MATHEMATICS
FOR THE
ELEMENTARY SCHOOL
BOOK 3
PART I
School Mathematics Study Group

Mathematics for the Elementary School

Book 3

Unit 56
Mathematics for the Elementary School
Book 3

Student's Text, Part I

REVISED EDITION

Prepared under the supervision of the Panel on Elementary School Mathematics of the School Mathematics Study Group:

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Chapter I. Sets of Points
   I - 1. Points, curves, line segments .............. 1 - 8
   I - 2. Lines, rays, and angles ................. 9 - 24
   I - 3. Simple closed curves, polygons ........... 25 - 29
   I - 4. Regions .................................. 30 - 37
   I - 5. Some special triangles .................. 38 - 43

Chapter II. Addition and Subtraction: Review and Extensions
   II - 1. Sets: joining and removing ............. 44 - 54
   II - 2. Comparisons of sets; order among numbers .. 55 - 58
   II - 3. Addition and subtraction facts ........... 59 - 75
   II - 4. Place value .............................. 76 - 93
   II - 5. Techniques for finding sums .............. 94 - 116
   II - 6. Techniques for finding differences .......... 117 - 136
   II - 7. Problem solving .......................... 137 - 146
           Supplementary problem sets ........ 147 - 154
   II - 8. Extensions ................................ 155 - 174
Chapter III. Describing Points and Numbers

III - 1. Coordinates of a point on a line .............. 175 - 176
III - 2. Motions on the number line ............... 177 - 180
III - 3. Coordinates in a plane ..................... 181 - 189
III - 4. Plane figures .................................. 190 - 196
III - 5. Stretching pictures of segments on a line .. 197 - 199
III - 6. Enlarging pictures ............................ 200 - 207
III - 7. Scale drawing .................................. 208 - 211

Chapter IV. Arrays and Multiplication

IV - 1. Arrays ............................................. 213 - 215
IV - 2. Multiplication ................................. 216 - 217
IV - 3. The Basic Multiplication Facts .......... 218 - 220
IV - 4. Prime Numbers .................................. 221 - 234
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.
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.

   • F
   
   G •

3. Write two names for the line segment above.

   _______ _______
Line Segments

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
6. Below are two points, A and B.
Draw line segment AB.

A ●

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

7. Here is line segment MN.
Mark two points on MN. Name them O and T.

MO is one subset of MN.
Name five other line segments that are subsets of line segment MN.
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. \( AB \) is congruent to __________

\( IK \) is congruent to __________

3. __________ is congruent to __________.

_________ is congruent to __________.
Congruence of Line Segments

4. 

\[ \overline{AB} \] is congruent to _____, _____, and _____.

\[ \overline{MQ} \] is congruent to _____, _____, and _____.

7
Review
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 \(\overrightarrow{EF}\).

Draw \(\overrightarrow{EF}\). Is \(\overrightarrow{EF}\) a subset of \(\overrightarrow{EF}\)? Yes No

Is \(\overrightarrow{EF}\) a subset of \(\overrightarrow{EF}\)? Yes No

Can you show all of \(\overrightarrow{EF}\)? Yes No

Some other names for \(\overrightarrow{EF}\) are \(\overrightarrow{CA}\), \(\overrightarrow{AE}\), and \(\overrightarrow{DF}\).

Write at least six other names below.

---

9
2. The point $R$ is named below.
   Draw five different lines through point $R$.
   Mark and name another point on each line.

   ![Diagram of point R with lines drawn through it]

   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 $QZ$.

   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 $\overrightarrow{YZ}$ 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
Rays

3. Here is another line.

Y L A X

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

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

<table>
<thead>
<tr>
<th>A line segment has</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>one endpoint</td>
<td>_____</td>
</tr>
<tr>
<td>two endpoints</td>
<td>T</td>
</tr>
<tr>
<td>no endpoints</td>
<td>_____</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>A ray has</th>
<th>A line has</th>
</tr>
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<tbody>
<tr>
<td>one endpoint</td>
<td>one endpoint</td>
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<tr>
<td>two endpoints</td>
<td>two endpoints</td>
</tr>
<tr>
<td>no endpoints</td>
<td>no endpoints</td>
</tr>
</tbody>
</table>

6. The point $Q$ is marked below.

\[ \bullet \]

\[ Q \]

Draw five different rays above, each with endpoint $Q$. 

13
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. _______
Angles

3. Name the vertex and the rays.

- For the triangle with vertices A, B, and C:
  - Vertex: ______
  - Rays: ______  ______

- For the triangle with vertices X, Y, and Z:
  - Vertex: ______
  - Rays: ______  ______

- For the triangle with vertices A, K, and N:
  - Vertex: ______
  - Rays: ______  ______

- For the line segment with endpoints D and E:
  - 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 $\overrightarrow{BD}$ 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 \( \angle _______ \).
Right Angles and Congruence

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 $\angle$ MLO and $\angle$ MLF congruent angles?  Yes  No
   Are $\angle$ MLO and $\angle$ MLF right angles?  Yes  No

2. Test $\angle$ PQR and $\angle$ PKQ to see if they are congruent.

   Are $\angle$ PQR and $\angle$ PKQ congruent angles?  Yes  No
   Do the points K, Q, and R lie on a line?  Yes  No
   Are $\angle$ PQR and $\angle$ PKQ right angles?  Yes  No
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 $C$.

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 \( \overline{CD} \).

Look at some of the curves and points we now have.
Segment \( \overline{CA} \) is part of the ray \( \overrightarrow{CA} \) with endpoint \( C \).

Ray \( \overrightarrow{CA} \) and ray \( \overrightarrow{CD} \) form a right angle.
The vertex of the right angle is \( \ldots \).
Name the right angle. \( \ldots \).
Right Angles

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.

\[ \angle ABC \text{ and } \angle DEF \text{ are right angles.} \]
\[ \angle GHI \text{ is congruent to } \angle JKL. \]

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
Closed Curves

Mark an $\times$ on each closed curve.
Simple Closed Curves

1. Mark an $\times$ 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
Congruence of Polygons

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 \( \triangle ABC \).

![Diagram of two triangles with labeled vertices X, Y, Z, C, A, B.]

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 \( \underline{_____} \).

Line segment \( \overline{YZ} \) is congruent to \( \underline{_____} \).

Line segment \( \overline{XZ} \) is congruent to \( \underline{_____} \).

Is \( \triangle XYZ \) congruent to \( \triangle ABC \)?  
Yes  No
Congruence of Polygons

4. Here are two rectangles.
   We will call one rectangle $ABCD$.

   \[ \begin{array}{c}
   A \\
   B \\
   C \\
   D
   \end{array} \]

   \[ \begin{array}{c}
   E \\
   F \\
   G \\
   H
   \end{array} \]

   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.
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

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
<th>Can Draw?</th>
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</thead>
<tbody>
<tr>
<td>A</td>
<td>B</td>
<td>Yes</td>
</tr>
<tr>
<td>A</td>
<td>C</td>
<td>Yes</td>
</tr>
<tr>
<td>A</td>
<td>D</td>
<td>Yes</td>
</tr>
<tr>
<td>B</td>
<td>C</td>
<td>Yes</td>
</tr>
<tr>
<td>B</td>
<td>D</td>
<td>Yes</td>
</tr>
<tr>
<td>C</td>
<td>D</td>
<td>Yes</td>
</tr>
</tbody>
</table>

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 region.

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 $\overline{AC}$.

D •

B •

A •

C •

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 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 \( \overline{RT} \)?

Is \( \triangle RST \) an isosceles triangle?

Is your copy of \( \overline{RS} \) also congruent to \( \overline{ST} \)?

Are the three sides of this triangle congruent?

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

Is an equilateral triangle always an isosceles triangle?  Yes  No
1. Figure ABCD is a square.

Draw AC.

Name the two triangles you see. _________ _________

Is ΔACD an isosceles triangle?

Yes  No

Name its congruent sides. _________ and _________

Is ΔACD a right triangle?

Yes  No

Is ΔACD an isosceles right triangle?

Yes  No

Is ΔACD an equilateral triangle?

Yes  No

Do you think ΔACD and ΔACB are congruent?

Yes  No
2. Look at quadrilateral $ABCD$.

Draw $\overline{AC}$.

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

<table>
<thead>
<tr>
<th>GIRL</th>
<th>APPLE</th>
<th>GREEN</th>
<th>BANANA</th>
</tr>
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<tbody>
<tr>
<td>BLUE</td>
<td>GRAPE</td>
<td>BABY</td>
<td>PURPLE</td>
</tr>
<tr>
<td>GRASS</td>
<td>BOOK</td>
<td>PLATE</td>
<td>BLACK</td>
</tr>
</tbody>
</table>

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. ________________________________
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](image1)

   ![Subset B](image2)

   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.

   ![Blank space for drawing](image3)

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.

   ![Picture 1](image4)

   A B C
   D E F
   G H I

   Jane Bob
   Sally Mary
   Joe Ann
   Bill Charles

48
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 \( R = \{\text{dress, hat, sock, shoe, coat}\} \)
   
   Set \( T \) is a subset of Set \( R \).
   
   Set \( T = \{\text{shoe, sock}\} \)
   
   Ring the set remaining when Set \( T \) is removed from Set \( R \).
   
   \( \{\text{sock, shoe}\} \) \hspace{1cm} \{\text{coat, hat, dress}\} \hspace{1cm} \{\text{hat, shoe, coat}\} \)

2. Set \( V = \{\text{doll, wagon, ball, house, crayon}\} \)
   
   Set \( W = \{\text{ball, crayon}\} \)
   
   Ring the set remaining when Set \( W \) is removed from Set \( V \).
   
   \( \{\text{house, dog, cat, ball}\} \) \hspace{1cm} \{\text{crayon, ball}\} \hspace{1cm} \{\text{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 \( F \).
   
   \( \{3\} \) \hspace{1cm} \{2, 3, 4, 7\} \hspace{1cm} \{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 \( H \).
   
   \( \{5, 6, 7, 8\} \) \hspace{1cm} \{6, 7, 8\} \hspace{1cm} \{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 $M$.
   
   $\{20, 21, 22, 23\}$  $\{24, 25\}$  $\{20, 21, 22\}$
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:
    \[4 + 3 + 2 = 9\]
    \[6 + 5 = 11, \text{ and } 11 - 2 = 9.\]
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"

<p>| | | | | | | | |</p>
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<thead>
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<td>62</td>
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<td>43</td>
<td>53</td>
<td>55</td>
<td>29</td>
<td>43</td>
</tr>
</tbody>
</table>

56
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.  
   \[ \text{Set } A = \{13, 14, 15, 16, 17\} \]
   Set $B$ is the set of whole numbers greater than 9 but less than 16.  
   \[ \text{Set } B = \{10, 11, 12, 13, 14, 15\} \]
   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.  
   \[ \text{Set } R = \{ \} \]
   Set $T$ is the set of whole numbers greater than 48 but less than 53.  
   \[ \text{Set } T = \{ \} \]
   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.  
   \[ \text{Set } F = \{ \} \]
   Set $G$ is the set of whole numbers greater than 50 but less than 57.  
   \[ \text{Set } G = \{ \} \]
   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.  
   \[ \text{Set } X = \{ \} \]
   Set $Y$ is the set of whole numbers greater than 82 but less than 90.  
   \[ \text{Set } Y = \{ \} \]
   The members in the intersection of sets $X$ and $Y$ are:  
   \[
   \{
   \}
   \]
Addition Chart

<table>
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<th>+</th>
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<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
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</tr>
</tbody>
</table>
Relating Subtraction to Addition

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

Example: 10 - 4 = _____
        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 = _____

60
Relating Addition to Subtraction

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

\[ 9 + \underline{\hspace{1cm}} = 17 \]
\[ 17 - 8 = 9 \]

1. \[ 4 + \underline{\hspace{1cm}} = 12 \]
2. \[ 7 + \underline{\hspace{1cm}} = 13 \]
3. \[ 7 + \underline{\hspace{1cm}} = 11 \]
4. \[ 8 + \underline{\hspace{1cm}} = 15 \]
5. \[ 5 + \underline{\hspace{1cm}} = 12 \]
6. \[ 3 + \underline{\hspace{1cm}} = 12 \]
7. \[ 6 + \underline{\hspace{1cm}} = 14 \]
8. \[ 9 + \underline{\hspace{1cm}} = 15 \]
9. \[ 6 + \underline{\hspace{1cm}} = 11 \]
10. \[ 5 + \underline{\hspace{1cm}} = 14 \]
11. \[ 4 + \underline{\hspace{1cm}} = 13 \]
12. \[ 9 + \underline{\hspace{1cm}} = 18 \]
Miscellaneous Exercises
Addition and Related Subtraction

<table>
<thead>
<tr>
<th>10</th>
<th>10</th>
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</thead>
<tbody>
<tr>
<td>4 + 6 = _____</td>
<td>2 + 8 = _____</td>
</tr>
<tr>
<td>6 + 4 = _____</td>
<td>8 + _____ = _____</td>
</tr>
<tr>
<td>10 - 6 = _____</td>
<td>10 - _____ = _____</td>
</tr>
<tr>
<td>10 - 4 = _____</td>
<td>10 - _____ = _____</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>10</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 + 7 = _____</td>
<td>9 + 1 = _____</td>
</tr>
<tr>
<td>7 + _____ = _____</td>
<td>1 + _____ = _____</td>
</tr>
<tr>
<td>10 - 3 = _____</td>
<td>10 - 1 = _____</td>
</tr>
<tr>
<td>10 - _____ = _____</td>
<td>10 - _____ = _____</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>9</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>7 + 2 = _____</td>
<td>5 + _____ = _____</td>
</tr>
<tr>
<td>2 + _____ = _____</td>
<td>4 + _____ = _____</td>
</tr>
<tr>
<td>9 - 2 = _____</td>
<td>9 - _____ = _____</td>
</tr>
<tr>
<td>9 - _____ = _____</td>
<td>9 - _____ = _____</td>
</tr>
</tbody>
</table>
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 |
|   |
|   |
|   |
|   |
|   |
|   |
|   |
|   |

63
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.

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Image" /></td>
<td><img src="image2.png" alt="Image" /></td>
<td><img src="image3.png" alt="Image" /></td>
</tr>
<tr>
<td><img src="image4.png" alt="Image" /></td>
<td><img src="image5.png" alt="Image" /></td>
<td><img src="image6.png" alt="Image" /></td>
</tr>
</tbody>
</table>

\[ 6 + 8 = 10 + 4 \]
\[ 6 + 8 = \]

\[ 5 + 9 = \]
\[ 5 + 9 = \]

FINISH:

- \[ 9 + 1 + 4 = 14 \]
- \[ 8 + 2 + 4 = 14 \]
- \[ 7 + 3 + 4 = 14 \]
- \[ 6 + \_ + \_ = 14 \]
- \[ \_ + 5 + \_ = 14 \]
- \[ 4 + \_ + 4 = 14 \]
- \[ 3 + \_ + \_ = 14 \]
- \[ 2 + \_ + \_ = 14 \]
- \[ 1 + \_ + \_ = 14 \]

\[ 7 + 7 = \]

\[ 7 + 7 = \]

64
Using a Ten in Addition and Subtraction

Think of the sum of the two numbers as 10 and some ones.

