STUDENT'S TEXT

UNIT NO. 56

MATHEMATICS FOR THE ELEMENTARY SCHOOL

BOOK 3

PART I

SCHOOL MATHEMATICS STUDY GROUP

School Mathematics Study Group

Mathematics for the Elementary School

Book 3

Unit 56

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Mathematics for the Elementary School

Book 3

Student's Text, Part I

REVISED EDITION

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Student's Text, Book 3

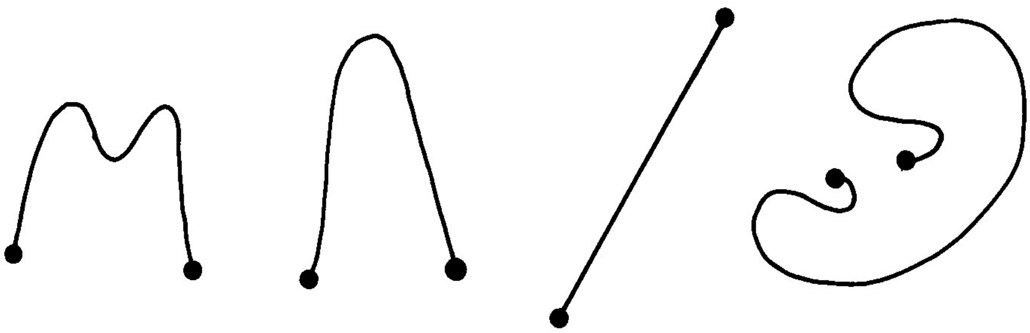
Points and Curves

1. Mark five points below.

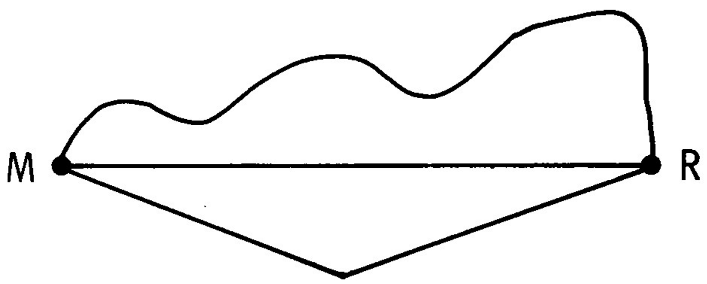
   Name them with the first five letters of the alphabet.

2. Mark a point on each curve.

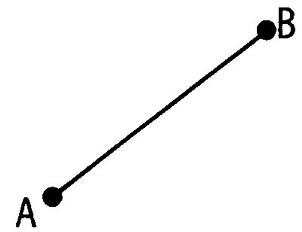
   Name each point with a different letter of the alphabet.



3. Put the letter P on the picture of the straight curve from M to R.

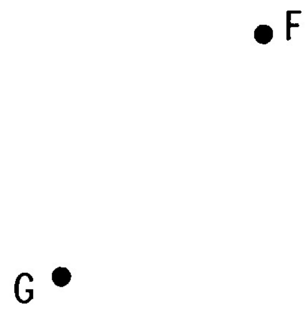


1. Here is a picture of a line segment.



Write a name for this line segment. ____________________

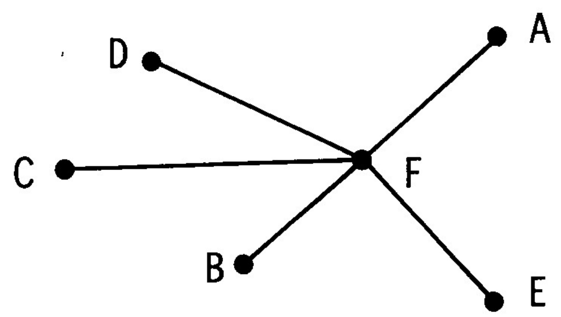
2. Draw a line segment with F and G as endpoints.



3. Write two names for the line segment above.

________ ________

4. Here are some line segments that have point F as an endpoint.



One line segment is named below.

Name four other line segments.

$\overline{AF}$ ________ ________ ________ ________

5. Draw two line segments that have point W as an endpoint.

Name these line segments $\overline{WX}$ and $\overline{WY}$.

Draw two more line segments that have W as an endpoint.

Name these line segments $\overline{WO}$ and $\overline{WP}$.

W

•

Can you draw more line segments with W as an endpoint? Yes No

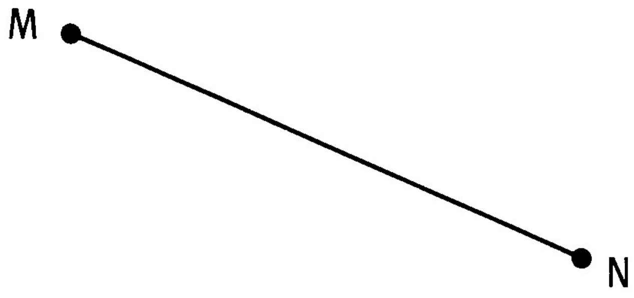
6. Below are two points, A and B.

Draw line segment $\overline{AB}$.

How many line segments can you draw that have the two endpoints A and B? ________________

7. Here is line segment $\overline{MN}$.

Mark two points on $\overline{MN}$. Name them O and T.



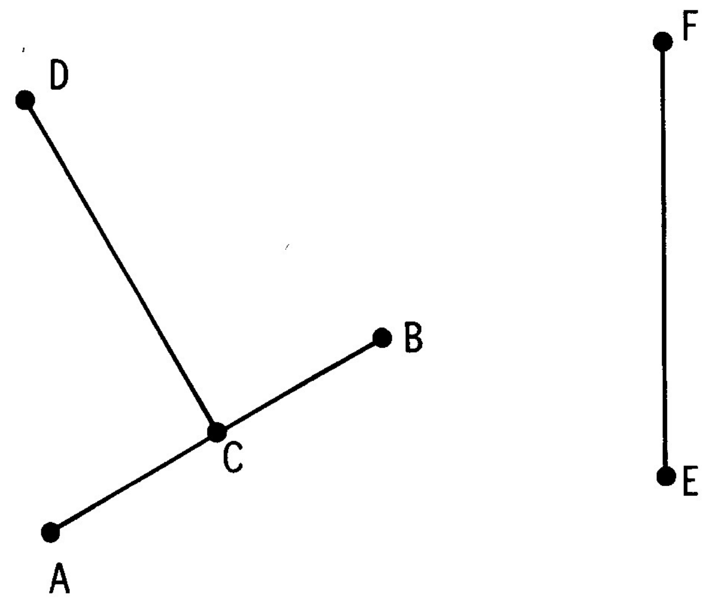
$\overline{MO}$ is one subset of $\overline{MN}$.

Name five other line segments that are subsets of line segment $\overline{MN}$.

$\overline{MO}$ ______ ______ ______ ______ ______

Congruence of Line Segments

1. Look at the segments below.

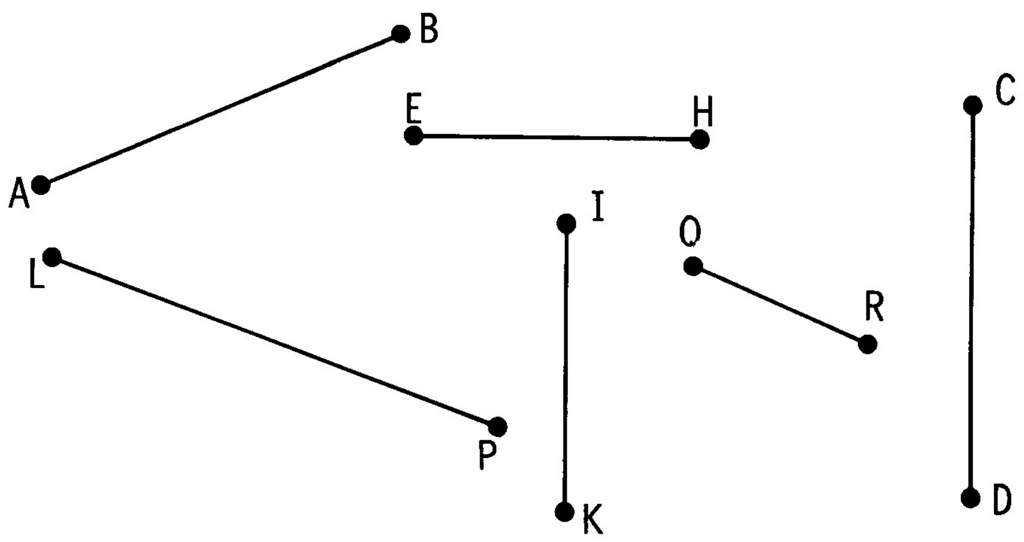


Do you think $\overline{AB}$ is congruent to $\overline{CD}$? Yes No

Compare $\overline{AB}$, $\overline{CD}$, $\overline{EF}$ and show below what you find.
Make a ring around the right answer.

$\overline{AB}$ is congruent to $\overline{CD}$.	Yes	No
$\overline{AB}$ is congruent to $\overline{EF}$.	Yes	No
$\overline{CD}$ is congruent to $\overline{EF}$.	Yes	No

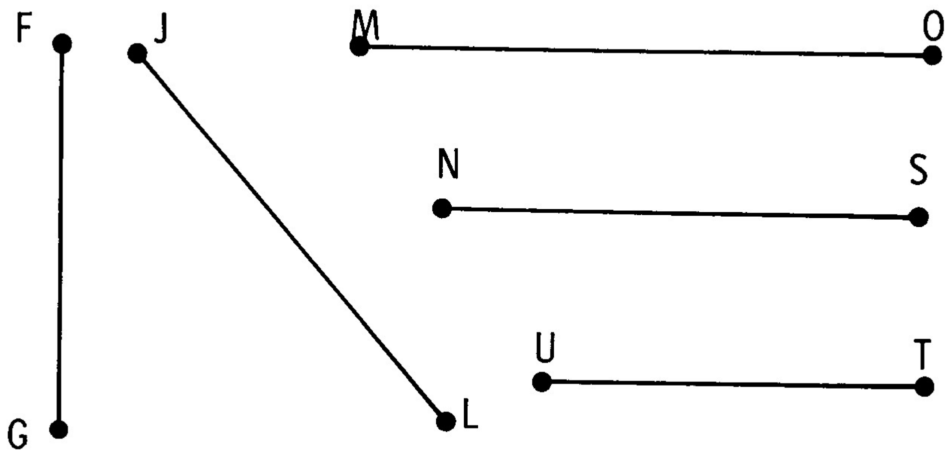
2.



$\overline{AB}$ is congruent to __________

$\overline{IK}$ is congruent to __________

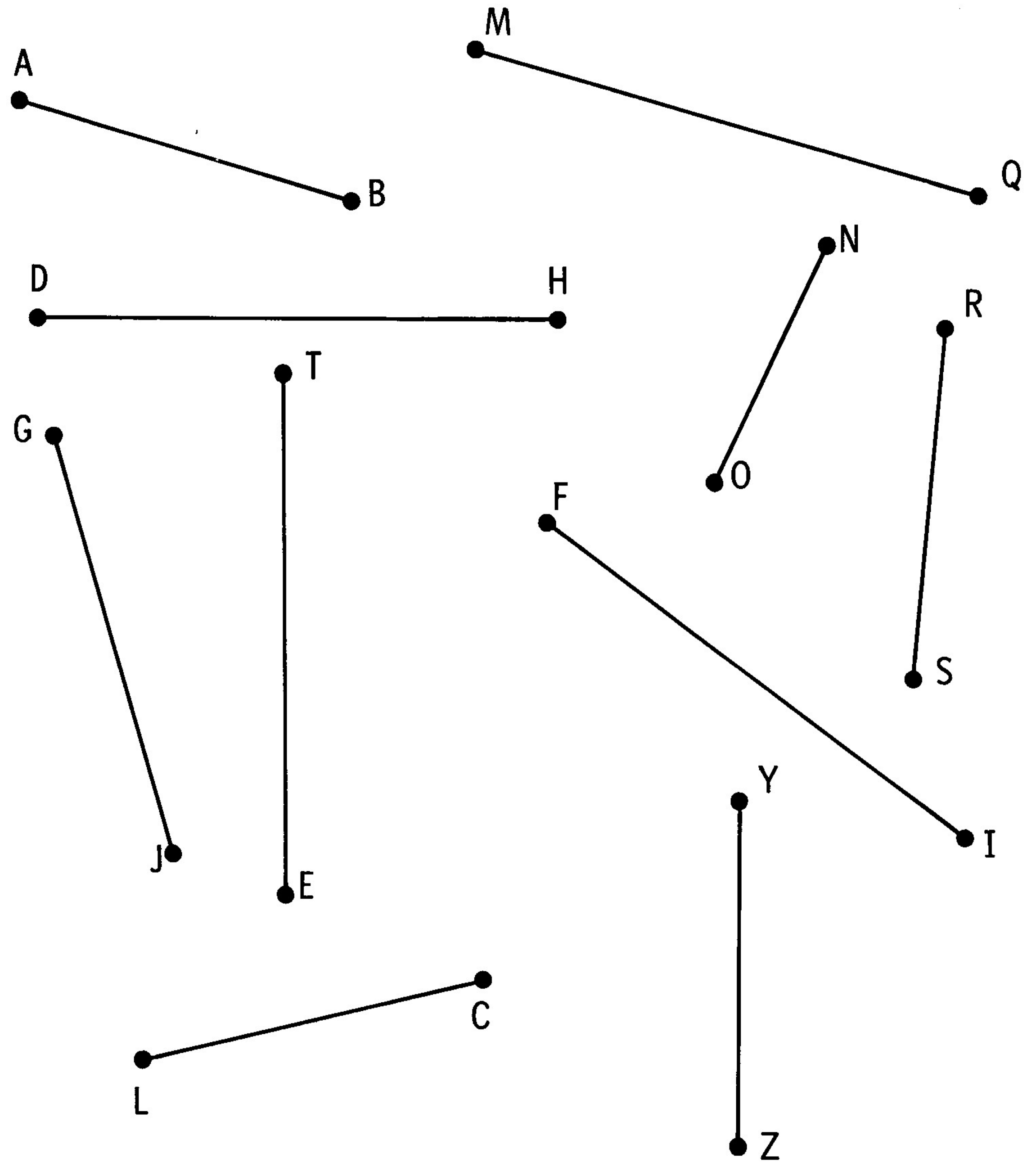
3.



__________ is congruent to __________.

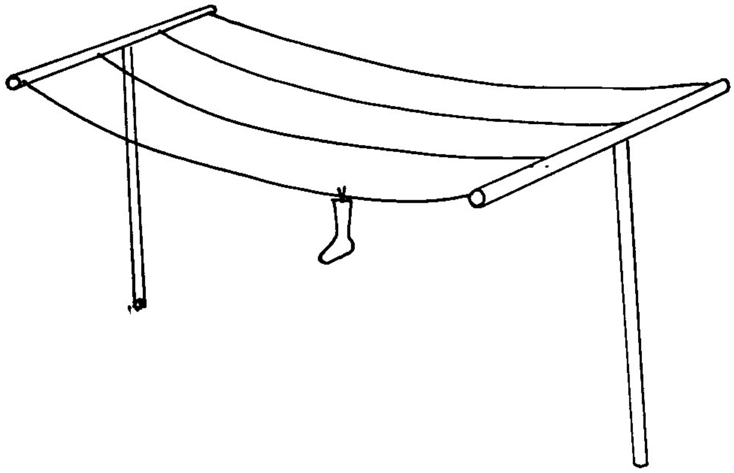
__________ is congruent to __________.

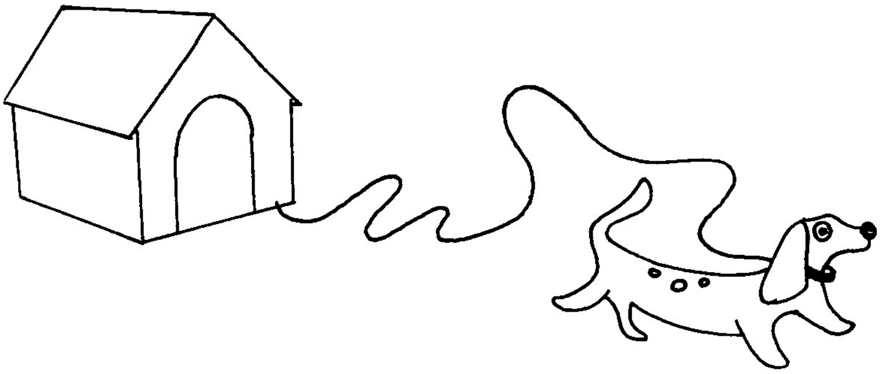
4.

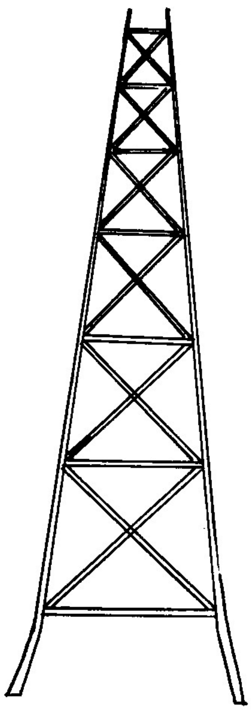


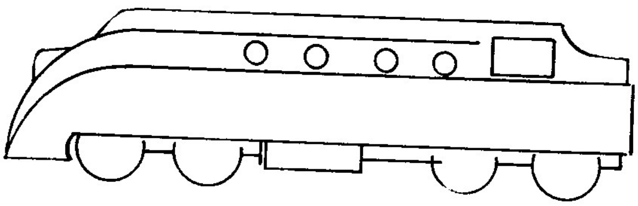
$\overline{AB}$ is congruent to _______, _______, and _______.

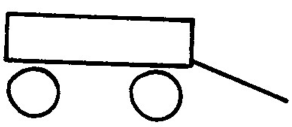
$\overline{MQ}$ is congruent to _______, _______, and _______.











Lines

1. Find the points E, C, A, B, D, and F named on the page.

   Draw $\overline{AB}$.

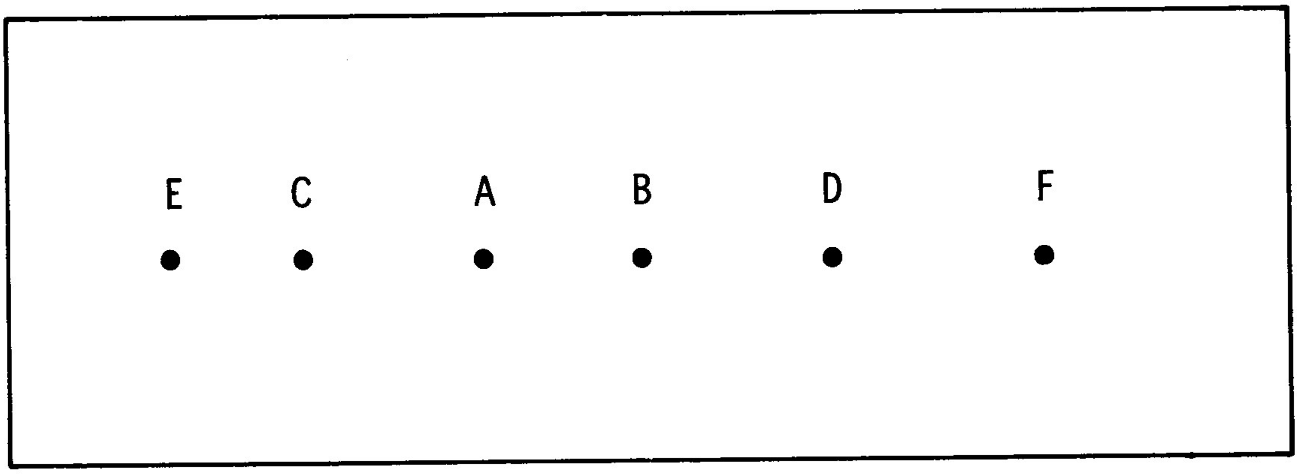
   Draw $\overline{CD}$. Is $\overline{AB}$ a subset of $\overline{CD}$? Yes No

   Draw $\overline{EF}$. The line segment $\overline{CD}$ is a subset of ________________.

   Draw $\overleftrightarrow{EF}$. Is $\overline{EF}$ a subset of $\overleftrightarrow{EF}$? Yes No

   Is $\overline{EF}$ a subset of $\overline{EF}$? Yes No

   Can you show all of $\overleftrightarrow{EF}$? Yes No



Some other names for $\overleftrightarrow{EF}$ are $\overleftrightarrow{CA}$, $\overleftrightarrow{AE}$, and $\overleftrightarrow{DF}$.

Write at least six other names below.

______ ______ ______ ______ ______ ______

2. The point R is named below.

Draw five different lines through point R.

Mark and name another point on each line.

• R

Name the lines you have drawn.

________ ________ ________ ________ ________

Can many more lines be drawn through R? Yes No

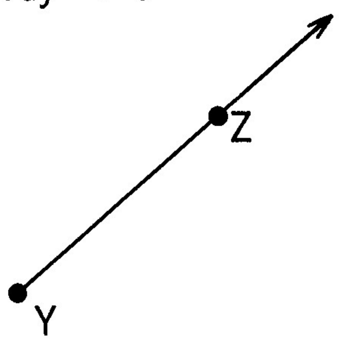
3. Mark two points below. Name them Q and Z.

Draw $\overleftrightarrow{QZ}$.

Can you draw a different line through Q and Z? Yes No

Rays

1. Here is a picture of ray $\overrightarrow{YZ}$.



Name two points on $\overrightarrow{YZ}$. ______ ______

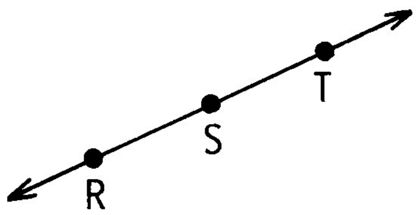
Name the endpoint of ray $\overrightarrow{YZ}$. ______

Is the endpoint named first? Yes No

Name a line segment in the picture. ________

Does $\overrightarrow{YZ}$ go on from $\overline{YZ}$ in one direction only? Yes No

2. Here is a picture of a line.

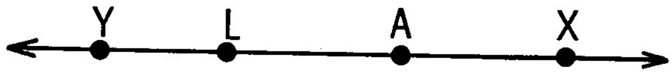


Name four rays on this line. ____ ____ ____ ____

Are the endpoints named first? Yes No

Is $\overrightarrow{RT}$ another name for $\overrightarrow{TR}$? Yes No

3. Here is another line.



How many rays on the line can have A as an endpoint? ________

Name three line segments on the line that have A as an endpoint. ______ ______ ______

4. Draw a ray. Name it $\overrightarrow{AB}$.

Is $\overline{AB}$ a subset of $\overrightarrow{AB}$? Yes No

Is $\overrightarrow{BA}$ another name for $\overrightarrow{AB}$? Yes No

5. Mark the letter T as shown to complete each sentence correctly.

A line segment has
one endpoint ____
two endpoints _T_
no endpoints ____

A ray has	A line has
one endpoint ____	one endpoint ____
two endpoints ____	two endpoints ____
no endpoints ____	no endpoints ____

6. The point Q is marked below.

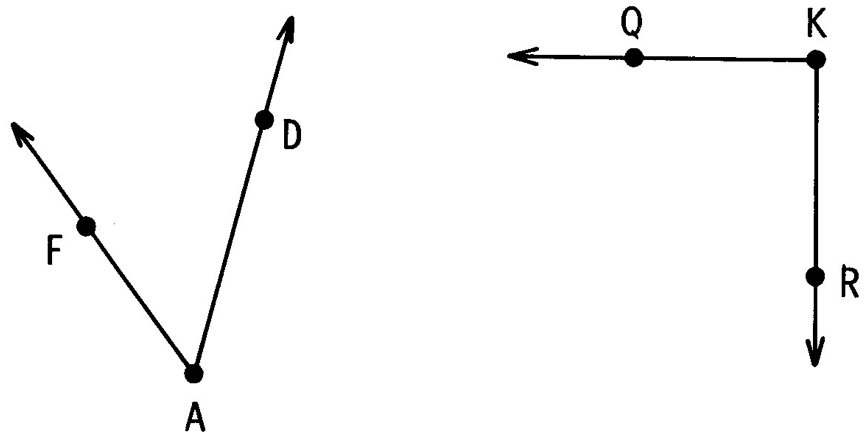
• Q

Draw five different rays above, each with endpoint Q.

1. Here are four rays.

   The rays are named $\overrightarrow{AF}$, $\overrightarrow{AD}$, $\overrightarrow{KQ}$, and $\overrightarrow{KR}$.

   These rays form two angles.



   Name the two angles. ________ ________

   Give two other names for $\angle FAD$ and $\angle QKR$. ______ ______

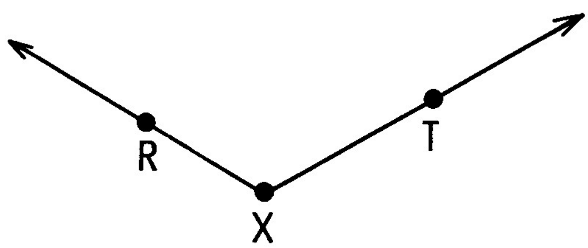
   The vertex of $\angle FAD$ is point A.

   Name the vertex of the other angle. ________

   Mark a point C between K and R on ray $\overrightarrow{KR}$.

   Now write two new names for $\angle QKR$. _____ _____

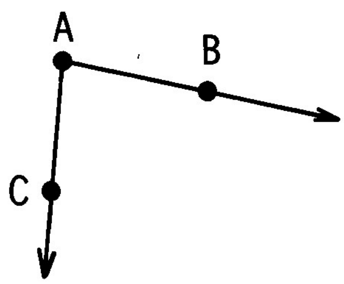
2. Here is another angle.



   Name this angle. ____________

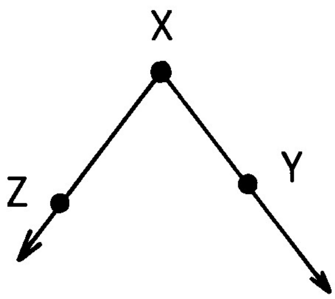
   Name its vertex. ____________

3. Name the vertex and the rays.



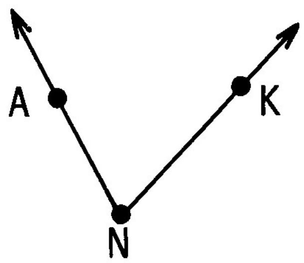
vertex ______

rays __________ __________



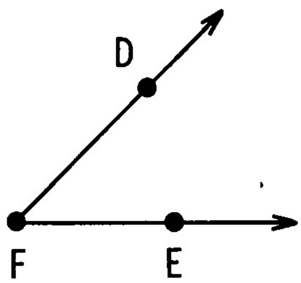
vertex ______

rays __________ __________



vertex ______

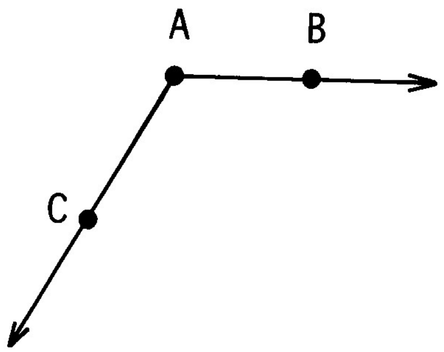
rays __________ __________

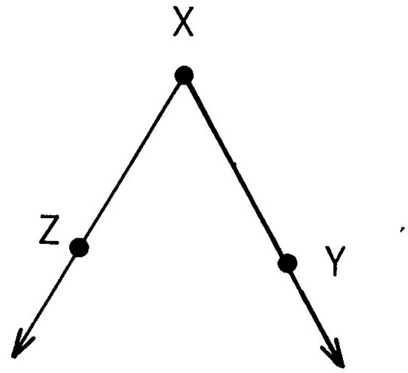


vertex ______

rays __________ __________

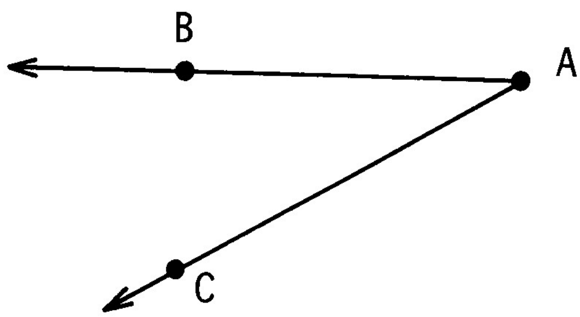
4. Write two names for each angle.





__________ __________ __________ __________

5. Below is a picture of $\angle BAC$.



Mark another point on $\overrightarrow{AB}$. Name it D.

Mark another point on $\overrightarrow{AC}$ and name it E.

Is $\overrightarrow{AB}$ the same ray as $\overrightarrow{AD}$? Yes No

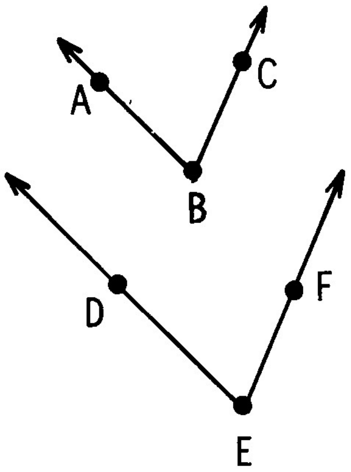
Is $\overrightarrow{AC}$ the same ray as $\overrightarrow{AE}$? Yes No

Is $\angle BAC$ the same angle as $\angle EAD$? Yes No

Is $\overline{BD}$ a subset of $\overrightarrow{AB}$? Yes No

Congruence of Angles

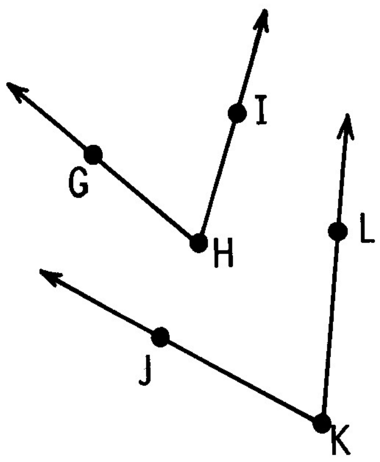
1.



Is $\angle ABC$ congruent to $\angle DEF$?

Yes No

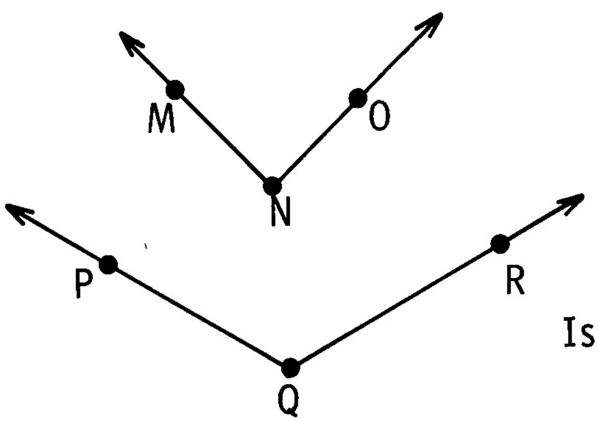
2.



Is $\angle GHI$ congruent to $\angle JKL$?

Yes No

3.

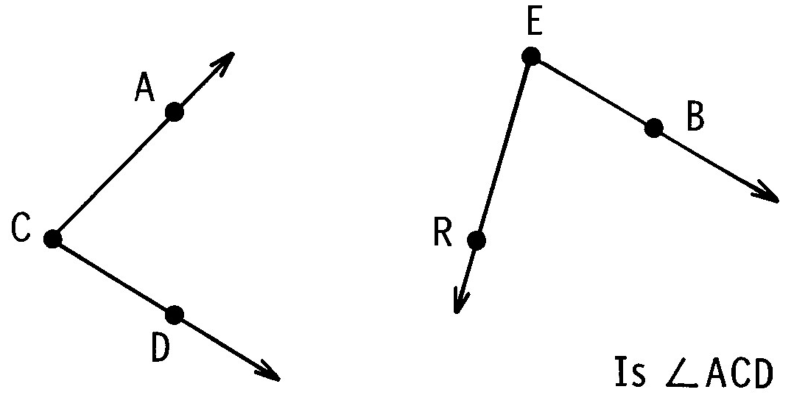


Is $\angle PQR$ congruent to $\angle MNO$?

Yes No

Congruence of Angles

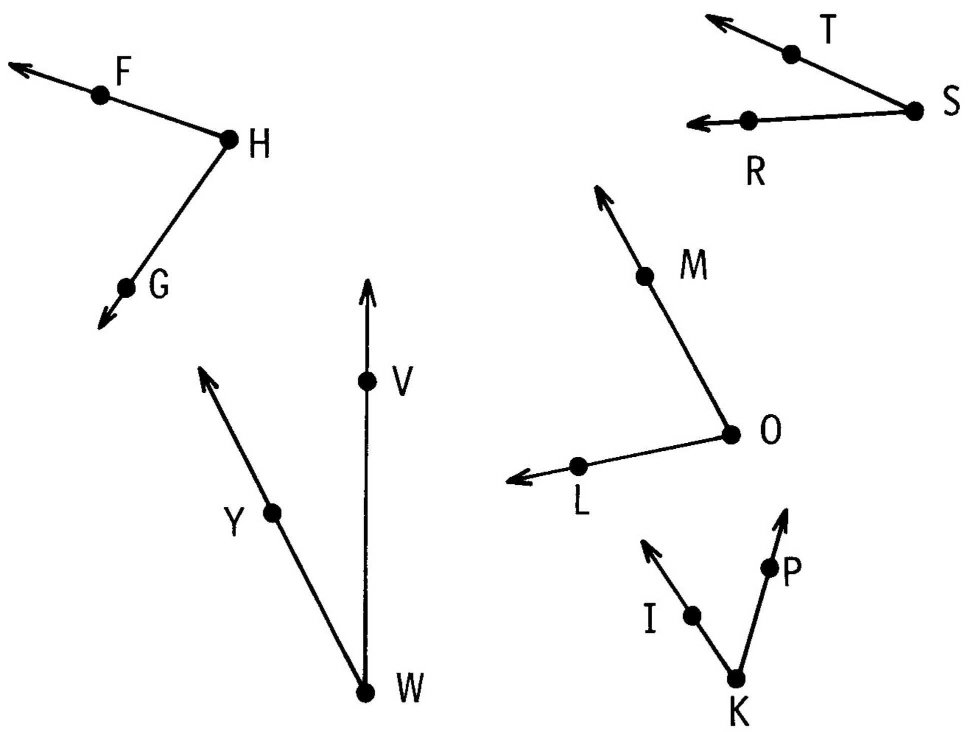
4.



Is $\angle ACD$ congruent to $\angle BER$?

Yes No

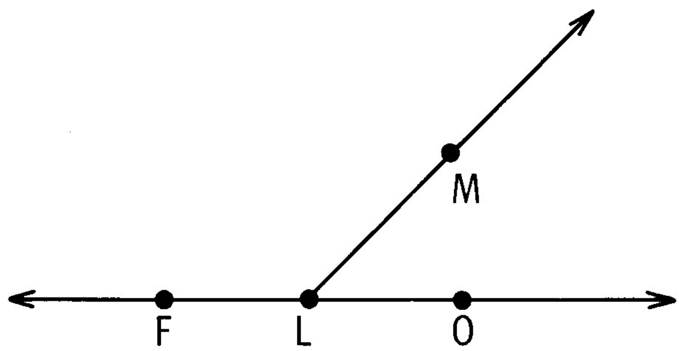
5.



$\angle$________ is congruent to $\angle$________.

$\angle$________ is congruent to $\angle$________.

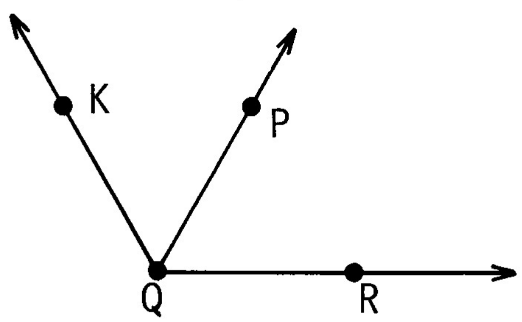
1. The points F, L, and O lie on a line.
   Make a tracing of one angle.
   Test to see if the angles are congruent.



Are ∠MLO and ∠MLF congruent angles? Yes No

Are ∠MLO and ∠MLF right angles? Yes No

2. Test ∠PQR and ∠PQK to see if they are congruent.

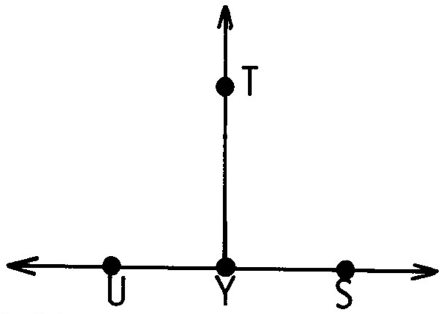


Are ∠PQR and ∠PQK congruent angles? Yes No

Do the points K, Q, and R lie on a line? Yes No

Are ∠PQR and ∠PQK right angles? Yes No

3. Test ∠TYS and ∠TYU to see if they are congruent.

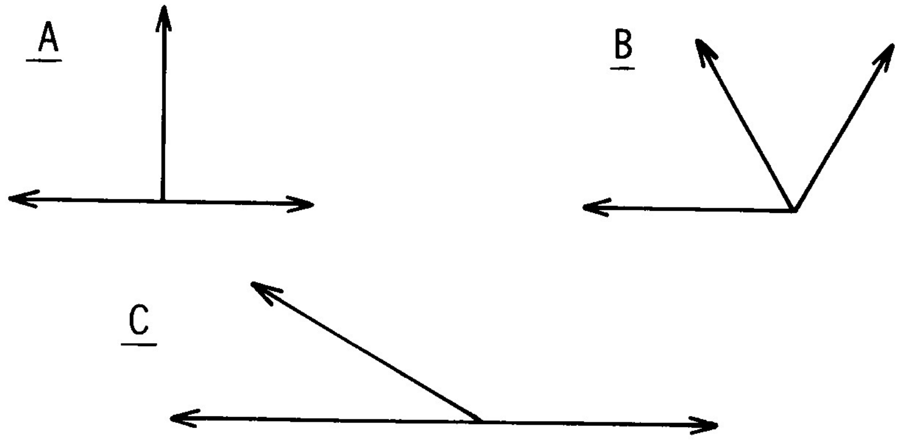


Are ∠TYS and ∠TYU congruent angles? Yes No

Do the points S, Y, and U lie on a line? Yes No

Are ∠TYS and ∠TYU right angles? Yes No

4. Here are three pairs of angles; the pairs are called A, B, and C.



Set B is one set of congruent angles.

Which other set looks like a pair of congruent angles? ________

Tell by looking which pair of angles could be right angles. ________

Tell by testing which other pair of angles are congruent. ________

Tell by testing which pair of angles are right angles. ________

Forming a Right Angle

5. Here is one way to form a right angle.

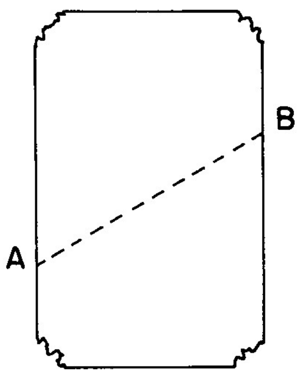
   Step 1--Think about folding the sheet along $\overline{AB}$.

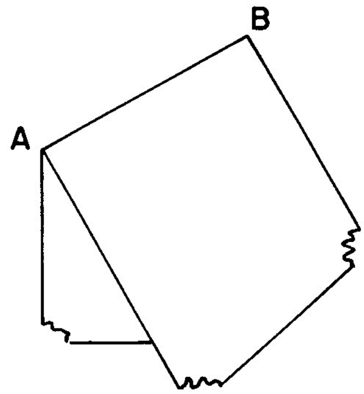
   Step 2--Crease $\overline{AB}$ to show the line segment $\overline{AB}$.

   Step 3--Think about folding the paper along $\overline{CD}$ so that endpoint B fits exactly on A.

   Step 4--Crease $\overline{CD}$ to show the line segment $\overline{CD}$.

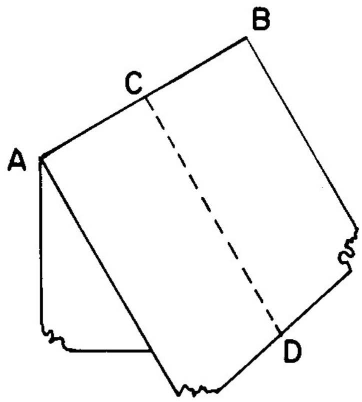
Step 1

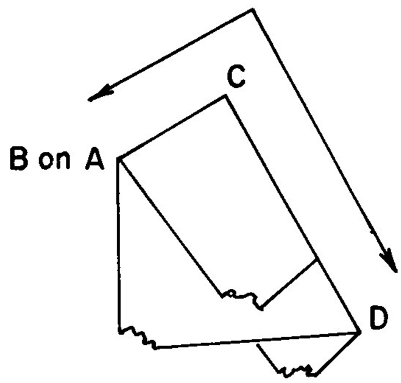




Step 2

Step 3





Step 4

Look at some of the curves and points we now have.

Segment $\overline{CA}$ is part of the ray ______ with endpoint C.

Ray $\overrightarrow{CA}$ and ray $\overrightarrow{CD}$ form a right angle.

The vertex of the right angle is __________.

Name the right angle. ________________.

6. We can use our right angle to draw other right angles.

   Below is ray $\overrightarrow{AB}$ with endpoint A.

   Place the vertex of your right angle on point A.

   Place one edge of your right angle along $\overrightarrow{AB}$.

   Draw along the other edge.

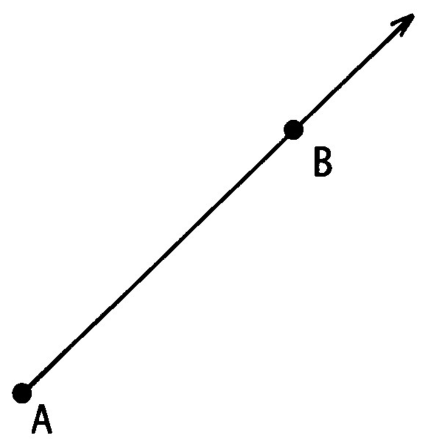
   Name this ray. ______________

   Name this right angle. ____________

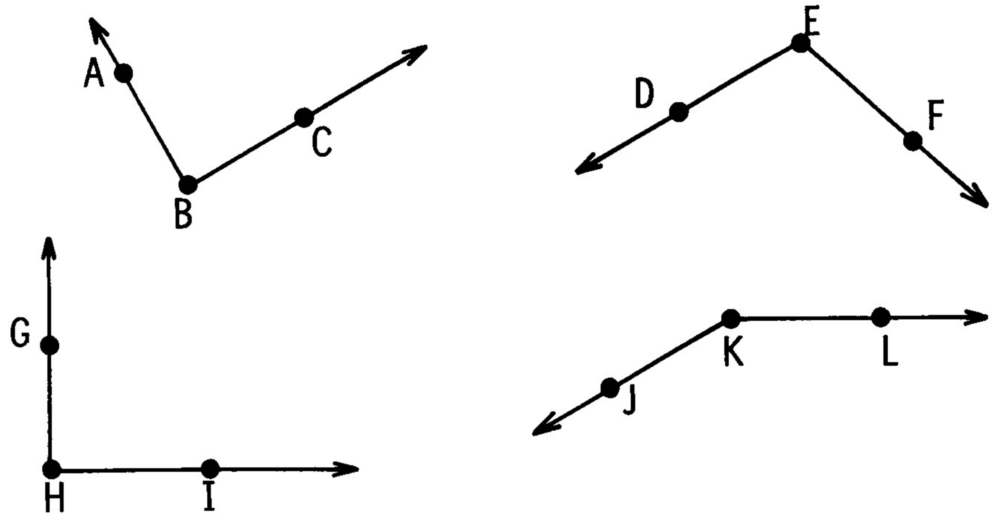
   Draw another right angle using $\overrightarrow{AB}$ and its endpoint A.

   Name this angle. ____________

   What kind of curve did you form with the two rays you drew? ________



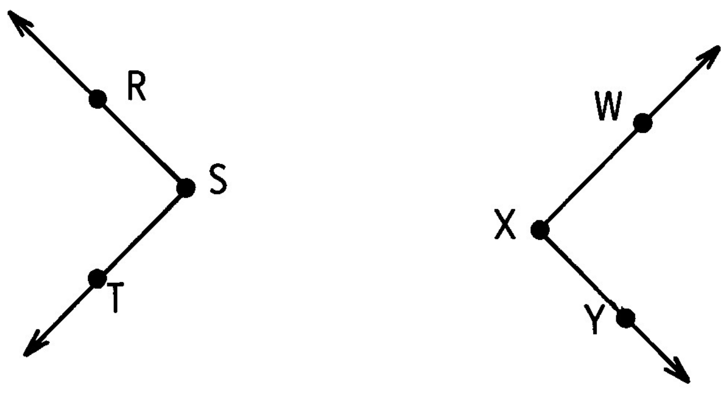
7. Test these angles to find the right angles.



_________ and _________ are right angles.

_________ is congruent to _________.

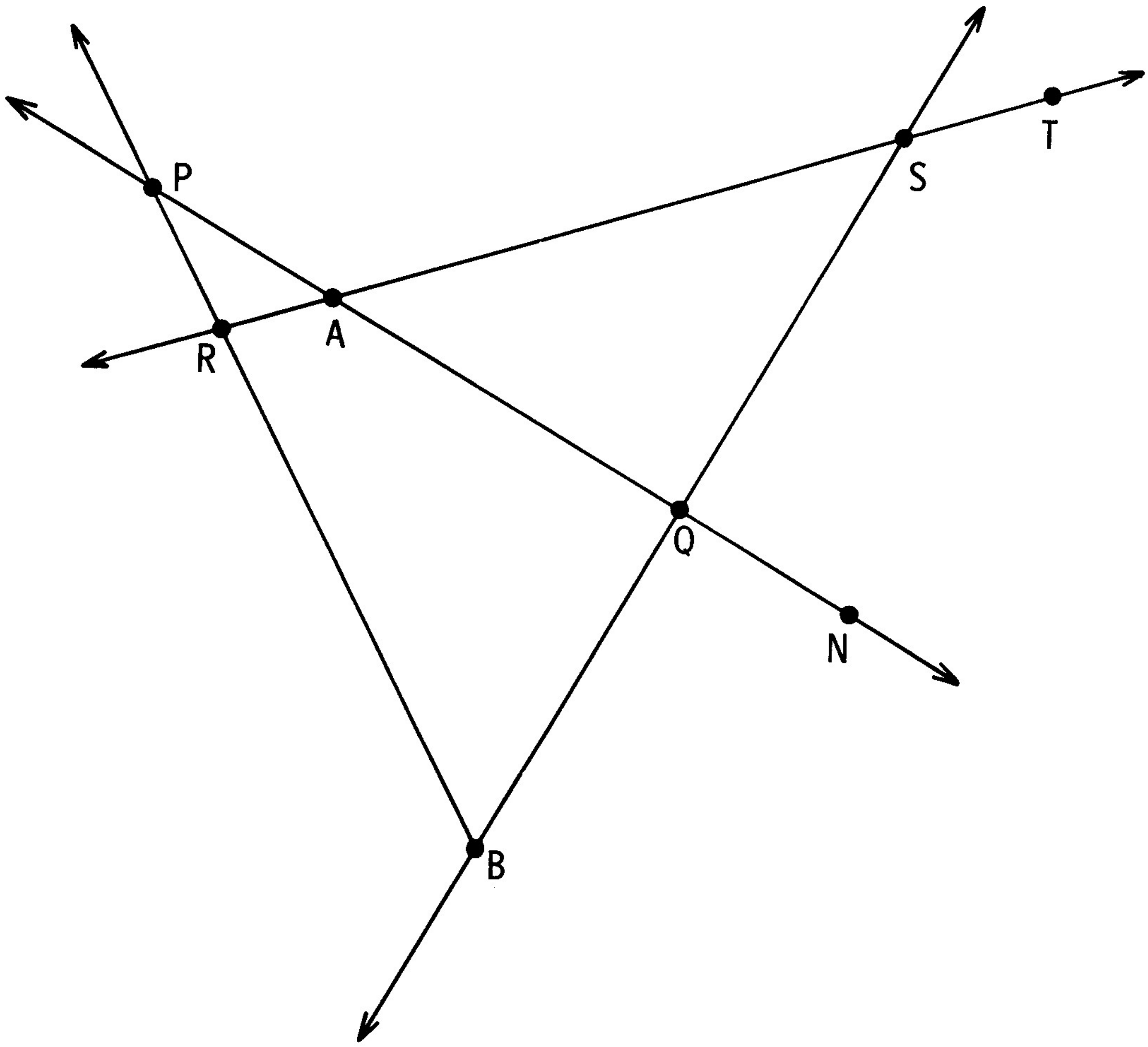
8. Use your angle to test if $\angle RST$ and $\angle WXY$ are right angles.



Is $\angle RST$ congruent to $\angle WXY$? Yes No

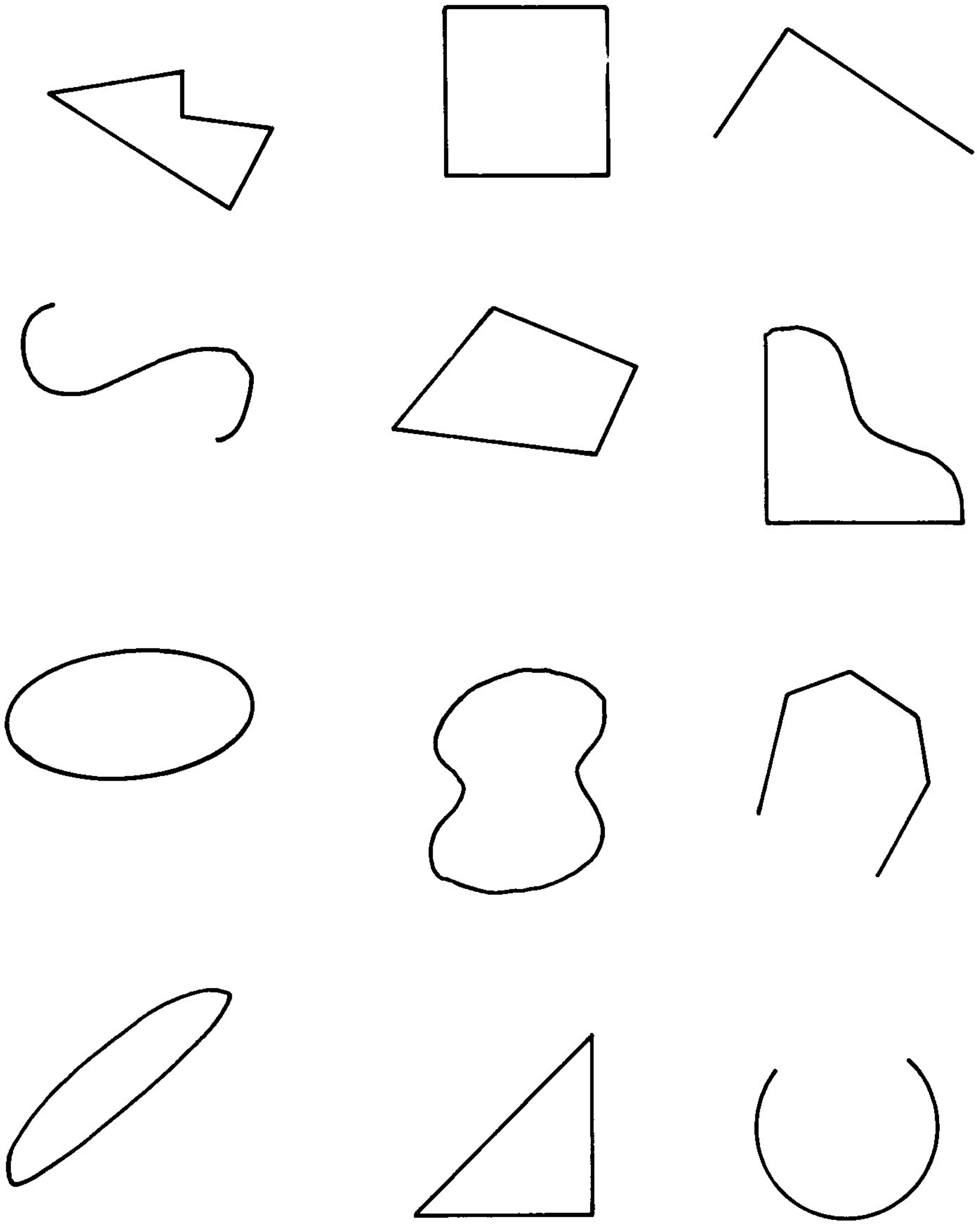
Do you think a right angle is always congruent to another right angle? Yes No

Review



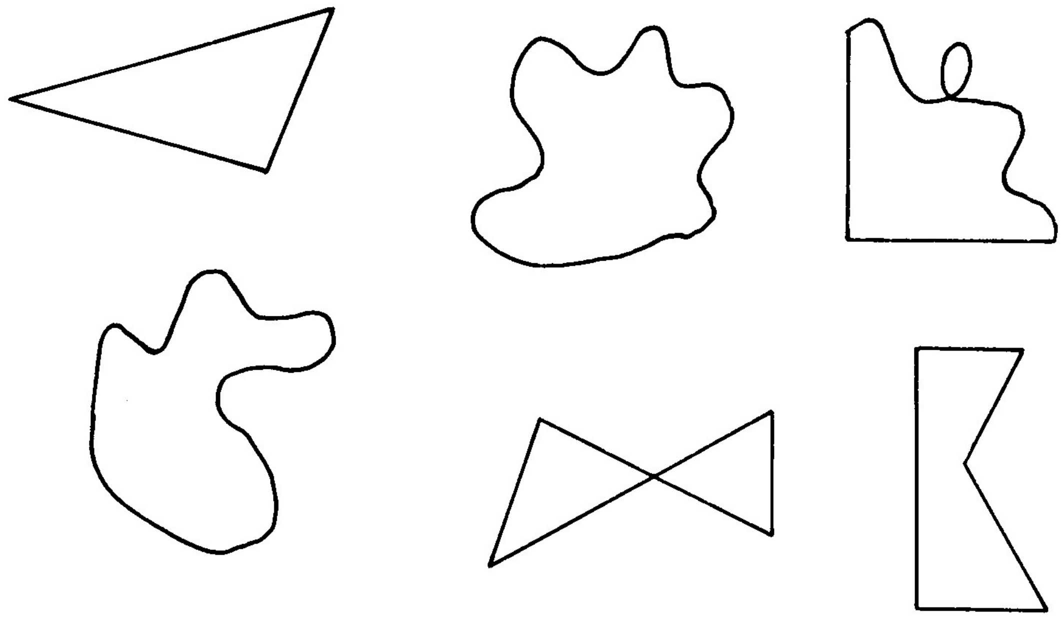
Closed Curves

Mark an X on each closed curve.



Simple Closed Curves

1. Mark an X on each simple closed curve.



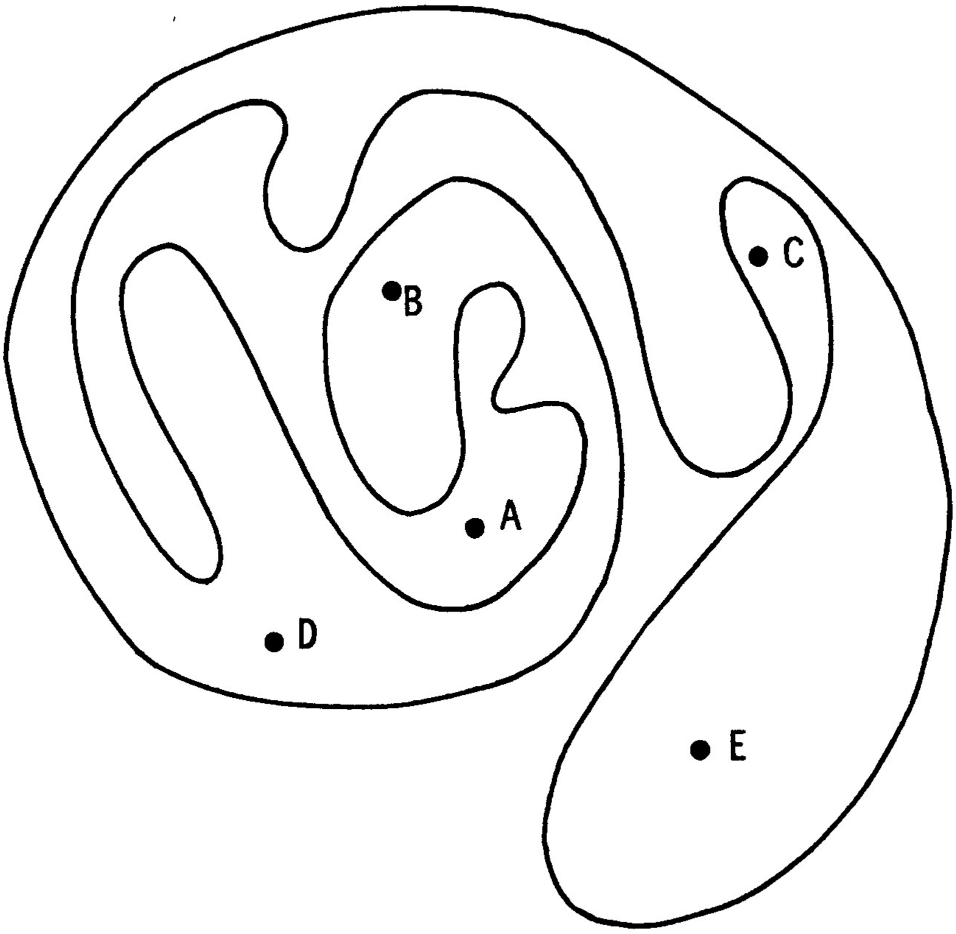
2. Draw a closed curve which is not simple.

Mark a point where this curve crosses itself.

Color a simple closed curve that is a subset of your curve.

Simple Closed Curves

3.



Is the curve a simple closed curve? Yes No

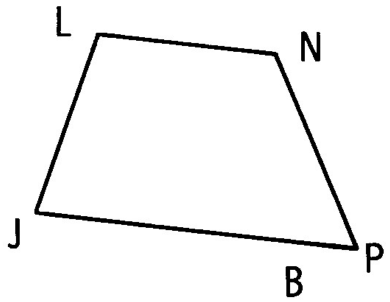
Look at points A, B, C, D, E.

Write names of points which are inside the curve. ____ ____ ____

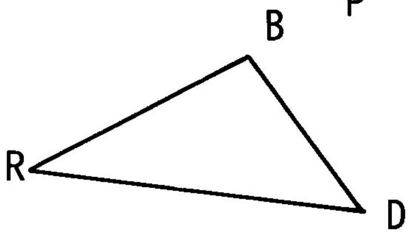
Write names of points which are outside the curve. ____ ____

1. Here are pictures of different polygons.

   Use your pencil to connect each polygon with its name.



Triangle



Quadrilateral

Name three line segments on the triangle. ____ ____ ____

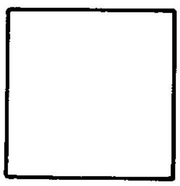
Name each vertex of the triangle. ____ ____ ____

Name the sides of the quadrilateral. ____ ____ ____ ____

Name each vertex of the quadrilateral. ____ ____ ____ ____

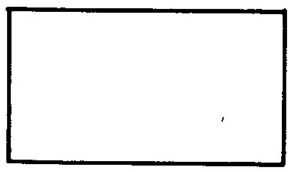
2. Two quadrilaterals are shown below.

   Connect them with their special names.

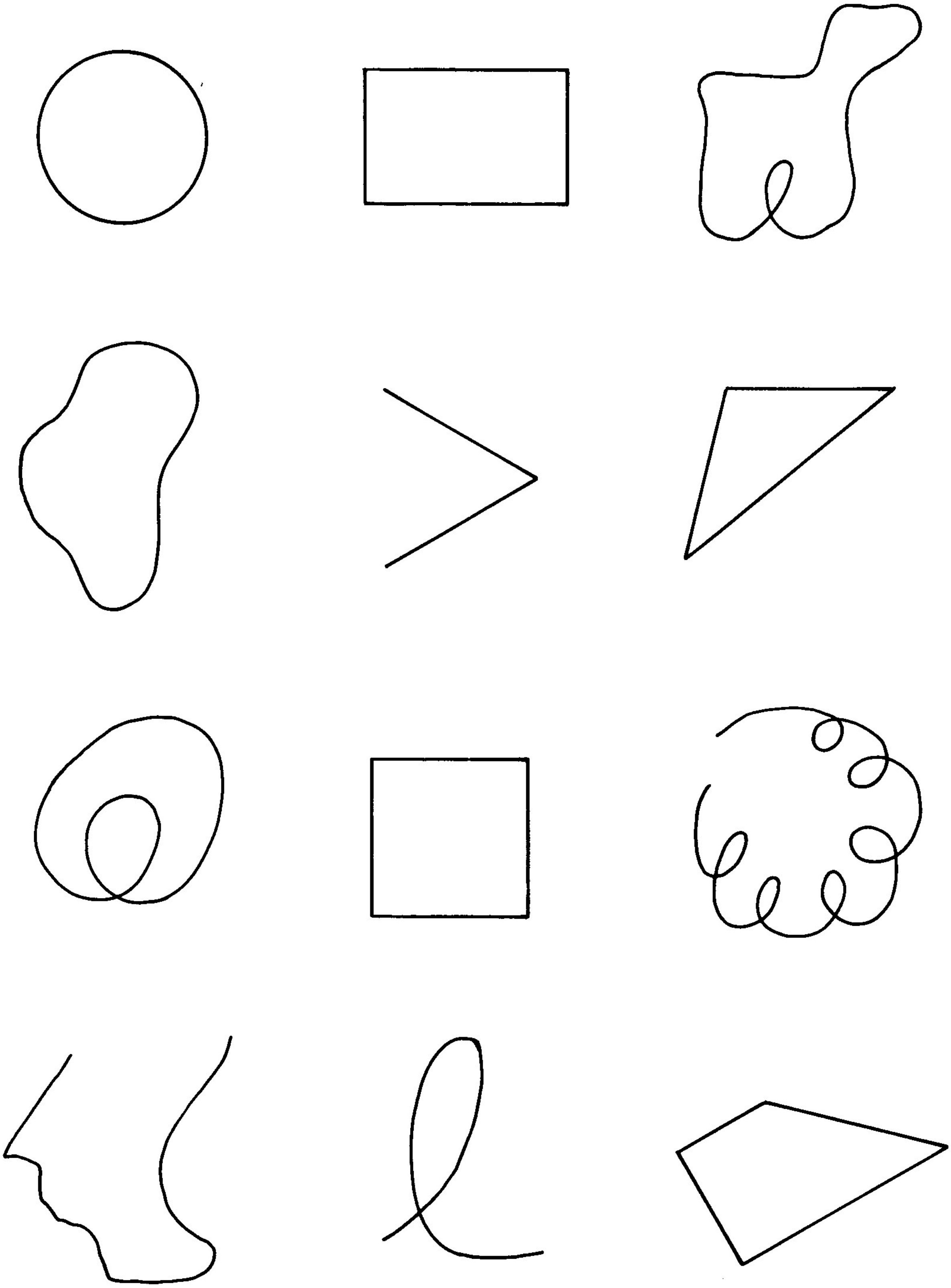


Square

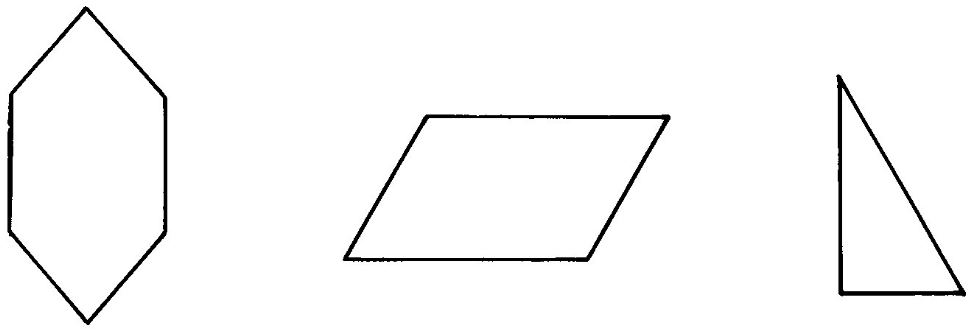
Rectangle



Review



1. These simple closed curves are unions of line segments.



These kinds of curves are called ____________________.

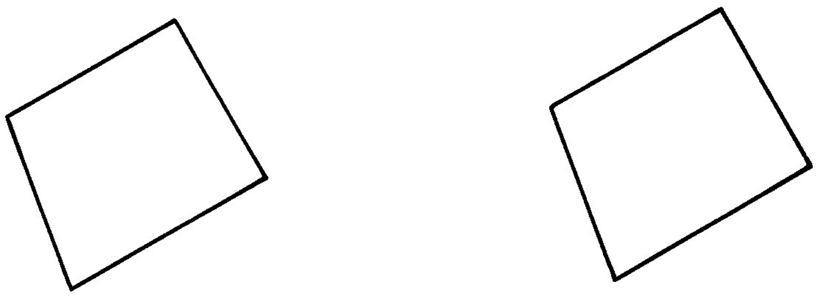
Can any of these polygons fit on each other exactly? Yes No

Do you think polygons can be congruent when they do not have the same number of sides? Yes No

2. Two quadrilaterals are shown here.

Make a tracing of one curve.

Test to see if the sides and angles of the tracing fit exactly on the sides and angles of the other curve.



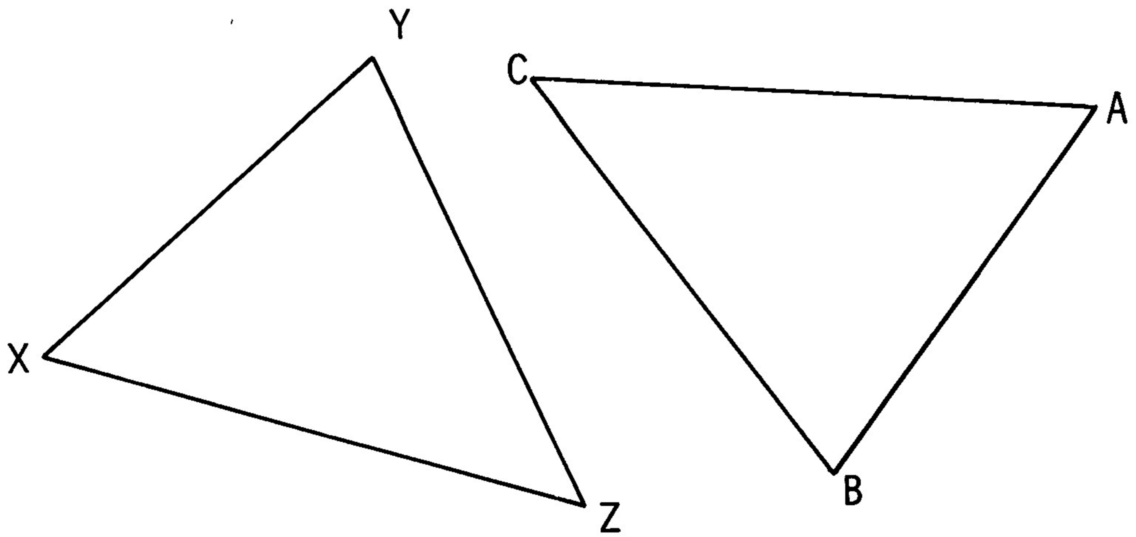
Do the sides fit exactly? Yes No

Do the angles fit exactly? Yes No

Are the curves congruent? Yes No

Congruence of Polygons

3. These triangles are named $\triangle XYZ$ and $\triangle ABC$.



Do you think the triangles are congruent? Yes No

Make a tracing of $\triangle XYZ$.

Mark the points X, Y, Z on the tracing.

Can you fit the tracing of $\triangle XYZ$ on $\triangle ABC$ without turning it? Yes No

If you turn the tracing, can it fit on $\triangle ABC$? Yes No

Line segment $\overline{XY}$ is congruent to ________.

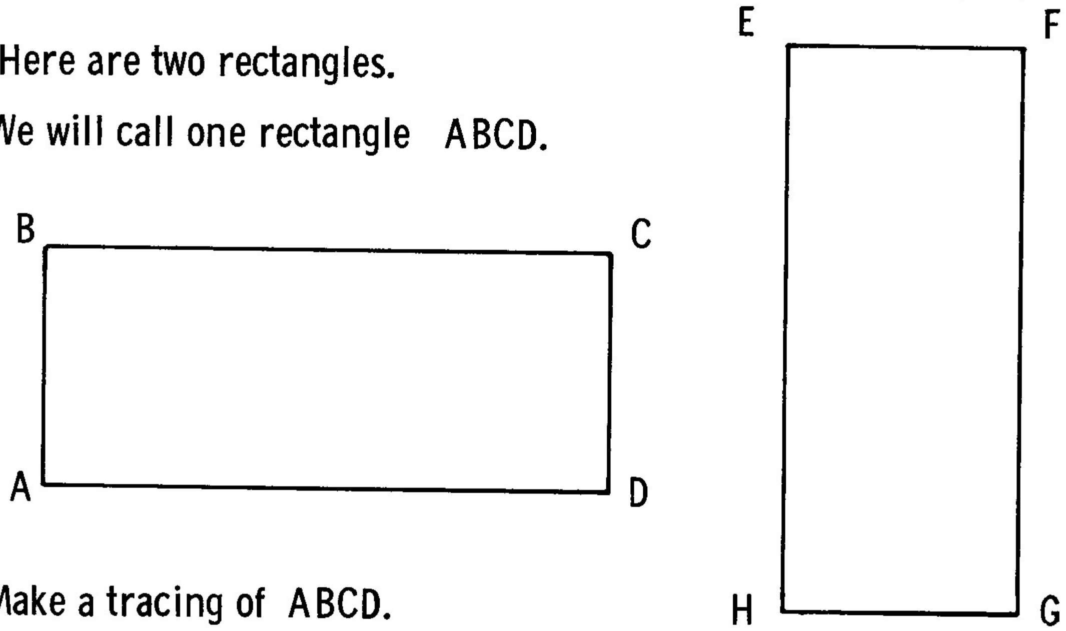
Line segment $\overline{YZ}$ is congruent to ________.

Line segment $\overline{XZ}$ is congruent to ________.

Is $\triangle XYZ$ congruent to $\triangle ABC$? Yes No

4. Here are two rectangles.

   We will call one rectangle ABCD.



Make a tracing of ABCD.

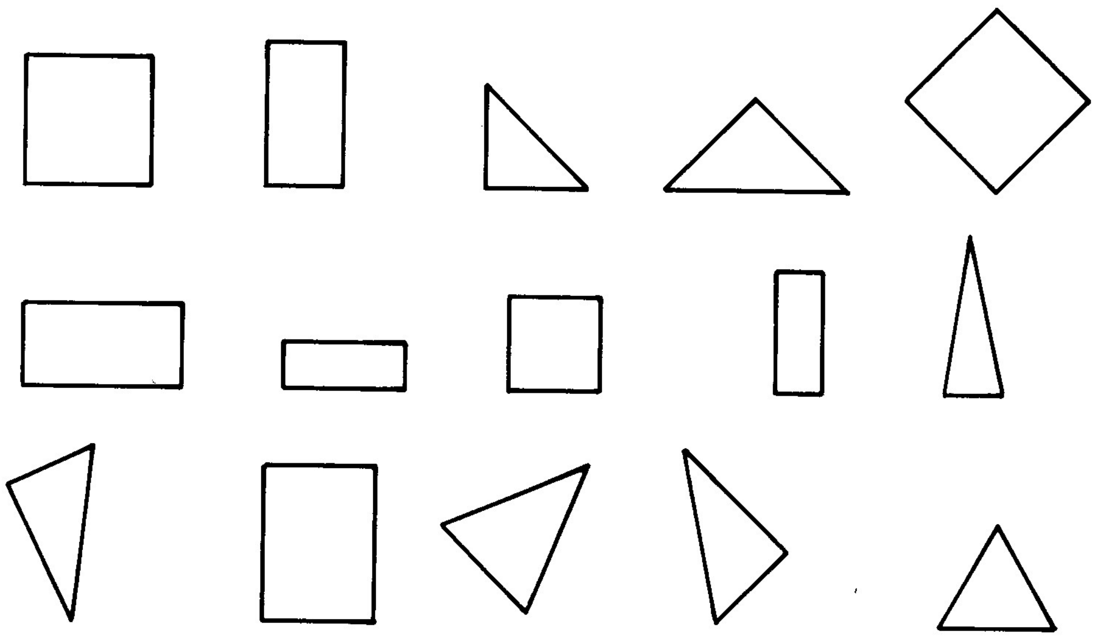
Test to see if the tracing fits exactly on EFGH.

Do the line segments fit exactly? Yes No

Do you need to test the angles for congruence? Yes No

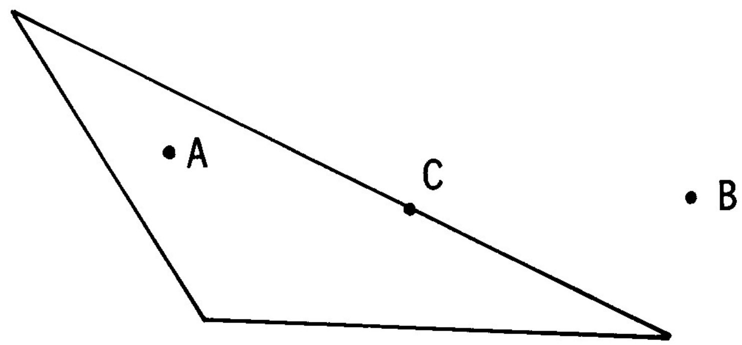
Is ABCD congruent to EFGH? Yes No

5. Put a cross in the two congruent figures in each row.



Inside, On, and Outside

1. A polygon with three sides is called a triangle.

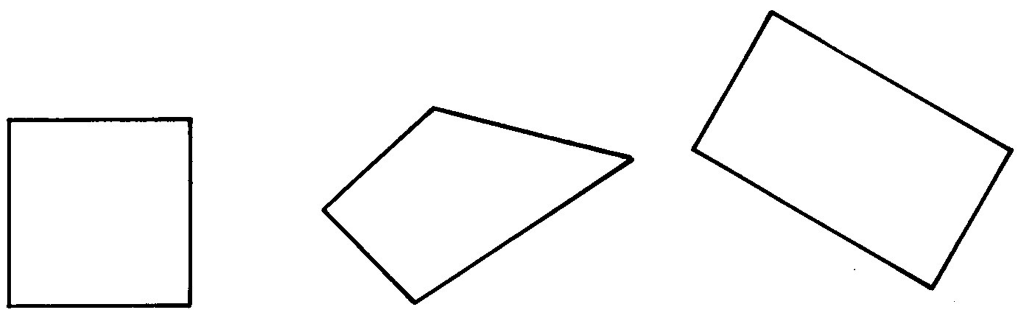


Name a point inside the triangle. ____________

Name a point on the triangle. ______________

Name a point outside the triangle. ___________

2. Polygons with four sides are called quadrilaterals.



Write 1 in the rectangle that is not a square.

Write 2 inside the square.

Write 3 just outside each quadrilateral.

Mark X on each rectangle.

Interior and Exterior

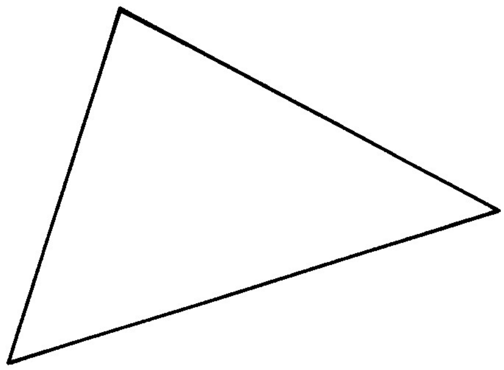
1.

Mark a point J in the interior of this curve.

Mark a point C on the curve.

Mark a point D in the exterior of the curve.

2. Here is a triangle.



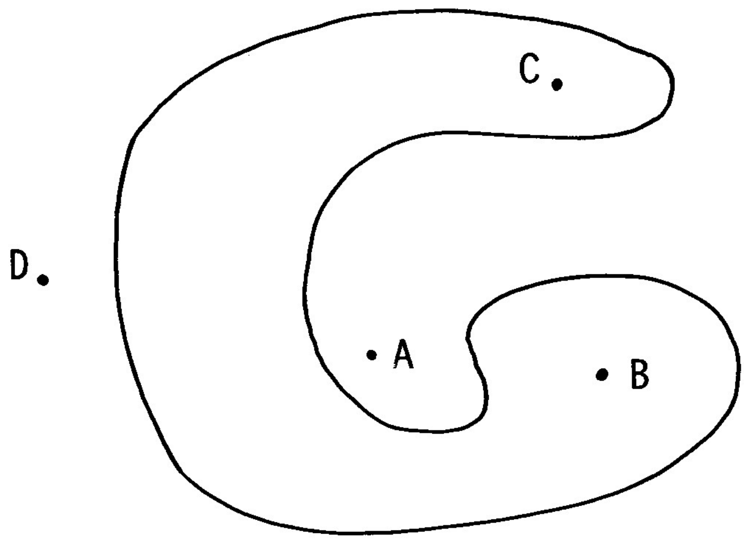
Color the triangle, but not its interior.

Color the interior using another color.

Interior and Exterior

3. Name two points in the interior of this figure. __________

   Name two points in the exterior of this figure. __________



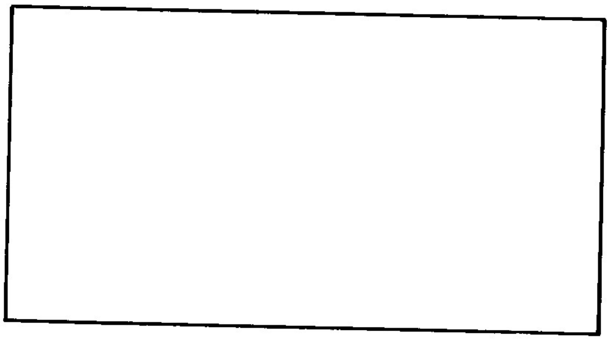
Without crossing the figure, can you draw a curve

from A to B?	Yes	No
from A to C?	Yes	No
from A to D?	Yes	No
from B to C?	Yes	No
from B to D?	Yes	No
from C to D?	Yes	No

Can any curve in a plane pass from the interior of a simple closed curve to its exterior without crossing the curve? Yes No

Regions

1. Here is a rectangle.



Color the curve.

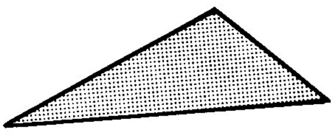
Color the interior using a different color.

When we think of a curve and its interior, we call the figure a <u>region</u>.

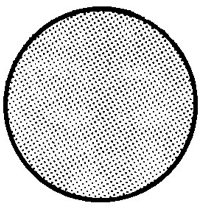
2. Below are several regions and names for regions.

Regions will be shaded in this book.

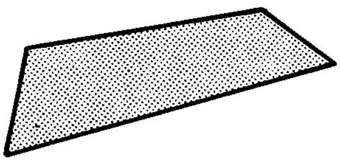
Pair each region with its correct name.



Quadrilateral region



Circular region



Triangular region

Regions

3\. Draw a triangle.

Color the triangle yellow.

Color the interior of the triangle red.

The region shown is a triangular region.

4\. Draw $\overline{AD}$, $\overline{DB}$, $\overline{CB}$, and $\overline{AC}$.

