CSMP Mathematics for the Intermediate Grades Part V

Blacklines

Note: This packet contains blackline masters for home activities, parent letters, and numerous activities that coordinate with *CSMP Mathematics for the Intermediate Grades, Part V*. There are no limits to the number of times these blacklines may be reproduced.

The Home Activity section begins with an introductory letter to parents/guardians. Subsequent home activities may be reproduced and cut off, one at a time, and sent home as appropriate. Then there are blacklines to coordinate with lessons in the five strands, N, L, G, P, and W organized in order, by strand. Following these are generic blacklines and forms for lesson notes.

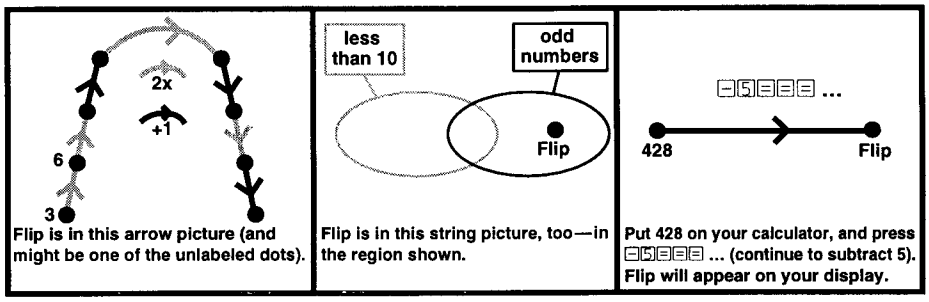
A LETTER TO PARENTS ABOUT *CSMP*

The *Comprehensive School Mathematics Program* (*CSMP*) is the mathematics program we use in your child's class. It is difficult to describe in a letter *CSMP*'s rich and exciting way of teaching mathematics. This, however, is a short introduction to *CSMP* and an invitation for you to visit your child's math class.

CSMP is different because it uses several "picture" languages. These languages make it easy for children to understand some very interesting but complex mathematical ideas. Students enjoy using these picture languages. At times during the year, we will send more information about these languages with examples from our *CSMP* lessons.

The developers of *CSMP* believe that mathematics is more than just arithmetic and that students learn best when they are solving interesting problems. They believe that students should understand, enjoy, and use their skills instead of just practicing them. With *CSMP*, students use their arithmetic skills while they play number games, solve detective stories, or build number "roads."

CSMP students use these clues to find Flip. Can you?



Children learn mathematical ideas and skills in different ways and at different times. For this reason *CSMP* teachers do not stick to one topic until everyone has learned it. Instead, the many concepts and skills are taught several times during the year. Students learn something during each lesson and master each skill when they are able.

In our math classes students participate in lessons with the whole class at times, with a smaller group at other times, and sometimes by themselves. Students are encouraged to talk about their ideas and to find different ways of solving a problem. The student workbooks and worksheets have easy, average, and hard pages so that all children can work on problems that are right for them.

Your child may be using a calculator for some math lessons. Calculators do not replace the need for arithmetic skills, but they do provide interesting mental arithmetic exercises. Students will use calculators to explore mathematical concepts and number patterns, or to practice math facts. They may also use calculators on problems involving tedious calculations or particularly difficult numbers.

We hope you will visit a *CSMP* math class soon. It can be an exciting experience.

Sincerely,

P.S. Flip, the secret number, is 13.

IG-V HOME ACTIVITIES

Dear Parent/Guardian:

Activities that accompany various lessons in our mathematics program (*CSMP Mathematics for the Intermediate Grades)* will be sent home with your child periodically. They will be called "Home Activities" rather than "homework," because we hope you will use them as an opportunity to become involved with your child in learning more about the *CSMP* tools, methods, and skills.

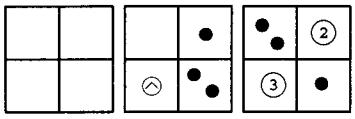
Some home activities will be follow-up or practice for a class lesson; others will be for enrichment or extension. Please keep all the activities and materials in the envelope provided. Some materials may be used more than once, and you may want to refer back to previous activities.

Sincerely,

N1

In mathematics class, we sometimes play a game called *Minicomputer Golf.* The following is a brief description of the game. Try playing it with your child.

Start with a number on the Minicomputer using several checkers, and set a target or goal. For example:



Rules: Players take turns moving just one checker from the square it's on to any other square.

A move should take the number on the Minicomputer toward the goal.

The move that reaches the goal exactly is the winning move.

Note: The ②-checker is a weighted checker and has the same effect as putting two regular checkers on that square. The ⊖-checker is a negative checker.

N5

Try to solve this calculator puzzle with your child.

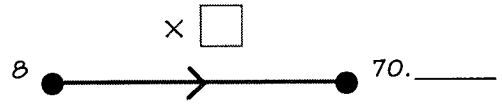
The only keys you may use are [4], [7], [+], [−], [×], [÷], and [=].
You may use the keys in any way you like.
Start with 0 on the display. Try to put 100 (or 150 or 0.5) on the display.

You may also pretend it costs a penny for every key you press. Then, try to solve the puzzle in the cheapest possible way.

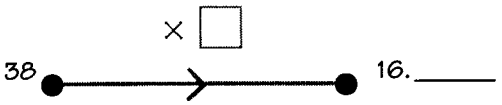
N8

We have been playing a game where we use a calculator to find an arrow label. You might like to play this game with your child. The object is to determine a label for an arrow so that the number at the starting dot times some number (indicated by the arrow) equals a decimal number at the ending dot. The following pictures are for a couple possible games. You can create other examples yourself.

- Take turns to try to solve the problem–fill in the box for the arrow.
- Record each attempt on a piece of paper for both to see.
- The first person to find a good solution is the winner.



Solutions range (approximately) from x8.76 to x8.87.



Solutions range (approximately) from x0.422 to x0.447.

N10

Your child is bringing home worksheets on various methods we have been using to add fractions with unlike denominators. Ask your child to explain how to add fractions such as $\frac{2}{3} + \frac{2}{5}$; then, work with your child to solve the problems on these worksheets.

N12

Your child is bringing home an estimation problem similar to ones we have used in our mathematics class. One number in a number sentence is missing a decimal point. Otherwise, the number sentence would be correct. The problem is to place a decimal point so the equation is true. For example:

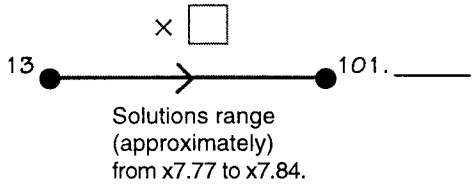
3.7 x 42.28 = 1 5 6 4 3 6

Using estimation, can you determine where the missing decimal point belongs? Try to solve the problem your child made up, or make up some problems like this to do with your child.

N20

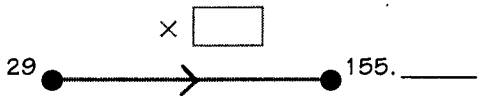
In mathematics class we have been playing a calculator game that you might like to try with your child. It works like this.

- Take turns to try to solve the problem–fill in the box for the arrow.
- Record each attempt on a piece of paper for both to see.
- The first person to find a good solution is the winner.

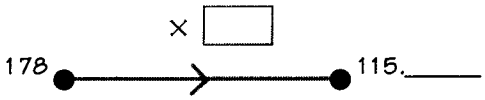


Solutions range (approximately) from x7.77 to x7.84.

Here are a couple more problems you can use playing the game with your child.



Solutions range (approximately) from x5.345 to x5.379.



Solutions range (approximately) from x0.647 to x0.651.

N30

Some of the strategies we use in solving percent problems make use of patterns or properties of percent. Knowing the results of some easy percent calculations, we can solve several others. For example, ask your child to work with you on these percent problems.

10% of 60 = ____	50% of 96 = ____
5% of 60 = ____	25% of 96 = ____
15% of 60 = ____	75% of 96 = ____
30% of 60 = ____	10% of 96 = ____
45% of 60 = ____	35% of 96 = ____
90% of 60 = ____	85% of 96 = ____

N34

In mathematics class, we played a game called *Calculator Golf*. The following is a brief description of the game. Try playing it with your child.

Start with a number on the calculator display and set a goal.
Choose two number keys that will be allowed in the game.
For example:

Starting number: 38
Goal: 1 000

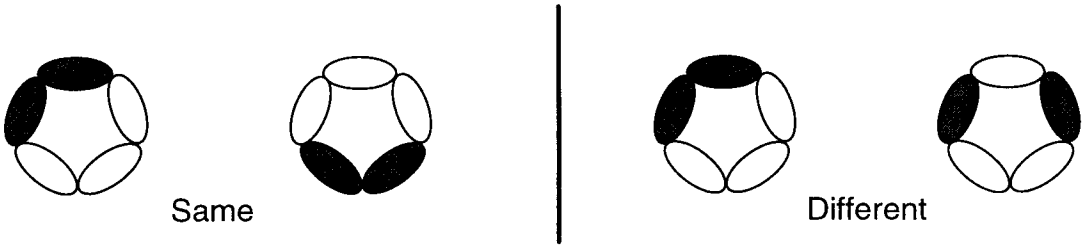
Keys: [5] [6] [=]
[+] [−] [×] [÷]

Players take turns pressing an operation key followed by the number keys in any combination (in this case any combination of [5] and [6]); then press [=]. Players work together to get the goal 1 000 on the display in as few turns as possible.

L6

In mathematics class we studied a problem about the number of arrangements of red beads and white beads in a necklace and on a pole. Here the pictures are with five beads, but our problem was with ten beads.

Ask your child to tell you the story of Theophilus, and to explain when necklace arrangements are different and when they are the same.



With your child, first predict the number of possible arrangements of two red and three white beads in a necklace or on a pole. Which has more? Then try to picture all the possible arrangements.

ANSWER: Necklace two ways; pole ten ways.

G6

Through experimentation, we have estimated the area of a circle and found area patterns. As a result of this process, we also found estimates for a multiplier □x the square of the radius to get the area (approximately) of the circle. This multiplier is well known in geometry as a special number called "pi." The usual symbol for pi is the Greek letter π.

Your child is bringing home a description of how the class found an estimate for the number π, and how this led to a method for calculating the area of a circle. We will have another opportunity to estimate π when we compare the diameters and circumferences of many circular objects.

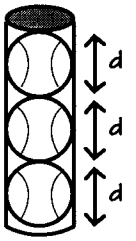
G7

In mathematics class we have been studying a special number called "pi"." The symbol for pi is π, a letter in the Greek alphabet. The value of π to eight decimal places is 3.14159265. You may remember that π is used in determining the circumference and the area of a circle.

If you have a can of tennis balls at home, you can try the following activity with your child. First, empty the can of tennis balls. Then try to determine, without measuring, which is greater, the height or the circumference of the can. Use a string to test your conjecture.

For your information:

- The height of the can is almost equal to three times the length of a diameter of a tennis ball. This is because three tennis balls fit snugly into the can.
- The circumference of the can is almost equal to the circumference of a tennis ball. Therefore, the circumference of the can is about 3.14 times the length of a diameter of a tennis ball.
- The circumference of the can is greater than the height of the can, although the difference is not much.



G10

In mathematics class we have been finding volumes and surface areas of boxes. Your child is bringing home a report in which he/she has made suggestions to a cereal company about how to box their product. Read the report and ask your child to explain his/her recommendations.

P2

Ask your child to tell you the story about a girl named Sylvia who must ride her bike to the ferry in a certain amount of time. Her friend suggests she take a shortcut through Muskrat Swamp, but Sylvia doesn't know which paths through Muskrat Swamp are the shortest. She's going to have to guess, but if she takes the wrong path, she won't get to the ferry on time. Ask your child to show you the map of Muskrat Swamp and to explain how to calculate the probability of Sylvia arriving on time.

P4

In mathematics class we have been experimenting with reaction times in order to understand the terms *best result*, *mean*, *mode*, and *median*. Ask your child to describe the experiment to you, and then conduct the experiment with other family members. Let your child calculate and explain the results.

P6

In mathematics class we have been working with probabilities, comparing expected results to actual results. We thought about the concept of extrasensory perception (ESP) to discuss the probability of getting certain results by just guessing. You may like to work with your child to administer a similar test at home with family members, friends, and neighbors.

W4

When you press the keys on a calculator in a particular order to obtain a specific number, you create a "calculator sentence." For example, this is a calculator sentence for 11:

9 × 3 + 6 ÷ 3 = 11

Note: To create calculator sentences as described here you need a calculator that responds to instructions in the order in which they are given (does chain operations). To check yours, enter 4 + 1 × 2 =. If you have 10 on the display, then your calculator functions in this manner.

With you child, fill in the operation keys (+, –, x, or ÷) in these calculator sentences. Check the results with you calculator.

9 □ 3 □ 6 □ 3 = 6
9 □ 3 □ 6 □ 3 = 12
7 □ 2 □ 5 □ 1 = 10
7 □ 2 □ 5 □ 1 = 1

You and your child may like to create calculator sentences like these for each other to solve.

W10

Your child is bringing home a storybook that we used in mathematics class, *Election in the Number World*. Let him or her tell you about the story, or read it together. You may like to discuss the method you prefer for writing numbers, or discuss when one method of writing numbers is better than another.