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>6 + 7 = 10 + 3</td>
<td>9 + 5 =</td>
<td></td>
</tr>
<tr>
<td>7 + 4 = 10 + 1</td>
<td>8 + 6 =</td>
<td></td>
</tr>
<tr>
<td>9 + 6 = 10 +</td>
<td>5 + 6 =</td>
<td></td>
</tr>
<tr>
<td>8 + 5 = 10 +</td>
<td>4 + 8 =</td>
<td></td>
</tr>
<tr>
<td>9 + 2 =</td>
<td>8 + 8 =</td>
<td></td>
</tr>
<tr>
<td>8 + 4 =</td>
<td>7 + 5 =</td>
<td></td>
</tr>
<tr>
<td>5 + 9 =</td>
<td>8 + 3 =</td>
<td></td>
</tr>
<tr>
<td>6 + 8 =</td>
<td>7 + 6 =</td>
<td></td>
</tr>
<tr>
<td>9 + 4 =</td>
<td>9 + 3 =</td>
<td></td>
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<tr>
<td>5 + 8 =</td>
<td>4 + 7 =</td>
<td></td>
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<tr>
<td>6 + 5 =</td>
<td>9 + 9 =</td>
<td></td>
</tr>
<tr>
<td>8 + 9 =</td>
<td>7 + 7 =</td>
<td></td>
</tr>
</tbody>
</table>

65
Pairs of Numbers

Complete this chart.

<table>
<thead>
<tr>
<th>Number First number</th>
<th>Number Second number</th>
<th>Operation</th>
<th>Whole number sum or difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>4</td>
<td>+</td>
<td>11</td>
</tr>
<tr>
<td>12</td>
<td>3</td>
<td>-</td>
<td>9</td>
</tr>
<tr>
<td>6</td>
<td>10</td>
<td>-</td>
<td>Not any</td>
</tr>
<tr>
<td>5</td>
<td>8</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>9</td>
<td>-</td>
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</tr>
<tr>
<td>8</td>
<td>7</td>
<td>+</td>
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</tr>
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<td>7</td>
<td>14</td>
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<tr>
<td>16</td>
<td>8</td>
<td>-</td>
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<td>5</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>9</td>
<td></td>
<td>Not any</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>+</td>
<td>6</td>
</tr>
<tr>
<td>12</td>
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<td>0</td>
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</tbody>
</table>
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
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.
# Miscellaneous Exercises

Finish each equation.

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
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<td>$8 + 8 = $</td>
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<td>$15 + 7 = $</td>
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<td>$6 + 9 = $</td>
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<td>$9 + 5 = $</td>
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<td>$14 - 8 = $</td>
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<td>$7 + 9 = $</td>
<td></td>
<td>$8 + 6 = $</td>
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<tr>
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<td>$16 - 9 = $</td>
<td></td>
<td>$14 - 6 = $</td>
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<tr>
<td></td>
<td>$5 + = 13$</td>
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<td></td>
<td>$+ 5 = 12$</td>
<td></td>
<td>$+ 8 = 17$</td>
</tr>
</tbody>
</table>
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.

\[
\begin{array}{ccc}
(4) & 2 & 6 \\
0 & 3 & 3 \\
4 & 5 & 9 \\
\end{array}
\quad \quad
\begin{array}{ccc}
3 & 4 \\
6 & \_ & \_ \\
7 & 10 \\
\end{array}
\]

\[
\begin{array}{ccc}
5 & \_ & \_ \\
2 & 4 & \_ \\
5 & 12 & \_ \\
\end{array}
\quad \quad
\begin{array}{ccc}
4 & 4 \\
4 & 5 & \_ \\
8 & 13 & \_ \\
\end{array}
\]

\[
\begin{array}{ccc}
3 & 8 \\
2 & \_ & \_ \\
6 & 11 & \_ \\
\end{array}
\quad \quad
\begin{array}{ccc}
4 & 7 \\
2 & \_ & \_ \\
8 & 14 & \_ \\
\end{array}
\]

70
Miscellaneous Exercises

Fill in the charts by finding the sum of pairs of numbers.
## Miscellaneous Exercises

Make these sentences true by using $=, <, \text{ or } >$.

|   | Make these true by using $+ \text{ and } -$.
|---|---|
| 1. $7 + 6 \underline{\quad} 6 + 7$ | 1. $4 \underline{\quad} 2 > 7 \underline{\quad} 5$
| 2. $5 + 8 \underline{\quad} 5 + 9$ | 2. $9 \underline{\quad} 7 < 8 \underline{\quad} 4$
| 3. $9 + 3 \underline{\quad} 2 + 9$ | 3. $8 \underline{\quad} 2 < 7 \underline{\quad} 2$
| 4. $6 + 3 \underline{\quad} 9 + 1$ | 4. $7 \underline{\quad} 7 > 8 \underline{\quad} 2$
| 5. $6 + 5 \underline{\quad} 5 + 6$ | 5. $8 \underline{\quad} 9 < 9 \underline{\quad} 9$
| 6. $2 + 9 \underline{\quad} 9 + 2$ | 6. $9 \underline{\quad} 4 > 7 \underline{\quad} 6$
| 7. $7 + 3 \underline{\quad} 4 + 7$ | 7. $14 \underline{\quad} 3 > 8 \underline{\quad} 4$
| 8. $6 + 6 \underline{\quad} 6 + 5$ | 8. $9 \underline{\quad} 8 < 6 \underline{\quad} 4$
| 9. $2 + 7 \underline{\quad} 3 + 7$ | 9. $17 \underline{\quad} 2 > 8 \underline{\quad} 4$
| 10. $4 + 8 \underline{\quad} 8 + 4$ | 10. $21 \underline{\quad} 6 < 9 \underline{\quad} 8$
| 11. $6 + 2 \underline{\quad} 2 + 6$ | 11. $28 \underline{\quad} 4 > 15 \underline{\quad} 8$
| 12. $2 + 9 \underline{\quad} 8 + 3$ | 12. $34 \underline{\quad} 7 < 25 \underline{\quad} 15$
| 13. $5 + 8 \underline{\quad} 8 + 5$ | 13. $79 \underline{\quad} 24 > 149 \underline{\quad} 57$
| 14. $4 + 8 \underline{\quad} 6 + 5$ | 14. $56 \underline{\quad} 29 < 12 \underline{\quad} 14$
| 15. $3 + 9 \underline{\quad} 9 + 3$ | 15. $89 \underline{\quad} 45 > 134 \underline{\quad} 51$
| 16. $6 + 4 \underline{\quad} 7 + 3$ | 16. $201 \underline{\quad} 98 > 300 \underline{\quad} 56$
Miscellaneous Exercises

Fill in the blanks with the correct numerals.
Begin at the left and go clockwise.

\[
\begin{align*}
7 + (9) &= 16 - 9 = \\
+ 8 &= 15 - 6 = \\
4 + \_ &= 11 - 8 = \\
2 + \_ &= 12 - 9 = \\
8 + \_ &= 14 - 8 = \\
5 + \_ &= 13 - 7 = \\
\end{align*}
\]
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

76
Hundreds, Tens, and Ones

Complete each of these.

<table>
<thead>
<tr>
<th>1 one hundred</th>
<th>10 tens</th>
<th>1 ten</th>
<th>10 ones</th>
</tr>
</thead>
<tbody>
<tr>
<td>186: ___ hundred, ___ tens, and ___ ones</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>342: ___ hundreds, ___ tens, and ___ ones</td>
<td></td>
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<tr>
<td>203: ___ hundreds, ___ tens, and ___ ones</td>
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<tr>
<td>230: ___ hundreds, ___ tens, and ___ ones</td>
<td></td>
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<tr>
<td>__: 6 hundreds, 2 tens, and 5 ones</td>
<td></td>
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<tr>
<td>__: 4 hundreds, 9 tens, and 6 ones</td>
<td></td>
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<tr>
<td>__: 7 hundreds, 0 tens, and 4 ones</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>__: 5 hundreds, 4 tens, and 1 one</td>
<td></td>
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</tbody>
</table>
# Hundreds, Tens, and Ones

<p>| | | | | | | | | | | | | | | | | |</p>
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</table>

\[
124 = 100 + 20 + 4
\]

Fill in the blanks:

\[
563 = \underline{500} + \underline{60} + \underline{3}
\]

\[
247 = \underline{200} + \underline{40} + \underline{7}
\]

\[
486 = \underline{400} + \underline{80} + \underline{6}
\]

\[
625 = \underline{600} + \underline{20} + \underline{5}
\]

\[
\underline{_____} = 700 + 40 + 1
\]

\[
\underline{_____} = 500 + 90 + 8
\]

\[
\underline{_____} = 400 + 60
\]

\[
\underline{_____} = 800 + 2
\]

78
Hundreds, Tens, and Ones

Fill the blanks.

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

80
Renaming Numbers

1.

\[200 + 50 + 12 = 263\]

A set of ten \underline{\hspace{2cm}} can be shown as
one \underline{\hspace{2cm}}.

\[200 + 60 + 3 = 263\]

2.

\[400 + 130 + 5 = \underline{\hspace{2cm}}\]

A set of ten \underline{\hspace{2cm}} can be shown as
one \underline{\hspace{2cm}}.

\[\underline{\hspace{2cm}}\]
Renaming Numbers

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

83
Naming a Number in Different Ways

Complete the following sentences.

\[ 357 = 3 \text{ hundreds } + \underline{\text{____}} \text{ tens } + 7 \text{ ones}, \]

or \[ 3 \text{ hundreds } + 4 \text{ tens } + \underline{\text{____}} \text{ ones}, \]

or \[ 2 \text{ hundreds } + \underline{\text{____}} \text{ tens } + 17 \text{ ones}. \]

\[ 268 = \underline{\text{____}} \text{ hundreds } + 6 \text{ tens } + 8 \text{ ones}, \]

or \[ 2 \text{ hundreds } + 5 \text{ tens } + \underline{\text{____}} \text{ ones}, \]

or \[ 1 \text{ hundred } + \underline{\text{____}} \text{ tens } + 18 \text{ ones}. \]

\[ 569 = \underline{\text{____}} \text{ tens } + 9 \text{ ones}, \]

or \[ 4 \text{ hundreds } + \underline{\text{____}} \text{ tens } + 9 \text{ ones}, \]

or \[ \underline{\text{____}} \text{ hundreds } + 15 \text{ tens } + 19 \text{ ones}. \]

Write \[ 426 \] in three other ways.

\[ \underline{\text{____}} \underline{\text{____}} \underline{\text{____}} \]

\[ \underline{\text{____}} \underline{\text{____}} \underline{\text{____}} \]

\[ \underline{\text{____}} \underline{\text{____}} \underline{\text{____}} \]

Write \[ 752 \] in three other ways.

\[ \underline{\text{____}} \underline{\text{____}} \underline{\text{____}} \]

\[ \underline{\text{____}} \underline{\text{____}} \underline{\text{____}} \]

\[ \underline{\text{____}} \underline{\text{____}} \underline{\text{____}} \]
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.

<table>
<thead>
<tr>
<th></th>
<th>100 + 40 + 3</th>
<th></th>
<th>400 + 90 + 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>500 + 70 + 12</td>
<td>J</td>
<td>600 + 10 + 15</td>
</tr>
<tr>
<td>B</td>
<td>600 + 160 + 4</td>
<td>K</td>
<td>500 + 80 + 2</td>
</tr>
<tr>
<td>C</td>
<td>900 + 20 + 2</td>
<td>L</td>
<td>700 + 00 + 16</td>
</tr>
<tr>
<td>D</td>
<td>300 + 00 + 7</td>
<td>M</td>
<td>700 + 60 + 4</td>
</tr>
<tr>
<td>E</td>
<td>600 + 110 + 6</td>
<td>N</td>
<td>200 + 100 + 7</td>
</tr>
<tr>
<td>F</td>
<td>100 + 30 + 13</td>
<td>O</td>
<td>500 + 120 + 5</td>
</tr>
<tr>
<td>G</td>
<td>200 + 10 + 17</td>
<td>P</td>
<td>800 + 120 + 2</td>
</tr>
<tr>
<td>H</td>
<td>764</td>
<td></td>
<td>227</td>
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<tr>
<td>I</td>
<td>491</td>
<td></td>
<td>143</td>
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<tr>
<td>J</td>
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<tr>
<td>P</td>
<td>582</td>
<td></td>
<td>582</td>
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</tbody>
</table>

85
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.

\[ 3465 = \underline{ } \text{ thousands} + \underline{ } \text{ hundreds} + \underline{ } \text{ tens} + \underline{ } \text{ ones} \]
\[ 3465 = \underline{ } + \underline{ } + \underline{ } + \underline{ } \]
Renaming Numbers

1. \[4000 + 200 + 40 + 3 = \]

2. \[6000 + 300 + 30 + 7 = \]

3. \[\_\_\_\_ + \_\_\_\_ + \_\_\_\_ + \_\_\_\_ = \]

4. \[\_\_\_\_ + \_\_\_\_ + \_\_\_\_ + \_\_\_\_ = \]

5. \[\_\_\_\_ + \_\_\_\_ + \_\_\_\_ + \_\_\_\_ = \]

6. \[\_\_\_\_ + \_\_\_\_ + \_\_\_\_ + \_\_\_\_ = \]

87
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 = \[ \frac{6000}{\phantom{0}} + \frac{300}{\phantom{0}} + \frac{20}{\phantom{0}} + \frac{4}{\phantom{0}} \]

5289 = \[ \frac{\phantom{5000}}{} + \frac{\phantom{200}}{} + \frac{\phantom{80}}{} + \frac{\phantom{9}}{} \]

9165 = \[ \frac{\phantom{9000}}{} + \frac{\phantom{100}}{} + \frac{\phantom{60}}{} + \frac{\phantom{5}}{} \]

___ = 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.

89
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.
   
   
   
   
   
   
   

90
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 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:
   ____________________________
   ____________________________
   ____________________________
   ____________________________

91
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 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:
   __________________________________________
   __________________________________________
   __________________________________________
   __________________________________________
   __________________________________________
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

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<tbody>
<tr>
<td>100</td>
<td>150</td>
<td>200</td>
<td>250</td>
<td>300</td>
<td>350</td>
</tr>
</tbody>
</table>

Write < or > between each pair of numerals.