Underline the correct names for the figure you drew.

(1) a simple closed curve

(2) a polygon

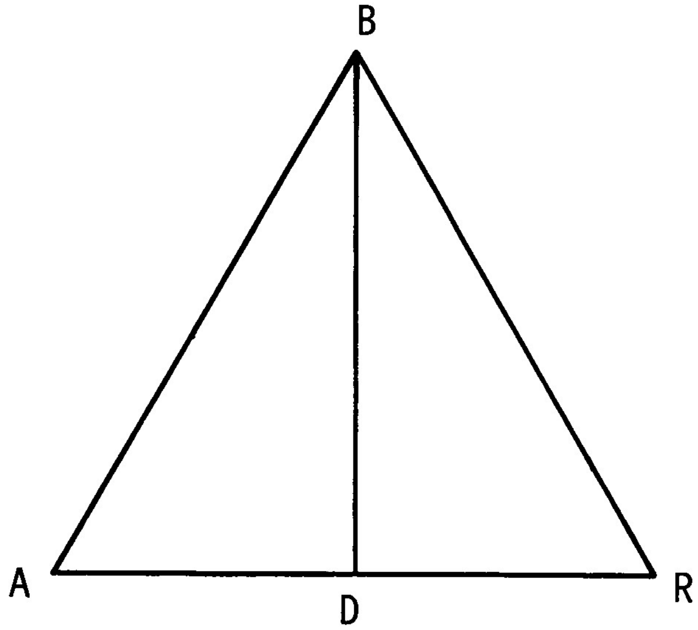
(3) a triangle

(4) a quadrilateral

(5) a quadrilateral region

Right Triangles

Here are triangle ABR and line segment $\overline{BD}$.



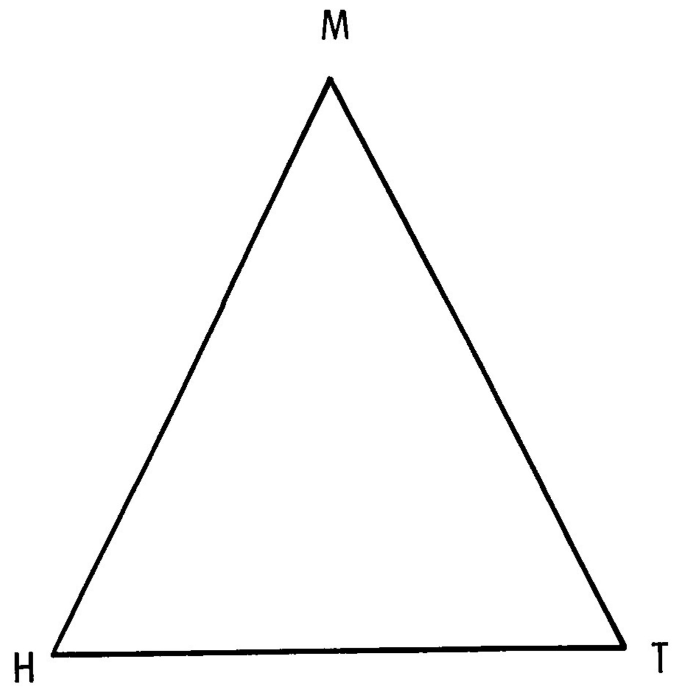
Are $\angle$BDA and $\angle$BDR congruent? Yes No

Are $\angle$BDA and $\angle$BDR right angles? Yes No

Name two right triangles. ________ ________

Are these right triangles congruent? Yes No

Isosceles Triangles



1. Is $\overline{HM}$ congruent to $\overline{MT}$? Yes No

   How many congruent sides does $\triangle$ HMT have? ________

   Is $\triangle$ HMT an isosceles triangle? Yes No

2. Make a tracing of $\triangle$ HMT.

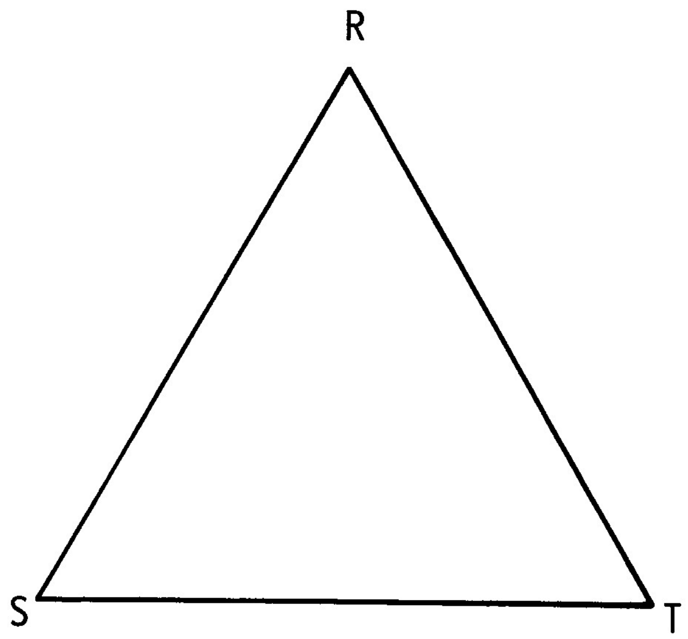
   Fold it so that the tracings of $\overline{MH}$ and $\overline{MT}$ fit on each other.

   Is $\angle$ MHT congruent to $\angle$ MTH? Yes No

   How many congruent angles does $\triangle$ HMT have? ________

3. An isosceles triangle has ________ congruent sides and ________ congruent angles.

Equilateral Triangles

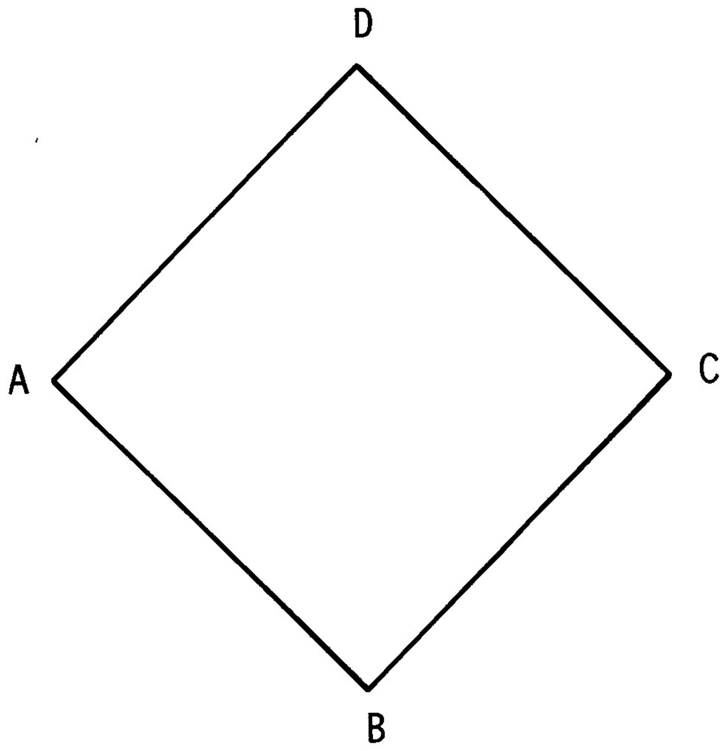


Mark off $\overline{RS}$ on the edge of a sheet of paper.

Is your copy of $\overline{RS}$ congruent to $\overline{RT}$?	Yes	No
Is $\triangle RST$ an isosceles triangle?	Yes	No
Is your copy of $\overline{RS}$ also congruent to $\overline{ST}$?	Yes	No
Are the three sides of this triangle congruent?	Yes	No

The special kind of isosceles triangle with all three sides congruent is called an <u>equilateral</u> <u>triangle.</u>

Is an equilateral triangle always an isosceles triangle? Yes No



1. Figure ABCD is a square.

   Draw $\overline{AC}$.

   Name the two triangles you see. ________ ________

   Is $\triangle ACD$ an isosceles triangle? Yes No

   Name its congruent sides. ________ and ________

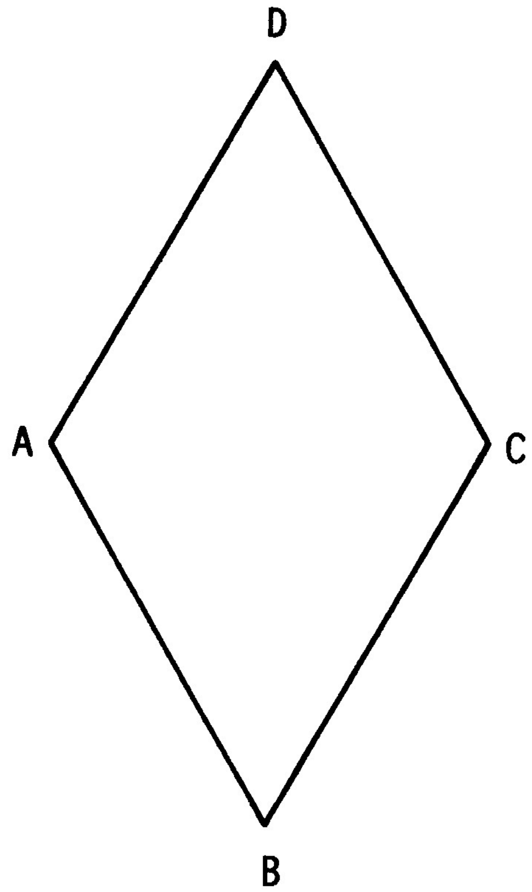
   Is $\triangle ACD$ a right triangle? Yes No

   Is $\triangle ACD$ an isosceles right triangle? Yes No

   Is $\triangle ACD$ an equilateral triangle? Yes No

   Do you think $\triangle ACD$ and $\triangle ACB$ are congruent? Yes No

Review

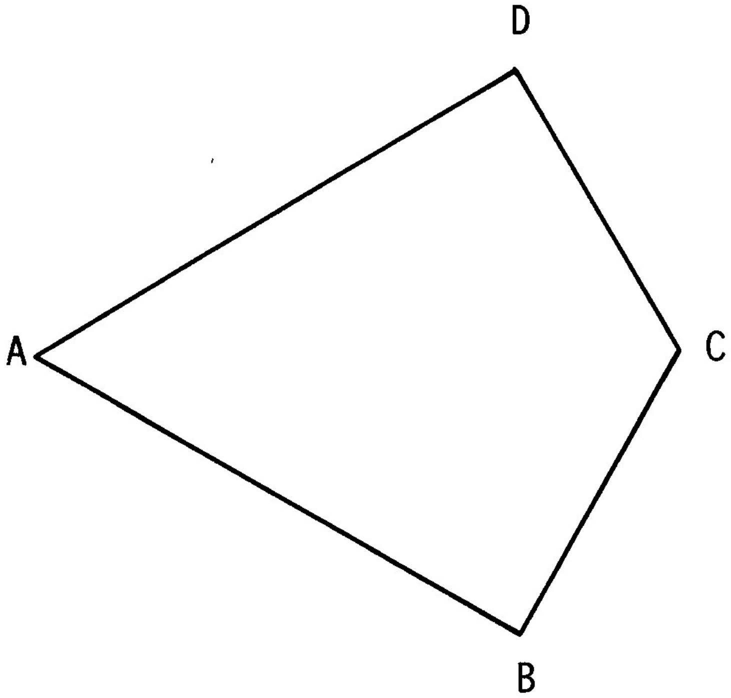


2. Look at quadrilateral ABCD.

Draw $\overline{AC}$.

Is $\triangle ACD$ isosceles?	Yes	No
Is $\triangle ACD$ a right triangle?	Yes	No
Is $\triangle ACD$ equilateral?	Yes	No
Is $\triangle ACB$ equilateral?	Yes	No
Are $\overline{AB}$, $\overline{BC}$, $\overline{CD}$, and $\overline{DA}$ congruent?	Yes	No
Is ABCD a square?	Yes	No

Review

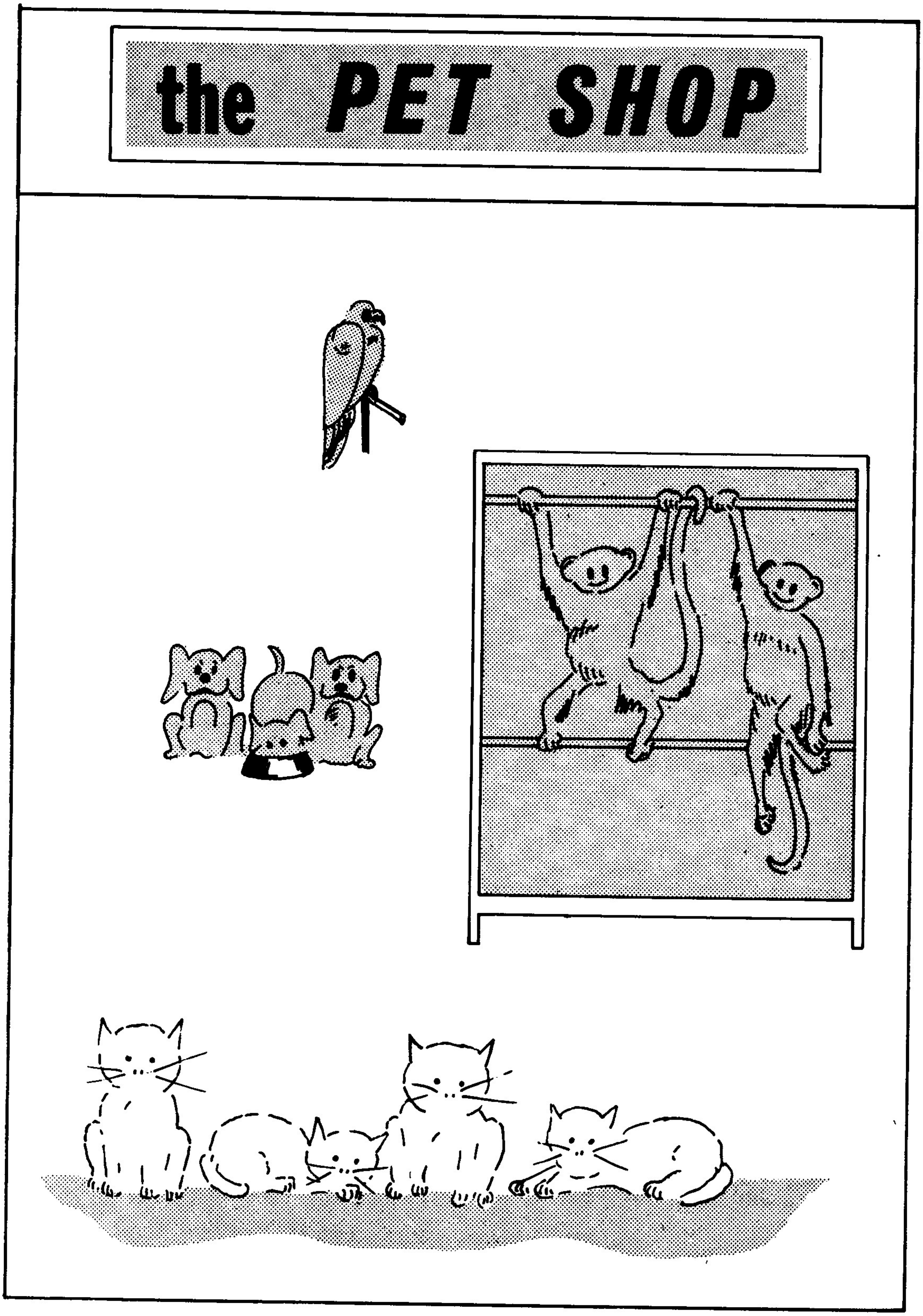


3. Look at quadrilateral ABCD.

Is $\angle ADC$ a right angle?	Yes	No
Is $\angle ABC$ a right angle?	Yes	No

4. Draw AC above.

Is $\triangle ADC$ a right triangle?	Yes	No
Is $\triangle ADC$ isosceles?	Yes	No
Is $\triangle ADC$ congruent to $\triangle ABC$?	Yes	No


the PET SHOP

Subsets

GIRL	APPLE	GREEN	BANANA
BLUE	GRAPE	BABY	PURPLE
GRASS	BOOK	PLATE	BLACK

Set A

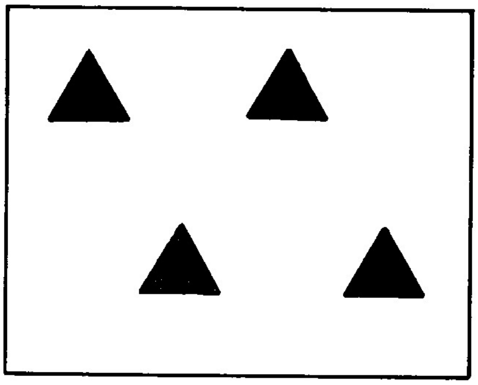
1. The words in the box that begin with <u>a</u> are a subset of Set A.
   List the members of this subset. ____________________
2. The words that begin with <u>b</u> are also a subset of Set A.
   List the members of this subset. ____________________

   ____
3. Ring the words that begin with <u>p</u>. How many members in this subset? ____________________
4. Describe the subset whose members are words that begin with <u>z</u>.

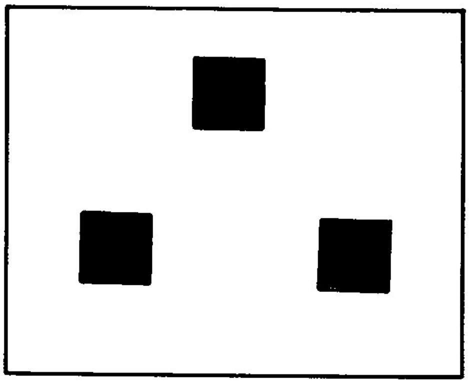
   ____
5. Ring the words that begin with <u>gr</u>. How many members in this subset? ______________
   List the members. ____________________

   ____

Union of Sets



Set A



Set B

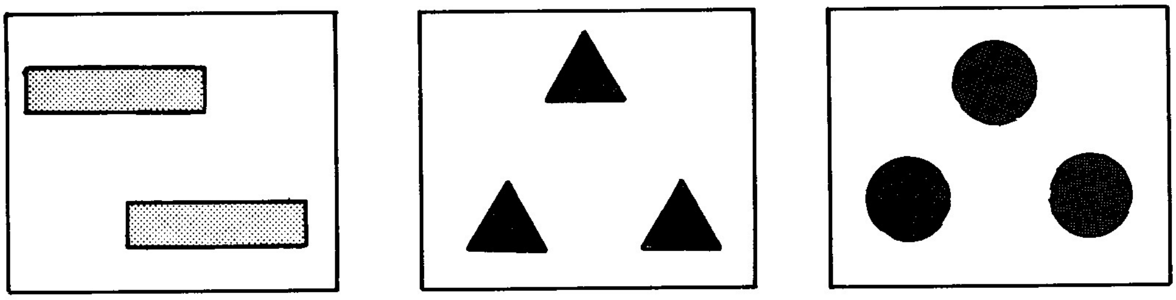
1. How many members are in Set A? ________
2. How many members are in Set B? ________
3. Think of joining Set A and Set B.

   When we join two sets we have a new set called the union of the two sets.

   Draw a picture for the union of sets A and B.

4. How many members are in the union of sets A and B? ________
5. Write an equation for the two sets and their union. ________

Union of Sets



Set X Set Y Set Z

6. How many members are in Set X? ________

7. How many members are in Set Y? ________

8. Draw a picture for the union of sets X and Y.

9. Write an equation for X and Y and their union.

____

10. How many members are in Set Z? ________

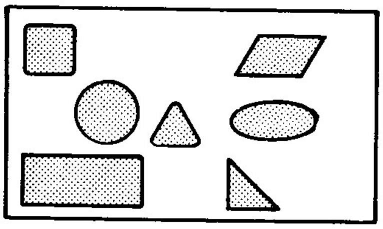
11. Draw a picture for the union of sets Y and Z.

12. Write an equation for Y and Z and their union.

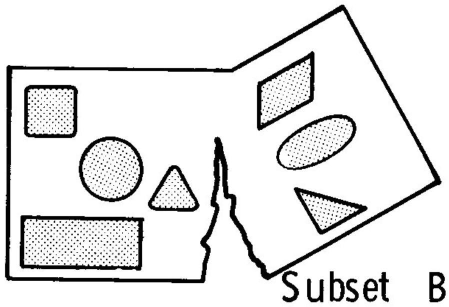
____

Removing a Subset

1. Look at these pictures.



Set A



Subset B

How many members are in Set A? ________

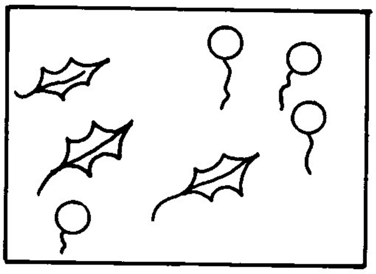
2. How many members are in the subset being removed? ________

3. Draw a picture of the set that would be left when Subset B is removed from Set A.

4. How many members are in the set remaining when Subset B is removed from Set A? ____________

5. Write an equation which describes the set remaining. ______________

6. Look at these pictures. Ring a subset in each picture and write an equation for the set remaining.



A	B	C
D	E	F
G	H	I

Jane	Bob
Sally	Mary
Joe	Ann
Bill	Charles

______________ ______________ ______________

Union of Sets

1. Set A = {lamb, pig, dog}

   Set B = {cow, cat}

   Ring the set that is the union of sets A and B.

   {lamb, horse, pig, dog, cat} {lamb, pig, dog, cat, goat}

   {lamb, pig, dog, cat, cow} {cow, cat, lamb, dog, fish}

2. Set C = {book, pencil, eraser, crayon}

   Set D = {clip, tape, ruler}

   Ring the set that is the union of sets C and D.

   {crayon, ruler, pencil, eraser, tape}

   {clip, ruler, book, crayon, pencil, eraser, tape}

   {tape, ruler, book, pencil, eraser, crayon, chalk}

3. Set E = {rubber, tin, doll}

   Set F = {ball, kite, bat, car}

   Set G is the union of sets E and F.

   Ring set G.

   {rubber, tin, ball, car, doll, car, kite}

   {car, rubber, tin, doll, ball, kite, cap}

   {kite, doll, ball, rubber, tin, car, bat}

Removing a Subset

1. Set R = {dress, hat, sock, shoe, coat}

   Set T is a subset of Set R.

   Set T = {shoe, sock}

   Ring the set remaining when Set T is removed from Set R.

   {sock, shoe} {coat, hat, dress} {hat, shoe, coat}

2. Set V = {doll, wagon, ball, house, crayon}

   Set W = {ball, crayon}

   Ring the set remaining when Set W is removed from Set V.

   {house, dog, cat, ball} {crayon, ball} {wagon, doll, house}

3. Set F = {0, 1, 2, 3, 4, 5, 6}

   Set G = {6, 4, 2, 0}

   Ring the set remaining when Set G is removed from Set F.

   {3} {2, 3, 4, 7} {5, 1, 3}

4. Set H = {0, 1, 2, 3, 4, 5, 6, 7, 8}

   Set K is the set of numbers less than 5.

   List the members of Set K. ______________________

   Ring the set remaining when Set K is removed from Set H.

   {5, 6, 7, 8} {6, 7, 8} {0, 1, 2, 3, 4}

5. Set P = {11, 12, 13, 14, 15}

Set X is the set of numbers less than 12 in set P.

List the members of Set X. ______________________________

Ring the set remaining when Set X is removed from Set P.

{12, 13, 14, 15}   {13, 14, 15}   {14, 15}

6. Set M = {20, 21, 22, 23, 24, 25}

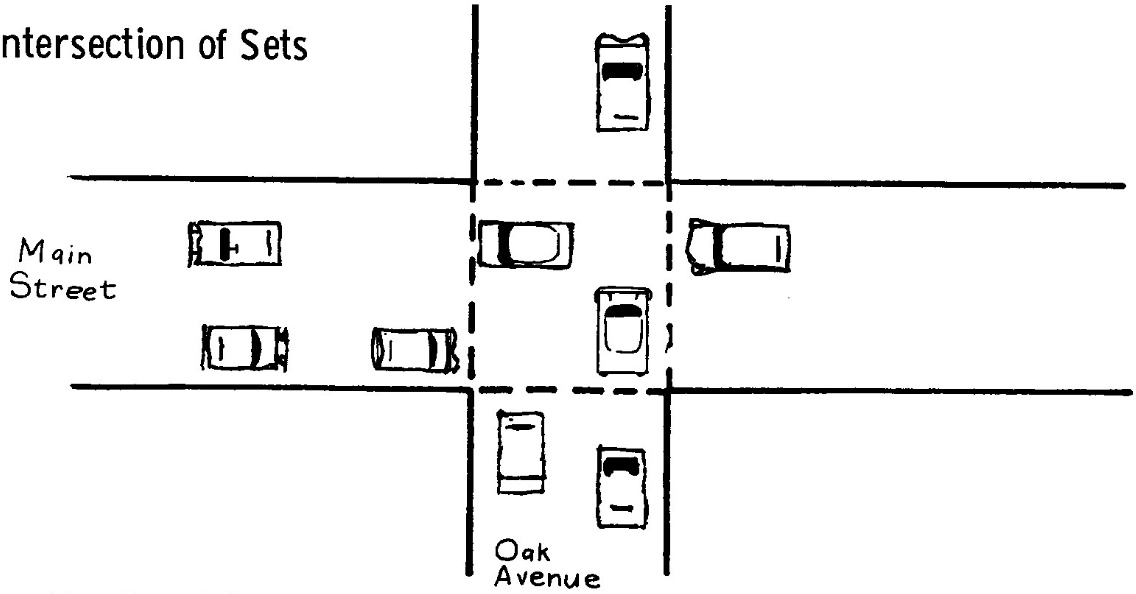
Set H is the set of numbers greater than 23 in set M.

List the members of Set H.

Ring the set remaining when Set H is removed from Set M.

{20, 21, 22, 23}   {24, 25}   {20, 21, 22}

Intersection of Sets



1. Use the picture to answer these questions.

   How many cars are on Main Street but not on Oak Avenue? ______
   Color each of these cars red.

   How many cars are on Oak Avenue but not on Main Street? ______
   Color each of these cars green.

   How many cars are on Main Street and on Oak Avenue at the same time? . . . . ______
   Color each of these cars blue.

   Total number of cars in the picture: ______

   Total number of cars on Main Street: ______

   Total number of cars on Oak Avenue: ______

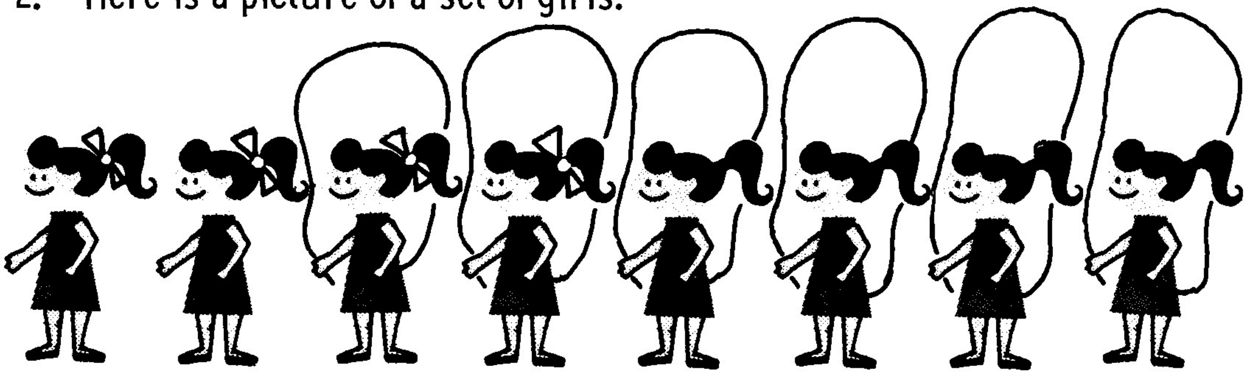
   Number of cars in the intersection of Main Street and Oak Avenue: . . . . ______

   Explain each of these sentences in relation to the picture:

   $4 + 3 + 2 = 9$

   $6 + 5 = 11$, and $11 - 2 = 9$.

2. Here is a picture of a set of girls:



How many girls are in each of these subsets:

The set of girls with bows and jump-ropes. ________

The set of girls with bows but without jump-ropes. ________

The set of girls with jump-ropes but without bows. ________

Are each two of these three sets disjoint? ________

Write an equation for the number of girls all together using the numbers of girls in the three subsets:

____

Draw a ring around each of these sets:

The set of girls with bows. This set has ________ members.

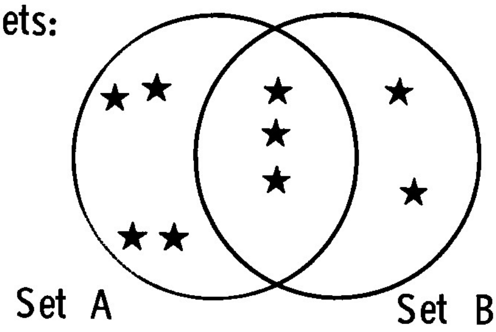
The set of girls with jump-ropes. This set has ________ members.

Are these two sets disjoint? ________

How many members are in the intersection of these two sets? ________

Write an equation for the picture. ________________________

3. Here are some sets:



Are sets A and B disjoint sets? ________

How can you tell? ____

____

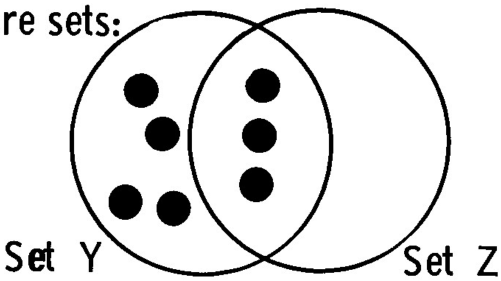
How many members are there in set A? ________

How many members are there in set B? ________

How many members are there in the intersection of set A and set B? ________

How many members are there in the union of set A and set B? ________

4. Here are some more sets:



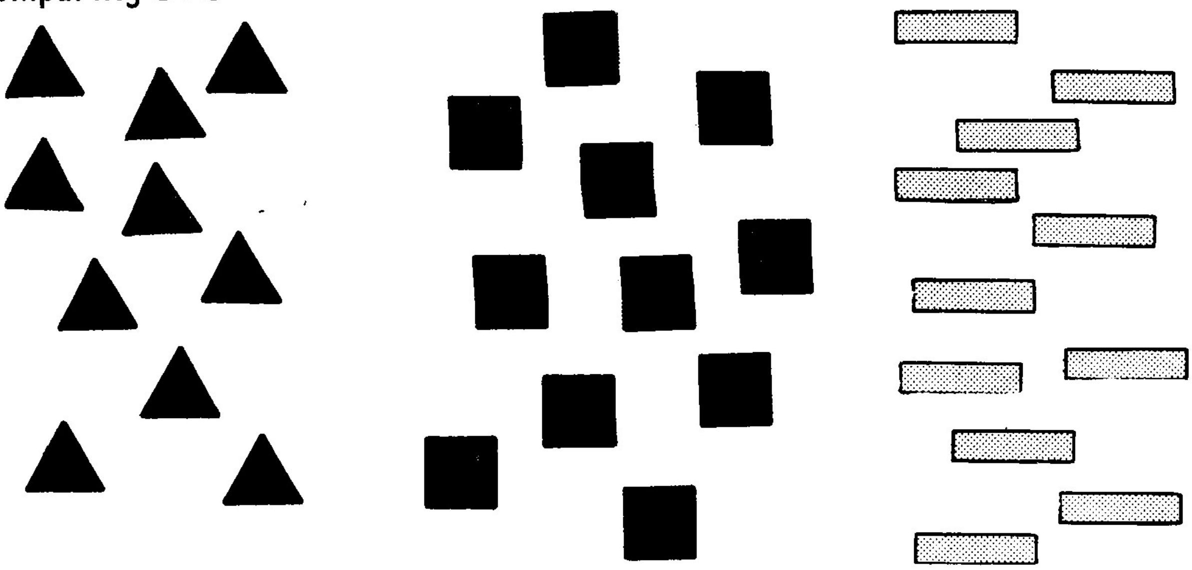
How many members in Set Y? ________

How many members in the intersection of sets Y and Z? ________

There are 12 members in the union of sets Y and Z.

How many members in set Z? ________

Comparing Sets



1) There are more squares than ______________________.

Show by pairing that your answer is correct.

2) There are as many ____________ as ______________.

Show by pairing that your answer is correct.

3) Is the set of  's equivalent to the set of  's? ________

How do you know? ____

____

4) How many members in the set of  's? ________

5) How many members in the set of  's? ________

6) How does the number line help you remember that:

(a) 11 is greater than 10? ______________________________

(b) 8 is less than 10? ______________________________

Comparing Numbers

Write either $<$ or $>$ between each pair of numerals:

Remember: $7 < 9$ is read "7 is less than 9" $9 > 5$ is read "9 is greater than 5"

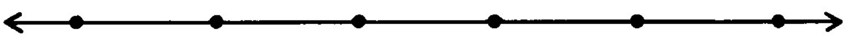
9	15	18	16	23	32
15	19	45	51	72	67
8	6	81	35	89	73
21	17	23	8	76	84
35	31	17	25	43	25
47	52	38	49	28	39
28	21	67	62	17	37
75	80	11	29	39	26
3	7	14	31	62	47
53	55	29	43	99	102

Using the Number Line

The set of whole numbers greater than 17 but less than 21 is {18, 19, 20}.

1. The set of whole numbers greater than 29 but less than 32 is { }.

2. The set of whole numbers greater than 36 but less than 41 is { }.



3. The set of whole numbers greater than 52 but less than 55 is { }.

4. The set of whole numbers greater than 92 but less than 88 is { }.

Intersection of Sets of Numbers

1. Set A is the set of whole numbers greater than 12 but less than 18.	Set A = {13, 14, 15, 16, 17}
Set B is the set of whole numbers greater than 9 but less than 16.	Set B = {10, 11, 12, 13, 14, 15}
The members in the intersection of sets A and B are:	{ }

2. Set R is the set of whole numbers greater than 50 but less than 54.	Set R ={ }
Set T is the set of whole numbers greater than 48 but less than 53.	Set T = { }
The members in the intersection of sets R and T are:	{ }

3. Set F is the set of whole numbers greater than 47 but less than 53.	Set F = { }
Set G is the set of whole numbers greater than 50 but less than 57.	Set G = { }
The members in the intersection of sets F and G are:	{ }

4. Set X is the set of whole numbers greater than 79 but less than 85.	Set X = { }
Set Y is the set of whole numbers greater than 82 but less than 90.	Set Y = { }
The members in the intersection of sets X and Y are:	{ }

Addition Chart

+	0	1	2	3	4	5	6	7	8	9
0										
1										
2										
3										
4										
5										
6										
7										
8										
9										

Relating Subtraction to Addition

Fill in the blank. Then write the associated addition fact.

Example: 10 - 4 = ___6___

6 + 4 = 10

1. 13 - 7 = _____

6. 15 - 8 = _____

2. 11 - 6 = _____

7. 14 - 9 = _____

3. 16 - 8 = _____

8. 12 - 5 = _____

4. 14 - 6 = _____

9. 13 - 8 = _____

5. 17 - 9 = _____

10. 16 - 7 = _____

Relating Addition to Subtraction

Complete. Then rewrite each addition fact as a subtraction fact.

$9 + \_\_\_\_ = 17$

$17 - 8 = 9$

1. $4 + \_\_\_\_ = 12$	7. $6 + \_\_\_\_ = 14$
2. $7 + \_\_\_\_ = 13$	8. $9 + \_\_\_\_ = 15$
3. $7 + \_\_\_\_ = 11$	9. $6 + \_\_\_\_ = 11$
4. $8 + \_\_\_\_ = 15$	10. $5 + \_\_\_\_ = 14$
5. $5 + \_\_\_\_ = 12$	11. $4 + \_\_\_\_ = 13$
6. $3 + \_\_\_\_ = 12$	12. $9 + \_\_\_\_ = 18$

Miscellaneous Exercises

Addition and Related Subtraction

10

4 + 6 = _____

6 + 4 = _____

10 - 6 = _____

10 - 4 = _____

10

2 + 8 = _____

8 + _____ = _____

10 - _____ = _____

10 - _____ = _____

10

3 + 7 = _____

7 + _____ = _____

10 - 3 = _____

10 - _____ = _____

10

9 + 1 = _____

1 + _____ = _____

10 - 1 = _____

10 - _____ = _____

9

7 + 2 = _____

2 + _____ = _____

9 - 2 = _____

9 - _____ = _____

9

5 + _____ = _____

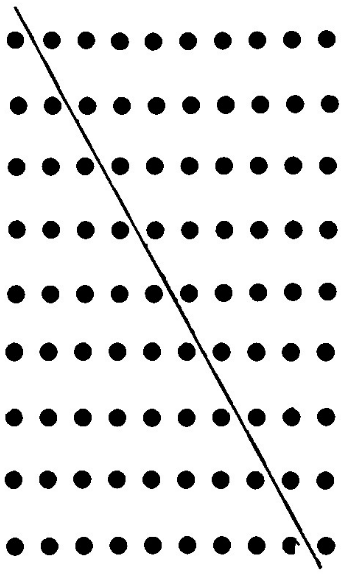
4 + _____ = _____

9 - _____ = _____

9 - _____ = _____

Partitions of a Set of Ten Things

Write an equation for each row.



10 = 1 + _____

10 = 2 + _____

10 = 3 + _____

10 = 4 + _____

10 = 5 + _____

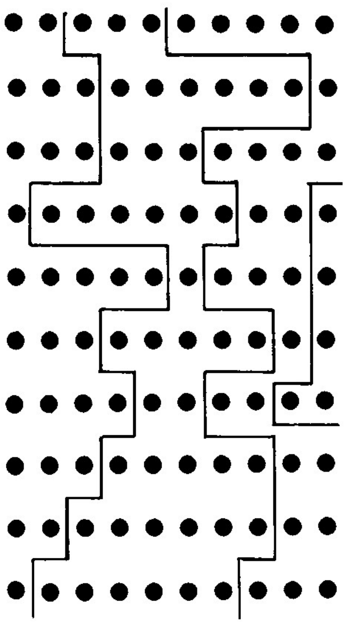
10 = _____ + _____

10 = _____ + 3

10 = _____ + _____

10 = _____ + _____

Write an equation for each row.

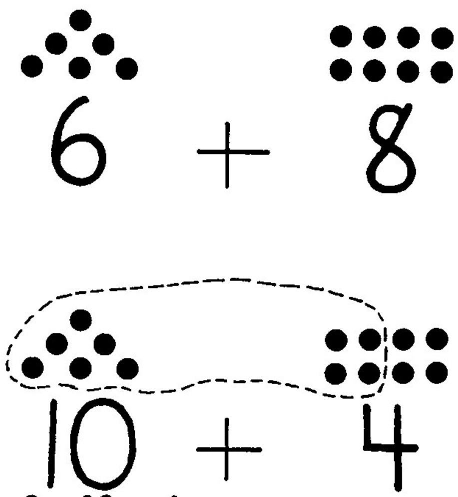


2 + 3 + 5 = 10

3 + 5 + 1 = 10

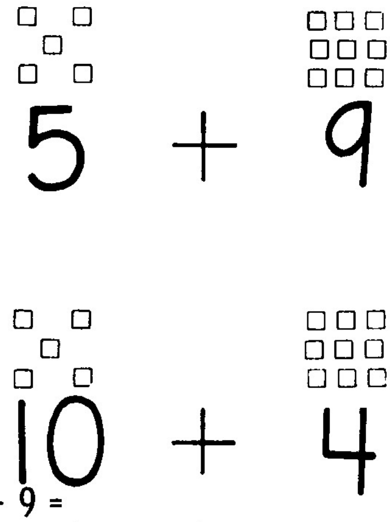
Using a Ten in Addition and Subtraction

Join some of the members of the second set to the first set to make a group of ten.



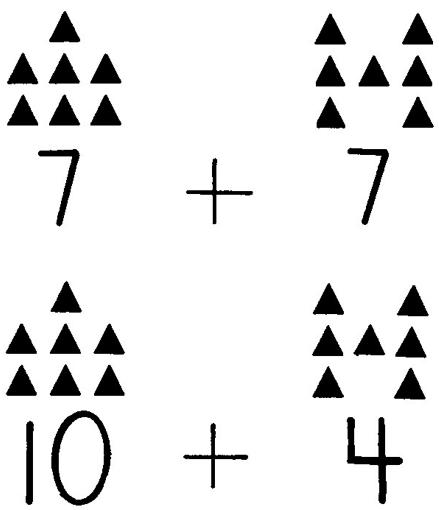
6 + 8 = 10 + 4

6 + 8 = ___



5 + 9 = ______

5 + 9 = ___



______ = ______

7 + 7 = ______

FINISH:

9 + 1 + 4 = 14

8 + 2 + 4 = 14

7 + 3 + 4 = 14

6 + ___ + ___ = 14

___ + 5 + ___ = 14

4 + ___ + 4 = 14

3 + ___ + ___ = 14

2 + ___ + ___ = 14

1 + ___ + ___ = 14

Using a Ten in Addition and Subtraction

Think of the sum of the two numbers as 10 and some ones.	
6 + 7 = 10 + 3	9 + 5 = ______
7 + 4 = 10 + 1	8 + 6 = ______
9 + 6 = 10 + _____	5 + 6 = ______
8 + 5 = 10 + _____	4 + 8 = ______
9 + 2 = ______	8 + 8 = ______
8 + 4 = ______	7 + 5 = ______
5 + 9 = ______	8 + 3 = ______
6 + 8 = ______	7 + 6 = ______
9 + 4 = ______	9 + 3 = ______
5 + 8 = ______	4 + 7 = ______
6 + 5 = ______	9 + 9 = ______
8 + 9 = ______	7 + 7 = ______

Pairs of Numbers

Complete this chart.

Number Pair First number	Number Pair Second number	Operation	Whole number sum or difference
7	4	+	11
12	3	-	9
6	10	-	Not any
5	8	+	
15	9	-	
8	7	+	
7	14	-	
16	8	-	
5	9		14
9	5		4
5	9		Not any
6		+	6
	12		0

Miscellaneous Exercises

Write two addends for each sum. Then change the order of the addends. Use numbers less than 10.

11
9, 2
2, 9
8, 3
3, 8

12

13

14

15

16

17

18

Miscellaneous Exercises

The sum of two numbers is named in each larger box. Below each sum is one of the addends. Name the other addend. The first one is done for you.

12	
5	7
8	
4	

11	
3	
9	
7	

13	
6	
9	
7	

14	
9	
8	
6	

13	
5	
7	
4	

16	
7	
8	
9	

12	
10	
9	
7	

15	
9	
8	
4	

Miscellaneous Exercises

Finish each equation.	
$8 + 7 =$ $15 + 7 =$	$8 + 8 =$ $16 - 8 =$
$6 + 9 =$ $15 + 9 =$	$9 + 5 =$ $14 - 5 =$
$9 + 8 =$ $17 + 8 =$	$6 + 8 =$ $14 - 8 =$
$7 + 9 =$ $16 - 9 =$	$8 + 6 =$ $14 - 6 =$
$5 + \quad = 13$ $8 + \quad = 13$	$5 + \quad = 14$ $9 + \quad = 14$
$\quad + 7 = 12$ $\quad + 5 = 12$	$\quad + 9 = 17$ $\quad + 8 = 17$

Miscellaneous Exercises

Fill in the blanks so that in each row the sum of the first two numbers is the third number

and

in each column the sum of the first two numbers is the third number.

(4)	2	6
0	3	3
4	5	9

	3	4
6		
7		10

5		
2		4
	5	12

4		4
4	5	
8		13

3		8
2		
	6	11

	4	7
	2	
8		14

Miscellaneous Exercises

Fill in the charts by finding the sum of pairs of numbers.

	2	7	6	8
5	7			
9	11			
3			9	
4				

	7	5	9	8
6				
0				
8				
5				

	4	6	7	9
5				
1				
6				
7				

	8	6	9	5
8				
5				
7				
6				

Miscellaneous Exercises

Make these sentences true by using =, <, or >.

1. 7 + 6 ______ 6 + 7
2. 5 + 8 ______ 5 + 9
3. 9 + 3 ______ 2 + 9
4. 6 + 3 ______ 9 + 1
5. 6 + 5 ______ 5 + 6
6. 2 + 9 ______ 9 + 2
7. 7 + 3 ______ 4 + 7
8. 6 + 6 ______ 6 + 5
9. 2 + 7 ______ 3 + 7
10. 4 + 8 ______ 8 + 4
11. 6 + 2 ______ 2 + 6
12. 2 + 9 ______ 8 + 3
13. 5 + 8 ______ 8 + 5
14. 4 + 8 ______ 6 + 5
15. 3 + 9 ______ 9 + 3
16. 6 + 4 ______ 7 + 3

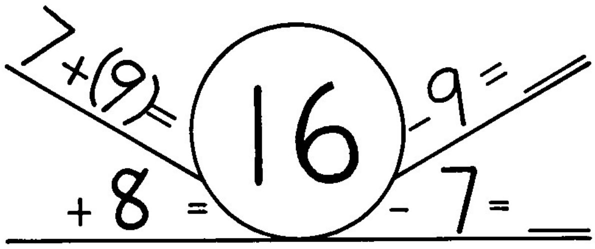
Make these true by using + and -.

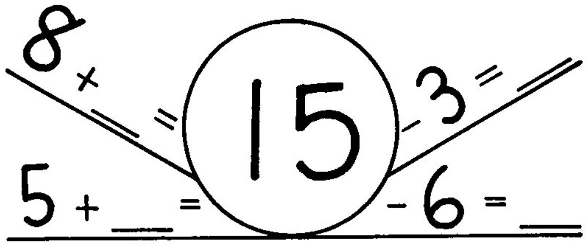
1. 4 ___ 2 > 7 ___ 5
2. 9 ___ 7 < 8 ___ 4
3. 8 ___ 2 < 7 ___ 2
4. 7 ___ 7 > 8 ___ 2
5. 8 ___ 9 < 9 ___ 9
6. 9 ___ 4 > 7 ___ 6
7. 14 ___ 3 > 8 ___ 4
8. 9 ___ 8 < 6 ___ 4
9. 17 ___ 2 > 8 ___ 4
10. 21 ___ 6 < 9 ___ 8
11. 28 ___ 4 > 15 ___ 8
12. 34 ___ 7 < 25 ___ 15
13. 79 ___ 24 > 149 ___ 57
14. 56 ___ 29 < 12 ___ 14
15. 89 ___ 45 > 134 ___ 51
16. 201 ___ 98 > 300 ___ 56

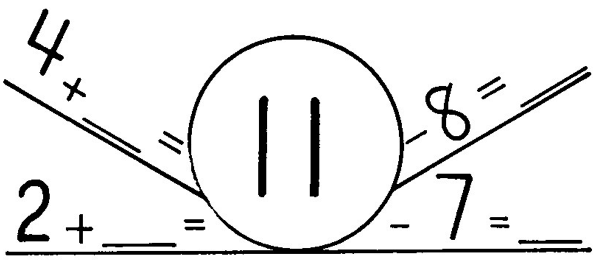
Miscellaneous Exercises

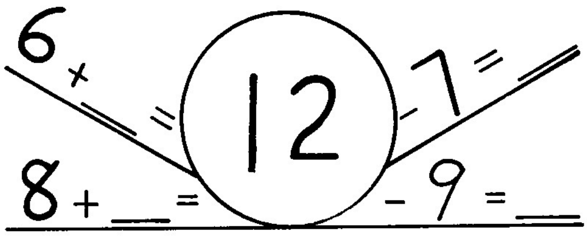
Fill in the blanks with the correct numerals.

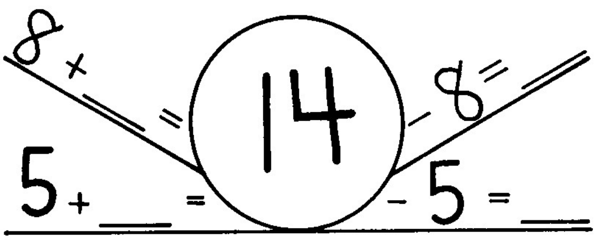
Begin at the left and go clockwise.

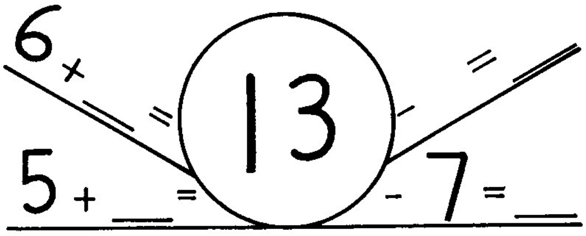










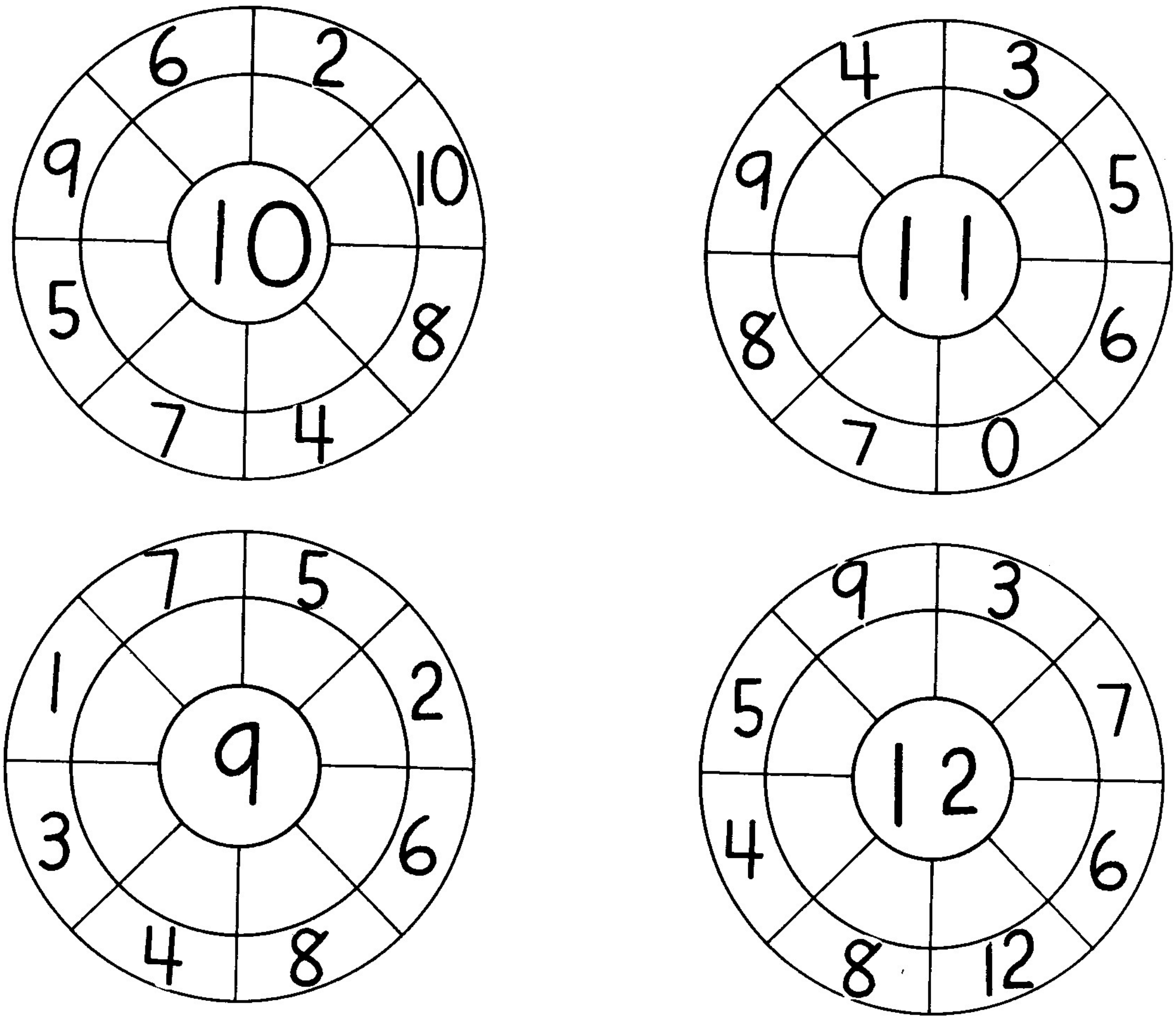


Miscellaneous Exercises

Fill in the second ring.

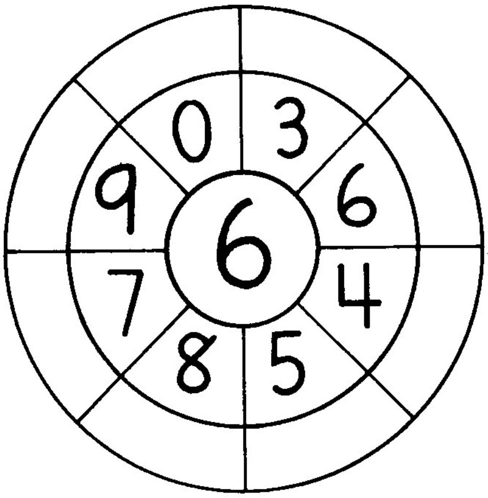
Given addend plus other addend equals the sum named in the third ring. Example: $2 + n = 13$

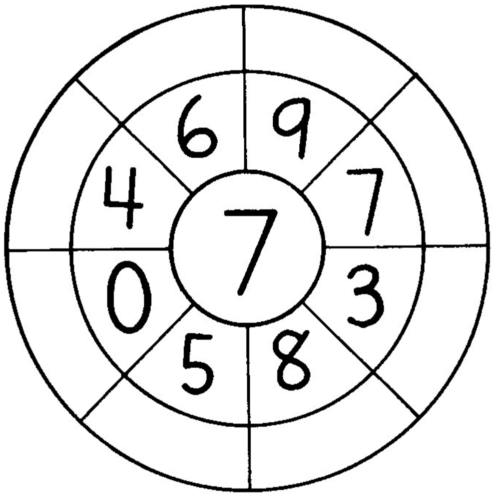
$n = ?$



Miscellaneous Exercises

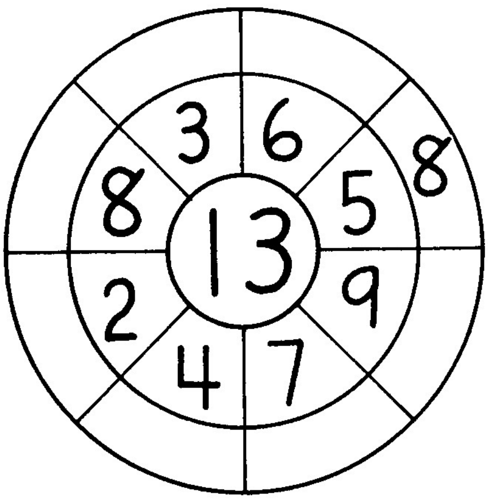
1. Find the sum by adding the number named in the center ring to a number named in the second ring. Write the sum in the outer ring.

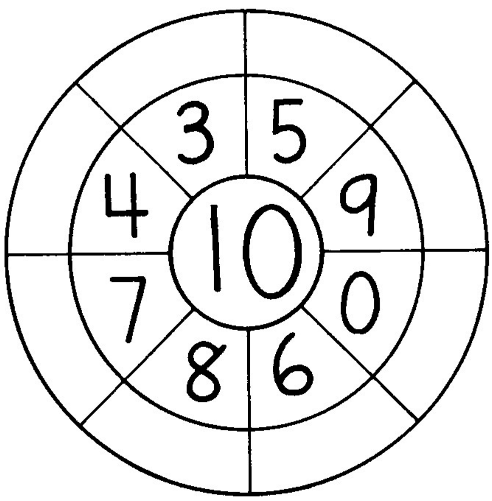




2. Find the difference by subtracting a number named in the second ring from the number named in the center ring.

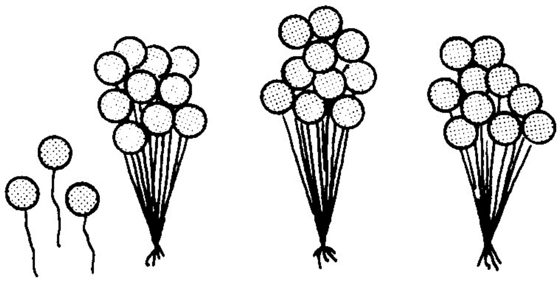
For example: 13 - 5 = 8.





Tens and Ones

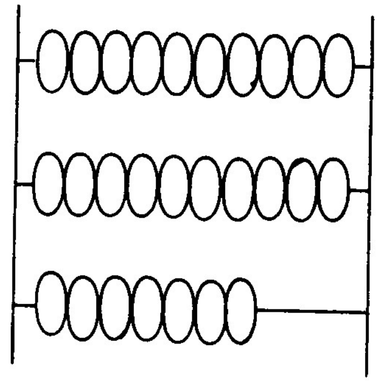
Fill in the blanks.



_____ tens, _____ ones

or

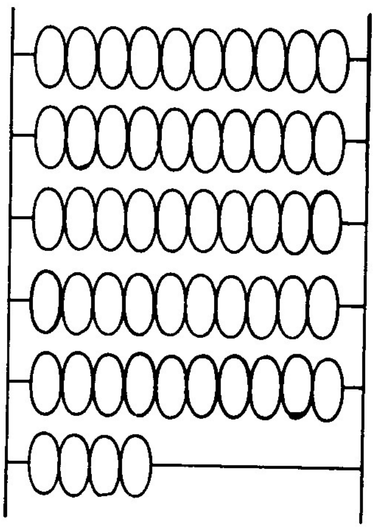
____



_____ tens, _____ ones

or

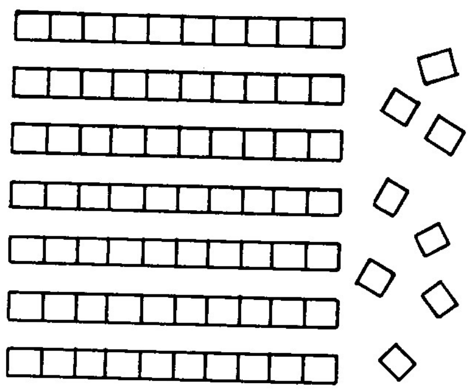
____



_____ tens, _____ ones

or

____



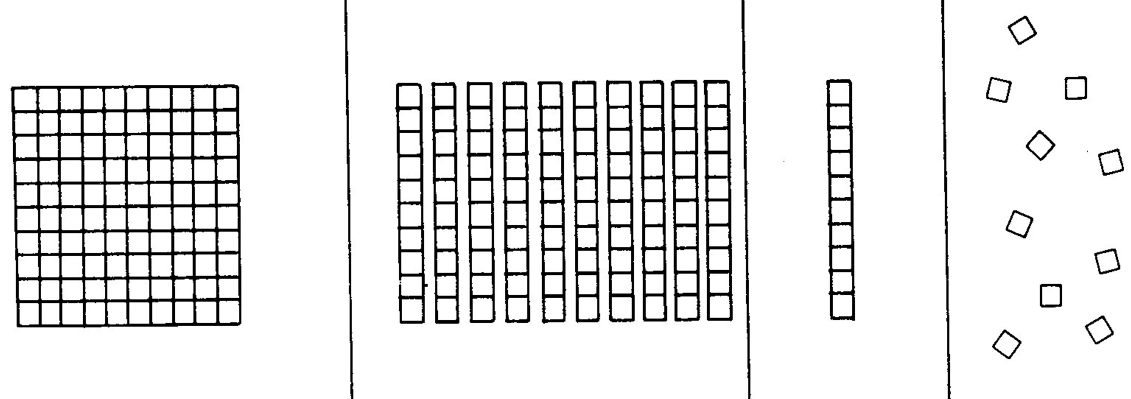
_____ tens, _____ ones

or

____

Hundreds, Tens, and Ones

Complete each of these.



1 one hundred	10 tens	1 ten	10 ones

186: ____ hundred, ____ tens, and ____ ones

342: ____ hundreds, ____ tens, and ____ ones

203: ____ hundreds, ____ tens, and ____ ones

230: ____ hundreds, ____ tens, and ____ ones

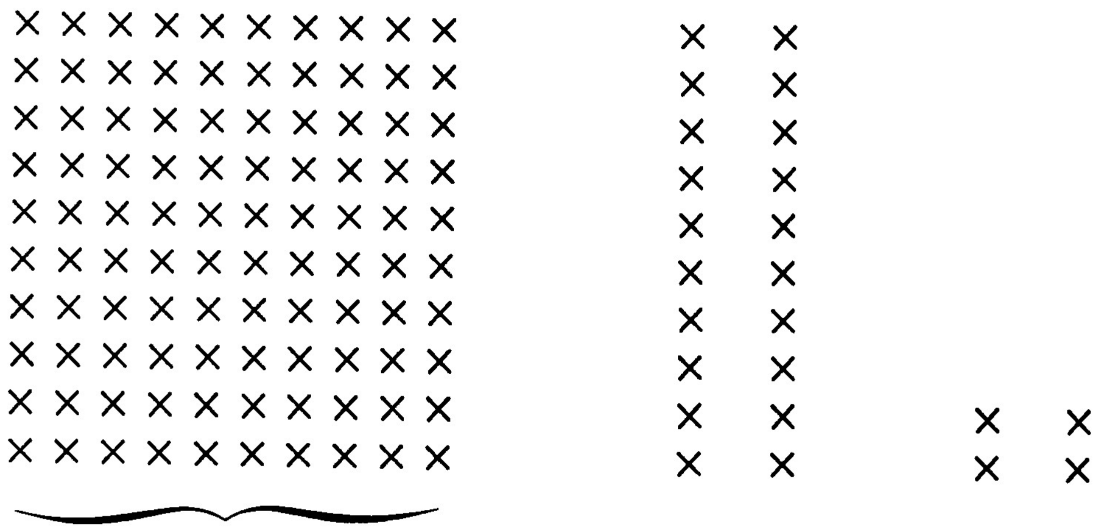
____: 6 hundreds, 2 tens, and 5 ones

____: 4 hundreds, 9 tens, and 6 ones

____: 7 hundreds, 0 tens, and 4 ones

____: 5 hundreds, 4 tens, and 1 one

Hundreds, Tens, and Ones



124 = 100 + 20 + 4

Fill in the blanks:

563 = 500 + 60 + 3

247 = ______________________

486 = ______________________

625 = ______________________

_____ = 700 + 40 + 1

_____ = 500 + 90 + 8

_____ = 400 + 60

_____ = 800 + 2

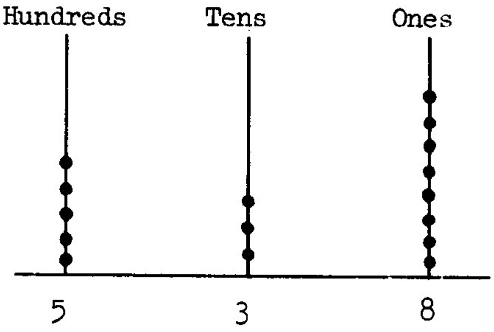
Hundreds, Tens, and Ones

Fill the blanks.

847 = 800 + 40 + 7	603 = ______
235 = ______	476 = ______
670 = ______	875 = ______
509 = ______	570 = ______
999 = ______	409 = ______
419 = ______	888 = ______
______ = 700 + 4	______ = 800 + 10
______ = 20 + 100 + 8	______ = 200 + 30 + 5
______ = 6 + 30 + 800	______ = 4 + 600
______ = 200 + 80	______ = 80 + 900
______ = 5 + 600	______ = 5 + 200

An abacus can help us represent a number.

1.

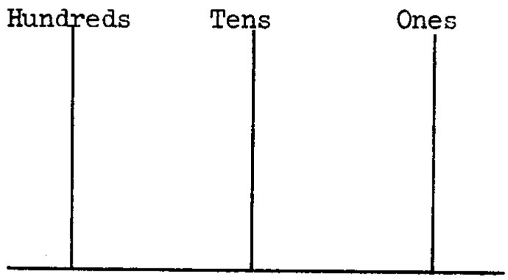


The number ________ is represented on this abacus.

________ = 5 hundreds + 3 tens + 8 ones, or

________ = 500 + 30 + 8.

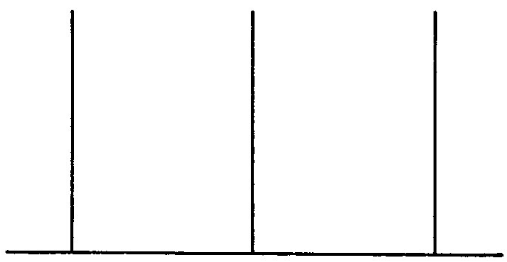
2.



Show 472 on this abacus.

472 = ________ + ________ + ________

3.

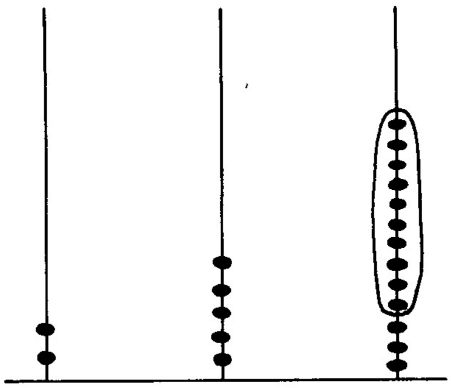


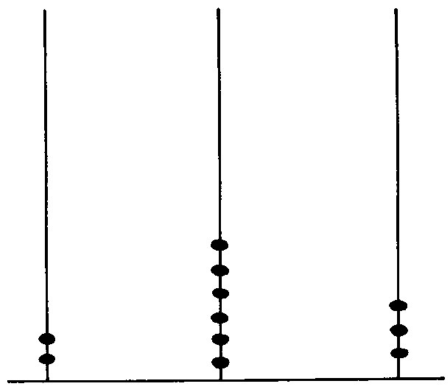
Show 817 on this abacus.

817 = ________ + ________ + ________

Renaming Numbers

1.





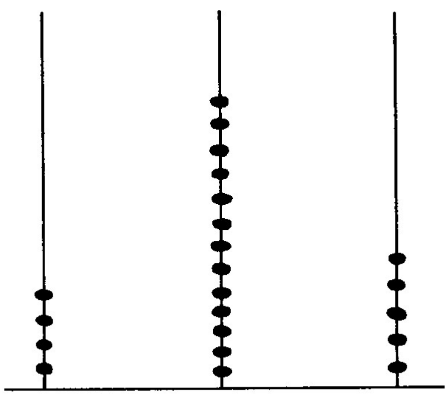
200 + 50 + 12 = 263

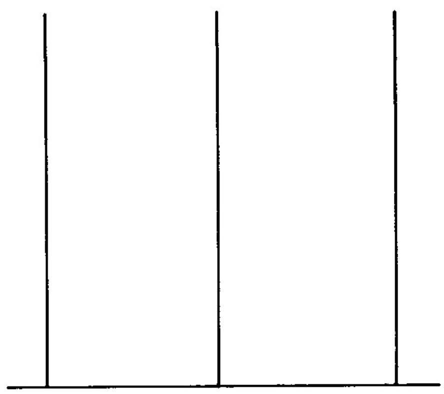
A set of ten ________________ can be shown as

one________________.

200 + 60 + 3 = 263

2.





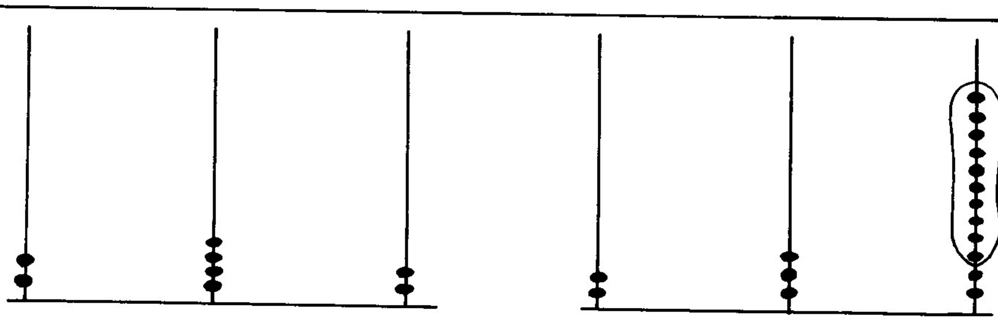
400 + 130 + 5 = ____________

A set of ten ________________ can be shown as

one ________________.

____

3.

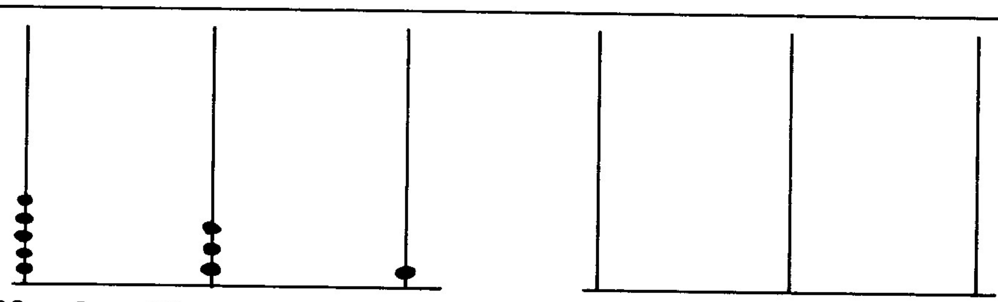


200 + 40 + 2 = 242

Show one set of ten as a set of ten ones.

Write the new name. ____________________

4.

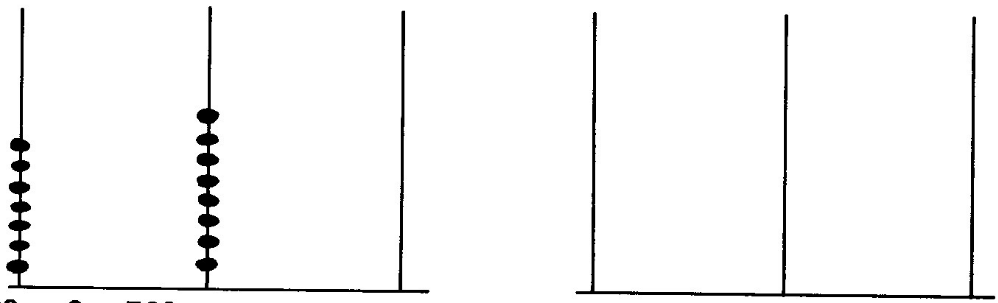


500 + 30 + 1 = 531

Show one hundred as a set of ten tens.

Write the new name. ____________________

5.

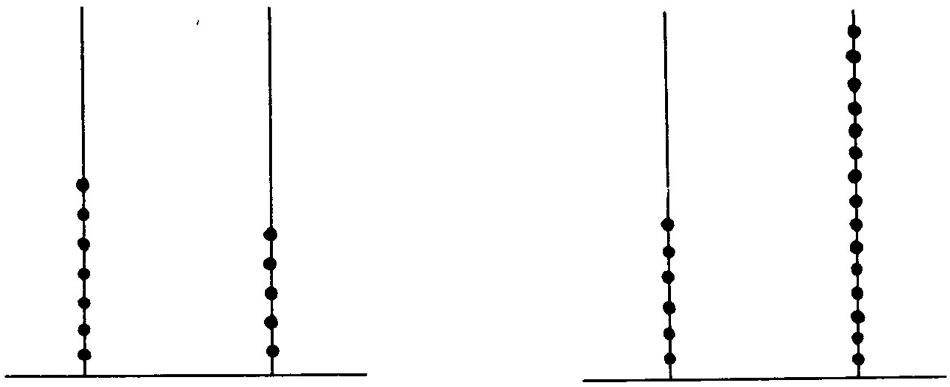


700 + 80 + 0 = 780

Show one set of ten as a set of ten ones.

Write the new name. ____________________

Different Ways of Thinking About a Number



75 = _______ tens + _______ ones = _______ tens + _______ ones

68 = ______ tens + ______ ones or _____ tens + _____ ones	57 = ______ tens + ______ ones or _____ tens + ______ ones
94 = ______ tens + ______ ones or _____ tens + ______ ones	84 = ______ tens + ______ ones or _____ tens + ______ ones
39 = ______ tens + ______ ones or _____ tens + ______ ones	71 = ______ tens + ______ one or _____ tens + ______ ones
62 = ______ tens + ______ ones or _____ tens + ______ ones	96 = ______ tens + ______ ones or _____ tens + ______ ones
49 = ______ tens + ______ ones or _____ tens + ______ ones	74 = ______ tens + ______ ones or _____ tens + ______ ones

Naming a Number in Different Ways

Complete the following sentences.

357 = 3 hundreds + ______ tens + 7 ones,
or 3 hundreds + 4 tens + ____ ones,
or 2 hundreds + ______ tens + 17 ones.

268 = ____ hundreds + 6 tens + 8 ones,
or 2 hundreds + 5 tens + ____ ones,
or 1 hundred + _____ tens + 18 ones.

569 = _____ tens + 9 ones,
or 4 hundreds + _____ tens + 9 ones,
or ____ hundreds + 15 tens + 19 ones.

Write 426 in three other ways.

____

____

____

Write 752 in three other ways.

____

____

____

Renaming a Number

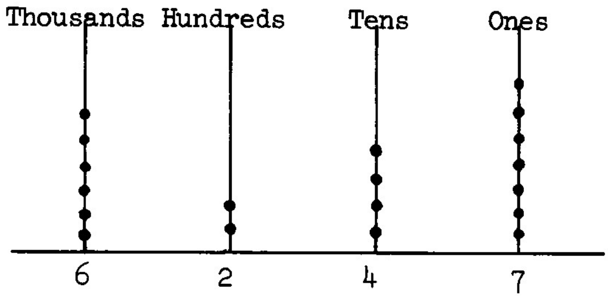
Match the expanded form with the standard form. For example, (A) 100 + 40 + 3 = 143, so A is placed in the blank beside 143.

A	100 + 40 + 3	I	400 + 90 + 1
B	500 + 70 + 12	J	600 + 10 + 15
C	600 + 160 + 4	K	500 + 80 + 2
D	900 + 20 + 2	L	700 + 00 + 16
E	300 + 00 + 7	M	700 + 60 + 4
F	600 + 110 + 6	N	200 + 100 + 7
G	100 + 30 + 13	O	500 + 120 + 5
H	200 + 10 + 17	P	800 + 120 + 2

764 ______	227 ______	582 B
491 ______	143 A	625 ______
716 ______	922 ______	307 ______

Thousands

1.

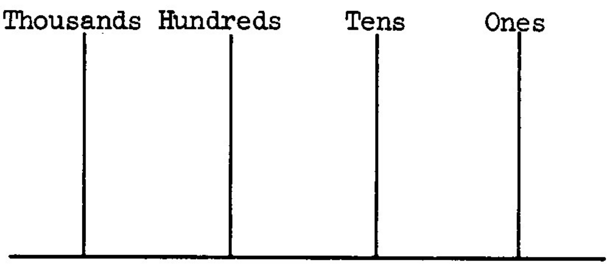


The number ________ is represented on this abacus.

________ = 6 thousands + 2 hundreds + 4 tens + 7 ones

________ = 6000 + 200 + 40 + 7

2. Show 3465 on this abacus.

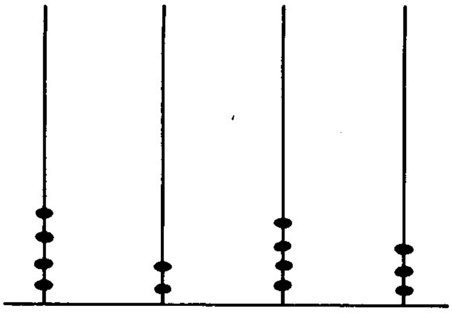


3465 = ____ thousands + ____ hundreds + ____ tens + ____ ones

3465 = ____ + ____ + ____ + ____

Renaming Numbers

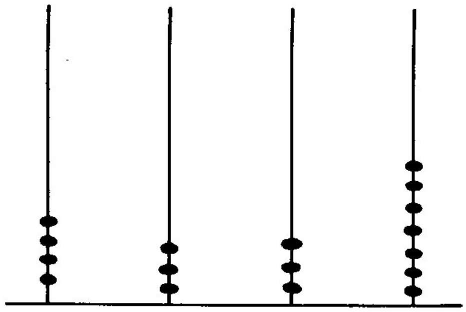
1.



4000 + 200 + 40 + 3 =

____

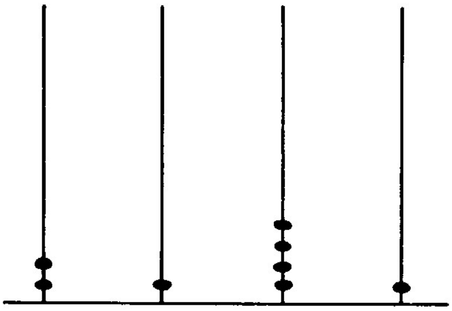
2.



6000 + 300 + 30 + 7 =

____

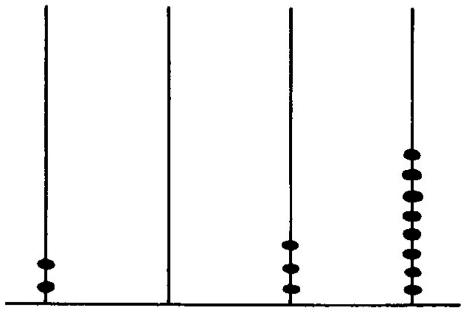
3.



____ + ____ + ____ + ____ =

____

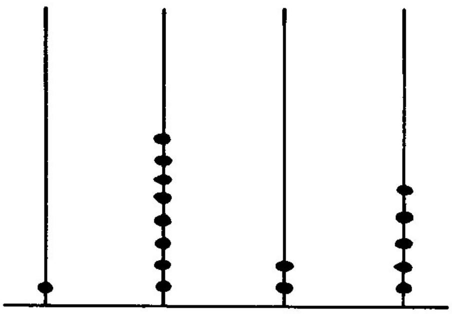
4.



____ + ____ + ____ + ____ =

____

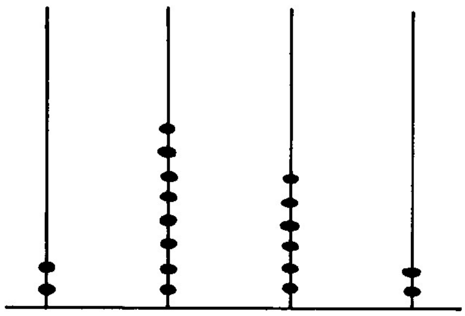
5.



____ + ____ + ____ + ____ =

____

6.