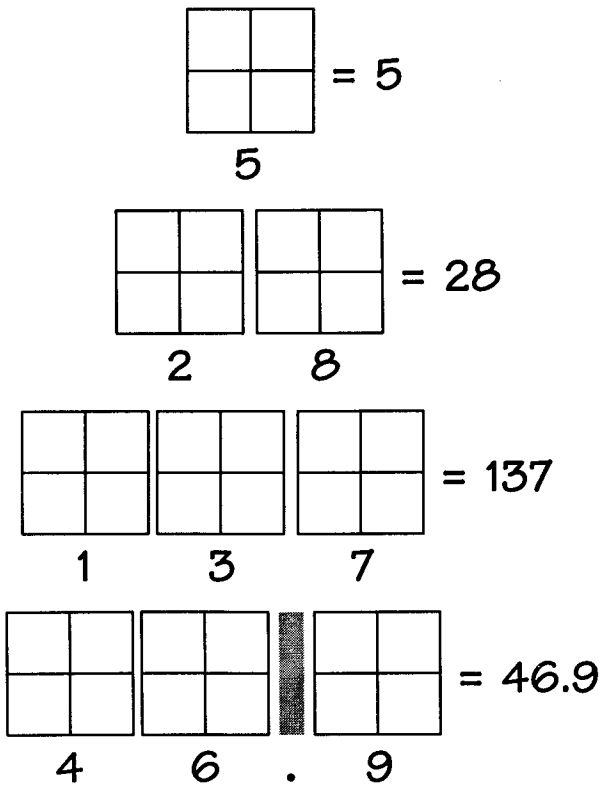
N1(a)

Dear Parent/Guardian:

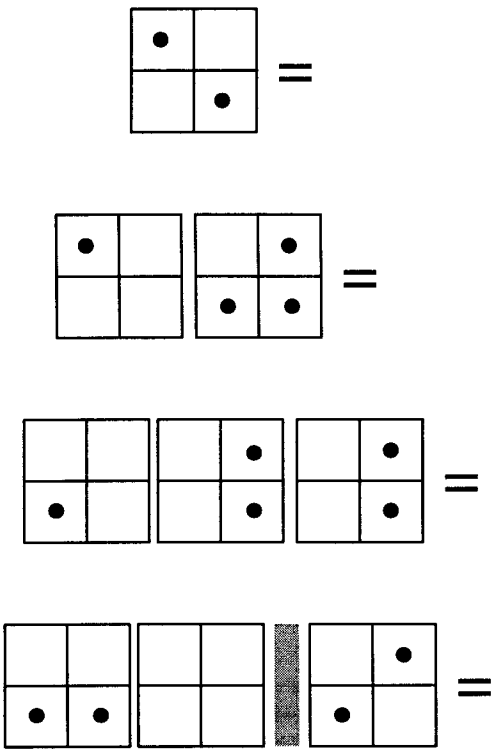
Your child has been learning to use the Papy Minicomputer in mathematics. This simple abacus allows children to become familiar with numbers. Using the Minicomputer, they work on concepts of addition, subtraction, multiplication, and division somtimes before they are able to do the calculations routinely. Also, the Minicomputer is used to do mental arithmetic and to investigate how numbers work. In some games using the Minicomputer, its structure gives a role to strategic thinking. The back of this page explains how the Minicomputer models our usual decimal system and works with place-value concepts.

Ask your child to tell you about the colors of the squares on our classroom Minicomputer. Then ask him or her to show you how to put numbers on the Minicomputer and read them. Objects such as pennies, dried beans, game chips, or paper clips may serve as checkers.

Put these numbers on the Minicomputer.



Read the number on the Minicomputer.



As the year progresses, you and your child can use the Minicomputer to solve a variety of problems. We hope you find this information helpful.

Sincerely,

N1(b)

THE PAPY MINICOMPUTER

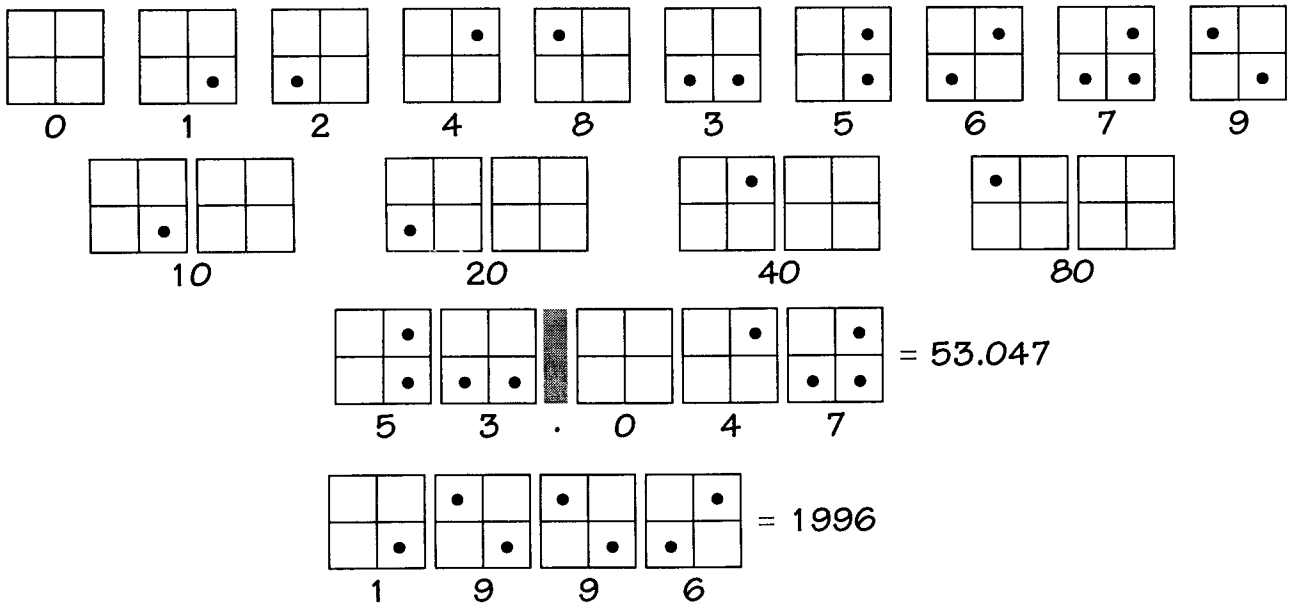
The Papy Minicomputer, a kind of abacus, models the positional structure of our system of numbers and hence lends itself as a powerful tool in arithmetic. The Minicomputer consists of brightly colored boards and a set of checkers. Each square has a numerical value.[†] These are the values on the ones board.

Brown	Purple
8	4
Red	White
2	1

As you move to the next board to the left, you have the tens board with corresponding values; the next board to the left is the hundreds board with corresponding values; and so on.

8000	4000	800	400	80	40	8	4
2000	1000	200	100	20	10	2	1

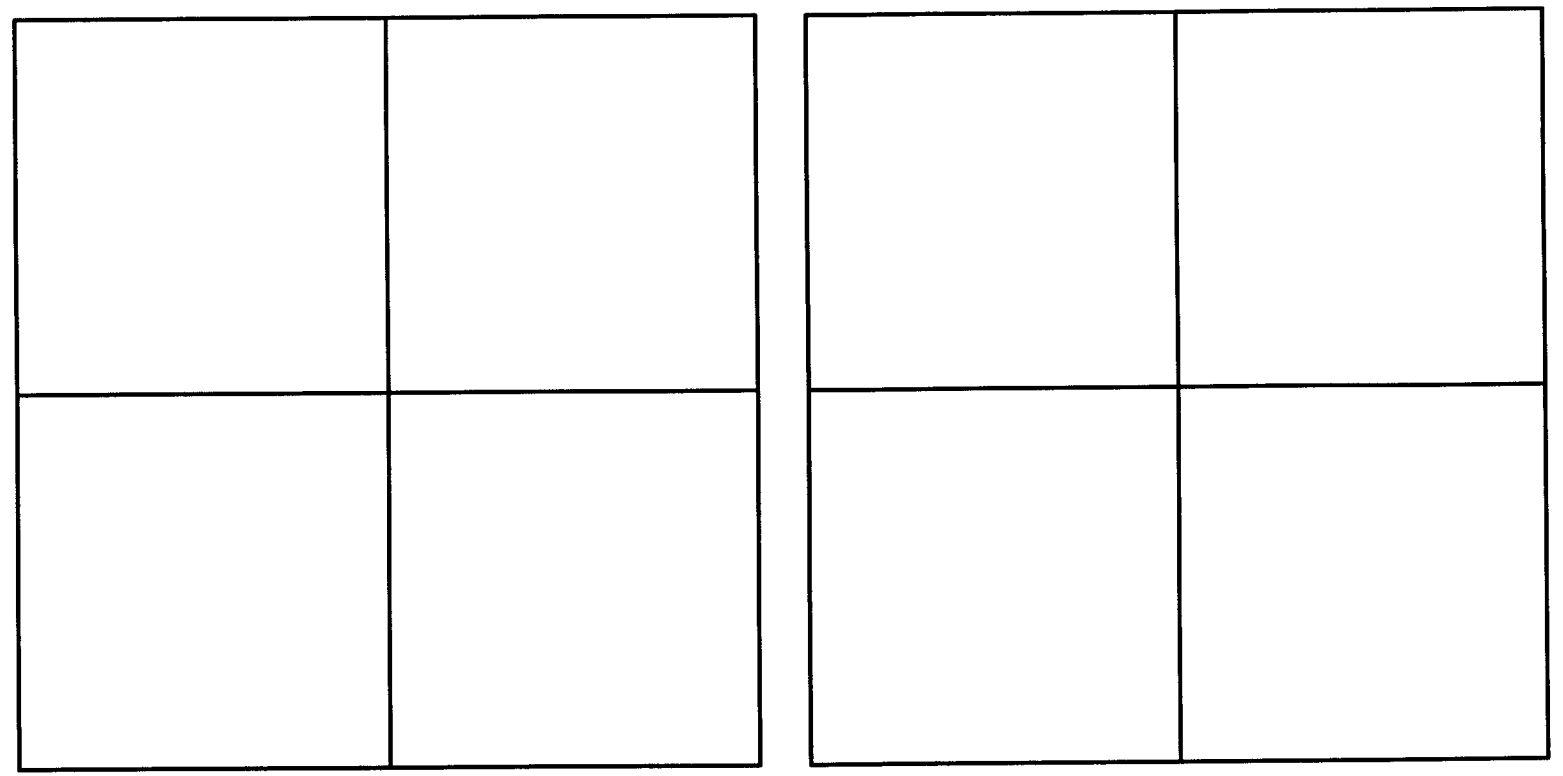
A number is put on the Minicomputer by placing checkers on its squares. A checker assumes the value of the square it is on. If several checkers are on the Minicomputer, the number is the sum of the values of the checkers. A number can be put on the Minicomputer in a variety of ways, but the representation that uses at most one checker on each square and uses checkers to represent a digit 9 or less is usually the easiest to read. In this case, we say that the number is in *standard configuration.* Standard configurations for the numbers 0–9 become as familiar to the students as the usual numerals so that they no longer need to do mental calculations for such configurations.

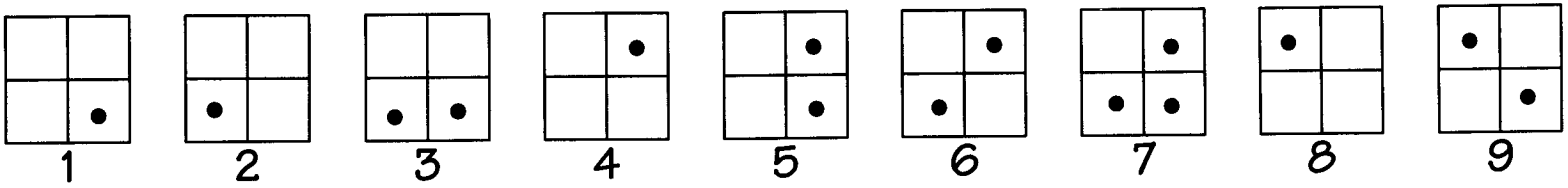


[†]The values of the squares are not written on the boards; learning them is part of becoming acquainted with the Minicomputer.

N1(c)

Papy Minicomputer





N2

Dear Parent/Guardian:

Developing mental arithmetic skills is just as important as paper and pencil arithmetic skills, so we incorporate mental arithmetic often in our math lessons. Mental arithmetic is important because it enables your child to recall math facts, to be aware of number patterns in arithmetic, and to review a variety of concepts.

You, too, can work on mental arithmetic with your child at home. It can be done whenever you have a free moment with your child—in the car, during a walk, at the dinner table, or before bedtime. Try to make your mental arithmetic activities short and fast-moving. Here are some sample sequences of math facts.

8 + 7 = ?	37 + 10 = ?	10 − 3 = ?	3 × 6 = ?	3 × 7 = ?
18 + 7 = ?	37 + 8 = ?	12 − 5 = ?	3 × 10 = ?	6 × 7 = ?
8 + 17 = ?	37 + 100 = ?	15 − 8 = ?	3 × 16 = ?	12 × 7 = ?
18 + 17 = ?	37 + 98 = ?	25 − 18 = ?	3 × 116 = ?	12 × 14 = ?

Another mental arithmetic game is the Number Line Game. To play, choose a secret number between 100 and 500. Let your child guess your number. After each guess, respond by saying, "My secret number is more (or less) than ____ (the guess)." Your child should use this information to make a next guess until the secret number is discovered. Sometimes let your child choose the number while you guess.

To play another game, select a number and take turns making up facts for that number. For example, suppose you select the number 50. Some facts for 50 would be 47 + 3, 2 x 25, 300 ÷ 6, 75 – 25, ¼ x 200, and so on.

Many counting activities are also good mental arithmetic. For example, practice counting by threes, fives, tens, and so on. Vary the counting by sometimes starting at a number other than 0 or by counting backward.

Have fun practicing mental arithmetic!

Sincerely,

N5

Dear Parent/Guardian:

We will be using calculators at school to enhance many of our math lessons. Calculators are useful tools that can help us work on mental arithmetic skills (especially memorization of facts), pattern recognition, and problem-solving strategies.

You may want to use a calculator with your child at home. The following are examples of calculator activities we do in math lessons and are ones you may like to try with your child. In each case, we describe the activity or give just one sample problem.

- Turn on the calculator and check that 0 is on the display. Cover the display. Press [6] [×] [3] [+] [4] [÷] [2] [=]. Ask what will be on the display, and then check.
- Use the calculator to solve addition, subtraction, or multiplication problems. In this case, you may first estimate a solution and then use the calculator to check how close your estimate was.

Note: For the remaining examples you will need a calculator with an automatic constant feature.

- Teach the calculator to count by fours using the following steps:
  1) Put on the starting number.
  2) Press [+] [4].
  3) Then press [=] [=] [=] and so on.

  Describe the sequence of numbers you see on the display. Occasionally, predict the next number or the number you will see if you press [=] six more times.
- Teach the calculator to count backward by fives using these steps:
  1) Put on the starting number (for example, 102).
  2) Press [−] [5].
  3) Then press [=] [=] [=] and so on.
- Teach the calculator a secret rule and let your child try to guess the rule. For example:

Rule	**To Prepare the Calculator**
Subtract 5	Press [5] [−] [5] [=]
Multiply by 7	Press [7] [×] [0] [=]
Add 4	Press [−] [4] [+] [4] [=]
Divide by 8	Press [0] [÷] [8] [=]

  Each time you put a number on the display of the calculator and press [=], the calculator will show a new number—the result of using the rule on your number. In this mode the calculator may be used to practice facts. For example, when the calculator is prepared as above to multiply by 7, you can use it to practice 7x facts.

We hope you and your child enjoy using a calculator for these and other activities.