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<tbody>
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<td>129</td>
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<td>391</td>
<td>450</td>
<td>376</td>
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<td>235</td>
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<td>253</td>
<td>350</td>
<td>287</td>
<td>459</td>
<td>176</td>
<td>253</td>
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<tbody>
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<td>1500</td>
<td>2000</td>
<td>2500</td>
<td>3000</td>
<td>3500</td>
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</tbody>
</table>

|   |   |   |   |   |   |
|---|---|---|---|---|
| 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:

<table>
<thead>
<tr>
<th>52 + 37</th>
<th>83 + 16</th>
</tr>
</thead>
<tbody>
<tr>
<td>26 + 42</td>
<td>43 + 55</td>
</tr>
<tr>
<td>72 + 13</td>
<td>14 + 44</td>
</tr>
</tbody>
</table>
The Sum of Two Numbers

Compute:

<table>
<thead>
<tr>
<th>67 + 32</th>
<th>45 + 56</th>
</tr>
</thead>
<tbody>
<tr>
<td>74 + 15</td>
<td>58 + 31</td>
</tr>
<tr>
<td>46 + 53</td>
<td>36 + 32</td>
</tr>
</tbody>
</table>
The Sum of Two Numbers

Compute:

<table>
<thead>
<tr>
<th>362 + 507</th>
<th>450 + 249</th>
</tr>
</thead>
<tbody>
<tr>
<td>743 + 253</td>
<td>804 + 194</td>
</tr>
<tr>
<td>512 + 466</td>
<td>277 + 702</td>
</tr>
</tbody>
</table>
The Sum of Two Numbers

Compute:

<table>
<thead>
<tr>
<th>127 + 651</th>
<th>504 + 265</th>
</tr>
</thead>
<tbody>
<tr>
<td>1645 + 8253</td>
<td>7064 + 1825</td>
</tr>
<tr>
<td>8403 + 1596</td>
<td>3754 + 5005</td>
</tr>
</tbody>
</table>
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:

\[ 36 + 28 = \underline{\phantom{0}} \]

<table>
<thead>
<tr>
<th>A. Think of 36 as:</th>
<th>B. Think of 28 as:</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Diagram" /></td>
<td><img src="image2" alt="Diagram" /></td>
</tr>
<tr>
<td>((30 + 6))</td>
<td>((20 + 8))</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>C. Join the tens:</th>
<th>D. Join the ones:</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image3" alt="Diagram" /></td>
<td><img src="image4" alt="Diagram" /></td>
</tr>
<tr>
<td>((30 + 20))</td>
<td>((6 + 8))</td>
</tr>
</tbody>
</table>

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

Make a ring around a set of ten.

\[ 6 + 8 = 10 + \underline{\phantom{0}} \]
\[ (30 + 20) + (10 + 4) = \underline{\phantom{0}} \]
E. Join the new set of ten to the other sets of ten. These are the ones.

\[(30 + 20 + 10) + 4 = 60 + 4 = 64\]

F. You can write:

\[
\begin{align*}
36 + 28 & \quad 36 \\
36 = 30 + 6 & \quad \text{OR} \\
28 = 20 + 8 & \\
50 + 14 & = 50 + 10 + 4 = 64
\end{align*}
\]
Renaming Ones

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

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

100
The Sum of Two Numbers

Compute:

<table>
<thead>
<tr>
<th>63 + 29</th>
<th>58 + 25</th>
</tr>
</thead>
<tbody>
<tr>
<td>54 + 27</td>
<td>49 + 28</td>
</tr>
<tr>
<td>65 + 29</td>
<td>23 + 47</td>
</tr>
</tbody>
</table>
The Sum of Two Numbers

Compute:

<table>
<thead>
<tr>
<th>76 + 18</th>
<th>67 + 19</th>
</tr>
</thead>
<tbody>
<tr>
<td>58 + 7</td>
<td>59 + 38</td>
</tr>
<tr>
<td>35 + 46</td>
<td>47 + 9</td>
</tr>
</tbody>
</table>
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) \( 29 + 28 = \_\_\_\_\_\_ \)

103
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.

So, \( 237 + 126 = 300 + 50 + 13 \)
\[ = 300 + 60 + 3 \]
\[ = 363 \]

We can write:

\[ 237 = 200 + 30 + 7 \]
\[ 126 = 100 + 20 + 6 \]
\[ \quad 300 + 50 + 13 = 300 + 60 + 3 = 363 \]

Ann has 363 stamps.
The Sum of Two Numbers

Compute:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>345</td>
<td>538</td>
</tr>
<tr>
<td>+249</td>
<td>+237</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>816</td>
<td>248</td>
</tr>
<tr>
<td>+185</td>
<td>+125</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>347</td>
<td>723</td>
</tr>
<tr>
<td>+226</td>
<td>+158</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>707</td>
<td>349</td>
</tr>
<tr>
<td>+105</td>
<td>+233</td>
</tr>
</tbody>
</table>
The Sum of Two Numbers

Compute:

<table>
<thead>
<tr>
<th>248</th>
<th>394</th>
</tr>
</thead>
<tbody>
<tr>
<td>+129</td>
<td>+283</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>369</th>
<th>348</th>
</tr>
</thead>
<tbody>
<tr>
<td>+128</td>
<td>+161</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>764</th>
<th>586</th>
</tr>
</thead>
<tbody>
<tr>
<td>+29</td>
<td>+123</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>459</th>
<th>340</th>
</tr>
</thead>
<tbody>
<tr>
<td>+26</td>
<td>+360</td>
</tr>
</tbody>
</table>
The Sum of Two Numbers

Compute:

<table>
<thead>
<tr>
<th>204 + 567</th>
<th>348 + 236</th>
</tr>
</thead>
<tbody>
<tr>
<td>753 + 239</td>
<td>546 + 329</td>
</tr>
<tr>
<td>728 + 267</td>
<td>806 + 187</td>
</tr>
</tbody>
</table>
The Sum of Two Numbers

Compute:

<table>
<thead>
<tr>
<th>437 + 243</th>
<th>461 + 279</th>
</tr>
</thead>
<tbody>
<tr>
<td>537 + 256</td>
<td>825 + 137</td>
</tr>
<tr>
<td>347 + 268</td>
<td>158 + 629</td>
</tr>
</tbody>
</table>
The Sum of Two Numbers

Compute:

1) 532 + 149  
13) 409 + 217

2) 304 + 177  
14) 268 + 206

3) 348 + 29   
15) 74 + 16

4) 502 + 378  
16) 67 + 208

5) 37 + 156   
17) 146 + 726

6) 848 + 129  
18) 848 + 108

7) 325 + 39   
19) 37 + 207

8) 207 + 308  
20) 475 + 206

9) 206 + 385  
21) 671 + 329

10) 81 + 19   
22) 106 + 87

11) 469 + 317 
23) 164 + 206

12) 36 + 407  
24) 129 + 69

109
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.

So, 237 + 191 = 300 + 120 + 8
= 300 + 100 + 20 + 8
= 400 + 20 + 8
= 428

We can write:

\[
\begin{align*}
237 &= 200 + 30 + 7 \\
191 &= 100 + 90 + 1 \\
\hline
300 + 120 + 8 &= 400 + 20 + 8 = 428
\end{align*}
\]

OR

\[
\begin{align*}
237 &= \underline{237} \\
191 &= \underline{+ 191} \\
\hline
&\underline{+ 8} \\
&\underline{120} \\
&\underline{428}
\end{align*}
\]

Ann has 428 stamps.
<table>
<thead>
<tr>
<th></th>
<th>Renaming Ten Tens</th>
</tr>
</thead>
<tbody>
<tr>
<td>1)</td>
<td>$300 + 170 + 8$</td>
</tr>
<tr>
<td></td>
<td>$400 + 70 + 8 = 478$</td>
</tr>
<tr>
<td>2)</td>
<td>$500 + 120 + 7$</td>
</tr>
<tr>
<td></td>
<td>___ + ___ + ___ = ___</td>
</tr>
<tr>
<td>3)</td>
<td>$100 + 140 + 6$</td>
</tr>
<tr>
<td></td>
<td>___ + ___ + ___ = ___</td>
</tr>
<tr>
<td>4)</td>
<td>$700 + 150 + 0$</td>
</tr>
<tr>
<td></td>
<td>___ + ___ + ___ = ___</td>
</tr>
<tr>
<td>5)</td>
<td>$200 + 100 + 8$</td>
</tr>
<tr>
<td></td>
<td>___ + ___ + ___ = ___</td>
</tr>
<tr>
<td>6)</td>
<td>$400 + 190 + 2$</td>
</tr>
<tr>
<td></td>
<td>___ + ___ + ___ = ___</td>
</tr>
<tr>
<td>7)</td>
<td>$800 + 130 + 3$</td>
</tr>
<tr>
<td></td>
<td>___ + ___ + ___ = ___</td>
</tr>
<tr>
<td>8)</td>
<td>$600 + 160 + 6$</td>
</tr>
<tr>
<td></td>
<td>___ + ___ + ___ = ___</td>
</tr>
<tr>
<td>9)</td>
<td>$100 + 100 + 5$</td>
</tr>
<tr>
<td></td>
<td>___ + ___ + ___ = ___</td>
</tr>
<tr>
<td>10)</td>
<td>$800 + 190 + 9$</td>
</tr>
<tr>
<td></td>
<td>___ + ___ + ___ = ___</td>
</tr>
</tbody>
</table>
### Renaming Ten Tens

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>396</td>
<td>765</td>
</tr>
<tr>
<td>+283</td>
<td>+173</td>
</tr>
</tbody>
</table>

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>493</td>
<td>398</td>
</tr>
<tr>
<td>+215</td>
<td>+261</td>
</tr>
</tbody>
</table>

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>613</td>
<td>384</td>
</tr>
<tr>
<td>+196</td>
<td>+263</td>
</tr>
</tbody>
</table>

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>794</td>
<td>342</td>
</tr>
<tr>
<td>+173</td>
<td>+166</td>
</tr>
</tbody>
</table>
## Renaming Ten Tens

<table>
<thead>
<tr>
<th>783 + 643 = _____</th>
<th>495 + 192 = _____</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>496 + 213 = _____</td>
<td>384 + 571 = _____</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>764 + 142 = _____</td>
<td>135 + 284 = _____</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>431 + 176 = _____</td>
<td>327 + 292 = _____</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Output

114
Renaming Ten Tens

Compute the sum.

<table>
<thead>
<tr>
<th>395 + 282</th>
<th>784 + 192</th>
</tr>
</thead>
<tbody>
<tr>
<td>651 + 263</td>
<td>493 + 276</td>
</tr>
<tr>
<td>364 + 273</td>
<td>487 + 161</td>
</tr>
<tr>
<td>276 + 550</td>
<td>386 + 253</td>
</tr>
</tbody>
</table>
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?

116
## Renaming the Sum

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1)</td>
<td>93 - 48</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>93 = 80 + 13</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2)</td>
<td>47 - 19</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>47 = ___ + ___</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3)</td>
<td>54 - 28</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>54 = ___ + ___</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4)</td>
<td>63 - 27</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>63 = ___ + ___</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5)</td>
<td>97 - 19</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>97 = ___ + ___</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6)</td>
<td>55 - 26</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>55 = ___ + ___</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7)</td>
<td>74 - 56</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>74 = ___ + ___</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8)</td>
<td>21 - 17</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>21 = ___ + ___</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9)</td>
<td>36 - 18</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>36 = ___ + ___</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10)</td>
<td>95 - 27</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>95 = ___ + ___</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11)</td>
<td>71 - 38</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>71 = ___ + ___</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12)</td>
<td>65 - 48</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>65 = ___ + ___</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13)</td>
<td>44 - 19</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>44 = ___ + ___</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14)</td>
<td>52 - 39</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>52 = ___ + ___</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Computing the Difference Between Two Numbers

<table>
<thead>
<tr>
<th>75 - 28 = _____</th>
<th>68 - 29 = _____</th>
</tr>
</thead>
</table>
| \[
\begin{aligned}
75 &= 60 + 15 \\
-28 &= (20 + 8) \\
40 + 7 &= 47
\end{aligned}
\] | 68 | -29 |

<table>
<thead>
<tr>
<th>84 - 16 = _____</th>
<th>46 - 27 = _____</th>
</tr>
</thead>
</table>
| \[
\begin{aligned}
84 \\
-16
\end{aligned}
\] | 46 | -27 |

<table>
<thead>
<tr>
<th>53 - 24 = _____</th>
<th>35 - 17 = _____</th>
</tr>
</thead>
</table>
| \[
\begin{aligned}
53 \\
-24
\end{aligned}
\] | 35 | -17 |

<table>
<thead>
<tr>
<th>92 - 65 = _____</th>
<th>62 - 48 = _____</th>
</tr>
</thead>
</table>
| \[
\begin{aligned}
92 \\
-65
\end{aligned}
\] | 62 | -48 |
Computing the Difference

<table>
<thead>
<tr>
<th>92 - 85 = _________</th>
<th>94 - 76 = _________</th>
</tr>
</thead>
<tbody>
<tr>
<td>56 - 39 = _________</td>
<td>75 - 58 = _________</td>
</tr>
<tr>
<td>25 - 17 = _________</td>
<td>86 - 29 = _________</td>
</tr>
<tr>
<td>Calculation</td>
<td>Answer</td>
</tr>
<tr>
<td>-------------</td>
<td>--------</td>
</tr>
<tr>
<td>$75 - 39$</td>
<td>______</td>
</tr>
<tr>
<td>$53 - 34$</td>
<td>______</td>
</tr>
<tr>
<td>$64 - 18$</td>
<td>______</td>
</tr>
<tr>
<td>$63 - 17$</td>
<td>______</td>
</tr>
<tr>
<td>$82 - 24$</td>
<td>______</td>
</tr>
<tr>
<td>$81 - 27$</td>
<td>______</td>
</tr>
</tbody>
</table>
Finding the Difference Between Two Numbers

<table>
<thead>
<tr>
<th>46 and 19</th>
<th>43 and 25</th>
</tr>
</thead>
<tbody>
<tr>
<td>92 and 47</td>
<td>62 and 44</td>
</tr>
<tr>
<td>53 and 26</td>
<td>51 and 26</td>
</tr>
<tr>
<td>84 and 35</td>
<td>67 and 39</td>
</tr>
<tr>
<td>74 and 39</td>
<td>45 and 16</td>
</tr>
<tr>
<td>82 and 25</td>
<td>52 and 19</td>
</tr>
</tbody>
</table>
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 balloons 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: \[ \] + \[ \] + \[ \] = \[ \]

\[
\begin{align*}
300 + 80 + 5 \\
- (100 + 50 + 2) \\
\frac{200 + 30 + 3}{200 + 30 + 3} = \underline{} \underline{} \underline{}
\end{align*}
\]

Wayne has \[ \underline{23} \] more stamps to put in his book.
### Computing the Difference Between Two Numbers

<table>
<thead>
<tr>
<th>534 - 123 = _____</th>
<th>758 - 325 = _____</th>
</tr>
</thead>
<tbody>
<tr>
<td>947 - 314 = _____</td>
<td>862 - 531 = _____</td>
</tr>
<tr>
<td>428 - 216 = _____</td>
<td>753 - 443 = _____</td>
</tr>
<tr>
<td>698 - 264 = _____</td>
<td>589 - 263 = _____</td>
</tr>
</tbody>
</table>
### The Difference Between Two Numbers

**Compute:**

<table>
<thead>
<tr>
<th>384 - 162 = _____</th>
<th>765 - 334 = _____</th>
</tr>
</thead>
<tbody>
<tr>
<td>987 - 234 = _____</td>
<td>905 - 704 = _____</td>
</tr>
<tr>
<td>879 - 235 = _____</td>
<td>598 - 275 = _____</td>
</tr>
<tr>
<td>374 - 152 = _____</td>
<td>384 - 163 = _____</td>
</tr>
</tbody>
</table>
## Renaming the Sum

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
</table>
| 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

<table>
<thead>
<tr>
<th>Number</th>
<th>Difference</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>672</td>
<td>-235</td>
<td>437</td>
</tr>
<tr>
<td>591</td>
<td>-347</td>
<td>244</td>
</tr>
<tr>
<td>894</td>
<td>-488</td>
<td>406</td>
</tr>
<tr>
<td>750</td>
<td>-237</td>
<td>513</td>
</tr>
</tbody>
</table>
Computing the Difference Between Two Numbers

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>348 -</td>
<td>129</td>
</tr>
<tr>
<td>761 -</td>
<td>356</td>
</tr>
<tr>
<td>532 -</td>
<td>318</td>
</tr>
<tr>
<td>974 -</td>
<td>538</td>
</tr>
<tr>
<td>883 -</td>
<td>647</td>
</tr>
</tbody>
</table>
Finding Differences
Find the difference between each pair of numbers.