____ + ____ + ____ + ____ =

____

Thousands

Complete each of these:

____ ones = 1 ten

____ tens = 1 hundred

____ hundreds = 1 thousand

2748 = ____ thousands + ____ hundreds + ____ tens + ____ ones

5619 = ____ thousands + ____ hundreds + ____ ten + ____ ones

7546 = ____ thousands + ____ hundreds + ____ tens + ____ ones

____ = 5 thousands + 3 hundreds + 8 tens + 0 ones

____ = 3 thousands + 0 hundreds + 7 tens + 4 ones

____ = 9 thousands + 2 hundreds + 0 tens + 6 ones

6324 = 6000 + 300 + 20 + 4

5289 = ____ + ____ + ____ + ____

9165 = ____ + ____ + ____ + ____

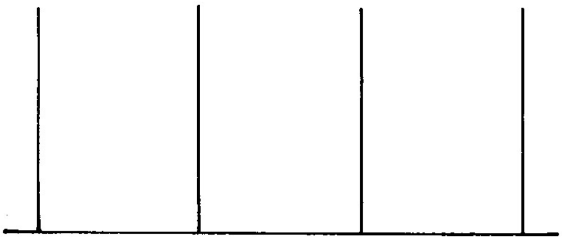
____ = 2000 + 900 + 10 + 2

____ = 7000 + 500 + 3

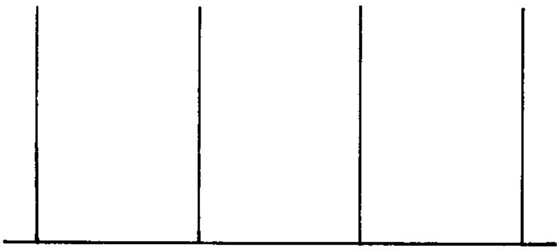
____ = 4000 + 80 + 7

Naming a Number in Different Ways

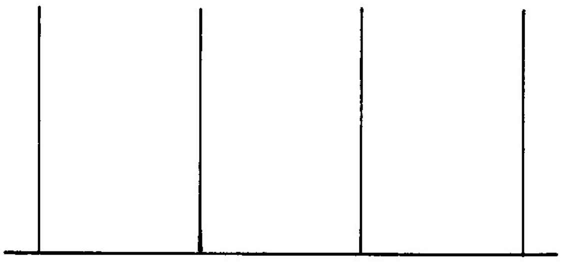
1. Show 6549 on the abacus with 6 thousands, 5 hundreds, 4 tens and 9 ones.



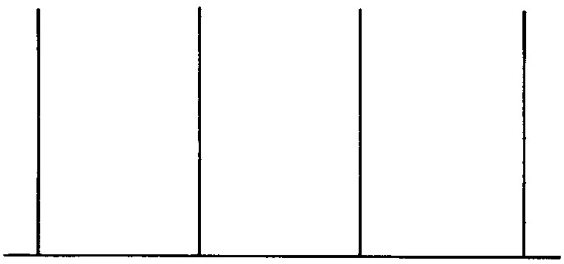
2. Show 6549 with only 5 thousands.



3. Show 6549 with only 3 tens.



4. Show 6549 with only 4 hundreds.



Naming a Number in Different Ways

1. Here are some ways to name 3547.

   3547 ones

   35 hundreds + 4 tens + 7 ones

   3 thousands + 5 hundreds + 4 tens + 7 ones

   354 tens + 7 ones

   3000 + 500 + 40 + 7

   3500 + 40 + 7

2. Show some ways to name 2356.

   ____

   ____

   ____

   ____

   ____

   ____

3. Show some ways to name 4253.

   ____

   ____

   ____

   ____

   ____

   ____

Names for Numbers

1. From the list below check (✓) all the ways of naming 6529.

   a) 6,529 ones

   b) 652 tens + nine ones

   c) 6000 + 500 + 10 + 9

   d) 6000 + 1500 + 20 + 9

   e) 5000 + 1500 + 20 + 9

   f) 65 hundreds + 20 + 9

   g) 6000 + 400 + 20 + 9

   h) 6000 + 500 + 20 + 19

2. Answer <u>Yes</u> or <u>No.</u>

   a) 5,324 is 53 tens and 24 ones. ____________

   b) 7381 = 600 + 120 + 8. ________

   c) 32 hundreds + 2 tens + 16 ones = 3236. ________

   d) 537 = 400 + 13 + 7. ________

3. The number 2, 538 can be named in many ways. Write some of them.

   2,538: ________________________

   ____

   ____

   ____

Naming a Number in Different Ways

1. Here are some ways to name 3547.

    3547 ones

    35 hundreds + 4 tens + 7 ones

    3 thousands + 5 hundreds + 4 tens + 7 ones

    354 tens + 7 ones

    3000 + 500 + 40 + 7

    3500 + 40 + 7

2. Show some ways to name 2356.

    ____

    ____

    ____

    ____

    ____

    ____

3. Show some ways to name 4253.

    ____

    ____

    ____

    ____

    ____

    ____

Names for Numbers

1. From the list below check (✓) all the ways of naming 6529.

   a) 6,529 ones

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   d) 6000 + 1500 + 20 + 9

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   f) 65 hundreds + 20 + 9

   g) 6000 + 400 + 20 + 9

   h) 6000 + 500 + 20 + 19

2. Answer <u>Yes</u> or <u>No.</u>

   a) 5,324 is 53 tens and 24 ones. ____________

   b) 7381 = 600 + 120 + 8. ________

   c) 32 hundreds + 2 tens + 16 ones = 3236. ________

   d) 537 = 400 + 13 + 7. ________

3. The number 2, 538 can be named in many ways. Write some of them.

   2,538: ________________________

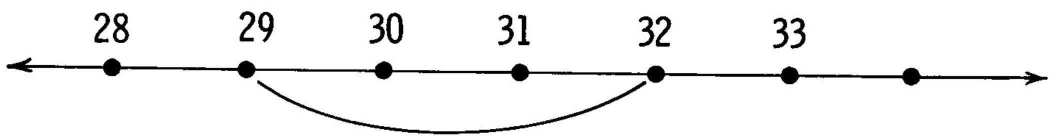
   ____

   ____

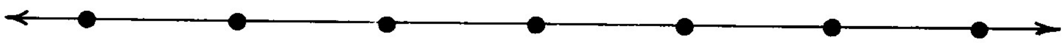
   ____

Using the Number Line

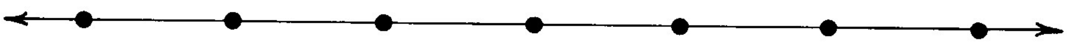
The set of whole numbers greater than 28 but less than 33 is {29, 30, 31, 32}.



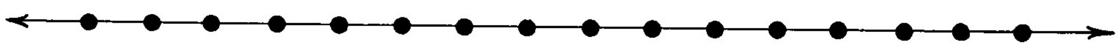
1. The set of whole numbers greater than 67 but less than 73 is { }.



2. The set of whole numbers greater than 198 but less than 204 is { }.

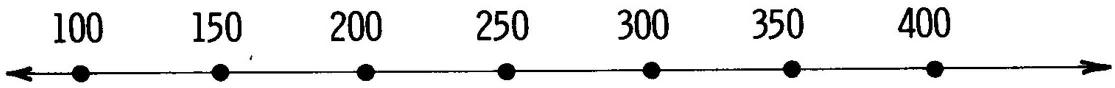


3. The set of whole numbers greater than 789 but less than 800 is { }.



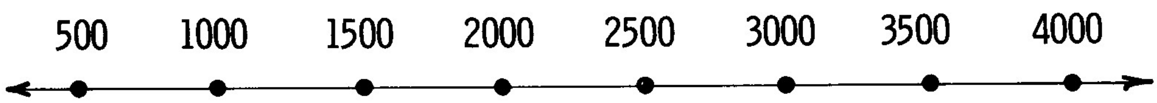
4. The set of whole numbers greater than 993 but less than 1002 is { }.

Comparing Numbers



Write < or > between each pair of numerals.

129	156	391	450	376	285
175	200	402	343	491	176
235	167	156	380	207	377
253	350	287	459	176	253



500	1500	3520	2001	3427	3548
2000	1000	756	1156	2763	3276
3500	2500	2356	2556	4051	4027
4000	500	3702	3046	1776	1492

The Sum of Two Numbers

Compute:

52 + 37	83 + 16
26 + 42	43 + 55
72 + 13	14 + 44

The Sum of Two Numbers

Compute:

67 + 32	45 + 56
74 + 15	58 + 31
46 + 53	36 + 32

The Sum of Two Numbers

Compute:

362 + 507	450 + 249
743 + 253	804 + 194
512 + 466	277 + 702

The Sum of Two Numbers

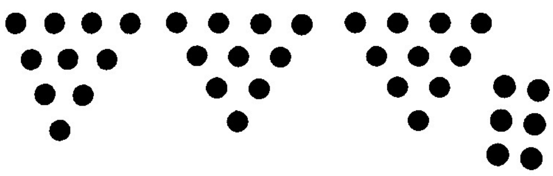
Compute:

127 + 651	504 + 265
1645 + 8253	7064 + 1825
8403 + 1596	3754 + 5005

Mary has a bouquet with 36 flowers. If Jill gives her a bouquet having 28 flowers, how many flowers will Mary have? We may write:

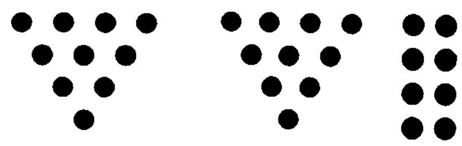
$$36 + 28 = \_\_\_\_\_\_$$

A. Think of 36 as:



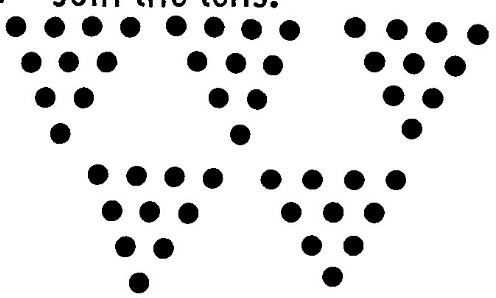
(30 + 6)

B. Think of 28 as:



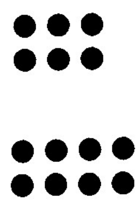
(20 + 8)

C. Join the tens:



(30 + 20)

D. Join the ones:



(6 + 8)

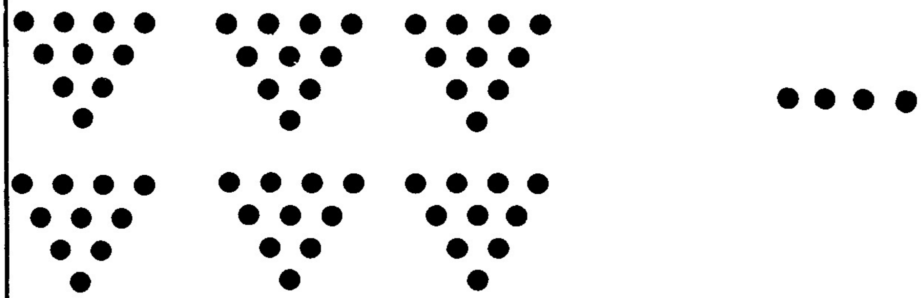
Do you see that we have another set of ten when we join the ones?

Make a ring around a set of ten.

$6 + 8 = 10 + \_\_\_\_\_\_.$

$(30 + 20) + (10 + 4) = \_\_\_\_\_\_.$

E. Join the new set of ten to the other sets of ten. These are the ones.



(30 + 20 + 10) (4)

$$(30 + 20 + 10) + 4 = 60 + 4 = 64$$

F. You can write:

$$\begin{array}{l} 36 + 28 \\ 36 = 30 + 6 \\ 28 = \underline{20 + 8} \\ \quad\; 50 + 14 = 50 + 10 + 4 = 64 \end{array}$$

OR

$$\begin{array}{r} 36 \\ +\ \underline{28} \\ 14 \\ \underline{50} \\ 64 \end{array}$$

Renaming Ones

Mark those for which you would rename 10 ones as 1 ten.

1) 27 + 35	13) 45 + 9
2) 57 + 26	14) 42 + 56
3) 54 + 25	15) 67 + 23
4) 73 + 27	16) 57 + 16
5) 41 + 14	17) 34 + 57
6) 43 + 26	18) 23 + 64
7) 35 + 40	19) 89 + 7
8) 26 + 38	20) 66 + 27
9) 37 + 48	21) 47 + 29
10) 74 + 13	22) 28 + 39
11) 29 + 8	23) 33 + 52
12) 25 + 18	24) 17 + 64

The Sum of Two Numbers

Compute:

63 + 29	58 + 25
54 + 27	49 + 28
65 + 29	23 + 47

The Sum of Two Numbers

Compute:

76 + 18	67 + 19
58 + 7	59 + 38
35 + 46	47 + 9

The Sum of Two Numbers

Compute:

1) 59 + 37 = ______

2) 46 + 28 = ______

3) 37 + 55 = ______

4) 14 + 78 = ______

5) 25 + 69 = ______

6) 38 + 47 = ______

7) 65 + 26 = ______

8) 47 + 37 = ______

9) 63 + 19 = ______

10) 54 + 37 = ______

11) 63 + 28 = ______

12) 15 + 75 = ______

13) 39 + 59 = ______

14) 28 + 69 = ______

15) 47 + 39 = ______

16) 29 + 28 = ______

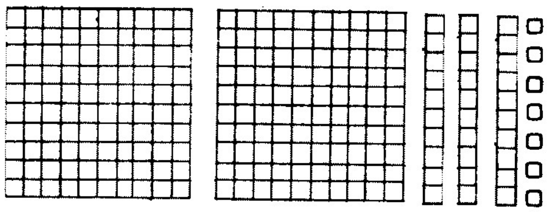
Ann has 237 stamps in her stamp collection.

Her grandmother gave her 126 more stamps.

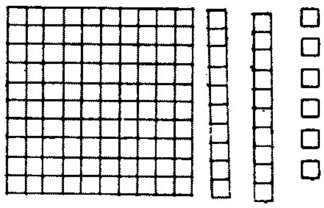
How many stamps does Ann have now?

We write: 237 + 126

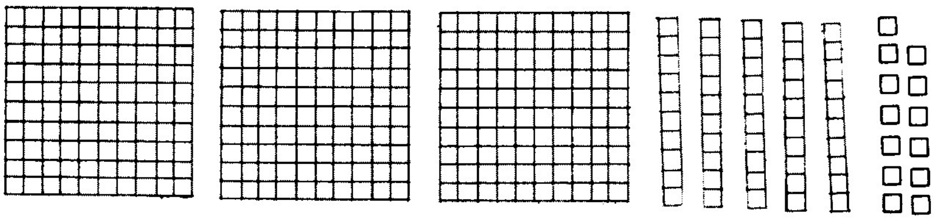
Think of 237 as:



Think of 126 as:



Join the hundreds, then the tens, and then the ones.



Think of 13 as 10 + 3.

$$\begin{aligned} \text{So,}\quad 237 + 126 &= 300 + 50 + 13 \\ &= 300 + 60 + 3 \\ &= 363 \end{aligned}$$

We can write:

$$\begin{array}{rcl} 237 &=& 200 + 30 + 7 \\ 126 &=& \underline{100 + 20 + 6} \\ && 300 + 50 + 13 = 300 + 60 + 3 = 363 \end{array}$$

OR

$$\begin{array}{r} 237 \\ +\ \underline{126} \\ 13 \\ 50 \\ \underline{300} \\ 363 \end{array}$$

Ann has 363 stamps.

The Sum of Two Numbers

Compute:

$\begin{array}{r} 345 \\ +\underline{249} \end{array}$	$\begin{array}{r} 538 \\ +\underline{237} \end{array}$
$\begin{array}{r} 816 \\ +\underline{185} \end{array}$	$\begin{array}{r} 248 \\ +\underline{125} \end{array}$
$\begin{array}{r} 347 \\ +\underline{226} \end{array}$	$\begin{array}{r} 723 \\ +\underline{158} \end{array}$
$\begin{array}{r} 707 \\ +\underline{105} \end{array}$	$\begin{array}{r} 349 \\ +\underline{233} \end{array}$

The Sum of Two Numbers

Compute:

248 +129	394 +283
369 +128	348 +161
764 + 29	586 +123
459 + 26	340 +360

The Sum of Two Numbers

Compute:

204 + 567	348 + 236
753 + 239	546 + 329
728 + 267	806 + 187

The Sum of Two Numbers

Compute:

437 + 243	461 + 279
537 + 256	825 + 137
347 + 268	158 + 629

The Sum of Two Numbers

Compute:

1) 532 + 149

2) 304 + 177

3) 348 + 29

4) 502 + 378

5) 37 + 156

6) 848 + 129

7) 325 + 39

8) 207 + 308

9) 206 + 385

10) 81 + 19

11) 469 + 317

12) 36 + 407

13) 409 + 217

14) 268 + 206

15) 74 + 16

16) 67 + 208

17) 146 + 726

18) 848 + 108

19) 37 + 207

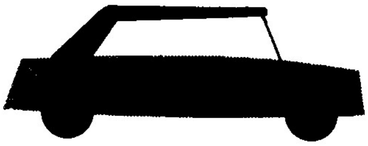
20) 475 + 206

21) 671 + 329

22) 106 + 87

23) 164 + 206

24) 129 + 69



A Vacation Trip

1. Ed's parents took him to visit a park.
   They drove 269 miles the first day.
   The second day they went 317 miles.
   How far did they travel in 2 days?

2. Ed saw 14 different car license plates.
   The next day he saw 9.
   He claims he saw 24 in 2 days.
   Did he? How do you know?

3. On Monday 406 cars went into the park.
   On Tuesday 375 more came in.
   How many visited the park on Monday and Tuesday?

4. There were 14 bears and 8 deer along the road.
   Ed saw them.
   How many animals did he see?

5. Ed ate \$6.38 worth of food.
   His share of the motel bill was \$3.38.
   What did his trip cost his father?

Finding the Sum of Two Numbers

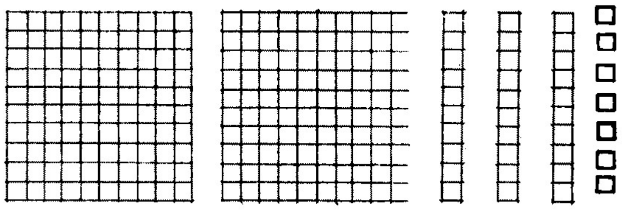
Ann had 237 stamps in her collection.

Her grandmother gave her 191 more stamps.

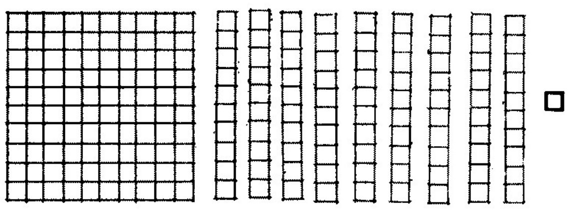
How many stamps does Ann have now?

We write: 237 + 191

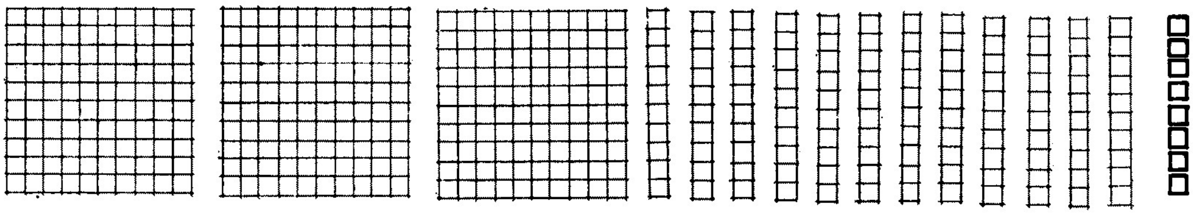
Think of 237 as:



Think of 191 as:



Join the hundreds, then the tens, and then the ones.



Think of 12 tens as 100 + 20.

$$
\begin{aligned}
\text{So,}\quad 237 + 191 &= 300 + 120 + 8 \\
&= 300 + 100 + 20 + 8 \\
&= 400 + 20 + 8 \\
&= 428
\end{aligned}
$$

We can write:

$$
\begin{array}{rcl}
237 &=& 200 + 30 + 7 \\
191 &=& \underline{100 + 90 + 1} \\
 && 300 + 120 + 8 \\
 && 400 + 20 + 8 = 428
\end{array}
$$

OR

$$
\begin{array}{r}
237 \\
\underline{+191} \\
8 \\
120 \\
\underline{300} \\
428
\end{array}
$$

Ann has 428 stamps.

Renaming Ten Tens

1) 300 + 170 + 8 400 + 70 + 8 = 478	6) 400 + 190 + 2 ___ + ___ + ___ = ___
2) 500 + 120 + 7 ___ + ___ + ___ = ___	7) 800 + 130 + 3 ___ + ___ + ___ = ___
3) 100 + 140 + 6 ___ + ___ + ___ = ___	8) 600 + 160 + 6 ___ + ___ + ___ = ___
4) 700 + 150 + 0 ___ + ___ + ___ = ___	9) 100 + 100 + 5 ___ + ___ + ___ = ___
5) 200 + 100 + 8 ___ + ___ + ___ = ___	10) 800 + 190 + 9 ___ + ___ + ___ = ___

Renaming Ten Tens

396 +283	765 +173
493 +215	398 +261
613 +196	384 +263
794 +173	342 +166

Renaming Ten Tens

783 + 643 = ______	495 + 192 = ______
496 + 213 = ______	384 + 571 = ______
764 + 142 = ______	135 + 284 = ______
431 + 176 = ______	327 + 292 = ______

Renaming Ten Tens

Compute the sum.

395 + 282	784 + 192
651 + 263	493 + 276
364 + 273	487 + 161
276 + 550	386 + 253

Uncle Jim's Farm

1. Uncle Jim lives 170 miles from Boys' Town.
   Boys' Town is 268 miles from White City.
   Uncle Jim drove to White City by way of Boys' Town.
   How many miles did he travel?

2. Jane visited the farm.
   She saw 76 cows along the highway.
   Uncle Jim has many horses.
   She counted 52.
   Did she see more than 100 animals?

3. On the farm are 784 hens.
   There are 20 roosters.
   How many chickens does Uncle Jim have?

4. Last year Uncle Jim made $475 in wheat.
   The corn crop was worth $450.
   How much money did he make on grain?

5. The hired man put 170 bales of hay in the barn.
   He did the same thing the next week.
   How many bales of hay did he store?

Renaming the Sum

1) 93 - 48

93 = 80 + 13

2) 47 - 19

47 = ___ + ___

3) 54 - 28

54 = ___ + ___

4) 63 - 27

63 = ___ + ___

5) 97 - 19

97 = ___ + ___

6) 55 - 26

55 = ___ + ___

7) 74 - 56

74 = ___ + ___

8) 21 - 17

21 = ___ + ___

9) 36 - 18

36 = ___ + ___

10) 95 - 27

95 = ___ + ___

11) 71 - 38

71 = ___ + ___

12) 65 - 48

65 = ___ + ___

13) 44 - 19

44 = ___ + ___

14) 52 - 39

52 = ___ + ___

Computing the Difference Between Two Numbers

$75 - 28 =$ ______

$$\begin{array}{rcl} 75 & = & 60 + 15 \\ -\underline{28} & = & \underline{(20 + \;\;8)} \\ & & 40 + \;\;7 = 47 \end{array}$$

$68 - 29 =$ ______

$$\begin{array}{r} 68 \\ -\underline{29} \end{array}$$

$84 - 16 =$ ______

$$\begin{array}{r} 84 \\ -\underline{16} \end{array}$$

$46 - 27 =$ ______

$$\begin{array}{r} 46 \\ -\underline{27} \end{array}$$

$53 - 24 =$ ______

$$\begin{array}{r} 53 \\ -\underline{24} \end{array}$$

$35 - 17 =$ ______

$$\begin{array}{r} 35 \\ -\underline{17} \end{array}$$

$92 - 65 =$ ______

$$\begin{array}{r} 92 \\ -\underline{65} \end{array}$$

$62 - 48 =$ ______

$$\begin{array}{r} 62 \\ -\underline{48} \end{array}$$

Computing the Difference

92 - 85 = ________	94 - 76 = ________
56 - 39 = ________	75 - 58 = ________
25 - 17 = ________	86 - 29 = ________

Computing the Difference

75 - 39 = _______	53 - 34 = _______
64 - 18 = _______	63 - 17 = _______
82 - 24 = _______	81 - 27 = _______

Finding the Difference Between Two Numbers

46 and 19	43 and 25
92 and 47	62 and 44
53 and 26	51 and 26
84 and 35	67 and 39
74 and 39	45 and 16
82 and 25	52 and 19

The Birthday Party

1) Bill invited 35 children to his party.
Yesterday his mother bought a package of balloons.
There were 18 balloons in the package.
Bill wants to give each child a balloon.
How many more ballons does he need ?

2) There are 50 candles in a box.
Bill is 8 years old.
How many candles will not be used?

3) Bill received 29 gifts.
How many children did not bring a gift?

4) John brought Bill a box of marbles.
Bill had 56 marbles.
Now he has 94.
How many marbles were in the box?

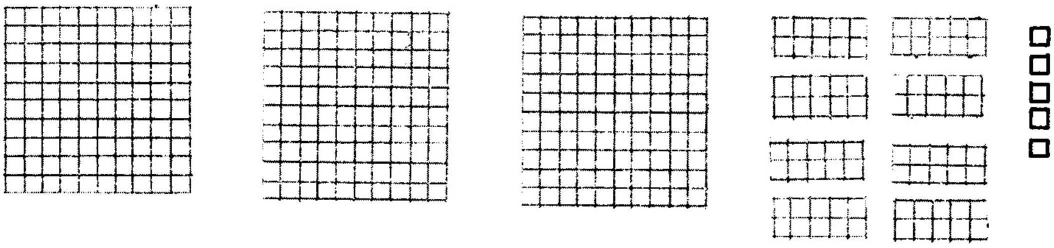
5) There were 19 boys at the party.
How many girls were there?

Finding the Difference Between Two Numbers

Wayne has 385 stamps. He put 152 of them in a stamp book. How many more does he have to put in the stamp book?

We write: 385 - 152 = ________

Think of 385 as: 300 + 80 + 5



We want to remove 152.

Think of 152 as 100 + 50 + 2

Think of removing 152 by ringing 1 set of one hundred, 5 sets of ten, and 2 sets of one.

Write the number of members in the set that is left.

________ hundreds, ________ tens, ________ ones.

We can write this: _____ + _____ + _____ = _____

$$\begin{array}{r} 300 + 80 + 5 \\ -\ (100 + 50 + 2) \\ \hline 200 + 30 + 3 \end{array} = \_\_\_\_\_\_\_\_\_\_$$

Wayne has ________ more stamps to put in his book.

Computing the Difference Between Two Numbers

534 - 123 = _____	758 - 325 = _____
947 - 314 = _____	862 - 531 = _____
428 - 216 = _____	753 - 443 = _____
698 - 264 = _____	589 - 263 = _____

The Difference Between Two Numbers

Compute:

384 - 162 = _____	765 - 334 = _____
987 - 234 = _____	905 - 704 = _____
879 - 235 = _____	598 - 275 = _____
374 - 152 = _____	384 - 163 = _____

1)	448 - 129 448 = 400 + 30 + 18
2)	572 - 227 572 = ___ + ___ + ___
3)	740 - 235 740 = ___ + ___ + ___
4)	571 - 329 571 = ___ + ___ + ___
5)	884 - 366 884 = ___ + ___ + ___
6)	793 - 458 793 = ___ + ___ + ___
7)	366 - 138 366 = ___ + ___ + ___
8)	857 - 248 857 = ___ + ___ + ___

Computing Differences

$$\begin{array}{r} 672 \\ -\underline{235} \end{array}$$

$$\begin{array}{r} 591 \\ -\underline{347} \end{array}$$

$$\begin{array}{r} 894 \\ -\underline{488} \end{array}$$

$$\begin{array}{r} 750 \\ -\underline{237} \end{array}$$

Computing the Difference Between Two Numbers

348 - 129
761 - 356
532 - 318
974 - 538
883 - 647

Finding Differences

Find the difference between each pair of numbers.

1) 391 and 269	6) 289 and 168
2) 994 and 267	7) 678 and 339
3) 792 and 269	8) 387 and 178
4) 545 and 237	9) 963 and 238
5) 434 and 329	10) 852 and 548

Renaming the Sum

1)	327 - 184 327 = 200 + 120 + 7
2)	809 - 582 809 = ___ + ___ + ___
3)	548 - 296 548 = ___ + ___ + ___
4)	739 - 546 739 = ___ + ___ + ___
5)	610 - 250 610 = ___ + ___ + ___
6)	768 - 473 768 = ___ + ___ + ___
7)	346 - 173 346 = ___ + ___ + ___
8)	218 - 192 218 = ___ + ___ + ___

Finding Differences

Find the difference between each pair of numbers.

1) 349 and 184 200 + 140 + 9 (100 + 80 + 4) 100 + 60 + 5 = _____	6) 539 and 284
2) 901 and 290	7) 504 and 242
3) 847 and 283	8) 928 and 296
4) 638 and 293	9) 588 and 297
5) 427 and 295	10) 650 and 180

615 - 283
719 - 237
476 - 285
827 - 265

Computing the Difference

514 - 123
947 - 254
428 - 286
618 - 264
728 - 375

Computing the Difference

871 - 390
708 - 345
557 - 273
469 - 283
673 - 280

What must be renamed?

1)	*347 - 128*	*100*	*10*	*1*
2)	814 - 381	100	10	1
3)	73 - 48	100	10	1
4)	132 - 29	100	10	1
5)	49 - 27	100	10	1
6)	205 - 91	100	10	1
7)	981 - 257	100	10	1
8)	604 - 391	100	10	1
9)	876 - 59	100	10	1
10)	603 - 291	100	10	1
11)	540 - 239	100	10	1
12)	809 - 397	100	10	1

Some Problems to Solve

1. 969 children go to our school. There are 175 in the first grade. How many are not in the first grade?

   ____

   __________ are not.

2. The third grade gave \$3.30 to the Red Cross. This was \$.50 more than the sixth grade collected. How much did the sixth grade give?

   ____

   They gave ____________.

3. The baseball team played 162 games. They lost 91 of them. How many did they win?

   ____

   They won _________ games.

4. Joe is reading a book. The book has 302 pages. He has read 150 pages. How many pages are left to read?

   ____

   He has _______ pages to read.

Problem Solving

Jerry had ______ blocks.
He found ______ blocks.
How many blocks does
Jerry have now?

____

Jerry has ________ blocks.

Beth had ______ apples.
She gave ______ apples to Bill.
How many apples does
Beth have?

____

Beth has ________ apples.

Sue needs ______ bags.
She has ______ bags.
How many more bags does
she need?

____

Sue needs ______ bags.

Mother had ______ cookies.
Father took ______ of them.
How many cookies does
Mother have now?

____

Mother has ______ cookies.

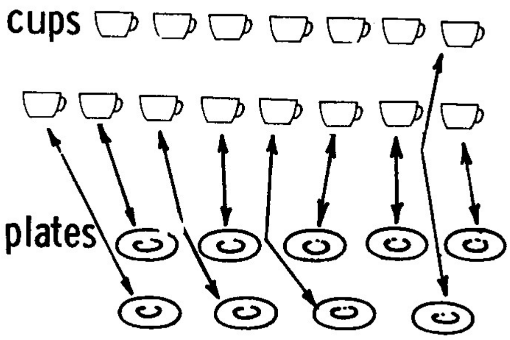
Draw pictures to help solve the problem.

Judy and Susan were playing house.

Judy brought out 9 toy plates.

Susan brought out 15 toy cups.

How many more cups than plates did the girls have?



____

There were ________ more cups than plates.

Bob and Kim went to the store to buy some candy.

Bob got 12 pieces of candy.

Kim got 18 pieces of candy.

Find how many more pieces of candy Kim had than Bob had.

Bob's candy

Kim's candy

____

Kim had ________ more pieces of candy.

Solving Problems

1. Jan and Mark were going to play garage.

   Jan had 12 toy trucks.

   Mark had 21 toy cars.

   How many more cars than trucks were there?

   ____

   There were _________ more cars than trucks.

2. Bill and Glenn were going to the store.

   Bill had 33 cents.

   Glenn had 18 cents.

   How many fewer cents did Glenn have than Bill had?

   ____

   Glenn had ________ fewer cents than Bill had.

3. Susan's mother has 2 dozen pencils.

   Susan has 9 pencils.

   How many more pencils does Susan's mother have than Susan has?

   ____

   Susan's mother has ______ more pencils.

4. Jack ate 12 pancakes.

Father ate 9 pancakes.

Father ate how many fewer pancakes than Jack?

____

Father ate ________ fewer pancakes.

5. Sally and Beth have 22 books.

Bob and Jim have 17 books.

How many more books do the girls have than have the boys?

____

The girls have ________ more books.

6. Twenty-five crows were sitting on a fence.

Forty-one cows were in the field.

How many fewer crows than cows were there?

____

There were ________ fewer crows than cows.

7. Tom caught 21 fish.

Father and Mother each caught 8 fish.

Find how many more fish Tom caught than his parents caught.

____

Tom caught ______ more fish than his parents caught.

8. There were 43 elm and 28 oak trees in the park.

How many more elm trees than oak trees were in the park?

____

There were ______ more elm trees than oak trees.

Solving Problems

Find the answer and write the answer sentence.

1. Miss Brown had 78 sheets of red paper and 29 sheets of blue paper. Find how many fewer sheets of blue paper than red paper Miss Brown had.

2. Miss Brown asked Judy to get the paint brushes. Judy got 32 wide brushes and 19 narrow brushes. How many more wide brushes than narrow brushes did she get?

3. The first box of colored chalk had 43 pieces. The second box of chalk had 28 pieces. How many more pieces were in the first box than in the second box?

4. Miss Brown said that she had 63 pairs of scissors and that Miss Stone had only 38 pairs of scissors. *How many fewer pairs of scissors did Miss Stone have than Miss Brown had?* ____________

5. In the A parking lot there were 247 cars.
In the B parking lot there were 173 cars.
Find how many more cars were in the A lot than in the B lot. ____________

6. There were 97 sport cars in the A lot.
There were 129 standard cars in the A lot.
How many fewer sport cars than standard cars were there in the A lot? ____________

7. There were 67 sport cars in the B lot.
There were 96 standard cars in the B lot.
Find how many more standard cars than sport cars were in the B lot. ____________

8. All together there were 150 station wagons in lots A and B.
There were 31 trucks parked there.
How many more station wagons than trucks were there in the lots? ____________

Problem Solving

Write the equation that will help solve the problem.

Put the ( ) where they belong in your equations.

1.	Judy had 6 records She bought 3 more records. On the way home she broke 2 records. How many records does Judy have now?	$n = (6+3) - 2$ $n = 9 - 2$ $n = 7$
2.	Jim had 2 shirts and his mother bought 3 new shirts for him. His grandmother sent a new shirt for his birthday. Now how many shirts does Jim have?	
3.	Beth borrowed 6 crayons from Susan. That afternoon she returned 4 crayons to Susan. Then she borrowed 3 crayons from Jerry. How many borrowed crayons does Beth have?	
4.	Mrs. White had only 4 eggs so she bought a dozen eggs. How many eggs did she have after she put 6 eggs into a cake?	

5. 14 cars were in the parking lot.

6 cars came to park and 4 cars drove away.

How many cars were in the parking lot then?

6. Mr. Black planted 4 oak trees.

Next he planted 3 maple trees.

Last of all he planted 5 elm trees.

How many trees did he plant?

7. Mother made 8 red aprons and 5 blue aprons.

She gave 4 blue aprons away.

How many aprons does she have now?

8. Sally had 12 cents.

She gave 5 cents to Bill.

Later Father gave 3 cents to Sally.

How many cents does Sally have now?

Set 1

Solving Problems

Write an equation and complete the answer sentence.

1. The popcorn man had 75 bags of popcorn to sell.
   At the end of the day he had 17 bags left.
   How many were sold?

   ____

   _________ bags of popcorn were sold.

2. Bill and Bob counted cars as they walked home.
   Bill counted 67 cars and Bob counted 86 cars.
   How many cars did they both count?

   ____

   They counted _________ cars.

3. In a spelling contest Jim's team made 32 points.
   Henry's team made 17 points.
   By how many points did Jim's team win?

   ____

   Jim's team won by _________ points.

4. Sue picked flowers for her teacher.
   She picked 49 daisies and a dozen tulips.
   How many flowers did she pick?

   ____

   Sue picked _________ flowers for her teacher.

Solving Problems

Write an equation and complete the answer sentence.

1. William has 14 pencils. If his mother gives him 12 more, how many pencils will he have?

____

William will have _________ pencils.

2. James is 21 years old. He is 13 years older than his brother. How old is his brother?

____

His brother is _________ years old.

3. John's teacher has 25 pieces of chalk. If she gives John 8 pieces, how many will she have?

____

She will have _________ pieces of chalk.

4. If Pete spends 25¢ on oranges and 31¢ on bananas, how much will he have spent on fruit?

____

He will have spent ___________ on fruit.

5. The Carpenters' dog Rover just had 10 puppies. Their other dog, Fido, had 6 puppies a month ago. How many puppies did both dogs have?

____

Both dogs had __________ puppies.

6. Mr. Barton is 40 years old. Mr. Hill is 19 years old. How much older than Mr. Hill is Mr. Barton?

____

Mr. Barton is __________ years older than Mr. Hill.

7. If Mr. Jackson catches 14 fish and his wife catches 15 fish, how many fish do they catch in all?

____

They catch ________ fish.

8. Mickey hit 54 home runs. He hit 20 more than Dave. How many home runs did Dave hit?

____

Dave hit __________ home runs.

9. Tim had 13 pears. Jeff gave him 4 apples. How many pieces of fruit does Tim have now?

____

Tim has __________ pieces of fruit.

10. A football club has 30 members. Only 14 members played in their big game. How many members did not play?

____

__________ members did not play.

11. Roger is 18 years old. He has a brother named Max. If the sum of Roger's and Max's ages is 32, how old is Max?

____

Max is __________ years old.

12. Timothy needs 98¢. He has 25¢ now. How much will he have to earn before he has 98¢?

____

He must earn __________.

13. Bill had 50 marbles. He gave Jerome 14 of them. How many marbles does Bill have now?

____

Bill has ________ marbles.

14. Mr. Singer has 40 chickens. He bought a chicken house that can hold 90 chickens. How many more chickens will he need to fill his chicken house?

____

He will need ________ chickens.

15. Patty had some jelly beans. Kim gave her 16 more and now she has 34. How many did she have at first?

____

She had ________ jelly beans.

16. There were 43 trees on one street. On another street there were 56 trees. How many trees were there on both streets?

____

There were ________ trees on both streets.

Solving Problems Set 3

Write an equation and an answer sentence.

1. Mary's sister was 15 years old. Mary was 5 years younger than her sister. How old was Mary?

____

____

2. The boys in Mrs. Jones' class wanted to play baseball. They needed 18 members for two teams. There were only 11 boys on the field. How many more boys were needed before the game could begin?

____

____

3. Carol had to walk 9 blocks to school. Jane had to walk 13 blocks. Which girl had to walk farther? How many more blocks did she have to walk?

____

____

4. Alice's new baby sister weighed only 7 pounds. Alice weighed 35 pounds. How many more pounds did Alice weigh than her baby sister?

____

____

5. Susie baked 2 dozen cookies. She needed 3 dozen for the class party. How many more cookies did she have to bake?

____

____

6. There were 34 children in the class. Nineteen of these were boys. How many girls were in the class?

____

____

7. Sixty-two children had parts in a play. There were 80 parts to be filled. How many more children were needed?

____

____

8. George and Jerry rode their bikes 22 blocks from Jerry's house to the store. On the way home George stopped at his house which was only 7 blocks from the store. How many more blocks did Jerry have to ride to get home?

____

____

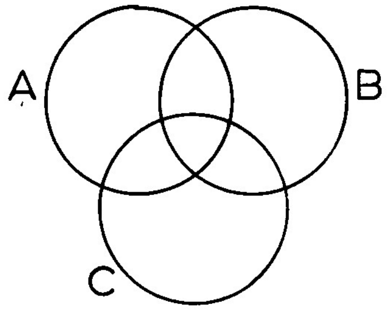
9. Linda has earned 25 cents. She wants to buy a tea set that costs 59 cents. How much more money does she need?

____

____

★ Overlapping Sets

1. Here are three circles A, B, C.



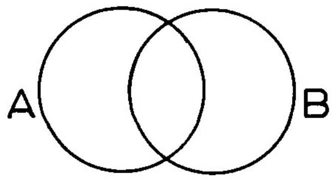
(a) Find a point that is inside all three circles. Mark that point with a dot.

(b) Now find a point that is inside circles B and C but outside circle A. Mark this point with a small X.

(c) Now find a point that is inside circle B but outside circles A and C. Mark this point with a small o.

(d) Now find a point that is outside all of the circles. Mark this point with a small box.

2. Here are two circles.



(a) Put five dots in the region that is inside both circles.

(b) Put three dots inside circle A but outside circle B.

(c) Put four dots inside circle B but outside circle A.

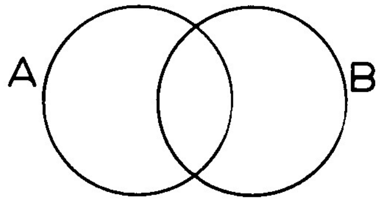
How many dots are in circle A? ________

How many dots are in circle B? ________

How many dots are in the picture all together? ________

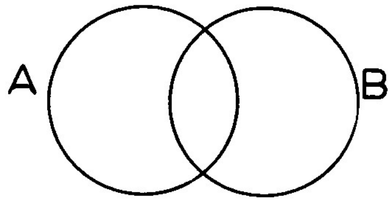
How many dots are both in circle A and in circle B? ________

3. Can you put 3 dots in this picture so that there are exactly 2 dots in circle A and 2 dots in circle B? ________



4. What is the smallest number of dots you can put in this picture and still have five dots in circle A and four dots in circle B?

____



5. It is rainy today, so each pupil in Miss Black's class has brought either a raincoat or an umbrella. Six raincoats and seven umbrellas are hanging in the cloak-room. Two pupils brought both an umbrella and a raincoat. How many pupils are in Miss Black's class? ________

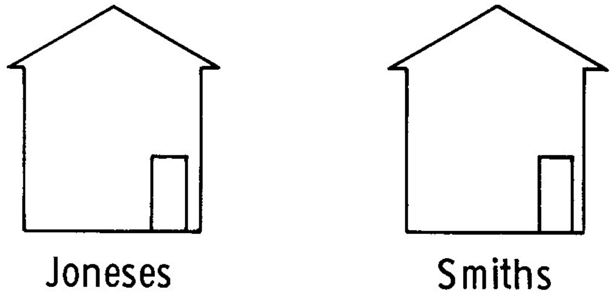
6. Mr. Adams has nine birds in his pet shop. Five of them are brightly colored and five of them have good singing voices. I would like to buy a brightly colored bird with a good singing voice. Do you think Mr. Adams has one? ________

Why? ____

____

7. The Smiths and the Joneses are next door neighbors. The Smiths have 5 children, 3 of whom are girls. There are 6 boys in the two families. The Joneses have 4 children. How many of the Jones children are girls? ________

Here are the two houses. Put in X's for boys and O's for girls. This will help you find the answer.

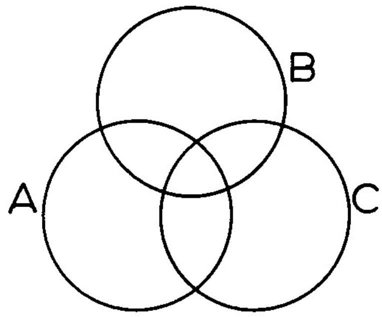


8. Here are three circles A, B, and C. Can you put in three dots so that:

circle A will have one dot in it?

circle B will have two dots in it?

circle C will have three dots in it?



★ Sequences

1. $1 + 2 =$ _____

   $1 + 2 + 3 =$ _____

   $1 + 2 + 3 + 4 =$ _____

   $1 + 2 + 3 + 4 + 5 =$ _____

2. $9 + 8 =$ _____

   $9 + 8 - 7 =$ _____

   $9 + 8 - 7 - 6 =$ _____

   $9 + 8 - 7 - 6 + 5 =$ _____

   $9 + 8 - 7 - 6 + 5 + 4 =$ _____

   $9 + 8 - 7 - 6 + 5 + 4 - 3 =$ _____

   $9 + 8 - 7 - 6 + 5 + 4 - 3 - 2 =$ _____

3. $8 + 7 =$ _____

   $8 + 7 - 3 =$ _____

   $8 + 7 - 3 + 1 =$ _____

   $8 + 7 - 3 + 1 - 9 =$ _____

4. $7 + 8 - 6 - 7 =$ _____

   Let's change the order of the numbers:

   $7 - 7 + 8 - 6 =$ _____

   Is the answer the same? __________

5. Let's try that again.

$9 + 6 + 4 =$ _____

Now change the order of the numbers:

$6 + 4 + 9 =$ _____

Is the answer the same? ________

Which order do you like better? ________

Why? ____

6. $7 + 9 + 3 + 1 =$ _____

Can you change the order of the numbers so that the addition is easier? ________

How? ____

7. $8 + 5 - 7 - 4 =$ _____

8. $3 + 9 + 7 - 1 =$ _____

9. $3 + 8 + 4 + 3 =$ _____

10. There are 2 planets closer to the sun than the earth. There are 6 planets farther from the sun than the earth. How many planets are there all together? (Do not forget the earth; it is a planet too!)

____

11. Last year Mr. Frank had these trees in his yard:

4 maples

5 oaks

7 elms

3 birches

During the winter a storm knocked down 2 birches and this summer the Dutch elm disease killed 4 of the elms. How many trees does Mr. Frank have now? ______________

12. Each day a jet airplane flies from New York to Chicago and then from Chicago to San Francisco. One day 30 passengers rode all the way from New York to San Francisco, 80 passengers rode only as far as Chicago, and 70 passengers got on at Chicago and rode to San Francisco.

How many people rode on the plane that day? ____________

How many people were on the plane between New York and Chicago? ________________

How many people were on the plane between Chicago and San Francisco? ______________

★Sums

1. Here is a set of numbers:

3, 2, 9, 6

Find a subset of these numbers whose sum is 8. Cross out the numbers you have chosen and write them into this equation.

_______ + _______ = 8.

The sum of the numbers left over should be 12. Write them in:

_______ + _______ = 12.

2. Do this one the same way. Cross out the numbers as you put them into the equations. Use each number only once.

1, 7, 5, 8

_______ + _______ = 6

_______ + _______ = 15

3. Now do this one:

8, 4, 3, 9, 4

_______ + _______ = 17

_______ + _______ + _______ = 11

Can you find a subset of <u>three</u> numbers that add up to 17, leaving a subset of <u>two</u> numbers that add up to 11?

_______ + _______ + _______ = 17

_______ + _______ = 11

4. This time write in your own plus signs.

7, 8, 2, 6, 1

____________________ 14

____________________ 10

Find another way to do this one:

____________________ 14

____________________ 10

5. Now do these the same way:

(a) 5, 4, 8, 3

____________ 8

____________ 12

(b) 9, 8, 3, 6

____________ 17

____________ 9

(c) 6, 5, 8, 4, 7

____________ 15

____________ 15

(d) 9, 8, 7, 6, 2

____________ 17

____________ 15

6. Look back at Problem 5. How many ways can you find to do each of those examples.

(a) ________ (b) ________

(c) ________ (d) ________

7. Here are some with three equations to fill in.

Remember to use each number only once.

(a) 7, 2, 9, 3, 6, 6

________________ = 9

________________ = 11

________________ = 13

(b) 13, 5, 9, 3, 2, 9

________________ = 18

________________ = 15

________________ = 8

(c) 8, 6, 9, 8, 5, 9

________________ = 14

________________ = 15

________________ = 16

8. Make two equations out of these numbers. Use each number once and only once. If you like you may put two or more numbers on the right side of the equation.

1, 2, 3, 4, 5, 6, 7

__________ = __________

__________ = __________

9. This time make three equations. Remember to use each number once and only once.

5, 13, 7, 5, 9, 16, 13

__________ = __________

__________ = __________

__________ = __________

★Magic Squares

1. Here is an array of numbers.

1	5	2	8
3	1	8	
4	2	2	

Add the numbers in the rows and put the sums you get in the boxes at the right. The first one is done for you. Now add the numbers in the columns and put the sums in the circles along the bottom.

What is the sum of the numbers in the boxes? ________

What is the sum of the numbers in the circles? ________

Now look back at the array.

What is the sum of the nine numbers in the array? ________

Are the three sums you have just found all the same? ______

Why? ____

____

2. Here is an array with some numbers missing. Fill in the missing numbers so that the row sums and the column sums are all correct.

0		1	1
			2
1		1	3
1	2	3	

3. Now try this one:

7	7		20
	8		20
		9	20
20	20	20	

4. How many ways are there to do this one? ____________

9			24
	9		24
		9	24
24	24	24	

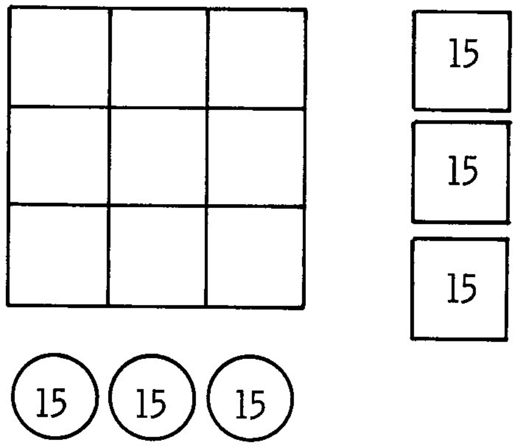
5. Here is one with four rows and four columns.

2	4	6		20
	6		0	20
8			9	20
	7	7		20
20	20	20	20	

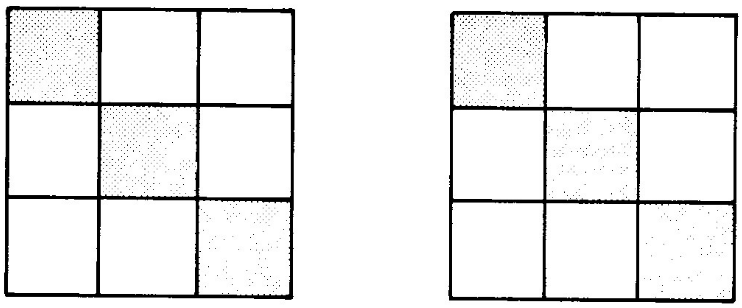
6. To do this one use each of the numbers

1, 2, 3, 4, 5, 6, 7, 8, 9

once and only once.



7. Two subsets of an array are called <u>diagonal subsets.</u> In the arrays below the diagonal subsets are shaded:



Now do Problem 5 in such a way that the sums of the diagonal subsets are also to equal to 15.

The array you will find is called a "magic square."

★Roman Numeral Arithmetic

In this lesson we are going to learn to do some arithmetic with Roman numerals. You have probably seen Roman numerals on clocks or in books.

Here are the first twelve:

		5	V	10	X
1	I	6	VI	11	XI
2	II	7	VII	12	XII
3	III	8	VIII		
4	IIII	9	VIIII		

This is the way the numerals were written in the early days of Rome. In later times 4 was sometimes written IV and 9 was sometimes written IX. In this lesson, however, we will write 4 with four I's and 9 with a V and four I's in the manner of the early Romans. This will make the arithmetic easier.

Let's begin by writing some more Roman numerals. The Romans used these letters:

I	for	1
V	for	5
X	for	10
L	for	50
C	for	100

They also had some more letters for greater numbers, but we won't talk about those now. To find out what number a Roman numeral stands for, you just add all the numbers that the letters stand for. For example:

$$XI = 10 + 1 = 11$$

Here are some other examples:

$$XVI = 10 + 5 + 1 = 16$$

$$XIII = 10 + 1 + 1 + 1 = 13$$

$$CLXXV = 100 + 50 + 10 + 10 + 5 = 175$$

1. What numbers do these Roman numerals stand for?
   Write out the sum as shown above.

   VIII = ________________

   LXV = ________________

   CXI = ________________

   XXXVI = ________________

   CCLXII = ________________

2. Here is a simple addition in Roman numerals:

   $$VI + II = VIII$$

   To add VI and II all you have to do is put together all the letters in both numerals. Think about why this is so. Here are some more additions that can be done in this simple way:

XI + I = ______

XXV + II = ______

X + XVI + III = ______

LX + XV = ______

Now check your work by changing the Roman numerals into your everyday numbers.

3. The early Romans always wrote the letters in order: first the C's, then the L's, then the X's, then the V's, then the I's. Sometimes to do addition you have to rearrange the letters. Try these. The first one is done for you.

XII + VI = <u>XVIII</u>

XII + V = ______

XXIII + VI = ______

LXI + VII = ______

CXV + LI + X = ______

4. Now try these. The first one is done for you.

CXI + LVI = <u>CLXVII</u>

CXXII + LVI = ______

V + CCXIII + LI = ______

LII + XXXI + CV = ______

5. So far we have just put together all the letters in the numbers to be added. Sometimes addition is a little more complicated. If, for example, we just put together the letters in this addition example:

III + II

we get IIIII. But the Romans never wrote five I's together. Instead, they wrote V. Here are the rules the Romans used:

(1) No numeral ever has more than four I's in it.

(2) No numeral ever has more than one V in it.

(3) No numeral ever has more than four X's in it.

(4) No numeral ever has more than one L in it.

(5) No numeral ever has more than four C's in it.

6. The Romans also used these letters:

D for 500

M for 1000

What do you think the Romans' rule for D was?

(6) No numeral ever has more than ______ D in it.

7. Now use these rules when you do the following additon examples. The first two are done for you.

III + II = ___V___

XIII + III = ___XVI___

XXXIIII + III = __________

CII + XI + LII = __________

CXII + XXII + I = ________

DX + DI = ________

8. Now do these:

V + V = ________

CV + XVI + V = ________

VI + XV = ________

LV + XV + VII = ________

MCXI + V + XVII = ________

VIII + III = ________

9. Now do these:

XX + XXXV = ________

LV + CLV = ________

XXII + XXXIII = ________

MLV + XV + LVII = ________

CLVI + LXII + LII = ________

XXX + XV + DVI = ________

10. Our numerals 1, 2, 3, 4, ... are called Arabic numerals. Write these problems in Roman numerals. Then do them in Roman numerals. Check your answer by adding the regular way. The first one is done for you.

27 + 18 = 45

XXVII + XVIII = XXXXV

55 + 24 = ______

______ = ______

63 + 14 = ______

______ = ______

107 + 86 = ______

______ = ______

36 + 335 = ______

______ = ______

1247 + 115 = ______

______ = ______

11. Now try some subtraction. Figure out the rules for yourself.

XXIII - XII = ______

VIIII - III = ______

XVII - XVI = ______

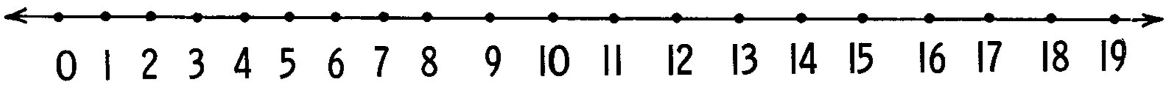
X - V = ______

X - VII = ______

L - XX = ______

Describing Points by Numbers

1.



Mark points A, B, C, D.

Point A has the coordinate 10.

Point B has the coordinate 3.

Point C has the coordinate 17.

Point D has the coordinate 12.

Complete the following:

The length of $\overline{AB}$ is (10 - 3) units or ________ units.

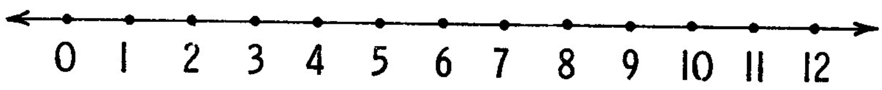
The length of $\overline{BC}$ is (________) units or ________ units.

The length of $\overline{CD}$ is (________) units or ________ units.

The total number of units in $\overline{AB}$, $\overline{BC}$, and $\overline{CD}$ is ________.

The distance from A to D is ________ units.

2.



Mark points A, B, C, D.

Point A has the coordinate 2.

Point B is 3 units to the right of A.

Point C is 5 units to the left of B.

Point D is 11 units to the right of C.

B has the coordinate ________.

C has the coordinate ________.

D has the coordinate ________.

The length of $\overline{BC}$ is ________ units.

The length of $\overline{AD}$ is ________ units.

Motion on a Line

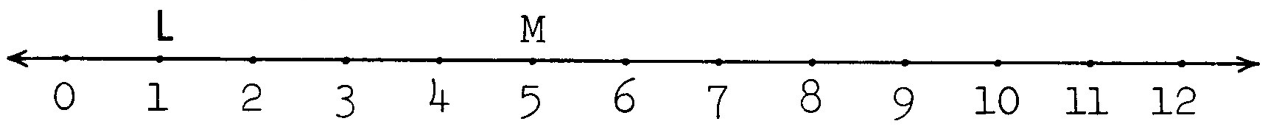
1. When George goes home from school he passes a long fence. The picture shows the fence. The dots are the fence posts.

George likes to describe the posts with whole numbers.
He describes post A by the number 4.
He describes post B by the number 5.

Draw a ring around the post he describes with the number 0.
Can George describe all the posts with whole numbers? ________

Sally does not like the way George describes the posts.
She says the numbers that describe A and B should be 6 and 7.
Put a cross on the post Sally describes by the number 0.
Can Sally describe all the posts by whole numbers? ________

2. Pretend this number line shows a railroad track.



A train is on the track.

Its ends are at L and M.

Color red the track where the train is standing.

Point L is described by the number ________.

Point M is described by the number ________.

The length of the train is ________ units.

The train moves 6 units to the right.

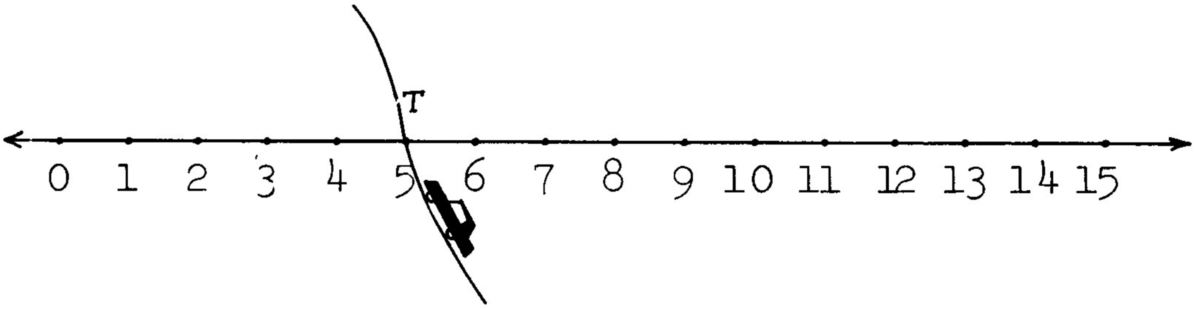
Call the new endpoints P and Q.

Point P is described by number ________.

Point Q is described by number ________.

Color green the track where the train is now.

3. Pretend the number line is a railroad track.



A train is on the track.

Its ends are described by numbers 2 and 9.

Color the track where the train is standing.

A road crosses the track at T.

A car is on the road.

Can the car cross the track? ________

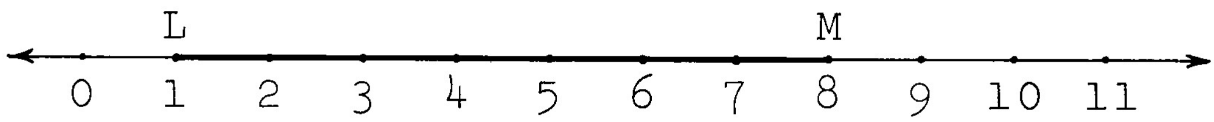
The train moves to the right.

The front of the train is described by the number 13.

The back of the train is described by the number ________.

Can the car now cross the track? ________

4. Pretend this number line shows a railroad track.



A train is on the track.

Its ends are at L and M.

A road crosses the track at a point X.

Point X is described by the number 51.

Can you imagine the point X? ________

The train moves 46 units to the right and stops.

Its ends are described by the numbers ________ and ________.

Has the train crossed the road? ________

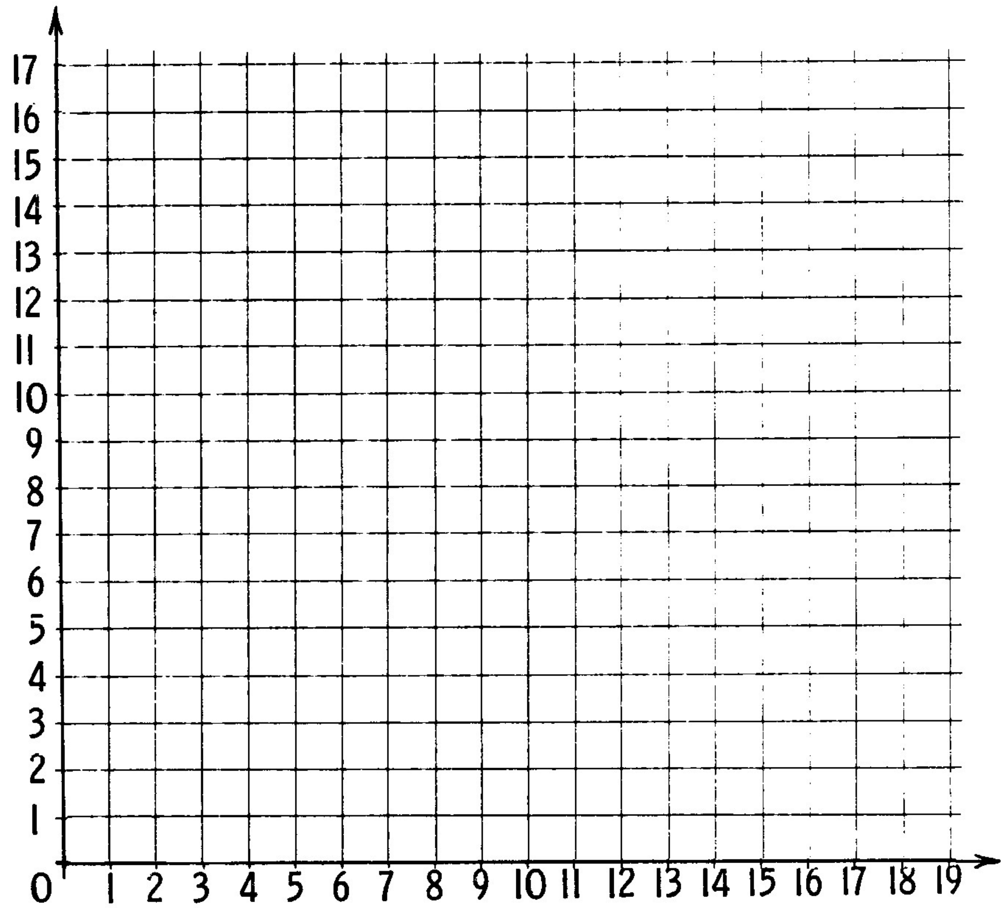
Coordinates in a Plane

1. Draw segments joining the following points in order:

   (10, 4) (10, 6) (12, 6) (12, 7) (11, 7) (12, 7) (12, 8)

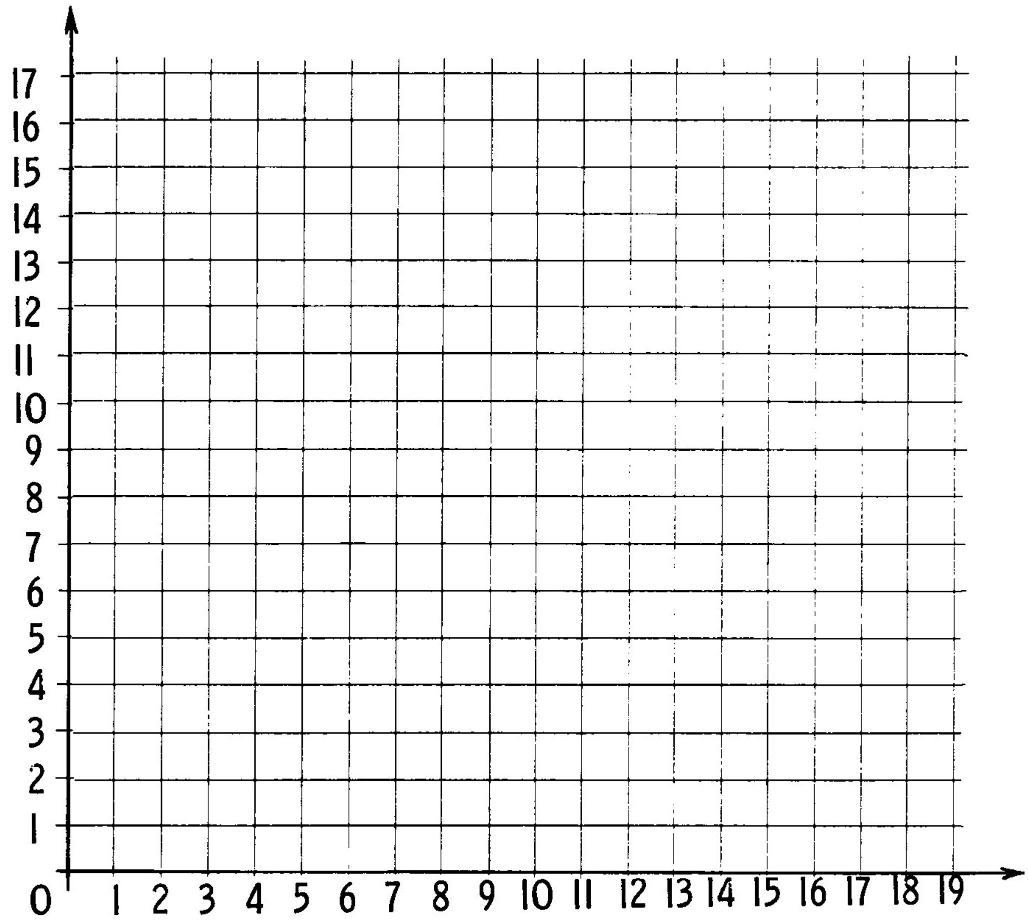
   (13, 8) (12, 10) (13, 11) (13, 12) (12, 13) (8, 13) (7, 12)

   (7, 8) (8, 6) (8, 4).



What did you find? ____________________

2.

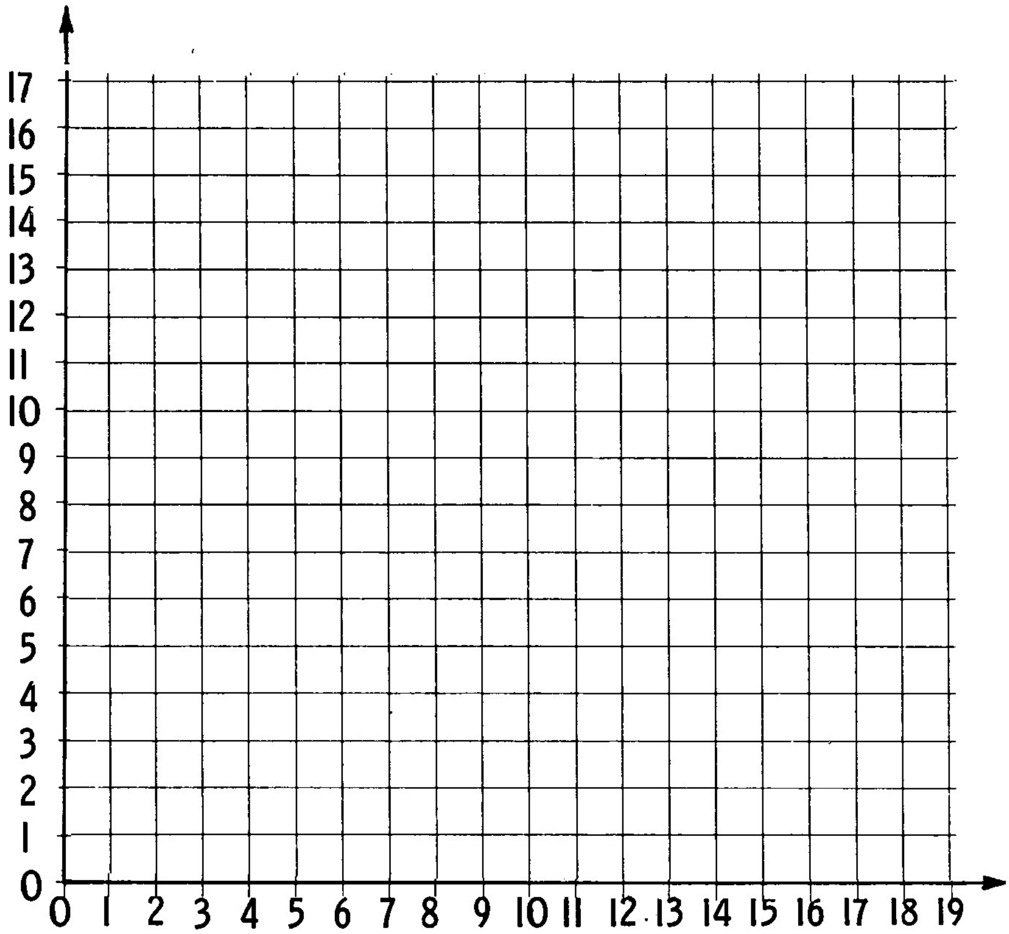


Use your ruler to draw the line through the points (6, 1) and (2, 5).

Other points which seem to lie on this line are (,), (,),

(,), (,), (,), and (,).

3.



Use your ruler to draw the line through the points (4, 1) and (12, 13).

Some other points which seem to lie on this line are (,) and (,),

also (,) and (,).

4. Draw segments joining the following points in order :

(2, 13) (2, 9) (2, 11) (4, 11) (4, 9) (4, 13).

Draw segments joining the following points in order:

(7, 12) (5, 12) (5, 10) (6, 10) (5, 10) (5, 8) (7, 8).

Draw segments joining the following points in order:

(8, 11) (8, 7) (10, 7).

Draw segments joining the following points in order:

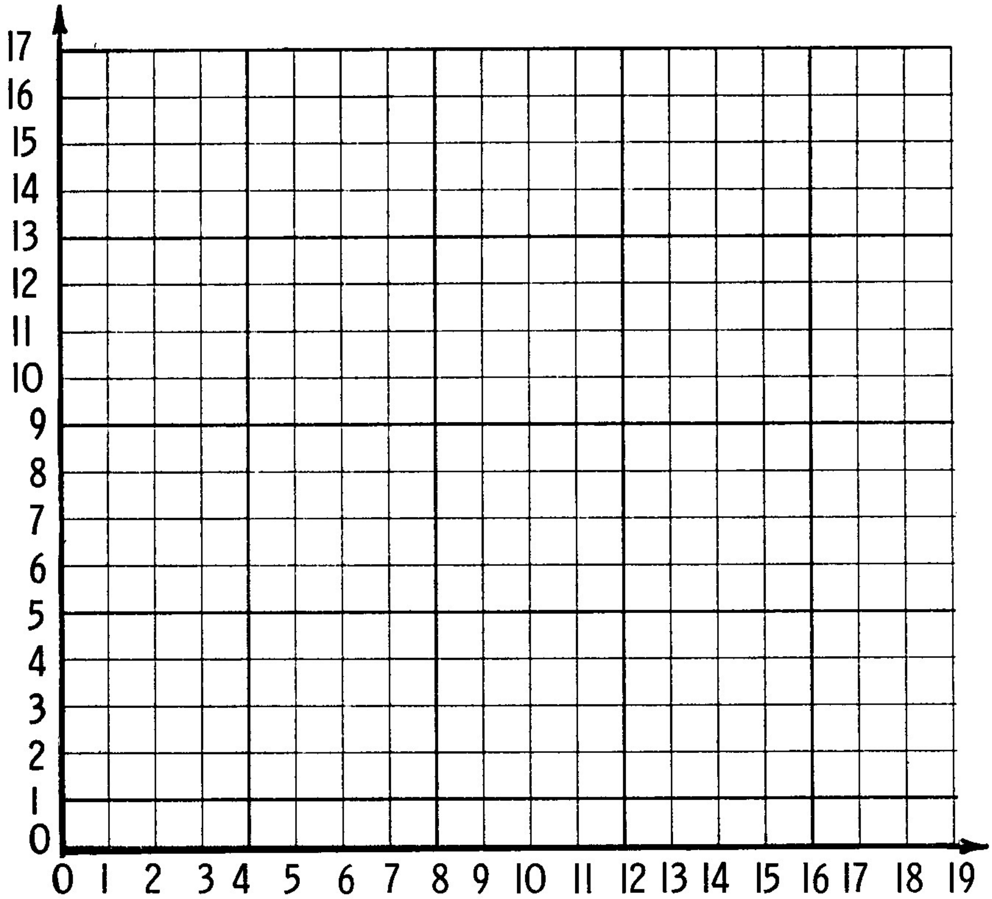
(13, 6) (11, 6) (11, 10).

Draw segments joining the following points in order:

(15, 5) (16, 5) (17, 6) (17, 8) (16, 9) (15, 9)
(14, 8) (14, 6) (15, 5).

What did you find? ______________________________

4.


0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

5. Give numbers describing A, B, C, D.

A(,), B(,), C(,), D(,).

Draw $\overline{AC}$ and $\overline{BD}$. Call their point of intersection E.

Give numbers describing E. (,)

The length of $\overline{BD}$ is ________ units.

Draw $\overrightarrow{AD}$ and $\overrightarrow{BC}$.

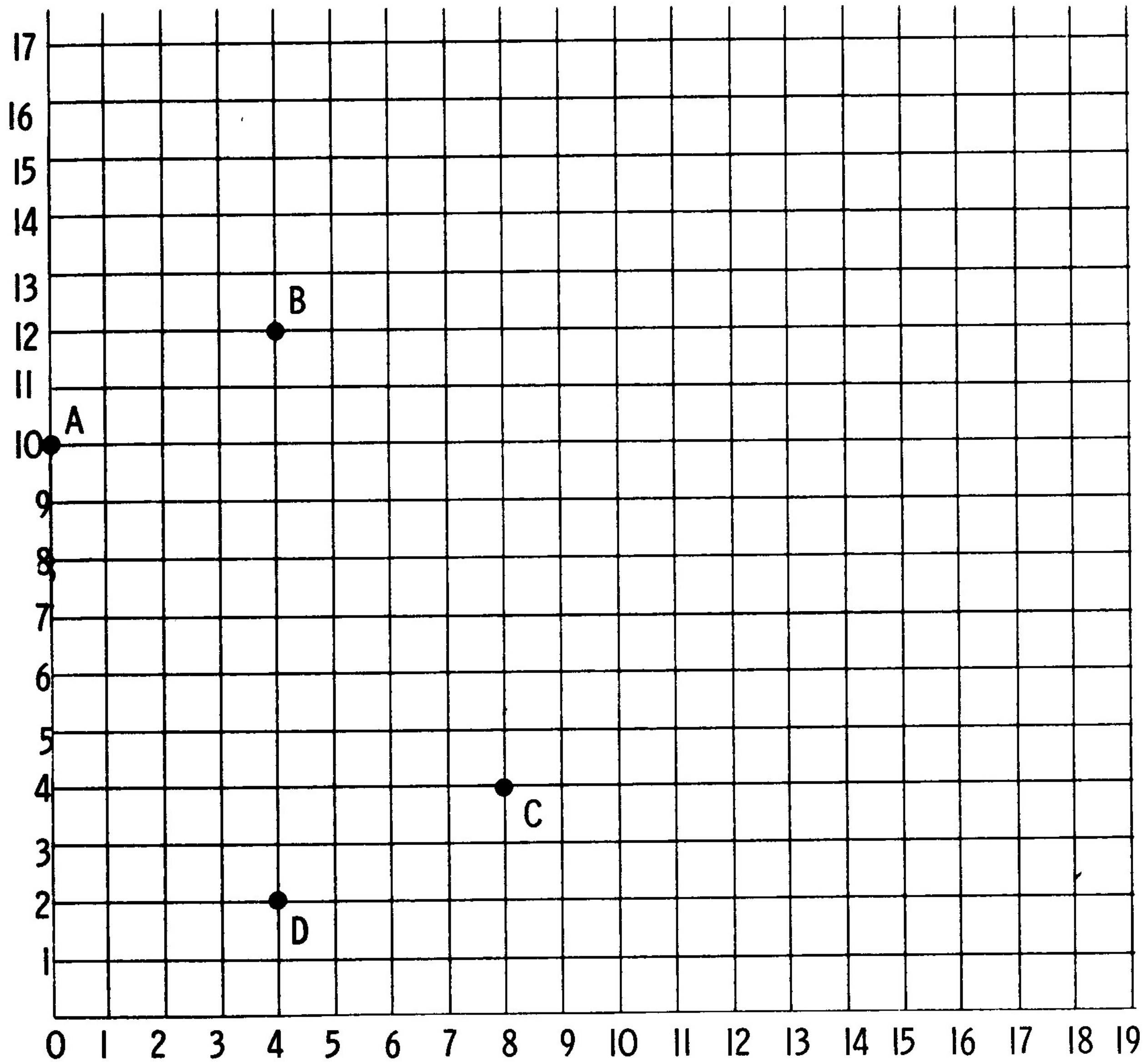
Give numbers describing the points where $\overrightarrow{AD}$ and $\overrightarrow{BC}$ meet the bottom line. (,) (,)

Draw $\overline{AB}$ and $\overline{CD}$. What kind of figure is ABCD? __________

Draw $\overleftrightarrow{CD}$.

Give numbers describing the point where $\overleftrightarrow{CD}$ meets the bottom line. (,).

5.


A
B
C
D
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

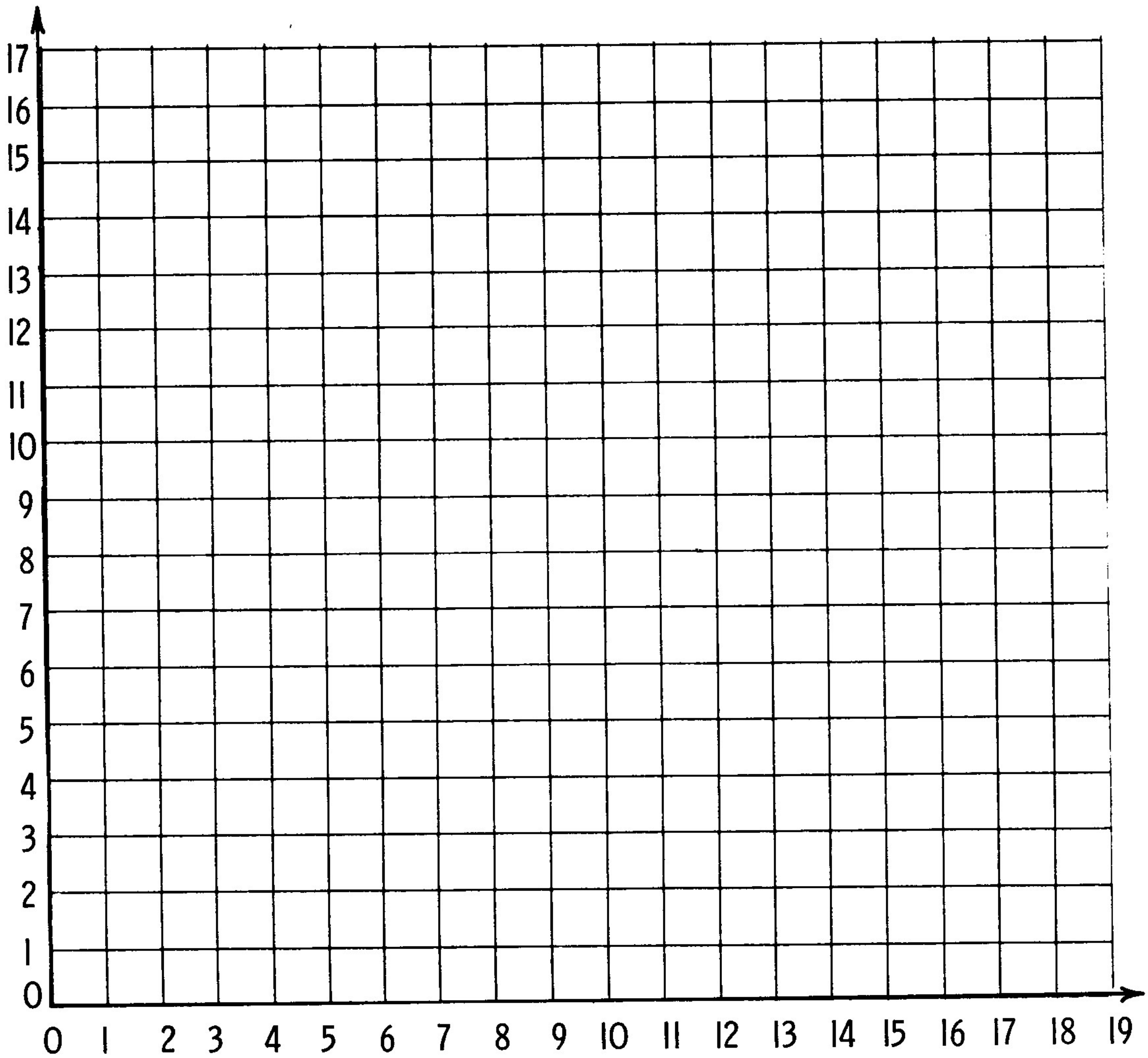
6. Make a figure on the facing page.