Sincerely,

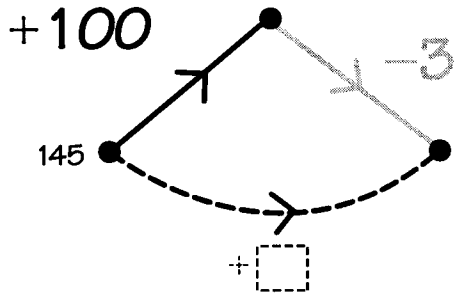
N9

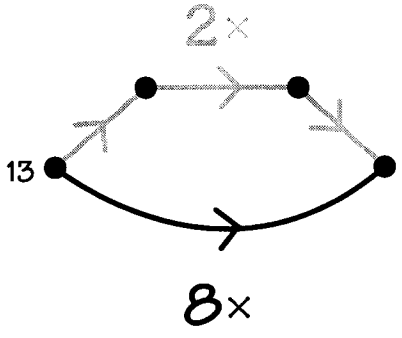
Dear Parent/Guardian:

We use arrows and arrow pictures in many of our math lessons. Since arrows are used everywhere in our daily lives—signals, advertisements, directions, and so on—why not use them in mathematics?

Arrow diagrams are an important teaching aid in our mathematics program because they are a pictorial way of showing relationships. Relations play a central role in mathematics, and arrows provide a vivid and concrete way to understand them.

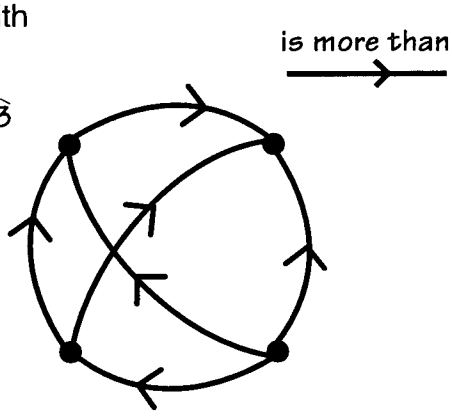
Here are a few examples of the way arrows picture relationships. Ask your child to help you label the dots or an arrow.

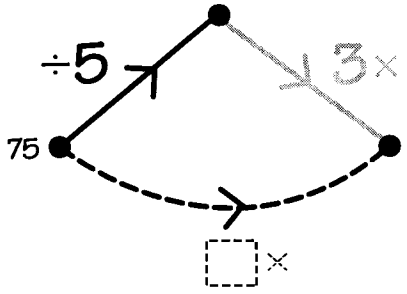




Label the dots with these numbers.

$\widehat{10}$ 10 6.5 $\widehat{3}$





We hope you can see from these examples that arrow pictures are fun to use in mathematics. Watch for many other uses of arrows on the papers that your child brings home.

Sincerely,

N11

Dear Parent/Guardian:

The learning of basic number facts is an important part of any mathematics program. We work on this in many ways:

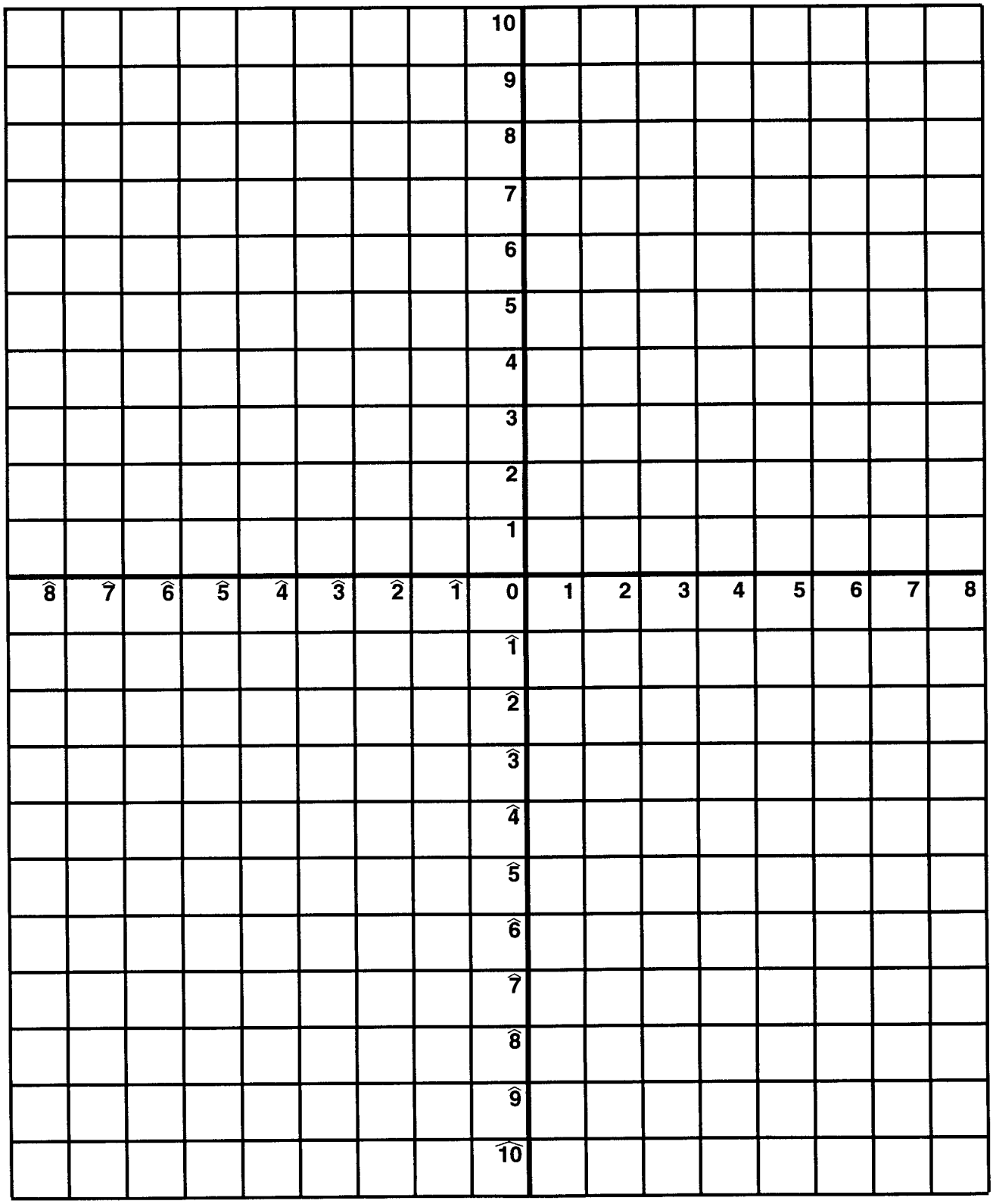
- using concrete and visual models for different kinds of numbers and number relationships;
- counting by various numbers;
- labeling dots in arrow pictures;
- solving problems that require number facts;
- making connections (related facts) and observing patterns; and
- playing games with numbers.

You will find that your child is being encouraged to recall basic number facts in some of the home activities we suggest and in a variety of problems in workbooks.

As you work with your child, you can encourage the learning of basic facts. Look for interesting ways to do this. For example, calculators and computer programs are fun for some while others will like flashcards or mental games. Most children like to use numbers in real and meaningful family tasks. We will try to make other suggestions in our home activities. Home practice on basic number facts, like any skill, is important.

Sincerely,

N13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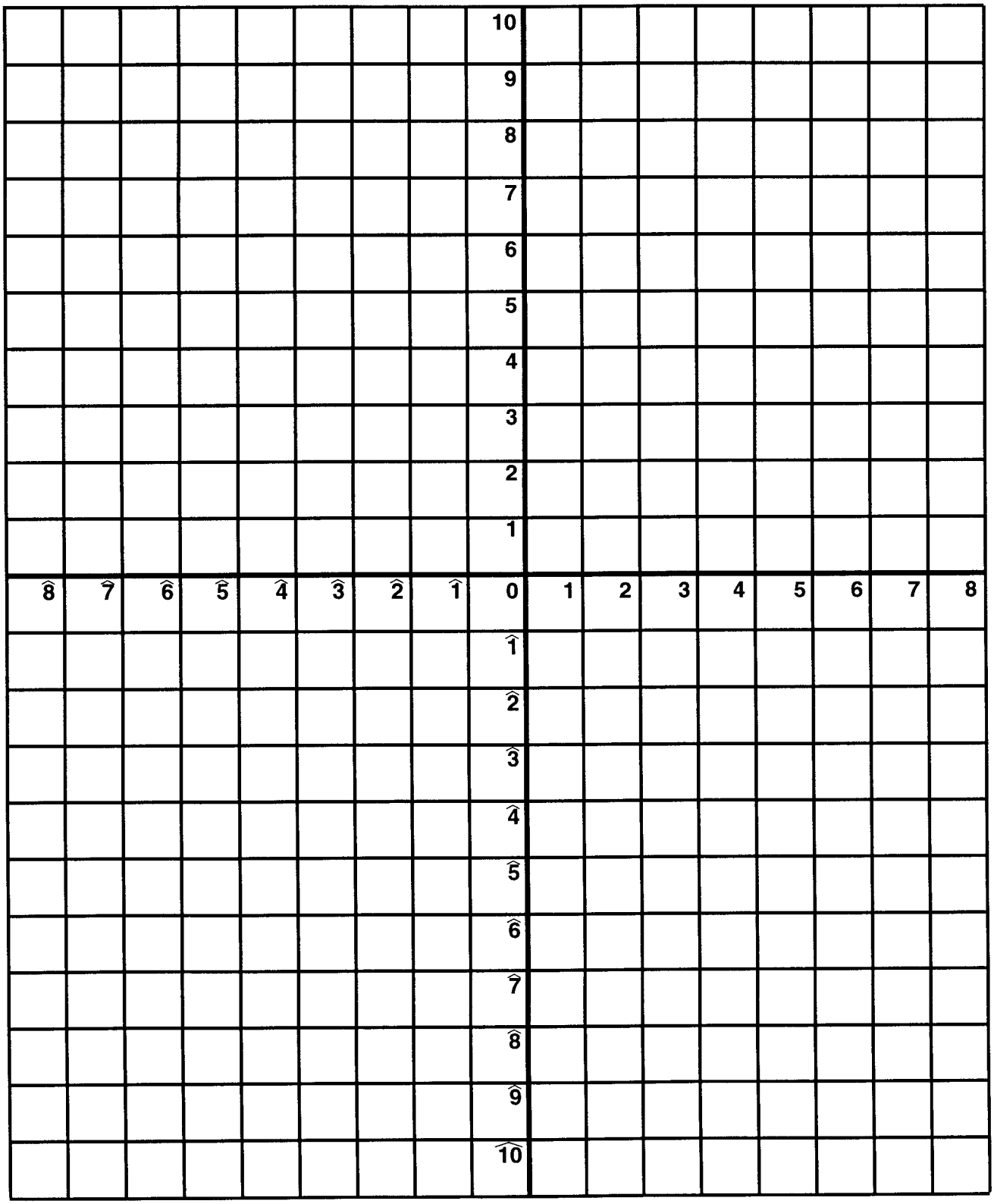
N17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N18

Dear Parent/Guardian:

In our mathematics class, we are working on extending a paper/pencil method (algorithm) for division to include decimal places. As you should be aware from earlier letters, this is not the beginning of our work on these division concepts, nor on solving division problems. In fact, our current work on this paper/pencil algorithm really summarizes many of our earlier experiences with division.

The algorithm suggests that we use a sequence of routine steps, and our earlier experiences help us understand reasons for the steps. For example:

	71.22	R = 0.11
23)	1638.17	
	−1610.00	70
	28.17	
	−23.00	1
	5.17	
	− 4.60	0.2
	0.57	
	− 0.46	0.02
	0.11	

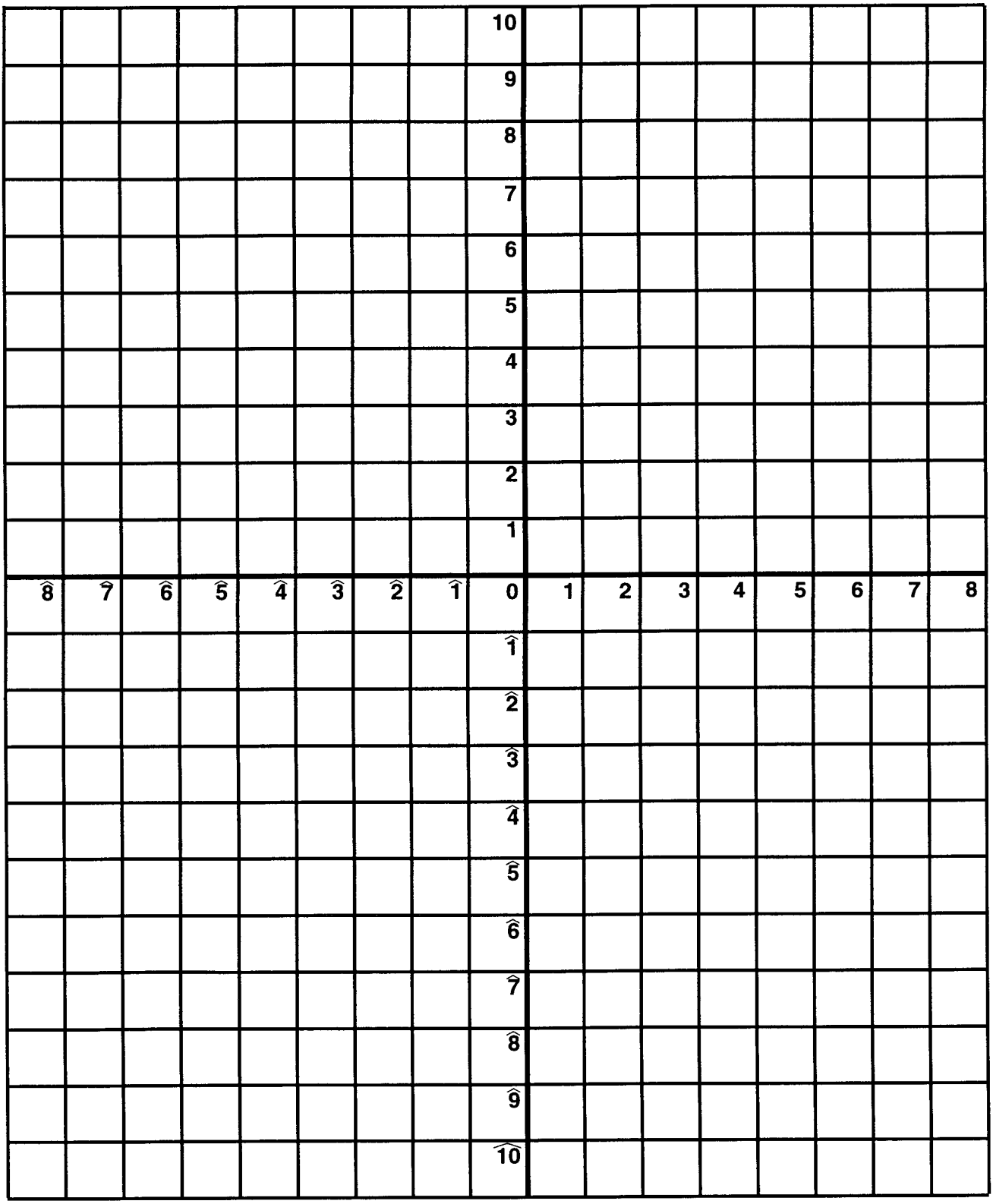
Note: You may expect this procedure to be more abbreviated. However, it is not necessary and your child may either choose to make or not to make abbreviations.