<p>| | | | | | | |</p>
<table>
<thead>
<tr>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1)</td>
<td>391 and 269</td>
<td>2)</td>
<td>994 and 267</td>
<td>3)</td>
<td>792 and 269</td>
<td>4)</td>
</tr>
<tr>
<td>5)</td>
<td>434 and 329</td>
<td>6)</td>
<td>289 and 168</td>
<td>7)</td>
<td>678 and 339</td>
<td>8)</td>
</tr>
<tr>
<td>9)</td>
<td>963 and 238</td>
<td>10)</td>
<td>852 and 548</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Renaming the Sum

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
</table>
| 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.

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>349 and 184</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>(200 + 140 + 9)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(\frac{100}{100} + \frac{80}{60} + \frac{4}{5})</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>901 and 290</td>
<td>7</td>
</tr>
<tr>
<td>3</td>
<td>847 and 283</td>
<td>8</td>
</tr>
<tr>
<td>4</td>
<td>638 and 293</td>
<td>9</td>
</tr>
<tr>
<td>5</td>
<td>427 and 295</td>
<td>10</td>
</tr>
</tbody>
</table>

131
### Computing the Difference

<p>| | |</p>
<table>
<thead>
<tr>
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<tbody>
<tr>
<td>615</td>
<td>283</td>
</tr>
<tr>
<td>719</td>
<td>237</td>
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<tr>
<td>476</td>
<td>285</td>
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<td>827</td>
<td>265</td>
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Computing the Difference

<table>
<thead>
<tr>
<th>Equation</th>
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<tbody>
<tr>
<td>$514 - 123$</td>
</tr>
<tr>
<td>$947 - 254$</td>
</tr>
<tr>
<td>$428 - 286$</td>
</tr>
<tr>
<td>$618 - 264$</td>
</tr>
<tr>
<td>$728 - 375$</td>
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</table>
Computing the Difference

<p>| | |</p>
<table>
<thead>
<tr>
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<tr>
<td>871</td>
<td>390</td>
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<tr>
<td>708</td>
<td>345</td>
</tr>
<tr>
<td>557</td>
<td>273</td>
</tr>
<tr>
<td>469</td>
<td>283</td>
</tr>
<tr>
<td>673</td>
<td>280</td>
</tr>
</tbody>
</table>
What must be renamed?

1) 347 - 128

2) 814 - 381

3) 73 - 48

4) 132 - 29

5) 49 - 27

6) 205 - 91

7) 981 - 257

8) 604 - 391

9) 876 - 59

10) 603 - 291

11) 540 - 239

12) 809 - 397

<table>
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<td>3</td>
<td>4</td>
<td>7</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>8</td>
<td>1</td>
<td>4</td>
<td>-</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>7</td>
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</tr>
<tr>
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<td>5</td>
<td>4</td>
<td>0</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>12</td>
<td>8</td>
<td>0</td>
<td>9</td>
<td>-</td>
<td>3</td>
</tr>
</tbody>
</table>

135
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.
Problem Solving

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.

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?
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?

   __________ 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

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.

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?

A

B

C
★ 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 **three** numbers that add up to 17, leaving a subset of **two** numbers that add up to 11?

   _______ + _______ + _______ = 17

   _______ + _______ = 11

   161
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
(b) 9, 8, 3, 6

____________________ 8  ________________ 17
____________________ 12  ________________ 9

(c) 6, 5, 8, 4, 7
(d) 9, 8, 7, 6, 2

____________________ 15  ________________ 17
____________________ 15  ________________ 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.

\[ 1, \ 2, \ 3, \ 4, \ 5, \ 6, \ 7 \]

\[ \quad = \quad \]

\[ \quad = \quad \]

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

\[ 5, \ 13, \ 7, \ 5, \ 9, \ 16, \ 13 \]

\[ \quad = \quad \]

\[ \quad = \quad \]

\[ \quad = \quad \]
1. Here is an array of numbers.

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

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? __________________________________________________

__________________________________________________________

165
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

1  1
```

```
1  2  3
```

3. Now try this one:

```
7  7

   8

   9
```

```
20

20

20
```

```
20  20  20
```
4. How many ways are there to do this one? __________

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

<table>
<thead>
<tr>
<th>2</th>
<th>4</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>7</td>
<td></td>
</tr>
</tbody>
</table>

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.

   \[
   \begin{array}{ccc}
   15 & & 15 \\
   & 15 & 15 \\
   15 & 15 & 15 \\
   \end{array}
   \]

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

   \[
   \begin{array}{ccc}
   & & \\
   & & \\
   & & \\
   \end{array}
   \]

   \[
   \begin{array}{ccc}
   & & \\
   & & \\
   & & \\
   \end{array}
   \]

   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:

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>V</td>
<td>10</td>
</tr>
<tr>
<td>1</td>
<td>I</td>
<td>6</td>
</tr>
<tr>
<td>2</td>
<td>II</td>
<td>7</td>
</tr>
<tr>
<td>3</td>
<td>III</td>
<td>8</td>
</tr>
<tr>
<td>4</td>
<td>IIII</td>
<td>9</td>
</tr>
</tbody>
</table>

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:

\[ \text{XI} = 10 + 1 = 11 \]

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.

\[ \text{VIII} = \phantom{0} \]
\[ \text{LXV} = \phantom{0} \]
\[ \text{CXI} = \phantom{0} \]
\[ \text{XXXVI} = \phantom{0} \]
\[ \text{CCLXII} = \phantom{0} \]

2. Here is a simple addition in Roman numerals:

\[ \text{VI} + \text{II} = \text{VIII} \]

To add \text{VI} and \text{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 = _______
XII + V = _______
XXIII + VI = _______
LXI + VII = _______
CXV + LI + X = _______

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

CXI + LVI = _______
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:

$$\text{III + II}$$

we get $$\text{IIII}.$$ But the Romans never wrote five I’s together. Instead, they wrote $$\text{V}.$$ 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:

$$\begin{align*}
\text{D} &\text{ for 500} \\
\text{M} &\text{ for 1000}
\end{align*}$$

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 addition examples. The first two are done for you.

$$\begin{align*}
\text{III + II} &\text{ = } \text{V} \\
\text{XIII + III} &\text{ = } \text{XVI} \\
\text{XXXIII + III} &\text{ = } \text{_________} \\
\text{CII + XI + LII} &\text{ = } \text{172}
\end{align*}$$
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 = \underline{45}
XXVII + XVIII = \underline{XXXV}

55 + 24 = \underline{79}
\underline{55} + \underline{24} = \underline{79}

63 + 14 = \underline{77}
\underline{63} + \underline{14} = \underline{77}

107 + 86 = \underline{193}
\underline{107} + \underline{86} = \underline{193}

36 + 335 = \underline{371}
\underline{36} + \underline{335} = \underline{371}

1247 + 115 = \underline{1362}
\underline{1247} + \underline{115} = \underline{1362}

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

XXIII - XII = \underline{11}
VIII - III = \underline{5}
XVII - XVI = \underline{1}
X - V = \underline{5}
X - VII = \underline{3}
L - XX = \underline{30}

174
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.

   A   B

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? ____________________________
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:
   \( (2, 13) \quad (2, 9) \quad (2, 11) \quad (4, 11) \quad (4, 9) \quad (4, 13). \)

   Draw segments joining the following points in order:
   \( (7, 12) \quad (5, 12) \quad (5, 10) \quad (6, 10) \quad (5, 10) \quad (5, 8) \quad (7, 8). \)

   Draw segments joining the following points in order:
   \( (8, 11) \quad (8, 7) \quad (10, 7). \)

   Draw segments joining the following points in order:
   \( (13, 6) \quad (11, 6) \quad (11, 10). \)

   Draw segments joining the following points in order:
   \( (15, 5) \quad (16, 5) \quad (17, 6) \quad (17, 8) \quad (16, 9) \quad (15, 9) \)
   \( (14, 8) \quad (14, 6) \quad (15, 5). \)

   What did you find? 

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 $\overrightarrow{CD}$.

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

186
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.
Pictures in the Plane

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.

<table>
<thead>
<tr>
<th>(\overline{AB})</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>(\overline{BC})</td>
<td></td>
</tr>
<tr>
<td>(\overline{PR})</td>
<td></td>
</tr>
<tr>
<td>(\angle ABC)</td>
<td></td>
</tr>
<tr>
<td>(\angle RPQ)</td>
<td></td>
</tr>
<tr>
<td>(\angle BCA)</td>
<td></td>
</tr>
</tbody>
</table>

190
Pictures in the Plane

A.
Pictures in the Plane

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

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? ________
Enlarging Segments on the Number Line.

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

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

   B  C  A

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.

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>P</th>
<th>Q</th>
<th>R</th>
</tr>
</thead>
</table>

Show below the number of units in each segment.

<table>
<thead>
<tr>
<th>AB</th>
<th>BC</th>
<th>AC</th>
<th>PQ</th>
<th>QR</th>
<th>PR</th>
</tr>
</thead>
</table>

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 $\overline{AC}$? 

197
2. Look at the number line.

A

B

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

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 \( \triangle TSW \) congruent to \( \triangle BAC \)? 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 ________.
Make a larger picture of the boat on the facing page.

Multiply all coordinates by 2.
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 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.
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 ___

213
The Number of Elements in an Array

<table>
<thead>
<tr>
<th>Draw an array, then fill in the blank.</th>
</tr>
</thead>
<tbody>
<tr>
<td>A 5 by 3 array has ____ elements.</td>
</tr>
<tr>
<td>A 7 by 3 array has ____ elements.</td>
</tr>
<tr>
<td>A 4 by 9 array has ____ elements.</td>
</tr>
<tr>
<td>A 3 by 6 array has ____ elements.</td>
</tr>
</tbody>
</table>
Arrays and Equations

Match the array with the equation that describes it.

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>D</td>
<td>E</td>
<td>F</td>
</tr>
<tr>
<td>G</td>
<td>H</td>
<td>I</td>
</tr>
</tbody>
</table>

1) $8 + 8 + 8 + 8 = 32$ _______  5) $5 \times 6 = 30$ _______
2) $6 \times 4 = 24$ _______  6) $5 \times 7 = 35$ _______
3) $4 \times 5 = 20$ _______  7) $7 + 7 + 7 = 21$ _______
4) $3 + 3 + 3 + 3 = 12$ _______  8) $5 \times 3 = 15$ _______
  9) $8 \times 2 = 16$ _______

215
# Multiplication Equations

**Fill in the blanks:**

<table>
<thead>
<tr>
<th>1.</th>
<th>2.</th>
</tr>
</thead>
<tbody>
<tr>
<td>△ △ △ △ △</td>
<td>□ □ □ □</td>
</tr>
<tr>
<td>△ △ △ △</td>
<td>□ □ □ □</td>
</tr>
<tr>
<td>△ △ △ △</td>
<td>□ □ □ □</td>
</tr>
</tbody>
</table>

**Equation:** ________________  
**Product:** ________________  
**Factors:** ________________

<table>
<thead>
<tr>
<th>3.</th>
<th>4.</th>
</tr>
</thead>
<tbody>
<tr>
<td>★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★</td>
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<td>★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★</td>
</tr>
</tbody>
</table>

**Equation:** ________________  
**Product:** ________________  
**Factors:** ________________

<table>
<thead>
<tr>
<th>5.</th>
<th>6.</th>
</tr>
</thead>
<tbody>
<tr>
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</tbody>
</table>

**Equation:** ________________  
**Product:** ________________  
**Factors:** ________________
<table>
<thead>
<tr>
<th>Number</th>
<th>Description</th>
<th>Equation</th>
<th>Product</th>
<th>Factors</th>
</tr>
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<tbody>
<tr>
<td>7.</td>
<td>. . . . . .</td>
<td></td>
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<tr>
<td>8.</td>
<td>△ △ △</td>
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</tr>
<tr>
<td>9.</td>
<td>[Grid]</td>
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</tr>
<tr>
<td>10.</td>
<td>[Grid]</td>
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<td></td>
</tr>
<tr>
<td>11.</td>
<td>a b c d e f g h i j k l</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12.</td>
<td>b a d c f e h g j i k l</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

217
A Multiplication Table

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

<table>
<thead>
<tr>
<th>(\times)</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>5</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>12</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
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<tr>
<td>8</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Zero or One as a Factor

Write the products.

\[5 \times 0 = \underline{______}\] \[1 \times 9 = \underline{______}\]

\[0 \times 5 = \underline{______}\] \[9 \times 1 = \underline{______}\]

\[0 \times 0 = \underline{______}\] \[1 \times 89 = \underline{______}\]

\[0 \times 641 = \underline{______}\] \[1 \times \underline{______} = 13\]

\[0 \times n = \underline{______}\] \[\underline{______} \times 17 = 17\]

\[1,240 \times \underline{______} = 0\] \[n \times 1 = \underline{______}\]

How would you complete these equations?

\[\underline{______} \times 0 = 2\]
\[0 \times \underline{______} = 7\]

If zero is a factor, what is the product? \[\underline{______}\]

If one is a factor, what is the product? \[\underline{______}\]
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 ____
3 ____
4 ____
5 ____
6 ____
7 ____
8 ____
9 ____
10 ____
11 ____
12 ____
13 ____
14 ____
15 ____
16 ____
17 ____
18 ____
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:

\[ 2, 4, 6, 8, 10, 12, \ldots \]

These numbers are called multiples of 3:

\[ 3, 6, 9, 12, 15, 18, 21, \ldots \]

Write here the first ten multiples of 5:

\[
\begin{align*}
\underline{\text{What special name do we have for the multiples of 2?}} \\
\text{Every number is a multiple of 1, and every number is a multiple of itself.}
\end{align*}
\]

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.

\[
\begin{array}{cccccccccccc}
2 & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} \\
3 & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} \\
4 & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} \\
5 & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} \\
6 & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} \\
7 & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} \\
8 & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} \\
9 & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} \\
10 & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} \\
11 & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} \\
12 & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} \\
13 & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} \\
14 & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} \\
15 & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} \\
16 & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} \\
17 & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} & \underline{\phantom{1}} \\
223
\end{array}
\]
18       19       20       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.
<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2 prime</td>
<td>12 ________</td>
<td>22 ________</td>
</tr>
<tr>
<td>3 prime</td>
<td>13 prime</td>
<td>23 prime</td>
</tr>
<tr>
<td>4 (= 2 \times 2)</td>
<td>14 ________</td>
<td>24 ________</td>
</tr>
<tr>
<td>5 prime</td>
<td>15 ________</td>
<td>25 ________</td>
</tr>
<tr>
<td>6 (= 2 \times 3)</td>
<td>16 ________</td>
<td>26 ________</td>
</tr>
<tr>
<td>7 prime</td>
<td>17 prime</td>
<td>27 ________</td>
</tr>
<tr>
<td>8 (= 2 \times 2 \times 2)</td>
<td>18 ________</td>
<td>28 ________</td>
</tr>
<tr>
<td>9 ________</td>
<td>19 prime</td>
<td>29 prime</td>
</tr>
<tr>
<td>10 ________</td>
<td>20 ________</td>
<td>30 ________</td>
</tr>
<tr>
<td>11 prime</td>
<td>21 ________</td>
<td>31 prime</td>
</tr>
</tbody>
</table>

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.

\[
\begin{align*}
1 \times 1 &= \square \quad \square \quad \square \\
2 \times 2 &= \square \quad \square \quad \square \\
3 \times 3 &= \square \quad \square \quad \square \\
4 \times 4 &= \square \quad \square \quad \square \\
5 \times 5 &= \square \quad \square \quad \square \\
6 \times 6 &= \square \quad \square \quad \square \\
\end{align*}
\]

2. Now do these additions:

\[
\begin{align*}
1 &= \square \\
1 + 3 &= \square \\
1 + 3 + 5 &= \square \\
1 + 3 + 5 + 7 &= \square \\
1 + 3 + 5 + 7 + 9 &= \square \\
1 + 3 + 5 + 7 + 9 + 11 &= \square \\
\end{align*}
\]

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

226
4. Here is a dot.

\[ \bullet \]

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

Now make it into a $3 \times 3$ array. How many more dots did you need? ___

Now make it into a $4 \times 4$ array. How many more dots did you need? ___

Now make it into a $5 \times 5$ array. How many more dots did you need? ___

Now make it into a $6 \times 6$ 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:
0
0
0 0
0 0 0
0 0 0 0

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.

<table>
<thead>
<tr>
<th>Set B</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>6</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Set A</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>18</td>
</tr>
<tr>
<td>5</td>
</tr>
</tbody>
</table>

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

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:

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.

<table>
<thead>
<tr>
<th>4</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>
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
    5  20
    3

Set A

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

232
What is the sum of the numbers you put in the array? _______
Is this sum equal to \(13 \times 13\)? _______
Why? ____________________________________________________________

9. Use arrays to find these products:
   \[11 \times 11 = \quad \]
   \[12 \times 12 = \quad \]
   \[14 \times 14 = \quad \]
   \[15 \times 15 = \quad \]

10. When we write
    \[(2 + 3) \times (4 + 5) = \quad \]
    we mean that you must first do the additions 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.

Always do what is inside the parentheses first.

233
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.

234
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:

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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
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 × 11 = ______
   12 × 12 = ______
   14 × 14 = ______
   15 × 15 = ______

10. When we write

    (2 + 3) × (4 + 5) = ______

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

    5 × 9

    and then do the multiplication to get 45.

    When we write

    (2 × 3) + (4 × 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.

Always do what is inside the parentheses first.
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

232
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
    2
Set A  3  18
    5
```