   Use only segments whose endpoints are described by whole numbers.

   Use the numbers to tell how to draw your figure.

   See if a classmate can follow your directions without seeing your figure.

6.



A. Look at the figure on the next page.

The numbers describing A, B, C are
A (,), B(,), C(,).

Move 7 units to the right and 4 units up from each point.

Call these new points P, Q, R.

The numbers describing P, Q, R are
P(,) Q(,), R(,).

Mark P, Q, R.

Draw $\overline{PQ}$, $\overline{QR}$, and $\overline{RP}$.

Make a tracing of $\triangle$ABC.

Does this tracing exactly fit on $\triangle$PQR? ________

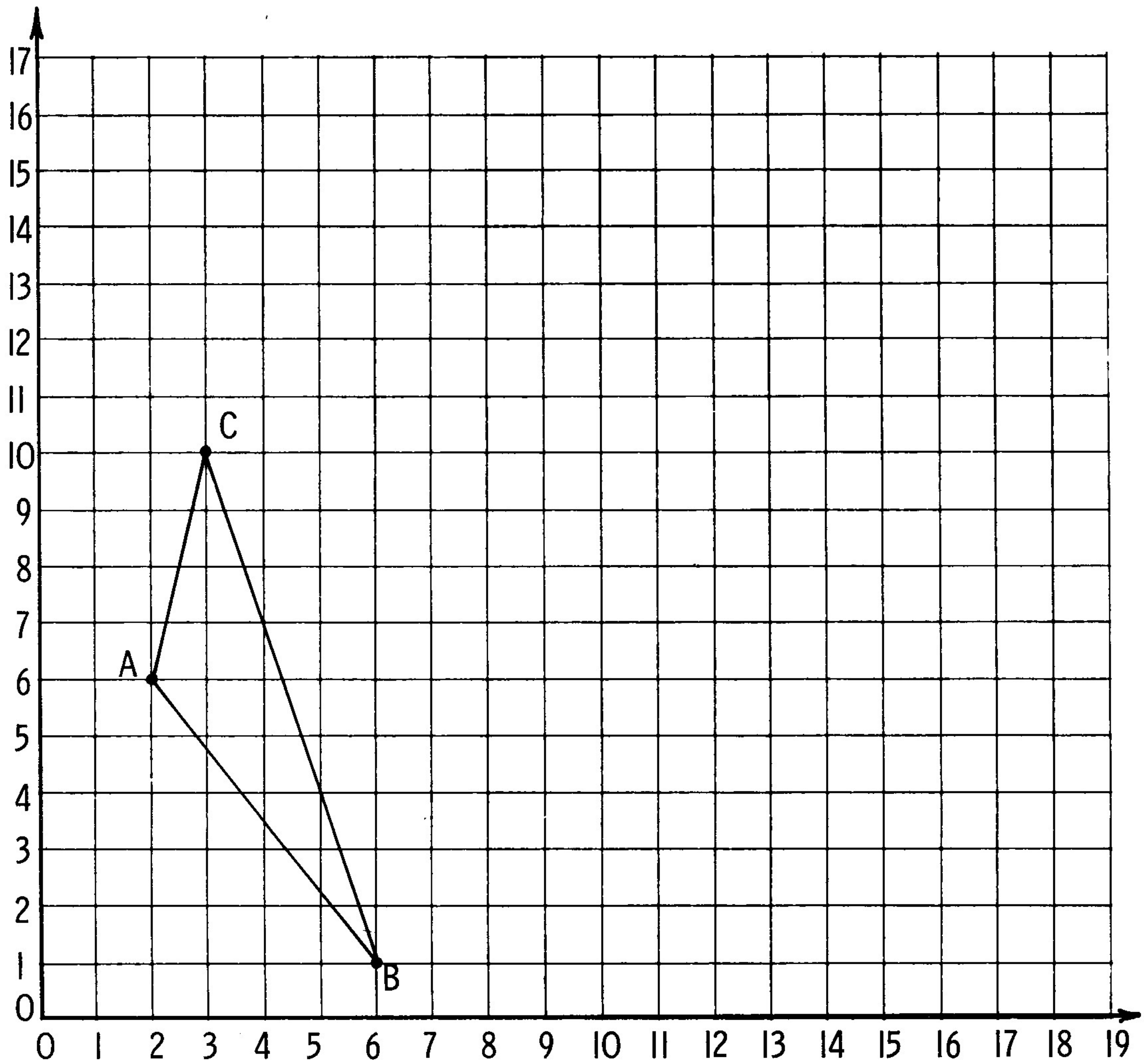
Do you find $\triangle$ABC congruent to $\triangle$PQR? ________

Complete the table below to show congruent sides and angles.

$\overline{AB}$	
$\overline{BC}$	
	$\overline{PR}$
$\angle$ABC	
	$\angle$RPQ
$\angle$BCA	

Pictures in the Plane

A.



1. The pairs of numbers describing A, B, C, D are
A(2, 12) B(0, 7) C(7, 3) D(5, 9).

Points P, Q, R, S are found by adding 5 to the first number in each pair.
The second numbers are not changed.
The pairs of numbers describing P, Q, R, S are
P(,), Q(,), R(,), S(,).

Mark A, B, C, D, P, Q, R, S on the opposite page.

Draw quadrilateral ABCD.

Draw quadrilateral PQRS.

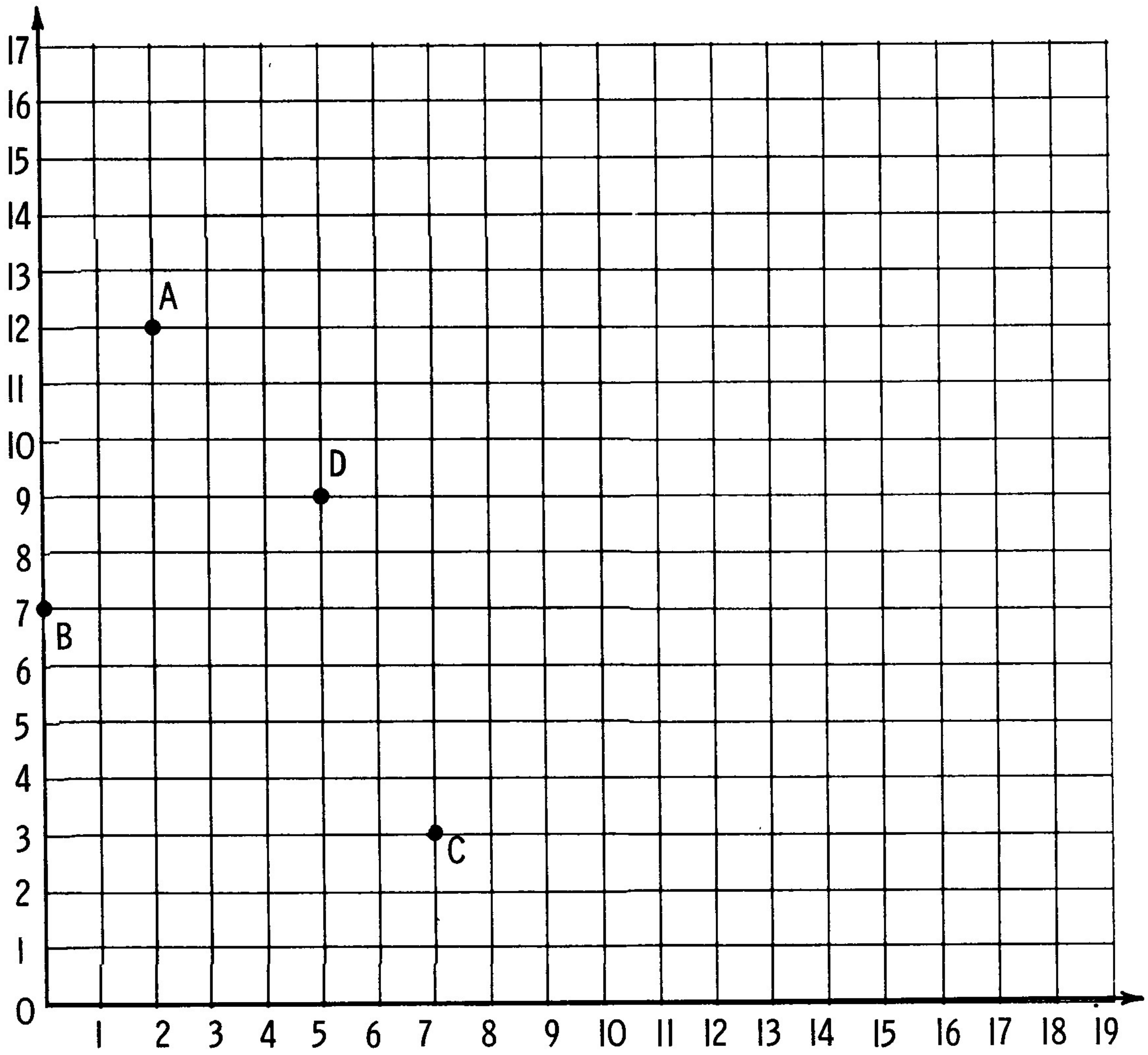
Make a tracing of ABCD.

Can you fit the tracing on PQRS? ________

Is ABCD congruent to PQRS? ________

Pictures in the Plane

1.



2. The pairs of numbers describing A, B, C, D, E are

A(1, 9) B(5, 7) C(2, 2) D(11, 1) E(6, 13).

Points P, Q, R, S, T are found by adding 6 to the first number in each pair and 2 to the second number.

The pairs of numbers describing P, Q, R, S, T are

P(,), Q(,), R(,),

S(,), T(,).

Mark all these points on the opposite page.

Draw $\overline{AB}$, $\overline{BC}$, $\overline{CD}$, $\overline{DE}$, $\overline{EA}$.

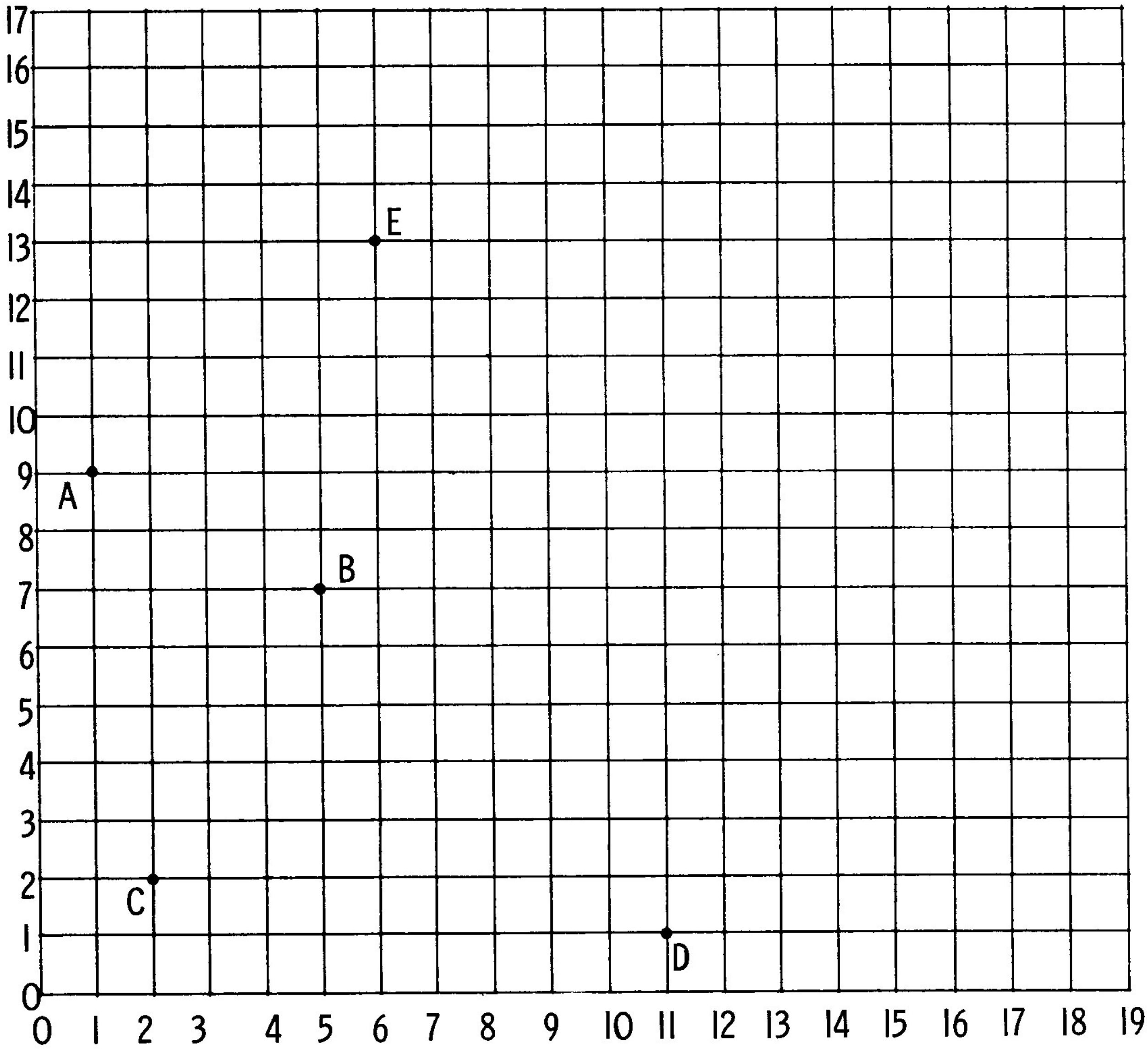
Draw $\overline{PQ}$, $\overline{QR}$, $\overline{RS}$, $\overline{ST}$, $\overline{TP}$.

Make a tracing of ABCDE.

Can you fit the tracing on PQRST? ________

Is ABCDE congruent to PQRST? ________

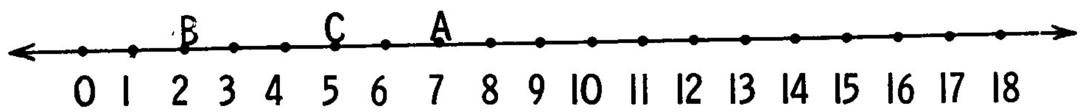
2.


17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
A
B
C
D
E

195

Enlarging Segments on the Number Line.

1. Points A, B, C are shown on the number line.



The number describing point P is two times the number for A.
The number describing point Q is two times the number for B.
The number describing point R is two times the number for C.

Mark points P, Q, R on the line.

Show below the number describing each point.

A	B	C	P	Q	R

Show below the number of units in each segment.

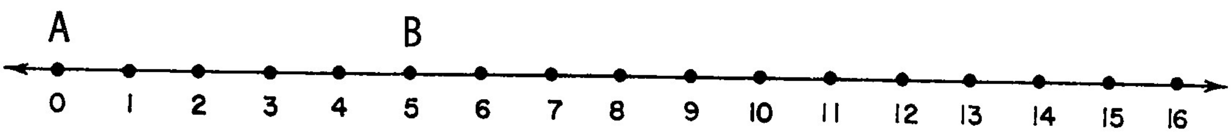
$\overline{AB}$	$\overline{BC}$	$\overline{AC}$	$\overline{PQ}$	$\overline{QR}$	$\overline{PR}$

Is $\overline{PQ}$ twice as long as $\overline{AB}$? ________

Is $\overline{QR}$ twice as long as $\overline{BC}$? ________

Is $\overline{PR}$ twice as long as $\overline{AC}$? ________

2. Look at the number line.



Color $\overline{AB}$ with a red crayon.

Multiply the numbers describing A and B by 3.

These new numbers are ________, ________.

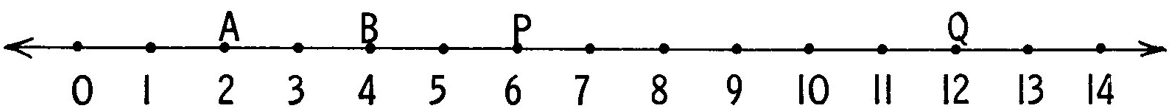
Call the new points P and Q.

Mark P and Q on the line.

Color $\overline{PQ}$ with a blue crayon.

The length of $\overline{PQ}$ is ________ times the length of $\overline{AB}$.

3. Look at the number line.

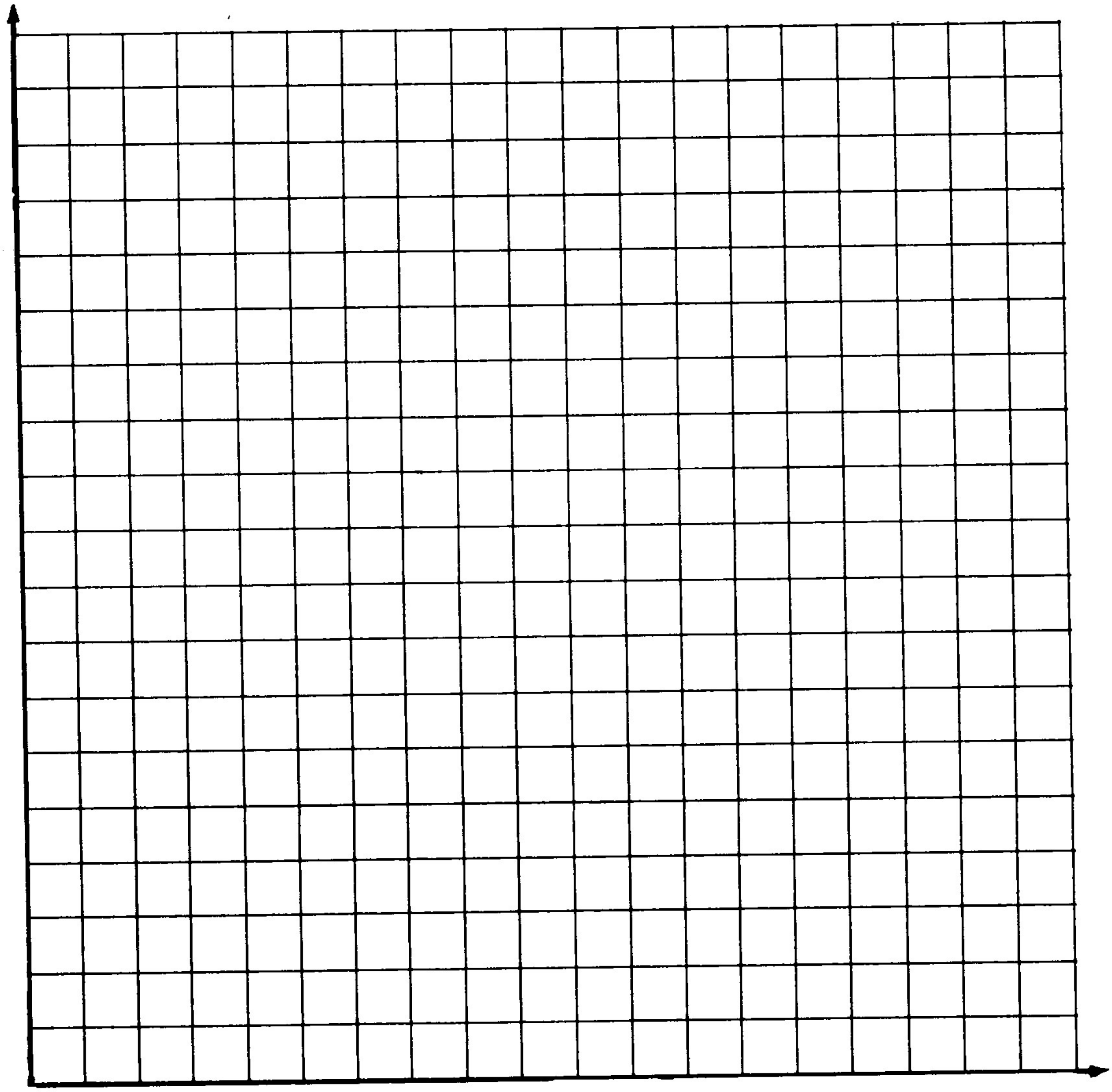


The number describing P is ______ times the number describing A.

The number describing Q is ______ times the number describing B.

The length of $\overline{PQ}$ is ______ times the length of $\overline{AB}$.

Are the three numbers you wrote in the blanks the same? ________



Enlarging Pictures

A. Look at the figure on page 201.

The coordinates of A, B, C are

A(,), B(,), C(,).

Multiply all the numbers by 2.

Call the new points S, T, W.

The coordinates of S, T, W are

S(,), T(,), W(,).

Mark the points S, T, W.

Draw $\triangle$STW.

Draw a ring around each correct answer below.

Is $\overline{ST}$ twice as long as $\overline{AB}$? Yes No

Tell how you found out.

Is $\overline{SW}$ twice as long as $\overline{AC}$? Yes No

Is $\overline{WT}$ twice as long as $\overline{CB}$? Yes No

Make a tracing of $\triangle$ABC.

Is $\triangle$ABC congruent to $\triangle$STW? Yes No

Is $\angle$TSW congruent to $\angle$BAC? Yes No

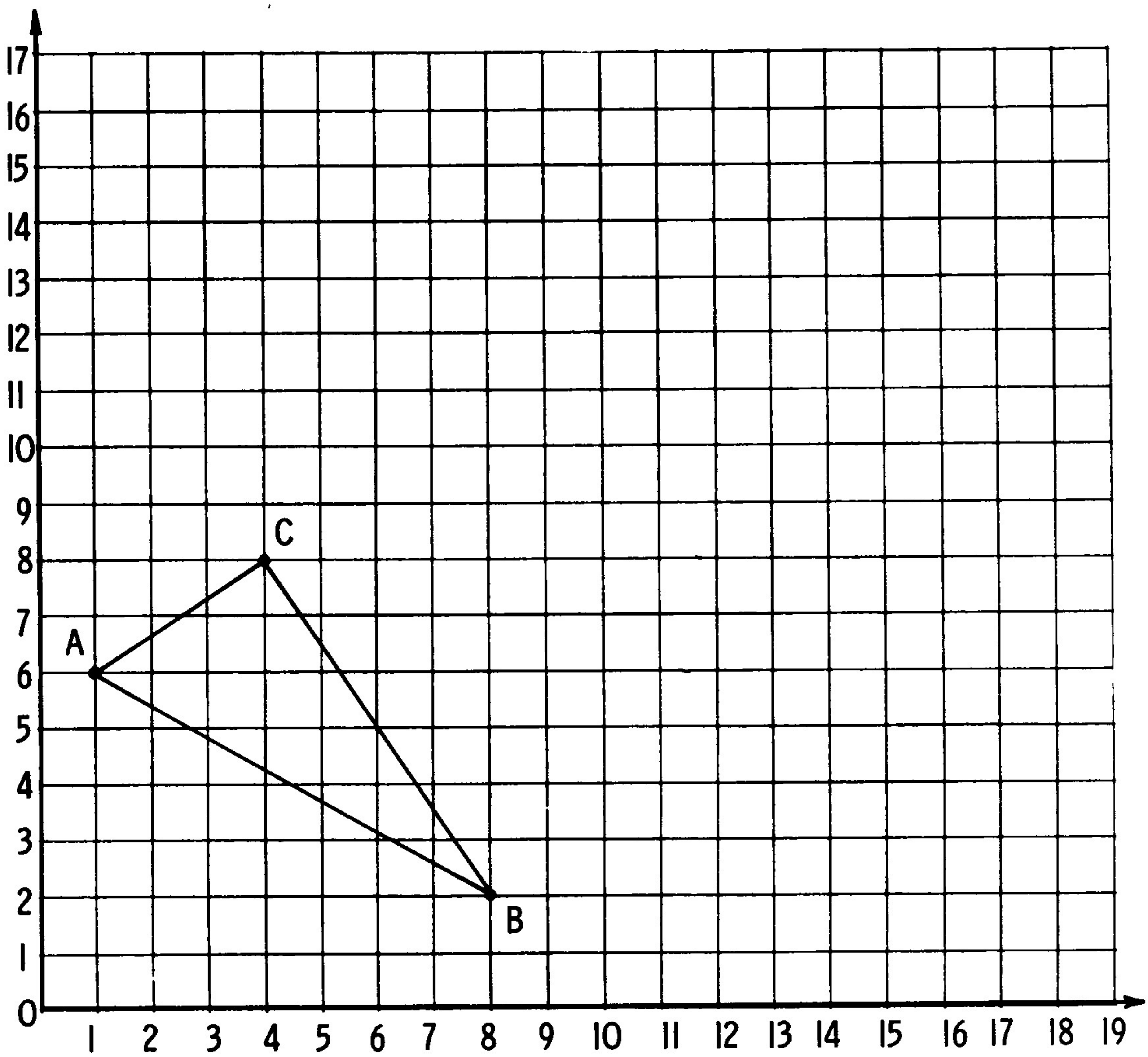
Use the tracing to check.

Name the angle congruent to $\angle$ABC. ________

Name the angle congruent to $\angle$TWS. ________

Enlarging Pictures

A.



B. Look at quadrilateral ABCD.

Multiply all coordinates of these points by 3.

Call the new points P, Q, R, S.

The coordinates of P, Q, R, S are

P(,), Q(,), R(,), S(,).

Locate points P, Q, R, S.

Draw quadrilateral PQRS.

Is $\overline{PQ}$ three times as long as $\overline{AB}$?	Yes	No
Is $\overline{QR}$ three times as long as $\overline{BC}$?	Yes	No
Is $\overline{RS}$ three times as long as $\overline{CD}$?	Yes	No
Is $\overline{PS}$ three times as long as $\overline{AD}$?	Yes	No

Make a tracing of ABCD.

Is the angle at A congruent to the angle at P? Yes No

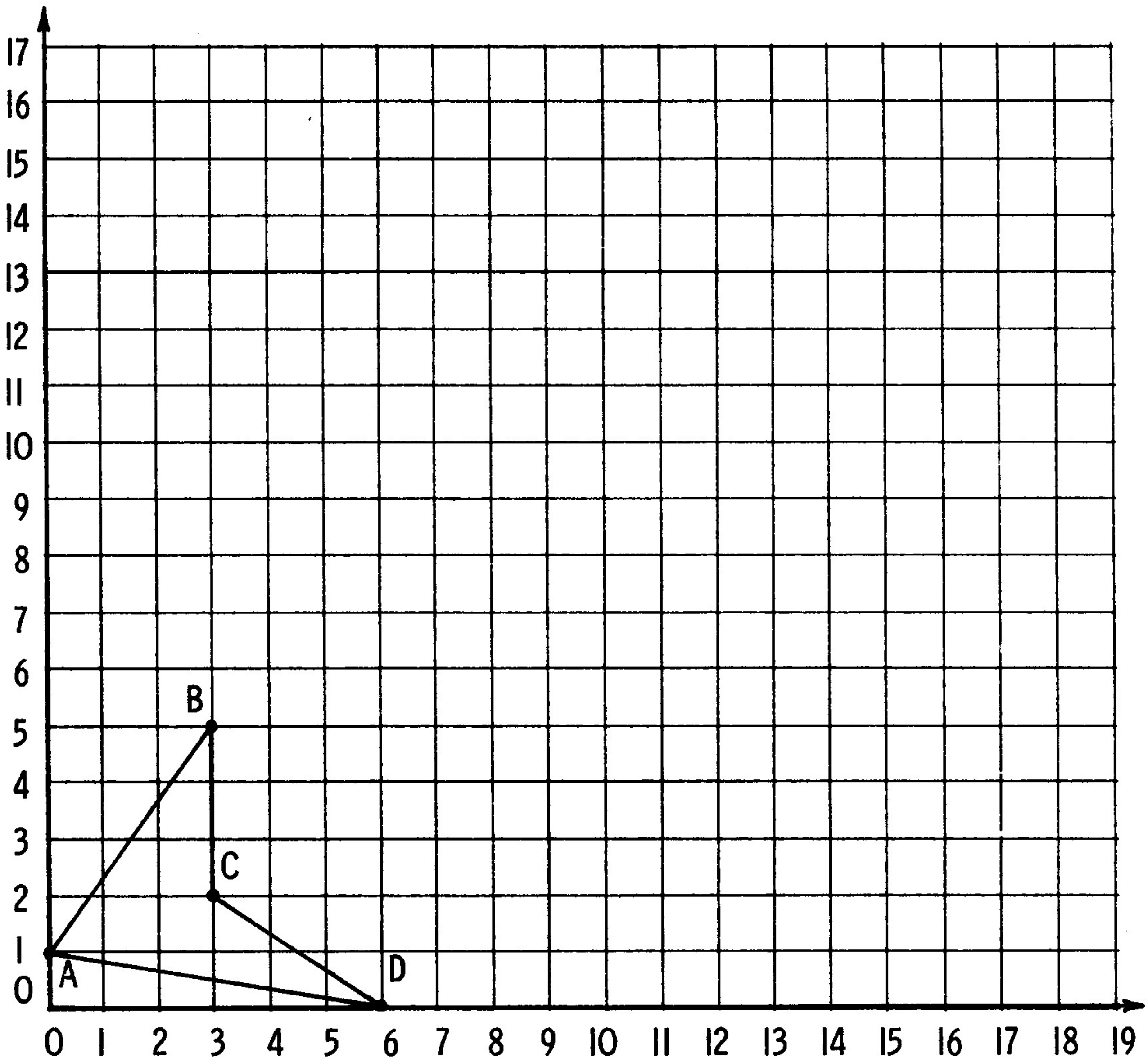
Use the tracing to find out.

The angle at B is congruent to the angle at ________.

The angle at S is congruent to the angle at ________.

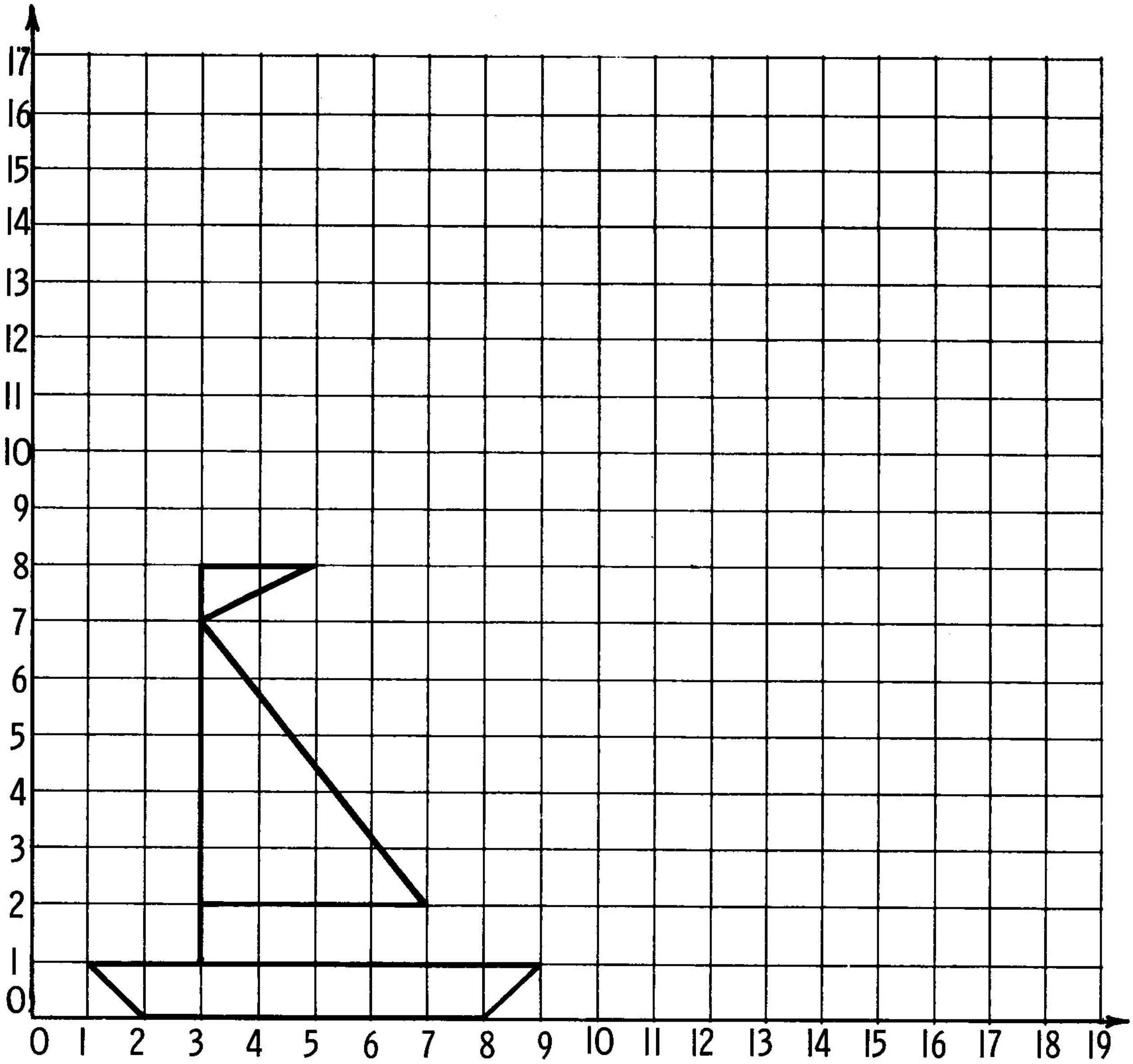
The angle at R is congruent to the angle at ________.

B.



17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
B
C
A
D
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19

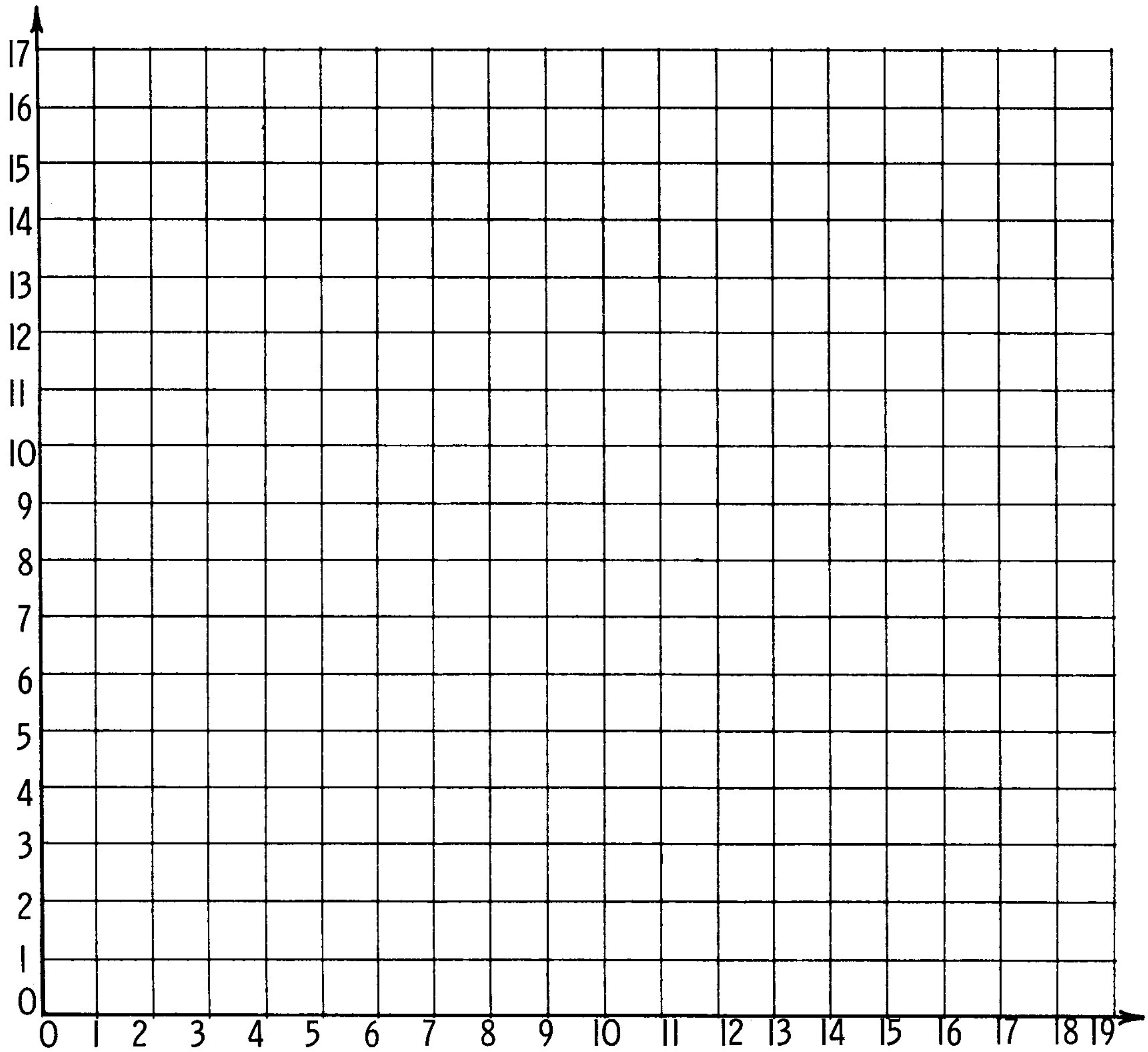
C.

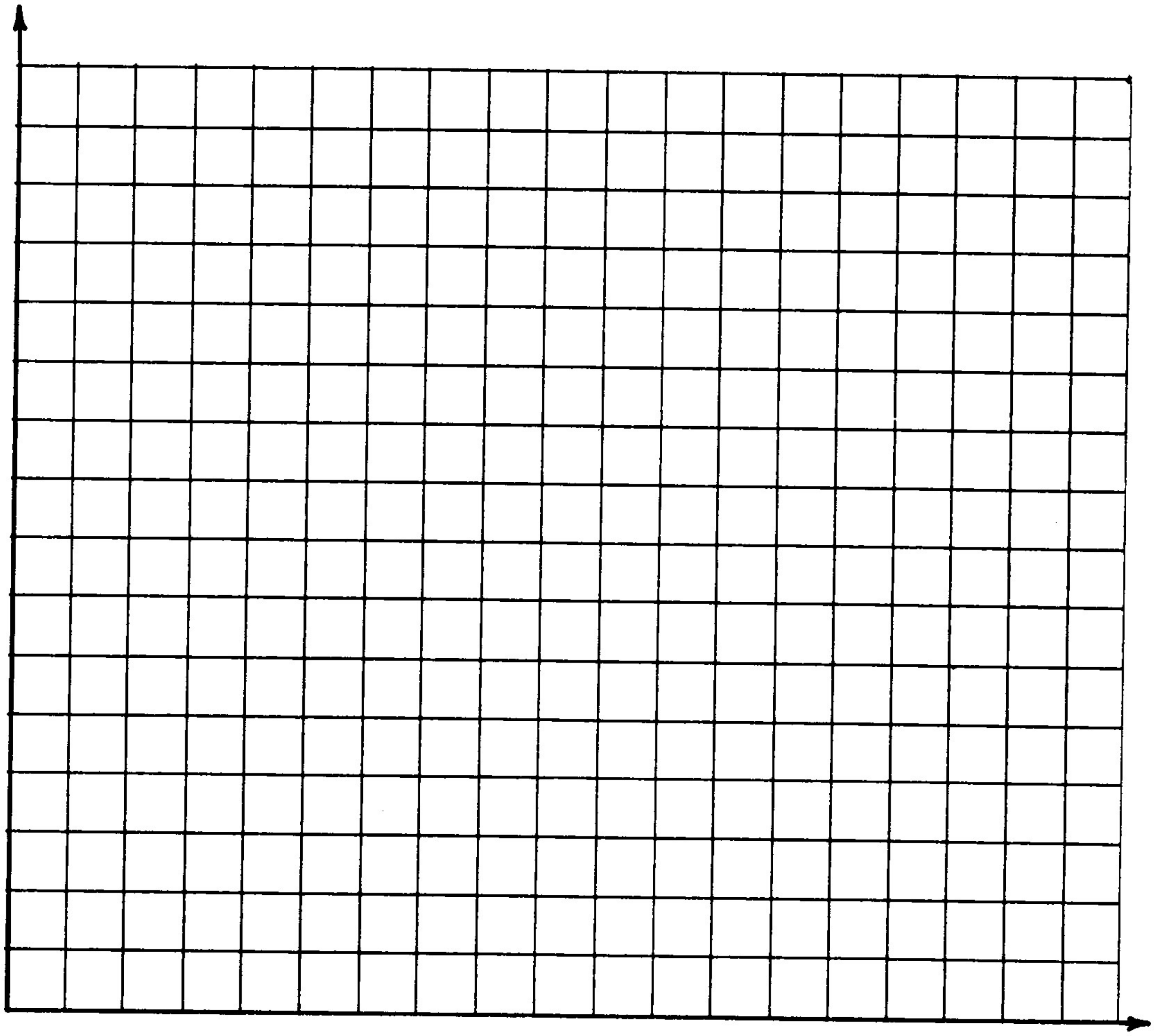


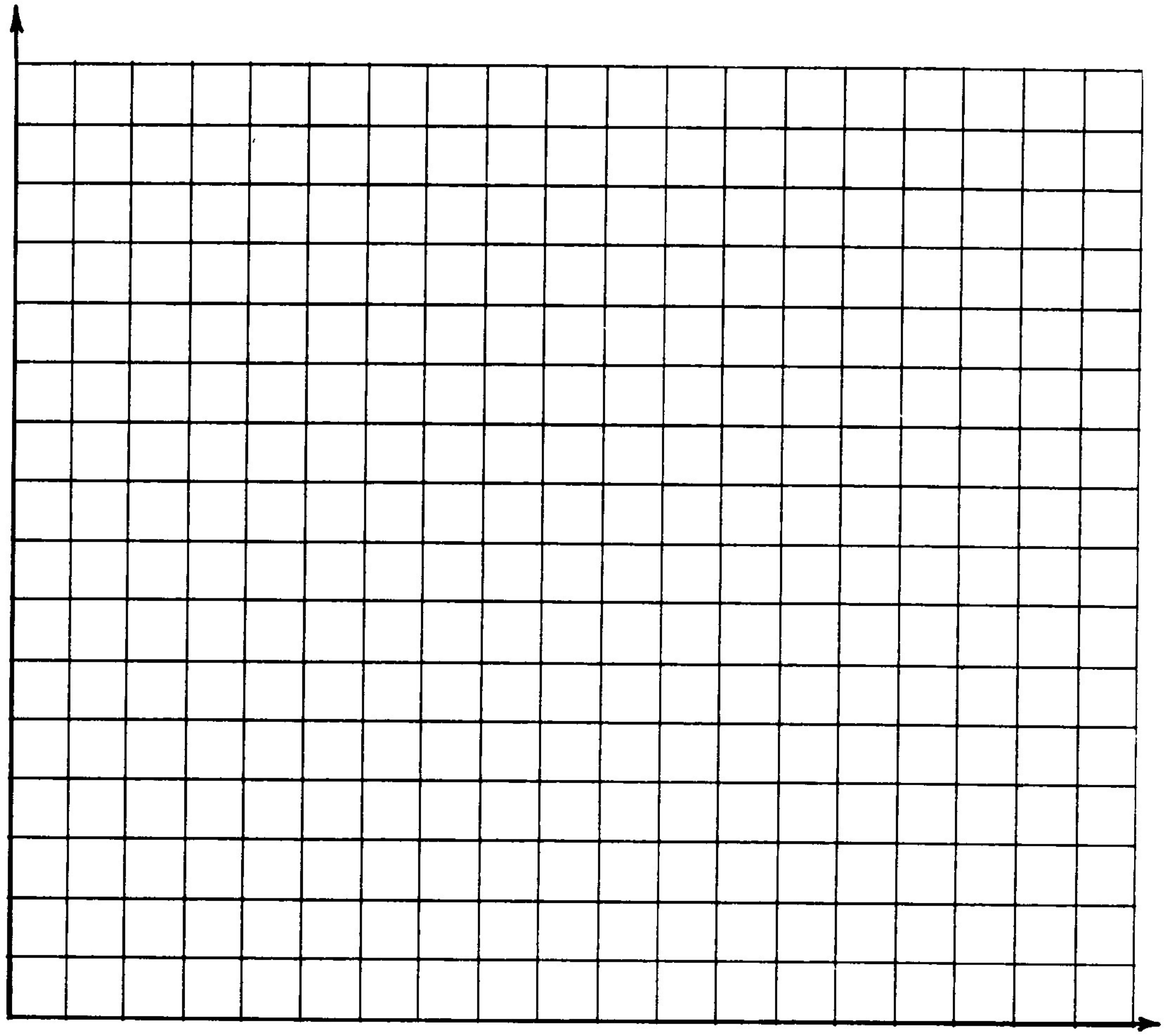
Make a larger picture of the boat on the facing page.

Multiply all coordinates by 2.

C.


0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19





1. Look at the figure on the facing page.

   ABCD is a scale drawing of the floor of a room.

   PQRS shows a table in this room.

   See the scale below the picture.

   Each small segment of this scale shows a one-foot segment in the room.

   Lay off this scale on the edge of a piece of paper.

   Lay it off several times to make a scale at least 20 units long.

2. Use the scale to find the following distances in the room (to the nearest foot).

   Length of longer side ________ ft.

   Length of shorter side ________ ft.

   Longer side of table ________ ft.

   Shorter side of table _______ ft.

   Distance matching $\overline{DB}$ ________ ft.

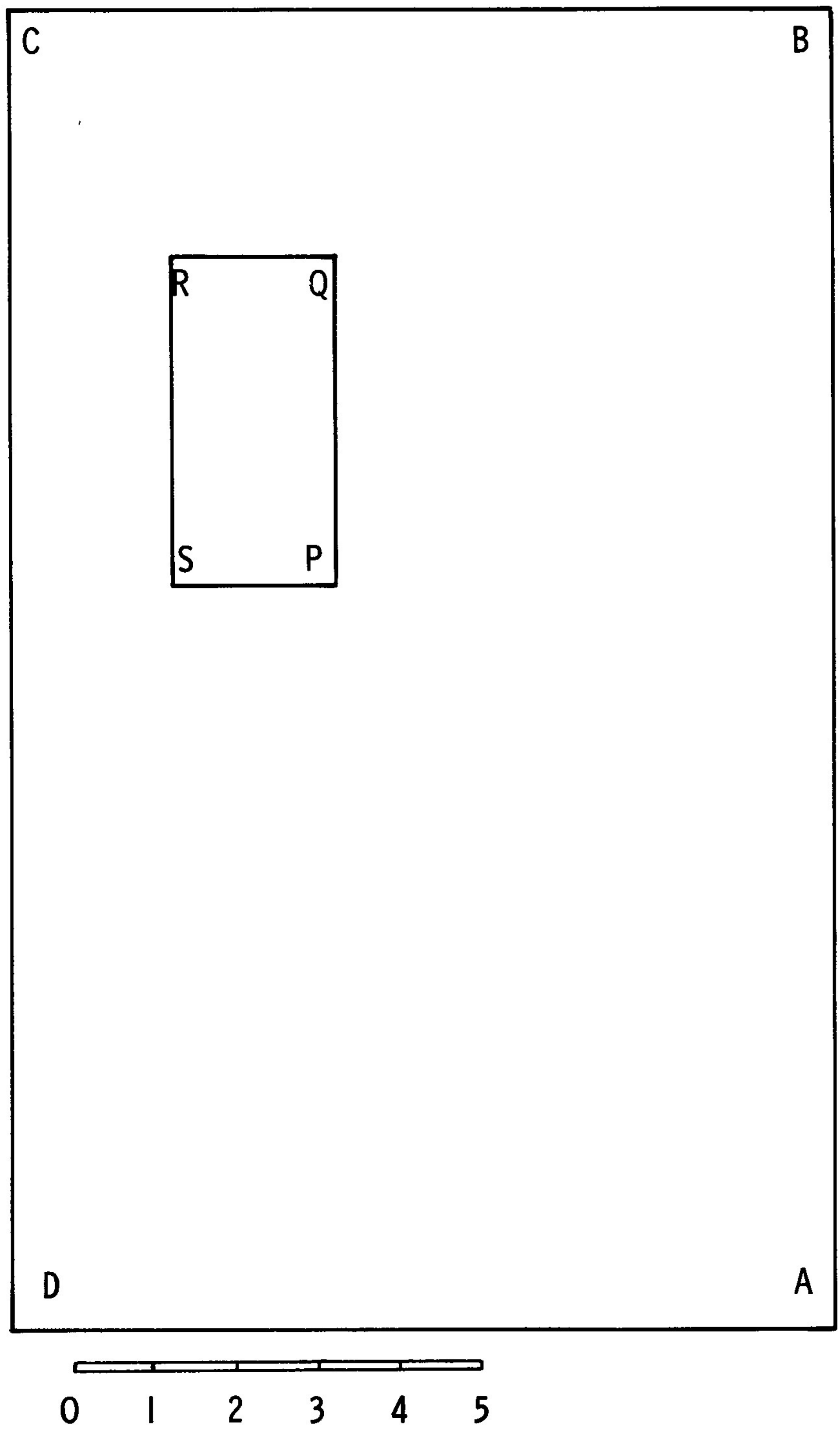
   Distance from the point matching C to nearest corner of the table

   ______________ ft.

   Distance from the point matching C to farthest corner of the table

   ______________ ft.

Reading Scale Drawings



Look at the figure on the facing page.

It is part of a map.

See the scale below the map.

Each little segment on this scale stands for one mile.

Find the following distances:

Shortest distance from Madison to Conway is ________ miles.

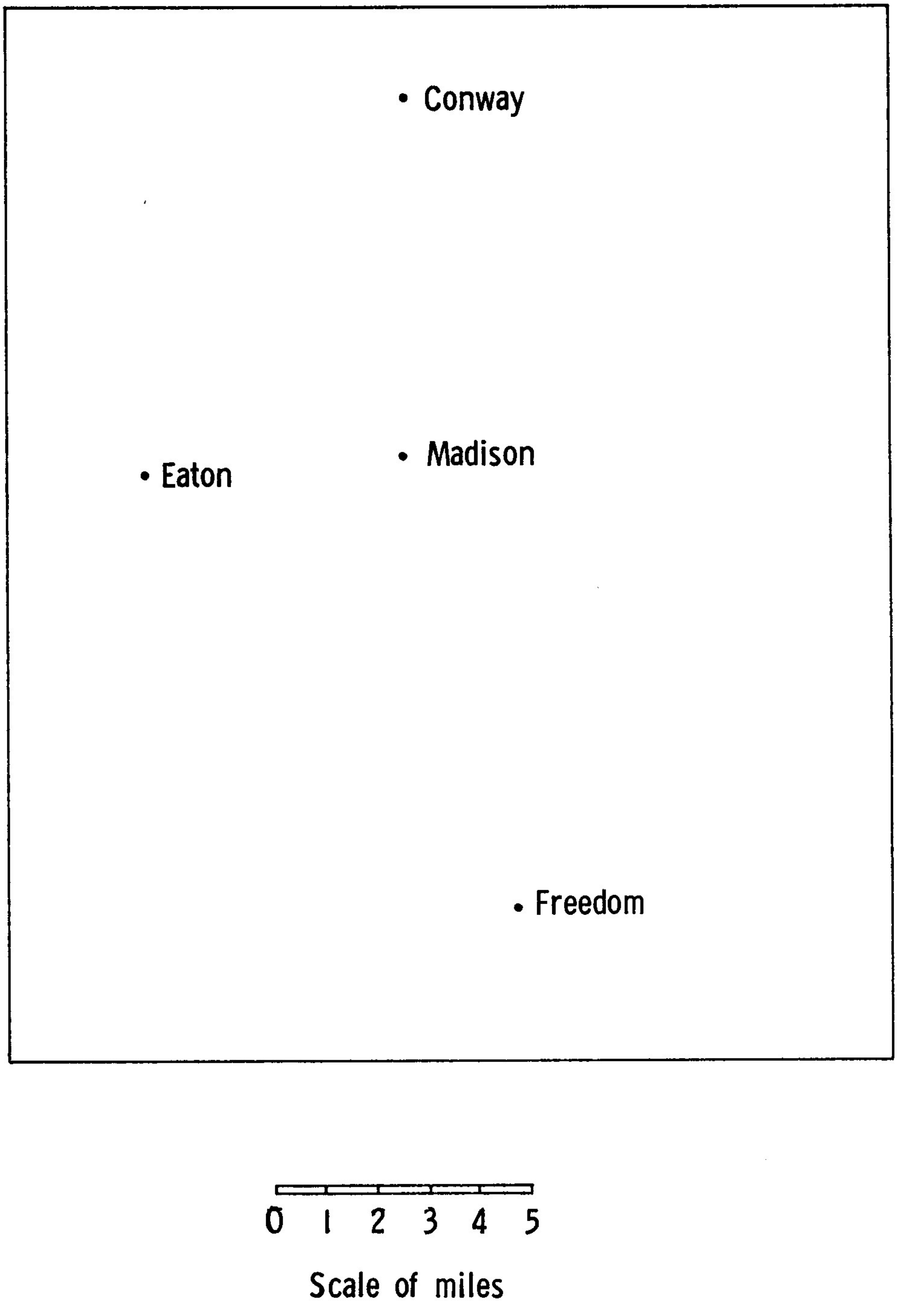
Shortest distance from Madison to Eaton is ________ miles.

Shortest distance from Madison to Freedom is ________ miles.

Shortest distance between Freedom and Eaton is ________ miles.

Shortest distance from Eaton to Madison to Freedom to Eaton is _____miles.

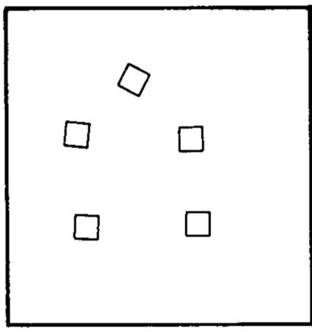
Distance from Conway to Eaton to Madison to Freedom is ________ miles.



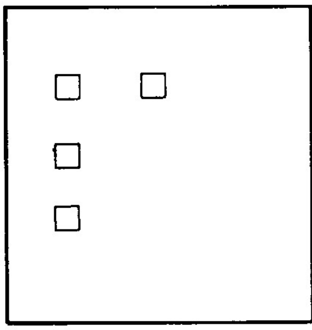
Conway
Eaton
Madison
Freedom
0 1 2 3 4 5
Scale of miles

Arrays

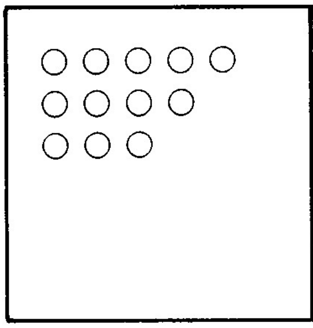
In the pictures below rearrange the objects to form an array. Write in the blanks the number of rows in your array and the number of objects in each row.



_____ by _____

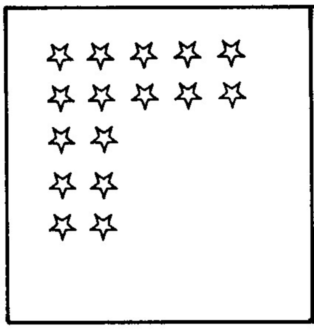


_____ by _____

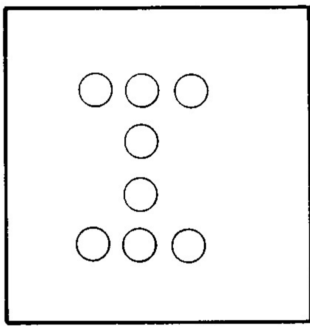


_____ by _____

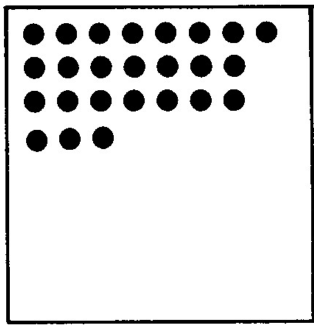
_____ by _____



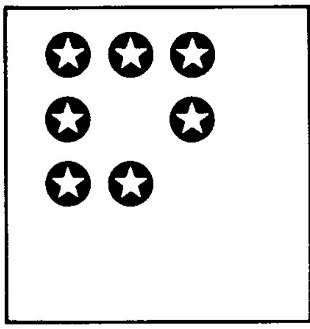
_____ by _____



_____ by _____



_____ by _____



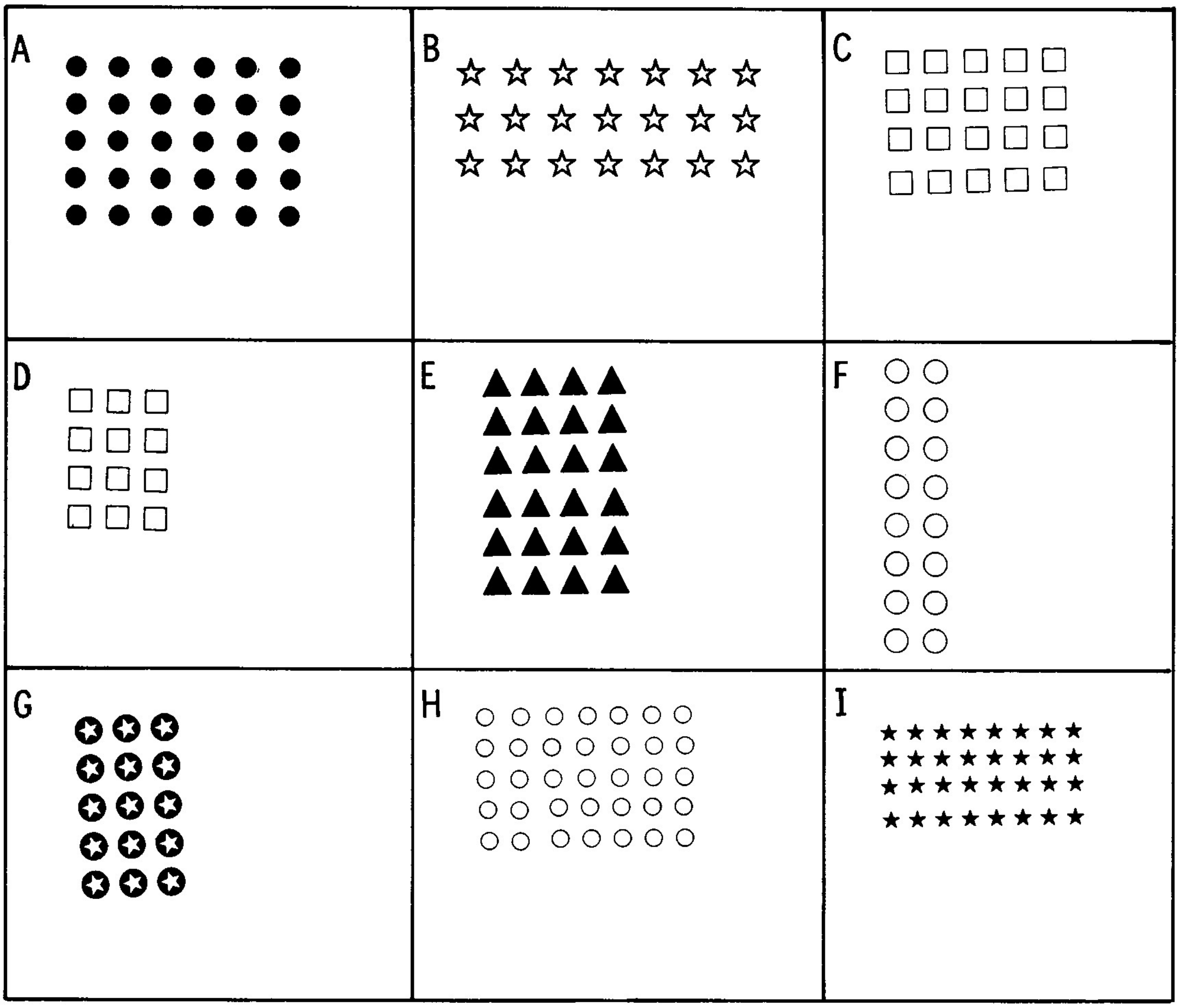
_____ by _____

The Number of Elements in an Array

Draw an array, then fill in the blank.	
A 5 by 3 array has ____ elements.	A 4 by 4 array has ____ elements.
A 7 by 3 array has ____ elements.	A 4 by 6 array has ____ elements.
A 4 by 9 array has ____ elements.	An 8 by 3 array has ____ elements.
A 3 by 6 array has ____ elements.	An 8 by 5 array has ____ elements.

Arrays and Equations

Match the array with the equation that describes it.



1) $8 + 8 + 8 + 8 = 32$ ________

2) $6 \times 4 = 24$ ________

3) $4 \times 5 = 20$ ________

4) $3 + 3 + 3 + 3 = 12$ ________

5) $5 \times 6 = 30$ ________

6) $5 \times 7 = 35$ ________

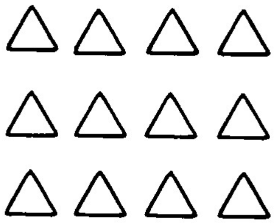
7) $7 + 7 + 7 = 21$ ________

8) $5 \times 3 = 15$ ________

9) $8 \times 2 = 16$ ________

Fill in the blanks:

1.

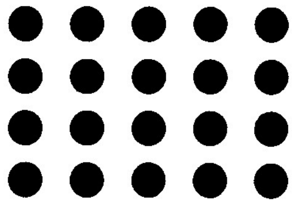


Equation: ____________________

Product: ____________________

Factors: ____________________

2.



Equation: ____________________

Product: ____________________

Factors: ____________________

3.

Equation: ____________________

Product: ____________________

Factors: ____________________

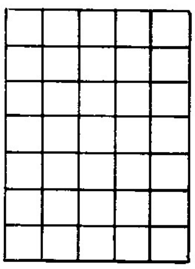
4.

Equation: ____________________

Product: ____________________

Factors: ____________________

5.

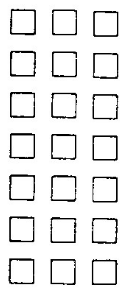


Equation: ____________________

Product: ____________________

Factors: ____________________

6.



Equation: ____________________

Product: ____________________

Factors: ____________________

7.

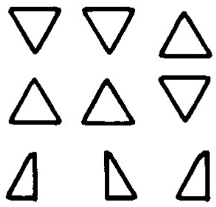
* * * * * *

Equation: ____________________

Product: ____________________

Factors: ____________________

8.

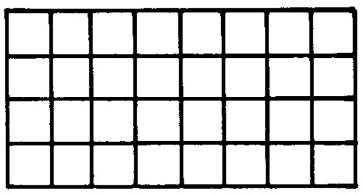


Equation: ____________________

Product: ____________________

Factors: ____________________

9.

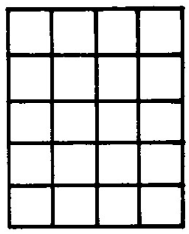


Equation: ____________________

Product: ____________________

Factors: ____________________

10.



Equation: ____________________

Product: ____________________

Factors: ____________________

11.

a	b	c	d
e	f	g	h
i	j	k	l

Equation: ____________________

Product: ____________________

Factors: ____________________

12.

b	a	d	c
f	e	h	g
j	i	k	l

Equation: ____________________

Product: ____________________

Factors: ____________________

A Multiplication Table

Write the product for each pair of factors, for example, $2 \times 6 = 12$, and $6 \times 2 = 12$.

×	0	1	2	3	4	5	6	7	8	9
0										
1										
2										
3										
4										
5										
6			12							
7										
8										
9										

Zero or One as a Factor

Write the products.

$5 \times 0 =$ ________ $1 \times 9 =$ ________

$0 \times 5 =$ ________ $9 \times 1 =$ ________

$0 \times 0 =$ ________ $1 \times 89 =$ ________

$0 \times 641 =$ ________ $1 \times$ ________ $= 13$

$0 \times n =$ ________ ________ $\times 17 = 17$

$1{,}240 \times$ ________ $= 0$ $n \times 1 =$ ________

How would you complete these equations?

________ $\times 0 = 2$

$0 \times$ ________ $= 7$

If zero is a factor, what is the product? ____________________

If one is a factor, what is the product? ____________________

Other Factors

1. Start at 0 and count to 18 by 2's.

____ ____ ____ ____ ____ ____ ____ ____ ____ ____

2. What row in your chart looks like your answer to question 1?

____________ What column? ____________

3. Start at 0 and count to 18 by 3's.

____ ____ ____ ____ ____ ____ ____ ____ ____

4. What row in your chart looks like your answer to question 3?

____________ What column? ____________

5. Start at 0 and count to 18 by 4's.

____ ____ ____ ____ ____ ____ ____ ____ ____

6. What row in your chart looks like your answer to question 5?

____________ What column? ____________

7. How can you tell just by looking at a product that it has 5 as a factor? ________________________

8. Why is there a row and a column that look like counting from 0 to 18 by 6's? ________________________

9. How many products appear in your chart only once? ____________

Why? ________________________

Prime Numbers and Products of Primes

Suppose you want to arrange a set of objects in an array. You can always make an array with just one row like this:

0 0 0 0 0 0 0 0 0

or just one object in each row like this:

0
0
0
0
0
0
0
0
0

But can you always make an array with more than one row and more than one object in each row? Let's see. Can you do it with 12 objects? ________
If you can, draw the array here:

Can you do it with 9 objects? _______ If you can, draw the array here:

Can you do it with 11 objects? ______ If you can, draw the array here:

Now try it for all the numbers listed below. For each number try to make an array with more than one row and more than one object in each row. If you can do it, draw the array. If you can't do it, put an X in the blank by the number.

2 ____	11 ____
3 ____	12 ____
4 ____	13 ____
5 ____	14 ____
6 ____	15 ____
7 ____	16 ____
8 ____	17 ____
9 ____	18 ____
10 ____	19 ____
	20 ____

The numbers you have marked with X are called prime numbers. As you go higher, the prime numbers get scarcer, but no matter how high you go there are always more prime numbers farther on. The set of prime numbers forms a mysterious and irregular-looking pattern.

These numbers are called multiples of 2:

2, 4, 6, 8, 10, 12, ...

These numbers are called multiples of 3:

3, 6, 9, 12, 15, 18, 21, ...

Write here the first ten multiples of 5:

____

What special name do we have for the multiples of 2? ______________

Every number is a multiple of 1, and every number is a multiple of itself.

In the list below put a 1 next to every multiple of 1, put a 2 next to every multiple of 2, put a 3 next to every multiple of 3, and so forth as far as you can go.

2 ___ ___ ___ ___ ___ ___

3 ___ ___ ___ ___ ___ ___

4 ___ ___ ___ ___ ___ ___

5 ___ ___ ___ ___ ___ ___

6 ___ ___ ___ ___ ___ ___

7 ___ ___ ___ ___ ___ ___

8 ___ ___ ___ ___ ___ ___

9 ___ ___ ___ ___ ___ ___

10 ___ ___ ___ ___ ___ ___

11 ___ ___ ___ ___ ___ ___

12 ___ ___ ___ ___ ___ ___

13 ___ ___ ___ ___ ___ ___

14 ___ ___ ___ ___ ___ ___

15 ___ ___ ___ ___ ___ ___

16 ___ ___ ___ ___ ___ ___

17 ___ ___ ___ ___ ___ ___

18 ___ ___ ___ ___ ___ ___ 20 ___ ___ ___ ___ ___ ___

19 ___ ___ ___ ___ ___ ___ 21 ___ ___ ___ ___ ___ ___

. . .

(The three dots after 21 show that you could go on and on.)

How many numbers is 8 a multiple of? ________

What is the smallest number that is a multiple of six numbers? ________

What is the smallest number that is a multiple of exactly five numbers? ________

Write Prime next to each number that is a multiple of no number except itself and 1. Does this check with the prime numbers you found using arrays? ________ If not, go back and check your work.

Do you remember what product means? What is the product of 2 and 5? ________

Every whole number greater than 1 is either a prime number or can be written as a product of prime numbers. Write each of the following numbers as a product of prime numbers. Be careful to use only prime numbers. Some of them are done for you.

2 prime	12 ________	22 ________
3 prime	13 prime	23 prime
4 $= 2 \times 2$	14 ________	24 ________
5 prime	15 ________	25 ________
6 $= 2 \times 3$	16 ________	26 ________
7 prime	17 prime	27 ________
8 $= 2 \times 2 \times 2$	18 ________	28 ________
9 ________	19 prime	29 prime
10 ________	20 ________	30 ________
11 prime	21 ________	31 prime

Is this equation correct? ________

$$2 \times 3 \times 5 = 30$$

How many numbers is 30 a multiple of? ________

How many different arrays could you make with 30 objects? ________

How many different arrays could you make with 100 objects? ________

★ Square and Triangular Arrays.

1. 3×3 is sometimes called the "square of 3." Can you think why? It can be represented by a square array.
Write the squares of the first six numbers and draw an array for each one.

$1 \times 1 =$ ____

$2 \times 2 =$ ____

$3 \times 3 =$ ____

$4 \times 4 =$ ____

$5 \times 5 =$ ____

$6 \times 6 =$ ____

2. Now do these additions:

$1 =$ ____

$1 + 3 =$ ____

$1 + 3 + 5 =$ ____

$1 + 3 + 5 + 7 =$ ____

$1 + 3 + 5 + 7 + 9 =$ ____

$1 + 3 + 5 + 7 + 9 + 11 =$ ____

3. Compare the answers you got in problems 1 and 2. What do you notice?

4. Here is a dot.

Make a 2×2 array by putting in more dots. How many more dots did you have to put in? ____________

Now make it into a 3×3 array. How many more dots did you need? _____

Now make it into a 4×4 array. How many more dots did you need? _____

Now make it into a 5×5 array. How many more dots did you need? _____

Now make it into a 6×6 array. How many more dots did you need? _____

5. Now look back at problems 1 and 2. Can you explain, using what you found out in problem 4, why you got the same answers to both problems 1 and 2? ____

____

6. The numbers 1, 4, 9, 16, 25, 36, ... etc., are called the <u>square numbers</u>. They are the numbers of things in square arrays. There is another set of numbers called the <u>triangle numbers</u>. These are the numbers of things in triangular arrays. Here are the first few triangle numbers with their arrays:

0	1
0 0 0	3
0 0 0 0 0 0	6
0 0 0 0 0 0 0 0 0 0	10

7. Do these additions:

   1 = _____

   1 + 2 = _____

   1 + 2 + 3 = _____

   1 + 2 + 3 + 4 = _____

   1 + 2 + 3 + 4 + 5 = _____

   1 + 2 + 3 + 4 + 5 + 6 = _____

   Did you get the triangle numbers? _________

   Explain why. ____

   ____

8. Here are the first few triangle numbers:

1, 3, 6, 10, 15, 21, 28, ...

Let's add them in pairs.

1 + 3 = ____

3 + 6 = ____

6 + 10 = ____

10 + 15 = ____

15 + 21 = ____

21 + 28 = ____

What numbers did you get? ________________ Can you explain why?

____

____

Hint: Try to fit two triangular arrays together.

★ Multiplying and Adding

1. Here are two sets of numbers:

   Set A: 2, 3, 5

   Set B: 4, 6

   Write down all the pairs of numbers you can make taking the first number from Set A and the second from Set B.

   ____

   ____

   ____

   ____

   ____

   ____

   We can show the set of number pairs you have just written by means of an array:

   Set B

		4	6
	2	.	.
Set A	3	.	.
	5	.	.

   Each dot in the array stands for one of the possible number pairs. Compare your list of pairs with the array. Do they check? ________

2. Multiply each pair of numbers in your list and put the product into this array. The product of 6 and 3 has been put in for you to show you where it goes.

		Set B	
		4	6
Set A	2		
	3		18
	5		

3. Add up the six numbers inside the array and put their sum in this box:

$\boxed{}$

We will come back to this number.

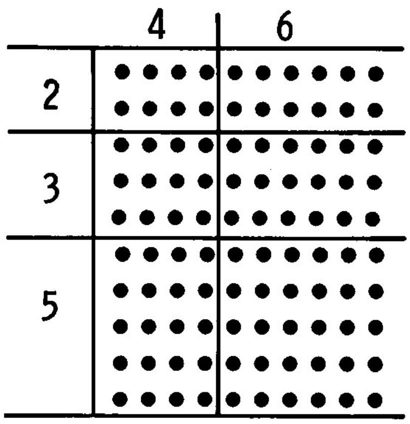
4. Find the sum of the numbers in Set A: 2 + 3 + 5 = ____

And in Set B: 4 + 6 = ____

5. Multiply these two sums together and put the product in this box:

$\boxed{}$

6. Now look at the numbers you have in the two boxes (problems 3 and 5). Are they the same? If they are not, go back and check your work. The two numbers should be the same. To see why, look at this array.



How many dots are there in each of the rectangular pieces of the array?

How many dots are there in the whole array? ________

Now explain why you got the same number in problems 3 and 5.

____

____

____

7. Fill in this array with the products of the numbers in Set A with those in Set B. One product has been put in for you.

Set B

		1	4	3
	2			
Set A	5		20	
	3			

What is the sum of the numbers inside the array? ________

Could you have found this out without actually filling in the array? ________ How? ________________________________

____

8. What is 13×13? ____________

Here is a way to find 13×13 using what we have learned. Fill in this array with the products as before:

	10	3
10		
3		

What is the sum of the numbers you put in the array? ________

Is this sum equal to 13×13? ________

Why? ____

____

9. Use arrays to find these products:

$$11 \times 11 = \_\_\_\_\_\_$$

$$12 \times 12 = \_\_\_\_\_\_$$

$$14 \times 14 = \_\_\_\_\_\_$$

$$15 \times 15 = \_\_\_\_\_\_$$

10. When we write

$$(2 + 3) \times (4 + 5) = \_\_\_\_\_\_\_$$

we mean that you must first do the additons inside the parentheses to get

$$5 \times 9$$

and then do the multiplication to get 45.

When we write

$$(2 \times 3) + (4 \times 5)$$

we mean that you must first do the multiplications inside the parentheses to get

$$6 + 20$$

and then do the addition to get 26.

<u>Always do what is inside the parentheses first.</u>

Is this equation correct? Do the arithmetic to find out. ________

$$(2 + 3) \times (2 + 5) = (2 \times 2) + (2 \times 5) + (3 \times 2) + (3 \times 5)$$

Can you make a product array to go with this equation?

Explain what the equation says about the array.

The following is a list of all those who participated in the preparation of this volume:

Leslie Beatty, Chula Vista City School District, Chula Vista, California
Truman Botts, University of Virginia
Leon W. Cohen, University of Maryland
Zigmund Drapalski, WTVS, Detroit Public Schools, Detroit, Michigan
Jean Dunn, Palo Alto Unified School District, Palo Alto, California
Wade Ellis, Oberlin College, Oberlin, Ohio
Mary Folsom, University of Miami
Mary E. Giamperoli, Edith C. Baker School, Chestnut Hill, Massachusetts
Leonard Gillman, University of Rochester, Rochester, New York
E. Glenadine Gibb, State College of Iowa
Muriel Greig, McColl School, Detroit, Michigan
Adrien L. Hess, Montana State College
Stanley B. Jackson, University of Maryland
John L. Kelley, University of California, Berkeley
Sharon Logan, Oak Ridge Elementary School, Arlington, Virginia
William F. McClintock, Stanislaus State College, Turlock, California
Mary McCulloch, University School, Northern Illinois University, DeKalb, Illinois
Patricia Michels, Joaquin Miller School, Oakland, California
Rose Mijanovich, Joaquin Miller School, Oakland, California
Mildred Pierce, Humbert School, Cedar Falls, Iowa
Frank W. Sinden, Bell Telephone Laboratories, Murray Hill, New Jersey
Jane Stenzel, Cambrian Elementary School District, San Jose, California
J. Fred Weaver, Boston University

Is this equation correct? Do the arithmetic to find out. ________

$$(2 + 3) \times (2 + 5) = (2 \times 2) + (2 \times 5) + (3 \times 2) + (3 \times 5)$$

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What is the sum of the numbers you put in the array? ______

Is this sum equal to 13×13? ______

Why? ____

____

9. Use arrays to find these products:

$$11 \times 11 = \_\_\_\_$$

$$12 \times 12 = \_\_\_\_$$

$$14 \times 14 = \_\_\_\_$$

$$15 \times 15 = \_\_\_\_$$

10. When we write

$$(2 + 3) \times (4 + 5) = \_\_\_\_$$

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$$(2 \times 3) + (4 \times 5)$$

we mean that you must first do the multiplications inside the parentheses to get

$$6 + 20$$

and then do the addition to get 26.

<u>Always do what is inside the parentheses first.</u>

How many dots are there in each of the rectangular pieces of the array?

How many dots are there in the whole array? ________

Now explain why you got the same number in problems 3 and 5.

____

____

____

7. Fill in this array with the products of the numbers in Set A with those in Set B. One product has been put in for you.

Set B

		1	4	3
	2			
Set A	5		20	
	3			

What is the sum of the numbers inside the array? ________

Could you have found this out without actually filling in the array? ________ How? ______________________________

____

8. What is 13×13? ____________

Here is a way to find 13×13 using what we have learned. Fill in this array with the products as before:

	10	3
10		
3		

2. Multiply each pair of numbers in your list and put the product into this array. The product of 6 and 3 has been put in for you to show you where it goes.

		Set B	
		4	6
Set A	2		
	3		18
	5		

3. Add up the six numbers inside the array and put their sum in this box:

$\boxed{}$

We will come back to this number.

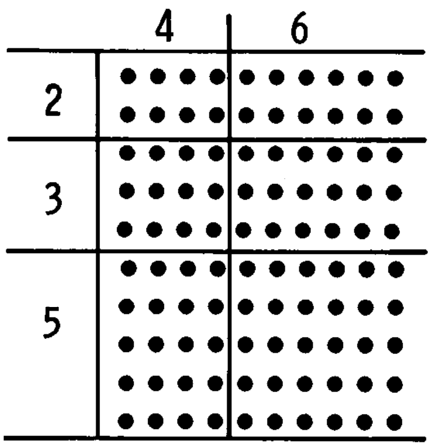
4. Find the sum of the numbers in Set A: $2 + 3 + 5 =$ ____

And in Set B: $4 + 6 =$ ____

5. Multiply these two sums together and put the product in this box:

$\boxed{}$

6. Now look at the numbers you have in the two boxes (problems 3 and 5). Are they the same? If they are not, go back and check your work. The two numbers should be the same. To see why, look at this array.



★ Multiplying and Adding

1. Here are two sets of numbers:

   Set A: 2, 3, 5

   Set B: 4, 6

   Write down all the pairs of numbers you can make taking the first number from Set A and the second from Set B.

   ____

   ____

   ____

   ____

   ____

   ____

   We can show the set of number pairs you have just written by means of an array:

		Set B	
		4	6
	2	.	.
Set A	3	.	.
	5	.	.

   Each dot in the array stands for one of the possible number pairs.

   Compare your list of pairs with the array. Do they check? ________

8. Here are the first few triangle numbers:

1, 3, 6, 10, 15, 21, 28, ...

Let's add them in pairs.

1 + 3 = ____

3 + 6 = ____

6 + 10 = ____

10 + 15 = ____

15 + 21 = ____

21 + 28 = ____

What numbers did you get? ______________ Can you explain why?