Also, in this case we chose to stop with two decimal places. Perhaps this calculation came from a problem involving dividing an amount of money.

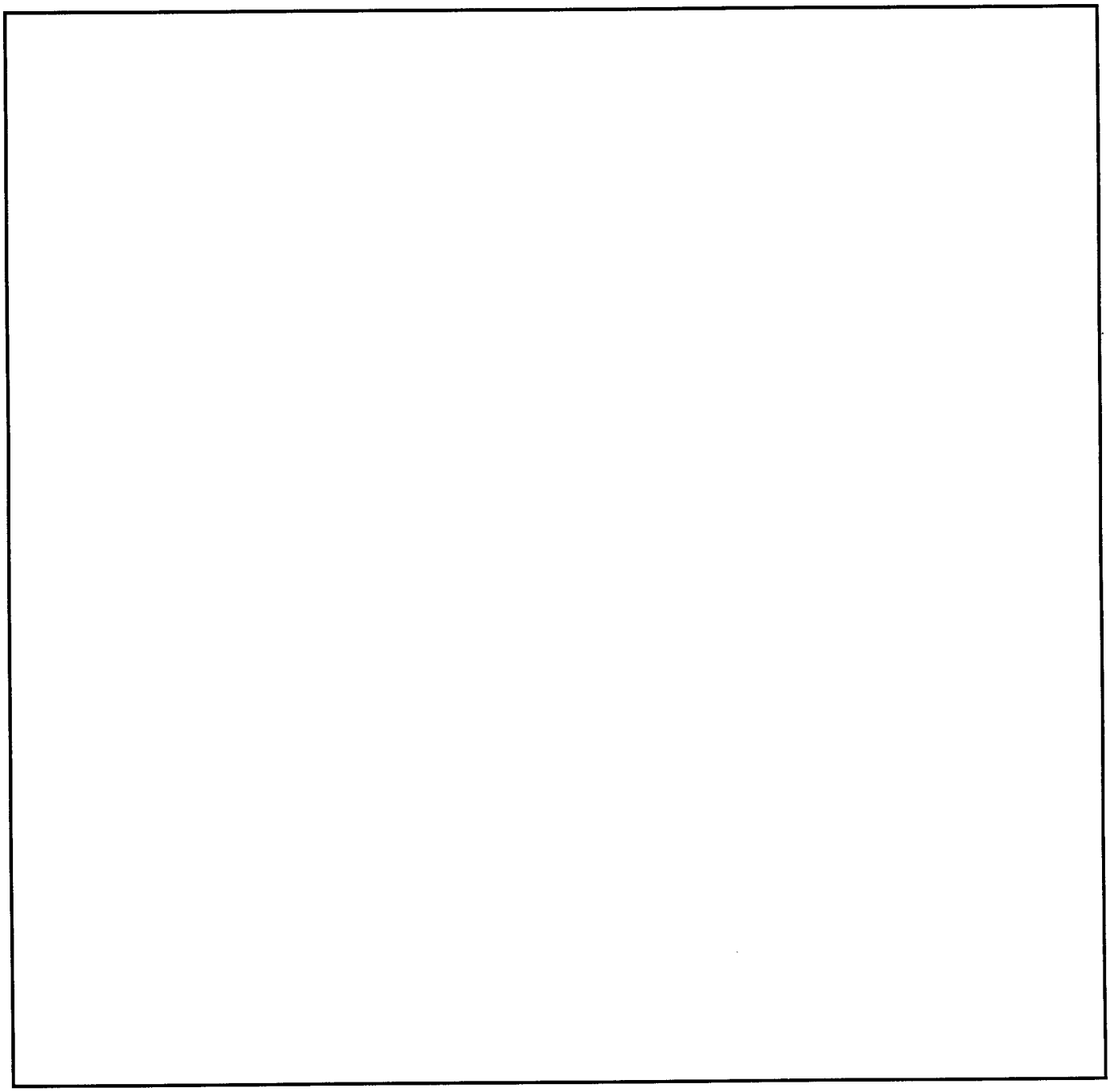
In doing division calculations at home, remember that a paper/pencil method is only one method. Sometimes it might be better to use mental methods, number patterns, or even a calculator. We hope that a variety of methods will help children develop the ability to check their work and recognize reasonable answers. Also, remember that calculation should be a tool for solving interesting problems rather than simply a chore done for its own sake.

Sincerely,

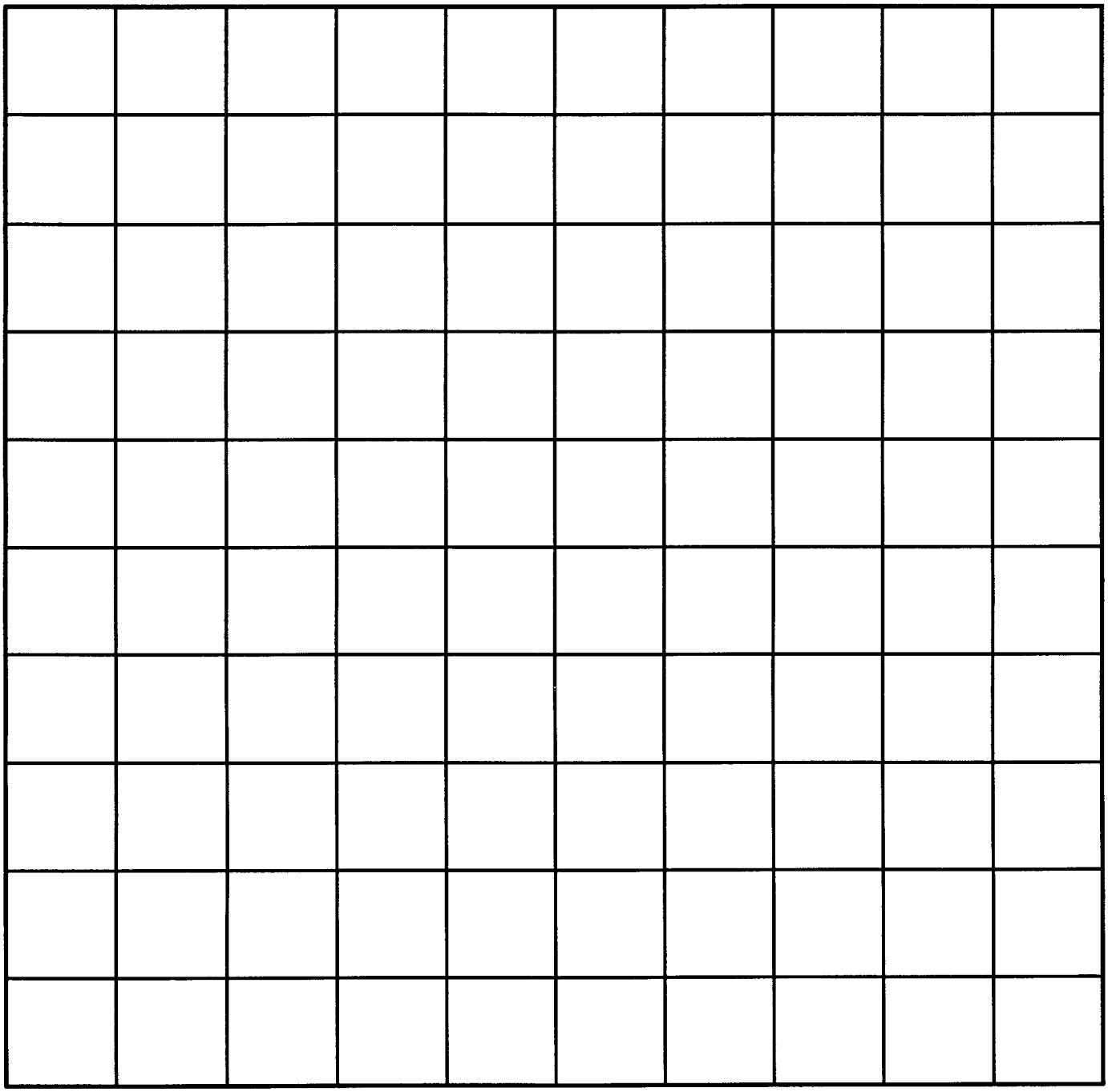
N19


10
9
8
7
6
5
4
3
2
1
$\hat{8}$ $\hat{7}$ $\hat{6}$ $\hat{5}$ $\hat{4}$ $\hat{3}$ $\hat{2}$ $\hat{1}$ 0 1 2 3 4 5 6 7 8
$\hat{1}$
$\hat{2}$
$\hat{3}$
$\hat{4}$
$\hat{5}$
$\hat{6}$
$\hat{7}$
$\hat{8}$
$\hat{9}$
$\hat{10}$

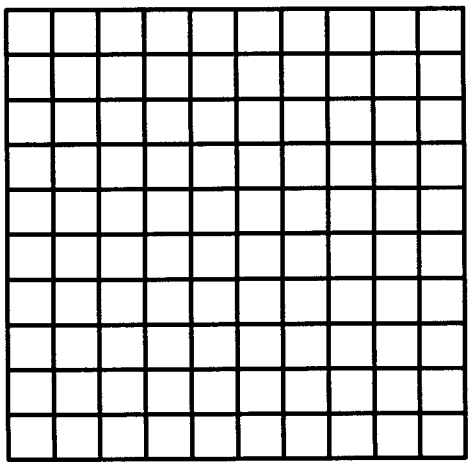
N23(a)

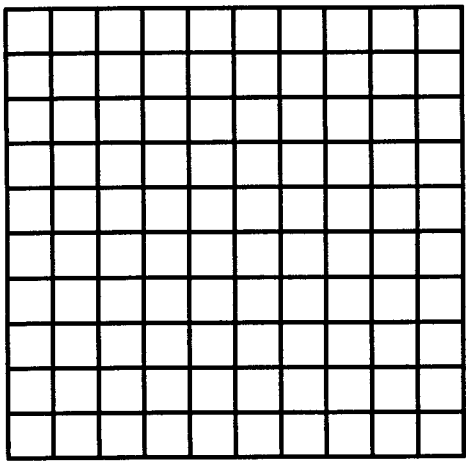


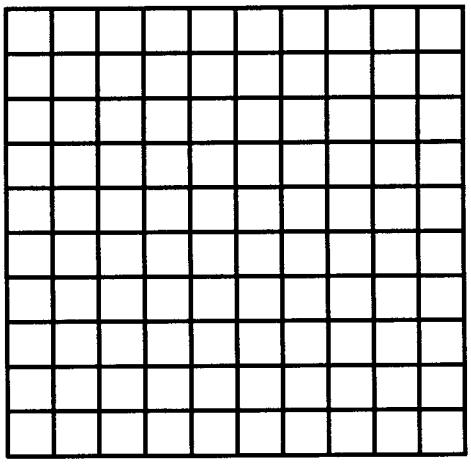
N23(b)

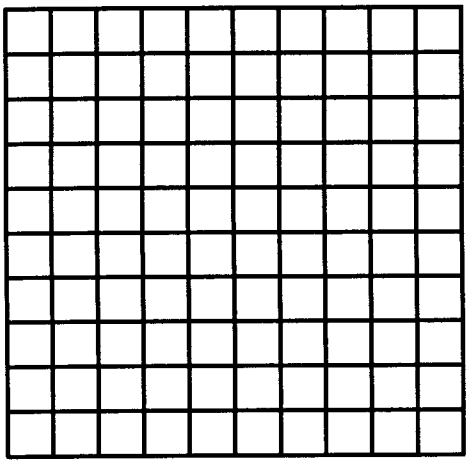


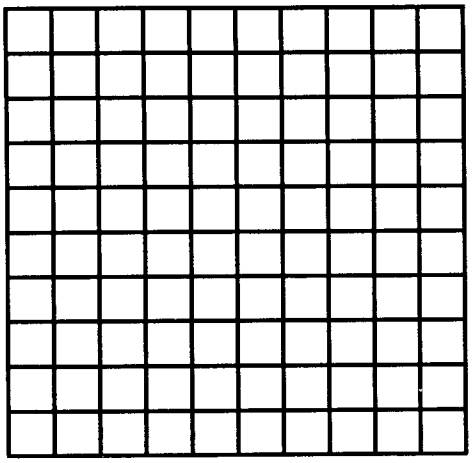
N23(c)

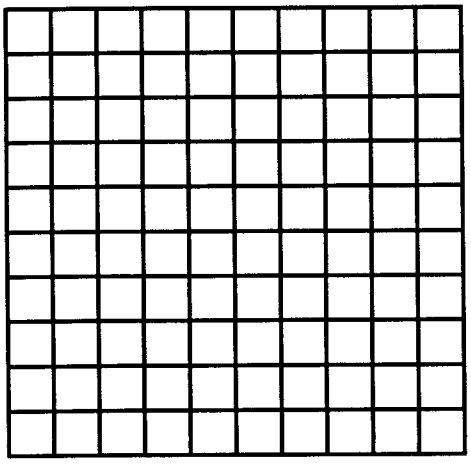












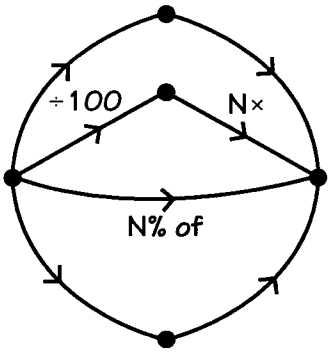
N23(d)

Dear Parent/Guardian:

In our mathematics class this semester, several lessons will focus on percent. This topic in mathematics is an important one for many reasons, but primarily because percent is a widely used concept and forms a bridge to numerous real-world situations.

We will be working on the meaning of percent (fraction or ratio) as per hundred or "out of 100" and on the relational nature or sense of percent. In addition, we will be trying to further develop students' intuition about percent and to describe patterns with percent calculations.

The following are some types of activities in our percent lessons.



- "N% of" can be found as a composition of ÷100 followed by Nx. Then, by finding equivalent compositions, we might find several fractions equivalent to N%.

  For example 60% = $^{60}/_{100}$ = $^{30}/_{50}$ = $^{3}/_{5}$ = $^{6}/_{10}$.

- What are some ways we sometimes hear percents being used? What do they mean? For example:
  - weather (percent chance of rain)
  - sports (percent wins or success)
  - sales (percent discounts or percent off original price)
  - test results (percent correct)

  Often such examples give context to our work with percents.