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

```

```

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:

```

```

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.

```

```

231
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:

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   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.
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 $2 \times 2$ array by putting in more dots. How many more dots did you have to put in? ________

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

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

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

Now make it into a $6 \times 6$ 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:

227
Square and Triangular Arrays.

1. $3 \times 3$ 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.
   
   $1 \times 1 = \square \quad \square \quad \square$
   $2 \times 2 = \square \quad \square \quad \square$
   $3 \times 3 = \square \quad \square \quad \square$
   $4 \times 4 = \square \quad \square \quad \square$
   $5 \times 5 = \square \quad \square \quad \square$
   $6 \times 6 = \square \quad \square \quad \square$

2. Now do these additions:
   
   $1 = \square$
   $1 + 3 = \square$
   $1 + 3 + 5 = \square$
   $1 + 3 + 5 + 7 = \square$
   $1 + 3 + 5 + 7 + 9 = \square$
   $1 + 3 + 5 + 7 + 9 + 11 = \square$

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

226
2 prime 12 ________ 22 ________
3 prime 13 prime 23 prime
4 = 2 × 2 14 ________ 24 ________
5 prime 15 ________ 25 ________
6 = 2 × 3 16 ________ 26 ________
7 prime 17 prime 27 ________
8 = 2 × 2 × 2 18 ________ 28 ________
9 ________ 19 prime 29 prime
10 ________ 20 ________ 30 ________
11 prime 21 ________ 31 prime

Is this equation correct? ________

2 × 3 × 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? ________
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:

$$2, 4, 6, 8, 10, 12, \ldots$$

These numbers are called multiples of 3:

$$3, 6, 9, 12, 15, 18, 21, \ldots$$

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.

$$
\begin{array}{cccccccccc}
2 & 4 & 6 & 8 & 10 & 12 & 14 & 16 & 18 & 20 \\
3 & 6 & 9 & 12 & 15 & 18 & 21 & 24 & 27 & 30 \\
4 & 8 & 12 & 16 & 20 & 24 & 28 & 32 & 36 & 40 \\
5 & 10 & 15 & 20 & 25 & 30 & 35 & 40 & 45 & 50 \\
6 & 12 & 18 & 24 & 30 & 36 & 42 & 48 & 54 & 60 \\
7 & 14 & 21 & 28 & 35 & 42 & 49 & 56 & 63 & 70 \\
8 & 16 & 24 & 32 & 40 & 48 & 56 & 64 & 72 & 80 \\
9 & 18 & 27 & 36 & 45 & 54 & 63 & 72 & 81 & 90 \\
10 & 20 & 30 & 40 & 50 & 60 & 70 & 80 & 90 & 100 \\
\end{array}
$$
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.

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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

or just one object in each row like this:

0
0
0
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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.

\[ 5 \times 0 = \underline{\hspace{2cm}} \quad 1 \times 9 = \underline{\hspace{2cm}} \]

\[ 0 \times 5 = \underline{\hspace{2cm}} \quad 9 \times 1 = \underline{\hspace{2cm}} \]

\[ 0 \times 0 = \underline{\hspace{2cm}} \quad 1 \times 89 = \underline{\hspace{2cm}} \]

\[ 0 \times 641 = \underline{\hspace{2cm}} \quad 1 \times \underline{\hspace{2cm}} = 13 \]

\[ 0 \times n = \underline{\hspace{2cm}} \quad \underline{\hspace{2cm}} \times 17 = 17 \]

\[ 1,240 \times \underline{\hspace{2cm}} = 0 \quad n \times 1 = \underline{\hspace{2cm}} \]

How would you complete these equations?

\[ \underline{\hspace{2cm}} \times 0 = 2 \]

\[ 0 \times \underline{\hspace{2cm}} = 7 \]

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 \(6 \times 2 = 12\).

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### Multiplication Equations

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<td><strong>Equation:</strong></td>
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<td><strong>Factors:</strong></td>
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Arrays and Equations

Match the array with the equation that describes it.

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
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<tr>
<td>![Array A]</td>
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<tr>
<th>D</th>
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<td>![Array D]</td>
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<th>G</th>
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<td>![Array G]</td>
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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) $8 \times 2 = 16$  

215
The Number of Elements in an Array

<table>
<thead>
<tr>
<th>A 5 by 3 array has ____ elements.</th>
<th>A 4 by 4 array has ____ elements.</th>
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<tbody>
<tr>
<td>A 7 by 3 array has ____ elements.</td>
<td>A 4 by 6 array has ____ elements.</td>
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<tr>
<td>A 4 by 9 array has ____ elements.</td>
<td>An 8 by 3 array has ____ elements.</td>
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<tr>
<td>A 3 by 6 array has ____ elements.</td>
<td>An 8 by 5 array has ____ elements.</td>
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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.

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___ by ___
• Conway

• Eaton

• Madison

• Freedom

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

Multiply all coordinates by 2.
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 PQ three times as long as AB? Yes No
Is QR three times as long as BC? Yes No
Is RS three times as long as CD? Yes No
Is PS three times as long as 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.
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 \( \overline{WI} \) 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 \( \angle TWS \). _______

200
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.

   ![Number Line Diagram]

   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.

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>P</th>
<th>Q</th>
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Show below the number of units in each segment.

<table>
<thead>
<tr>
<th></th>
<th>AB</th>
<th>BC</th>
<th>AC</th>
<th>PQ</th>
<th>QR</th>
<th>PR</th>
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Is PQ twice as long as AB? ________
Is QR twice as long as BC? ________
Is PR twice as long as AC? ________
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.
Pictures in the Plane

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 $PQRS$? 

192
Pictures in the Plane

A.
Pictures in the Plane

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 PQ, QR, and 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.

<table>
<thead>
<tr>
<th></th>
<th>( \overline{AB} )</th>
<th>( \overline{BC} )</th>
<th>( \overline{PR} )</th>
<th>( \angle ABC )</th>
<th>( \angle RPQ )</th>
<th>( \angle BCA )</th>
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190
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. Give numbers describing A, B, C, D.
   \[ A(\quad,\quad), \quad B(\quad,\quad), \quad C(\quad,\quad), \quad D(\quad,\quad). \]
   Draw \( \overline{AC} \) and \( \overline{BD} \). Call their point of intersection \( E \).

   Give numbers describing \( E \). \( (\quad,\quad) \)
   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. \( (\quad,\quad)(\quad,\quad) \)

   Draw \( \overrightarrow{AB} \) and \( \overrightarrow{CD} \). What kind of figure is \( ABCD \)? _______

   Draw \( \overrightarrow{CD} \).

   Give numbers describing the point where \( \overrightarrow{CD} \) meets the
   bottom line. \( (\quad,\quad) \).
4. Draw segments joining the following points in order:

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?
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 ( , ).
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 $(n, m)$, $(n, m)$, $(n, m)$, $(n, m)$, $(n, m)$, and $(n, m)$. 
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?  

181
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.

   A   B

   _______________________

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? ________
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 BC is ______ units.
The length of AD is ______ units.
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 = \_\_
VIII - III = \_\_
XVII - XVI = \_\_
X - V = \_\_
X - VII = \_\_
L - XX = \_\_\_

174
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:

$$\text{III} + \text{II}$$

we get $$\text{IIII}.$$ But the Romans never wrote five I’s together. Instead, they wrote $$\text{V}.$$ 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:

$$\text{D}$$ for 500
$$\text{M}$$ for 1000

What do you think the Romans’ rule for $$\text{D}$$ was?

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

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

$$\text{III} + \text{II} = \underline{\text{V}}$$
$$\text{XIII} + \text{III} = \underline{\text{XVI}}$$
$$\text{XXXIII} + \text{III} = \underline{\text{XCVI}}$$
$$\text{CII} + \text{XI} + \text{LII} = \underline{\text{172}}$$
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 = XVIII
XII + V = _______
XXIII + VI = _______
LXI + VII = _______
CXV + LI + X = _______

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

CXI + LVI = CLXVII
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:

\[ XI = 10 + 1 = 11 \]

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.
   \[ \text{VIII} = \underline{\phantom{00000}} \]
   \[ \text{LXV} = \underline{\phantom{00000}} \]
   \[ \text{CXI} = \underline{\phantom{00000}} \]
   \[ \text{XXXVI} = \underline{\phantom{00000}} \]
   \[ \text{CCLXII} = \underline{\phantom{00000}} \]

2. Here is a simple addition in Roman numerals:

\[ \text{VI} + \text{II} = \text{VIII} \]

To add \text{VI} and \text{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:

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>5</td>
<td>V</td>
<td>10</td>
<td>X</td>
</tr>
<tr>
<td>1</td>
<td>I</td>
<td>6</td>
<td>VI</td>
</tr>
<tr>
<td>2</td>
<td>II</td>
<td>7</td>
<td>VII</td>
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<tr>
<td>3</td>
<td>III</td>
<td>8</td>
<td>VIII</td>
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<tr>
<td>4</td>
<td>III</td>
<td>9</td>
<td>VIII</td>
</tr>
</tbody>
</table>

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

169
6. To do this one use each of the numbers
   
   1, 2, 3, 4, 5, 6, 7, 8, 9

   once and only once.

   \[ \begin{array}{ccc}
   & & \\
   & & \\
   & & 15 \\
   \end{array} \]

   \[ \begin{array}{ccc}
   15 & 15 & 15 \\
   & & \\
   & & \\
   \end{array} \]

7. Two subsets of an array are called \textit{diagonal subsets}. In the
   arrays below the diagonal subsets are shaded:

   \[ \begin{array}{ccc}
   \text{Shaded} & & \\
   & & \\
   & & \\
   \end{array} \]

   \[ \begin{array}{ccc}
   & & \\
   & & \\
   \text{Shaded} & & \\
   \end{array} \]

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

   The array you will find is called a "magic square."
4. How many ways are there to do this one? __________

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<tbody>
<tr>
<td>9</td>
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<td>9</td>
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<tr>
<td></td>
<td>9</td>
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</tr>
</tbody>
</table>

24  24  24

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

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>4</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
<td>9</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>7</td>
<td></td>
</tr>
</tbody>
</table>

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.

```
<table>
<thead>
<tr>
<th>0</th>
<th></th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>
```

```
1  2  3
```

3. Now try this one:

```
<table>
<thead>
<tr>
<th>7</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
```

```
20 20 20
```

```
20 20 20
```

166
1. Here is an array of numbers.

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>4</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

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.

\[
\begin{align*}
1, & \quad 2, \quad 3, \quad 4, \quad 5, \quad 6, \quad 7 \\
\_\_\_\_\_\_ & \quad = \quad \_\_\_\_\_\_ \\
\_\_\_\_\_\_ & \quad = \quad \_\_\_\_\_\_ 
\end{align*}
\]

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

\[
\begin{align*}
5, & \quad 13, \quad 7, \quad 5, \quad 9, \quad 16, \quad 13 \\
\_\_\_\_\_\_ & \quad = \quad \_\_\_\_\_\_ \\
\_\_\_\_\_\_ & \quad = \quad \_\_\_\_\_\_ \\
\_\_\_\_\_\_ & \quad = \quad \_\_\_\_\_\_ 
\end{align*}
\]
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  (b)  9, 8, 3, 6
        ___________ 8       ___________ 17
        ___________ 12       ___________ 9
   (c)  6, 5, 8, 4, 7  (d)  9, 8, 7, 6, 2
        ___________ 15       ___________ 17
        ___________ 15       ___________ 15

6. Look back at Problem 5. How many ways can you find to do
each of those examples.
   (a) _______          (b) _______
   (c) _______          (d) _______
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 three numbers that add up to 17, leaving a subset of two numbers that add up to 11?

_______ + _______ + _______ = 17

_______ + _______ = 11

161
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.
   \[ 9 + 6 + 4 = \ldots \]
   Now change the order of the numbers:
   \[ 6 + 4 + 9 = \ldots \]
   Is the answer the same? \ldots 
   Which order do you like better? \ldots 
   Why? \ldots 

6. \[ 7 + 9 + 3 + 1 = \ldots \]
   Can you change the order of the numbers so that the addition is easier? \ldots 
   How? \ldots 

7. \[ 8 + 5 - 7 - 4 = \ldots \]

8. \[ 3 + 9 + 7 - 1 = \ldots \]

9. \[ 3 + 8 + 4 + 3 = \ldots \]

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!) 

\ldots 

\ldots 

159
★ 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? \_\_\_\_\_\_\_

158
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?

A

B

C

157
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? 

![Diagram of circles A and B with dots]

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? 

![Diagram of circles A and B with dots]

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?
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.
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.
Problem Solving

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?

Draw pictures to help solve the problem.

cups

plates

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?


They won _______ games.

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?