____

____

Hint: Try to fit two triangular arrays together.

0	1
0 0 0	3
0 0 0 0 0 0	6
0 0 0 0 0 0 0 0 0 0	10

7. Do these additions:

   1 = _____

   1 + 2 = _____

   1 + 2 + 3 = _____

   1 + 2 + 3 + 4 = _____

   1 + 2 + 3 + 4 + 5 = _____

   1 + 2 + 3 + 4 + 5 + 6 = _____

   Did you get the triangle numbers? __________

   Explain why. ____

   ____

4. Here is a dot.

Make a 2×2 array by putting in more dots. How many more dots did you have to put in? __________

Now make it into a 3×3 array. How many more dots did you need? ____

Now make it into a 4×4 array. How many more dots did you need? ____

Now make it into a 5×5 array. How many more dots did you need? ____

Now make it into a 6×6 array. How many more dots did you need? ____

5. Now look back at problems 1 and 2. Can you explain, using what you found out in problem 4, why you got the same answers to both problems 1 and 2? ______________________________________

____

6. The numbers 1, 4, 9, 16, 25, 36, ... etc., are called the square numbers. They are the numbers of things in square arrays. There is another set of numbers called the triangle numbers. These are the numbers of things in triangular arrays. Here are the first few triangle numbers with their arrays:

★ Square and Triangular Arrays.

1. 3×3 is sometimes called the "square of 3." Can you think why? It can be represented by a square array.
   Write the squares of the first six numbers and draw an array for each one.

   $1 \times 1 =$ ____

   $2 \times 2 =$ ____

   $3 \times 3 =$ ____

   $4 \times 4 =$ ____

   $5 \times 5 =$ ____

   $6 \times 6 =$ ____

2. Now do these additions:

   $1 =$ ____

   $1 + 3 =$ ____

   $1 + 3 + 5 =$ ____

   $1 + 3 + 5 + 7 =$ ____

   $1 + 3 + 5 + 7 + 9 =$ ____

   $1 + 3 + 5 + 7 + 9 + 11 =$ ____

3. Compare the answers you got in problems 1 and 2. What do you notice?

2 prime

3 prime

4 $= 2 \times 2$

5 prime

6 $= 2 \times 3$

7 prime

8 $= 2 \times 2 \times 2$

9 ________

10 ________

11 prime

12 ________

13 prime

14 ________

15 ________

16 ________

17 prime

18 ________

19 prime

20 ________

21 ________

22 ________

23 prime

24 ________

25 ________

26 ________

27 ________

28 ________

29 prime

30 ________

31 prime

Is this equation correct? ________

$$2 \times 3 \times 5 = 30$$

How many numbers is 30 a multiple of? ________

How many different arrays could you make with 30 objects? ________

How many different arrays could you make with 100 objects? ________

18 ___ ___ ___ ___ ___ ___ 20 ___ ___ ___ ___ ___ ___

19 ___ ___ ___ ___ ___ ___ 21 ___ ___ ___ ___ ___ ___

. . .

(The three dots after 21 show that you could go on and on.)

How many numbers is 8 a multiple of? ________

What is the smallest number that is a multiple of six numbers? ________

What is the smallest number that is a multiple of exactly five numbers? ________

Write Prime next to each number that is a multiple of no number except itself and 1. Does this check with the prime numbers you found using arrays? ________ If not, go back and check your work.

Do you remember what product means? What is the product of 2 and 5? ________

Every whole number greater than 1 is either a prime number or can be written as a product of prime numbers. Write each of the following numbers as a product of prime numbers. Be careful to use only prime numbers. Some of them are done for you.

The numbers you have marked with X are called prime numbers. As you go higher, the prime numbers get scarcer, but no matter how high you go there are always more prime numbers farther on. The set of prime numbers forms a mysterious and irregular-looking pattern.

These numbers are called multiples of 2:

2, 4, 6, 8, 10, 12, ...

These numbers are called multiples of 3:

3, 6, 9, 12, 15, 18, 21, ...

Write here the first ten multiples of 5:

____

What special name do we have for the multiples of 2? ______________

Every number is a multiple of 1, and every number is a multiple of itself.

In the list below put a 1 next to every multiple of 1, put a 2 next to every multiple of 2, put a 3 next to every multiple of 3, and so forth as far as you can go.

2 ___ ___ ___ ___ ___ ___	10 ___ ___ ___ ___ ___ ___
3 ___ ___ ___ ___ ___ ___	11 ___ ___ ___ ___ ___ ___
4 ___ ___ ___ ___ ___ ___	12 ___ ___ ___ ___ ___ ___
5 ___ ___ ___ ___ ___ ___	13 ___ ___ ___ ___ ___ ___
6 ___ ___ ___ ___ ___ ___	14 ___ ___ ___ ___ ___ ___
7 ___ ___ ___ ___ ___ ___	15 ___ ___ ___ ___ ___ ___
8 ___ ___ ___ ___ ___ ___	16 ___ ___ ___ ___ ___ ___
9 ___ ___ ___ ___ ___ ___	17 ___ ___ ___ ___ ___ ___

Now try it for all the numbers listed below. For each number try to make an array with more than one row and more than one object in each row. If you can do it, draw the array. If you can't do it, put an X in the blank by the number.

2 ____	11 ____
3 ____	12 ____
4 ____	13 ____
5 ____	14 ____
6 ____	15 ____
7 ____	16 ____
8 ____	17 ____
9 ____	18 ____
10 ____	19 ____
	20 ____

Prime Numbers and Products of Primes

Suppose you want to arrange a set of objects in an array. You can always make an array with just one row like this:

0 0 0 0 0 0 0 0 0

or just one object in each row like this:

0
0
0
0
0
0
0
0
0

But can you always make an array with more than one row and more than one object in each row? Let's see. Can you do it with 12 objects? ________
If you can, draw the array here:

Can you do it with 9 objects? _______ If you can, draw the array here:

Can you do it with 11 objects? ______ If you can, draw the array here:

Other Factors

1. Start at 0 and count to 18 by 2's.

____ ____ ____ ____ ____ ____ ____ ____ ____ ____

2. What row in your chart looks like your answer to question 1?

____________ What column? ____________

3. Start at 0 and count to 18 by 3's.

____ ____ ____ ____ ____ ____ ____ ____ ____

4. What row in your chart looks like your answer to question 3?

____________ What column? ____________

5. Start at 0 and count to 18 by 4's.

____ ____ ____ ____ ____ ____ ____ ____ ____

6. What row in your chart looks like your answer to question 5?

____________ What column? ____________

7. How can you tell just by looking at a product that it has 5 as a factor? ________________________

8. Why is there a row and a column that look like counting from 0 to 18 by 6's? ________________________

9. How many products appear in your chart only once? ____________

Why? ________________________

Zero or One as a Factor

Write the products.

$5 \times 0 =$ ________ $1 \times 9 =$ ________

$0 \times 5 =$ ________ $9 \times 1 =$ ________

$0 \times 0 =$ ________ $1 \times 89 =$ ________

$0 \times 641 =$ ________ $1 \times$ ________ $= 13$

$0 \times n =$ ________ ________ $\times 17 = 17$

$1,240 \times$ ________ $= 0$ $n \times 1 =$ ________

How would you complete these equations?

________ $\times 0 = 2$

$0 \times$ ________ $= 7$

If zero is a factor, what is the product? ____________________

If one is a factor, what is the product? ____________________

A Multiplication Table

Write the product for each pair of factors, for example, $2 \times 6 = 12$, and $6 \times 2 = 12$.

×	0	1	2	3	4	5	6	7	8	9
0										
1										
2										
3										
4										
5										
6			12							
7										
8										
9										

7.

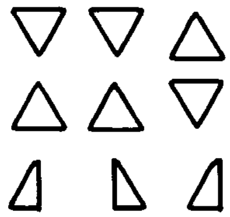
* * * * * *

Equation: ____________________

Product: ____________________

Factors: ____________________

8.

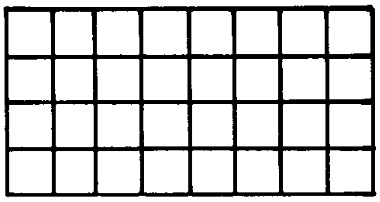


Equation: ____________________

Product: ____________________

Factors: ____________________

9.

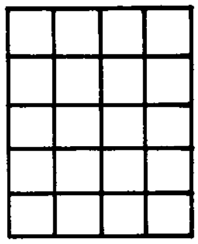


Equation: ____________________

Product: ____________________

Factors: ____________________

10.



Equation: ____________________

Product: ____________________

Factors: ____________________

11.

a b c d
e f g h
i j k l

Equation: ____________________

Product: ____________________

Factors: ____________________

12.

b a d c
f e h g
j i k l

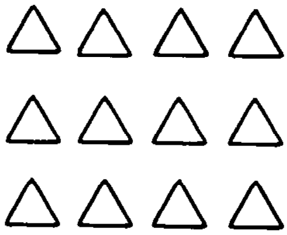
Equation: ____________________

Product: ____________________

Factors: ____________________

Multiplication Equations

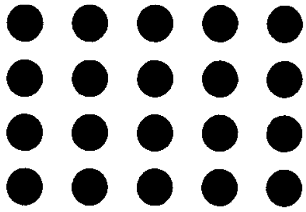
Fill in the blanks:

1. 

Equation: ____________________

Product: ____________________

Factors: ____________________

2. 

Equation: ____________________

Product: ____________________

Factors: ____________________

3. 

Equation: ____________________

Product: ____________________

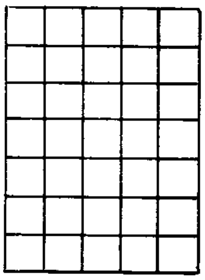
Factors: ____________________

4. 

Equation: ____________________

Product: ____________________

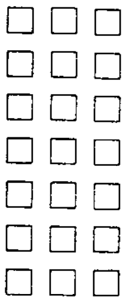
Factors: ____________________

5. 

Equation: ____________________

Product: ____________________

Factors: ____________________

6. 

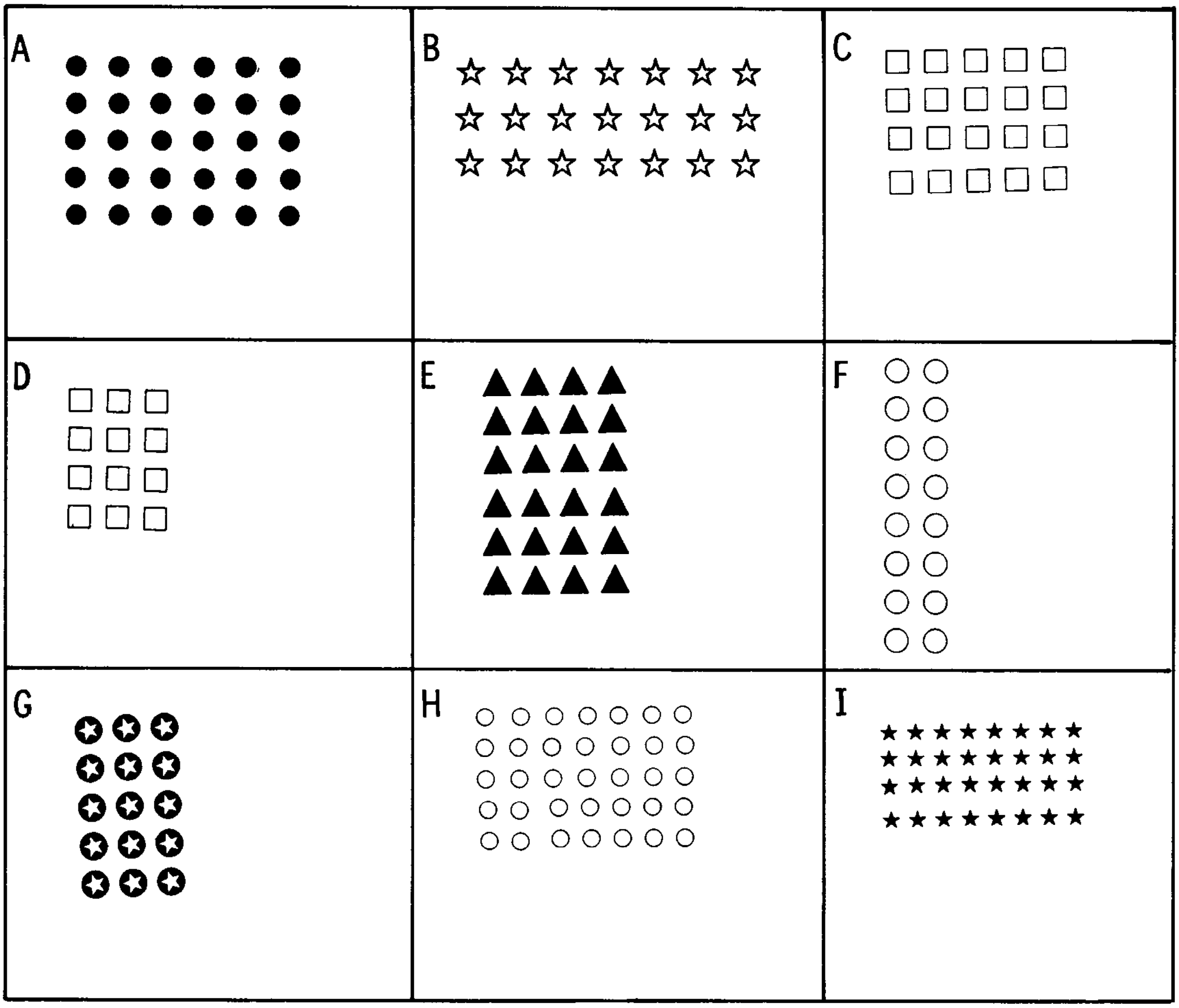
Equation: ____________________

Product: ____________________

Factors: ____________________

Arrays and Equations

Match the array with the equation that describes it.



1) $8 + 8 + 8 + 8 = 32$ ________

2) $6 \times 4 = 24$ ________

3) $4 \times 5 = 20$ ________

4) $3 + 3 + 3 + 3 = 12$ ________

5) $5 \times 6 = 30$ ________

6) $5 \times 7 = 35$ ________

7) $7 + 7 + 7 = 21$ ________

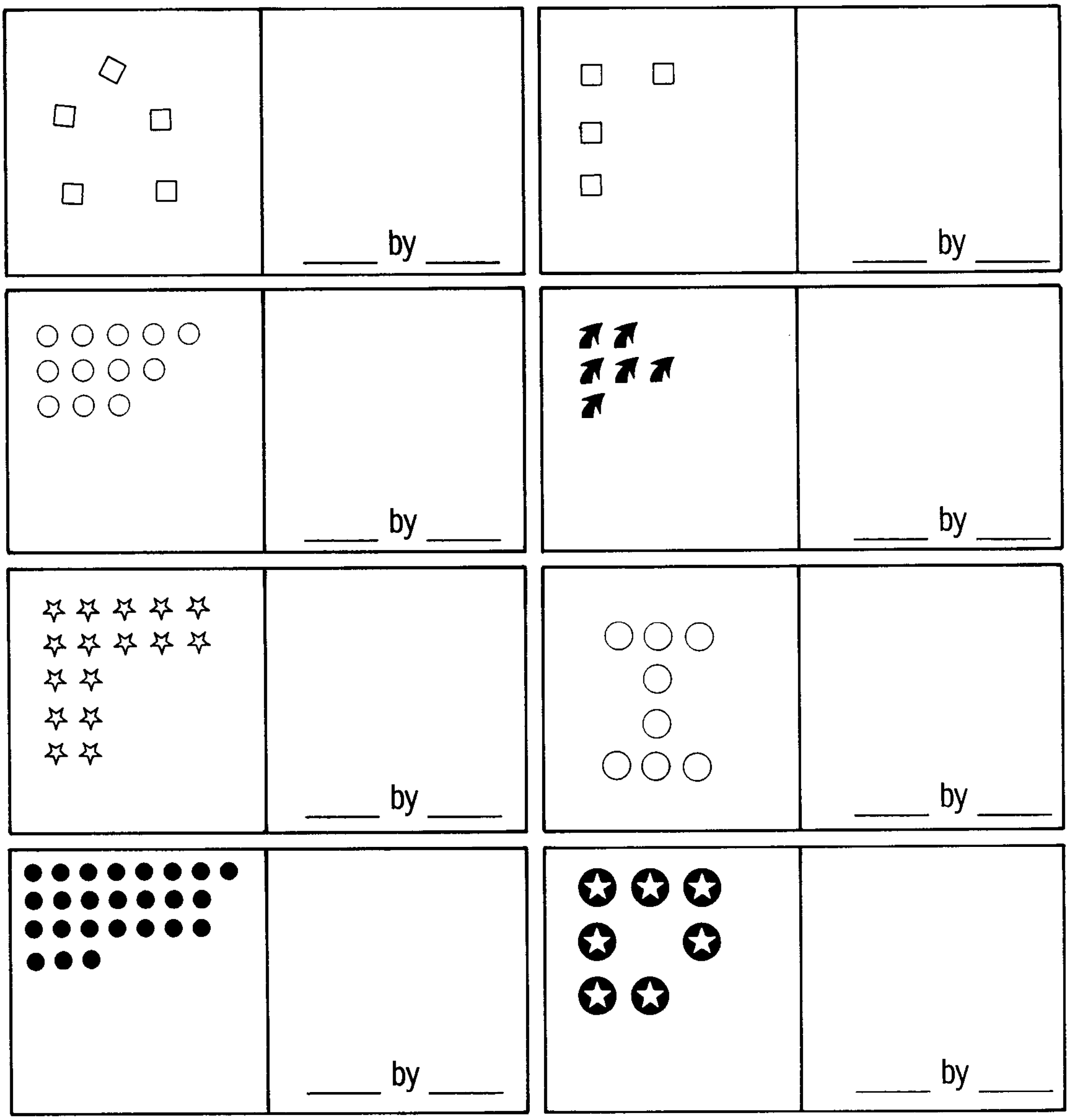
8) $5 \times 3 = 15$ ________

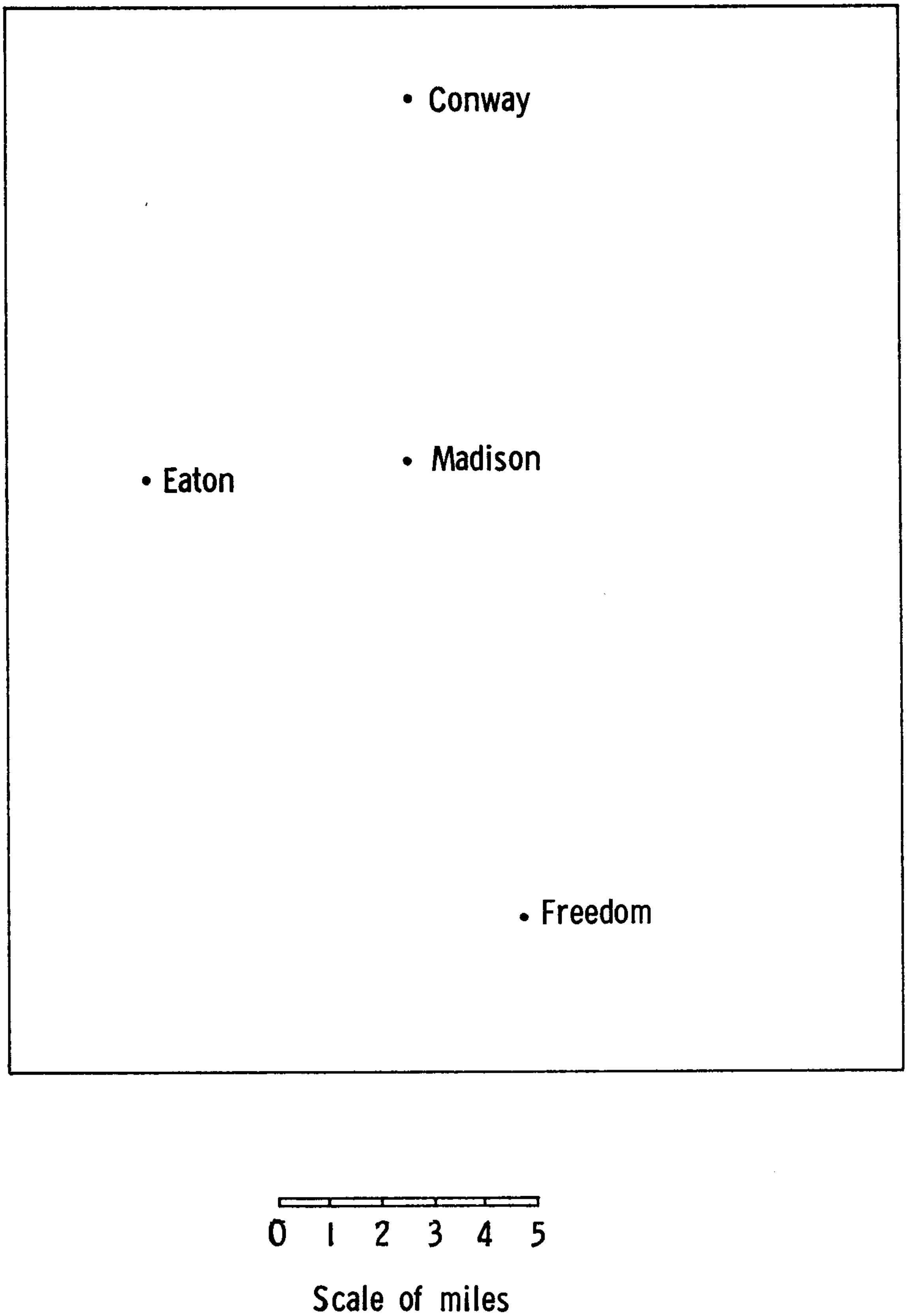
9) $8 \times 2 = 16$ ________

Draw an array, then fill in the blank.	
A 5 by 3 array has ____ elements.	A 4 by 4 array has ____ elements.
A 7 by 3 array has ____ elements.	A 4 by 6 array has ____ elements.
A 4 by 9 array has ____ elements.	An 8 by 3 array has ____ elements.
A 3 by 6 array has ____ elements.	An 8 by 5 array has ____ elements.

Arrays

In the pictures below rearrange the objects to form an array. Write in the blanks the number of rows in your array and the number of objects in each row.




Conway
Madison
Eaton
Freedom
0 1 2 3 4 5
Scale of miles

Look at the figure on the facing page.

It is part of a map.

See the scale below the map.

Each little segment on this scale stands for one mile.

Find the following distances:

Shortest distance from Madison to Conway is ________ miles.

Shortest distance from Madison to Eaton is ________ miles.

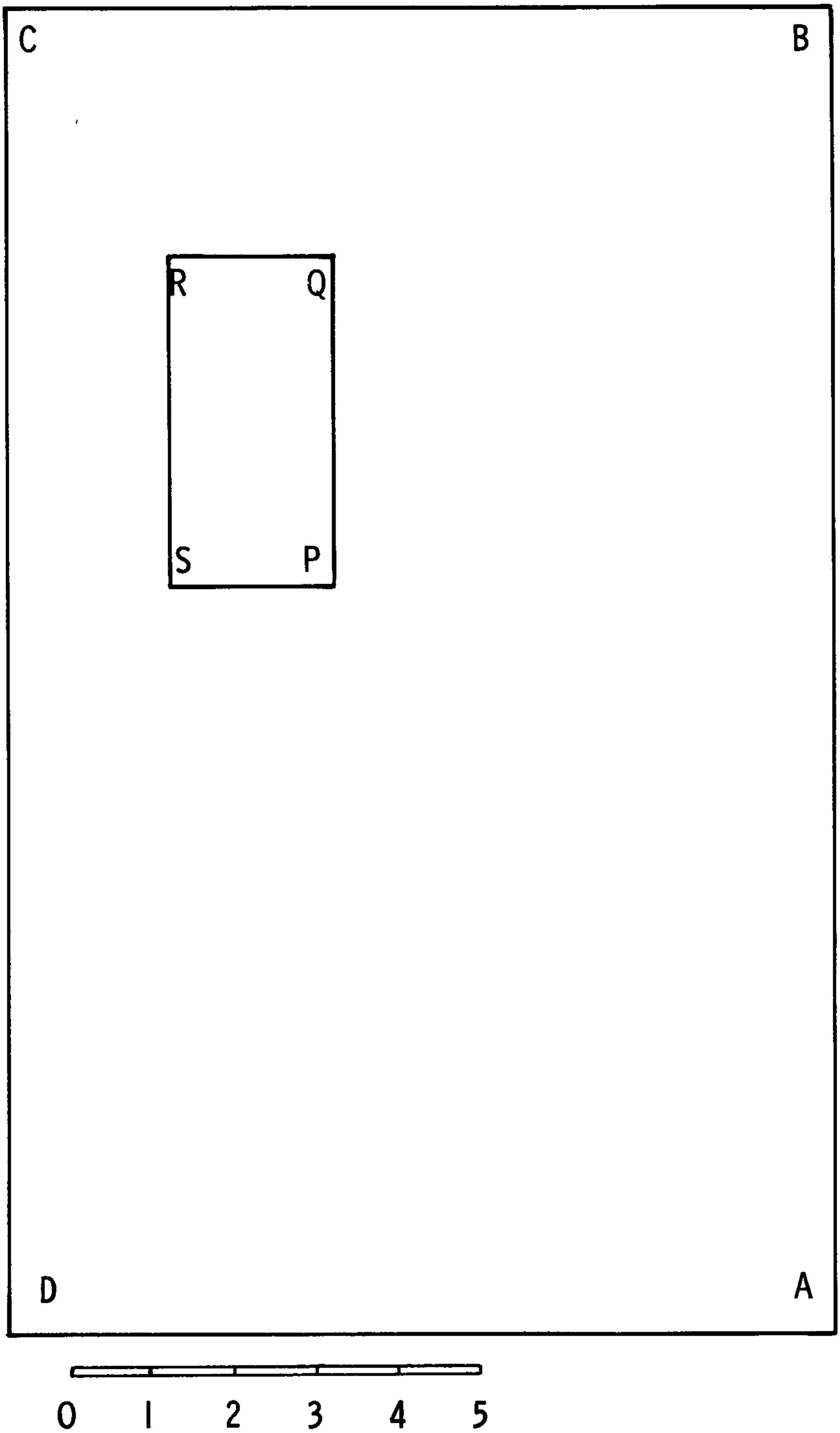
Shortest distance from Madison to Freedom is ________ miles.

Shortest distance between Freedom and Eaton is ________ miles.

Shortest distance from Eaton to Madison to Freedom to Eaton is _____miles.

Distance from Conway to Eaton to Madison to Freedom is ________ miles.

Reading Scale Drawings



1. Look at the figure on the facing page.

   ABCD is a scale drawing of the floor of a room.

   PQRS shows a table in this room.

   See the scale below the picture.

   Each small segment of this scale shows a one-foot segment in the room.

   Lay off this scale on the edge of a piece of paper.

   Lay it off several times to make a scale at least 20 units long.

2. Use the scale to find the following distances in the room (to the nearest foot).

   Length of longer side ________ ft.

   Length of shorter side ________ ft.

   Longer side of table ________ ft.

   Shorter side of table _______ ft.

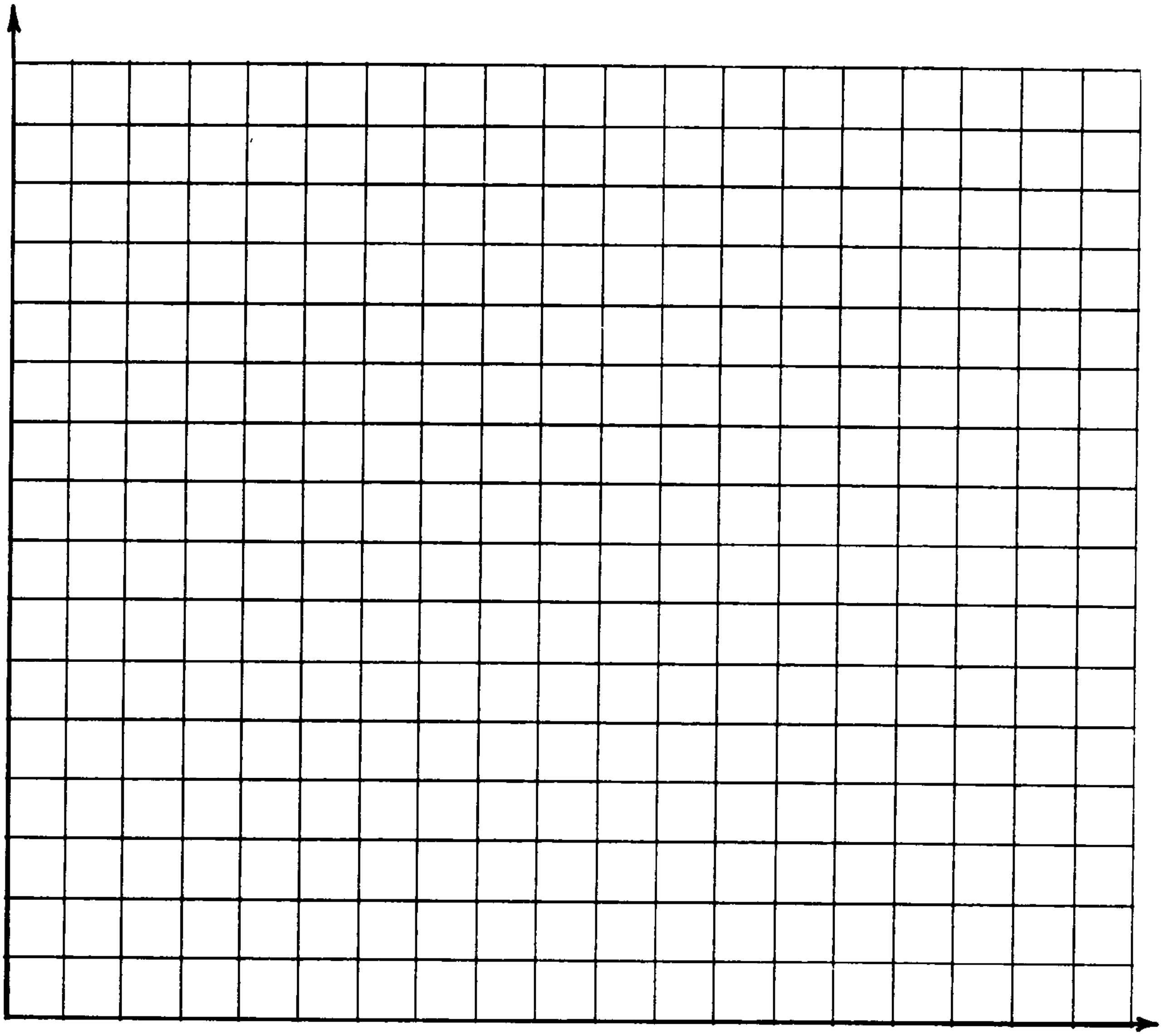
   Distance matching $\overline{DB}$ ________ ft.

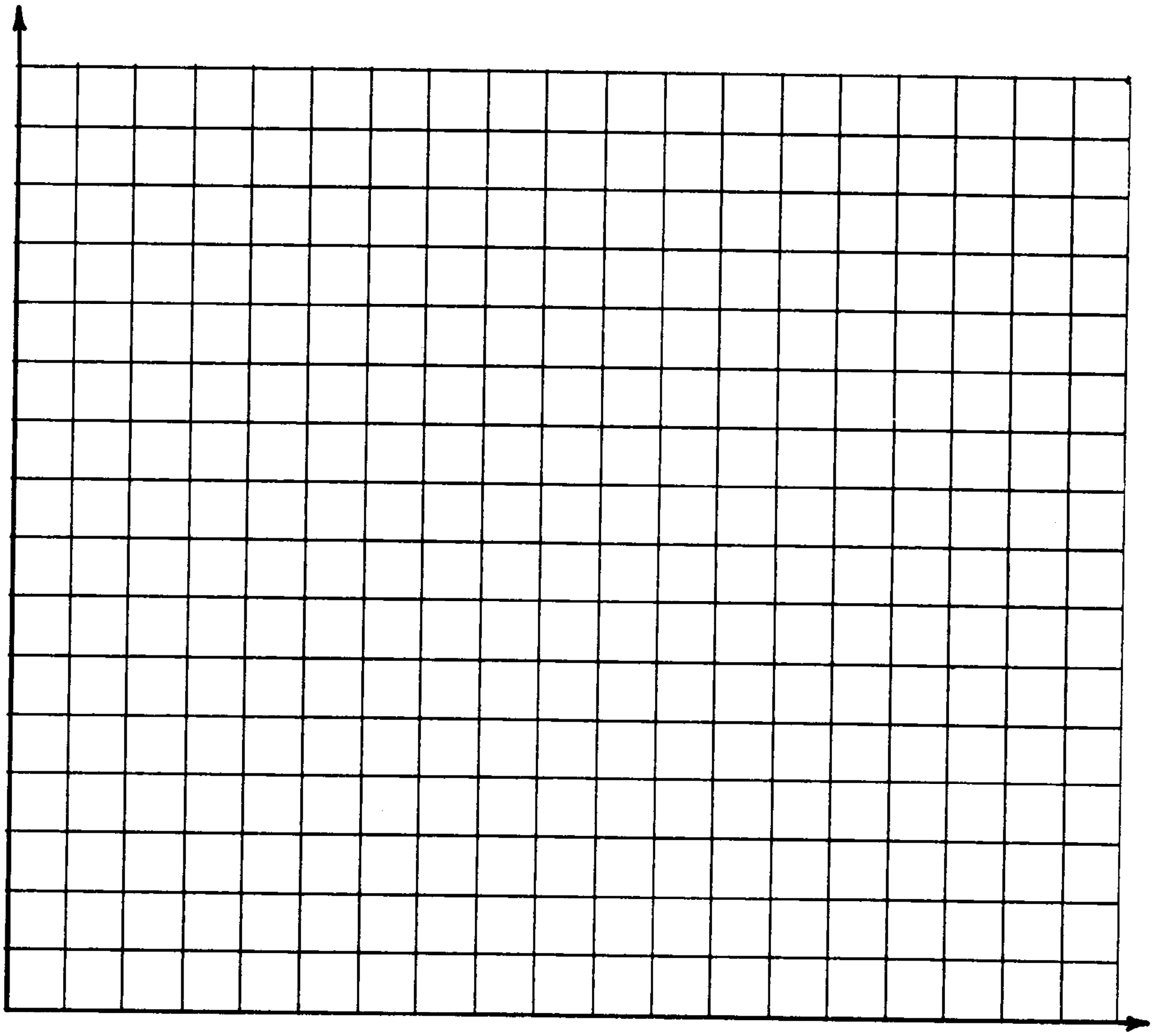
   Distance from the point matching C to nearest corner of the table

   _______________ ft.

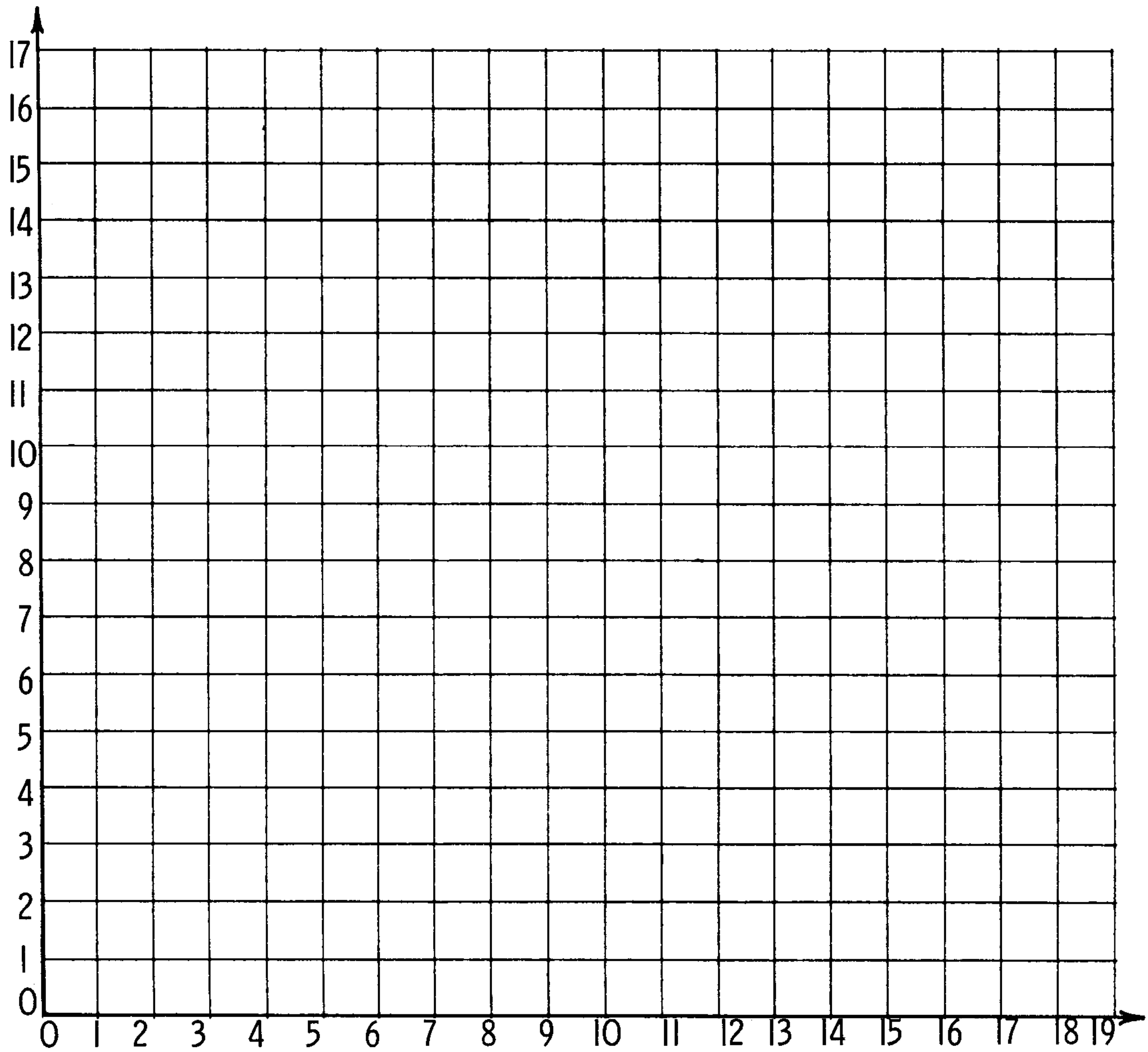
   Distance from the point matching C to farthest corner of the table

   _______________ ft.

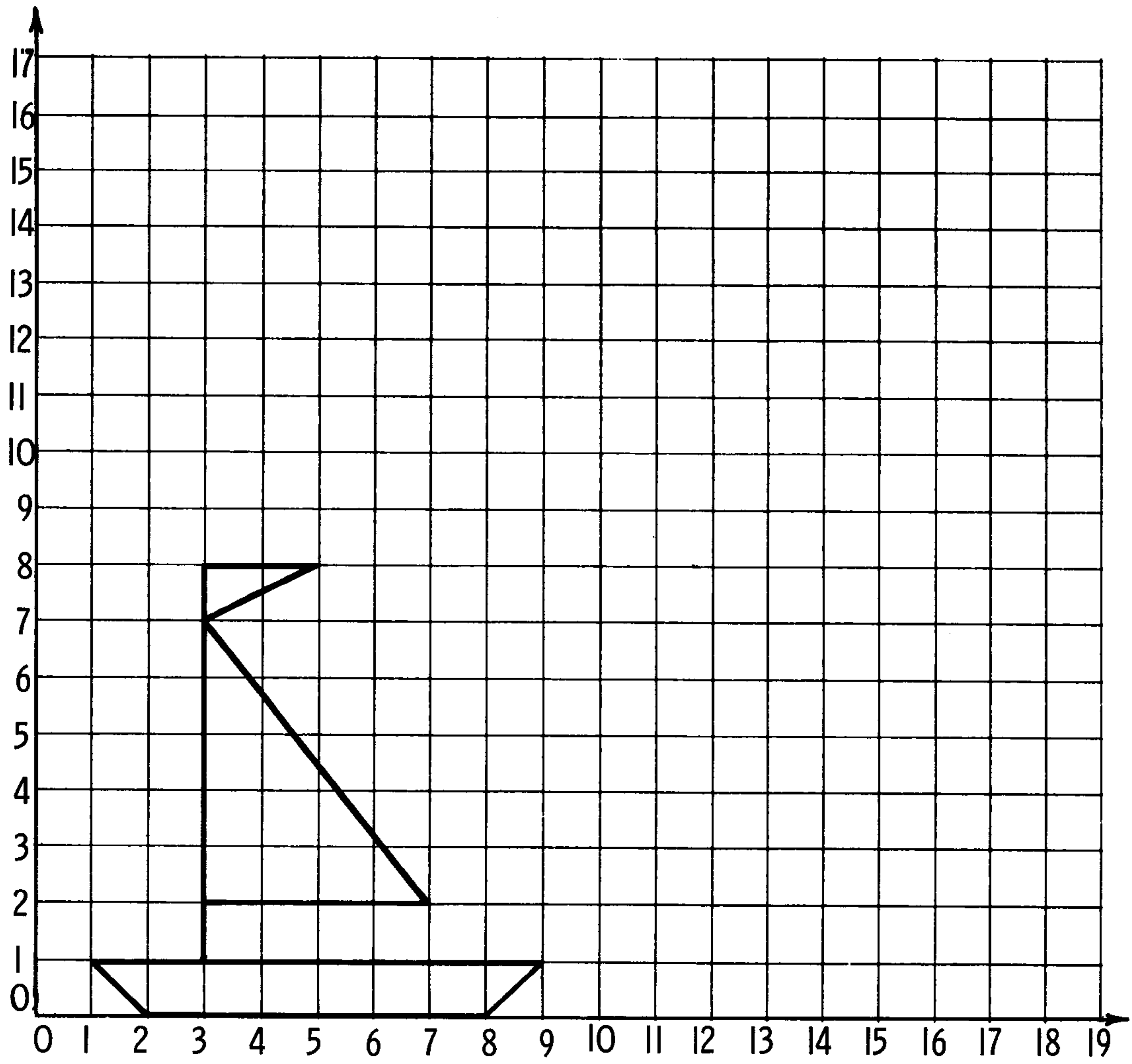




C.


0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19

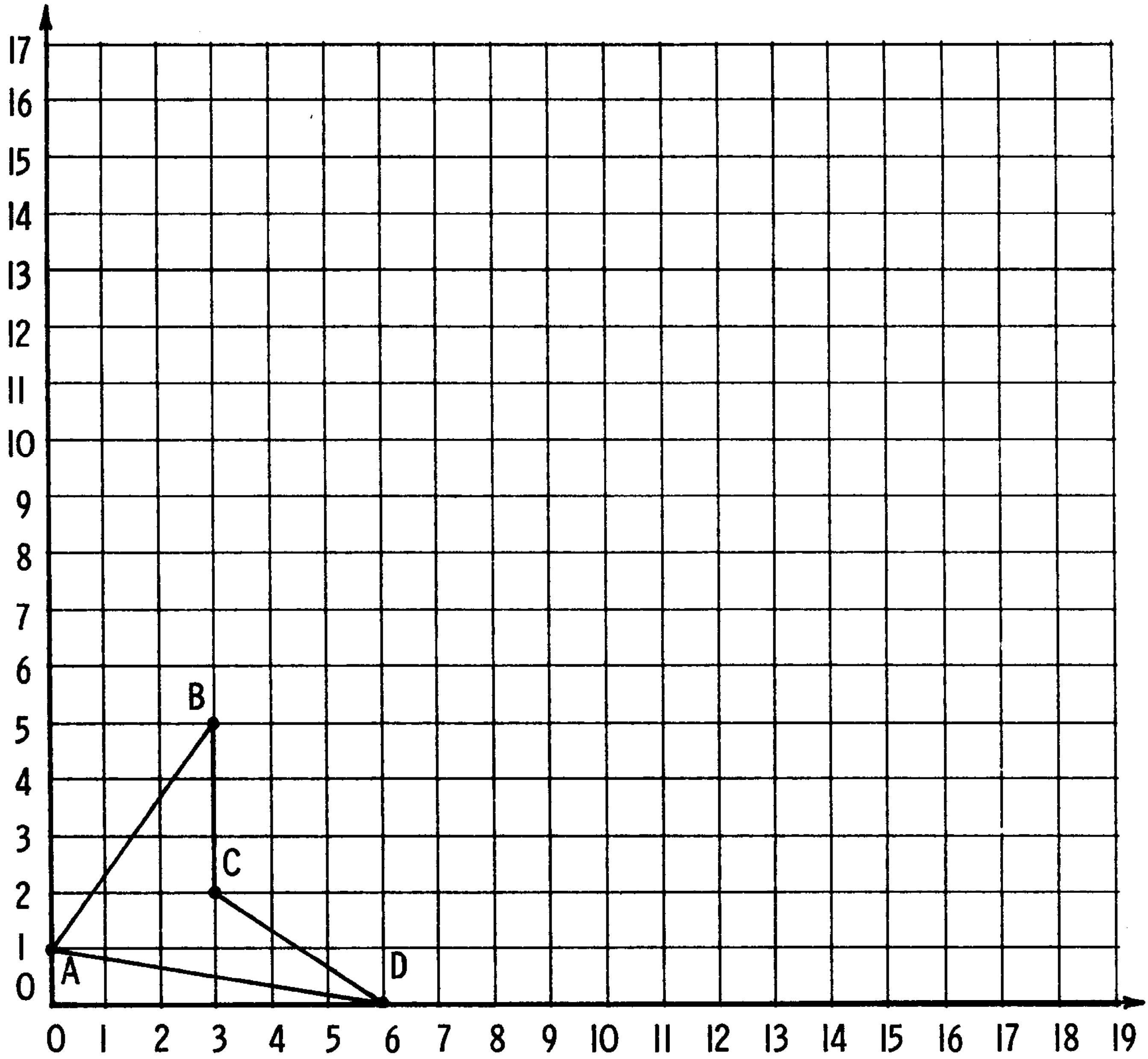
C.



Make a larger picture of the boat on the facing page.

Multiply all coordinates by 2.

B.



17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
B
C
A
D
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19

B. Look at quadrilateral ABCD.

Multiply all coordinates of these points by 3.

Call the new points P, Q, R, S.

The coordinates of P, Q, R, S are

P(,), Q(,), R(,), S(,).

Locate points P, Q, R, S.

Draw quadrilateral PQRS.

Is	$\overline{PQ}$	three times as long as	$\overline{AB}$?	Yes	No
Is	$\overline{QR}$	three times as long as	$\overline{BC}$?	Yes	No
Is	$\overline{RS}$	three times as long as	$\overline{CD}$?	Yes	No
Is	$\overline{PS}$	three times as long as	$\overline{AD}$?	Yes	No

Make a tracing of ABCD.

Is the angle at A congruent to the angle at P? Yes No

Use the tracing to find out.

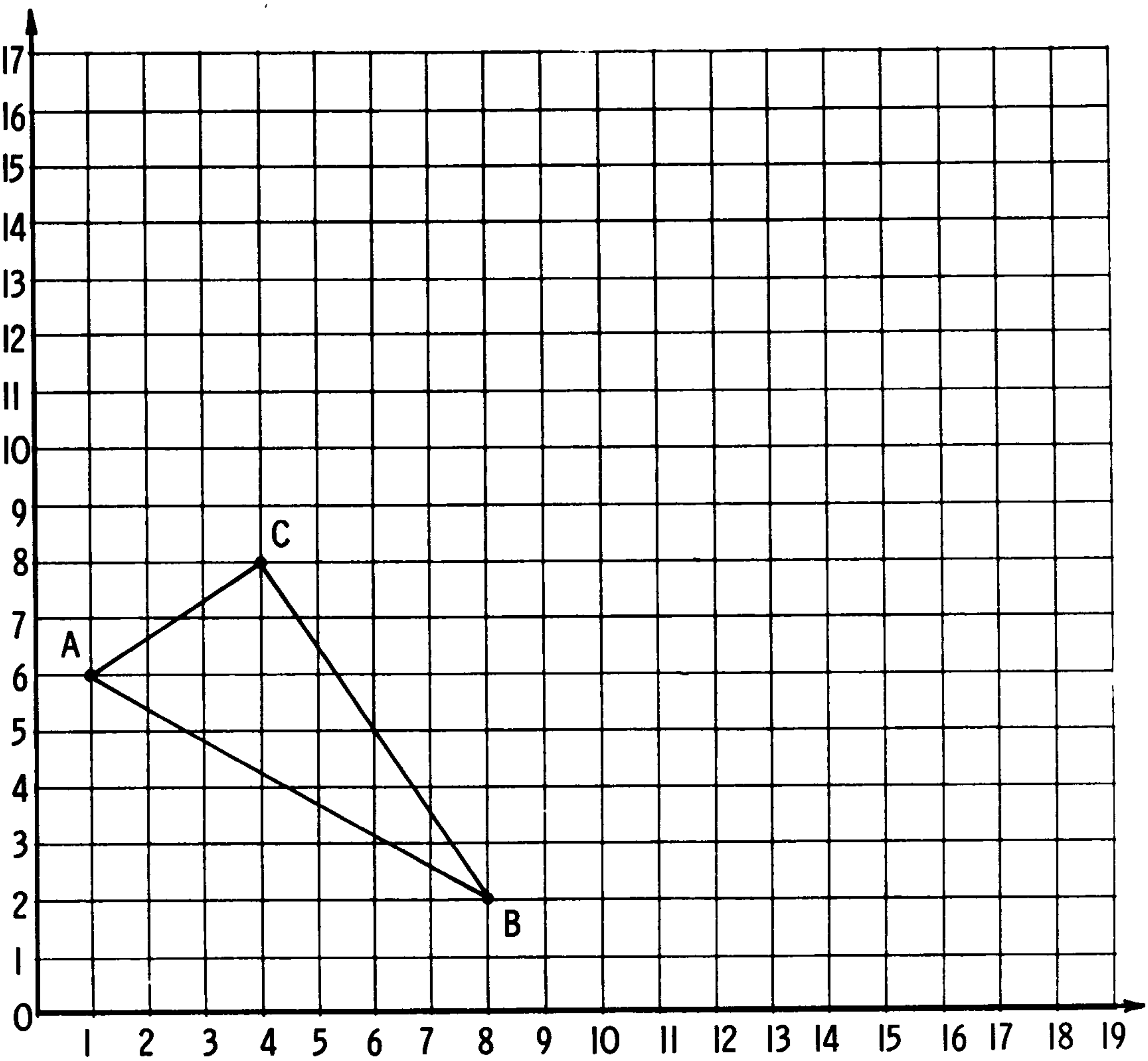
The angle at B is congruent to the angle at ________.

The angle at S is congruent to the angle at ________.

The angle at R is congruent to the angle at ________.

Enlarging Pictures

A.



A. Look at the figure on page 201.

The coordinates of A, B, C are

A(,), B(,), C(,).

Multiply all the numbers by 2.

Call the new points S, T, W.

The coordinates of S, T, W are

S(,), T(,), W(,).

Mark the points S, T, W.

Draw $\triangle$STW.

Draw a ring around each correct answer below.

Is $\overline{ST}$ twice as long as $\overline{AB}$? Yes No

Tell how you found out.

Is $\overline{SW}$ twice as long as $\overline{AC}$? Yes No

Is $\overline{WT}$ twice as long as $\overline{CB}$? Yes No

Make a tracing of $\triangle$ABC.

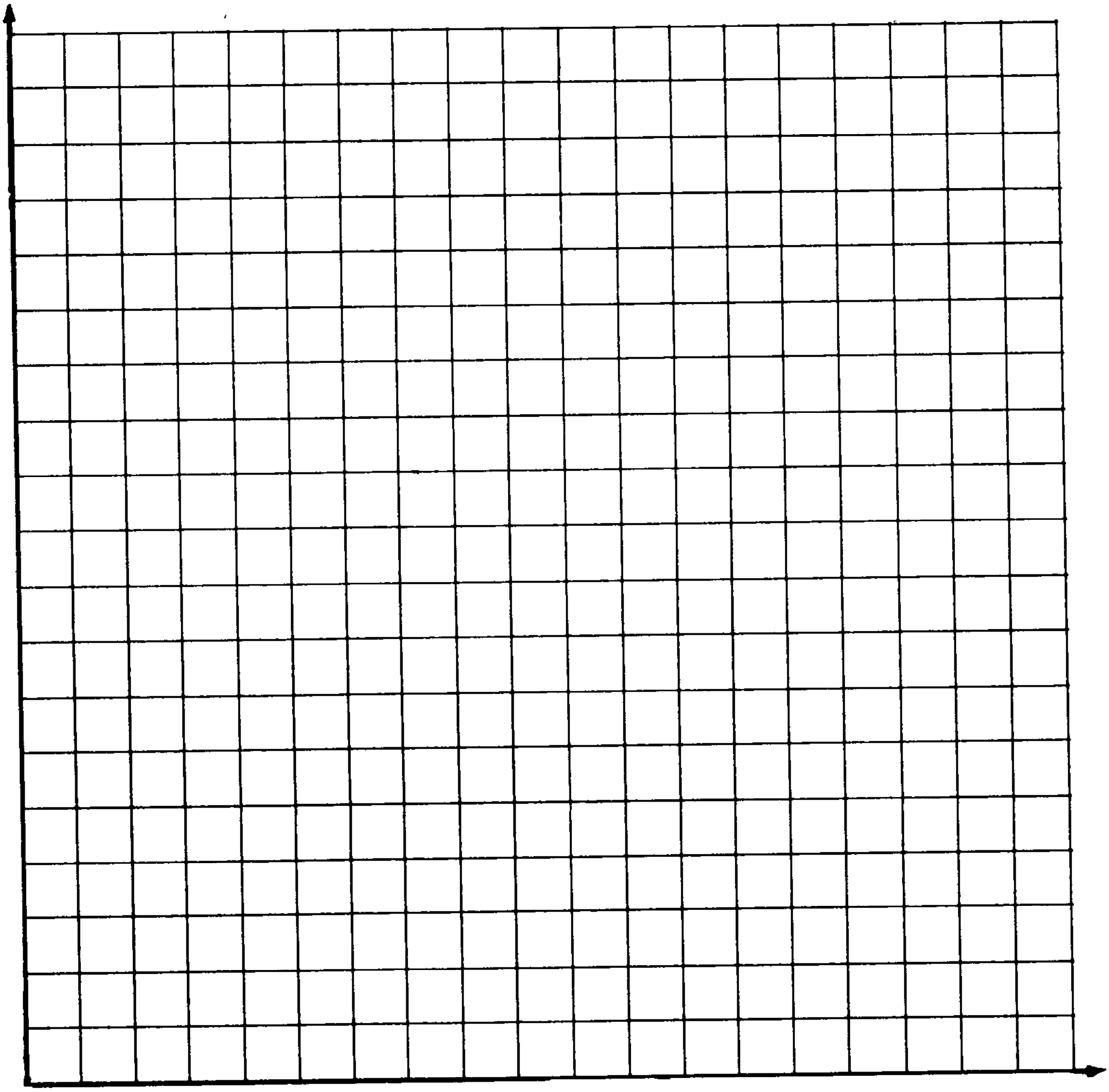
Is $\triangle$ABC congruent to $\triangle$STW? Yes No

Is $\angle$TSW congruent to $\angle$BAC? Yes No

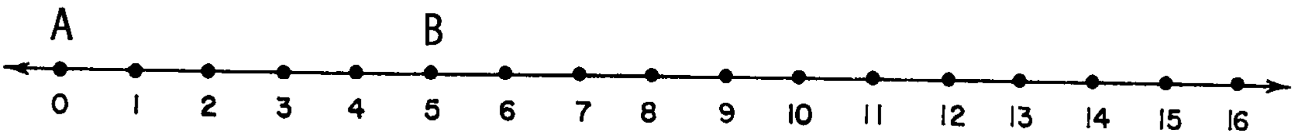
Use the tracing to check.

Name the angle congruent to $\angle$ABC. __________

Name the angle congruent to $\angle$TWS. __________



2. Look at the number line.



Color $\overline{AB}$ with a red crayon.

Multiply the numbers describing A and B by 3.

These new numbers are ________, ________.

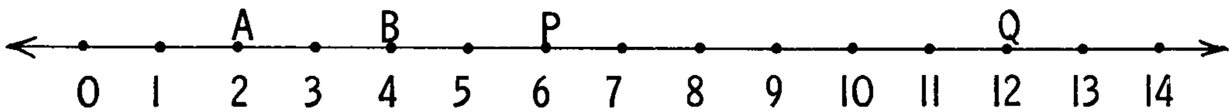
Call the new points P and Q.

Mark P and Q on the line.

Color $\overline{PQ}$ with a blue crayon.

The length of $\overline{PQ}$ is ________ times the length of $\overline{AB}$.

3. Look at the number line.



The number describing P is ______ times the number describing A.

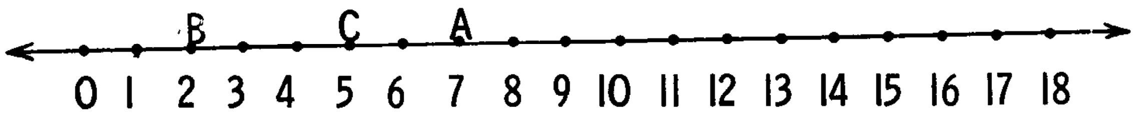
The number describing Q is ______ times the number describing B.

The length of $\overline{PQ}$ is ______ times the length of $\overline{AB}$.

Are the three numbers you wrote in the blanks the same? ________

Enlarging Segments on the Number Line.

1. Points A, B, C are shown on the number line.



The number describing point P is two times the number for A.
The number describing point Q is two times the number for B.
The number describing point R is two times the number for C.

Mark points P, Q, R on the line.

Show below the number describing each point.

A	B	C	P	Q	R

Show below the number of units in each segment.

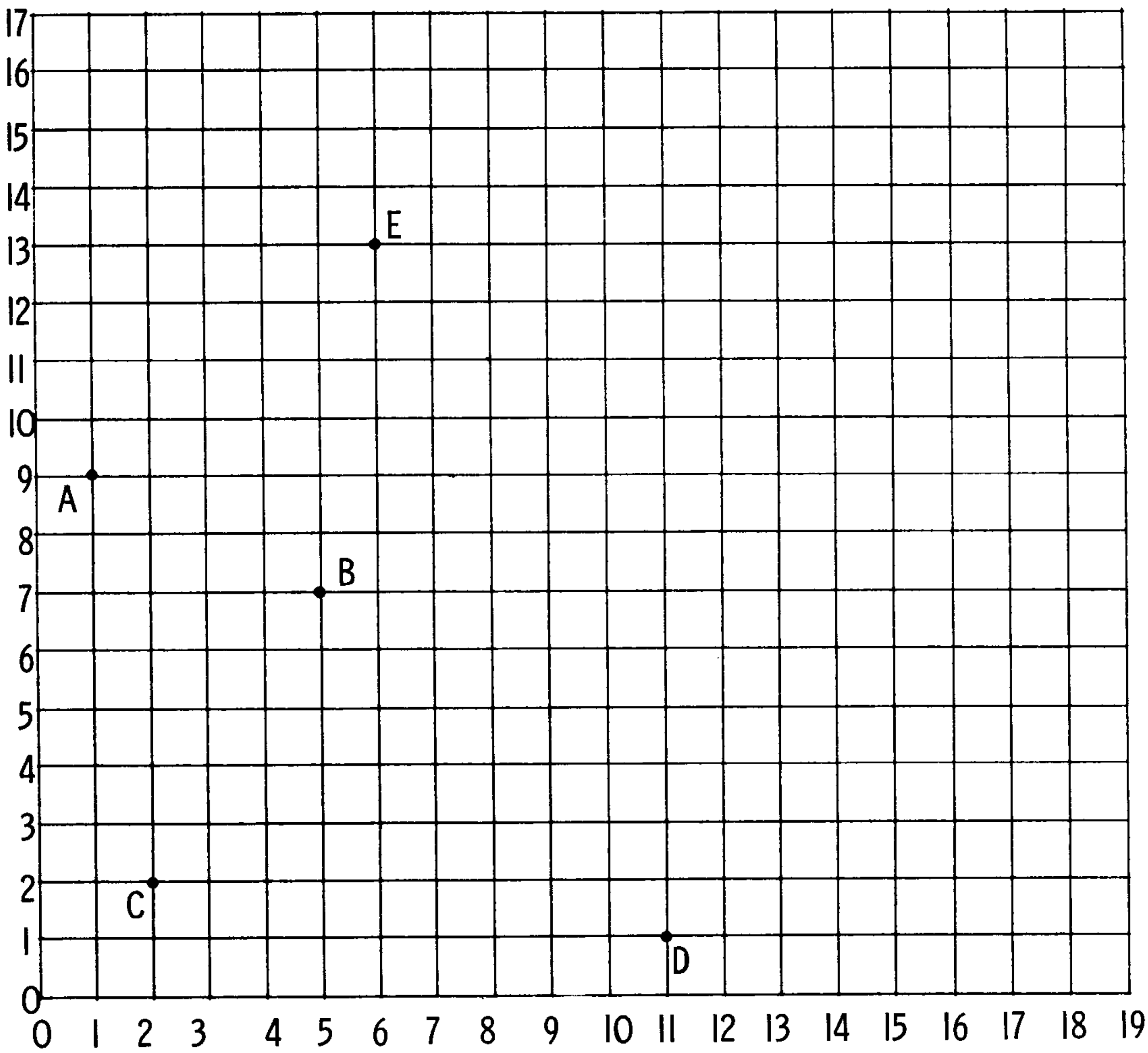
$\overline{AB}$	$\overline{BC}$	$\overline{AC}$	$\overline{PQ}$	$\overline{QR}$	$\overline{PR}$

Is $\overline{PQ}$ twice as long as $\overline{AB}$? ________

Is $\overline{QR}$ twice as long as $\overline{BC}$? ________

Is $\overline{PR}$ twice as long as $\overline{AC}$? ________

2.



17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
E
A
B
C
D
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19

2. The pairs of numbers describing A, B, C, D, E are

A(1, 9) B(5, 7) C(2, 2) D(11, 1) E(6, 13).

Points P, Q, R, S, T are found by adding 6 to the first number in each pair and 2 to the second number.

The pairs of numbers describing P, Q, R, S, T are

P(,), Q(,), R(,),

S(,), T(,).

Mark all these points on the opposite page.

Draw $\overline{AB}$, $\overline{BC}$, $\overline{CD}$, $\overline{DE}$, $\overline{EA}$.

Draw $\overline{PQ}$, $\overline{QR}$, $\overline{RS}$, $\overline{ST}$, $\overline{TP}$.

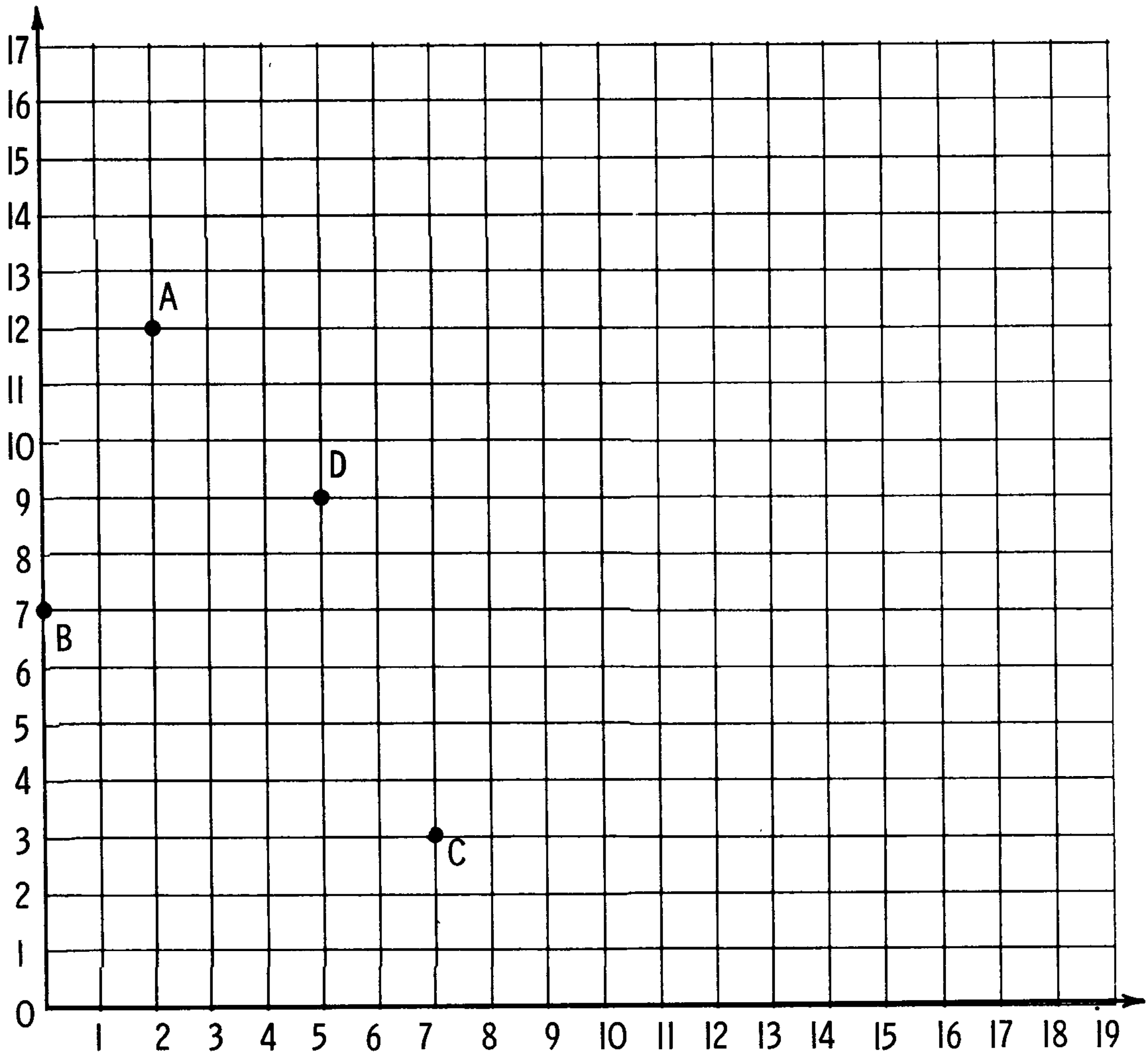
Make a tracing of ABCDE.

Can you fit the tracing on PQRST? ________

Is ABCDE congruent to PQRST? ________

Pictures in the Plane

1.



1. The pairs of numbers describing A, B, C, D are
A(2, 12) B(0, 7) C(7, 3) D(5, 9).

Points P, Q, R, S are found by adding 5 to the first number in each pair.
The second numbers are not changed.
The pairs of numbers describing P, Q, R, S are
P(,), Q(,), R(,), S(,).

Mark A, B, C, D, P, Q, R, S on the opposite page.

Draw quadrilateral ABCD.

Draw quadrilateral PQRS.

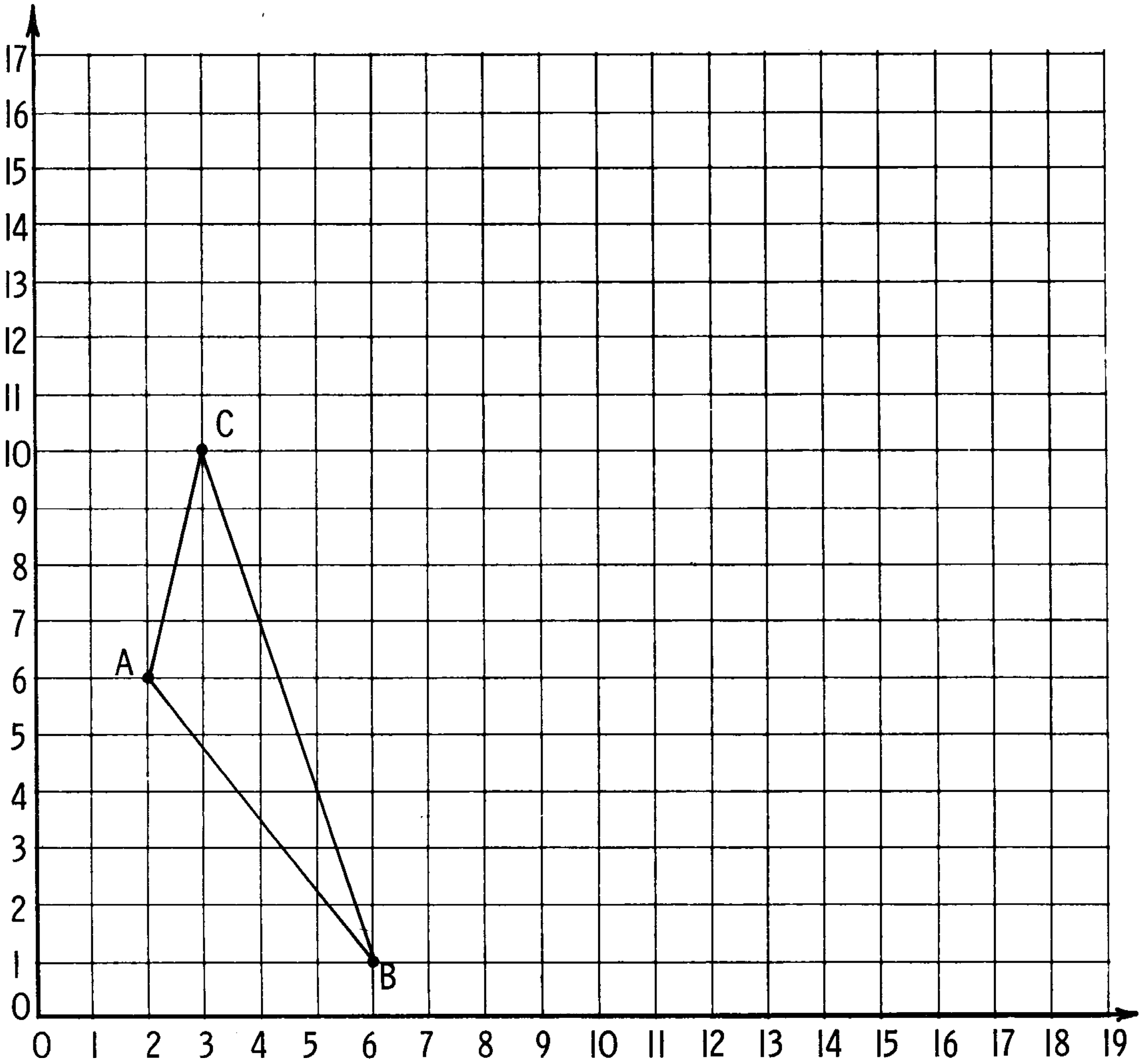
Make a tracing of ABCD.

Can you fit the tracing on PQRS? ________

Is ABCD congruent to PQRS? ________

Pictures in the Plane

A.



A. Look at the figure on the next page.

The numbers describing A, B, C are

A(,), B(,), C(,).

Move 7 units to the right and 4 units up from each point.

Call these new points P, Q, R.

The numbers describing P, Q, R are

P(,) Q(,), R(,).

Mark P, Q, R.

Draw $\overline{PQ}$, $\overline{QR}$, and $\overline{RP}$.

Make a tracing of $\triangle ABC$.

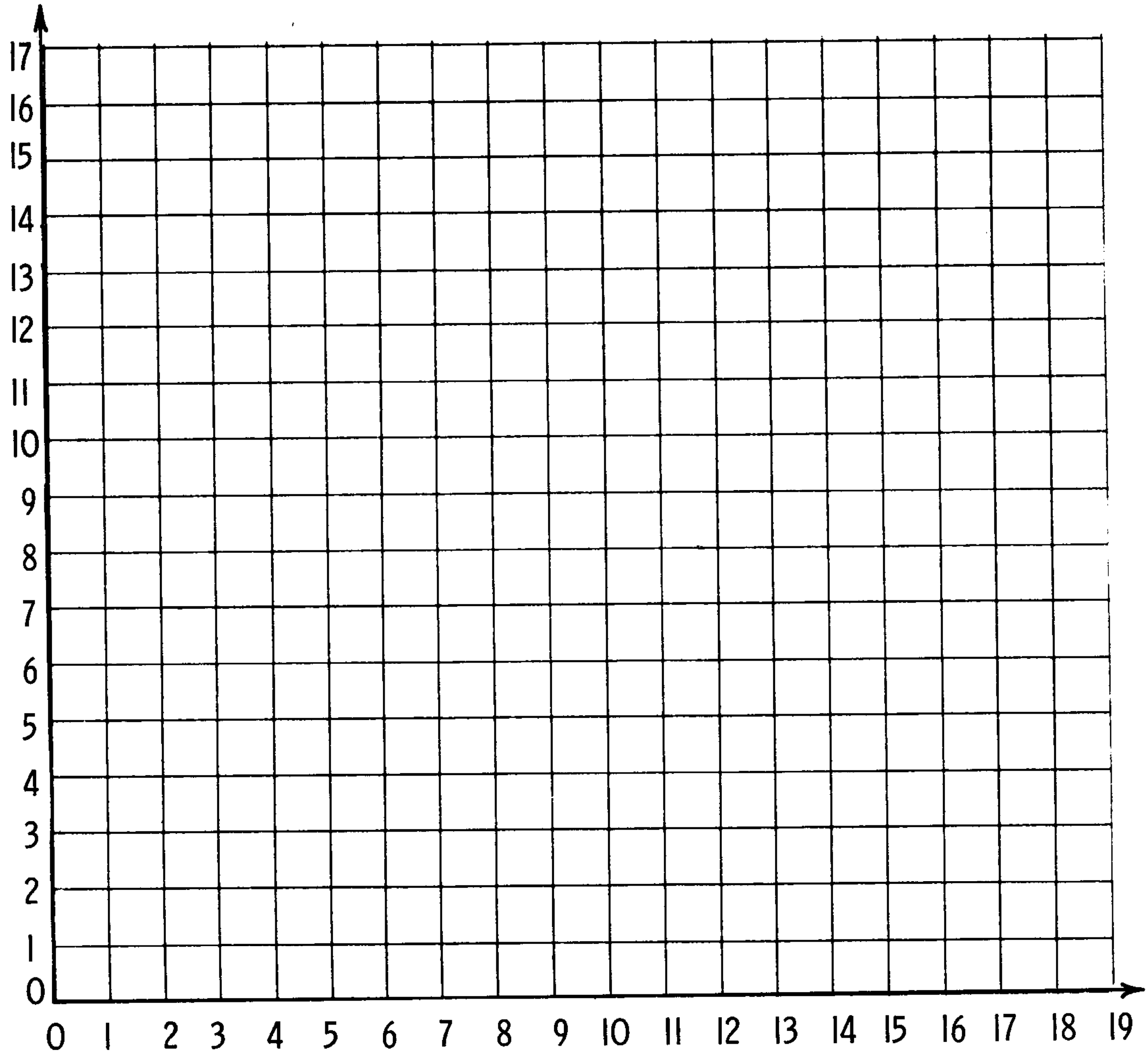
Does this tracing exactly fit on $\triangle PQR$? ________

Do you find $\triangle ABC$ congruent to $\triangle PQR$? ________

Complete the table below to show congruent sides and angles.

$\overline{AB}$	
$\overline{BC}$	
	$\overline{PR}$
$\angle ABC$	
	$\angle RPQ$
$\angle BCA$	

6.



0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

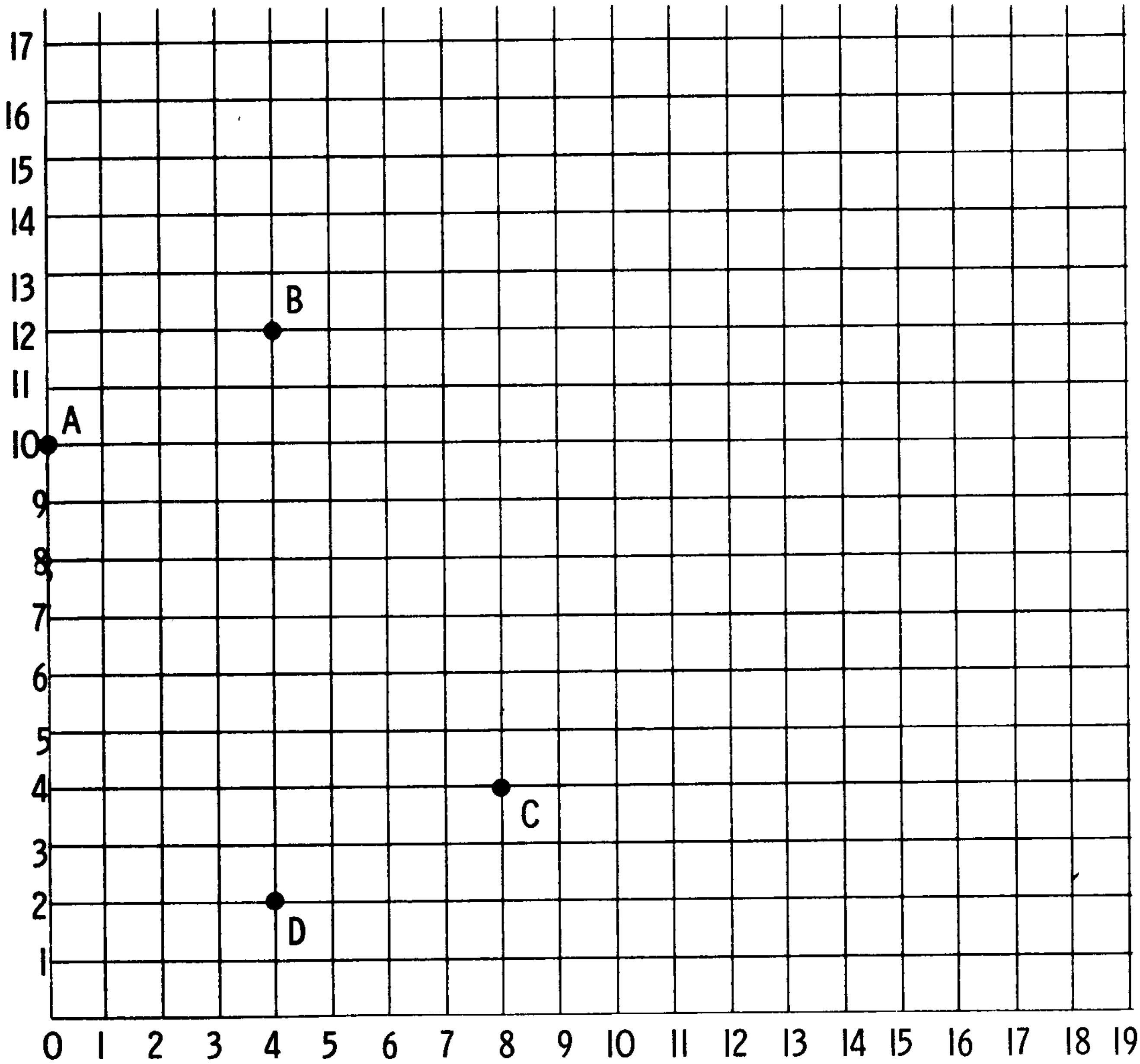
6. Make a figure on the facing page.

   Use only segments whose endpoints are described by whole numbers.

   Use the numbers to tell how to draw your figure.

   See if a classmate can follow your directions without seeing your figure.

5.


A
B
C
D
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

5. Give numbers describing A, B, C, D.

A(,), B(,), C(,), D(,).

Draw $\overline{AC}$ and $\overline{BD}$. Call their point of intersection E.

Give numbers describing E. (,)

The length of $\overline{BD}$ is ________ units.

Draw $\overrightarrow{AD}$ and $\overrightarrow{BC}$.