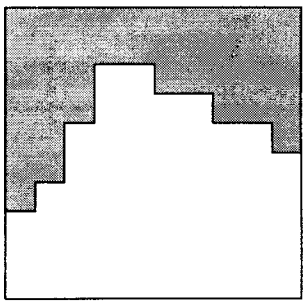
- Percent is additive.

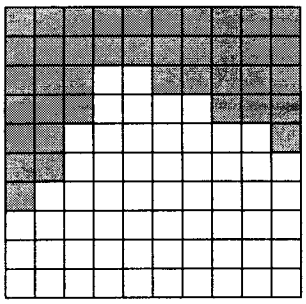
  50% of 88 = 44
  25% of 88 = 22
  75% of 88 = 66

  10% of 70 = 7
  5% of 70 = 3.5
  15% of 70 = 10.5

- Estimate the percent of a region shaded, and then use division of the region to calculate the percent.

Percent Shaded



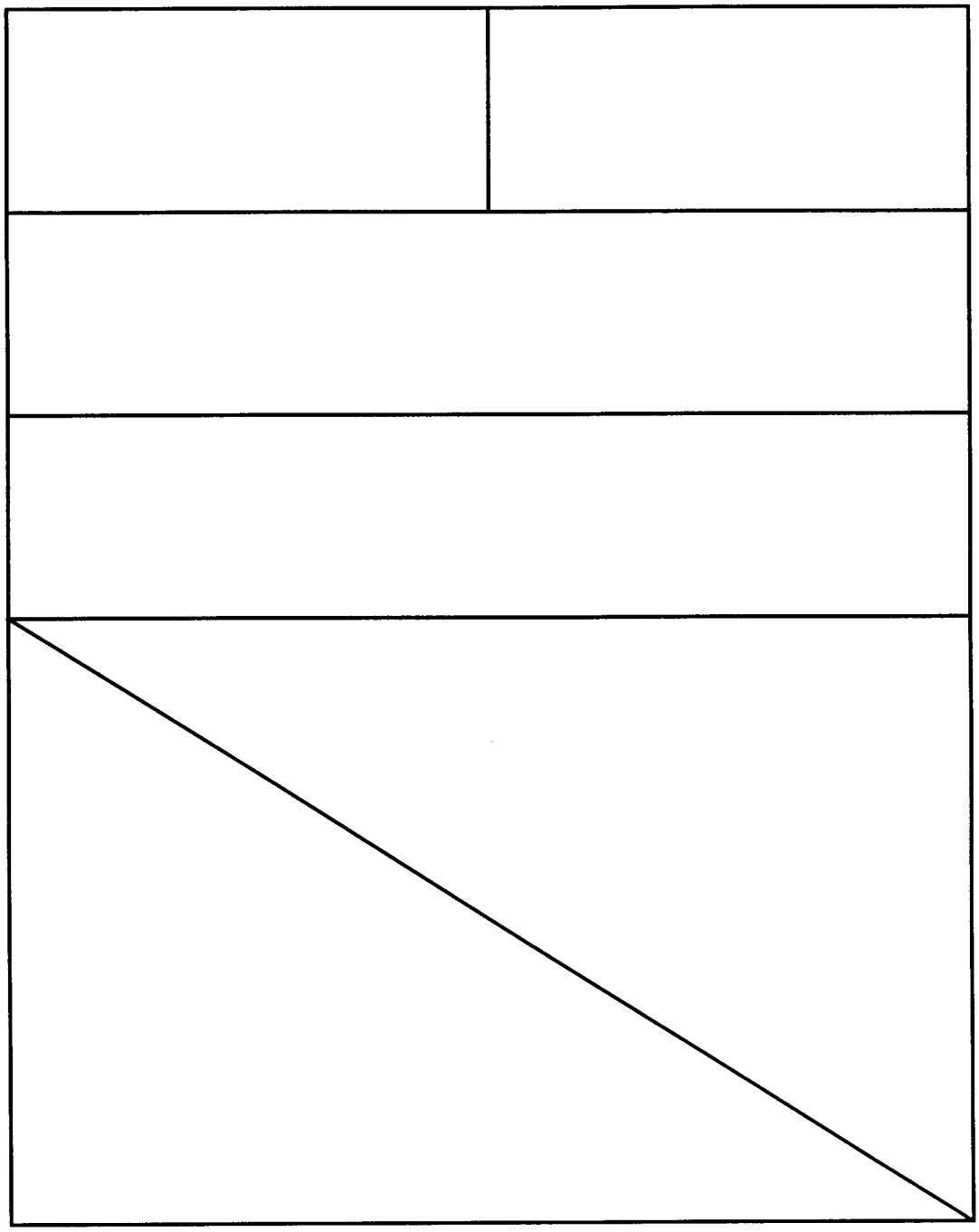


40%
40 out of 100

You may like to occasionally discuss the use of percent with your child, especially if the topic comes up in a conversation.

Sincerely,

N24



N29

									11									
									10									
									9									
									8									
									7									
									6									
									5									
									4									
									3									
									2									
									1									
9	8	7	6	5	4	3	2	1	0	1	2	3	4	5	6	7	8	9
									1									
									2									
									3									
									4									
									5									
									6									
									7									
									8									
									9									
									10									
									11									

L2

Dear Parent/Guardian:

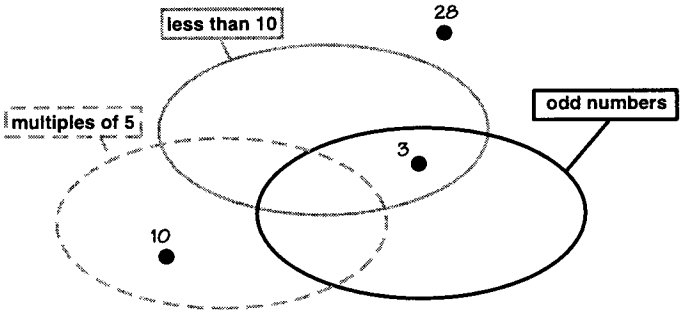
We often use what *CSMP* calls the "language of strings" (or Venn diagrams) for classification in our math lessons. Although this language developed from using concrete objects (loops of colored string), it is mostly a picture language now.

Using strings to classify helps students organize ideas while developing an understanding of concepts. Basically, the strings sort objects according to various attributes. An object is either in or out of a string. See the examples below.

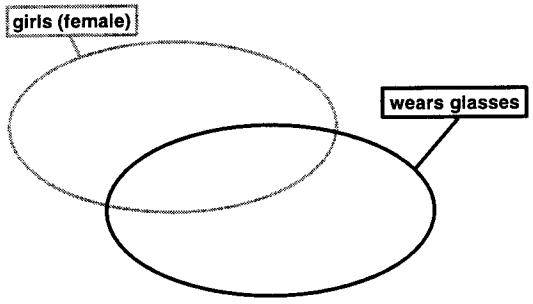
String pictures give us a way of recording and communicating about classifications. The ability to classify, reason, and extract information from classifications is an important skill for everyday life and particularly in understanding mathematics. The picture language of strings can help young minds to think logically and creatively, as well as to report their thinking, long before they have advanced verbal skills.

Here are a few examples of the use of strings in *CSMP.* Ask your child to help you do the following:

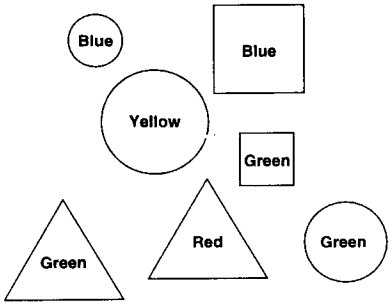
Place these numbers in the picture: 1 5 17 25 8 0 12

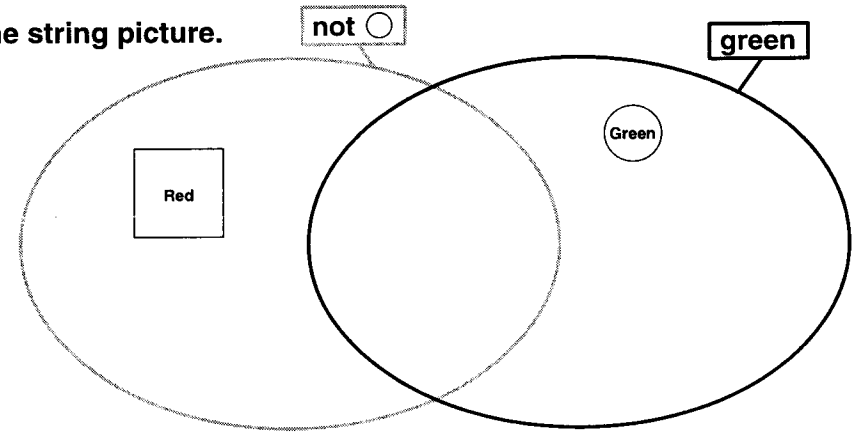


Place a dot for each member of your family.



Place these attribute blocks in the string picture.



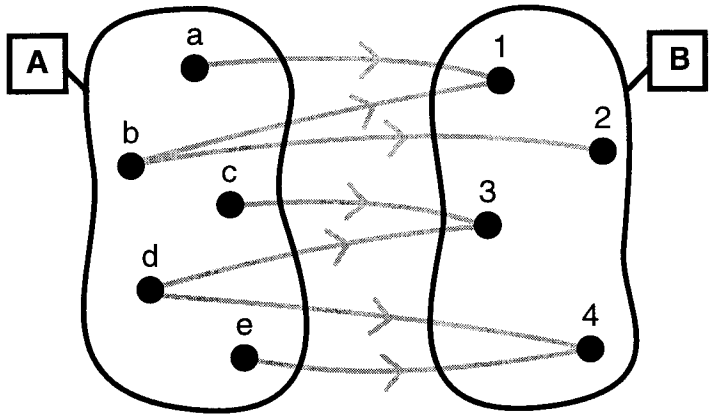


We hope you enjoy working with string pictures.

Sincerely,

Counting Relations from set **A** to set **B** L3

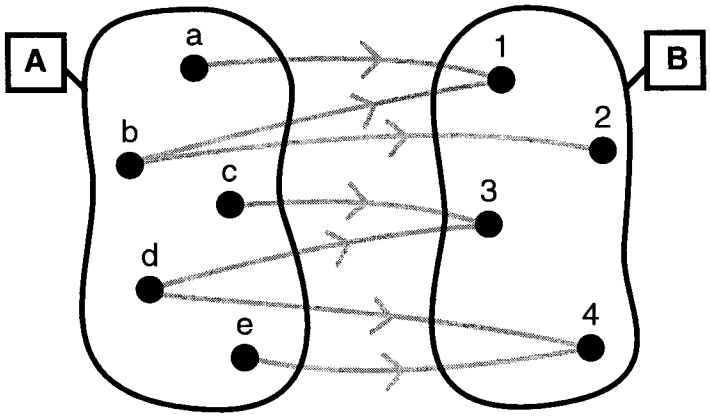
This is one example of a relation from set **A** to set **B**. Arrows start in **A** and end in **B**.

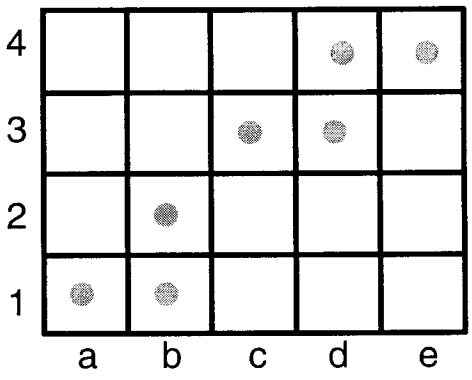


Draw several more examples of different relations from set **A** to set **B**.

Problem: How many different relations are there from set **A** to set **B**?

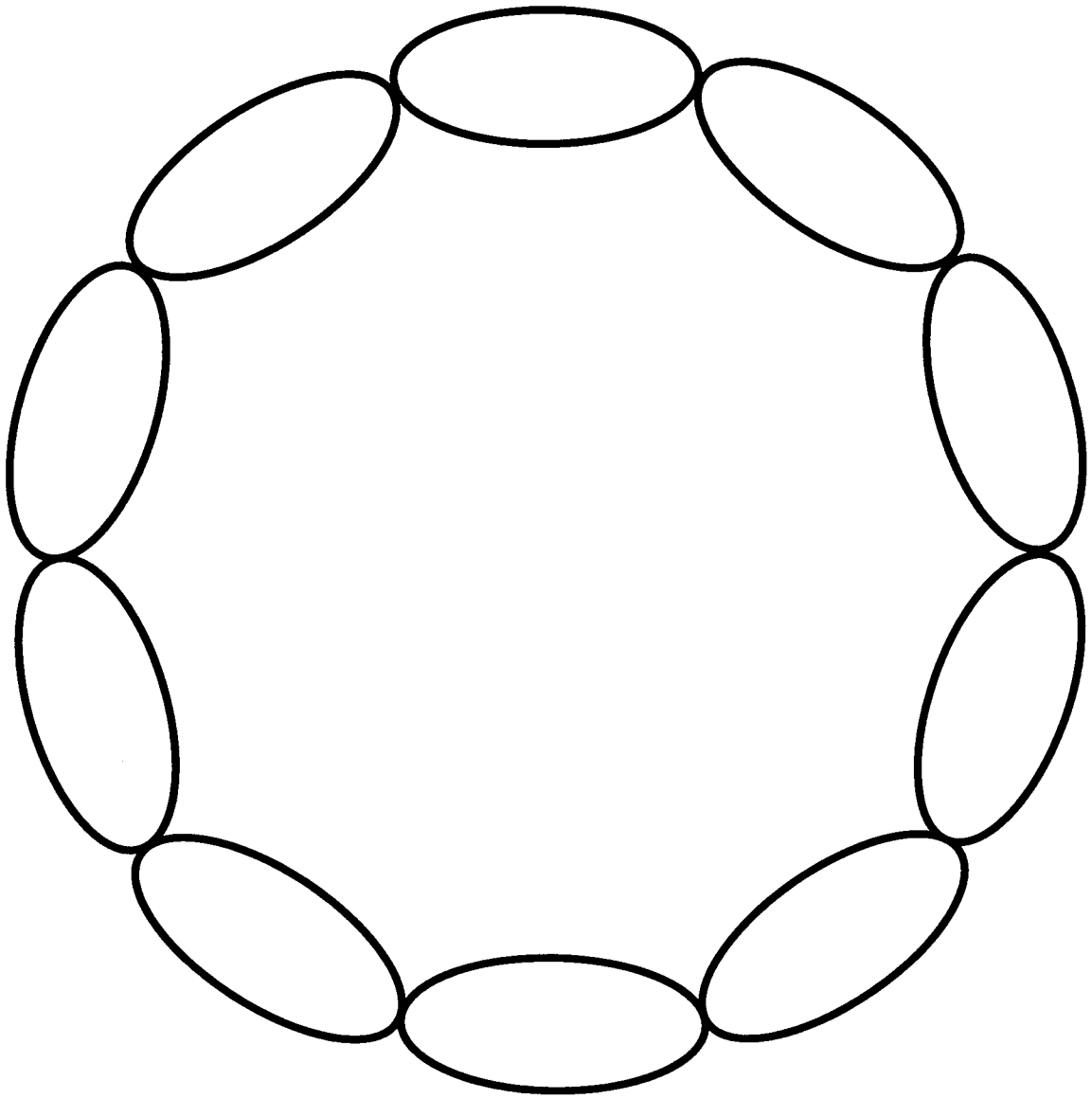
Use a grid and binary code to help solve this problem.
For example, the grid picture for the relation above could be:





Hint: Label the grid squares like a binary abacus. Assign code numbers to each relation. Find the least and greatest code numbers. Then find how many code numbers (relations) there are.