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.
<table>
<thead>
<tr>
<th></th>
<th>What must be renamed?</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>347 - 128</td>
<td>100</td>
</tr>
<tr>
<td>2</td>
<td>814 - 381</td>
<td>100</td>
</tr>
<tr>
<td>3</td>
<td>73 - 48</td>
<td>100</td>
</tr>
<tr>
<td>4</td>
<td>132 - 29</td>
<td>100</td>
</tr>
<tr>
<td>5</td>
<td>49 - 27</td>
<td>100</td>
</tr>
<tr>
<td>6</td>
<td>205 - 91</td>
<td>100</td>
</tr>
<tr>
<td>7</td>
<td>981 - 257</td>
<td>100</td>
</tr>
<tr>
<td>8</td>
<td>604 - 391</td>
<td>100</td>
</tr>
<tr>
<td>9</td>
<td>876 - 59</td>
<td>100</td>
</tr>
<tr>
<td>10</td>
<td>603 - 291</td>
<td>100</td>
</tr>
<tr>
<td>11</td>
<td>540 - 239</td>
<td>100</td>
</tr>
<tr>
<td>12</td>
<td>809 - 397</td>
<td>100</td>
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</tbody>
</table>
Computing the Difference

<table>
<thead>
<tr>
<th>Calculation</th>
</tr>
</thead>
<tbody>
<tr>
<td>871 - 390</td>
</tr>
<tr>
<td>708 - 345</td>
</tr>
<tr>
<td>557 - 273</td>
</tr>
<tr>
<td>469 - 283</td>
</tr>
<tr>
<td>673 - 280</td>
</tr>
</tbody>
</table>
Computing the Difference

\[
\begin{align*}
514 - 123 & \\
947 - 254 & \\
428 - 286 & \\
618 - 264 & \\
728 - 375 & 
\end{align*}
\]
Computing the Difference

<table>
<thead>
<tr>
<th>615 - 283</th>
</tr>
</thead>
<tbody>
<tr>
<td>719 - 237</td>
</tr>
<tr>
<td>476 - 285</td>
</tr>
<tr>
<td>827 - 265</td>
</tr>
</tbody>
</table>
Finding Differences

Find the difference between each pair of numbers.

<table>
<thead>
<tr>
<th>1) 349 and 184</th>
<th>6) 539 and 284</th>
</tr>
</thead>
</table>
| \[
\begin{align*}
200 &+ 140 + 9 \\
(100 &+ 80 + 4) \\
\frac{100 &+ 60 + 5}{}
\end{align*}
\] |
| \_ \_ \_ |

<table>
<thead>
<tr>
<th>2) 901 and 290</th>
<th>7) 504 and 242</th>
</tr>
</thead>
<tbody>
<tr>
<td>_ _ _</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3) 847 and 283</th>
<th>8) 928 and 296</th>
</tr>
</thead>
<tbody>
<tr>
<td>_ _ _</td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>4) 638 and 293</th>
<th>9) 588 and 297</th>
</tr>
</thead>
<tbody>
<tr>
<td>_ _ _</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>5) 427 and 295</th>
<th>10) 650 and 180</th>
</tr>
</thead>
<tbody>
<tr>
<td>_ _ _</td>
<td></td>
</tr>
</tbody>
</table>

131
### 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.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1)</td>
<td>391 and 269</td>
</tr>
<tr>
<td>2)</td>
<td>994 and 267</td>
</tr>
<tr>
<td>3)</td>
<td>792 and 269</td>
</tr>
<tr>
<td>4)</td>
<td>545 and 237</td>
</tr>
<tr>
<td>5)</td>
<td>434 and 329</td>
</tr>
<tr>
<td>6)</td>
<td>289 and 168</td>
</tr>
<tr>
<td>7)</td>
<td>678 and 339</td>
</tr>
<tr>
<td>8)</td>
<td>387 and 178</td>
</tr>
<tr>
<td>9)</td>
<td>963 and 238</td>
</tr>
<tr>
<td>10)</td>
<td>852 and 548</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>----------------------</td>
<td>----------------------</td>
</tr>
<tr>
<td><strong>348 - 129</strong></td>
<td></td>
</tr>
<tr>
<td><strong>761 - 356</strong></td>
<td></td>
</tr>
<tr>
<td><strong>532 - 318</strong></td>
<td></td>
</tr>
<tr>
<td><strong>974 - 538</strong></td>
<td></td>
</tr>
<tr>
<td><strong>883 - 647</strong></td>
<td></td>
</tr>
</tbody>
</table>
## Computing Differences

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>672</td>
<td>- 235</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>591</td>
<td>- 347</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>894</td>
<td>- 488</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>750</td>
<td>- 237</td>
</tr>
</tbody>
</table>
Renaming the Sum

1) \[ 448 - 129 \]
   \[ 448 = 400 + 30 + 18 \]

2) \[ 572 - 227 \]
   \[ 572 = \underline{\_} + \underline{\_} + \underline{\_} \]

3) \[ 740 - 235 \]
   \[ 740 = \underline{\_} + \underline{\_} + \underline{\_} \]

4) \[ 571 - 329 \]
   \[ 571 = \underline{\_} + \underline{\_} + \underline{\_} \]

5) \[ 884 - 366 \]
   \[ 884 = \underline{\_} + \underline{\_} + \underline{\_} \]

6) \[ 793 - 458 \]
   \[ 793 = \underline{\_} + \underline{\_} + \underline{\_} \]

7) \[ 366 - 138 \]
   \[ 366 = \underline{\_} + \underline{\_} + \underline{\_} \]

8) \[ 857 - 248 \]
   \[ 857 = \underline{\_} + \underline{\_} + \underline{\_} \]
The Difference Between Two Numbers

Compute:

<table>
<thead>
<tr>
<th>384 - 162 = _____</th>
<th>765 - 334 = _____</th>
</tr>
</thead>
<tbody>
<tr>
<td>987 - 234 = _____</td>
<td>905 - 704 = _____</td>
</tr>
<tr>
<td>879 - 235 = _____</td>
<td>598 - 275 = _____</td>
</tr>
<tr>
<td>374 - 152 = _____</td>
<td>384 - 163 = _____</td>
</tr>
</tbody>
</table>
Computing the Difference Between Two Numbers

<table>
<thead>
<tr>
<th>534 - 123 = _____</th>
<th>758 - 325 = _____</th>
</tr>
</thead>
<tbody>
<tr>
<td>947 - 314 = _____</td>
<td>862 - 531 = _____</td>
</tr>
<tr>
<td>428 - 216 = _____</td>
<td>753 - 443 = _____</td>
</tr>
<tr>
<td>698 - 264 = _____</td>
<td>589 - 263 = _____</td>
</tr>
</tbody>
</table>
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: \(385 - 152 = \underline{\quad} \)

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.

\(\underline{\quad}\) hundreds, \(\underline{\quad}\) tens, \(\underline{\quad}\) ones.

We can write this: \(\underline{\quad} + \underline{\quad} + \underline{\quad} = \underline{\quad}\)

\[
\begin{align*}
300 + 80 + 5 \\
- (100 + 50 + 2)
\end{align*}
\]

\[
\frac{200 + 30 + 3}{= \underline{\quad}}
\]

Wayne has \(\underline{\quad}\) 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 balloons 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

<table>
<thead>
<tr>
<th>46 and 19</th>
<th>43 and 25</th>
</tr>
</thead>
<tbody>
<tr>
<td>92 and 47</td>
<td>62 and 44</td>
</tr>
<tr>
<td>53 and 26</td>
<td>51 and 26</td>
</tr>
<tr>
<td>84 and 35</td>
<td>67 and 39</td>
</tr>
<tr>
<td>74 and 39</td>
<td>45 and 16</td>
</tr>
<tr>
<td>82 and 25</td>
<td>52 and 19</td>
</tr>
</tbody>
</table>
Computing the Difference

<table>
<thead>
<tr>
<th>75 - 39 = _______</th>
<th>53 - 34 = _______</th>
</tr>
</thead>
<tbody>
<tr>
<td>64 - 18 = _______</td>
<td>63 - 17 = _______</td>
</tr>
<tr>
<td>82 - 24 = _______</td>
<td>81 - 27 = _______</td>
</tr>
</tbody>
</table>
Computing the Difference

<table>
<thead>
<tr>
<th>92 - 85 = ________</th>
<th>94 - 76 = ________</th>
</tr>
</thead>
<tbody>
<tr>
<td>56 - 39 = ________</td>
<td>75 - 58 = ________</td>
</tr>
<tr>
<td>25 - 17 = ________</td>
<td>86 - 29 = ________</td>
</tr>
</tbody>
</table>
## Computing the Difference Between Two Numbers

<table>
<thead>
<tr>
<th>Calculation</th>
<th>Answer</th>
<th>Calculation</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>75 - 28 = ___</td>
<td>47</td>
<td>68 - 29 = ___</td>
<td>39</td>
</tr>
<tr>
<td>[75 = \frac{60 + 15}{40 + 7} = 47]</td>
<td>[68 = \frac{20 + 8}{29} = 39]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>84 - 16 = ___</td>
<td>68</td>
<td>46 - 27 = ___</td>
<td>19</td>
</tr>
<tr>
<td>84 - 16</td>
<td>68 - 27</td>
<td></td>
<td></td>
</tr>
<tr>
<td>53 - 24 = ___</td>
<td>29</td>
<td>35 - 17 = ___</td>
<td>18</td>
</tr>
<tr>
<td>53 - 24</td>
<td>35 - 17</td>
<td></td>
<td></td>
</tr>
<tr>
<td>92 - 65 = ___</td>
<td>27</td>
<td>62 - 48 = ___</td>
<td>14</td>
</tr>
<tr>
<td>92 - 65</td>
<td>62 - 48</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

118
## Renaming the Sum

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
</table>
| 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 = ___ + ___ |
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.

<table>
<thead>
<tr>
<th>395 + 282</th>
<th>784 + 192</th>
</tr>
</thead>
<tbody>
<tr>
<td>651 + 263</td>
<td>493 + 276</td>
</tr>
<tr>
<td>364 + 273</td>
<td>487 + 161</td>
</tr>
<tr>
<td>276 + 550</td>
<td>386 + 253</td>
</tr>
</tbody>
</table>
### Renaming Ten Tens

<table>
<thead>
<tr>
<th>783 + 643 = _____</th>
<th>495 + 192 = _____</th>
</tr>
</thead>
<tbody>
<tr>
<td>496 + 213 = _____</td>
<td>384 + 571 = _____</td>
</tr>
<tr>
<td>764 + 142 = _____</td>
<td>135 + 284 = _____</td>
</tr>
<tr>
<td>431 + 176 = _____</td>
<td>327 + 292 = _____</td>
</tr>
</tbody>
</table>
Renaming Ten Tens

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>396</td>
<td>+283</td>
<td>765</td>
</tr>
<tr>
<td>493</td>
<td>+215</td>
<td></td>
</tr>
<tr>
<td>613</td>
<td>+196</td>
<td>384</td>
</tr>
<tr>
<td>794</td>
<td>+173</td>
<td>342</td>
</tr>
</tbody>
</table>

113
<table>
<thead>
<tr>
<th></th>
<th>300 + 170 + 8</th>
<th>400 + 70 + 8 = 478</th>
<th>400 + 190 + 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>600 + 590 + 10 = 1199</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>500 + 120 + 7</td>
<td></td>
<td>800 + 130 + 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>900 + 150 + 3</td>
</tr>
<tr>
<td></td>
<td>100 + 140 + 6</td>
<td></td>
<td>600 + 160 + 6</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1200 + 2</td>
</tr>
<tr>
<td></td>
<td>700 + 150 + 0</td>
<td></td>
<td>100 + 100 + 5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1200 + 5</td>
</tr>
<tr>
<td></td>
<td>200 + 100 + 8</td>
<td></td>
<td>800 + 190 + 9</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1800 + 9</td>
</tr>
</tbody>
</table>
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.

So, 237 + 191 = 300 + 120 + 8

= 300 + 100 + 20 + 8

= 400 + 20 + 8

= 428

We can write:

OR

237 = 200 + 30 + 7
191 = 100 + 90 + 1
300 + 120 + 8
400 + 20 + 8 = 428

Ann has 428 stamps.
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:

<table>
<thead>
<tr>
<th>437 + 243</th>
<th>461 + 279</th>
</tr>
</thead>
<tbody>
<tr>
<td>537 + 256</td>
<td>825 + 137</td>
</tr>
<tr>
<td>347 + 268</td>
<td>158 + 629</td>
</tr>
</tbody>
</table>
The Sum of Two Numbers

Compute:

<table>
<thead>
<tr>
<th>204 + 567</th>
<th>348 + 236</th>
</tr>
</thead>
<tbody>
<tr>
<td>753 + 239</td>
<td>546 + 329</td>
</tr>
<tr>
<td>728 + 267</td>
<td>806 + 187</td>
</tr>
</tbody>
</table>
The Sum of Two Numbers

Compute:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>248</td>
<td>394</td>
</tr>
<tr>
<td>+129</td>
<td>+283</td>
</tr>
<tr>
<td>369</td>
<td>348</td>
</tr>
<tr>
<td>+128</td>
<td>+161</td>
</tr>
<tr>
<td>764</td>
<td>586</td>
</tr>
<tr>
<td>+29</td>
<td>+123</td>
</tr>
<tr>
<td>459</td>
<td>340</td>
</tr>
<tr>
<td>+26</td>
<td>+360</td>
</tr>
</tbody>
</table>
The Sum of Two Numbers

Compute:

<table>
<thead>
<tr>
<th>345</th>
<th>538</th>
</tr>
</thead>
<tbody>
<tr>
<td>+249</td>
<td>+237</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>816</th>
<th>248</th>
</tr>
</thead>
<tbody>
<tr>
<td>+185</td>
<td>+125</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>347</th>
<th>723</th>
</tr>
</thead>
<tbody>
<tr>
<td>+226</td>
<td>+158</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>707</th>
<th>349</th>
</tr>
</thead>
<tbody>
<tr>
<td>+105</td>
<td>+233</td>
</tr>
</tbody>
</table>
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 $10 + 3$.

So, $237 + 126 = 300 + 50 + 13$

$= 300 + 60 + 3$

$= 363$

We can write:

\[
\begin{align*}
237 &= 200 + 30 + 7 & \text{OR} & & 237 \\
126 &= 100 + 20 + 6 & & + 126 \\
300 + 50 + 13 &= 300 + 60 + 3 &= 363
\end{align*}
\]

Ann has 363 stamps.
The Sum of Two Numbers

Compute:

1)  59 + 37 = _______    9)  63 + 19 = _______

2)  46 + 28 = _______    10)  54 + 37 = _______

3)  37 + 55 = _______    11)  63 + 28 = _______

4)  14 + 78 = _______    12)  15 + 75 = _______

5)  25 + 69 = _______    13)  39 + 59 = _______

6)  38 + 47 = _______    14)  28 + 69 = _______

7)  65 + 26 = _______    15)  47 + 39 = _______

8)  47 + 37 = _______    16)  29 + 28 = _______
The Sum of Two Numbers

Compute:

<table>
<thead>
<tr>
<th>76 + 18</th>
<th>67 + 19</th>
</tr>
</thead>
<tbody>
<tr>
<td>58 + 7</td>
<td>59 + 38</td>
</tr>
<tr>
<td>35 + 46</td>
<td>47 + 9</td>
</tr>
</tbody>
</table>
The Sum of Two Numbers

Compute:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>63 + 29</td>
<td>58 + 25</td>
</tr>
<tr>
<td>54 + 27</td>
<td>49 + 28</td>
</tr>
<tr>
<td>65 + 29</td>
<td>23 + 47</td>
</tr>
</tbody>
</table>
## Renaming Ones

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

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>27 + 35</td>
<td>13</td>
<td>45 + 9</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>57 + 26</td>
<td>14</td>
<td>42 + 56</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>54 + 25</td>
<td>15</td>
<td>67 + 23</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>73 + 27</td>
<td>16</td>
<td>57 + 16</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>41 + 14</td>
<td>17</td>
<td>34 + 57</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>43 + 26</td>
<td>18</td>
<td>23 + 64</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>35 + 40</td>
<td>19</td>
<td>89 + 7</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>26 + 38</td>
<td>20</td>
<td>66 + 27</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>37 + 48</td>
<td>21</td>
<td>47 + 29</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>74 + 13</td>
<td>22</td>
<td>28 + 39</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>29 + 8</td>
<td>23</td>
<td>33 + 52</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>25 + 18</td>
<td>24</td>
<td>17 + 64</td>
<td></td>
</tr>
</tbody>
</table>
E. Join the new set of ten to the other sets of ten.