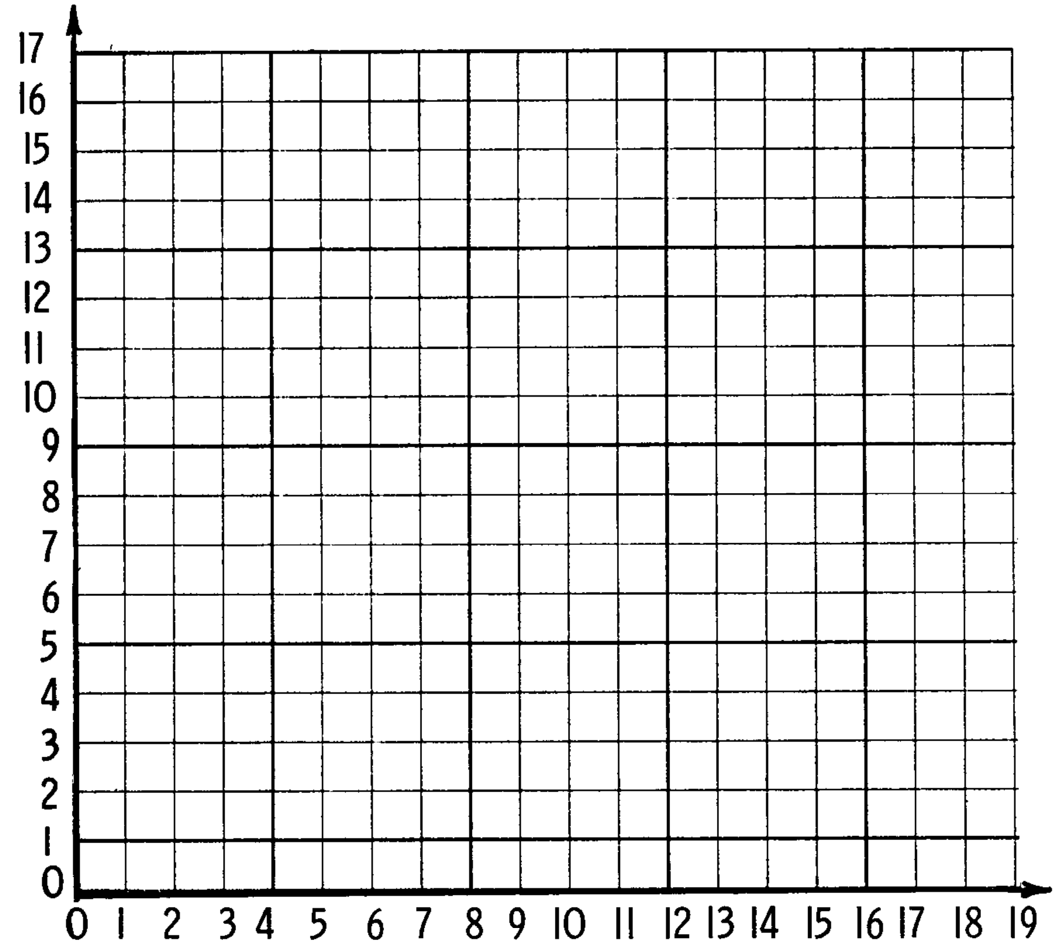
Give numbers describing the points where $\overrightarrow{AD}$ and $\overrightarrow{BC}$ meet the bottom line. (,) (,)

Draw $\overline{AB}$ and $\overline{CD}$. What kind of figure is ABCD? __________

Draw $\overleftrightarrow{CD}$.

Give numbers describing the point where $\overleftrightarrow{CD}$ meets the bottom line. (,).

4.


17
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12
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10
9
8
7
6
5
4
3
2
1
0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19

4. Draw segments joining the following points in order :

(2, 13) (2, 9) (2, 11) (4, 11) (4, 9) (4, 13).

Draw segments joining the following points in order :

(7, 12) (5, 12) (5, 10) (6, 10) (5, 10) (5, 8) (7, 8).

Draw segments joining the following points in order:

(8, 11) (8, 7) (10, 7).

Draw segments joining the following points in order:

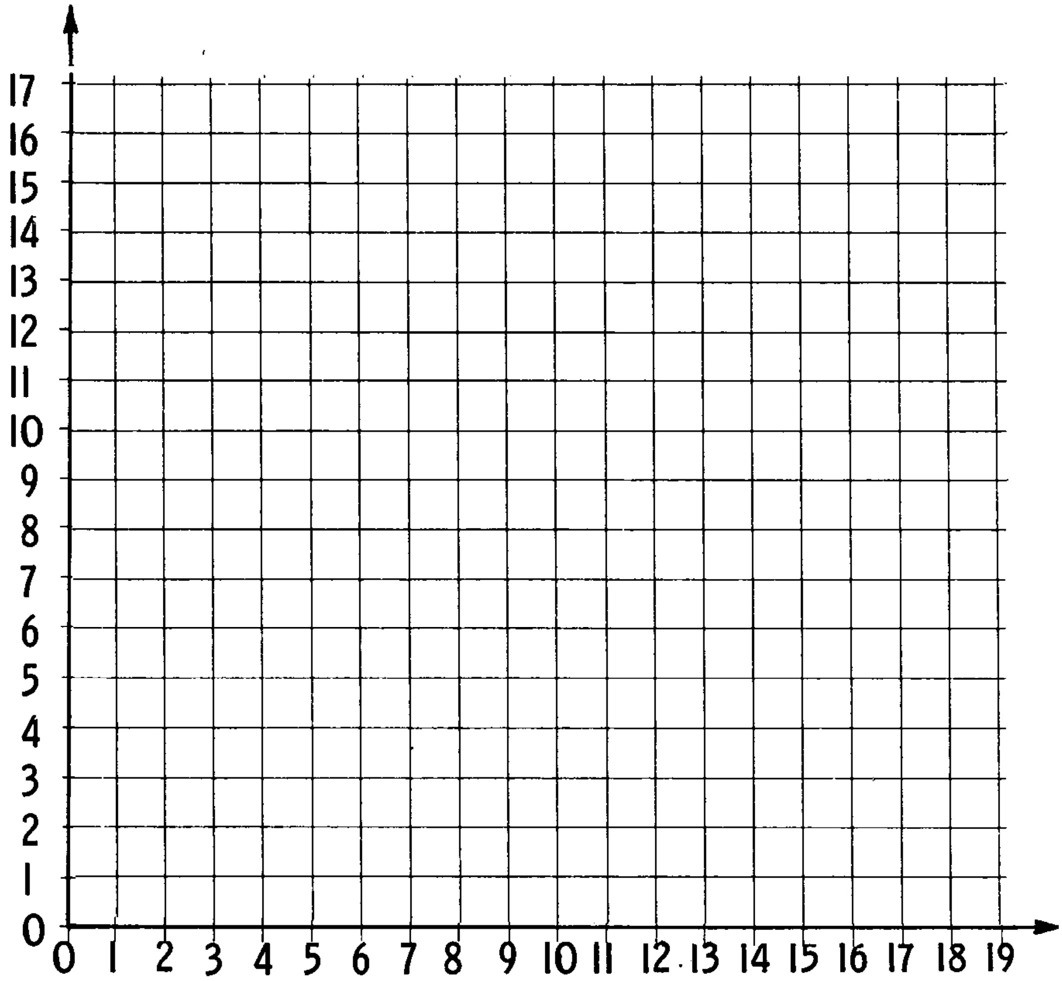
(13, 6) (11, 6) (11, 10).

Draw segments joining the following points in order:

(15, 5) (16, 5) (17, 6) (17, 8) (16, 9) (15, 9)
(14, 8) (14, 6) (15, 5).

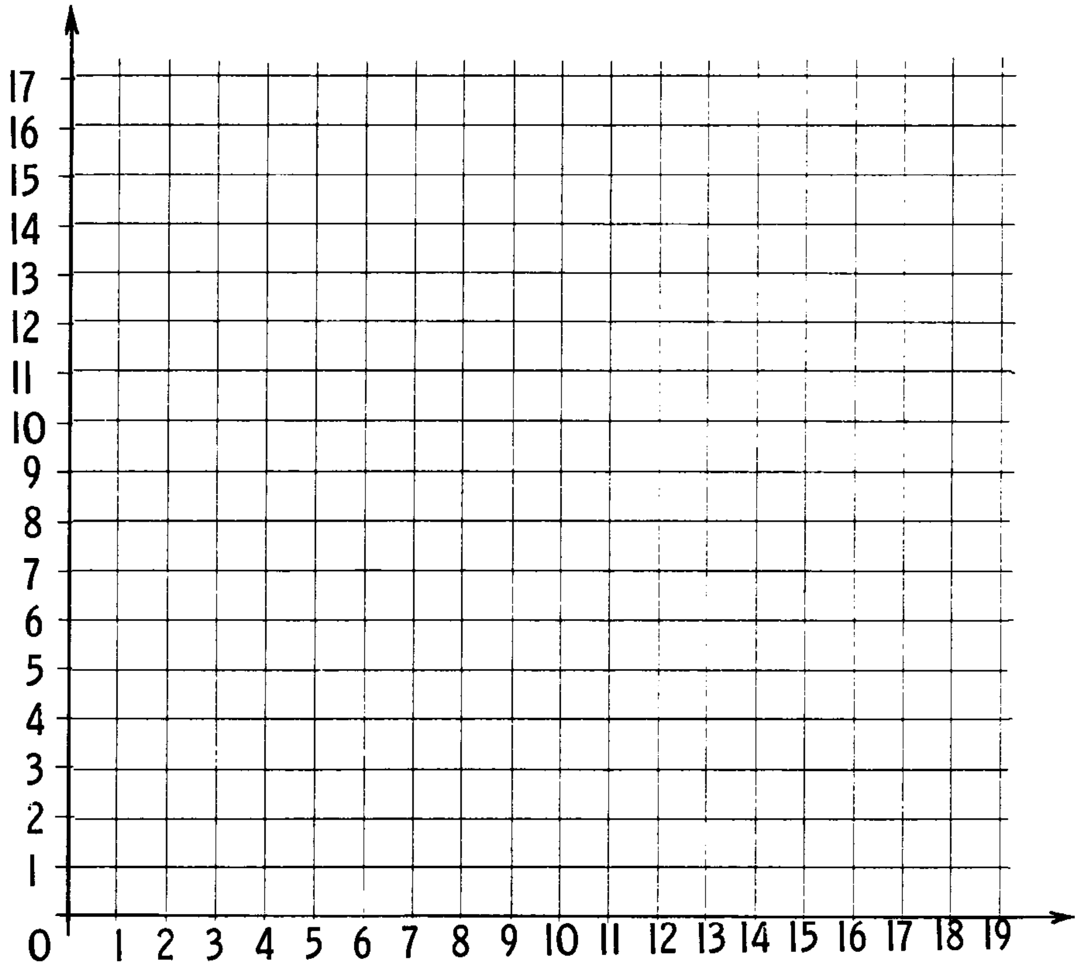
What did you find? ______________________________

3.



Use your ruler to draw the line through the points (4, 1) and (12, 13). Some other points which seem to lie on this line are (,) and (,), also (,) and (,).

2.



Use your ruler to draw the line through the points (6, 1) and (2, 5).

Other points which seem to lie on this line are (,), (,),

(,), (,), (,), and (,).

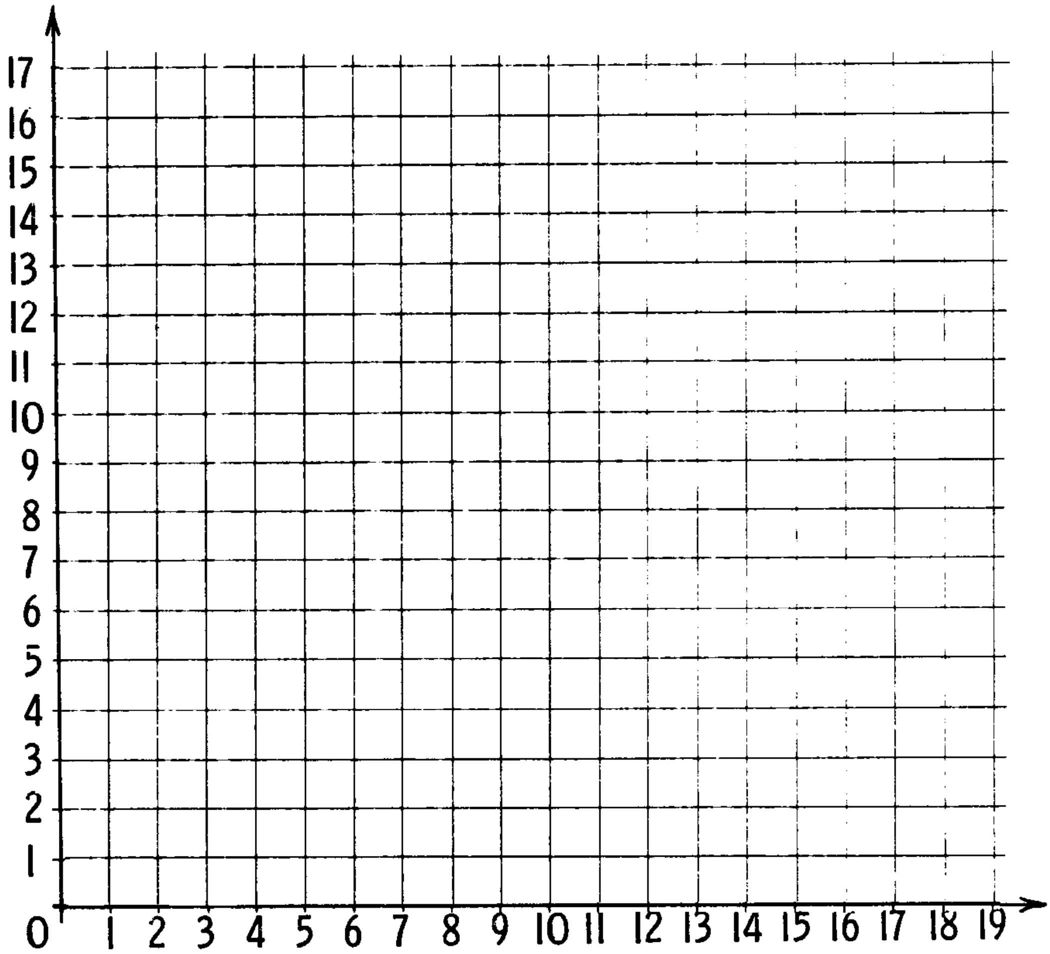
Coordinates in a Plane

1. Draw segments joining the following points in order:

(10, 4) (10, 6) (12, 6) (12, 7) (11, 7) (12, 7) (12, 8)

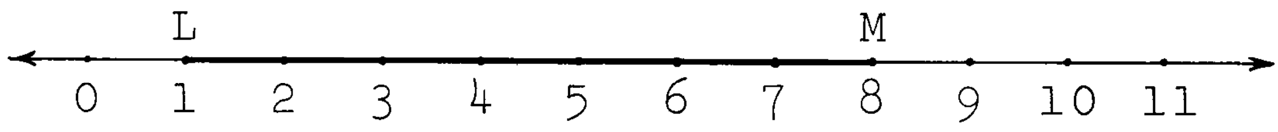
(13, 8) (12, 10) (13, 11) (13, 12) (12, 13) (8, 13) (7, 12)

(7, 8) (8, 6) (8, 4).



What did you find? ____________________

4. Pretend this number line shows a railroad track.



A train is on the track.

Its ends are at L and M.

A road crosses the track at a point X.

Point X is described by the number 51.

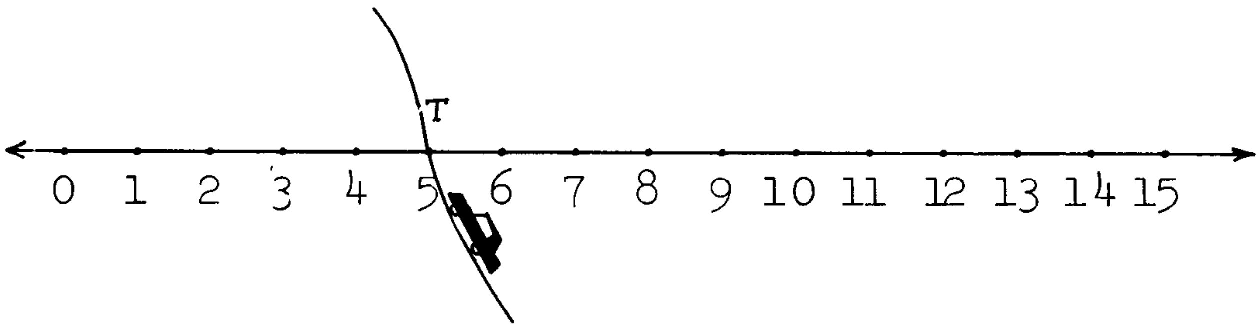
Can you imagine the point X? ________

The train moves 46 units to the right and stops.

Its ends are described by the numbers ________ and ________.

Has the train crossed the road? ________

3. Pretend the number line is a railroad track.



A train is on the track.

Its ends are described by numbers 2 and 9.

Color the track where the train is standing.

A road crosses the track at T.

A car is on the road.

Can the car cross the track? ________

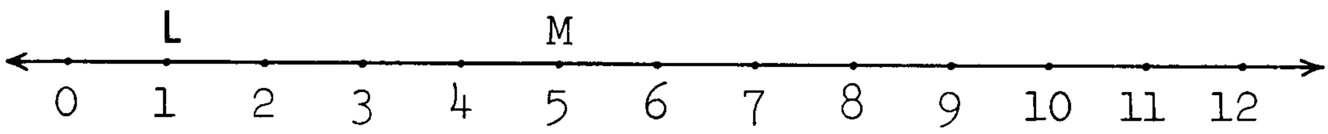
The train moves to the right.

The front of the train is described by the number 13.

The back of the train is described by the number ________.

Can the car now cross the track? ________

2. Pretend this number line shows a railroad track.



A train is on the track.

Its ends are at L and M.

Color red the track where the train is standing.

Point L is described by the number ________.

Point M is described by the number ________.

The length of the train is ________ units.

The train moves 6 units to the right.

Call the new endpoints P and Q.

Point P is described by number ________.

Point Q is described by number ________.

Color green the track where the train is now.

Motion on a Line

1. When George goes home from school he passes a long fence. The picture shows the fence. The dots are the fence posts.

George likes to describe the posts with whole numbers.

He describes post A by the number 4.

He describes post B by the number 5.

Draw a ring around the post he describes with the number 0.

Can George describe all the posts with whole numbers? ________

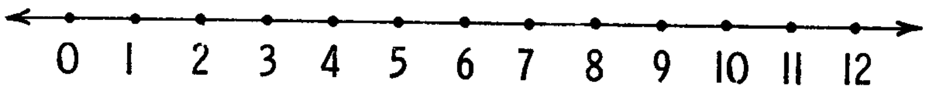
Sally does not like the way George describes the posts.

She says the numbers that describe A and B should be 6 and 7.

Put a cross on the post Sally describes by the number 0.

Can Sally describe all the posts by whole numbers? ________

2.



Mark points A, B, C, D.

Point A has the coordinate 2.

Point B is 3 units to the right of A.

Point C is 5 units to the left of B.

Point D is 11 units to the right of C.

B has the coordinate ________.

C has the coordinate ________.

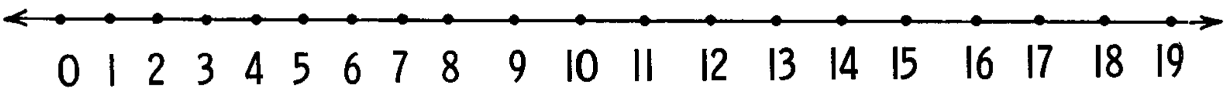
D has the coordinate ________.

The length of $\overline{BC}$ is ________ units.

The length of $\overline{AD}$ is ________ units.

Describing Points by Numbers

1.



Mark points A, B, C, D.

Point A has the coordinate 10.

Point B has the coordinate 3.

Point C has the coordinate 17.

Point D has the coordinate 12.

Complete the following:

The length of $\overline{AB}$ is (10 - 3) units or ________ units.

The length of $\overline{BC}$ is (________) units or ________ units.

The length of $\overline{CD}$ is (________) units or ________ units.

The total number of units in $\overline{AB}$, $\overline{BC}$, and $\overline{CD}$ is ________.

The distance from A to D is ________ units.

27 + 18 = 45

XXVII + XVIII = XXXXV

55 + 24 = ______

______ = ______

63 + 14 = ______

______ = ______

107 + 86 = ______

______ = ______

36 + 335 = ______

______ = ______

1247 + 115 = ______

______ = ______

11. Now try some subtraction. Figure out the rules for yourself.

XXIII - XII = ______

VIIII - III = ______

XVII - XVI = ______

X - V = ______

X - VII = ______

L - XX = ______

CXII + XXII + I = ________

DX + DI = ________

8. Now do these:

V + V = ________

CV + XVI + V = ________

VI + XV = ________

LV + XV + VII = ________

MCXI + V + XVII = ________

VIII + III = ________

9. Now do these:

XX + XXXV = ________

LV + CLV = ________

XXII + XXXIII = ________

MLV + XV + LVII = ________

CLVI + LXII + LII = ________

XXX + XV + DVI = ________

10. Our numerals 1, 2, 3, 4, ... are called Arabic numerals. Write these problems in Roman numerals. Then do them in Roman numerals. Check your answer by adding the regular way. The first one is done for you.

5. So far we have just put together all the letters in the numbers to be added. Sometimes addition is a little more complicated. If, for example, we just put together the letters in this addition example:

III + II

we get IIIII. But the Romans never wrote five I's together. Instead, they wrote V. Here are the rules the Romans used:

(1) No numeral ever has more than four I's in it.
(2) No numeral ever has more than one V in it.
(3) No numeral ever has more than four X's in it.
(4) No numeral ever has more than one L in it.
(5) No numeral ever has more than four C's in it.

6. The Romans also used these letters:

D for 500
M for 1000

What do you think the Romans' rule for D was?

(6) No numeral ever has more than ______ D in it.

7. Now use these rules when you do the following additon examples. The first two are done for you.

III + II = ___V___
XIII + III = ___XVI___
XXXIIII + III = ________
CII + XI + LII = ________

XI + I = ________

XXV + II = ________

X + XVI + III = ________

LX + XV = ________

Now check your work by changing the Roman numerals into your everyday numbers.

3. The early Romans always wrote the letters in order: first the C's, then the L's, then the X's, then the V's, then the I's. Sometimes to do addition you have to rearrange the letters. Try these. The first one is done for you.

XII + VI = <u>XVIII</u>

XII + V = ________

XXIII + VI = ________

LXI + VII = ________

CXV + LI + X = ________

4. Now try these. The first one is done for you.

CXI + LVI = <u>CLXVII</u>

CXXII + LVI = ________

V + CCXIII + LI = ________

LII + XXXI + CV = ________

They also had some more letters for greater numbers, but we won't talk about those now. To find out what number a Roman numeral stands for, you just add all the numbers that the letters stand for. For example:

$$\text{XI} = 10 + 1 = 11$$

Here are some other examples:

$$\text{XVI} = 10 + 5 + 1 = 16$$

$$\text{XIII} = 10 + 1 + 1 + 1 = 13$$

$$\text{CLXXV} = 100 + 50 + 10 + 10 + 5 = 175$$

1. What numbers do these Roman numerals stand for? Write out the sum as shown above.

   VIII = ____________________

   LXV = ____________________

   CXI = ____________________

   XXXVI = ____________________

   CCLXII = ____________________

2. Here is a simple addition in Roman numerals:

$$\text{VI} + \text{II} = \text{VIII}$$

   To add VI and II all you have to do is put together all the letters in both numerals. Think about why this is so. Here are some more additions that can be done in this simple way:

★Roman Numeral Arithmetic

In this lesson we are going to learn to do some arithmetic with Roman numerals. You have probably seen Roman numerals on clocks or in books.

Here are the first twelve:

		5	V	10	X
1	I	6	VI	11	XI
2	II	7	VII	12	XII
3	III	8	VIII		
4	IIII	9	VIIII		

This is the way the numerals were written in the early days of Rome. In later times 4 was sometimes written IV and 9 was sometimes written IX. In this lesson, however, we will write 4 with four I's and 9 with a V and four I's in the manner of the early Romans. This will make the arithmetic easier.

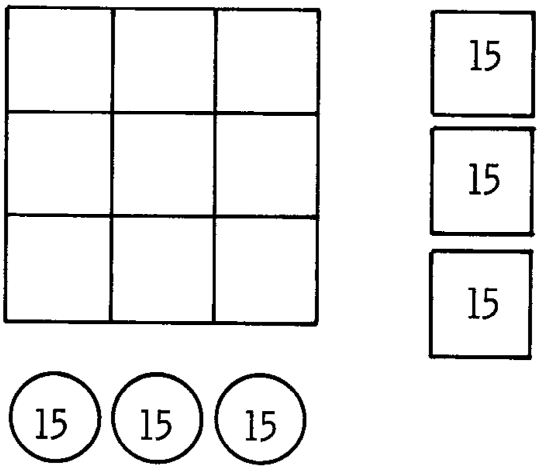
Let's begin by writing some more Roman numerals. The Romans used these letters:

I	for	1
V	for	5
X	for	10
L	for	50
C	for	100

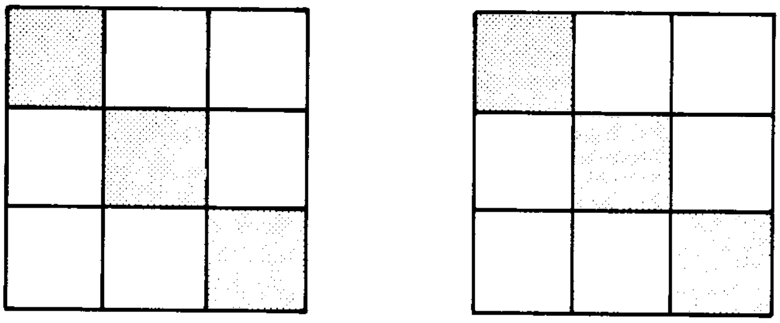
6. To do this one use each of the numbers

1, 2, 3, 4, 5, 6, 7, 8, 9

once and only once.



7. Two subsets of an array are called <u>diagonal subsets.</u> In the arrays below the diagonal subsets are shaded:



Now do Problem 5 in such a way that the sums of the diagonal subsets are also to equal to 15.

The array you will find is called a "magic square."

4. How many ways are there to do this one? ____________

9			24
	9		24
		9	24
24	24	24	

5. Here is one with four rows and four columns.

2	4	6		20
	6		0	20
8			9	20
	7	7		20
20	20	20	20	

2. Here is an array with some numbers missing. Fill in the missing numbers so that the row sums and the column sums are all correct.

0		1	1
			2
1		1	3
1	2	3	

3. Now try this one:

7	7		20
	8		20
		9	20
20	20	20	

★Magic Squares

1. Here is an array of numbers.

1	5	2	8
3	1	8	
4	2	2	

Add the numbers in the rows and put the sums you get in the boxes at the right. The first one is done for you. Now add the numbers in the columns and put the sums in the circles along the bottom.

What is the sum of the numbers in the boxes? ________

What is the sum of the numbers in the circles? ________

Now look back at the array.

What is the sum of the nine numbers in the array? ________

Are the three sums you have just found all the same? ______

Why? ____

____

8. Make two equations out of these numbers. Use each number once and only once. If you like you may put two or more numbers on the right side of the equation.

1, 2, 3, 4, 5, 6, 7

__________ = __________

__________ = __________

9. This time make three equations. Remember to use each number once and only once.

5, 13, 7, 5, 9, 16, 13

__________ = __________

__________ = __________

__________ = __________

7. Here are some with three equations to fill in.

Remember to use each number only once.

(a) 7, 2, 9, 3, 6, 6

______________ = 9

______________ = 11

______________ = 13

(b) 13, 5, 9, 3, 2, 9

______________ = 18

______________ = 15

______________ = 8

(c) 8, 6, 9, 8, 5, 9

______________ = 14

______________ = 15

______________ = 16

4. This time write in your own plus signs.

7, 8, 2, 6, 1

____________________ 14

____________________ 10

Find another way to do this one:

____________________ 14

____________________ 10

5. Now do these the same way:

(a) 5, 4, 8, 3

____________ 8

____________ 12

(b) 9, 8, 3, 6

____________ 17

____________ 9

(c) 6, 5, 8, 4, 7

____________ 15

____________ 15

(d) 9, 8, 7, 6, 2

____________ 17

____________ 15

6. Look back at Problem 5. How many ways can you find to do each of those examples.

(a) ________ (b) ________

(c) ________ (d) ________

★Sums

1. Here is a set of numbers:

3, 2, 9, 6

Find a subset of these numbers whose sum is 8. Cross out the numbers you have chosen and write them into this equation.

_______ + _______ = 8.

The sum of the numbers left over should be 12. Write them in:

_______ + _______ = 12.

2. Do this one the same way. Cross out the numbers as you put them into the equations. Use each number only once.

1, 7, 5, 8

_______ + _______ = 6

_______ + _______ = 15

3. Now do this one:

8, 4, 3, 9, 4

_______ + _______ = 17

_______ + _______ + _______ = 11

Can you find a subset of <u>three</u> numbers that add up to 17, leaving a subset of <u>two</u> numbers that add up to 11?

_______ + _______ + _______ = 17

_______ + _______ = 11

11. Last year Mr. Frank had these trees in his yard:

4 maples

5 oaks

7 elms

3 birches

During the winter a storm knocked down 2 birches and this summer the Dutch elm disease killed 4 of the elms. How many trees does Mr. Frank have now? ______________

12. Each day a jet airplane flies from New York to Chicago and then from Chicago to San Francisco. One day 30 passengers rode all the way from New York to San Francisco, 80 passengers rode only as far as Chicago, and 70 passengers got on at Chicago and rode to San Francisco.

How many people rode on the plane that day? ____________

How many people were on the plane between New York and Chicago? ________________

How many people were on the plane between Chicago and San Francisco? ______________

5. Let's try that again.

$9 + 6 + 4 =$ _____

Now change the order of the numbers:

$6 + 4 + 9 =$ _____

Is the answer the same? __________

Which order do you like better? __________

Why? ____

6. $7 + 9 + 3 + 1 =$ _____

Can you change the order of the numbers so that the addition is easier? __________

How? ____

7. $8 + 5 - 7 - 4 =$ _____

8. $3 + 9 + 7 - 1 =$ _____

9. $3 + 8 + 4 + 3 =$ _____

10. There are 2 planets closer to the sun than the earth. There are 6 planets farther from the sun than the earth. How many planets are there all together? (Do not forget the earth; it is a planet too!)

____

★ Sequences

1. $1 + 2 =$ _____

   $1 + 2 + 3 =$ _____

   $1 + 2 + 3 + 4 =$ _____

   $1 + 2 + 3 + 4 + 5 =$ _____

2. $9 + 8 =$ _____

   $9 + 8 - 7 =$ _____

   $9 + 8 - 7 - 6 =$ _____

   $9 + 8 - 7 - 6 + 5 =$ _____

   $9 + 8 - 7 - 6 + 5 + 4 =$ _____

   $9 + 8 - 7 - 6 + 5 + 4 - 3 =$ _____

   $9 + 8 - 7 - 6 + 5 + 4 - 3 - 2 =$ _____

3. $8 + 7 =$ _____

   $8 + 7 - 3 =$ _____

   $8 + 7 - 3 + 1 =$ _____

   $8 + 7 - 3 + 1 - 9 =$ _____

4. $7 + 8 - 6 - 7 =$ _____

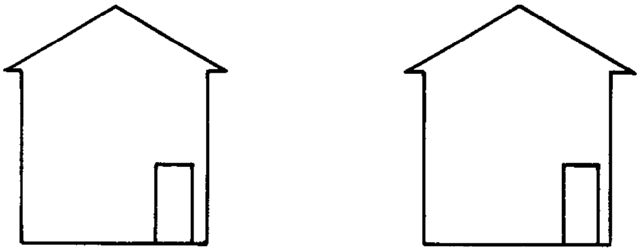
   Let's change the order of the numbers:

   $7 - 7 + 8 - 6 =$ _____

   Is the answer the same? _________

7. The Smiths and the Joneses are next door neighbors. The Smiths have 5 children, 3 of whom are girls. There are 6 boys in the two families. The Joneses have 4 children. How many of the Jones children are girls? _________

Here are the two houses. Put in X's for boys and O's for girls. This will help you find the answer.



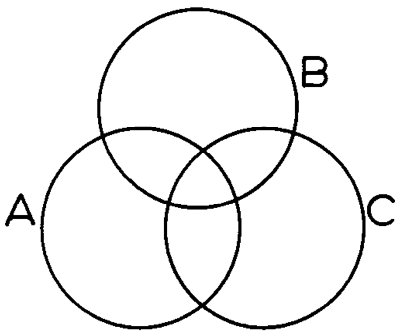
Joneses Smiths

8. Here are three circles A, B, and C. Can you put in three dots so that:

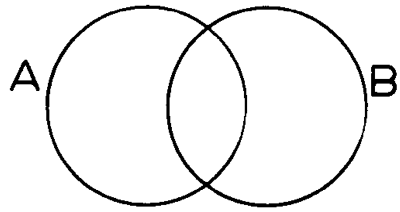
circle A will have one dot in it?

circle B will have two dots in it?

circle C will have three dots in it?

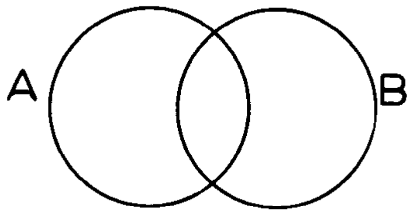


3. Can you put 3 dots in this picture so that there are exactly 2 dots in circle A and 2 dots in circle B? ________



4. What is the smallest number of dots you can put in this picture and still have five dots in circle A and four dots in circle B?

____



5. It is rainy today, so each pupil in Miss Black's class has brought either a raincoat or an umbrella. Six raincoats and seven umbrellas are hanging in the cloak-room. Two pupils brought both an umbrella and a raincoat. How many pupils are in Miss Black's class? ________

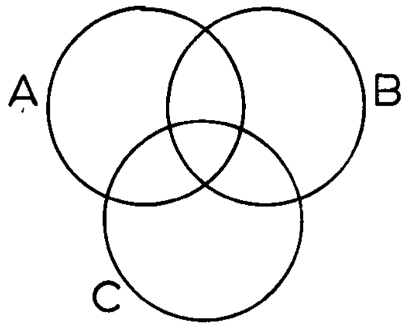
6. Mr. Adams has nine birds in his pet shop. Five of them are brightly colored and five of them have good singing voices. I would like to buy a brightly colored bird with a good singing voice. Do you think Mr. Adams has one? ________

Why? ____

____

★ Overlapping Sets

1. Here are three circles A, B, C.



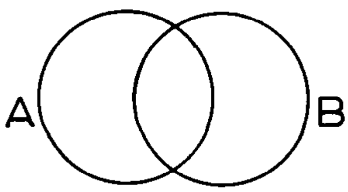
(a) Find a point that is inside all three circles. Mark that point with a dot.

(b) Now find a point that is inside circles B and C but outside circle A. Mark this point with a small X.

(c) Now find a point that is inside circle B but outside circles A and C. Mark this point with a small o.

(d) Now find a point that is outside all of the circles. Mark this point with a small box.

2. Here are two circles.



(a) Put five dots in the region that is inside both circles.

(b) Put three dots inside circle A but outside circle B.

(c) Put four dots inside circle B but outside circle A.

How many dots are in circle A? ________

How many dots are in circle B? ________

How many dots are in the picture all together? ________

How many dots are both in circle A and in circle B? ________

7. Sixty-two children had parts in a play. There were 80 parts to be filled. How many more children were needed?

____

____

8. George and Jerry rode their bikes 22 blocks from Jerry's house to the store. On the way home George stopped at his house which was only 7 blocks from the store. How many more blocks did Jerry have to ride to get home?

____

____

9. Linda has earned 25 cents. She wants to buy a tea set that costs 59 cents. How much more money does she need?

____

____

4. Alice's new baby sister weighed only 7 pounds. Alice weighed 35 pounds. How many more pounds did Alice weigh than her baby sister?

____

____

5. Susie baked 2 dozen cookies. She needed 3 dozen for the class party. How many more cookies did she have to bake?

____

____

6. There were 34 children in the class. Nineteen of these were boys. How many girls were in the class?

____

____

Write an equation and an answer sentence.

1. Mary's sister was 15 years old. Mary was 5 years younger than her sister. How old was Mary?

____

____

2. The boys in Mrs. Jones' class wanted to play baseball. They needed 18 members for two teams. There were only 11 boys on the field. How many more boys were needed before the game could begin?

____

____

3. Carol had to walk 9 blocks to school. Jane had to walk 13 blocks. Which girl had to walk farther? How many more blocks did she have to walk?

____

____

13. Bill had 50 marbles. He gave Jerome 14 of them. How many marbles does Bill have now?

____

Bill has ________ marbles.

14. Mr. Singer has 40 chickens. He bought a chicken house that can hold 90 chickens. How many more chickens will he need to fill his chicken house?

____

He will need ________ chickens.

15. Patty had some jelly beans. Kim gave her 16 more and now she has 34. How many did she have at first?

____

She had ________ jelly beans.

16. There were 43 trees on one street. On another street there were 56 trees. How many trees were there on both streets?

____

There were ________ trees on both streets.

9. Tim had 13 pears. Jeff gave him 4 apples. How many pieces of fruit does Tim have now?

____

Tim has __________ pieces of fruit.

10. A football club has 30 members. Only 14 members played in their big game. How many members did not play?

____

__________ members did not play.

11. Roger is 18 years old. He has a brother named Max. If the sum of Roger's and Max's ages is 32, how old is Max?

____

Max is __________ years old.

12. Timothy needs 98¢. He has 25¢ now. How much will he have to earn before he has 98¢?

____

He must earn __________.

5. The Carpenters' dog Rover just had 10 puppies. Their other dog, Fido, had 6 puppies a month ago. How many puppies did both dogs have?

____

Both dogs had __________ puppies.

6. Mr. Barton is 40 years old. Mr. Hill is 19 years old. How much older than Mr. Hill is Mr. Barton?

____

Mr. Barton is __________ years older than Mr. Hill.

7. If Mr. Jackson catches 14 fish and his wife catches 15 fish, how many fish do they catch in all?

____

They catch ________ fish.

8. Mickey hit 54 home runs. He hit 20 more than Dave. How many home runs did Dave hit?

____

Dave hit __________ home runs.

Solving Problems

Write an equation and complete the answer sentence.

1. William has 14 pencils. If his mother gives him 12 more, how many pencils will he have?

____

William will have _________ pencils.

2. James is 21 years old. He is 13 years older than his brother. How old is his brother?

____

His brother is _________ years old.

3. John's teacher has 25 pieces of chalk. If she gives John 8 pieces, how many will she have?

____

She will have _________ pieces of chalk.

4. If Pete spends 25¢ on oranges and 31¢ on bananas, how much will he have spent on fruit?

____

He will have spent __________ on fruit.

Set 1

Solving Problems

Write an equation and complete the answer sentence.

1. The popcorn man had 75 bags of popcorn to sell.
   At the end of the day he had 17 bags left.
   How many were sold?

   ____

   __________ bags of popcorn were sold.

2. Bill and Bob counted cars as they walked home.
   Bill counted 67 cars and Bob counted 86 cars.
   How many cars did they both count?

   ____

   They counted __________ cars.

3. In a spelling contest Jim's team made 32 points.
   Henry's team made 17 points.
   By how many points did Jim's team win?

   ____

   Jim's team won by __________ points.

4. Sue picked flowers for her teacher.
   She picked 49 daisies and a dozen tulips.
   How many flowers did she pick?

   ____

   Sue picked __________ flowers for her teacher.

5.	14 cars were in the parking lot. 6 cars came to park and 4 cars drove away. How many cars were in the parking lot then?	______ ______ ______
6.	Mr. Black planted 4 oak trees. Next he planted 3 maple trees. Last of all he planted 5 elm trees. How many trees did he plant?	______ ______ ______
7.	Mother made 8 red aprons and 5 blue aprons. She gave 4 blue aprons away. How many aprons does she have now?	______ ______ ______
8.	Sally had 12 cents. She gave 5 cents to Bill. Later Father gave 3 cents to Sally. How many cents does Sally have now?	______ ______ ______

Problem Solving

Write the equation that will help solve the problem.

Put the ( ) where they belong in your equations.

1.	Judy had 6 records She bought 3 more records. On the way home she broke 2 records. How many records does Judy have now?	$n = (6+3) - 2$ $n = 9 - 2$ $n = 7$
2.	Jim had 2 shirts and his mother bought 3 new shirts for him. His grandmother sent a new shirt for his birthday. Now how many shirts does Jim have?	
3.	Beth borrowed 6 crayons from Susan. That afternoon she returned 4 crayons to Susan. Then she borrowed 3 crayons from Jerry. How many borrowed crayons does Beth have?	
4.	Mrs. White had only 4 eggs so she bought a dozen eggs. How many eggs did she have after she put 6 eggs into a cake?	

8. All together there were 150 station wagons in lots A and B.
There were 31 trucks parked there.
How many more station wagons than trucks were there in the lots? __________

4. Miss Brown said that she had 63 pairs of scissors and that Miss Stone had only 38 pairs of scissors. *How many fewer pairs of scissors did* Miss Stone have than Miss Brown had? ______________

5. In the A parking lot there were 247 cars. In the B parking lot there were 173 cars. Find how many more cars were in the A lot than in the B lot. ______________

6. There were 97 sport cars in the A lot. There were 129 standard cars in the A lot. How many fewer sport cars than standard cars were there in the A lot? ______________

7. There were 67 sport cars in the B lot. There were 96 standard cars in the B lot. Find how many more standard cars than sport cars were in the B lot. ______________

Solving Problems

Find the answer and write the answer sentence.

1. Miss Brown had 78 sheets of red paper and 29 sheets of blue paper. Find how many fewer sheets of blue paper than red paper Miss Brown had.

   ____

   ____

2. Miss Brown asked Judy to get the paint brushes. Judy got 32 wide brushes and 19 narrow brushes. How many more wide brushes than narrow brushes did she get?

   ____

   ____

3. The first box of colored chalk had 43 pieces. The second box of chalk had 28 pieces. How many more pieces were in the first box than in the second box?

   ____

   ____

7. Tom caught 21 fish.

Father and Mother each caught 8 fish.

Find how many more fish Tom caught than his parents caught.

____

Tom caught ______ more fish than his parents caught.

8. There were 43 elm and 28 oak trees in the park.

How many more elm trees than oak trees were in the park?

____

There were ______ more elm trees than oak trees.

4. Jack ate 12 pancakes.

Father ate 9 pancakes.

Father ate how many fewer pancakes than Jack?

____

Father ate ________ fewer pancakes.

5. Sally and Beth have 22 books.

Bob and Jim have 17 books.

How many more books do the girls have than have the boys?

____

The girls have ________ more books.

6. Twenty-five crows were sitting on a fence.

Forty-one cows were in the field.

How many fewer crows than cows were there?

____

There were ________ fewer crows than cows.

Solving Problems

1. Jan and Mark were going to play garage.

   Jan had 12 toy trucks.

   Mark had 21 toy cars.

   How many more cars than trucks were there?

   ____

   There were ________ more cars than trucks.

2. Bill and Glenn were going to the store.

   Bill had 33 cents.

   Glenn had 18 cents.

   How many fewer cents did Glenn have than Bill had?

   ____

   Glenn had ________ fewer cents than Bill had.

3. Susan's mother has 2 dozen pencils.

   Susan has 9 pencils.

   How many more pencils does Susan's mother have than Susan has?

   ____

   Susan's mother has ______ more pencils.

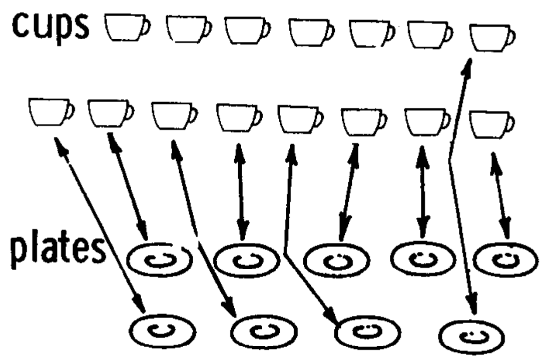
Draw pictures to help solve the problem.

Judy and Susan were playing house.

Judy brought out 9 toy plates.

Susan brought out 15 toy cups.

How many more cups than plates did the girls have?



____

There were ________ more cups than plates.

Bob and Kim went to the store to buy some candy.

Bob got 12 pieces of candy.

Kim got 18 pieces of candy.

Find how many more pieces of candy Kim had than Bob had.

Bob's candy

Kim's candy

____

Kim had ________ more pieces of candy.

Problem Solving

Jerry had ______ blocks. He found ______ blocks. How many blocks does Jerry have now? ____________________ Jerry has ________ blocks.	Beth had ______ apples. She gave ______ apples to Bill. How many apples does Beth have? ____________________ Beth has ________ apples.
Sue needs ______ bags. She has ______ bags. How many more bags does she need? ____________________ Sue needs ______ bags.	Mother had ______ cookies. Father took ______ of them. How many cookies does Mother have now? ____________________ Mother has ______ cookies.

Some Problems to Solve

1. 969 children go to our school. There are 175 in the first grade. How many are not in the first grade?

____

_______ are not.

2. The third grade gave \$3.30 to the Red Cross. This was \$.50 more than the sixth grade collected. How much did the sixth grade give?

____

They gave _________.

3. The baseball team played 162 games. They lost 91 of them. How many did they win?

____

They won _______ games.

4. Joe is reading a book. The book has 302 pages. He has read 150 pages. How many pages are left to read?

____

He has ______ pages to read.

What must be renamed?

1)	*347 - 128*	*100*	*10*	*1*
2)	814 - 381	100	10	1
3)	73 - 48	100	10	1
4)	132 - 29	100	10	1
5)	49 - 27	100	10	1
6)	205 - 91	100	10	1
7)	981 - 257	100	10	1
8)	604 - 391	100	10	1
9)	876 - 59	100	10	1
10)	603 - 291	100	10	1
11)	540 - 239	100	10	1
12)	809 - 397	100	10	1

871 - 390
708 - 345
557 - 273
469 - 283
673 - 280

Computing the Difference

514 - 123
947 - 254
428 - 286
618 - 264
728 - 375

615 - 283
719 - 237
476 - 285
827 - 265

Finding Differences

Find the difference between each pair of numbers.

1) 349 and 184 200 + 140 + 9 (100 + 80 + 4) 100 + 60 + 5 = _____	6) 539 and 284
2) 901 and 290	7) 504 and 242
3) 847 and 283	8) 928 and 296
4) 638 and 293	9) 588 and 297
5) 427 and 295	10) 650 and 180

Renaming the Sum

1)	327 - 184 327 = 200 + 120 + 7
2)	809 - 582 809 = ___ + ___ + ___
3)	548 - 296 548 = ___ + ___ + ___
4)	739 - 546 739 = ___ + ___ + ___
5)	610 - 250 610 = ___ + ___ + ___
6)	768 - 473 768 = ___ + ___ + ___
7)	346 - 173 346 = ___ + ___ + ___
8)	218 - 192 218 = ___ + ___ + ___

Finding Differences

Find the difference between each pair of numbers.

1) 391 and 269	6) 289 and 168
2) 994 and 267	7) 678 and 339
3) 792 and 269	8) 387 and 178
4) 545 and 237	9) 963 and 238
5) 434 and 329	10) 852 and 548

Computing the Difference Between Two Numbers

348 - 129
761 - 356
532 - 318
974 - 538
883 - 647

Computing Differences

$\begin{array}{r} 672 \\ -\underline{235} \end{array}$
$\begin{array}{r} 591 \\ -\underline{347} \end{array}$
$\begin{array}{r} 894 \\ -\underline{488} \end{array}$
$\begin{array}{r} 750 \\ -\underline{237} \end{array}$

Renaming the Sum

1)	448 - 129 448 = 400 + 30 + 18
2)	572 - 227 572 = ___ + ___ + ___
3)	740 - 235 740 = ___ + ___ + ___
4)	571 - 329 571 = ___ + ___ + ___
5)	884 - 366 884 = ___ + ___ + ___
6)	793 - 458 793 = ___ + ___ + ___
7)	366 - 138 366 = ___ + ___ + ___
8)	857 - 248 857 = ___ + ___ + ___

The Difference Between Two Numbers

Compute:

384 - 162 = _____	765 - 334 = _____
987 - 234 = _____	905 - 704 = _____
879 - 235 = _____	598 - 275 = _____
374 - 152 = _____	384 - 163 = _____

Computing the Difference Between Two Numbers

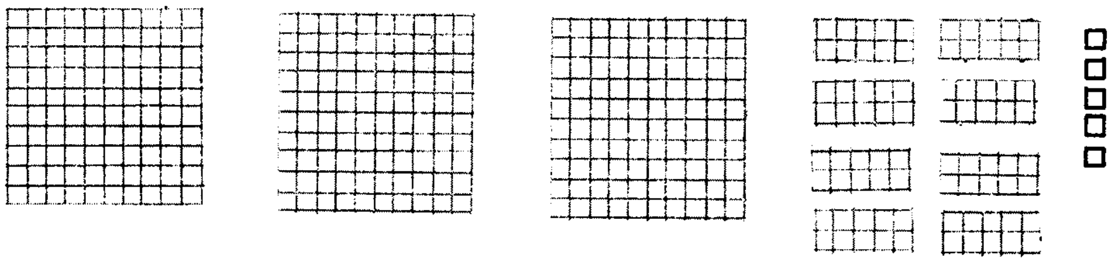
534 - 123 = _____	758 - 325 = _____
947 - 314 = _____	862 - 531 = _____
428 - 216 = _____	753 - 443 = _____
698 - 264 = _____	589 - 263 = _____

Finding the Difference Between Two Numbers

Wayne has 385 stamps. He put 152 of them in a stamp book. How many more does he have to put in the stamp book?

We write: 385 - 152 = ________

Think of 385 as: 300 + 80 + 5



We want to remove 152.

Think of 152 as 100 + 50 + 2

Think of removing 152 by ringing 1 set of one hundred, 5 sets of ten, and 2 sets of one.

Write the number of members in the set that is left.

________ hundreds, ________ tens, ________ ones.

We can write this: _____ + _____ + _____ = _____

$$\begin{array}{r} 300 + 80 + 5 \\ -\ (100 + 50 + 2) \\ \hline 200 + 30 + 3 \end{array} = \_\_\_\_\_\_\_\_$$

Wayne has ________ more stamps to put in his book.

The Birthday Party

1) Bill invited 35 children to his party.
Yesterday his mother bought a package of balloons.
There were 18 balloons in the package.
Bill wants to give each child a balloon.
How many more ballons does he need ?

2) There are 50 candles in a box.
Bill is 8 years old.
How many candles will not be used?

3) Bill received 29 gifts.
How many children did not bring a gift?

4) John brought Bill a box of marbles.
Bill had 56 marbles.
Now he has 94.
How many marbles were in the box?

5) There were 19 boys at the party.
How many girls were there?

Finding the Difference Between Two Numbers

46 and 19	43 and 25
92 and 47	62 and 44
53 and 26	51 and 26
84 and 35	67 and 39
74 and 39	45 and 16
82 and 25	52 and 19

Computing the Difference

75 - 39 = _______	53 - 34 = _______
64 - 18 = _______	63 - 17 = _______
82 - 24 = _______	81 - 27 = _______

Computing the Difference

92 - 85 = ________	94 - 76 = ________
56 - 39 = ________	75 - 58 = ________
25 - 17 = ________	86 - 29 = ________

Computing the Difference Between Two Numbers

75 - 28 = ______ 75 = 60 + 15 - 28 = (20 + 8) 40 + 7 = 47	68 - 29 = ______ 68 - 29
84 - 16 = ______ 84 - 16	46 - 27 = ______ 46 - 27
53 - 24 = ______ 53 - 24	35 - 17 = ______ 35 - 17
92 - 65 = ______ 92 - 65	62 - 48 = ______ 62 - 48

Renaming the Sum

1) 93 - 48 93 = _80_ + _13_	8) 21 - 17 21 = ___ + ___
2) 47 - 19 47 = ___ + ___	9) 36 - 18 36 = ___ + ___
3) 54 - 28 54 = ___ + ___	10) 95 - 27 95 = ___ + ___
4) 63 - 27 63 = ___ + ___	11) 71 - 38 71 = ___ + ___
5) 97 - 19 97 = ___ + ___	12) 65 - 48 65 = ___ + ___
6) 55 - 26 55 = ___ + ___	13) 44 - 19 44 = ___ + ___
7) 74 - 56 74 = ___ + ___	14) 52 - 39 52 = ___ + ___

Uncle Jim's Farm

1. Uncle Jim lives 170 miles from Boys' Town.
   Boys' Town is 268 miles from White City.
   Uncle Jim drove to White City by way of Boys' Town.
   How many miles did he travel?

2. Jane visited the farm.
   She saw 76 cows along the highway.
   Uncle Jim has many horses.
   She counted 52.
   Did she see more than 100 animals?

3. On the farm are 784 hens.
   There are 20 roosters.
   How many chickens does Uncle Jim have?

4. Last year Uncle Jim made $475 in wheat.
   The corn crop was worth $450.
   How much money did he make on grain?

5. The hired man put 170 bales of hay in the barn.
   He did the same thing the next week.
   How many bales of hay did he store?

Renaming Ten Tens

Compute the sum.

395 + 282	784 + 192
651 + 263	493 + 276
364 + 273	487 + 161
276 + 550	386 + 253

Renaming Ten Tens

783 + 643 = ______	495 + 192 = ______
496 + 213 = ______	384 + 571 = ______
764 + 142 = ______	135 + 284 = ______
431 + 176 = ______	327 + 292 = ______

Renaming Ten Tens

$\begin{array}{r} 396 \\ +\underline{283} \end{array}$	$\begin{array}{r} 765 \\ +\underline{173} \end{array}$
$\begin{array}{r} 493 \\ +\underline{215} \end{array}$	$\begin{array}{r} 398 \\ +\underline{261} \end{array}$
$\begin{array}{r} 613 \\ +\underline{196} \end{array}$	$\begin{array}{r} 384 \\ +\underline{263} \end{array}$
$\begin{array}{r} 794 \\ +\underline{173} \end{array}$	$\begin{array}{r} 342 \\ +\underline{166} \end{array}$

Renaming Ten Tens

1) 300 + 170 + 8 400 + 70 + 8 = 478	6) 400 + 190 + 2 ___ + ___ + ___ = ___
2) 500 + 120 + 7 ___ + ___ + ___ = ___	7) 800 + 130 + 3 ___ + ___ + ___ = ___
3) 100 + 140 + 6 ___ + ___ + ___ = ___	8) 600 + 160 + 6 ___ + ___ + ___ = ___
4) 700 + 150 + 0 ___ + ___ + ___ = ___	9) 100 + 100 + 5 ___ + ___ + ___ = ___
5) 200 + 100 + 8 ___ + ___ + ___ = ___	10) 800 + 190 + 9 ___ + ___ + ___ = ___

Finding the Sum of Two Numbers

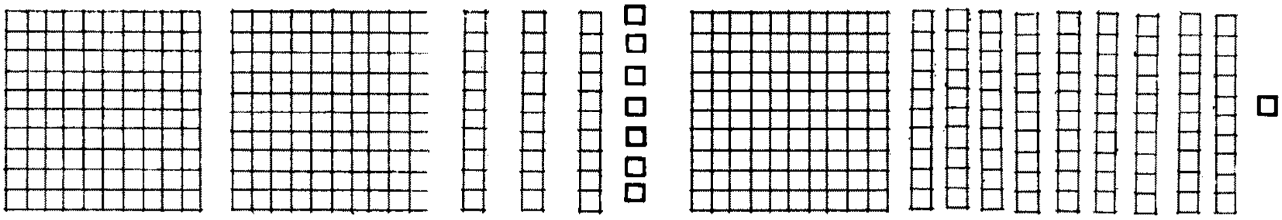
Ann had 237 stamps in her collection.

Her grandmother gave her 191 more stamps.

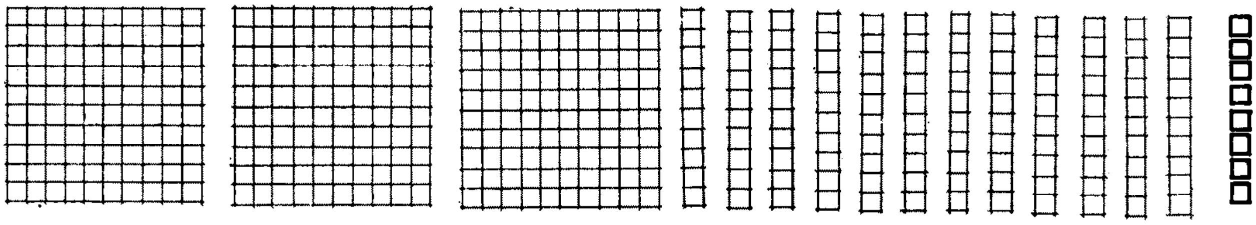
How many stamps does Ann have now?

We write: 237 + 191

Think of 237 as: Think of 191 as:



Join the hundreds, then the tens, and then the ones.



Think of 12 tens as 100 + 20.

$$\begin{aligned} \text{So,}\quad 237 + 191 &= 300 + 120 + 8 \\ &= 300 + 100 + 20 + 8 \\ &= 400 + 20 + 8 \\ &= 428 \end{aligned}$$

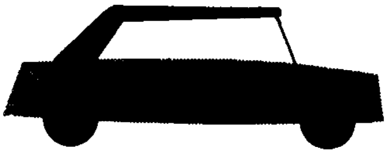
We can write:

$$\begin{array}{rcl} 237 & = & 200 + 30 + 7 \\ 191 & = & \underline{100 + 90 + 1} \\ & & 300 + 120 + 8 \\ & & 400 + 20 + 8 = 428 \end{array}$$

OR

$$\begin{array}{r} 237 \\ +\underline{191} \\ 8 \\ 120 \\ \underline{300} \\ 428 \end{array}$$

Ann has 428 stamps.



A Vacation Trip

1. Ed's parents took him to visit a park.
   They drove 269 miles the first day.
   The second day they went 317 miles.
   How far did they travel in 2 days?

2. Ed saw 14 different car license plates.
   The next day he saw 9.
   He claims he saw 24 in 2 days.
   Did he? How do you know?

3. On Monday 406 cars went into the park.
   On Tuesday 375 more came in.
   How many visited the park on Monday and Tuesday?

4. There were 14 bears and 8 deer along the road.
   Ed saw them.
   How many animals did he see?

5. Ed ate \$6.38 worth of food.
   His share of the motel bill was \$3.38.
   What did his trip cost his father?

The Sum of Two Numbers

Compute:

1) 532 + 149

2) 304 + 177

3) 348 + 29

4) 502 + 378

5) 37 + 156

6) 848 + 129

7) 325 + 39

8) 207 + 308

9) 206 + 385

10) 81 + 19

11) 469 + 317

12) 36 + 407

13) 409 + 217

14) 268 + 206

15) 74 + 16

16) 67 + 208

17) 146 + 726

18) 848 + 108

19) 37 + 207

20) 475 + 206

21) 671 + 329

22) 106 + 87

23) 164 + 206

24) 129 + 69

The Sum of Two Numbers

Compute:

437 + 243	461 + 279
537 + 256	825 + 137
347 + 268	158 + 629

The Sum of Two Numbers

Compute:

204 + 567	348 + 236
753 + 239	546 + 329
728 + 267	806 + 187

The Sum of Two Numbers

Compute:

$\begin{array}{r} 248 \\ +\underline{129} \end{array}$	$\begin{array}{r} 394 \\ +\underline{283} \end{array}$
$\begin{array}{r} 369 \\ +\underline{128} \end{array}$	$\begin{array}{r} 348 \\ +\underline{161} \end{array}$
$\begin{array}{r} 764 \\ +\underline{\ \ 29} \end{array}$	$\begin{array}{r} 586 \\ +\underline{123} \end{array}$
$\begin{array}{r} 459 \\ +\underline{\ \ 26} \end{array}$	$\begin{array}{r} 340 \\ +\underline{360} \end{array}$

The Sum of Two Numbers

Compute:

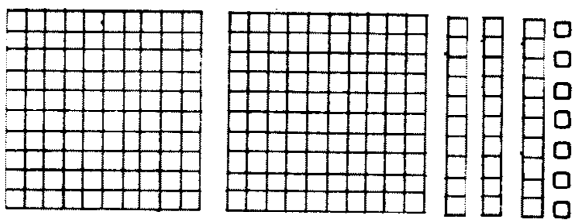
345 +249	538 +237
816 +185	248 +125
347 +226	723 +158
707 +105	349 +233

The Sum of Two Numbers

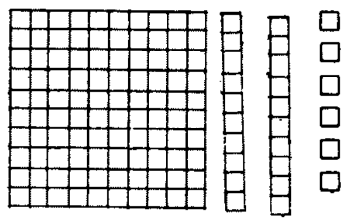
Ann has 237 stamps in her stamp collection.
Her grandmother gave her 126 more stamps.
How many stamps does Ann have now?

We write: 237 + 126

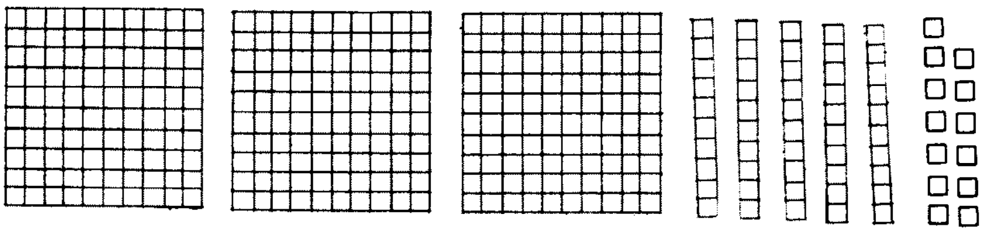
Think of 237 as:



Think of 126 as:



Join the hundreds, then the tens, and then the ones.



Think of 13 as 10 + 3.

$$\begin{aligned} \text{So,}\quad 237 + 126 &= 300 + 50 + 13 \\ &= 300 + 60 + 3 \\ &= 363 \end{aligned}$$

We can write:

$$\begin{array}{rcl} 237 & = & 200 + 30 + 7 \\ 126 & = & \underline{100 + 20 + 6} \\ & & 300 + 50 + 13 = 300 + 60 + 3 = 363 \end{array}$$

OR

$$\begin{array}{r} 237 \\ +\ \underline{126} \\ 13 \\ 50 \\ \underline{300} \\ 363 \end{array}$$

Ann has 363 stamps.

The Sum of Two Numbers

Compute:

1) 59 + 37 = ______

2) 46 + 28 = ______

3) 37 + 55 = ______

4) 14 + 78 = ______

5) 25 + 69 = ______

6) 38 + 47 = ______

7) 65 + 26 = ______

8) 47 + 37 = ______

9) 63 + 19 = ______

10) 54 + 37 = ______

11) 63 + 28 = ______

12) 15 + 75 = ______

13) 39 + 59 = ______

14) 28 + 69 = ______

15) 47 + 39 = ______

16) 29 + 28 = ______

The Sum of Two Numbers

Compute:

76 + 18	67 + 19
58 + 7	59 + 38
35 + 46	47 + 9

The Sum of Two Numbers

Compute:

63 + 29	58 + 25
54 + 27	49 + 28
65 + 29	23 + 47

Renaming Ones

Mark those for which you would rename 10 ones as 1 ten.

1) 27 + 35

2) 57 + 26

3) 54 + 25

4) 73 + 27

5) 41 + 14

6) 43 + 26

7) 35 + 40

8) 26 + 38

9) 37 + 48

10) 74 + 13

11) 29 + 8

12) 25 + 18

13) 45 + 9

14) 42 + 56

15) 67 + 23

16) 57 + 16

17) 34 + 57

18) 23 + 64

19) 89 + 7

20) 66 + 27

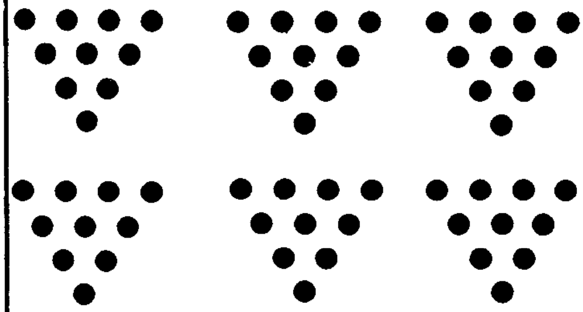
21) 47 + 29

22) 28 + 39

23) 33 + 52

24) 17 + 64

E. Join the new set of ten to the other sets of ten.



(30 + 20 + 10)

These are the ones.

(4)

$$(30 + 20 + 10) + 4 = 60 + 4 = 64$$

F. You can write:

$36 + 28$

$36 = 30 + 6$

$28 = \underline{20 + 8}$

$\quad 50 + 14 = 50 + 10 + 4 = 64$

OR

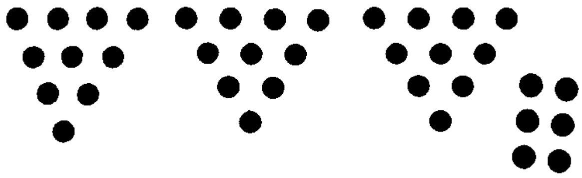
$$\begin{array}{r} 36 \\ +\ \underline{28} \\ 14 \\ \underline{50} \\ 64 \end{array}$$

The Sum of Two Numbers

Mary has a bouquet with 36 flowers. If Jill gives her a bouquet having 28 flowers, how many flowers will Mary have? We may write:

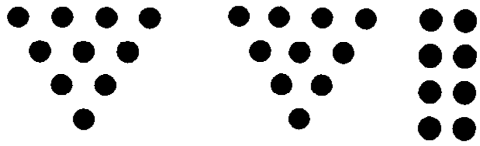
36 + 28 = ______

A. Think of 36 as:



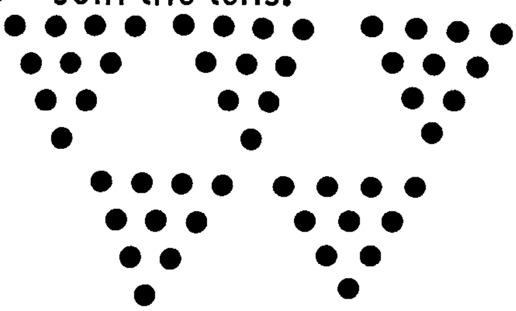
(30 + 6)

B. Think of 28 as:



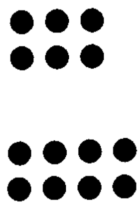
(20 + 8)

C. Join the tens:



(30 + 20)

D. Join the ones:



(6 + 8)

Do you see that we have another set of ten when we join the ones?

Make a ring around a set of ten.

6 + 8 = 10 + ________.

(30 + 20) + (10 + 4) = ________.

The Sum of Two Numbers

Compute:

127 + 651	504 + 265
1645 + 8253	7064 + 1825
8403 + 1596	3754 + 5005

The Sum of Two Numbers

Compute:

362 + 507	450 + 249
743 + 253	804 + 194
512 + 466	277 + 702

The Sum of Two Numbers

Compute:

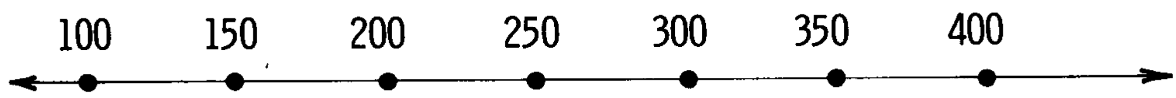
67 + 32	45 + 56
74 + 15	58 + 31
46 + 53	36 + 32

The Sum of Two Numbers

Compute:

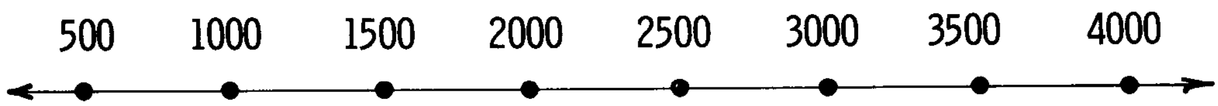
52 + 37	83 + 16
26 + 42	43 + 55
72 + 13	14 + 44

Comparing Numbers



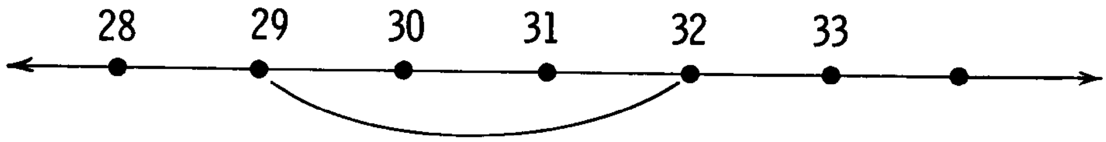
Write < or > between each pair of numerals.

129	156	391	450	376	285
175	200	402	343	491	176
235	167	156	380	207	377
253	350	287	459	176	253



500	1500	3520	2001	3427	3548
2000	1000	756	1156	2763	3276
3500	2500	2356	2556	4051	4027
4000	500	3702	3046	1776	1492

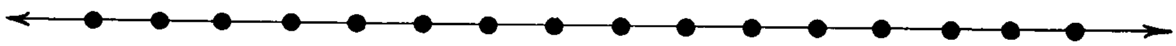
The set of whole numbers greater than 28 but less than 33 is {29, 30, 31, 32}.



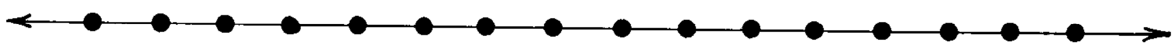
1. The set of whole numbers greater than 67 but less than 73 is
   {   }.

2. The set of whole numbers greater than 198 but less than 204 is
   {   }.

3. The set of whole numbers greater than 789 but less than 800 is
   {   }.



4. The set of whole numbers greater than 993 but less than 1002 is
   {   }.



Names for Numbers

1. From the list below check ($\checkmark$) all the ways of naming 6529.

   a) 6,529 ones

   b) 652 tens + nine ones

   c) 6000 + 500 + 10 + 9

   d) 6000 + 1500 + 20 + 9

   e) 5000 + 1500 + 20 + 9

   f) 65 hundreds + 20 + 9

   g) 6000 + 400 + 20 + 9

   h) 6000 + 500 + 20 + 19

2. Answer Yes or No.

   a) 5,324 is 53 tens and 24 ones. ____________

   b) 7381 = 600 + 120 + 8. ________

   c) 32 hundreds + 2 tens + 16 ones = 3236. ________

   d) 537 = 400 + 13 + 7. ________

3. The number 2, 538 can be named in many ways. Write some of them.

   2,538: ________________________

   ____

   ____

   ____

Naming a Number in Different Ways

1. Here are some ways to name 3547.

   3547 ones

   35 hundreds + 4 tens + 7 ones

   3 thousands + 5 hundreds + 4 tens + 7 ones

   354 tens + 7 ones

   3000 + 500 + 40 + 7

   3500 + 40 + 7

2. Show some ways to name 2356.

   ____

   ____

   ____

   ____

   ____

   ____

3. Show some ways to name 4253.

   ____

   ____

   ____

   ____

   ____

   ____

Names for Numbers

1. From the list below check ($\checkmark$) all the ways of naming 6529.

   a) 6,529 ones

   b) 652 tens + nine ones

   c) 6000 + 500 + 10 + 9

   d) 6000 + 1500 + 20 + 9

   e) 5000 + 1500 + 20 + 9

   f) 65 hundreds + 20 + 9

   g) 6000 + 400 + 20 + 9

   h) 6000 + 500 + 20 + 19

2. Answer <u>Yes</u> or <u>No.</u>

   a) 5,324 is 53 tens and 24 ones. ____________

   b) 7381 = 600 + 120 + 8. ________

   c) 32 hundreds + 2 tens + 16 ones = 3236. ________

   d) 537 = 400 + 13 + 7. ________

3. The number 2, 538 can be named in many ways. Write some of them.

   2,538: ________________________

   ____

   ____

   ____

Naming a Number in Different Ways

1. Here are some ways to name 3547.

   3547 ones

   35 hundreds + 4 tens + 7 ones

   3 thousands + 5 hundreds + 4 tens + 7 ones

   354 tens + 7 ones

   3000 + 500 + 40 + 7

   3500 + 40 + 7

2. Show some ways to name 2356.

   ____

   ____

   ____

   ____

   ____

   ____

3. Show some ways to name 4253.

   ____

   ____

   ____

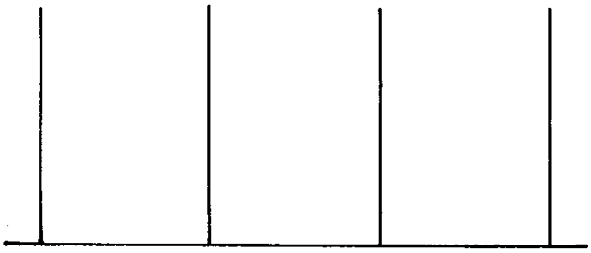
   ____

   ____

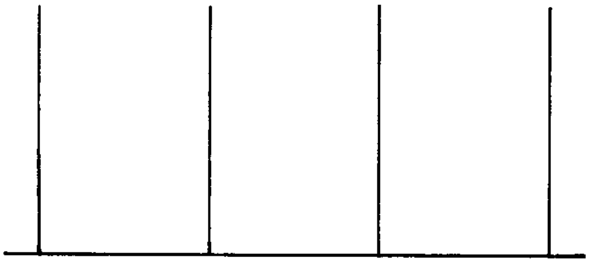
   ____

Naming a Number in Different Ways

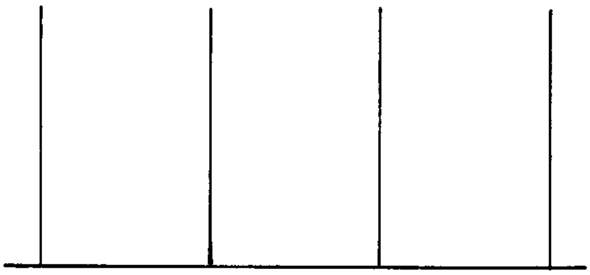
1. Show 6549 on the abacus with 6 thousands, 5 hundreds, 4 tens and 9 ones.



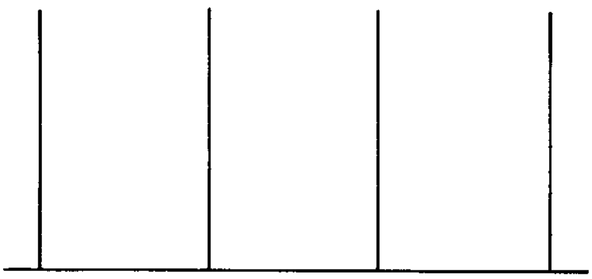
2. Show 6549 with only 5 thousands.



3. Show 6549 with only 3 tens.



4. Show 6549 with only 4 hundreds.



Thousands

Complete each of these:

_____ ones = 1 ten

_____ tens = 1 hundred

_____ hundreds = 1 thousand

2748 = _____ thousands + ____ hundreds + _____ tens + _____ ones

5619 = _____ thousands + ____ hundreds + _____ ten + _____ ones

7546 = _____ thousands + ____ hundreds + _____ tens + _____ ones

_____ = 5 thousands + 3 hundreds + 8 tens + 0 ones

_____ = 3 thousands + 0 hundreds + 7 tens + 4 ones

_____ = 9 thousands + 2 hundreds + 0 tens + 6 ones

6324 = 6000 + 300 + 20 + 4

5289 = _____ + _____ + _____ + _____

9165 = _____ + _____ + _____ + _____

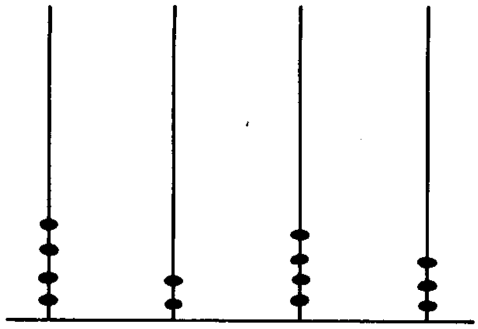
_____ = 2000 + 900 + 10 + 2

_____ = 7000 + 500 + 3

_____ = 4000 + 80 + 7

Renaming Numbers

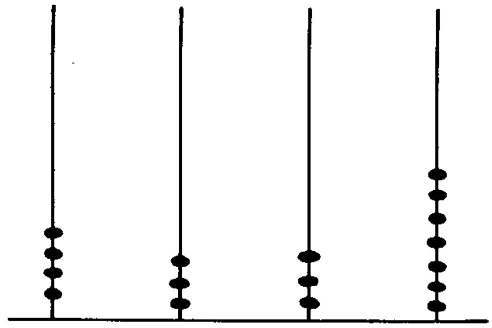
1.



4000 + 200 + 40 + 3 =

____

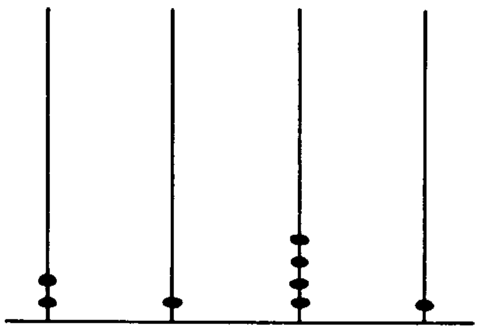
2.



6000 + 300 + 30 + 7 =

____

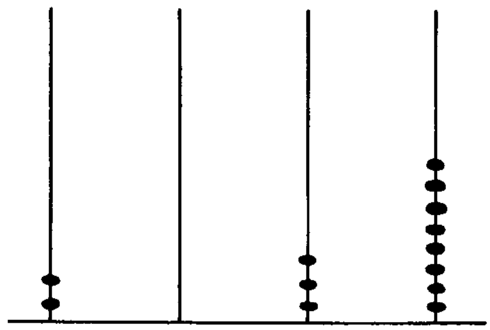
3.



______ + ______ + ______ + ______ =

____

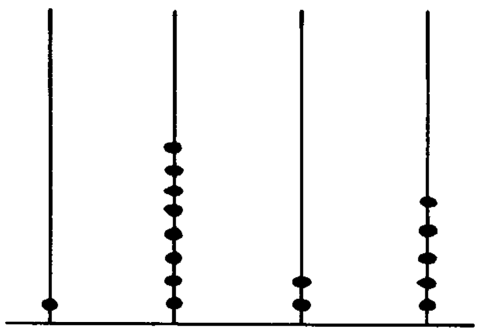
4.



______ + ______ + ______ + ______ =

____

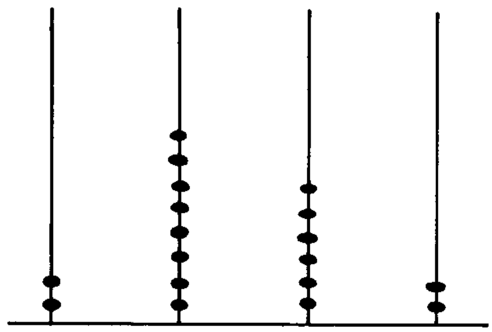
5.