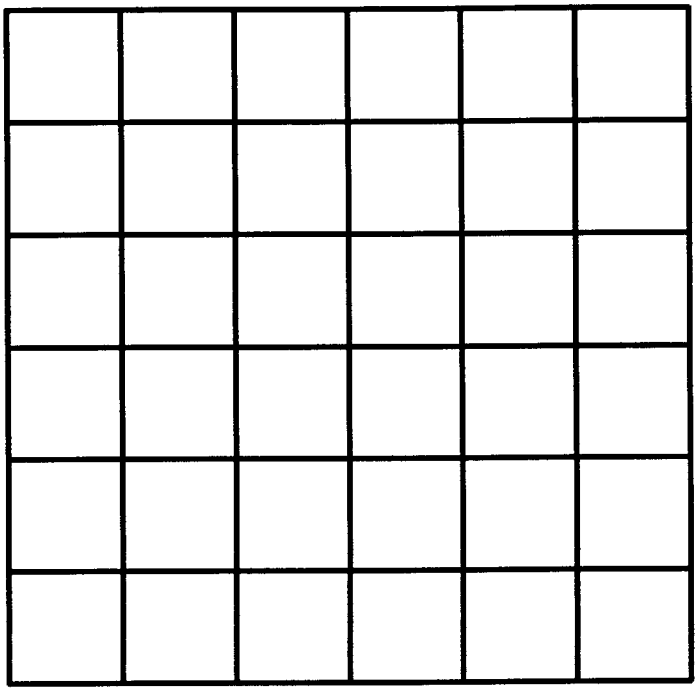
L5

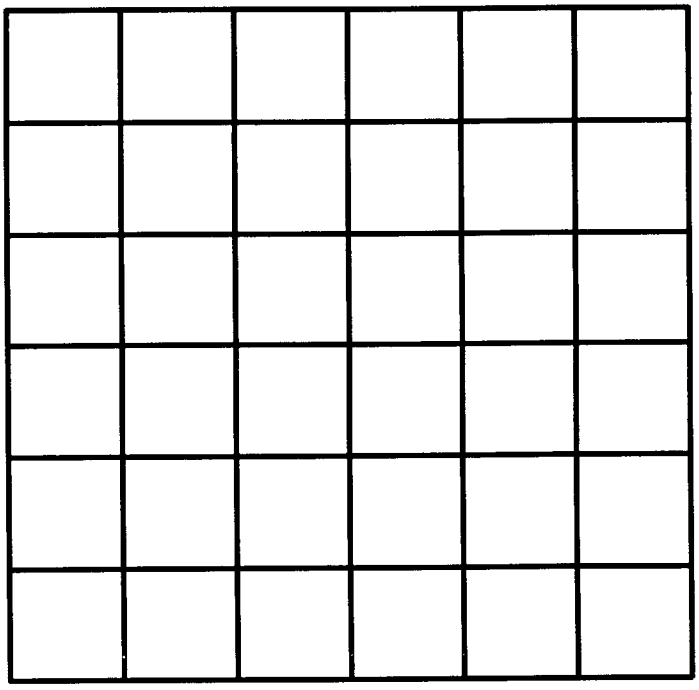


L10

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

L12





L14(a)

The Table Game

$+_{10}$	$-_{10}$	x_{10}
$\sqcap$	$\sqcup$	$\uparrow$
T_D	T_M	$\downarrow$
$T_<$	$T_>$	T_P

Name________________

Team________________

The Table Game

$+_{10}$	$-_{10}$	x_{10}
$\sqcap$	$\sqcup$	$\uparrow$
T_D	T_M	$\downarrow$
$T_<$	$T_>$	T_P

Name________________

Team________________

The Table Game

$+_{10}$	$-_{10}$	x_{10}
$\sqcap$	$\sqcup$	$\uparrow$
T_D	T_M	$\downarrow$
$T_<$	$T_>$	T_P

Name________________

Team________________

The Table Game

$+_{10}$	$-_{10}$	x_{10}
$\sqcap$	$\sqcup$	$\uparrow$
T_D	T_M	$\downarrow$
$T_<$	$T_>$	T_P

Name________________

Team________________

Secret Operation: _____ L14(b)

Points

Team A	Team B	Team C	Team D

First part of game

For correctly identifying *

- after first play – 10 points
- after second play – 9 points
- after third play – 8 points
- after fourth play – 7 points

Second part of game

For correctly making an entry

- on the diagonal – 1 point
- other than on the diagonal – 2 points

Secret Operation: _____

Points

Team A	Team B	Team C	Team D

First part of game

For correctly identifying *

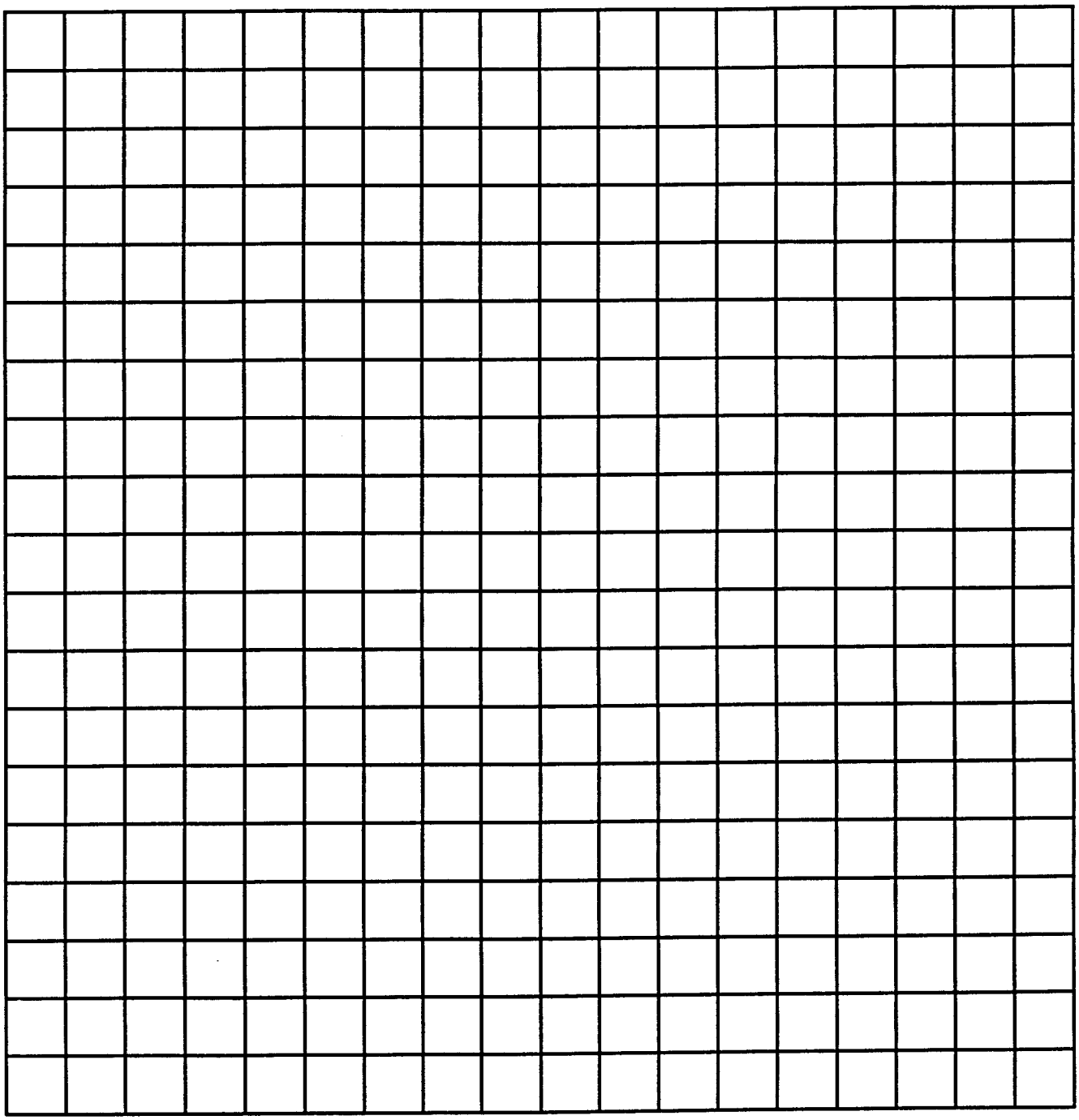
- after first play – 10 points
- after second play – 9 points
- after third play – 8 points
- after fourth play – 7 points