(30 + 20 + 10)  (4)

These are the ones.

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

F. You can write:

36 + 28
36 = 30 + 6  OR  36 + 28
28 = 20 + 8   \[\begin{array}{c}
\frac{36}{14} \\
\frac{50}{64}
\end{array}\]

50 + 14 = 50 + 10 + 4 = 64

99
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:

\[ 36 + 28 = \quad \] __________

<table>
<thead>
<tr>
<th>A. Think of 36 as:</th>
<th>B. Think of 28 as:</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Diagram" /></td>
<td><img src="image2" alt="Diagram" /></td>
</tr>
<tr>
<td>((30 + 6))</td>
<td>((20 + 8))</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>C. Join the tens:</th>
<th>D. Join the ones:</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image3" alt="Diagram" /></td>
<td><img src="image4" alt="Diagram" /></td>
</tr>
<tr>
<td>((30 + 20))</td>
<td>((6 + 8))</td>
</tr>
</tbody>
</table>

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:

<table>
<thead>
<tr>
<th>127 + 651</th>
<th>504 + 265</th>
</tr>
</thead>
<tbody>
<tr>
<td>1645 + 8253</td>
<td>7064 + 1825</td>
</tr>
<tr>
<td>8403 + 1596</td>
<td>3754 + 5005</td>
</tr>
</tbody>
</table>
The Sum of Two Numbers

Compute:

<table>
<thead>
<tr>
<th>362 + 507</th>
<th>450 + 249</th>
</tr>
</thead>
<tbody>
<tr>
<td>743 + 253</td>
<td>804 + 194</td>
</tr>
<tr>
<td>512 + 466</td>
<td>277 + 702</td>
</tr>
</tbody>
</table>
The Sum of Two Numbers

Compute:

<table>
<thead>
<tr>
<th>67 + 32</th>
<th>45 + 56</th>
</tr>
</thead>
<tbody>
<tr>
<td>74 + 15</td>
<td>58 + 31</td>
</tr>
<tr>
<td>46 + 53</td>
<td>36 + 32</td>
</tr>
</tbody>
</table>
The Sum of Two Numbers

Compute:

<table>
<thead>
<tr>
<th>52 + 37</th>
<th>83 + 16</th>
</tr>
</thead>
<tbody>
<tr>
<td>26 + 42</td>
<td>43 + 55</td>
</tr>
<tr>
<td>72 + 13</td>
<td>14 + 44</td>
</tr>
</tbody>
</table>
Comparing Numbers

Write $<$ or $>$ between each pair of numerals.

<p>| | | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>129</td>
<td>156</td>
<td>391</td>
<td>450</td>
<td>376</td>
<td>285</td>
<td></td>
<td></td>
</tr>
<tr>
<td>175</td>
<td>200</td>
<td>402</td>
<td>343</td>
<td>491</td>
<td>176</td>
<td></td>
<td></td>
</tr>
<tr>
<td>235</td>
<td>167</td>
<td>156</td>
<td>380</td>
<td>207</td>
<td>377</td>
<td></td>
<td></td>
</tr>
<tr>
<td>253</td>
<td>350</td>
<td>287</td>
<td>459</td>
<td>176</td>
<td>253</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<p>| | | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>500</td>
<td>1500</td>
<td>3520</td>
<td>2001</td>
<td>3427</td>
<td>3548</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2000</td>
<td>1000</td>
<td>756</td>
<td>1156</td>
<td>2763</td>
<td>3276</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3500</td>
<td>2500</td>
<td>2356</td>
<td>2556</td>
<td>4051</td>
<td>4027</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4000</td>
<td>500</td>
<td>3702</td>
<td>3046</td>
<td>1776</td>
<td>1492</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
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 \( \{ \} \).
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 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:
   ____________________________________________________
   ____________________________________________________
   ____________________________________________________
   ____________________________________________________

91
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.

   ________________________________________________________________
   ________________________________________________________________
   ________________________________________________________________
   ________________________________________________________________
   ________________________________________________________________
   ________________________________________________________________
   ________________________________________________________________

90
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 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:
   ____________________________
   ____________________________
   ____________________________
   ____________________________
   ____________________________

91
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.

________________________________________
________________________________________
________________________________________
________________________________________
________________________________________

90
Naming a Number in Different Ways

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

   [Diagram]

2. Show 6549 with only 5 thousands.

   [Diagram]

3. Show 6549 with only 3 tens.

   [Diagram]

4. Show 6549 with only 4 hundreds.

   [Diagram]
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

88
Renaming Numbers

1. \[4000 + 200 + 40 + 3 = \]

2. \[6000 + 300 + 30 + 7 = \]

3. \[\_ + \_ + \_ + \_ = \]

4. \[\_ + \_ + \_ + \_ = \]

5. \[\_ + \_ + \_ + \_ = \]

6. \[\_ + \_ + \_ + \_ = \]
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 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.

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

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>764</td>
<td>227</td>
<td>582</td>
<td>B</td>
<td></td>
</tr>
<tr>
<td>491</td>
<td>143</td>
<td>A</td>
<td>625</td>
<td></td>
</tr>
<tr>
<td>716</td>
<td>922</td>
<td>307</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
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.

_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________
Different Ways of Thinking About a Number

75 = _____ tens + _____ ones = _____ tens + _____ ones

| 68 = _____ tens + _____ ones | 57 = _____ tens + _____ ones |
| or _____ tens + _____ ones | or _____ tens + _____ ones |

| 94 = _____ tens + _____ ones | 84 = _____ tens + _____ ones |
| or _____ tens + _____ ones | or _____ tens + _____ ones |

| 39 = _____ tens + _____ ones | 71 = _____ tens + _____ one |
| or _____ tens + _____ ones | or _____ tens + _____ ones |

| 62 = _____ tens + _____ ones | 96 = _____ tens + _____ ones |
| or _____ tens + _____ ones | or _____ tens + _____ ones |

| 49 = _____ tens + _____ ones | 74 = _____ tens + _____ ones |
| or _____ 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. _______________
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.

81
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.

<table>
<thead>
<tr>
<th>847 = 800 + 40 + 7</th>
<th>603 = __________</th>
</tr>
</thead>
<tbody>
<tr>
<td>235 = __________</td>
<td>476 = __________</td>
</tr>
<tr>
<td>670 = __________</td>
<td>875 = __________</td>
</tr>
<tr>
<td>509 = __________</td>
<td>570 = __________</td>
</tr>
<tr>
<td>999 = __________</td>
<td>409 = __________</td>
</tr>
<tr>
<td>419 = __________</td>
<td>888 = __________</td>
</tr>
<tr>
<td>__________ = 700 + 4</td>
<td>__________ = 800 + 10</td>
</tr>
<tr>
<td>__________ = 20 + 100 + 8</td>
<td>__________ = 200 + 30 + 5</td>
</tr>
<tr>
<td>__________ = 6 + 30 + 800</td>
<td>__________ = 4 + 600</td>
</tr>
<tr>
<td>__________ = 200 + 80</td>
<td>__________ = 80 + 900</td>
</tr>
<tr>
<td>__________ = 5 + 600</td>
<td>__________ = 5 + 200</td>
</tr>
</tbody>
</table>
Hundreds, Tens, and Ones

\[
\begin{array}{cccc}
\times\times\times\times\times\times\times\times\times\times \times\times\times\times\times\times\times\times\times\times \\
\times\times\times\times\times\times\times\times\times\times \times\times\times\times\times\times\times\times\times\times \\
\times\times\times\times\times\times\times\times\times\times \times\times\times\times\times\times\times\times\times\times \\
\times\times\times\times\times\times\times\times\times\times \times\times\times\times\times\times\times\times\times\times \\
\times\times\times\times\times\times\times\times\times\times \times\times\times\times\times\times\times\times\times\times \\
\times\times\times\times\times\times\times\times\times\times \times\times\times\times\times\times\times\times\times\times \\
\times\times\times\times\times\times\times\times\times\times \times\times\times\times\times\times\times\times\times\times \\
\times\times\times\times\times\times\times\times\times\times \times\times\times\times\times\times\times\times\times\times \\
\end{array}
\]

\[
124 = 100 + 20 + 4
\]

Fill in the blanks:

\[
\begin{array}{cccc}
563 = \underline{500} + \underline{60} + \underline{3}
\\
247 = \\
486 = \\
625 = \\
\underline{\phantom{500}} = \underline{700} + \underline{40} + \underline{1}
\\
\underline{\phantom{500}} = \underline{500} + \underline{90} + \underline{8}
\\
\underline{\phantom{400}} = \underline{400} + \underline{60}
\\
\underline{\phantom{800}} = \underline{800} + \underline{2}
\end{array}
\]
Hundreds, Tens, and Ones

Complete each of these.

<table>
<thead>
<tr>
<th>1 one hundred</th>
<th>10 tens</th>
<th>1 ten</th>
<th>10 ones</th>
</tr>
</thead>
<tbody>
<tr>
<td>186: ___ hundred, ___ tens, and ___ ones</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>342: ___ hundreds, ___ tens, and ___ ones</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>203: ___ hundreds, ___ tens, and ___ ones</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>230: ___ hundreds, ___ tens, and ___ ones</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>___: 6 hundreds, 2 tens, and 5 ones</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>___: 4 hundreds, 9 tens, and 6 ones</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>___: 7 hundreds, 0 tens, and 4 ones</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>___: 5 hundreds, 4 tens, and 1 one</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Tens and Ones

Fill in the blanks.

______ tens, _____ ones
or

______ tens, _____ ones

______ tens, _____ ones
or

______ tens, _____ ones

______ 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.

\[
\begin{align*}
7 + (9) &= 16 & 8 + &= 15 \\
+ 8 &= &- 7 = &- 6 = \\
4 + &= 11 &6 + &= 12 \\
2 + &= - 7 = &8 + &= - 9 = \\
8 + &= 14 &6 + &= 13 \\
5 + &= - 5 = &5 + &= - 7 =
\end{align*}
\]
### Miscellaneous Exercises

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

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. $7 + 6$</td>
<td></td>
</tr>
<tr>
<td>2. $5 + 8$</td>
<td>$5 + 9$</td>
</tr>
<tr>
<td>3. $9 + 3$</td>
<td>$2 + 9$</td>
</tr>
<tr>
<td>4. $6 + 3$</td>
<td>$9 + 1$</td>
</tr>
<tr>
<td>5. $6 + 5$</td>
<td>$5 + 6$</td>
</tr>
<tr>
<td>6. $2 + 9$</td>
<td>$9 + 2$</td>
</tr>
<tr>
<td>7. $7 + 3$</td>
<td>$4 + 7$</td>
</tr>
<tr>
<td>8. $6 + 6$</td>
<td>$6 + 5$</td>
</tr>
<tr>
<td>9. $2 + 7$</td>
<td>$3 + 7$</td>
</tr>
<tr>
<td>10. $4 + 8$</td>
<td>$8 + 4$</td>
</tr>
<tr>
<td>11. $6 + 2$</td>
<td>$2 + 6$</td>
</tr>
<tr>
<td>12. $2 + 9$</td>
<td>$8 + 3$</td>
</tr>
<tr>
<td>13. $5 + 8$</td>
<td>$8 + 5$</td>
</tr>
<tr>
<td>14. $4 + 8$</td>
<td>$6 + 5$</td>
</tr>
<tr>
<td>15. $3 + 9$</td>
<td>$9 + 3$</td>
</tr>
<tr>
<td>16. $6 + 4$</td>
<td>$7 + 3$</td>
</tr>
</tbody>
</table>

Make these true by using `+` and `-`.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. $4$</td>
<td>$2 &gt; 7$</td>
</tr>
<tr>
<td>2. $9$</td>
<td>$7 &lt; 8$</td>
</tr>
<tr>
<td>3. $8$</td>
<td>$2 &lt; 7$</td>
</tr>
<tr>
<td>4. $7$</td>
<td>$7 &gt; 8$</td>
</tr>
<tr>
<td>5. $8$</td>
<td>$9 &lt; 9$</td>
</tr>
<tr>
<td>6. $9$</td>
<td>$4 &gt; 7$</td>
</tr>
<tr>
<td>7. $14$</td>
<td>$3 &gt; 8$</td>
</tr>
<tr>
<td>8. $9$</td>
<td>$8 &lt; 6$</td>
</tr>
<tr>
<td>9. $17$</td>
<td>$2 &gt; 8$</td>
</tr>
<tr>
<td>10. $21$</td>
<td>$6 &lt; 9$</td>
</tr>
<tr>
<td>11. $28$</td>
<td>$4 &gt; 15$</td>
</tr>
<tr>
<td>12. $34$</td>
<td>$7 &lt; 25$</td>
</tr>
<tr>
<td>13. $79$</td>
<td>$24 &lt; 149$</td>
</tr>
<tr>
<td>14. $56$</td>
<td>$29 &lt; 12$</td>
</tr>
<tr>
<td>15. $89$</td>
<td>$45 &gt; 134$</td>
</tr>
<tr>
<td>16. $201$</td>
<td>$98 &lt; 300$</td>
</tr>
</tbody>
</table>
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

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.

<table>
<thead>
<tr>
<th></th>
<th>4</th>
<th>2</th>
<th>6</th>
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<tbody>
<tr>
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<td>3</td>
<td></td>
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<tr>
<td>4</td>
<td>5</td>
<td>9</td>
<td></td>
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<th>4</th>
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<tr>
<td>6</td>
<td></td>
<td>10</td>
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<tr>
<td>7</td>
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<th></th>
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<tbody>
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<td>4</td>
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<td></td>
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<th>4</th>
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<td>5</td>
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<tr>
<td>8</td>
<td>13</td>
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<td>11</td>
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<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>14</td>
</tr>
</tbody>
</table>
## Miscellaneous Exercises

Finish each equation.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>(8 + 7) =</td>
<td>(8 + 8) =</td>
</tr>
<tr>
<td>(15 + 7) =</td>
<td>(16 - 8) =</td>
</tr>
<tr>
<td>(6 + 9) =</td>
<td>(9 + 5) =</td>
</tr>
<tr>
<td>(15 + 9) =</td>
<td>(14 - 5) =</td>
</tr>
<tr>
<td>(9 + 8) =</td>
<td>(6 + 8) =</td>
</tr>
<tr>
<td>(17 + 8) =</td>
<td>(14 - 8) =</td>
</tr>
<tr>
<td>(7 + 9) =</td>
<td>(8 + 6) =</td>
</tr>
<tr>
<td>(16 - 9) =</td>
<td>(14 - 6) =</td>
</tr>
<tr>
<td>(5 + _ = 13)</td>
<td>(5 + _ = 14)</td>
</tr>
<tr>
<td>(8 + _ = 13)</td>
<td>(9 + _ = 14)</td>
</tr>
<tr>
<td>(+ 7 = 12)</td>
<td>(+ 9 = 17)</td>
</tr>
<tr>
<td>(+ 5 = 12)</td>
<td>(+ 8 = 17)</td>
</tr>
</tbody>
</table>
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.

\[
\begin{array}{cccc}
12 & 11 & 13 & 14 \\
5 & 7 & 3 & 9 \\
8 & 9 & 6 & 9 \\
4 & 7 & 7 & 6 \\
\end{array}
\]

\[
\begin{array}{cccc}
13 & 16 & 12 & 15 \\
5 & 7 & 10 & 9 \\
7 & 8 & 9 & 8 \\
4 & 9 & 7 & 4 \\
\end{array}
\]
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
Pairs of Numbers

Complete this chart.