______ + ______ + ______ + ______ =

____

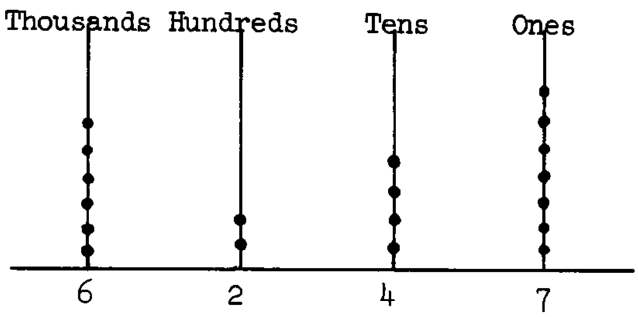
6.



______ + ______ + ______ + ______ =

____

1.

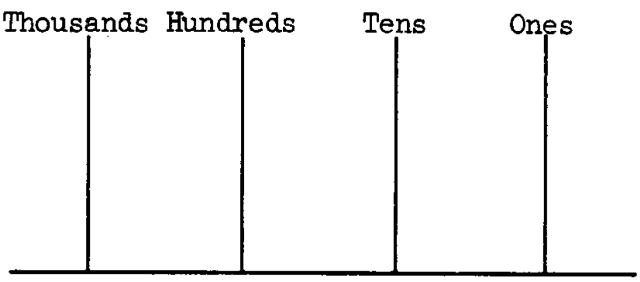


The number ________ is represented on this abacus.

________ = 6 thousands + 2 hundreds + 4 tens + 7 ones

________ = 6000 + 200 + 40 + 7

2. Show 3465 on this abacus.



3465 = ____ thousands + ____ hundreds + ____ tens + ____ ones

3465 = ____ + ____ + ____ + ____

Renaming a Number

Match the expanded form with the standard form. For example,
(A) 100 + 40 + 3 = 143, so A is placed in the blank beside 143.

A	100 + 40 + 3	I	400 + 90 + 1
B	500 + 70 + 12	J	600 + 10 + 15
C	600 + 160 + 4	K	500 + 80 + 2
D	900 + 20 + 2	L	700 + 00 + 16
E	300 + 00 + 7	M	700 + 60 + 4
F	600 + 110 + 6	N	200 + 100 + 7
G	100 + 30 + 13	O	500 + 120 + 5
H	200 + 10 + 17	P	800 + 120 + 2

764 ________	227 ________	582 B
491 ________	143 A	625 ________
716 ________	922 ________	307 ________

Complete the following sentences.

357 = 3 hundreds + ______ tens + 7 ones,

or 3 hundreds + 4 tens + _____ ones,

or 2 hundreds + ______ tens + 17 ones.

268 = ____ hundreds + 6 tens + 8 ones,

or 2 hundreds + 5 tens + _____ ones,

or 1 hundred + _____ tens + 18 ones.

569 = _____ tens + 9 ones,

or 4 hundreds + _____ tens + 9 ones,

or ____ hundreds + 15 tens + 19 ones.

Write 426 in three other ways.

____

____

____

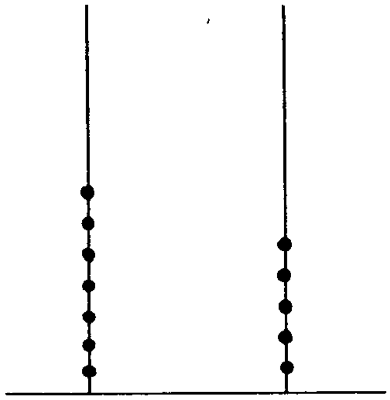
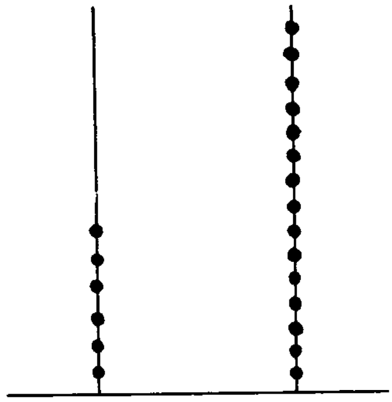
Write 752 in three other ways.

____

____

____

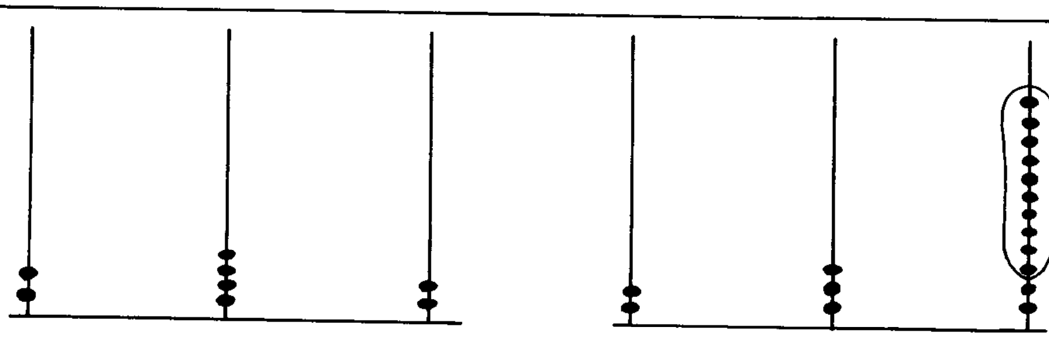
Different Ways of Thinking About a Number

75 = ______ tens + ______ ones = ______ tens + ______ ones

68 = ______ tens + ______ ones or ______ tens + ______ ones	57 = ______ tens + ______ ones or ______ tens + ______ ones
94 = ______ tens + ______ ones or ______ tens + ______ ones	84 = ______ tens + ______ ones or ______ tens + ______ ones
39 = ______ tens + ______ ones or ______ tens + ______ ones	71 = ______ tens + ______ one or ______ tens + ______ ones
62 = ______ tens + ______ ones or ______ tens + ______ ones	96 = ______ tens + ______ ones or ______ tens + ______ ones
49 = ______ tens + ______ ones or ______ tens + ______ ones	74 = ______ tens + ______ ones or ______ tens + ______ ones

3.

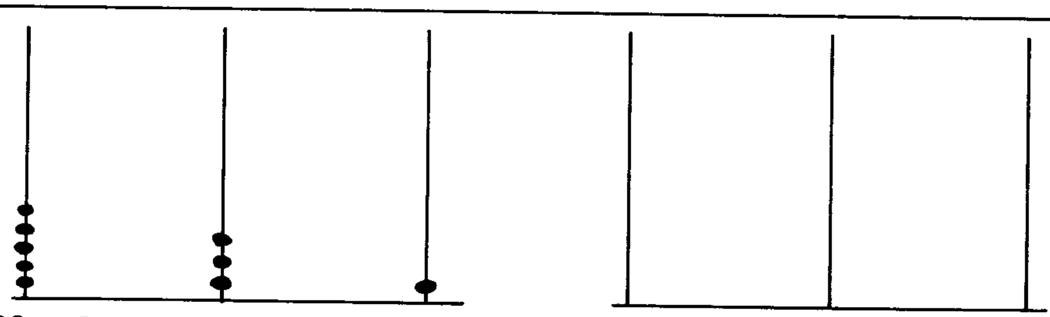


200 + 40 + 2 = 242

Show one set of ten as a set of ten ones.

Write the new name. ____________________

4.

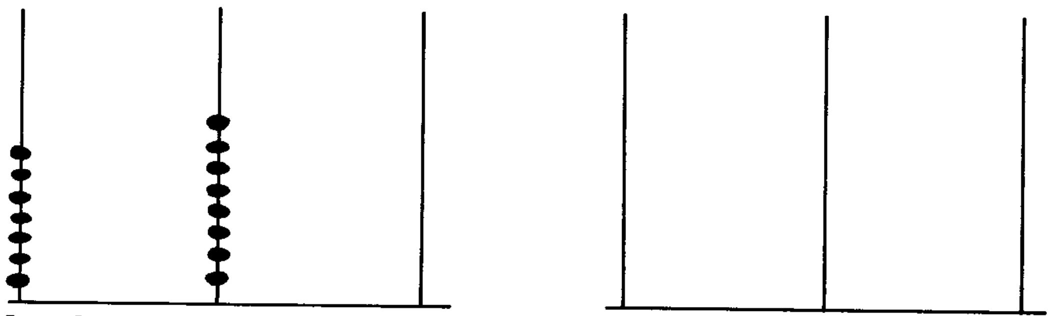


500 + 30 + 1 = 531

Show one hundred as a set of ten tens.

Write the new name. ____________________

5.



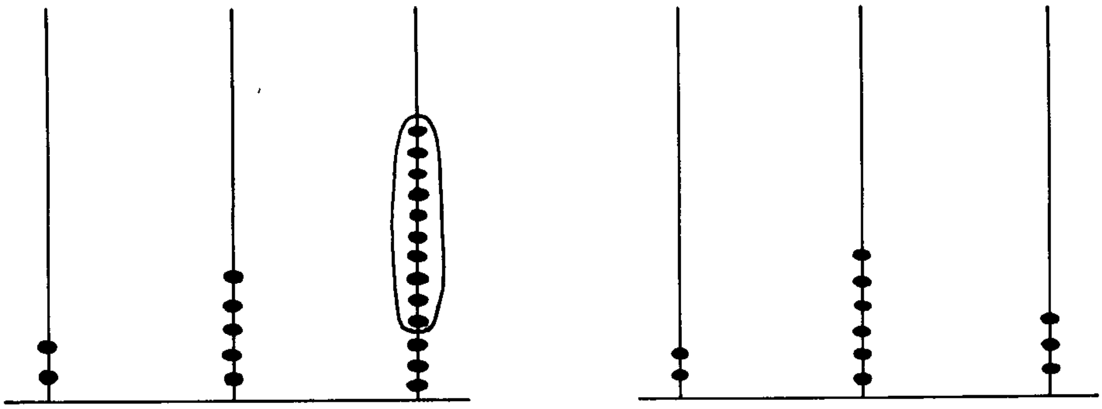
700 + 80 + 0 = 780

Show one set of ten as a set of ten ones.

Write the new name. ____________________

Renaming Numbers

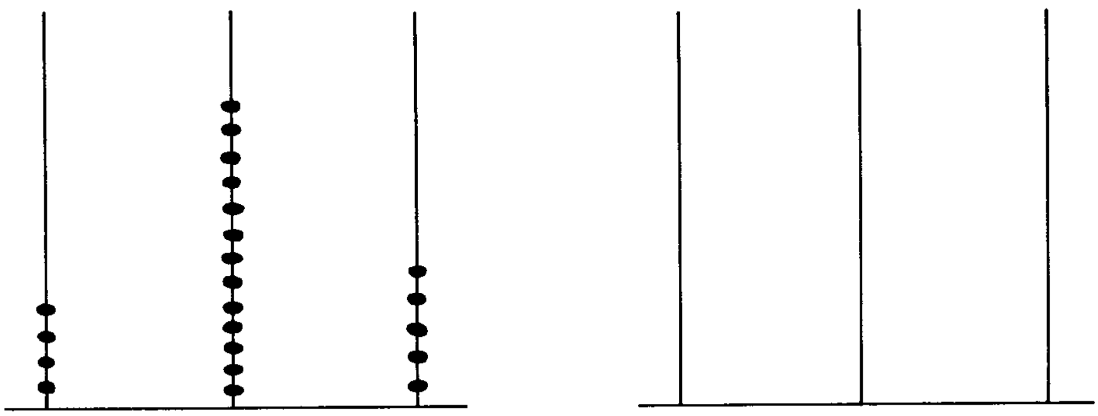
1.



200 + 50 + 12 = 263

A set of ten ____________ can be shown as one ____________. 200 + 60 + 3 = 263

2.



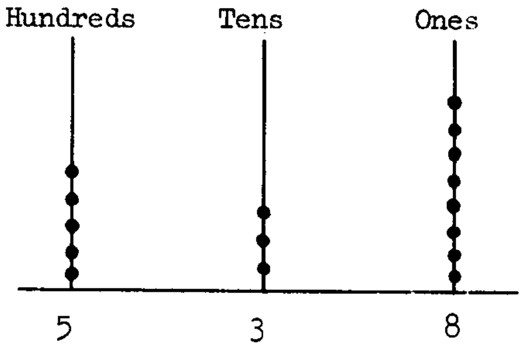
400 + 130 + 5 = ____________

A set of ten ____________ can be shown as one ____________. ____________________

Place Value

An abacus can help us represent a number.

1.

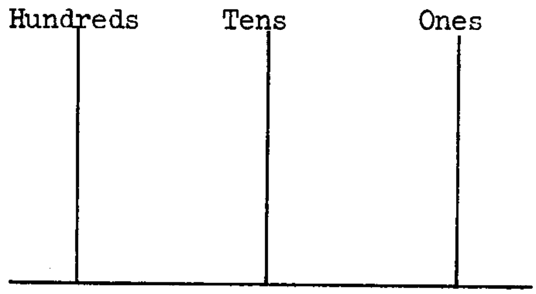


The number ________ is represented on this abacus.

________ = 5 hundreds + 3 tens + 8 ones, or

________ = 500 + 30 + 8.

2.



Show 472 on this abacus.

472 = ________ + ________ + ________

3.

Show 817 on this abacus.

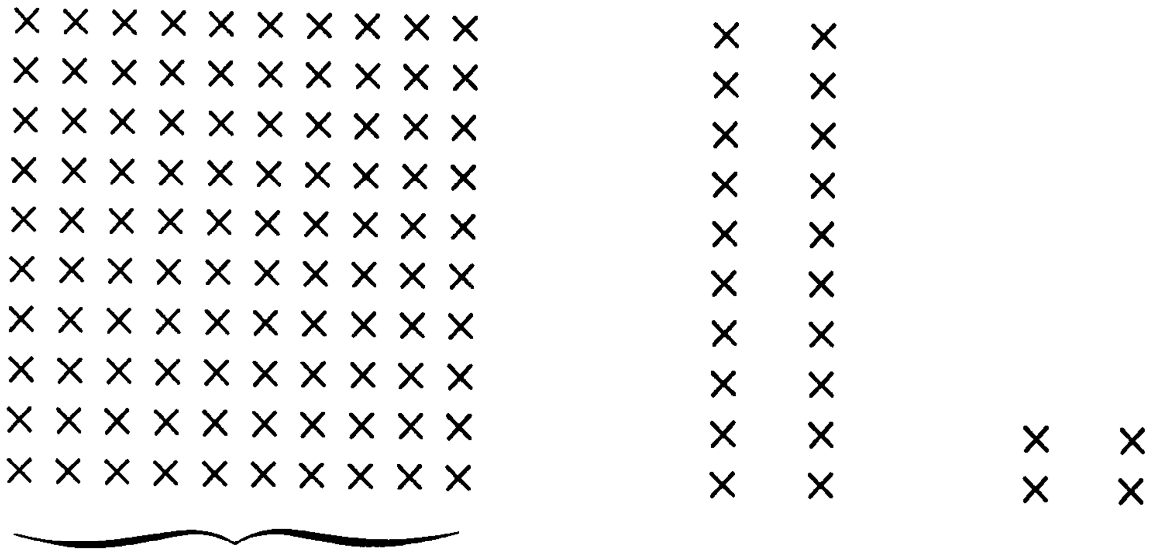
817 = ________ + ________ + ________

Hundreds, Tens, and Ones

Fill the blanks.

847 = 800 + 40 + 7	603 = ______
235 = ______	476 = ______
670 = ______	875 = ______
509 = ______	570 = ______
999 = ______	409 = ______
419 = ______	888 = ______
______ = 700 + 4	______ = 800 + 10
______ = 20 + 100 + 8	______ = 200 + 30 + 5
______ = 6 + 30 + 800	______ = 4 + 600
______ = 200 + 80	______ = 80 + 900
______ = 5 + 600	______ = 5 + 200

Hundreds, Tens, and Ones



124 = 100 + 20 + 4

Fill in the blanks:

563 = 500 + 60 + 3

247 = ____________________

486 = ____________________

625 = ____________________

_____ = 700 + 40 + 1

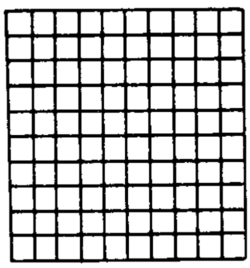
_____ = 500 + 90 + 8

_____ = 400 + 60

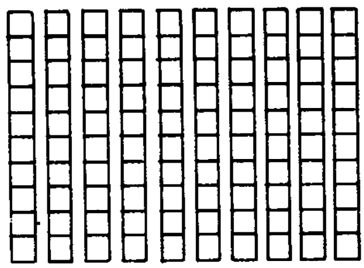
_____ = 800 + 2

Hundreds, Tens, and Ones

Complete each of these.

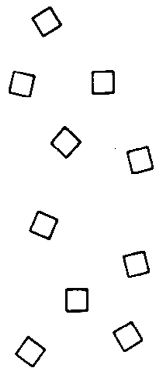


1 one hundred



10 tens

1 ten



10 ones

186: ____ hundred, ____ tens, and ____ ones

342: ____ hundreds, ____ tens, and ____ ones

203: ____ hundreds, ____ tens, and ____ ones

230: ____ hundreds, ____ tens, and ____ ones

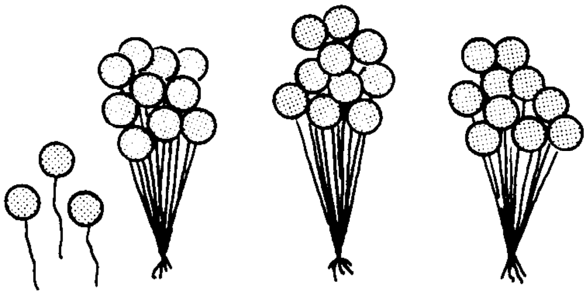
____: 6 hundreds, 2 tens, and 5 ones

____: 4 hundreds, 9 tens, and 6 ones

____: 7 hundreds, 0 tens, and 4 ones

____: 5 hundreds, 4 tens, and 1 one

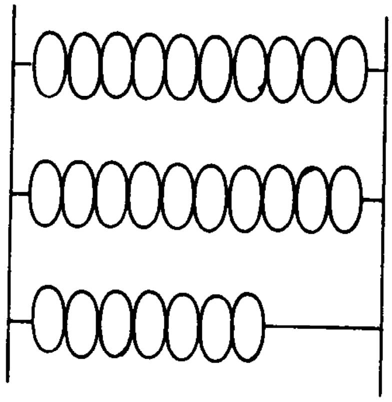
Fill in the blanks.



_____ tens, _____ ones

or

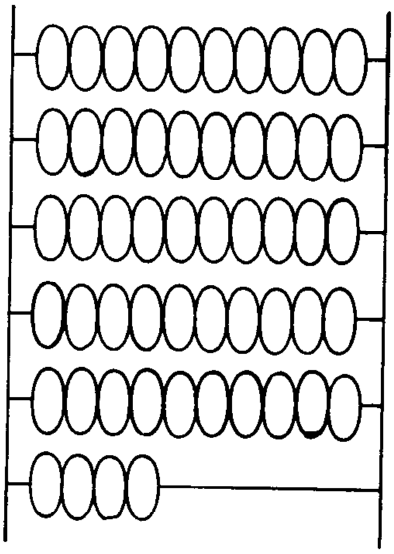
____



_____ tens, _____ ones

or

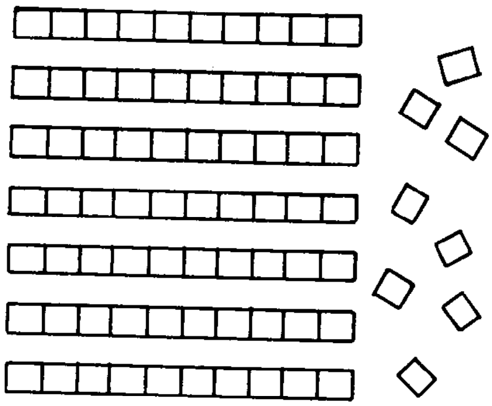
____



_____ tens, _____ ones

or

____



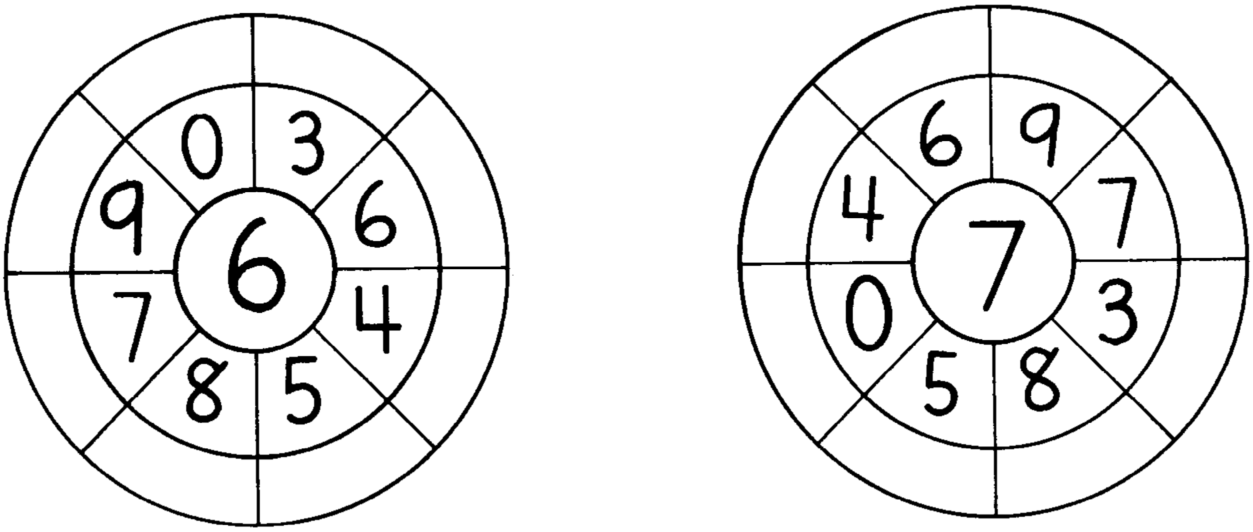
_____ tens, _____ ones

or

____

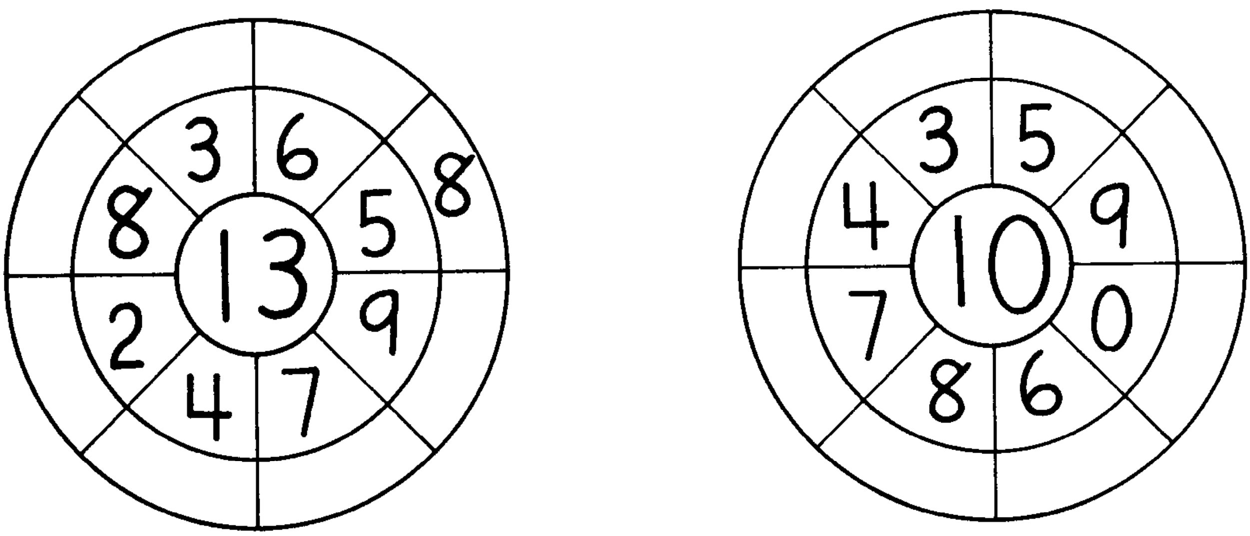
Miscellaneous Exercises

1. Find the sum by adding the number named in the center ring to a number named in the second ring. Write the sum in the outer ring.



2. Find the difference by subtracting a number named in the second ring from the number named in the center ring.

For example: 13 - 5 = 8.

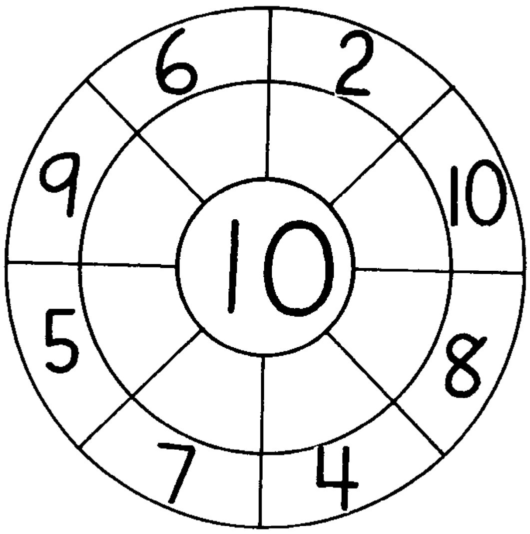


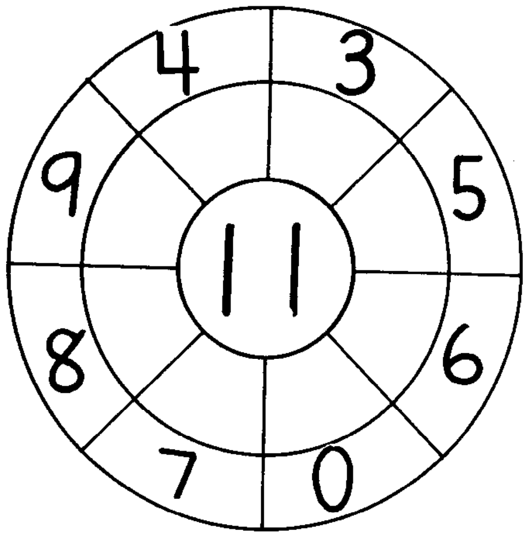
Miscellaneous Exercises

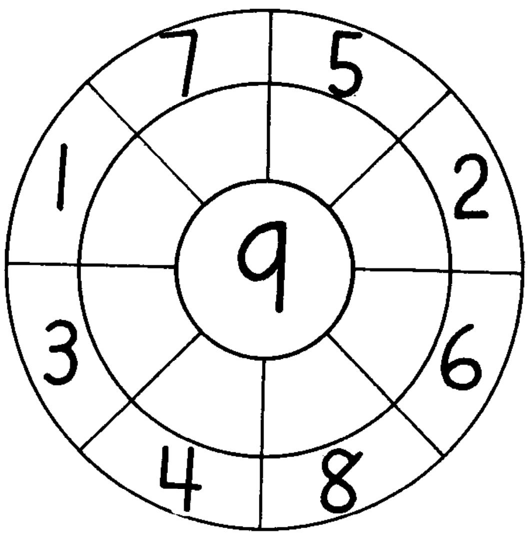
Fill in the second ring.

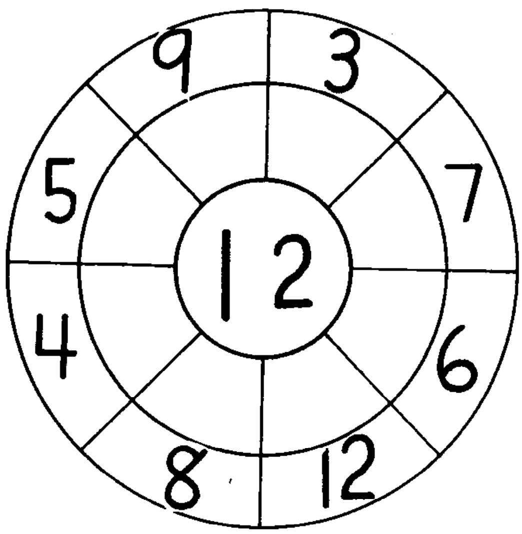
Given addend plus other addend equals the sum named in the third ring. Example: $2 + n = 13$

$n = ?$









Miscellaneous Exercises

Fill in the blanks with the correct numerals.

Begin at the left and go clockwise.

16

7 + (9) =

- 9 = ___

+ 8 =

- 7 = ___

15

8 + ___ =

- 3 = ___

5 + ___ =

- 6 = ___

11

4 + ___ =

- 8 = ___

2 + ___ =

- 7 = ___

12

6 + ___ =

- 7 = ___

8 + ___ =

- 9 = ___

14

8 + ___ =

- 8 = ___

5 + ___ =

- 5 = ___

13

6 + ___ =

- ___ = ___

5 + ___ =

- 7 = ___

Make these sentences true by using =, <, or >.

1. 7 + 6 ______ 6 + 7
2. 5 + 8 ______ 5 + 9
3. 9 + 3 ______ 2 + 9
4. 6 + 3 ______ 9 + 1
5. 6 + 5 ______ 5 + 6
6. 2 + 9 ______ 9 + 2
7. 7 + 3 ______ 4 + 7
8. 6 + 6 ______ 6 + 5
9. 2 + 7 ______ 3 + 7
10. 4 + 8 ______ 8 + 4
11. 6 + 2 ______ 2 + 6
12. 2 + 9 ______ 8 + 3
13. 5 + 8 ______ 8 + 5
14. 4 + 8 ______ 6 + 5
15. 3 + 9 ______ 9 + 3
16. 6 + 4 ______ 7 + 3

Make these true by using + and -.

1. 4 ___ 2 > 7 ___ 5
2. 9 ___ 7 < 8 ___ 4
3. 8 ___ 2 < 7 ___ 2
4. 7 ___ 7 > 8 ___ 2
5. 8 ___ 9 < 9 ___ 9
6. 9 ___ 4 > 7 ___ 6
7. 14 ___ 3 > 8 ___ 4
8. 9 ___ 8 < 6 ___ 4
9. 17 ___ 2 > 8 ___ 4
10. 21 ___ 6 < 9 ___ 8
11. 28 ___ 4 > 15 ___ 8
12. 34 ___ 7 < 25 ___ 15
13. 79 ___ 24 > 149 ___ 57
14. 56 ___ 29 < 12 ___ 14
15. 89 ___ 45 > 134 ___ 51
16. 201 ___ 98 > 300 ___ 56

Miscellaneous Exercises

Fill in the charts by finding the sum of pairs of numbers.

	2	7	6	8
5	7			
9	11			
3			9	
4				

	7	5	9	8
6				
0				
8				
5				

	4	6	7	9
5				
1				
6				
7				

	8	6	9	5
8				
5				
7				
6				

Fill in the blanks so that in each row the sum of the first two numbers is the third number

and

in each column the sum of the first two numbers is the third number.

(4)	2	6
0	3	3
4	5	9

	3	4
6		
7		10

5		
2		4
	5	12

4		4
4	5	
8		13

3		8
2		
	6	11

	4	7
	2	
8		14

Miscellaneous Exercises

Finish each equation.	
$8 + 7 =$ $15 + 7 =$	$8 + 8 =$ $16 - 8 =$
$6 + 9 =$ $15 + 9 =$	$9 + 5 =$ $14 - 5 =$
$9 + 8 =$ $17 + 8 =$	$6 + 8 =$ $14 - 8 =$
$7 + 9 =$ $16 - 9 =$	$8 + 6 =$ $14 - 6 =$
$5 + \quad = 13$ $8 + \quad = 13$	$5 + \quad = 14$ $9 + \quad = 14$
$\quad + 7 = 12$ $\quad + 5 = 12$	$\quad + 9 = 17$ $\quad + 8 = 17$

The sum of two numbers is named in each larger box. Below each sum is one of the addends. Name the other addend. The first one is done for you.

12	
5	7
8	
4	

11	
3	
9	
7	

13	
6	
9	
7	

14	
9	
8	
6	

13	
5	
7	
4	

16	
7	
8	
9	

12	
10	
9	
7	

15	
9	
8	
4	

Miscellaneous Exercises

Write two addends for each sum. Then change the order of the addends. Use numbers less than 10.

11	12	13	14
9, 2			
2, 9			
8, 3			
3, 8			

15	16	17	18

Pairs of Numbers

Complete this chart.

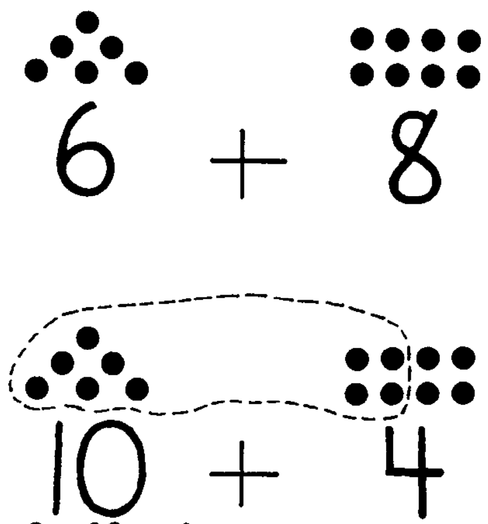
Number Pair First number	Number Pair Second number	Operation	Whole number sum or difference
7	4	+	11
12	3	-	9
6	10	-	Not any
5	8	+	
15	9	-	
8	7	+	
7	14	-	
16	8	-	
5	9		14
9	5		4
5	9		Not any
6		+	6
	12		0

Using a Ten in Addition and Subtraction

Think of the sum of the two numbers as 10 and some ones.	
6 + 7 = 10 + 3	9 + 5 = ______
7 + 4 = 10 + 1	8 + 6 = ______
9 + 6 = 10 + _____	5 + 6 = ______
8 + 5 = 10 + _____	4 + 8 = ______
9 + 2 = ______	8 + 8 = ______
8 + 4 = ______	7 + 5 = ______
5 + 9 = ______	8 + 3 = ______
6 + 8 = ______	7 + 6 = ______
9 + 4 = ______	9 + 3 = ______
5 + 8 = ______	4 + 7 = ______
6 + 5 = ______	9 + 9 = ______
8 + 9 = ______	7 + 7 = ______

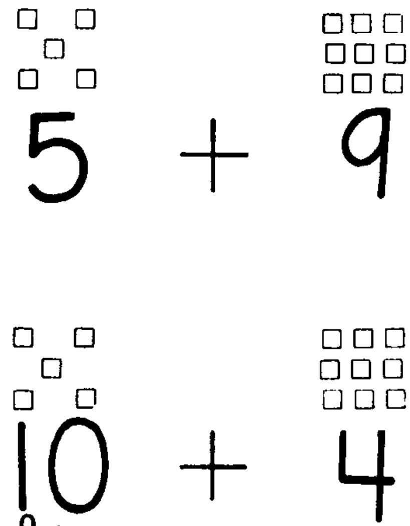
Using a Ten in Addition and Subtraction

Join some of the members of the second set to the first set to make a group of ten.



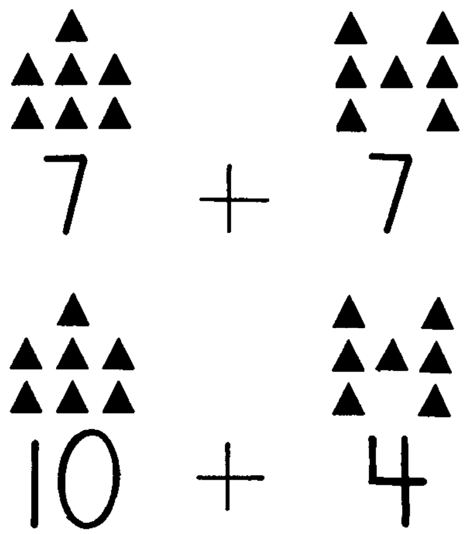
6 + 8 = 10 + 4

6 + 8 =



5 + 9 = ______

5 + 9 =



______ = ______

7 + 7 = ______

FINISH:

9 + 1 + 4 = 14

8 + 2 + 4 = 14

7 + 3 + 4 = 14

6 + ___ + ___ = 14

___ + 5 + ___ = 14

4 + ___ + 4 = 14

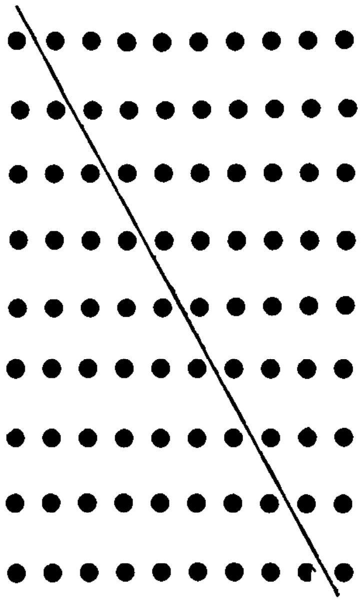
3 + ___ + ___ = 14

2 + ___ + ___ = 14

1 + ___ + ___ = 14

Partitions of a Set of Ten Things

Write an equation for each row.



10 = 1 + _____

10 = 2 + _____

10 = 3 + _____

10 = 4 + _____

10 = 5 + _____

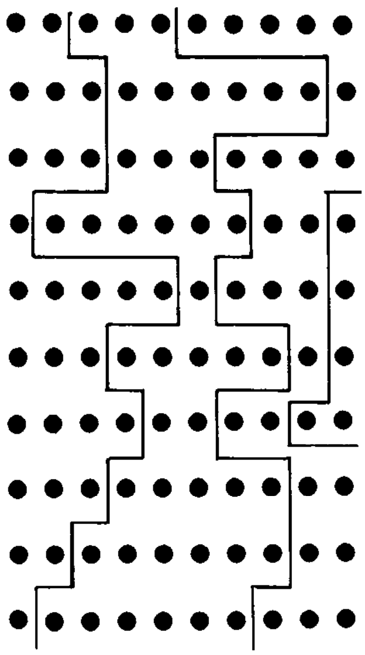
10 = _____ + _____

10 = _____ + 3

10 = _____ + _____

10 = _____ + _____

Write an equation for each row.



2 + 3 + 5 = 10

3 + 5 + 1 = 10

______________ ________

______________ ________

______________ ________

______________ ________

______________ ________

______________ ________

______________ ________

______________ ________

Miscellaneous Exercises

Addition and Related Subtraction

10
4 + 6 = _____
6 + 4 = _____
10 - 6 = _____
10 - 4 = _____

10
2 + 8 = _____
8 + _____ = _____
10 - _____ = _____
10 - _____ = _____

10
3 + 7 = _____
7 + _____ = _____
10 - 3 = _____
10 - _____ = _____

10
9 + 1 = _____
1 + _____ = _____
10 - 1 = _____
10 - _____ = _____

9
7 + 2 = _____
2 + _____ = _____
9 - 2 = _____
9 - _____ = _____

9
5 + _____ = _____
4 + _____ = _____
9 - _____ = _____
9 - _____ = _____

Relating Addition to Subtraction

Complete. Then rewrite each addition fact as a subtraction fact.

9 + ____ = 17

17 - 8 = 9

1. 4 + ____ = 12

2. 7 + ____ = 13

3. 7 + ____ = 11

4. 8 + ____ = 15

5. 5 + ____ = 12

6. 3 + ____ = 12

7. 6 + ____ = 14

8. 9 + ____ = 15

9. 6 + ____ = 11

10. 5 + ____ = 14

11. 4 + ____ = 13

12. 9 + ____ = 18

Relating Subtraction to Addition

Fill in the blank. Then write the associated addition fact.

Example: $10 - 4 = \underline{\quad 6 \quad}$

$6 + 4 = 10$

1. $13 - 7 =$ _____

2. $11 - 6 =$ _____

3. $16 - 8 =$ _____

4. $14 - 6 =$ _____

5. $17 - 9 =$ _____

6. $15 - 8 =$ _____

7. $14 - 9 =$ _____

8. $12 - 5 =$ _____

9. $13 - 8 =$ _____

10. $16 - 7 =$ _____

Addition Chart

+	0	1	2	3	4	5	6	7	8	9
0										
1										
2										
3										
4										
5										
6										
7										
8										
9										

Intersection of Sets of Numbers

1. Set A is the set of whole numbers greater than 12 but less than 18.	Set A = {13, 14, 15, 16, 17}
Set B is the set of whole numbers greater than 9 but less than 16.	Set B = {10, 11, 12, 13, 14, 15}
The members in the intersection of sets A and B are:	{ }

2. Set R is the set of whole numbers greater than 50 but less than 54.	Set R ={ }
Set T is the set of whole numbers greater than 48 but less than 53.	Set T = { }
The members in the intersection of sets R and T are:	{ }

3. Set F is the set of whole numbers greater than 47 but less than 53.	Set F = { }
Set G is the set of whole numbers greater than 50 but less than 57.	Set G = { }
The members in the intersection of sets F and G are:	{ }

4. Set X is the set of whole numbers greater than 79 but less than 85.	Set X = { }
Set Y is the set of whole numbers greater than 82 but less than 90.	Set Y = { }
The members in the intersection of sets X and Y are:	{ }

Using the Number Line

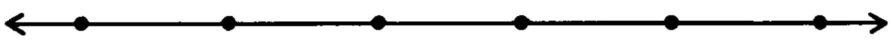
The set of whole numbers greater than 17 but less than 21 is {18, 19, 20}.

1. The set of whole numbers greater than 29 but less than 32 is

   {   }.

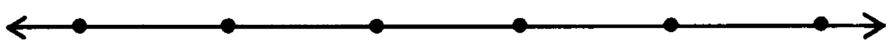
2. The set of whole numbers greater than 36 but less than 41 is

   {   }.



3. The set of whole numbers greater than 52 but less than 55 is

   {   }.



4. The set of whole numbers greater than 92 but less than 88 is

   {   }.

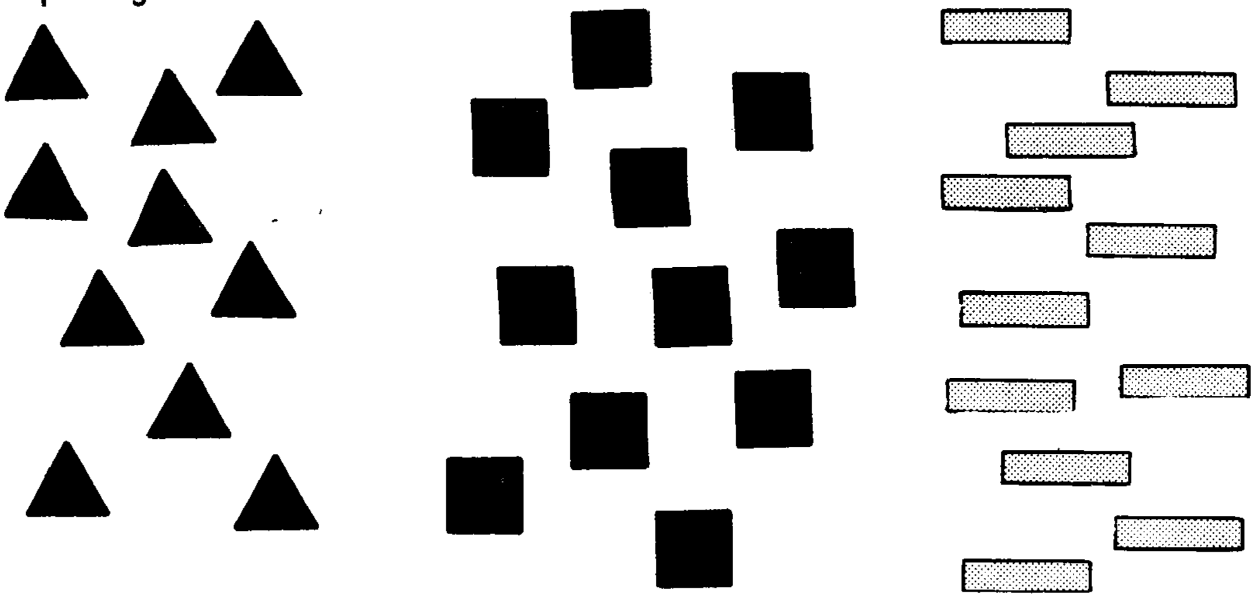
Comparing Numbers

Write either $<$ or $>$ between each pair of numerals:

Remember: $7 < 9$ is read "7 is less than 9" $9 > 5$ is read "9 is greater than 5"

9	15	18	16	23	32
15	19	45	51	72	67
8	6	81	35	89	73
21	17	23	8	76	84
35	31	17	25	43	25
47	52	38	49	28	39
28	21	67	62	17	37
75	80	11	29	39	26
3	7	14	31	62	47
53	55	29	43	99	102

Comparing Sets



1) There are more squares than ____________________.

Show by pairing that your answer is correct.

2) There are as many ____________ as ______________.

Show by pairing that your answer is correct.

3) Is the set of  's equivalent to the set of  's? ________

How do you know? ____

____

4) How many members in the set of  's? ________

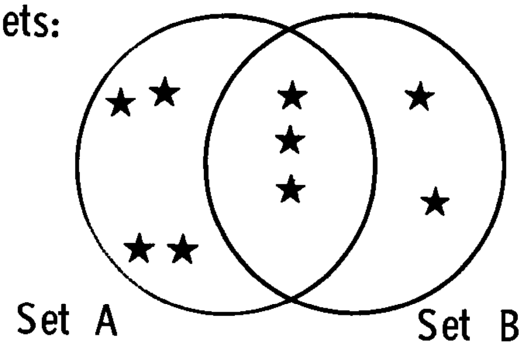
5) How many members in the set of  's? ________

6) How does the number line help you remember that:

(a) 11 is greater than 10? ________________________________

(b) 8 is less than 10? ________________________________

3. Here are some sets:



Are sets A and B disjoint sets? ________

How can you tell? ______________________________

____

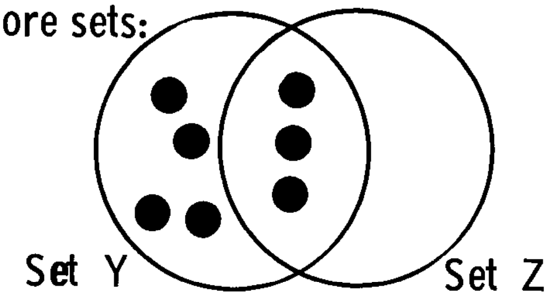
How many members are there in set A? ________

How many members are there in set B? ________

How many members are there in the intersection of set A and set B? ________

How many members are there in the union of set A and set B? ________

4. Here are some more sets:



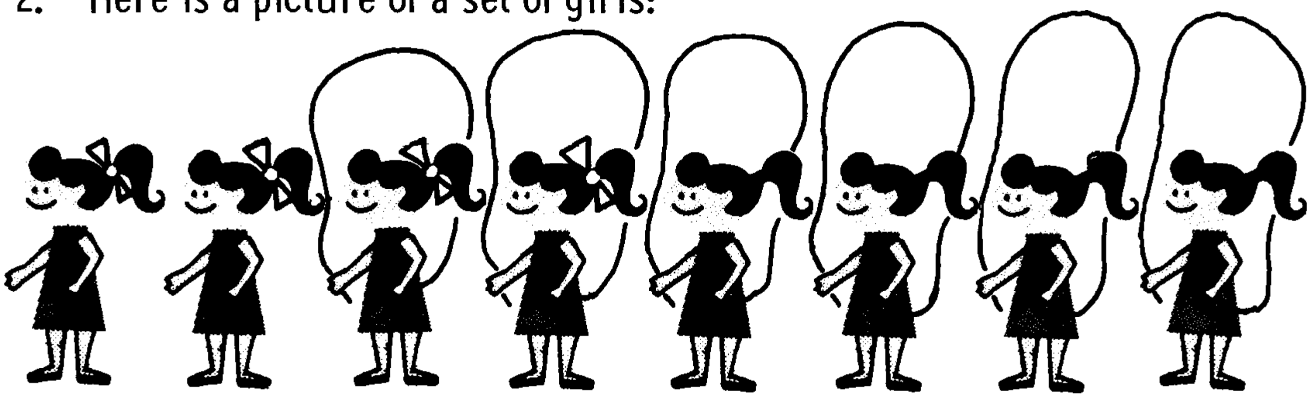
How many members in Set Y? ________

How many members in the intersection of sets Y and Z? ________

There are 12 members in the union of sets Y and Z.

How many members in set Z? ________

2. Here is a picture of a set of girls:



How many girls are in each of these subsets:

The set of girls with bows and jump-ropes. ________

The set of girls with bows but without jump-ropes. ________

The set of girls with jump-ropes but without bows. ________

Are each two of these three sets disjoint? ________

Write an equation for the number of girls all together using the numbers of girls in the three subsets:

____

Draw a ring around each of these sets:

The set of girls with bows. This set has ________ members.

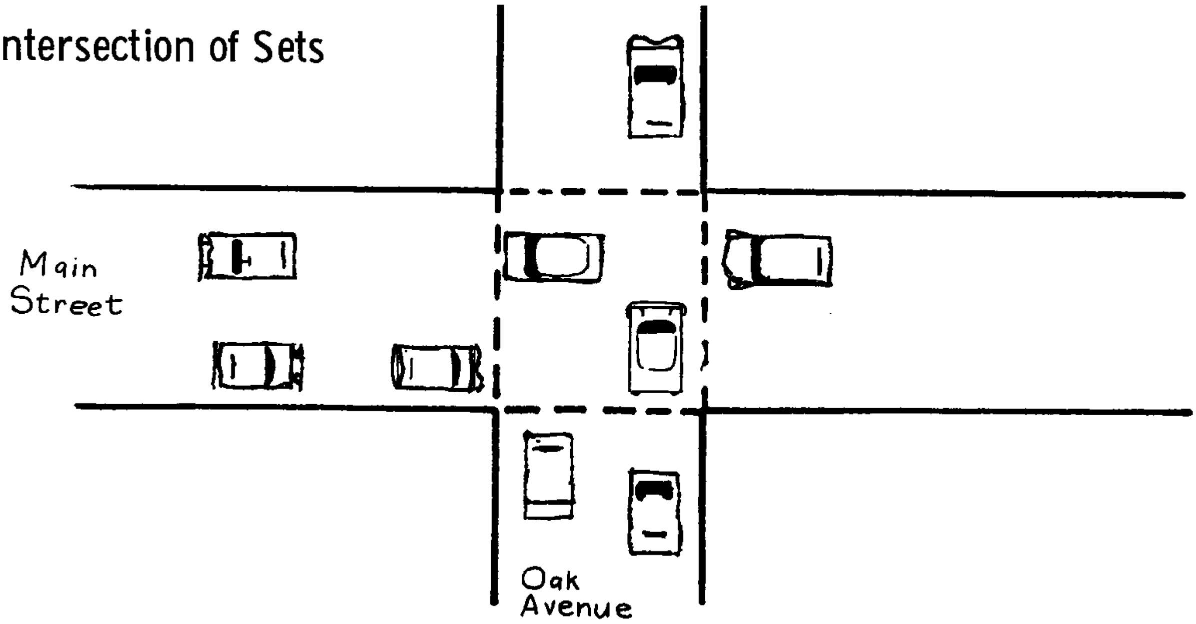
The set of girls with jump-ropes. This set has ________ members.

Are these two sets disjoint? ________

How many members are in the intersection of these two sets? ________

Write an equation for the picture. ________________________

Intersection of Sets



1. Use the picture to answer these questions.

   How many cars are on Main Street but not on Oak Avenue? ______
   Color each of these cars red.

   How many cars are on Oak Avenue but not on Main Street? ______
   Color each of these cars green.

   How many cars are on Main Street and on Oak Avenue at the same time? . . . . ______
   Color each of these cars blue.

   Total number of cars in the picture: ______

   Total number of cars on Main Street: ______

   Total number of cars on Oak Avenue: ______

   Number of cars in the intersection of Main Street and Oak Avenue: . . . . ______

   Explain each of these sentences in relation to the picture:

   $4 + 3 + 2 = 9$

   $6 + 5 = 11$, and $11 - 2 = 9$.

5. Set P = {11, 12, 13, 14, 15}

Set X is the set of numbers less than 12 in set P.

List the members of Set X. ______________________________

Ring the set remaining when Set X is removed from Set P.

{12, 13, 14, 15} {13, 14, 15} {14, 15}

6. Set M = {20, 21, 22, 23, 24, 25}

Set H is the set of numbers greater than 23 in set M.

List the members of Set H.

Ring the set remaining when Set H is removed from Set M.

{20, 21, 22, 23} {24, 25} {20, 21, 22}

1. Set R = {dress, hat, sock, shoe, coat}

   Set T is a subset of Set R.

   Set T = {shoe, sock}

   Ring the set remaining when Set T is removed from Set R.

   {sock, shoe} {coat, hat, dress} {hat, shoe, coat}

2. Set V = {doll, wagon, ball, house, crayon}

   Set W = {ball, crayon}

   Ring the set remaining when Set W is removed from Set V.

   {house, dog, cat, ball} {crayon, ball} {wagon, doll, house}

3. Set F = {0, 1, 2, 3, 4, 5, 6}

   Set G = {6, 4, 2, 0}

   Ring the set remaining when Set G is removed from Set F.

   {3} {2, 3, 4, 7} {5, 1, 3}

4. Set H = {0, 1, 2, 3, 4, 5, 6, 7, 8}

   Set K is the set of numbers less than 5.

   List the members of Set K. ______________________

   Ring the set remaining when Set K is removed from Set H.

   {5, 6, 7, 8} {6, 7, 8} {0, 1, 2, 3, 4}

Union of Sets

1. Set A = {lamb, pig, dog}

   Set B = {cow, cat}

   Ring the set that is the union of sets A and B.

   {lamb, horse, pig, dog, cat}   {lamb, pig, dog, cat, goat}

   {lamb, pig, dog, cat, cow}   {cow, cat, lamb, dog, fish}

2. Set C = {book, pencil, eraser, crayon}

   Set D = {clip, tape, ruler}

   Ring the set that is the union of sets C and D.

   {crayon, ruler, pencil, eraser, tape}

   {clip, ruler, book, crayon, pencil, eraser, tape}

   {tape, ruler, book, pencil, eraser, crayon, chalk}

3. Set E = {rubber, tin, doll}

   Set F = {ball, kite, bat, car}

   Set G is the union of sets E and F.

   Ring set G.

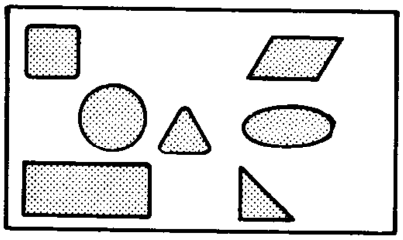
   {rubber, tin, ball, car, doll, car, kite}

   {car, rubber, tin, doll, ball, kite, cap}

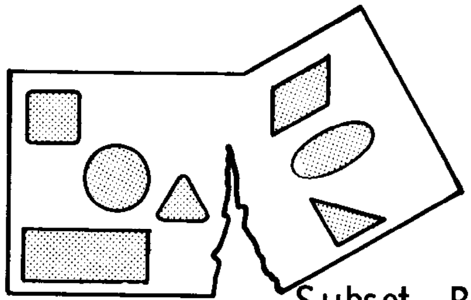
   {kite, doll, ball, rubber, tin, car, bat}

Removing a Subset

1. Look at these pictures.



Set A



Subset B

How many members are in Set A? ________

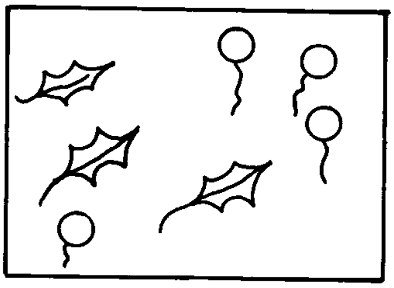
2. How many members are in the subset being removed? ________

3. Draw a picture of the set that would be left when Subset B is removed from Set A.

4. How many members are in the set remaining when Subset B is removed from Set A? ________

5. Write an equation which describes the set remaining. ________

6. Look at these pictures. Ring a subset in each picture and write an equation for the set remaining.

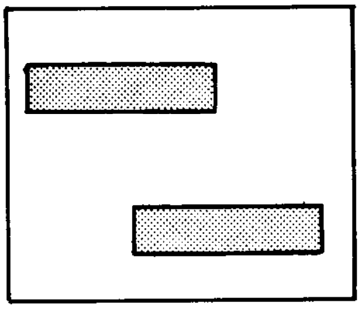


A	B	C
D	E	F
G	H	I

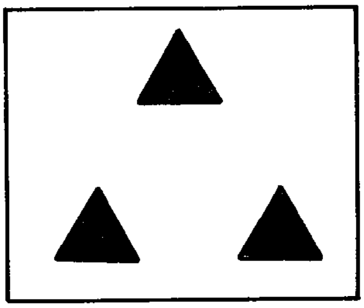
Jane	Bob
Sally	Mary
Joe	Ann
Bill	Charles

________ ________ ________

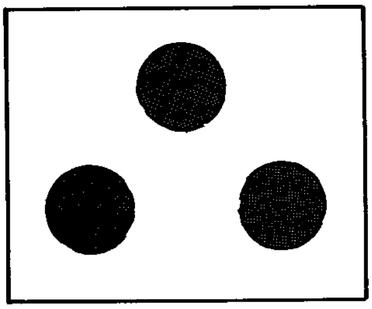
Union of Sets



Set X



Set Y



Set Z

6. How many members are in Set X? ________

7. How many members are in Set Y? ________

8. Draw a picture for the union of sets X and Y.

9. Write an equation for X and Y and their union.

____

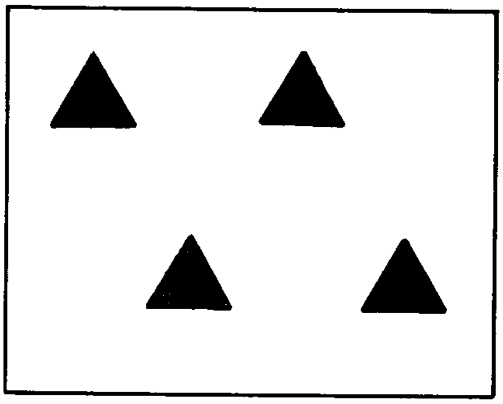
10. How many members are in Set Z? ________

11. Draw a picture for the union of sets Y and Z.

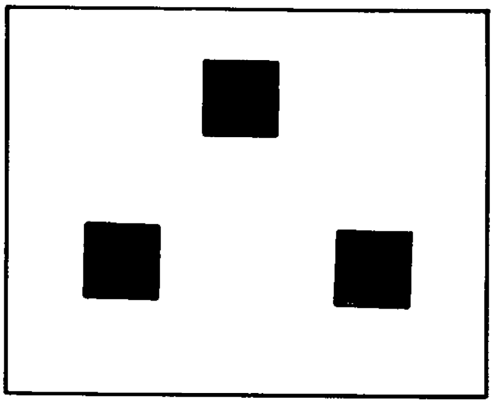
12. Write an equation for Y and Z and their union.

____

Union of Sets



Set A



Set B

1. How many members are in Set A? ________

2. How many members are in Set B? ________

3. Think of joining Set A and Set B.

   When we join two sets we have a new set called the union of the two sets.

   Draw a picture for the union of sets A and B.

4. How many members are in the union of sets A and B? ________

5. Write an equation for the two sets and their union. ________

Subsets

GIRL	APPLE	GREEN	BANANA
BLUE	GRAPE	BABY	PURPLE
GRASS	BOOK	PLATE	BLACK

Set A

1. The words in the box that begin with a are a subset of Set A. List the members of this subset. ______________________

2. The words that begin with b are also a subset of Set A. List the members of this subset. ______________________

   ____

3. Ring the words that begin with p. How many members in this subset? ______________________

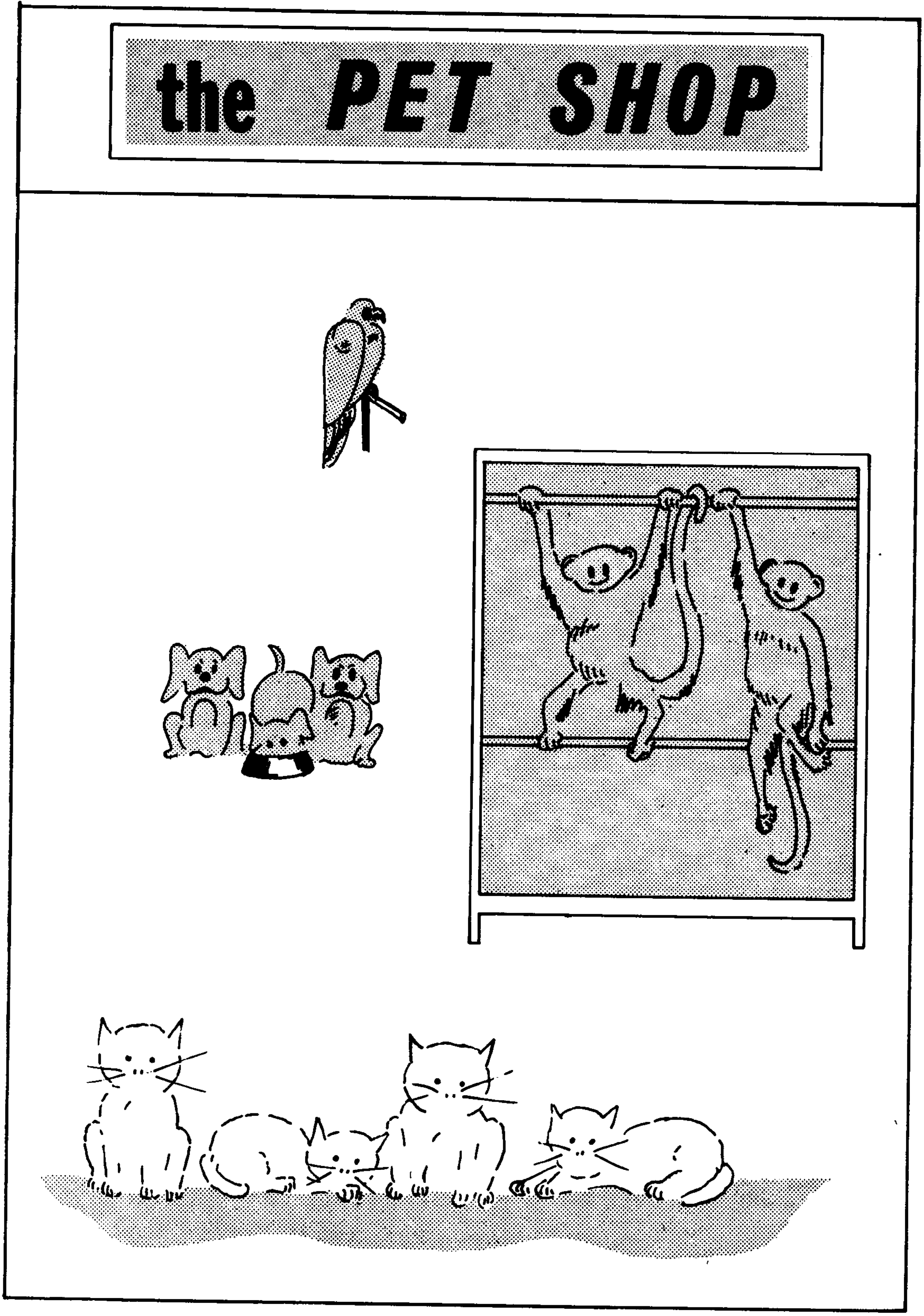
4. Describe the subset whose members are words that begin with z.

   ____

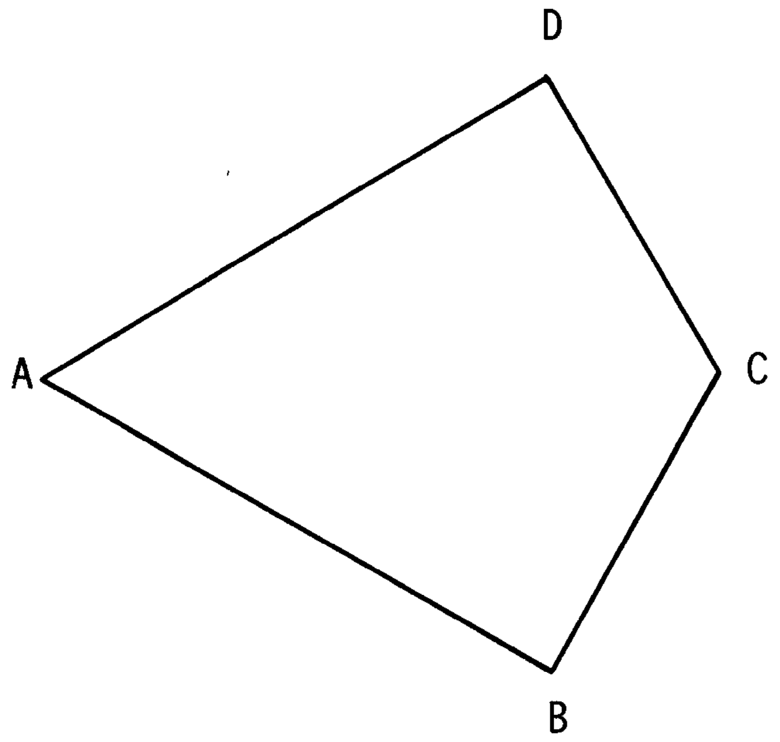
5. Ring the words that begin with gr. How many members in this subset? ______________

   List the members. ______________________

   ____


the PET SHOP

Review

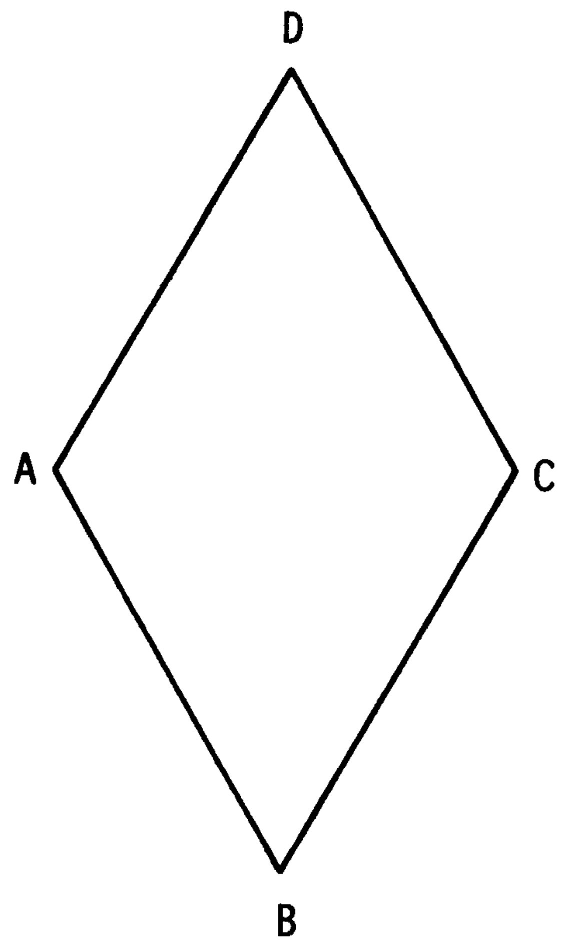


3. Look at quadrilateral ABCD.

Is $\angle ADC$ a right angle?	Yes	No
Is $\angle ABC$ a right angle?	Yes	No

4. Draw AC above.

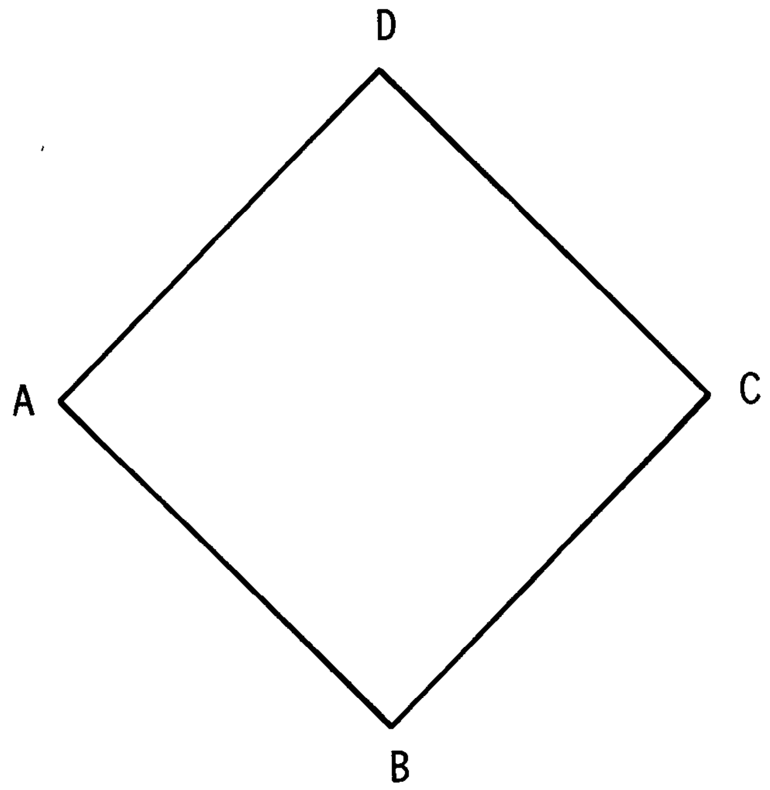
Is $\triangle ADC$ a right triangle?	Yes	No
Is $\triangle ADC$ isosceles?	Yes	No
Is $\triangle ADC$ congruent to $\triangle ABC$?	Yes	No



2. Look at quadrilateral ABCD.

Draw $\overline{AC}$.

Is $\triangle ACD$ isosceles?	Yes	No
Is $\triangle ACD$ a right triangle?	Yes	No
Is $\triangle ACD$ equilateral?	Yes	No
Is $\triangle ACB$ equilateral?	Yes	No
Are $\overline{AB}$, $\overline{BC}$, $\overline{CD}$, and $\overline{DA}$ congruent?	Yes	No
Is ABCD a square?	Yes	No



1. Figure ABCD is a square.

   Draw $\overline{AC}$.

   Name the two triangles you see. ________ ________

   Is $\triangle ACD$ an isosceles triangle? Yes No

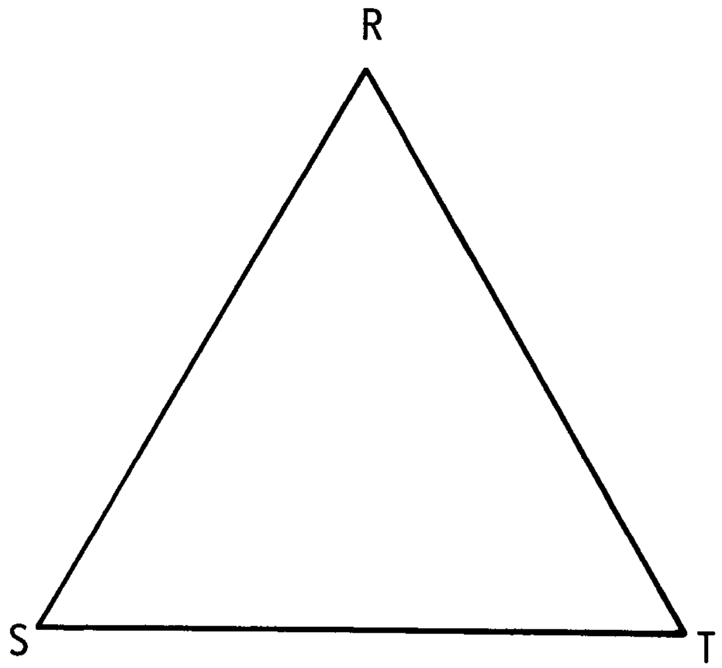
   Name its congruent sides. ________ and ________

   Is $\triangle ACD$ a right triangle? Yes No

   Is $\triangle ACD$ an isosceles right triangle? Yes No

   Is $\triangle ACD$ an equilateral triangle? Yes No

   Do you think $\triangle ACD$ and $\triangle ACB$ are congruent? Yes No



Mark off $\overline{RS}$ on the edge of a sheet of paper.

Is your copy of $\overline{RS}$ congruent to $\overline{RT}$? Yes No

Is $\triangle RST$ an isosceles triangle? Yes No

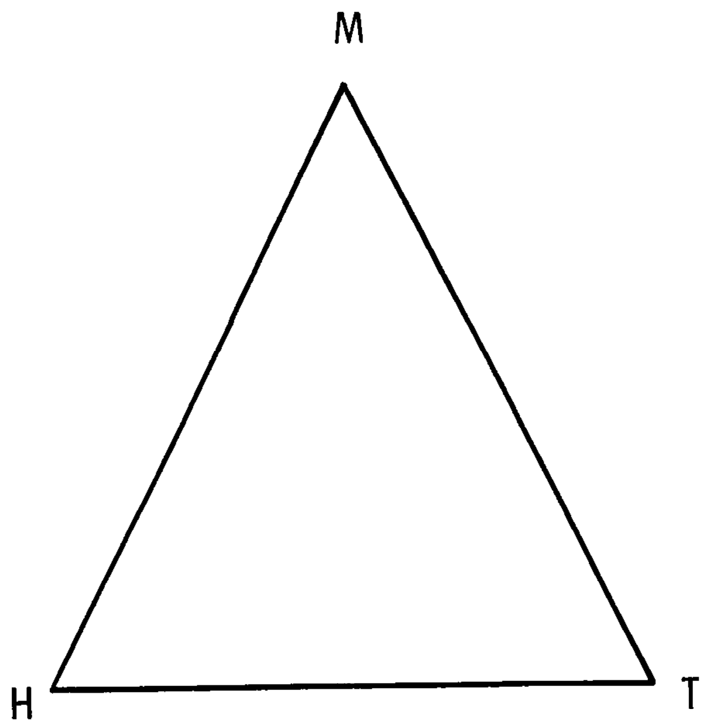
Is your copy of $\overline{RS}$ also congruent to $\overline{ST}$? Yes No

Are the three sides of this triangle congruent? Yes No

The special kind of isosceles triangle with all three sides congruent is called an <u>equilateral</u> <u>triangle.</u>

Is an equilateral triangle always an isosceles triangle? Yes No

Isosceles Triangles



1. Is $\overline{HM}$ congruent to $\overline{MT}$? Yes No

   How many congruent sides does $\triangle$ HMT have? ________

   Is $\triangle$ HMT an isosceles triangle? Yes No

2. Make a tracing of $\triangle$ HMT.

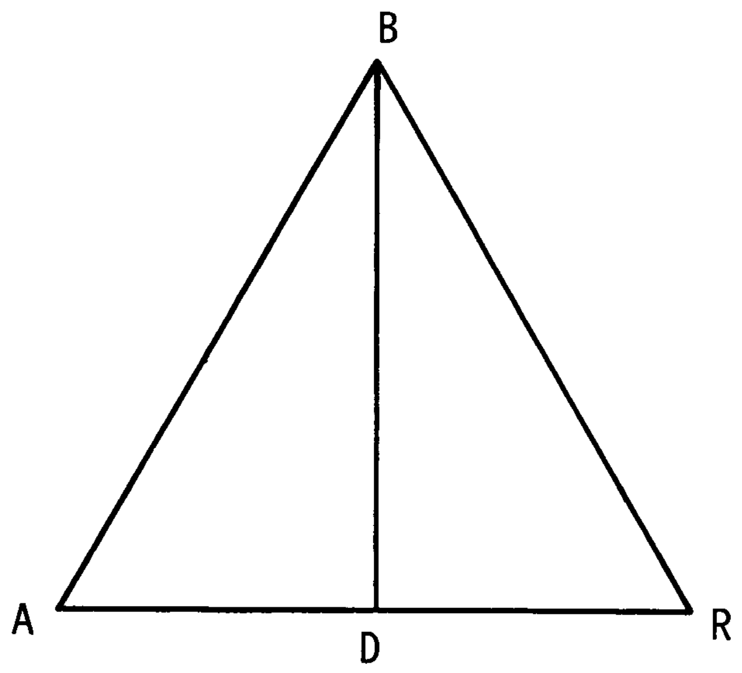
   Fold it so that the tracings of $\overline{MH}$ and $\overline{MT}$ fit on each other.

   Is $\angle$ MHT congruent to $\angle$ MTH? Yes No

   How many congruent angles does $\triangle$ HMT have? ________

3. An isosceles triangle has ________ congruent sides and ________ congruent angles.

Here are triangle ABR and line segment $\overline{BD}$.



Are $\angle BDA$ and $\angle BDR$ congruent? Yes No

Are $\angle BDA$ and $\angle BDR$ right angles? Yes No

Name two right triangles. ________ ________

Are these right triangles congruent? Yes No

3. Draw a triangle.

Color the triangle yellow.

Color the interior of the triangle red.

The region shown is a triangular region.

4. Draw $\overline{AD}$, $\overline{DB}$, $\overline{CB}$, and $\overline{AC}$.

Underline the correct names for the figure you drew.

(1) a simple closed curve

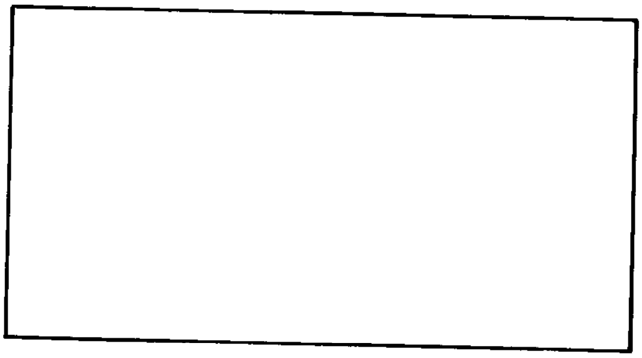
(2) a polygon

(3) a triangle

(4) a quadrilateral

(5) a quadrilateral region

1. Here is a rectangle.



Color the curve.

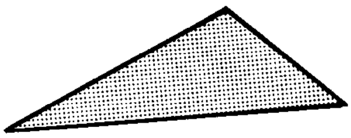
Color the interior using a different color.

When we think of a curve and its interior, we call the figure a <u>region</u>.

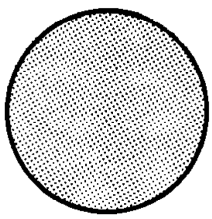
2. Below are several regions and names for regions.

Regions will be shaded in this book.

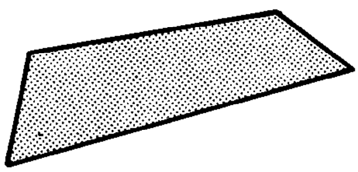
Pair each region with its correct name.



Quadrilateral region



Circular region

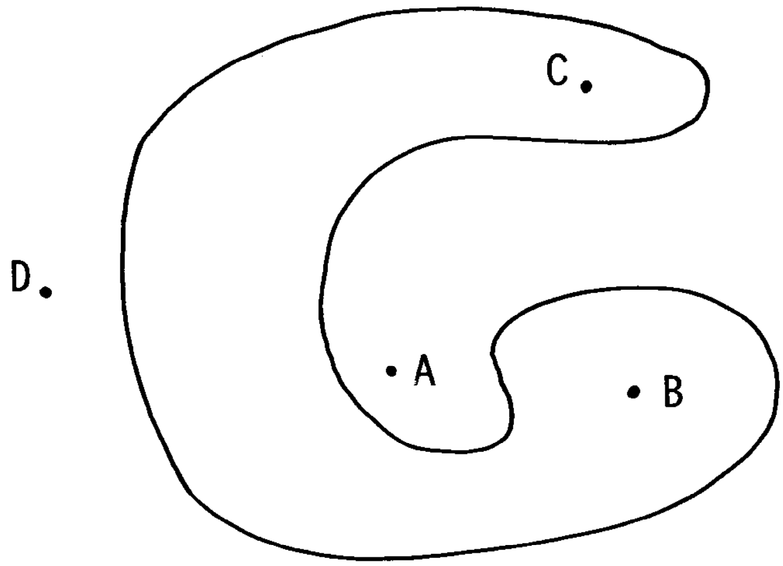


Triangular region

Interior and Exterior

3. Name two points in the interior of this figure. ________

   Name two points in the exterior of this figure. ________



Without crossing the figure, can you draw a curve

from A to B?	Yes	No
from A to C?	Yes	No
from A to D?	Yes	No
from B to C?	Yes	No
from B to D?	Yes	No
from C to D?	Yes	No

Can any curve in a plane pass from the interior of a simple closed curve to its exterior without crossing the curve? Yes No

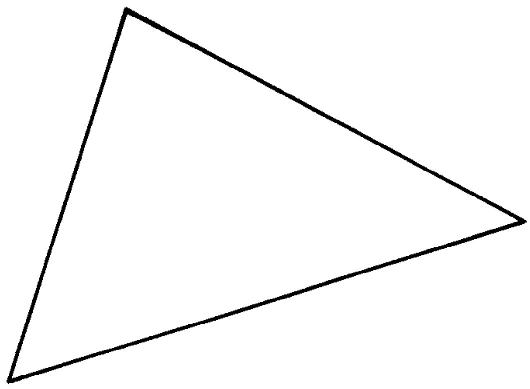
1.