Second part of game

For correctly making an entry

- on the diagonal – 1 point
- other than on the diagonal – 2 points

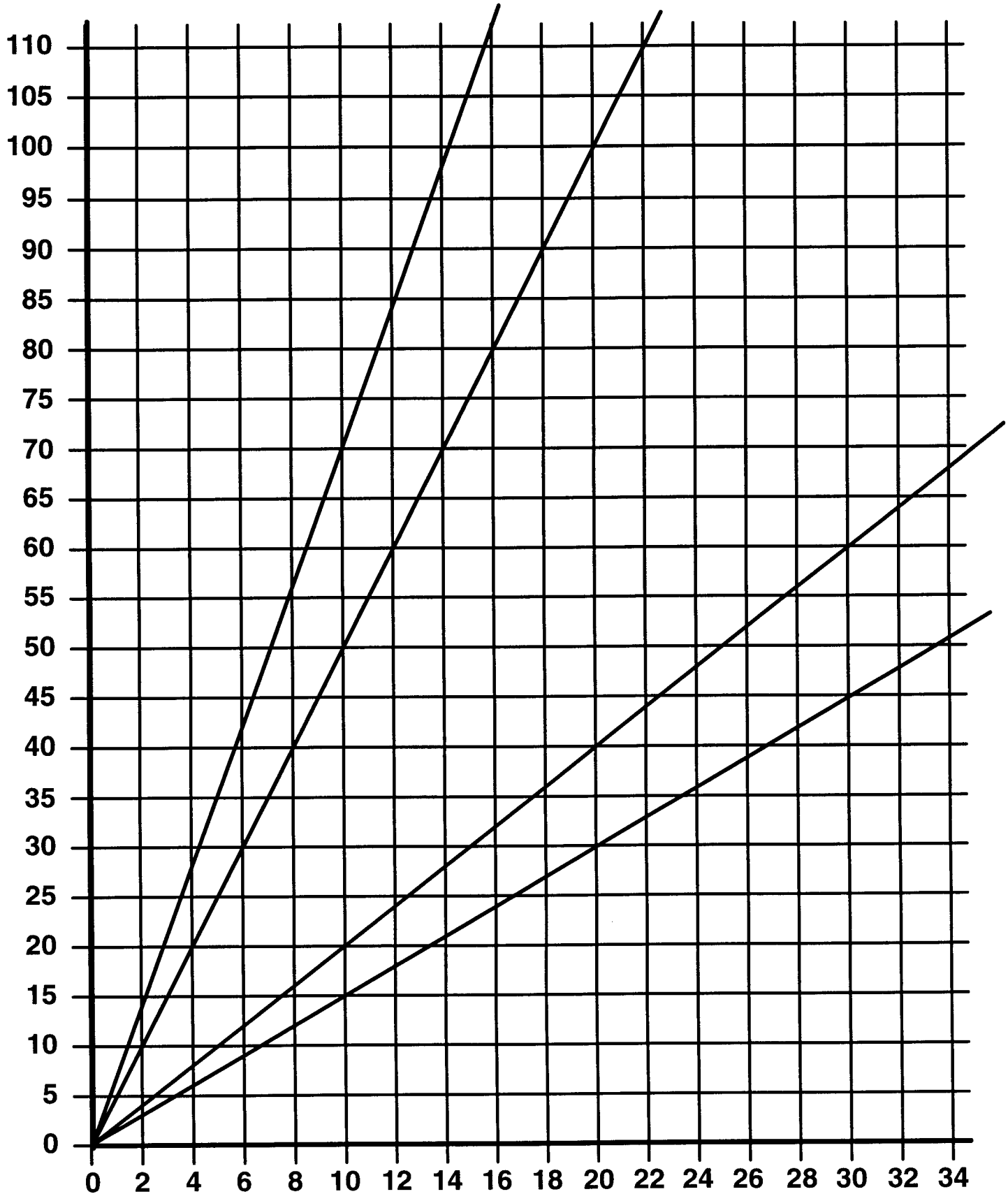
G5



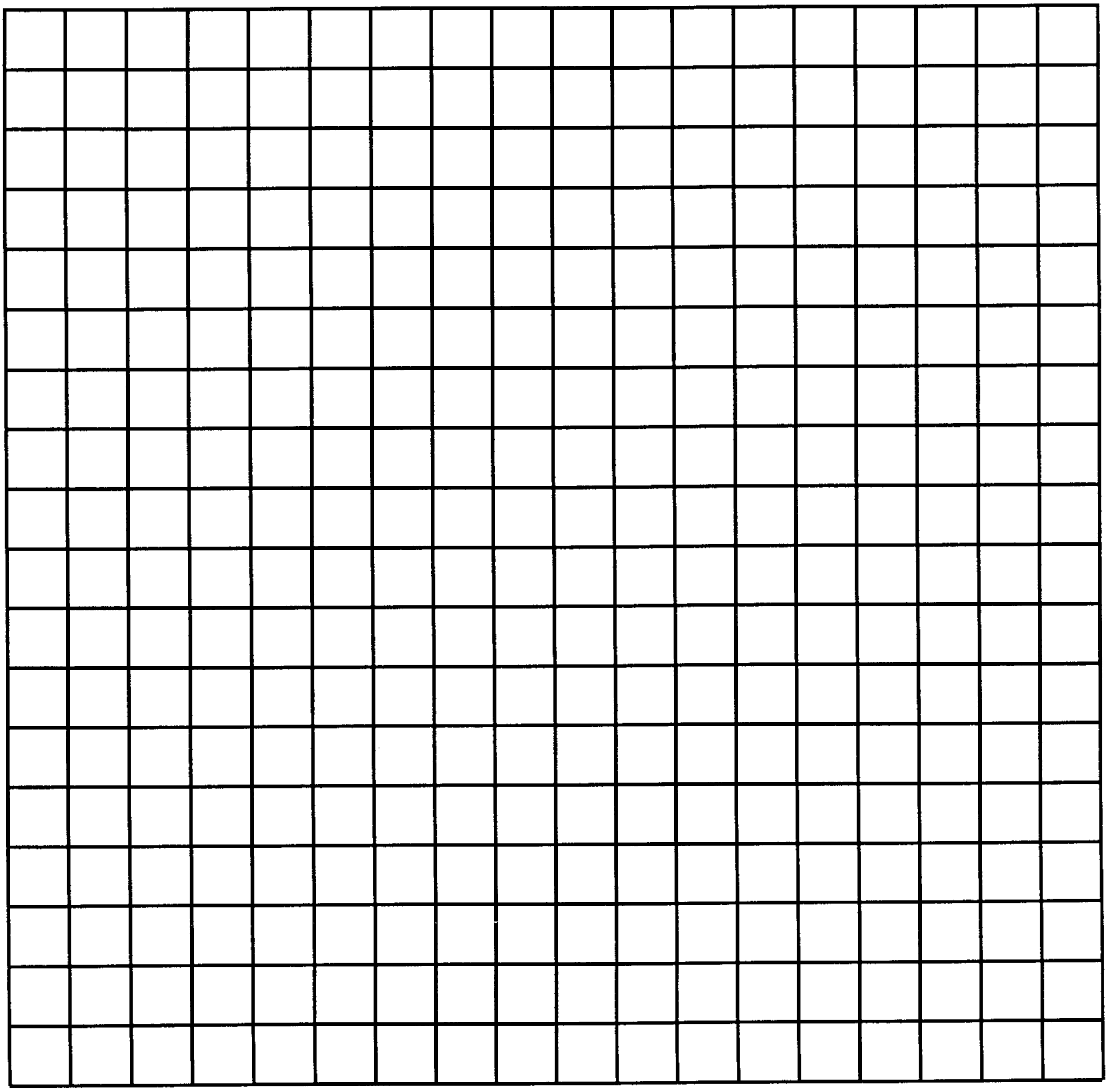
Radius of your circle:_____ Number of red squares:_____

Estimated area of your circle:_____ Number of blue squares:_____

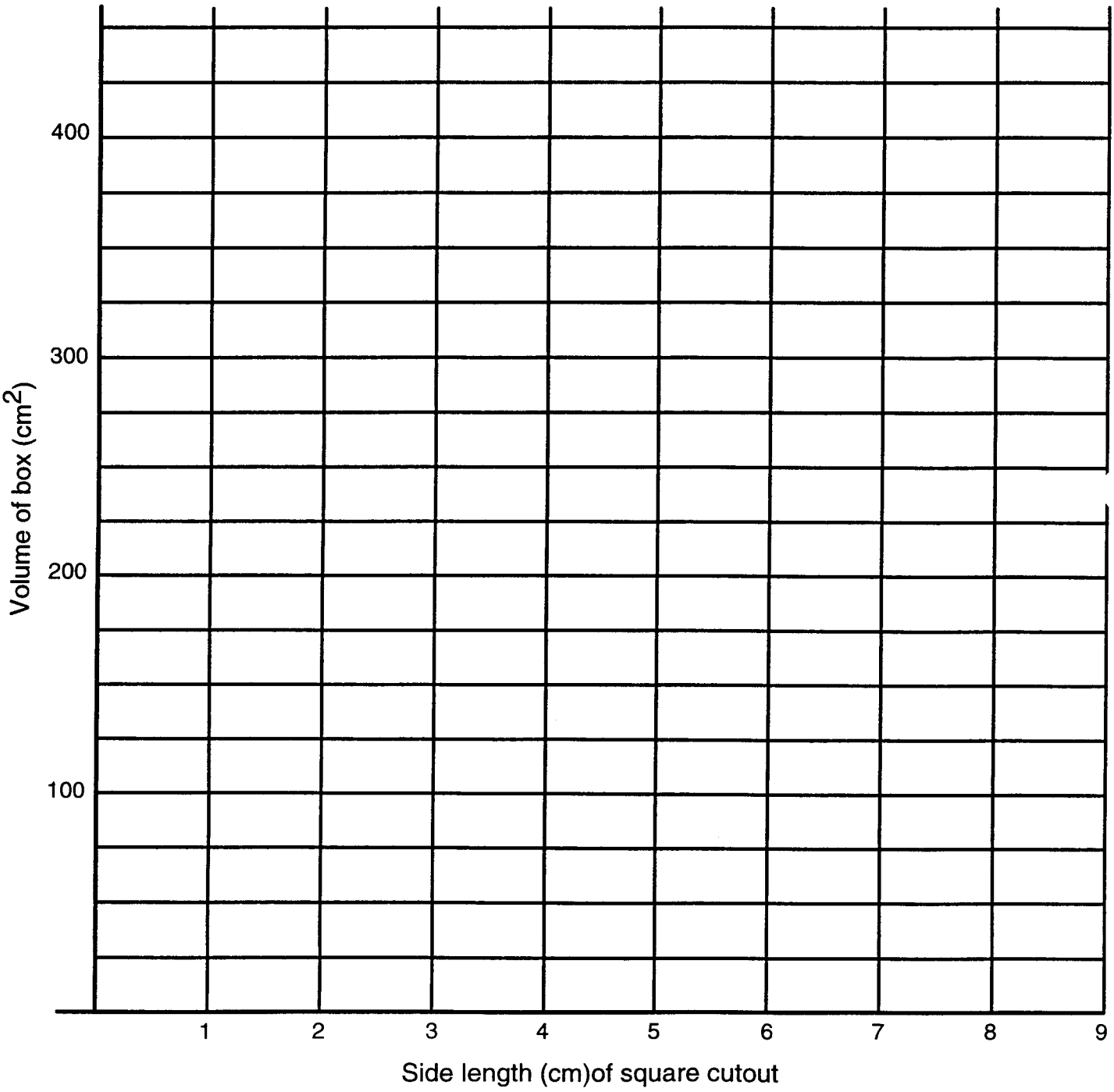
G7


110
105
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34

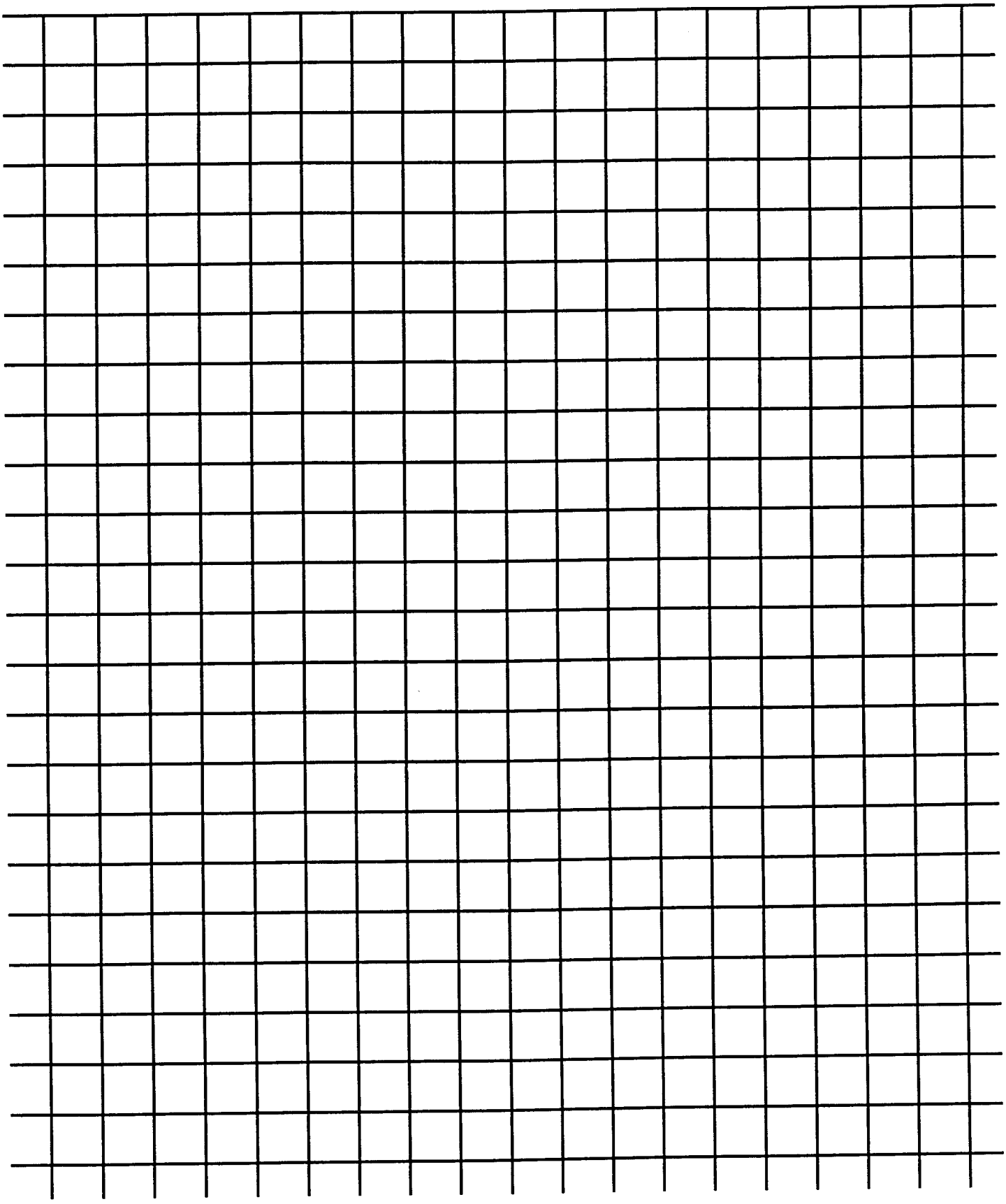
G8(a)



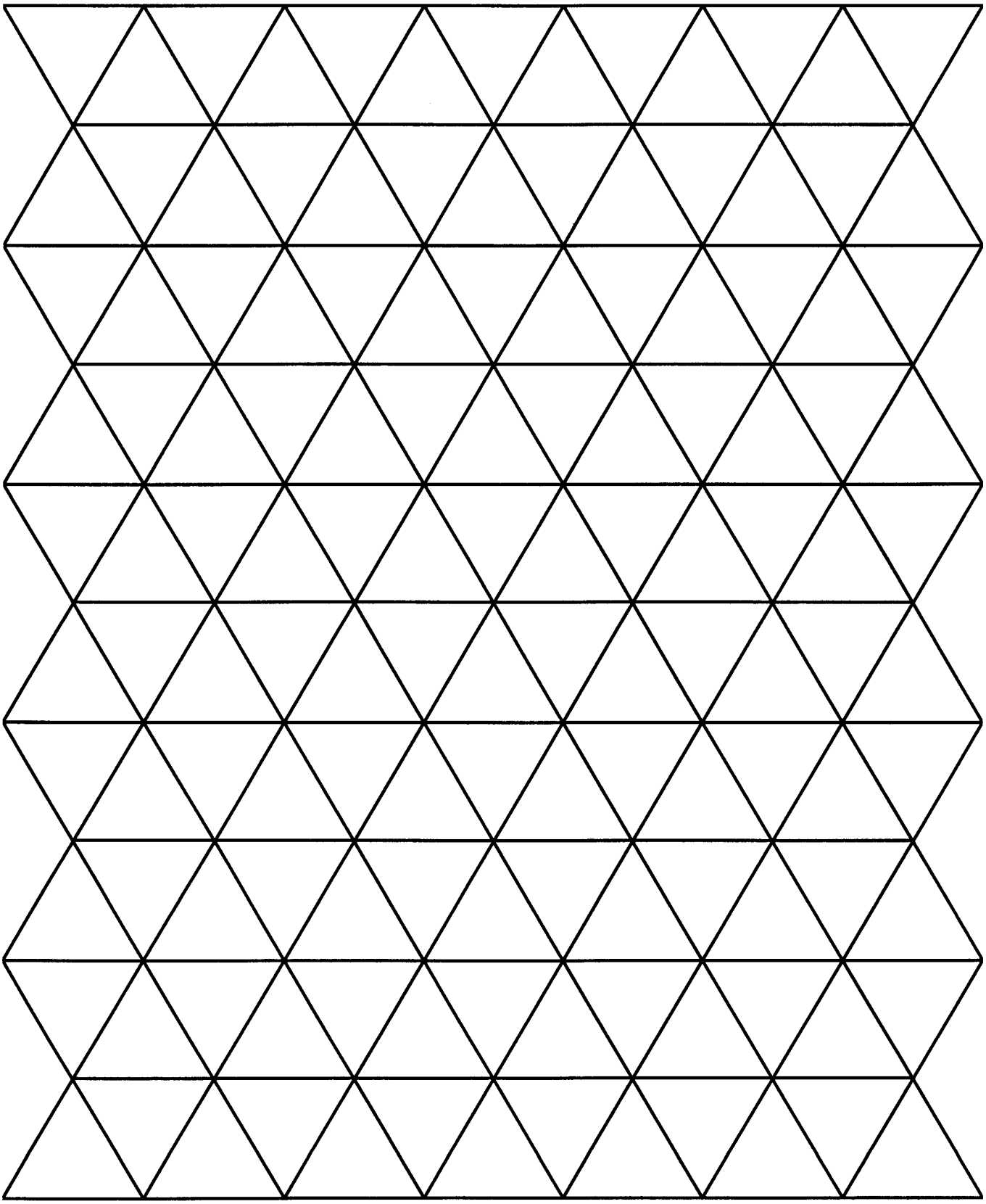
G8(b)


400
300
200
100
Volume of box (cm^2)
1
2
3
4
5
6
7
8
9
Side length (cm)of square cutout