<table>
<thead>
<tr>
<th>Number First number</th>
<th>Pair Second number</th>
<th>Operation</th>
<th>Whole number sum or difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>4</td>
<td>+</td>
<td>11</td>
</tr>
<tr>
<td>12</td>
<td>3</td>
<td>-</td>
<td>9</td>
</tr>
<tr>
<td>6</td>
<td>10</td>
<td>-</td>
<td>Not any</td>
</tr>
<tr>
<td>5</td>
<td>8</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>9</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>7</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>14</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>8</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>9</td>
<td></td>
<td>14</td>
</tr>
<tr>
<td>9</td>
<td>5</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>9</td>
<td></td>
<td>Not any</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>+</td>
<td>6</td>
</tr>
<tr>
<td>12</td>
<td></td>
<td></td>
<td>0</td>
</tr>
</tbody>
</table>
Using a Ten in Addition and Subtraction

Think of the sum of the two numbers as 10 and some ones.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>6 + 7 = 10 + 3</td>
<td>9 + 5 =</td>
</tr>
<tr>
<td>7 + 4 = 10 + 1</td>
<td>8 + 6 =</td>
</tr>
<tr>
<td>9 + 6 = 10 +</td>
<td>5 + 6 =</td>
</tr>
<tr>
<td>8 + 5 = 10 +</td>
<td>4 + 8 =</td>
</tr>
<tr>
<td>9 + 2 =</td>
<td>8 + 8 =</td>
</tr>
<tr>
<td>8 + 4 =</td>
<td>7 + 5 =</td>
</tr>
<tr>
<td>5 + 9 =</td>
<td>8 + 3 =</td>
</tr>
<tr>
<td>6 + 8 =</td>
<td>7 + 6 =</td>
</tr>
<tr>
<td>9 + 4 =</td>
<td>9 + 3 =</td>
</tr>
<tr>
<td>5 + 8 =</td>
<td>4 + 7 =</td>
</tr>
<tr>
<td>6 + 5 =</td>
<td>9 + 9 =</td>
</tr>
<tr>
<td>8 + 9 =</td>
<td>7 + 7 =</td>
</tr>
</tbody>
</table>
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.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Image" /></td>
<td><img src="image2.png" alt="Image" /></td>
</tr>
<tr>
<td>6 + 8 = 10 + 4</td>
<td>5 + 9 = ___</td>
</tr>
</tbody>
</table>

6 + 8 = __
5 + 9 = ___

### 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

7 + 7 = ___
Partitions of a Set of Ten Things

Write an equation for each row.

<table>
<thead>
<tr>
<th></th>
<th>10 - 1 + _____</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>10 = 2 + _____</td>
</tr>
<tr>
<td></td>
<td>10 = 3 + _____</td>
</tr>
<tr>
<td></td>
<td>10 = 4 + _____</td>
</tr>
<tr>
<td></td>
<td>10 = 5 + _____</td>
</tr>
<tr>
<td></td>
<td>10 = _____ + ____</td>
</tr>
<tr>
<td></td>
<td>10 = _____ + 3</td>
</tr>
<tr>
<td></td>
<td>10 = _____ + ____</td>
</tr>
<tr>
<td></td>
<td>10 = _____ + ____</td>
</tr>
</tbody>
</table>

Write an equation for each row.

<table>
<thead>
<tr>
<th></th>
<th>2 + 3 + 5 = 10</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3 + 5 + 1 = 10</td>
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<tr>
<td></td>
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</tr>
</tbody>
</table>

63
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: \(10 - 4 = \underline{6}\)
\[6 + 4 = 10\]

1. \(13 - 7 = \underline{6}\)
6. \(15 - 8 = \underline{7}\)

2. \(11 - 6 = \underline{5}\)
7. \(14 - 9 = \underline{5}\)

3. \(16 - 8 = \underline{8}\)
8. \(12 - 5 = \underline{7}\)

4. \(14 - 6 = \underline{8}\)
9. \(13 - 8 = \underline{5}\)

5. \(17 - 9 = \underline{8}\)
10. \(16 - 7 = \underline{9}\)
Addition Chart

<table>
<thead>
<tr>
<th>+</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
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</tbody>
</table>
Intersection of Sets of Numbers

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

2. Set $R$ is the set of whole numbers greater than 50 but less than 54. 
   
   Set $T$ is the set of whole numbers greater than 48 but less than 53. 
   
   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 $G$ is the set of whole numbers greater than 50 but less than 57. 
   
   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 $Y$ is the set of whole numbers greater than 82 but less than 90. 
   
   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
\{ \}.  

57
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"

<p>| | | | |</p>
<table>
<thead>
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<tbody>
<tr>
<td>9</td>
<td>15</td>
<td>18</td>
<td>16</td>
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<tr>
<td>15</td>
<td>19</td>
<td>45</td>
<td>51</td>
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<td>8</td>
<td>6</td>
<td>81</td>
<td>35</td>
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<tr>
<td>21</td>
<td>17</td>
<td>23</td>
<td>8</td>
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<td>35</td>
<td>31</td>
<td>17</td>
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<td>47</td>
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<td>38</td>
<td>49</td>
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<td>21</td>
<td>67</td>
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<td>75</td>
<td>80</td>
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<td></td>
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<td>47</td>
</tr>
<tr>
<td></td>
<td></td>
<td>99</td>
<td>102</td>
</tr>
</tbody>
</table>
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:

![Venn Diagram]

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:

![Venn Diagram]

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. __________________________
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 $11 - 2 = 9$. 

52
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 $M$.

$\{20, 21, 22, 23\}$  $\{24, 25\}$  $\{20, 21, 22\}$
Removing a Subset

1. Set $R = \{\text{dress, hat, sock, shoe, coat}\}$
   Set $T$ is a subset of Set $R$.
   Set $T = \{\text{shoe, sock}\}$
   Ring the set remaining when Set $T$ is removed from Set $R$.
   \{sock, shoe\} \quad \{coat, hat, dress\} \quad \{hat, shoe, coat\}

2. Set $V = \{\text{doll, wagon, ball, house, crayon}\}$
   Set $W = \{\text{ball, crayon}\}$
   Ring the set remaining when Set $W$ is removed from Set $V$.
   \{house, dog, cat, ball\} \quad \{crayon, ball\} \quad \{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\} \quad \{2, 3, 4, 7\} \quad \{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 $K$.
   \{5, 6, 7, 8\} \quad \{6, 7, 8\} \quad \{0, 1, 2, 3, 4\}
Union of Sets

1. Set $A = \{\text{lamb, pig, dog}\}$
   Set $B = \{\text{cow, cat}\}$
   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 $C = \{\text{book, pencil, eraser, crayon}\}$
   Set $D = \{\text{clip, tape, ruler}\}$
   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 $E = \{\text{rubber, tin, doll}\}$
   Set $F = \{\text{ball, kite, bat, car}\}$
   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: various objects]
   [Subset B: various objects removed]

   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.

   [Blank space for drawing]

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.

   [Images of objects with labels A, B, C, D, E, F, G, H, I]

   ___ ______

   Jane  Bob
   Sally  Mary
   Joe    Ann
   Bill   Charles

   ___ ______

48
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

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

<table>
<thead>
<tr>
<th>GIRL</th>
<th>APPLE</th>
<th>GREEN</th>
<th>BANANA</th>
</tr>
</thead>
<tbody>
<tr>
<td>BLUE</td>
<td>GRAPE</td>
<td>BABY</td>
<td>PURPLE</td>
</tr>
<tr>
<td>GRASS</td>
<td>BOOK</td>
<td>PLATE</td>
<td>BLACK</td>
</tr>
</tbody>
</table>

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. ________________________________

45
the PET SHOP
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 $AC$.

   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
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 equilateral triangle.

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.
Right Triangles

Here are triangle ABR and line segment 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
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 region.

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

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>C</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>A</td>
<td>D</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>B</td>
<td>C</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>B</td>
<td>D</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>C</td>
<td>D</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

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 \( AB\!CD \).

Make a tracing of \( AB\!CD \).

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 \( AB\!CD \) 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 $\triangle ABC$.

![Triangle Diagram]

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
Congruence of Polygons

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. ____ ____
Simple Closed Curves

1. Mark an $\times$ 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
Right Angles

7. Test these angles to find the right angles.

[Diagrams of various angles]

_____ and _____ are right angles.

_____ is congruent to _____.

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

[Diagrams of \( \angle RST \) and \( \angle WXY \)]

Is \( \angle RST \) congruent to \( \angle WXY \)? Yes No

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

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 \( AB \).
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 $\overline{CD}$.

![Diagrams of steps 1 to 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 $C$.

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 \( \angle MLO \) and \( \angle MLF \) congruent angles? \hspace{1cm} Yes \hspace{1cm} No
Are \( \angle MLO \) and \( \angle MLF \) right angles? \hspace{1cm} Yes \hspace{1cm} No

2. Test \( \angle PQR \) and \( \angle PQK \) to see if they are congruent.

Are \( \angle PQR \) and \( \angle PQK \) congruent angles? \hspace{1cm} Yes \hspace{1cm} No
Do the points K, Q, and R lie on a line? \hspace{1cm} Yes \hspace{1cm} No
Are \( \angle PQR \) and \( \angle PQK \) right angles? \hspace{1cm} Yes \hspace{1cm} No
4. Is $\angle ACD$ congruent to $\angle BER$? 
Yes  No

5. $\angle \underline{_____}$ is congruent to $\angle \underline{_____}$. 
$\angle \underline{_____}$ is congruent to $\angle \underline{_____}$. 

18
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 \( \overrightarrow{BD} \) a subset of \( \overrightarrow{AB} \)? Yes No
3. Name the vertex and the rays.

- **Diagram 1:**
  - Vertex: ______
  - Rays: ______  ______

- **Diagram 2:**
  - Vertex: ______
  - Rays: ______  ______

- **Diagram 3:**
  - Vertex: ______
  - Rays: ______  ______

- **Diagram 4:**
  - 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. __________
Rays

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

<table>
<thead>
<tr>
<th>A line segment has</th>
<th>A ray has</th>
</tr>
</thead>
<tbody>
<tr>
<td>one endpoint ___</td>
<td>one endpoint ___</td>
</tr>
<tr>
<td>two endpoints $T$</td>
<td>two endpoints ___</td>
</tr>
<tr>
<td>no endpoints ___</td>
<td>no endpoints ___</td>
</tr>
</tbody>
</table>

6. The point $Q$ is marked below.

![Diagram of point Q]

Draw five different rays above, each with endpoint $Q$. 

13
3. Here is another line.

![Line with points Y, L, A, X]

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 $\overrightarrow{YZ}$ 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 $QZ$.

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 AB.

   Draw CD. Is AB a subset of CD? Yes No

   Draw EF. The line segment CD is a subset of ____________.

   Draw EF. Is EF a subset of EF? Yes No
   Is EF a subset of EF? Yes No
   Can you show all of EF? Yes No

---

Some other names for EF are CA, AE, and DF.

Write at least six other names below.
4. Congruence of Line Segments

\[ \overline{AB} \text{ is congruent to } \overline{\_\_\_\_\_\_}, \overline{\_\_\_\_\_\_}, \text{ and } \overline{\_\_\_\_\_\_}. \]

\[ \overline{MQ} \text{ is congruent to } \overline{\_\_\_\_\_\_}, \overline{\_\_\_\_\_\_}, \text{ and } \overline{\_\_\_\_\_\_}. \]
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 AB.

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

7. Here is line segment MN.
   Mark two points on MN. Name them O and T.

   MO is one subset of MN.
   Name five other line segments that are subsets of line segment MN.

   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
1. Here is a picture of a line segment.

   A

   Write a name for this line segment. ________________________

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

   F

   G

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.
Chapter III. Describing Points and Numbers

III - 1. Coordinates of a point on a line .......... 175 - 176
III - 2. Motions on the number line ............... 177 - 180
III - 3. Coordinates in a plane ...................... 181 - 189
III - 4. Plane figures ................................ 190 - 196
III - 5. Stretching pictures of segments on a line .. 197 - 199
III - 6. Enlarging pictures ............................ 200 - 207
III - 7. Scale drawing .................................. 208 - 211

Chapter IV. Arrays and Multiplication

IV - 1. Arrays ............................................ 213 - 215
IV - 2. Multiplication .................................... 216 - 217
IV - 3. The Basic Multiplication Facts ............... 218 - 220
IV - 4. Prime Numbers ................................. 221 - 234
# Student's Text, Book 3

## Chapter I. Sets of Points

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>I - 1</td>
<td>Points, curves, line segments</td>
<td>1 - 8</td>
</tr>
<tr>
<td>I - 2</td>
<td>Lines, rays, and angles</td>
<td>9 - 24</td>
</tr>
<tr>
<td>I - 3</td>
<td>Simple closed curves, polygons</td>
<td>25 - 29</td>
</tr>
<tr>
<td>I - 4</td>
<td>Regions</td>
<td>30 - 37</td>
</tr>
<tr>
<td>I - 5</td>
<td>Some special triangles</td>
<td>38 - 43</td>
</tr>
</tbody>
</table>

## Chapter II. Addition and Subtraction: Review and Extensions

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>II - 1</td>
<td>Sets: joining and removing</td>
<td>44 - 54</td>
</tr>
<tr>
<td>II - 2</td>
<td>Comparisons of sets; order among numbers</td>
<td>55 - 58</td>
</tr>
<tr>
<td>II - 3</td>
<td>Addition and subtraction facts</td>
<td>59 - 75</td>
</tr>
<tr>
<td>II - 4</td>
<td>Place value</td>
<td>76 - 93</td>
</tr>
<tr>
<td>II - 5</td>
<td>Techniques for finding sums</td>
<td>94 - 116</td>
</tr>
<tr>
<td>II - 6</td>
<td>Techniques for finding differences</td>
<td>117 - 136</td>
</tr>
<tr>
<td>II - 7</td>
<td>Problem solving</td>
<td>137 - 146</td>
</tr>
<tr>
<td></td>
<td>Supplementary problem sets</td>
<td>147 - 154</td>
</tr>
<tr>
<td>II - 8</td>
<td>Extensions</td>
<td>155 - 174</td>
</tr>
</tbody>
</table>
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Mathematics for the Elementary School
Book 3

Student's Text, Part I

REVISED EDITION

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Book 3

Unit 56