Mark a point J in the interior of this curve.

Mark a point C on the curve.

Mark a point D in the exterior of the curve.

2. Here is a triangle.

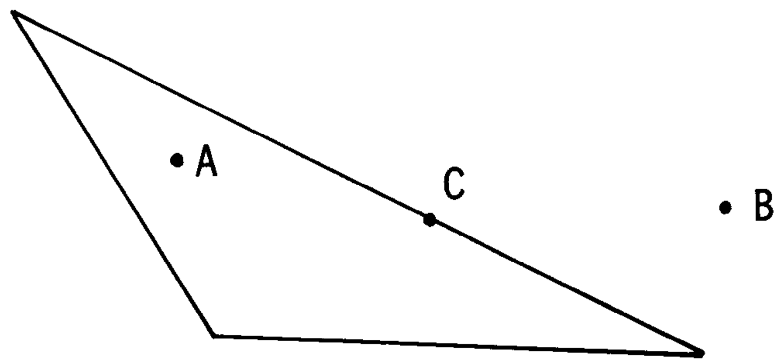


Color the triangle, but not its interior.

Color the interior using another color.

Inside, On, and Outside

1. A polygon with three sides is called a triangle.

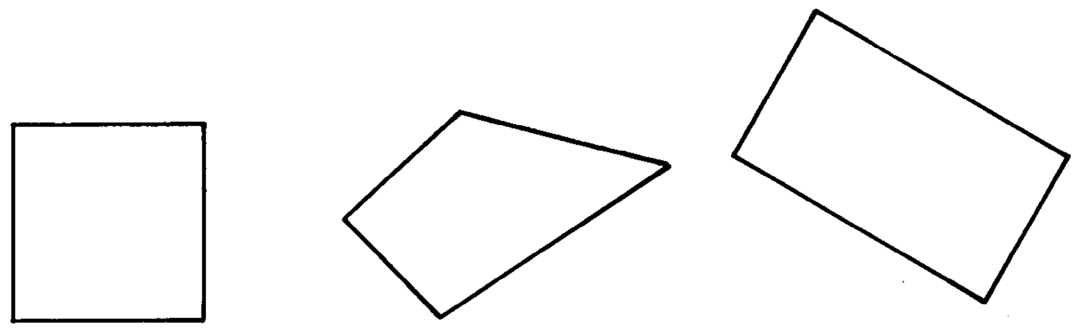


Name a point inside the triangle. ________

Name a point on the triangle. ________

Name a point outside the triangle. ________

2. Polygons with four sides are called quadrilaterals.



Write 1 in the rectangle that is not a square.

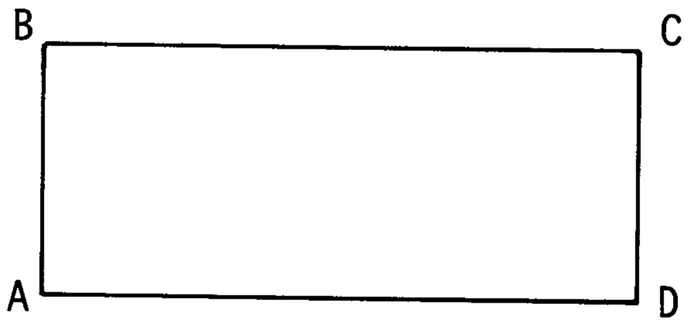
Write 2 inside the square.

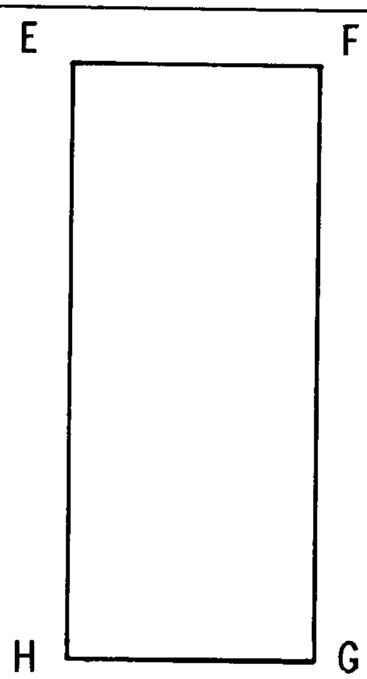
Write 3 just outside each quadrilateral.

Mark X on each rectangle.

4. Here are two rectangles.

We will call one rectangle ABCD.



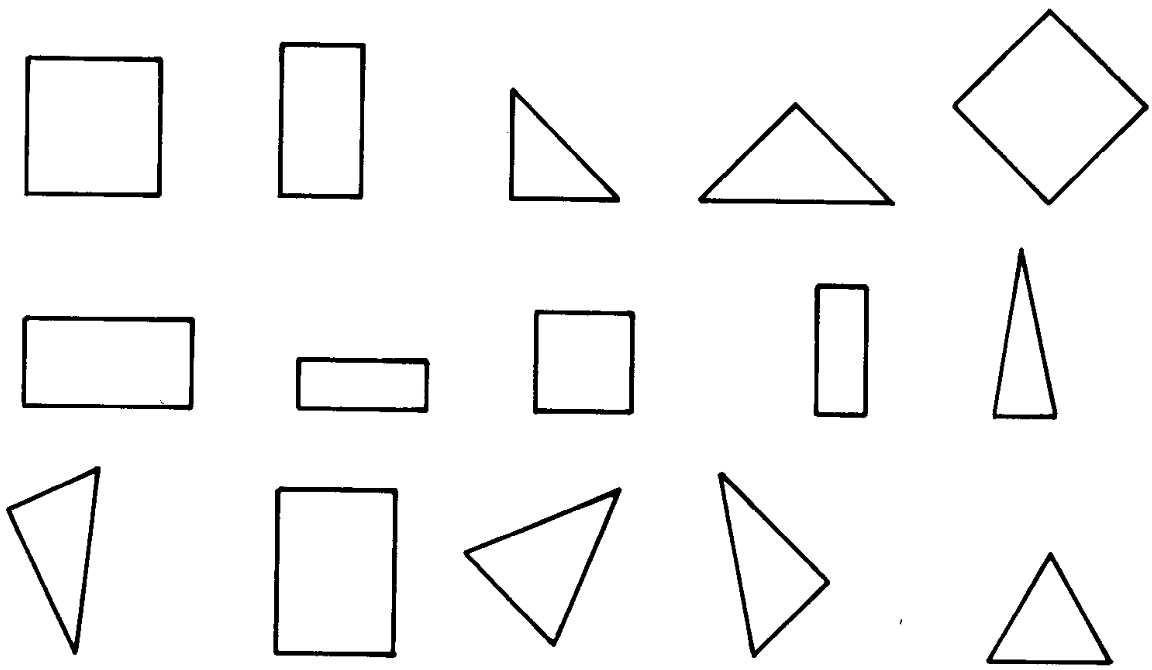


Make a tracing of ABCD.

Test to see if the tracing fits exactly on EFGH.

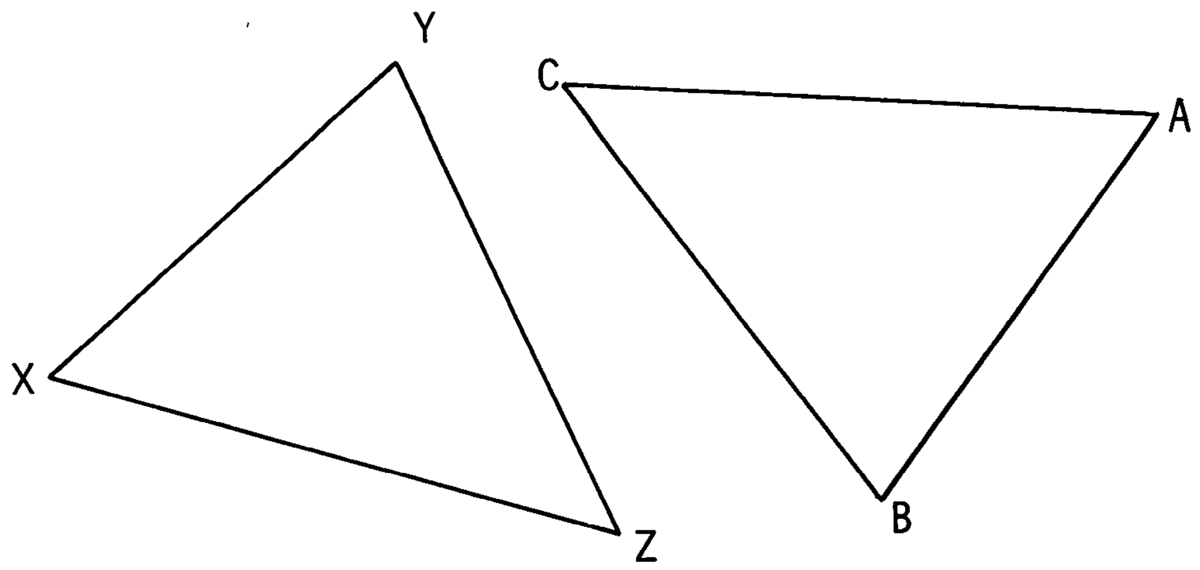
Do the line segments fit exactly?	Yes	No
Do you need to test the angles for congruence?	Yes	No
Is ABCD congruent to EFGH?	Yes	No

5. Put a cross in the two congruent figures in each row.



Congruence of Polygons

3. These triangles are named $\triangle XYZ$ and $\triangle ABC$.



Do you think the triangles are congruent? Yes No

Make a tracing of $\triangle XYZ$.

Mark the points X, Y, Z on the tracing.

Can you fit the tracing of $\triangle XYZ$ on $\triangle ABC$ without turning it? Yes No

If you turn the tracing, can it fit on $\triangle ABC$? Yes No

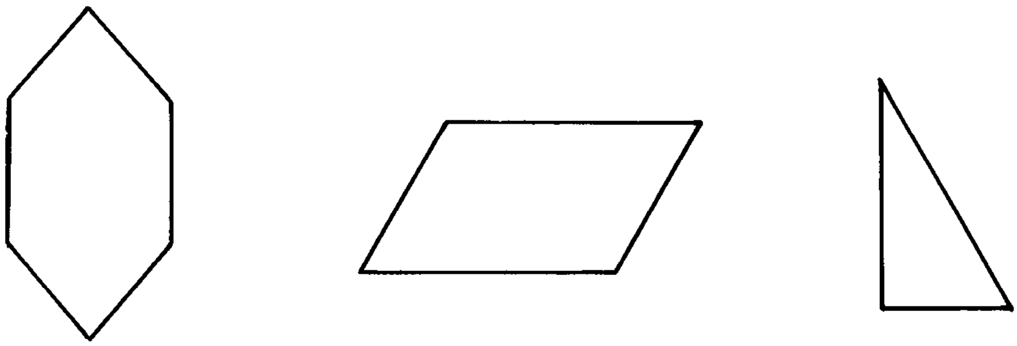
Line segment $\overline{XY}$ is congruent to ________.

Line segment $\overline{YZ}$ is congruent to ________.

Line segment $\overline{XZ}$ is congruent to ________.

Is $\triangle XYZ$ congruent to $\triangle ABC$? Yes No

1. These simple closed curves are unions of line segments.



These kinds of curves are called ____________________.

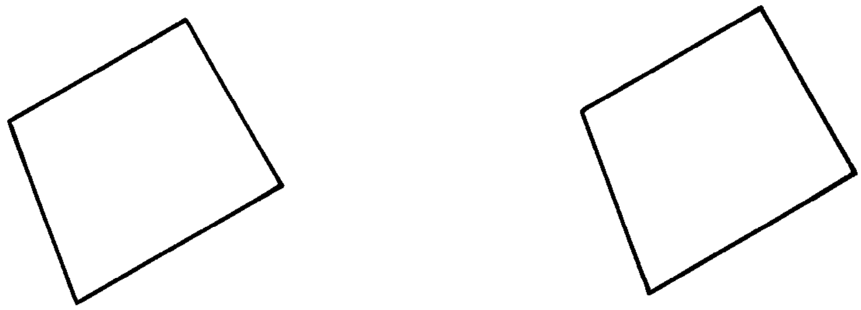
Can any of these polygons fit on each other exactly? Yes No

Do you think polygons can be congruent when they do not have the same number of sides? Yes No

2. Two quadrilaterals are shown here.

Make a tracing of one curve.

Test to see if the sides and angles of the tracing fit exactly on the sides and angles of the other curve.

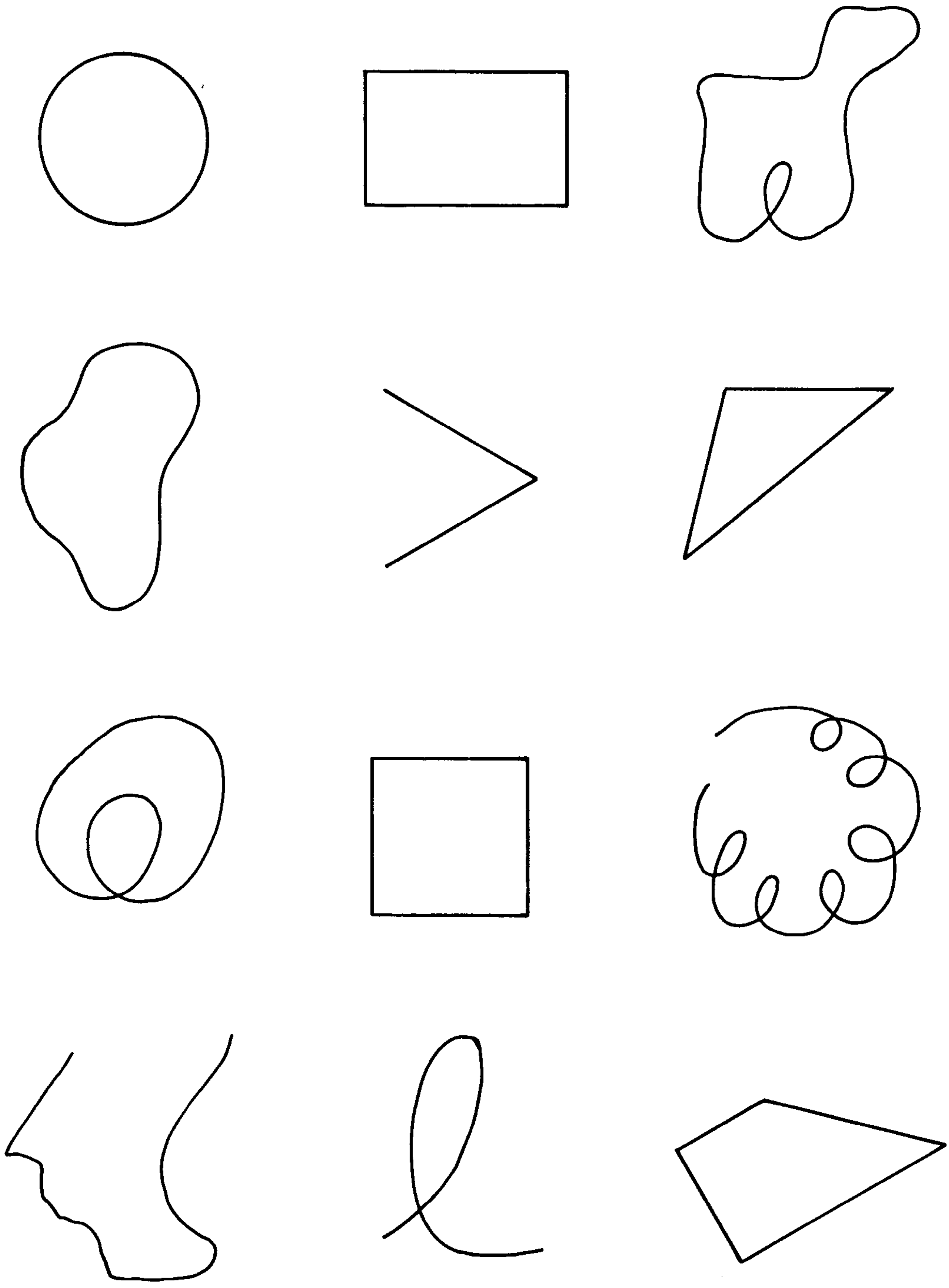


Do the sides fit exactly? Yes No

Do the angles fit exactly? Yes No

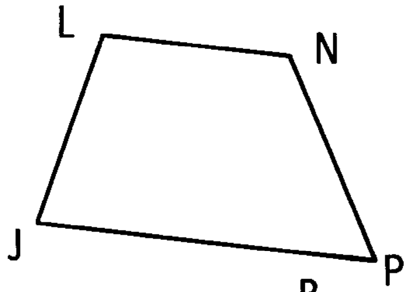
Are the curves congruent? Yes No

Review

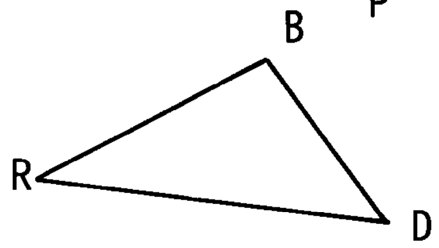


1. Here are pictures of different polygons.

   Use your pencil to connect each polygon with its name.



Triangle



Quadrilateral

Name three line segments on the triangle. ____ ____ ____

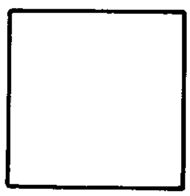
Name each vertex of the triangle. ____ ____ ____

Name the sides of the quadrilateral. ____ ____ ____ ____

Name each vertex of the quadrilateral. ____ ____ ____ ____

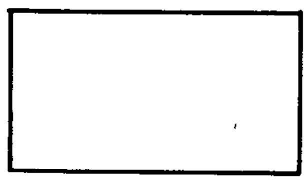
2. Two quadrilaterals are shown below.

   Connect them with their special names.



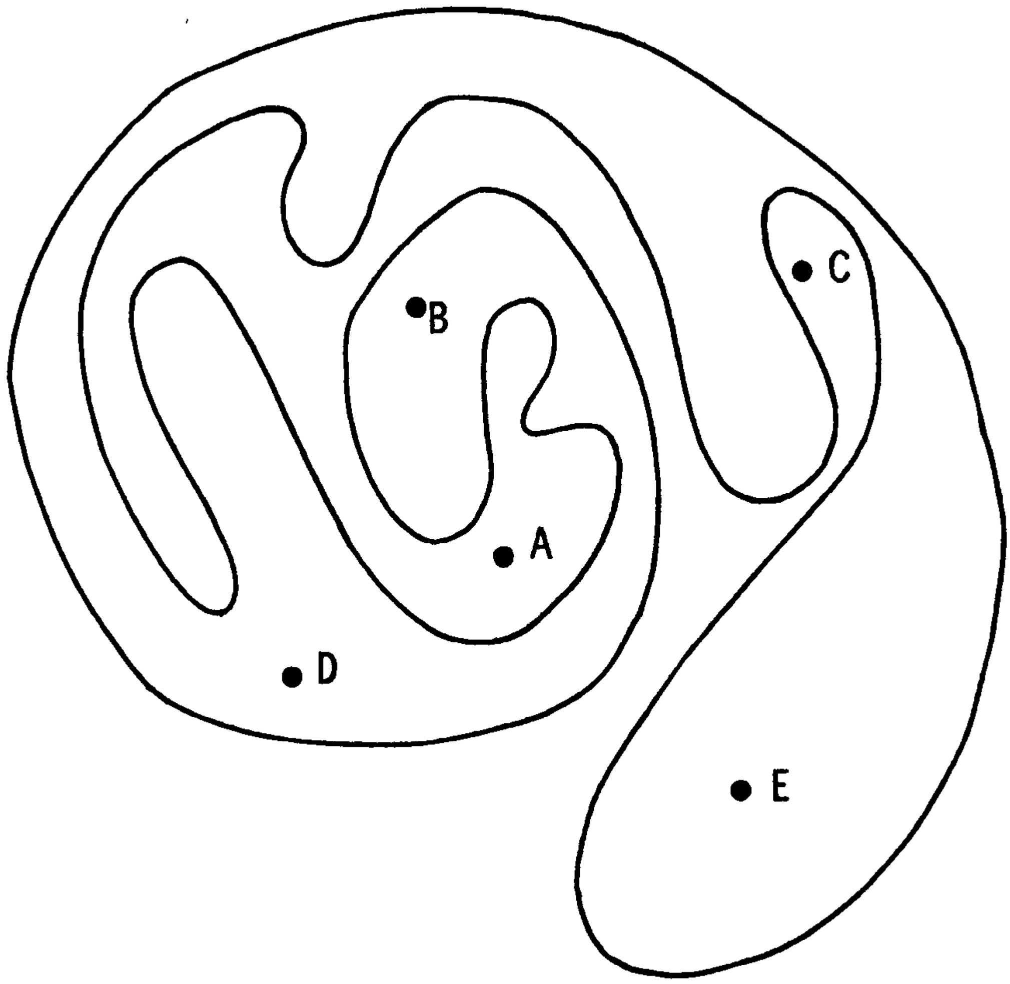
Square

Rectangle



Simple Closed Curves

3.



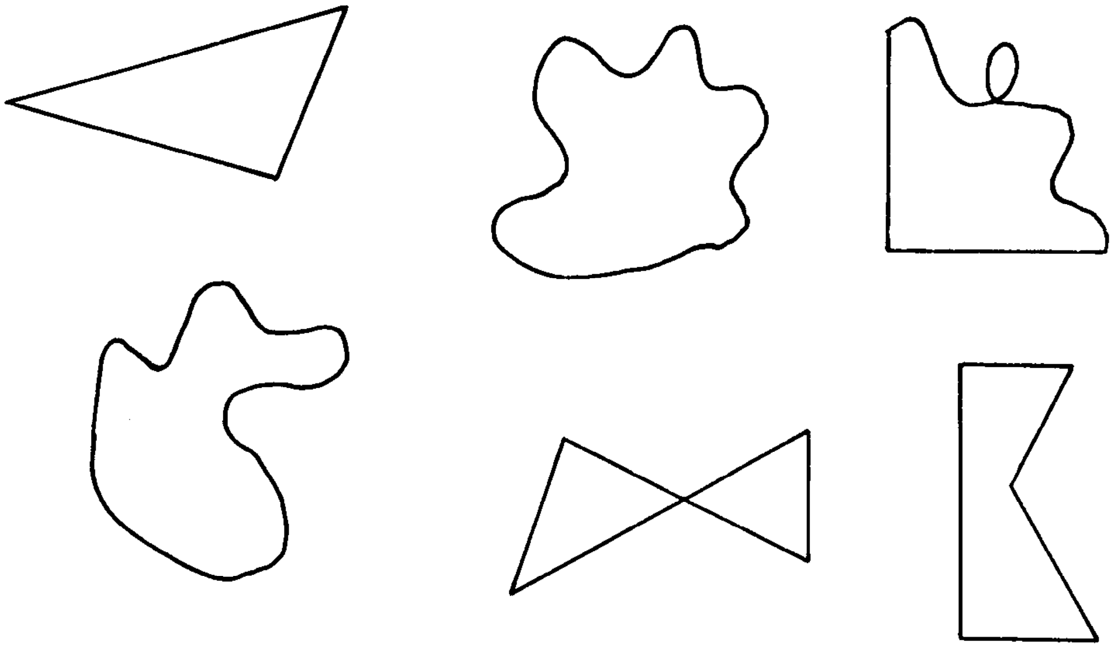
Is the curve a simple closed curve? Yes No

Look at points A, B, C, D, E.

Write names of points which are inside the curve. ____ ____ ____

Write names of points which are outside the curve. ____ ____

1. Mark an X on each simple closed curve.



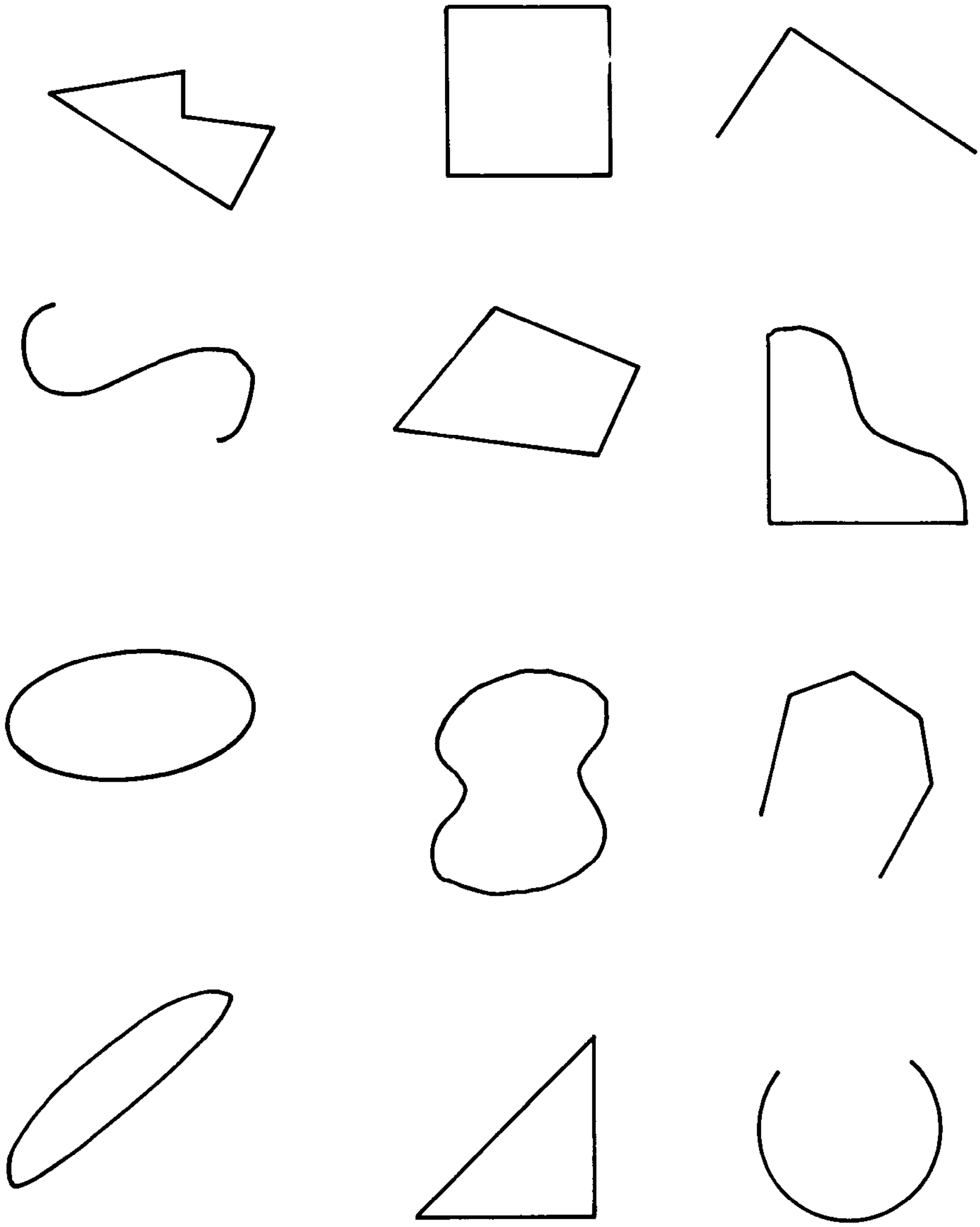
2. Draw a closed curve which is not simple.

Mark a point where this curve crosses itself.

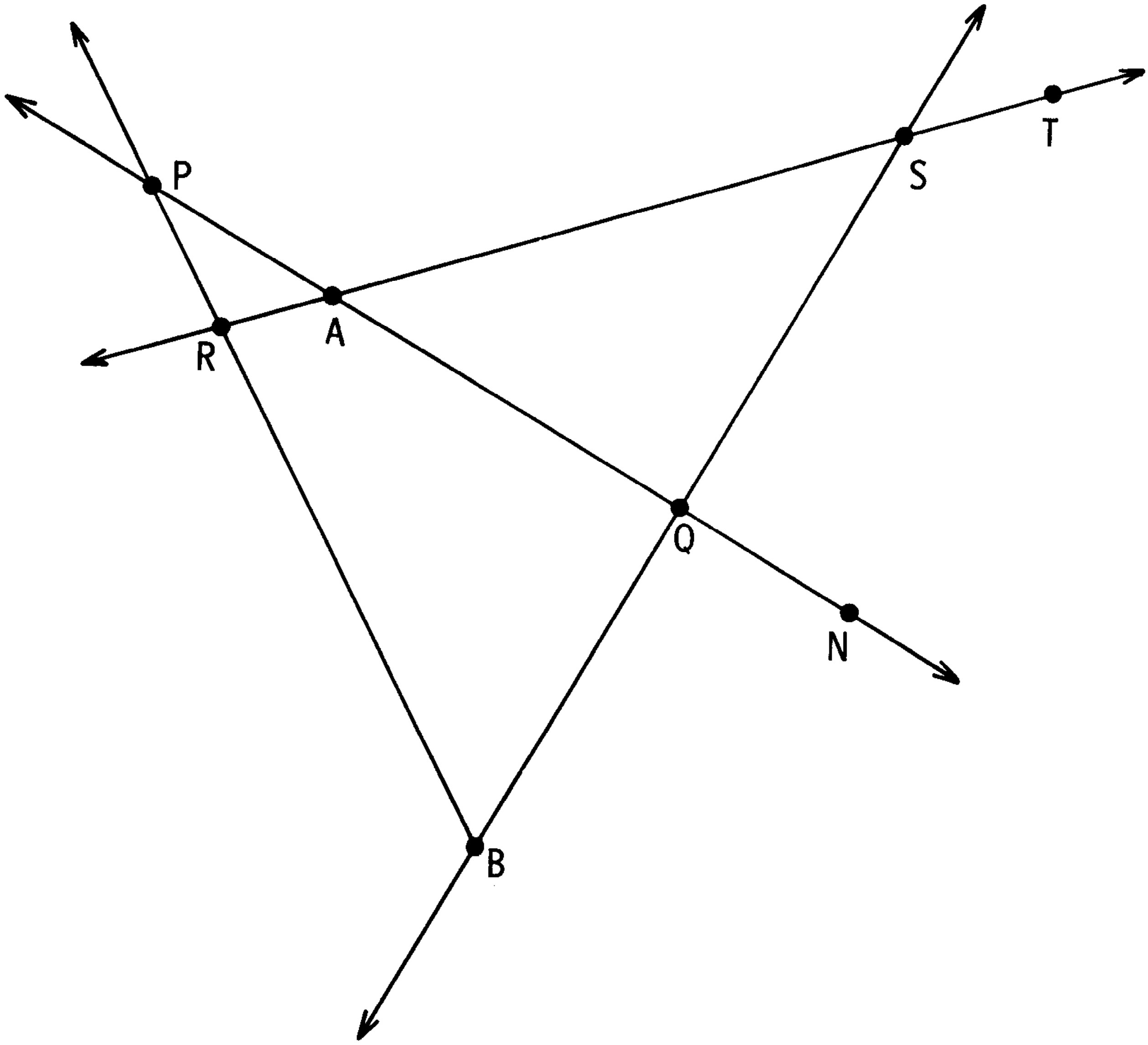
Color a simple closed curve that is a subset of your curve.

Closed Curves

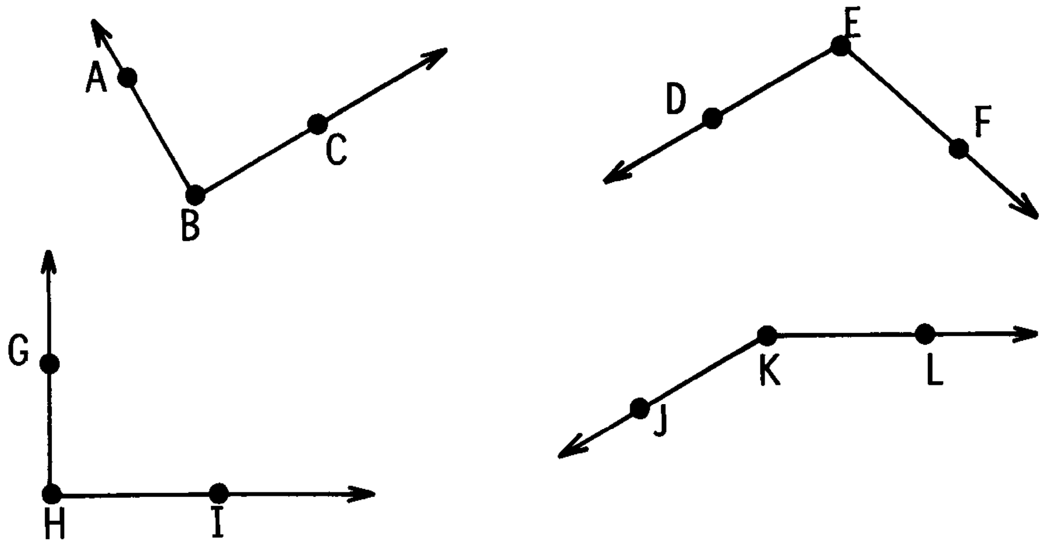
Mark an X on each closed curve.



Review



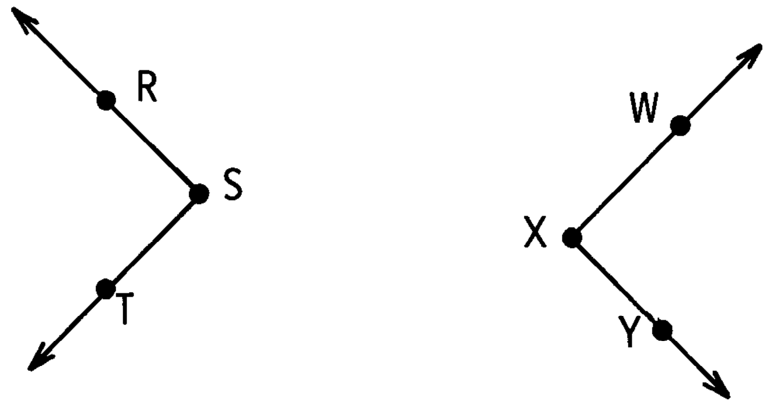
7. Test these angles to find the right angles.



________ and ________ are right angles.

________ is congruent to ________.

8. Use your angle to test if ∠RST and ∠WXY are right angles.



Is ∠RST congruent to ∠WXY? Yes No

Do you think a right angle is always congruent to another right angle? Yes No

6. We can use our right angle to draw other right angles.

   Below is ray $\overrightarrow{AB}$ with endpoint A.

   Place the vertex of your right angle on point A.

   Place one edge of your right angle along $\overrightarrow{AB}$.

   Draw along the other edge.

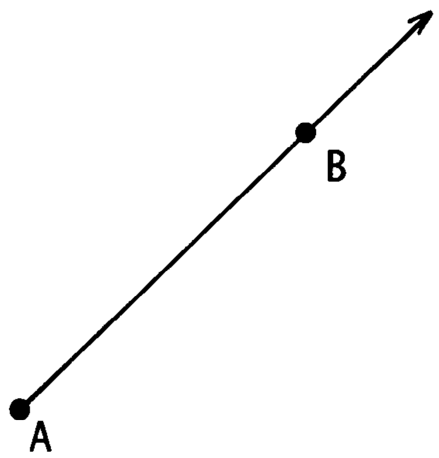
   Name this ray. ______________

   Name this right angle. ____________

   Draw another right angle using $\overrightarrow{AB}$ and its endpoint A.

   Name this angle. ____________

   What kind of curve did you form with the two rays you drew? _______



Forming a Right Angle

5. Here is one way to form a right angle.

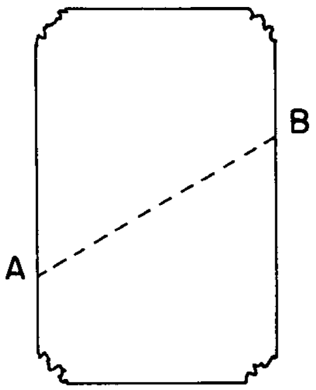
Step 1--Think about folding the sheet along $\overline{AB}$.

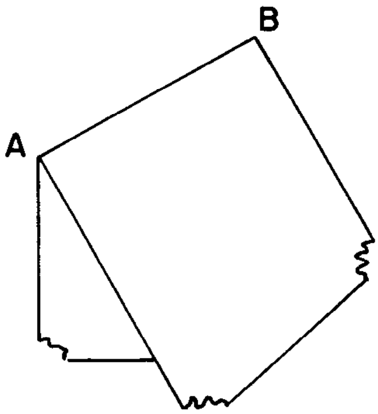
Step 2--Crease $\overline{AB}$ to show the line segment $\overline{AB}$.

Step 3--Think about folding the paper along $\overline{CD}$ so that endpoint B fits exactly on A.

Step 4--Crease $\overline{CD}$ to show the line segment $\overline{CD}$.

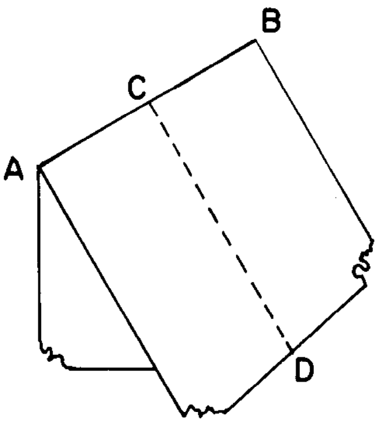
Step 1

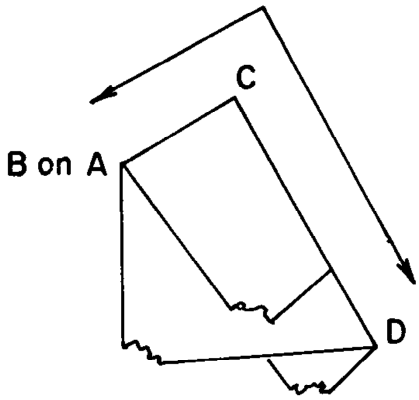




Step 2

Step 3





Step 4

Look at some of the curves and points we now have.

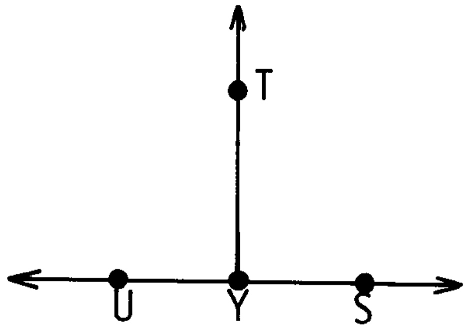
Segment $\overline{CA}$ is part of the ray ______ with endpoint C.

Ray $\overrightarrow{CA}$ and ray $\overrightarrow{CD}$ form a right angle.

The vertex of the right angle is ________.

Name the right angle. ______________.

3. Test $\angle TYS$ and $\angle TYU$ to see if they are congruent.



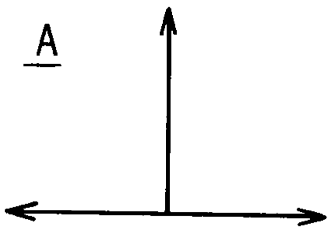
Are $\angle TYS$ and $\angle TYU$ congruent angles? Yes No

Do the points S, Y, and U lie on a line? Yes No

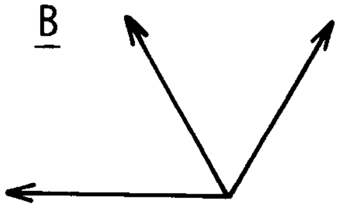
Are $\angle TYS$ and $\angle TYU$ right angles? Yes No

4. Here are three pairs of angles; the pairs are called A, B, and C.

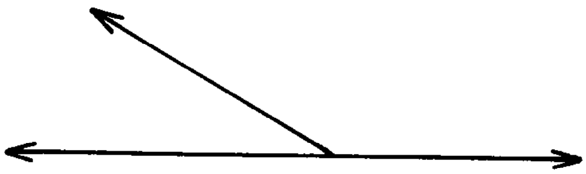
A



B



C



Set B is one set of congruent angles.

Which other set looks like a pair of congruent angles? ________

Tell by looking which pair of angles could be right angles. ________

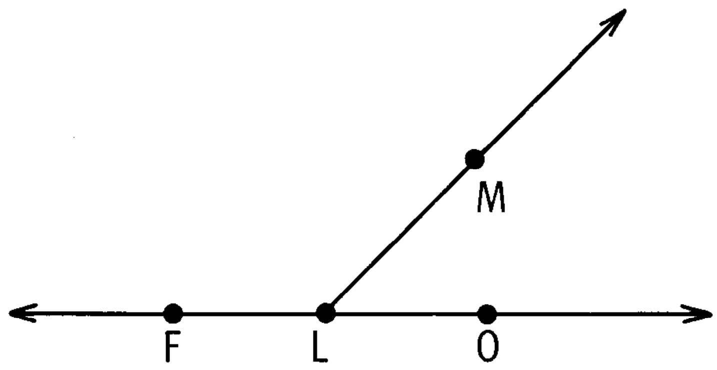
Tell by testing which other pair of angles are congruent. ________

Tell by testing which pair of angles are right angles. ________

1. The points F, L, and O lie on a line.

   Make a tracing of one angle.

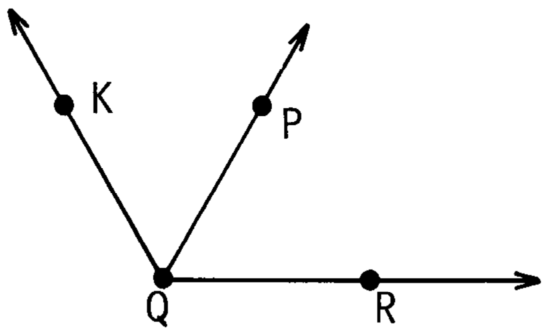
   Test to see if the angles are congruent.



Are ∠MLO and ∠MLF congruent angles? Yes No

Are ∠MLO and ∠MLF right angles? Yes No

2. Test ∠PQR and ∠PQK to see if they are congruent.

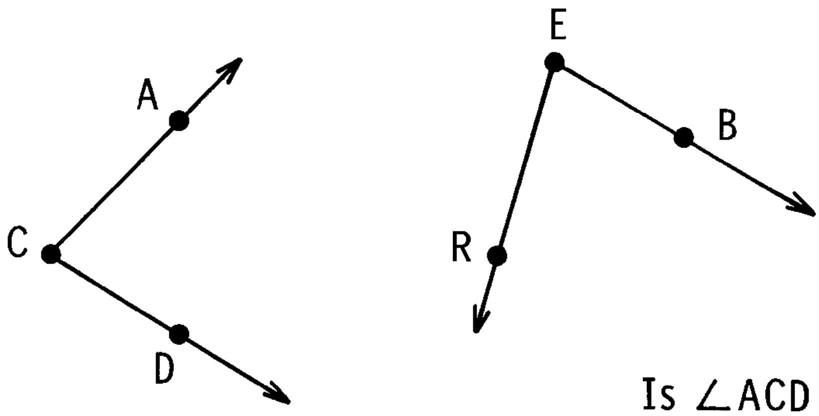


Are ∠PQR and ∠PQK congruent angles? Yes No

Do the points K, Q, and R lie on a line? Yes No

Are ∠PQR and ∠PQK right angles? Yes No

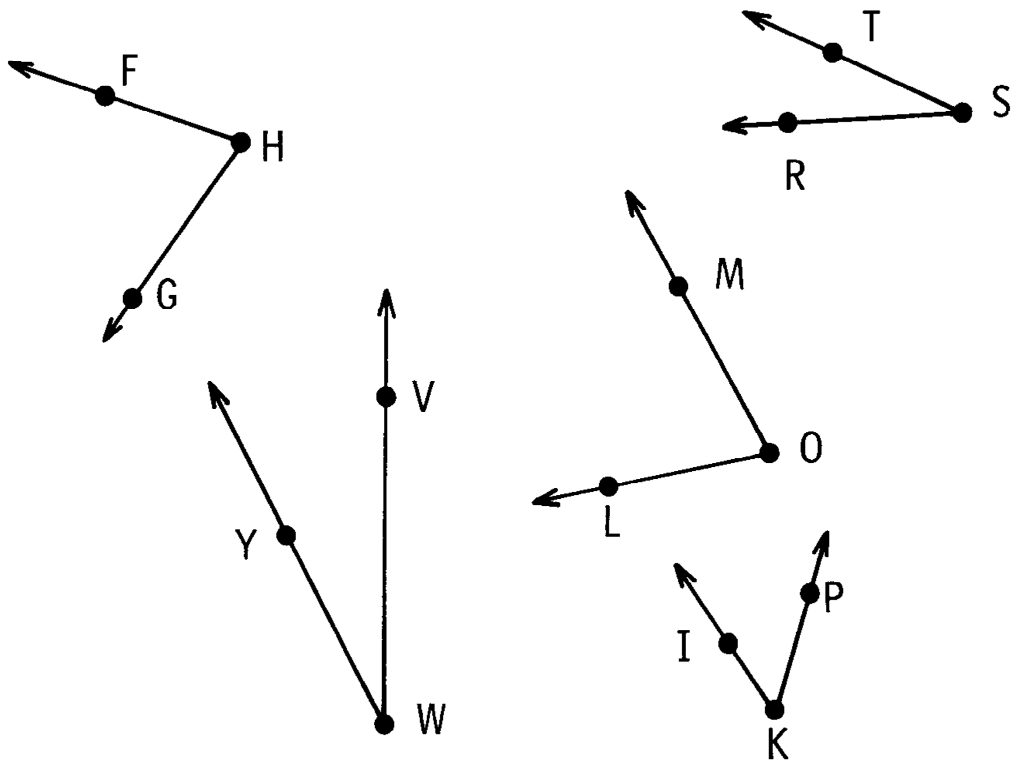
4.



Is ∠ACD congruent to ∠BER?

Yes No

5.

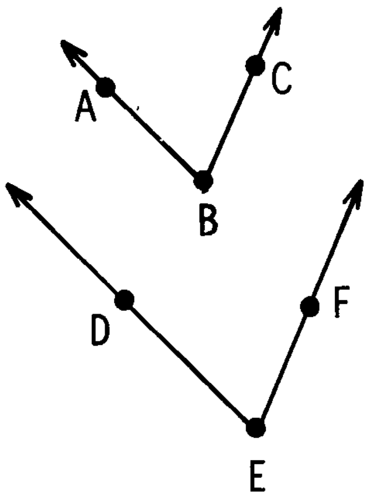


∠________ is congruent to ∠________.

∠________ is congruent to ∠________.

Congruence of Angles

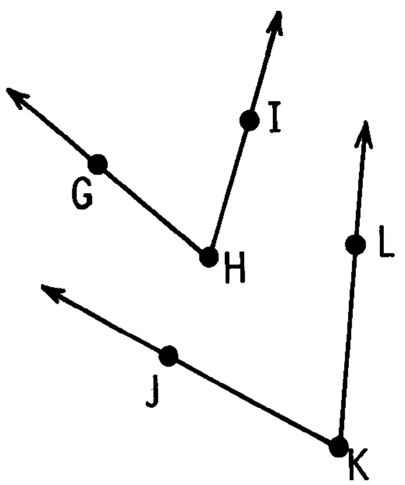
1.



Is $\angle ABC$ congruent to $\angle DEF$?

Yes No

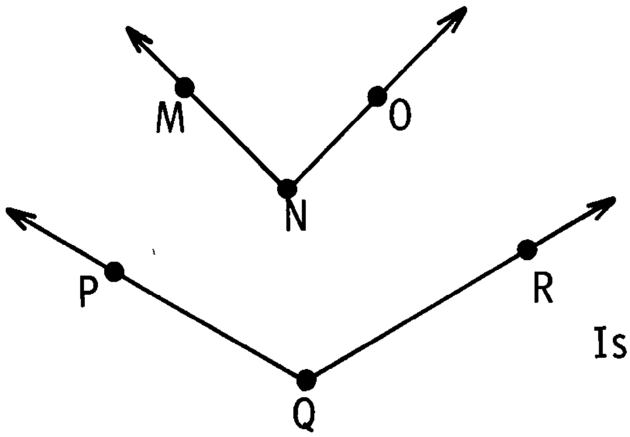
2.



Is $\angle GHI$ congruent to $\angle JKL$?

Yes No

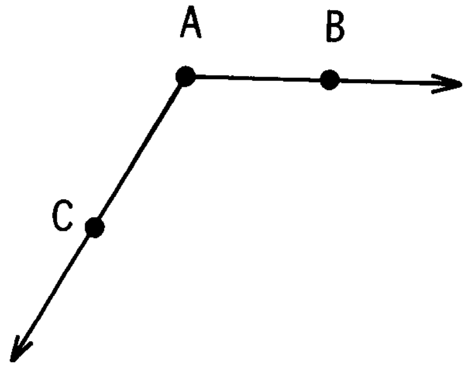
3.

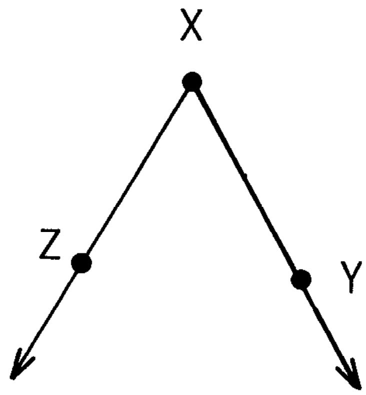


Is $\angle PQR$ congruent to $\angle MNO$?

Yes No

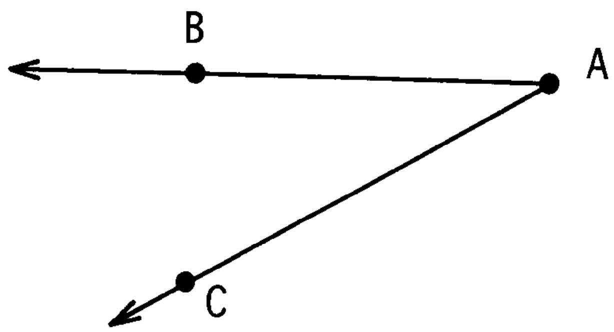
4. Write two names for each angle.





________ ________ ________ ________

5. Below is a picture of $\angle BAC$.



Mark another point on $\overrightarrow{AB}$. Name it D.

Mark another point on $\overrightarrow{AC}$ and name it E.

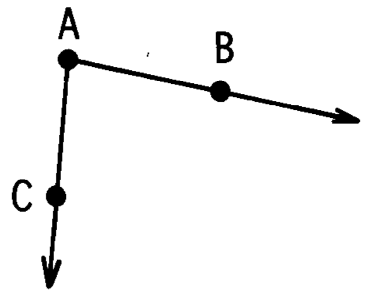
Is $\overrightarrow{AB}$ the same ray as $\overrightarrow{AD}$? Yes No

Is $\overrightarrow{AC}$ the same ray as $\overrightarrow{AE}$? Yes No

Is $\angle BAC$ the same angle as $\angle EAD$? Yes No

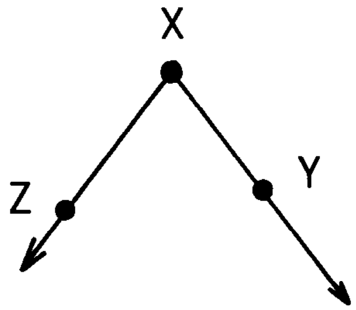
Is $\overline{BD}$ a subset of $\overrightarrow{AB}$? Yes No

3. Name the vertex and the rays.



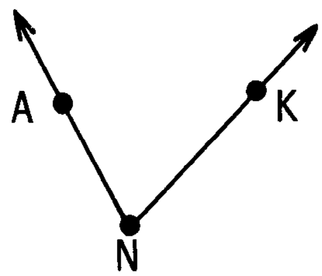
vertex _____

rays ________ ________



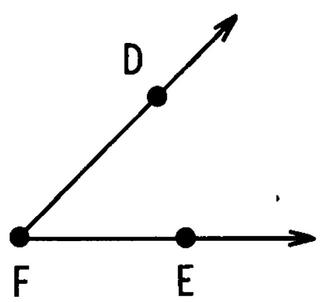
vertex _____

rays ________ ________



vertex _____

rays ________ ________



vertex _____

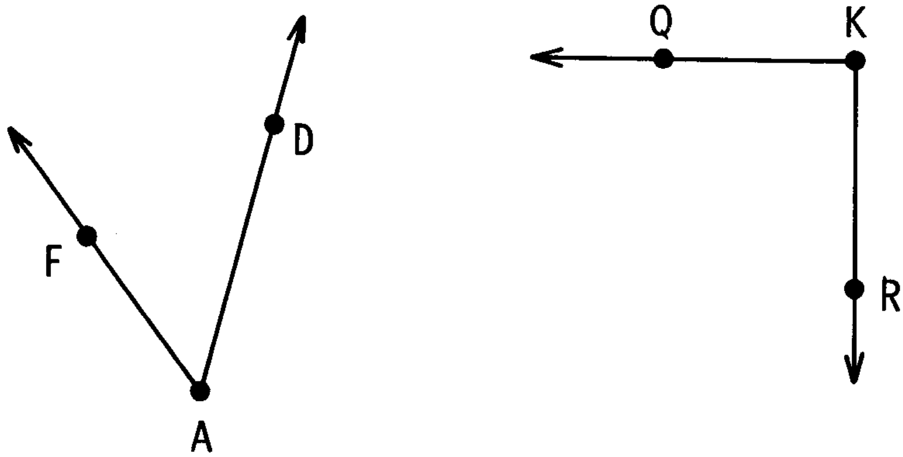
rays ________ ________

Angles

1. Here are four rays.

   The rays are named $\overrightarrow{AF}$, $\overrightarrow{AD}$, $\overrightarrow{KQ}$, and $\overrightarrow{KR}$.

   These rays form two angles.



   Name the two angles. ________ ________

   Give two other names for $\angle FAD$ and $\angle QKR$. ______ ______

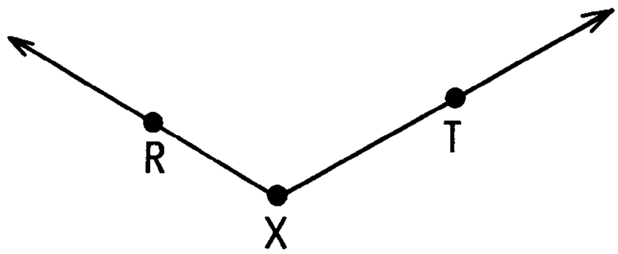
   The vertex of $\angle FAD$ is point A.

   Name the vertex of the other angle. ________

   Mark a point C between K and R on ray $\overrightarrow{KR}$.

   Now write two new names for $\angle QKR$. _____ _____

2. Here is another angle.



   Name this angle. ____________

   Name its vertex. ____________

5. Mark the letter T as shown to complete each sentence correctly.

A line segment has
one endpoint ____
two endpoints _T_
no endpoints ____

A ray has	A line has
one endpoint ____	one endpoint ____
two endpoints ____	two endpoints ____
no endpoints ____	no endpoints ____

6. The point Q is marked below.

Draw five different rays above, each with endpoint Q.

3. Here is another line.

How many rays on the line can have A as an endpoint? ________

Name three line segments on the line that have A as an endpoint. ______ ______ ______

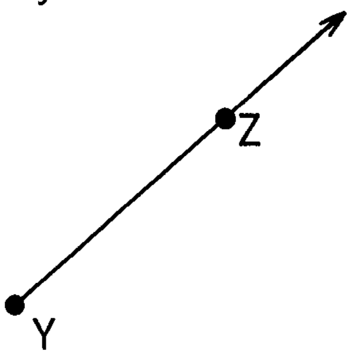
4. Draw a ray. Name it $\overrightarrow{AB}$.

Is $\overline{AB}$ a subset of $\overrightarrow{AB}$? Yes No

Is $\overrightarrow{BA}$ another name for $\overrightarrow{AB}$? Yes No

Rays

1. Here is a picture of ray $\overrightarrow{YZ}$.



Name two points on $\overrightarrow{YZ}$. ______ ______

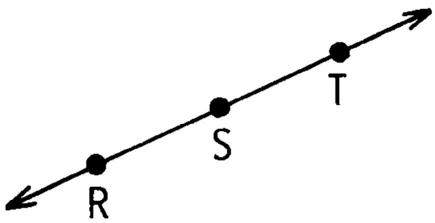
Name the endpoint of ray $\overrightarrow{YZ}$. ______

Is the endpoint named first? Yes No

Name a line segment in the picture. ______

Does $\overrightarrow{YZ}$ go on from $\overline{YZ}$ in one direction only? Yes No

2. Here is a picture of a line.



Name four rays on this line. ____ ____ ____ ____

Are the endpoints named first? Yes No

Is $\overrightarrow{RT}$ another name for $\overrightarrow{TR}$? Yes No

2. The point R is named below.

   Draw five different lines through point R.

   Mark and name another point on each line.

   • R

   Name the lines you have drawn.

   ________ ________ ________ ________ ________

   Can many more lines be drawn through R? Yes No

3. Mark two points below. Name them Q and Z.

   Draw $\overleftrightarrow{QZ}$.

   Can you draw a different line through Q and Z? Yes No

Lines

1. Find the points E, C, A, B, D, and F named on the page.

   Draw $\overline{AB}$.

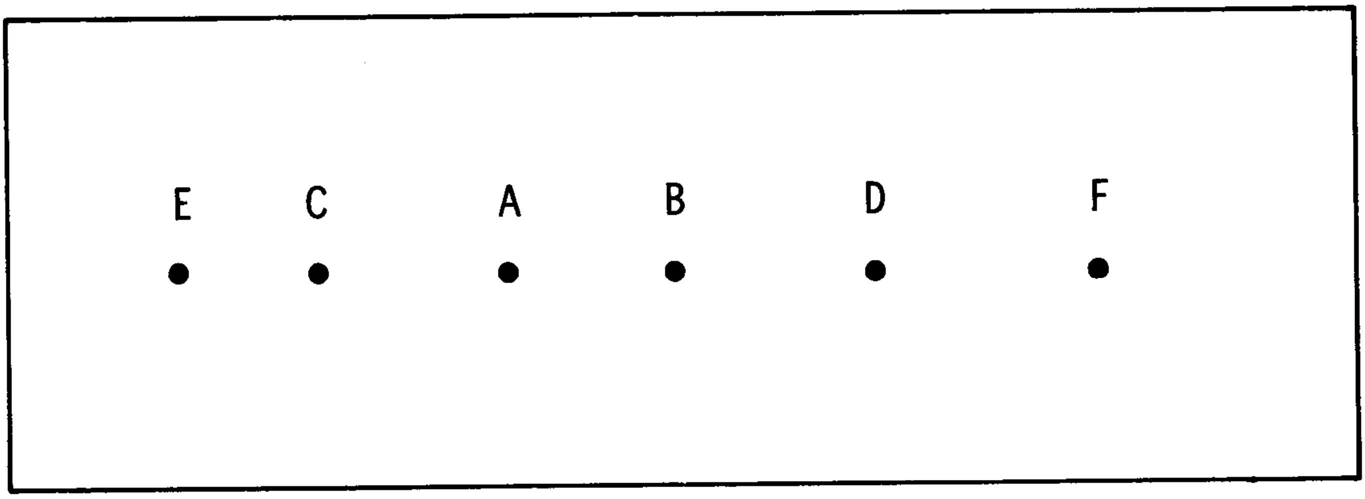
   Draw $\overline{CD}$. Is $\overline{AB}$ a subset of $\overline{CD}$? Yes No

   Draw $\overline{EF}$. The line segment $\overline{CD}$ is a subset of ________________.

   Draw $\overleftrightarrow{EF}$. Is $\overline{EF}$ a subset of $\overleftrightarrow{EF}$? Yes No

   Is $\overline{EF}$ a subset of $\overline{EF}$? Yes No

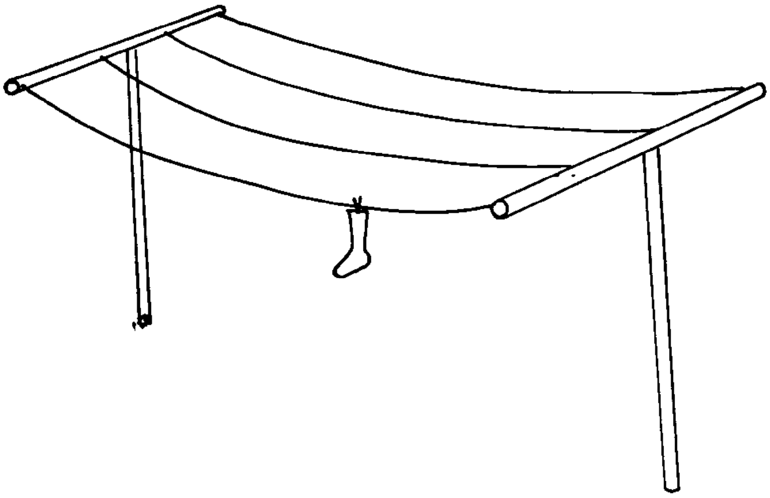
   Can you show all of $\overleftrightarrow{EF}$? Yes No

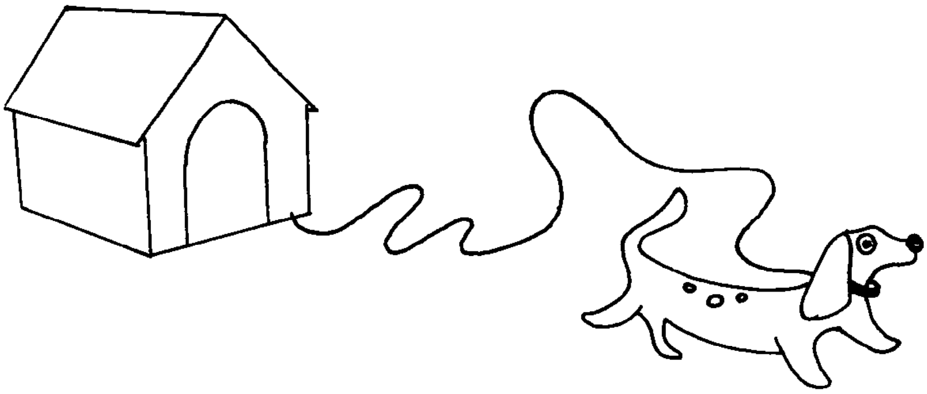


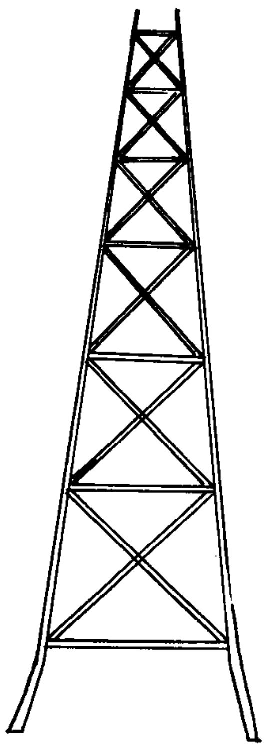
Some other names for $\overleftrightarrow{EF}$ are $\overleftrightarrow{CA}$, $\overleftrightarrow{AE}$, and $\overleftrightarrow{DF}$.

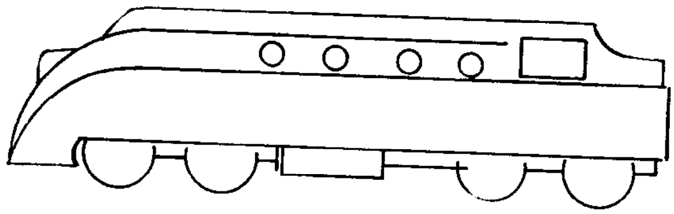
Write at least six other names below.

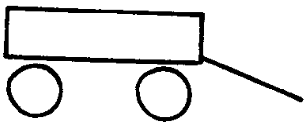
______ ______ ______ ______ ______ ______



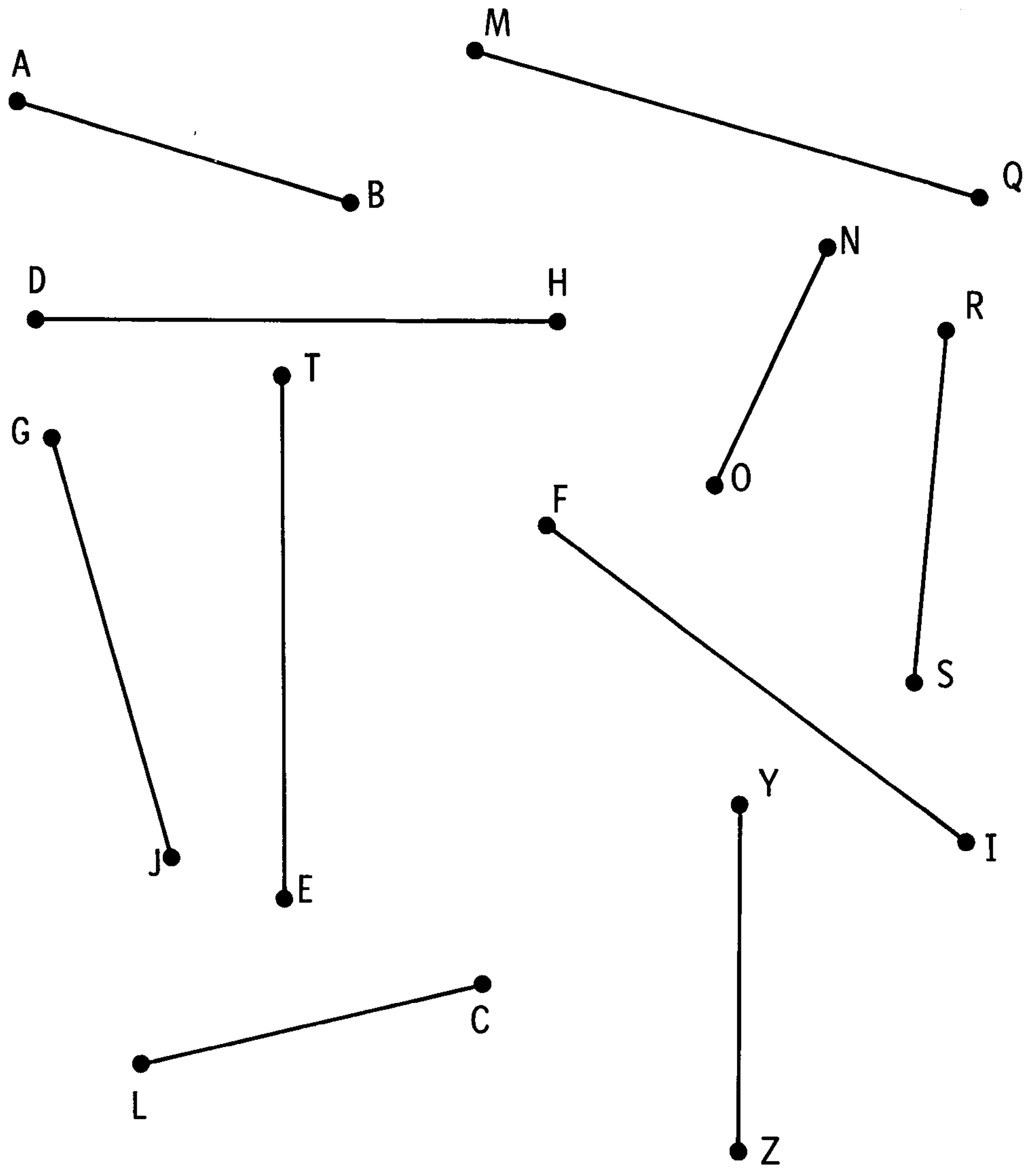








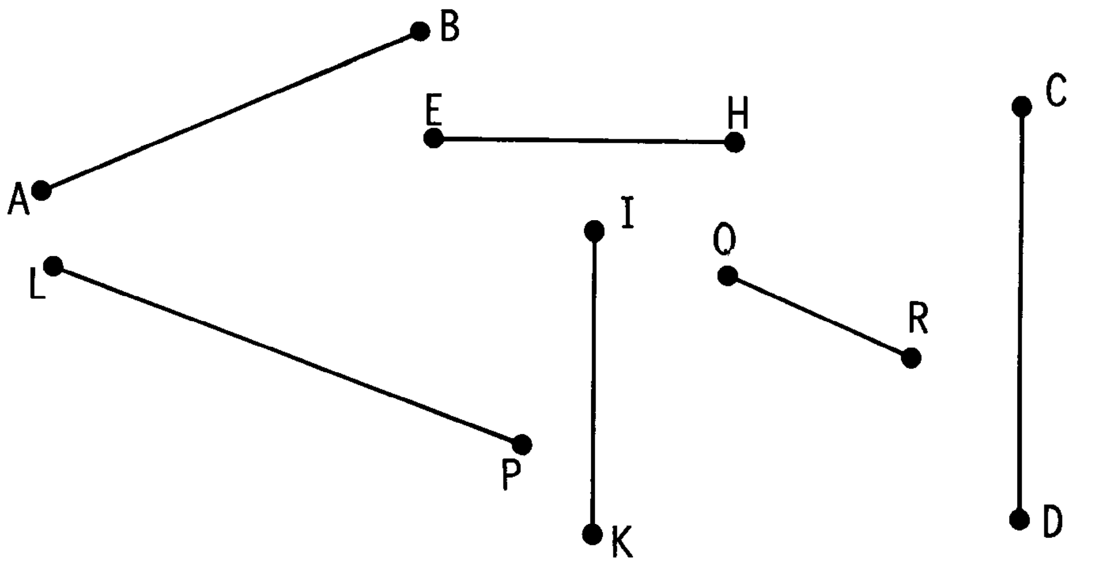
4.



$\overline{AB}$ is congruent to _______, _______, and _______.

$\overline{MQ}$ is congruent to _______, _______, and _______.

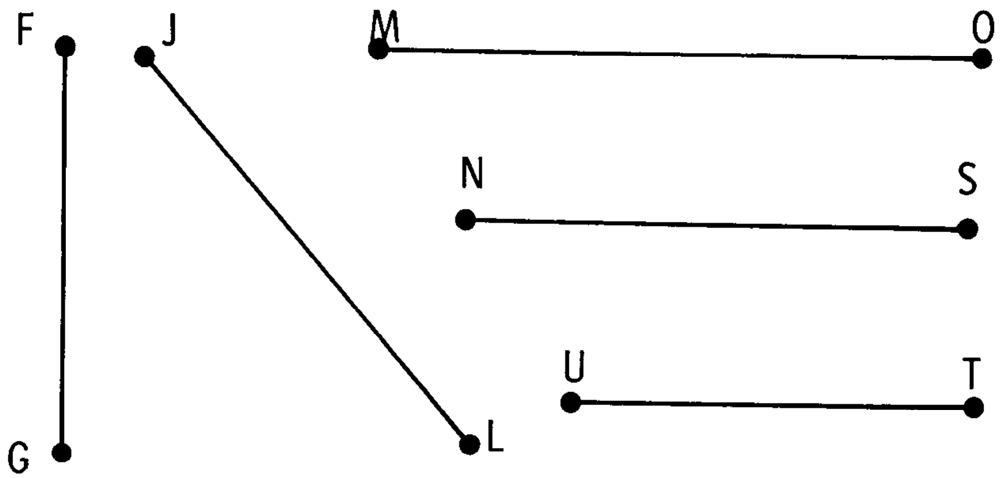
2.



$\overline{AB}$ is congruent to ________

$\overline{IK}$ is congruent to ________

3.

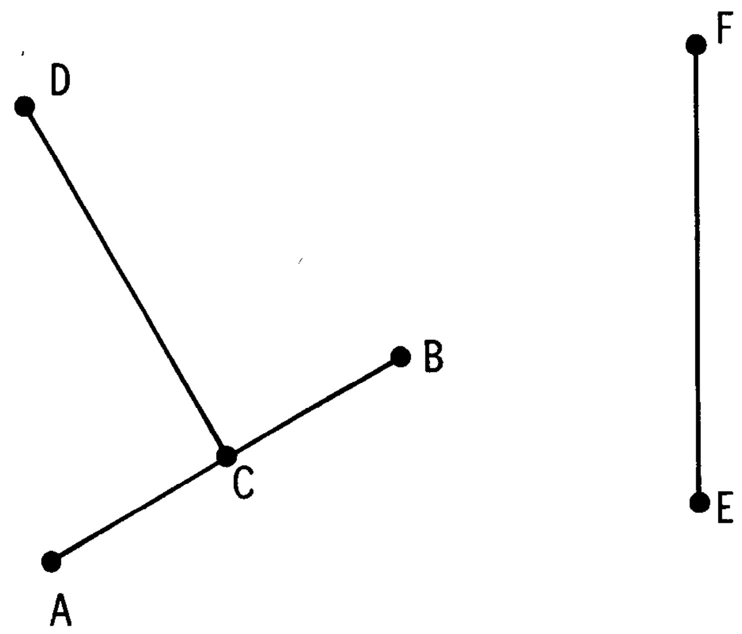


________ is congruent to ________.

________ is congruent to ________.

Congruence of Line Segments

1. Look at the segments below.



Do you think $\overline{AB}$ is congruent to $\overline{CD}$? Yes No

Compare $\overline{AB}$, $\overline{CD}$, $\overline{EF}$ and show below what you find.

Make a ring around the right answer.

$\overline{AB}$ is congruent to $\overline{CD}$.	Yes	No
$\overline{AB}$ is congruent to $\overline{EF}$.	Yes	No
$\overline{CD}$ is congruent to $\overline{EF}$.	Yes	No

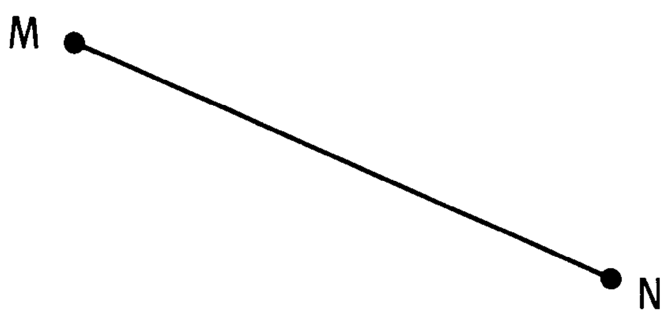
6. Below are two points, A and B.

Draw line segment $\overline{AB}$.

How many line segments can you draw that have the two endpoints A and B? ______________

7. Here is line segment $\overline{MN}$.

Mark two points on $\overline{MN}$. Name them O and T.

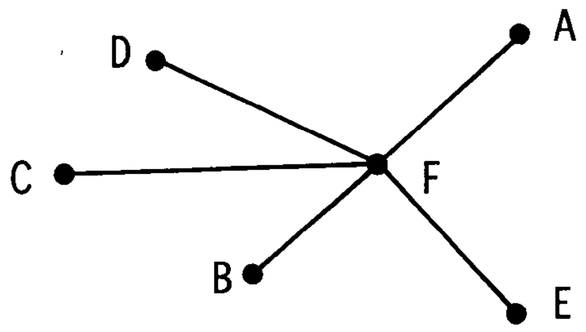


$\overline{MO}$ is one subset of $\overline{MN}$.

Name five other line segments that are subsets of line segment $\overline{MN}$.

$\overline{MO}$ ______ ______ ______ ______ ______ ______

4. Here are some line segments that have point F as an endpoint.



One line segment is named below.

Name four other line segments.

$\overline{AF}$ __________ __________ __________ __________

5. Draw two line segments that have point W as an endpoint.

Name these line segments $\overline{WX}$ and $\overline{WY}$.

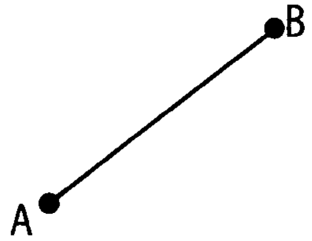
Draw two more line segments that have W as an endpoint.

Name these line segments $\overline{WO}$ and $\overline{WP}$.

Can you draw more line segments with W as an endpoint? Yes No

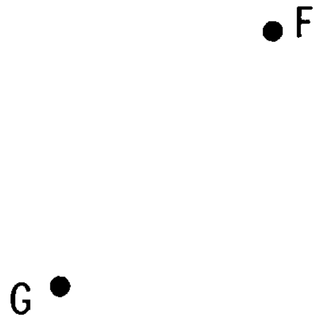
Line Segments

1. Here is a picture of a line segment.



Write a name for this line segment. ______________________

2. Draw a line segment with F and G as endpoints.



3. Write two names for the line segment above.

________ ________

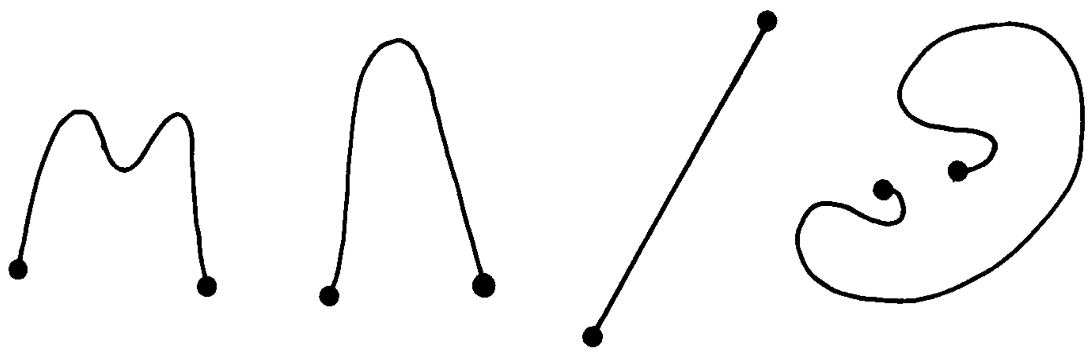
Points and Curves

1. Mark five points below.

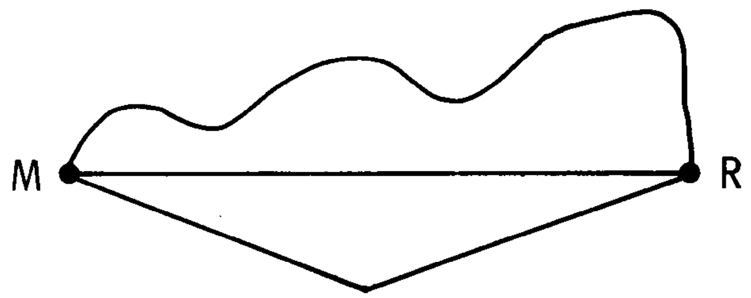
   Name them with the first five letters of the alphabet.

2. Mark a point on each curve.

   Name each point with a different letter of the alphabet.



3. Put the letter P on the picture of the straight curve from M to R.



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Book 3

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Unit 56

STUDENT'S TEXT

UNIT NO. 56

MATHEMATICS FOR THE ELEMENTARY SCHOOL

BOOK 3

PART I

SCHOOL MATHEMATICS STUDY GROUP