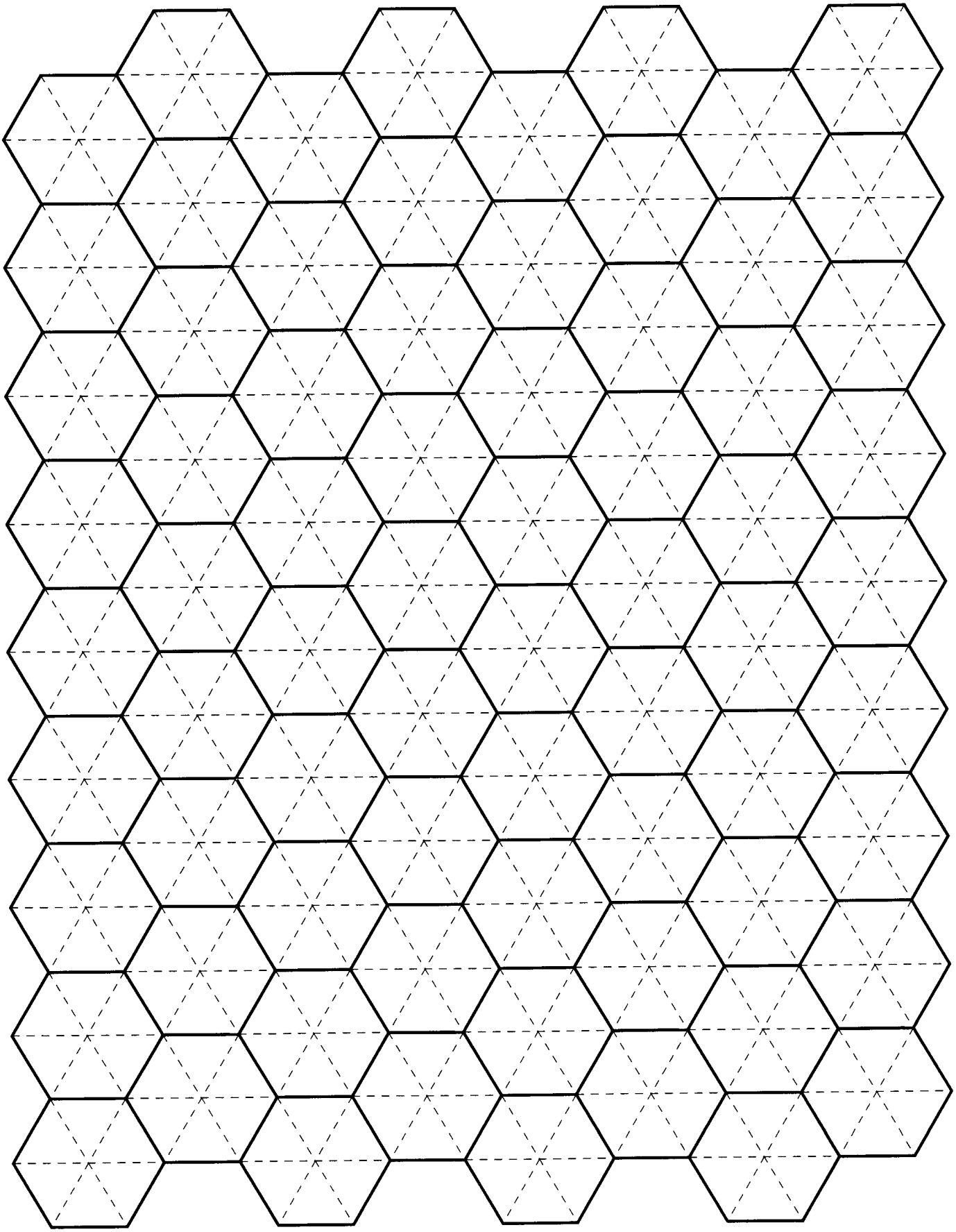
G9(a)



G9(b)

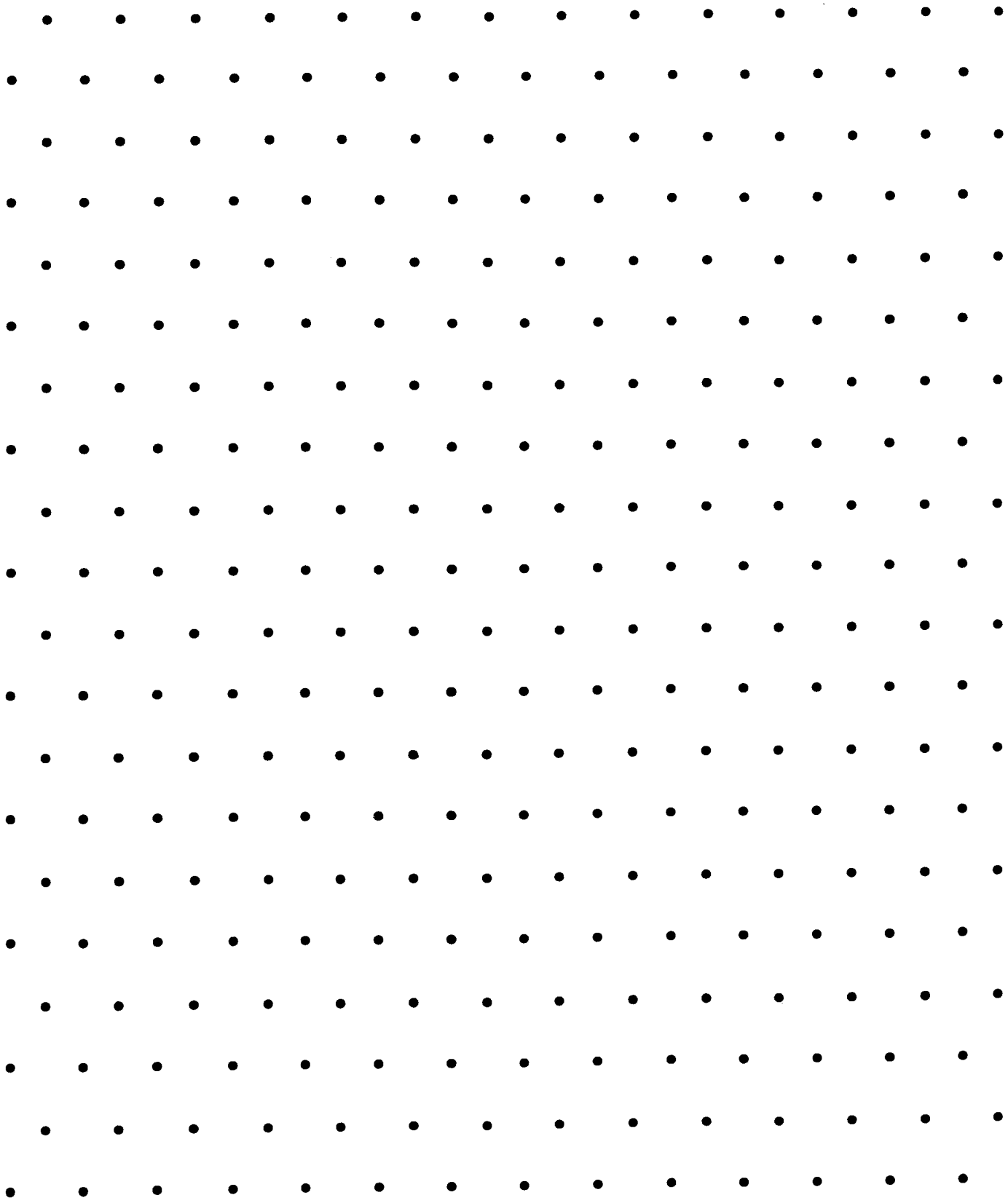


G9(c)



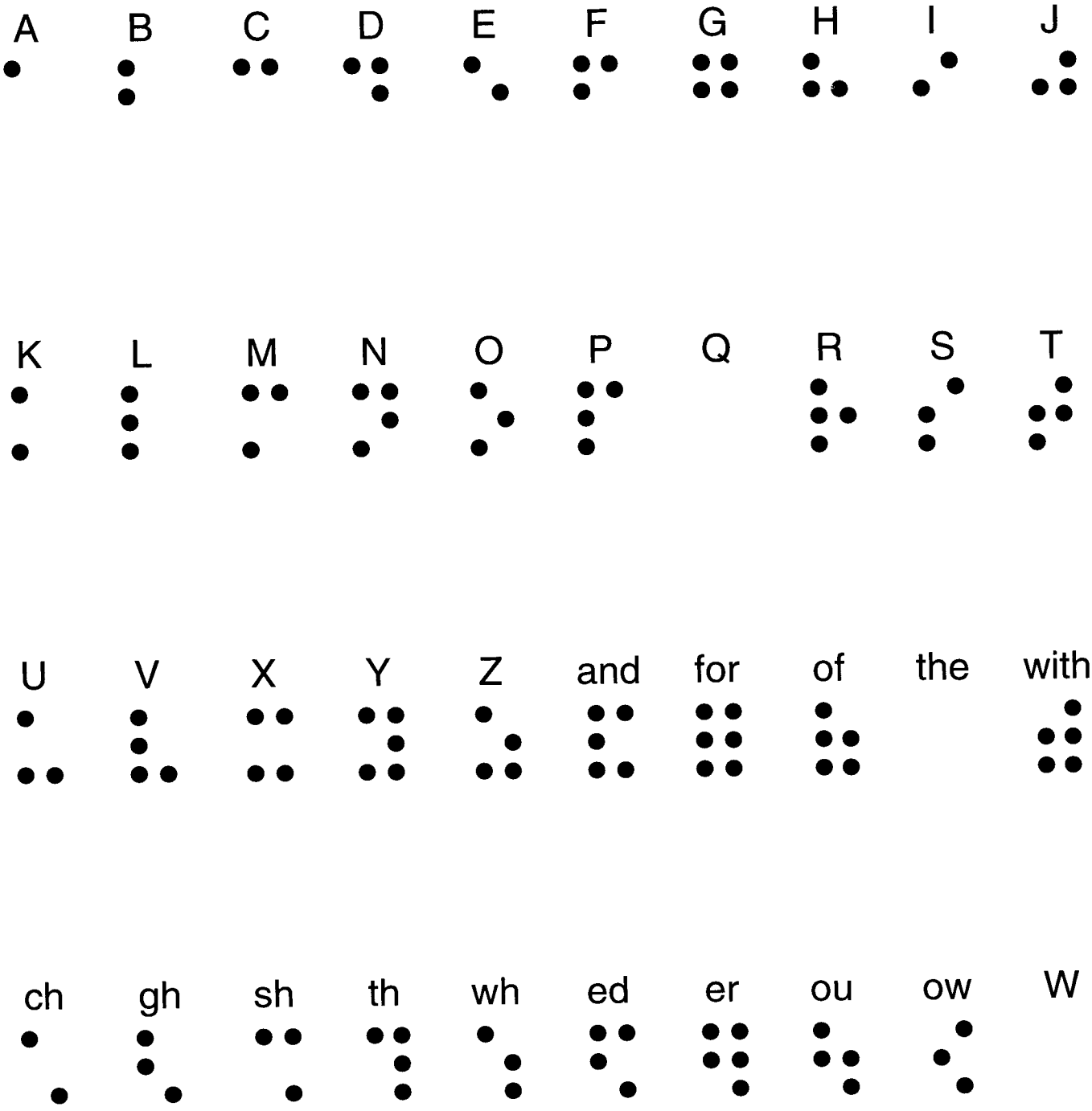
Isometric Dot Paper

G9(d)



P1(a)

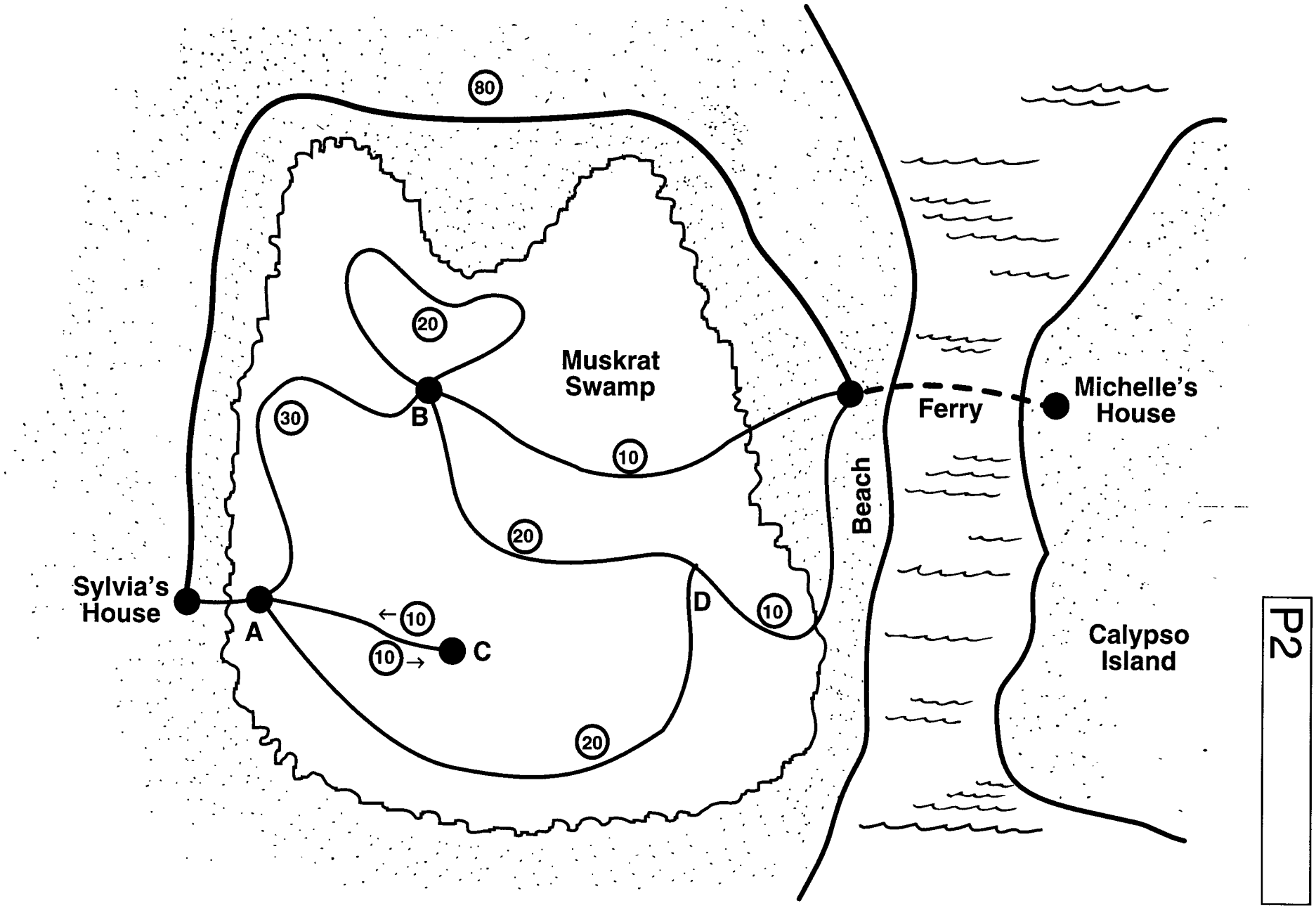
Braille Characters



P1(b)

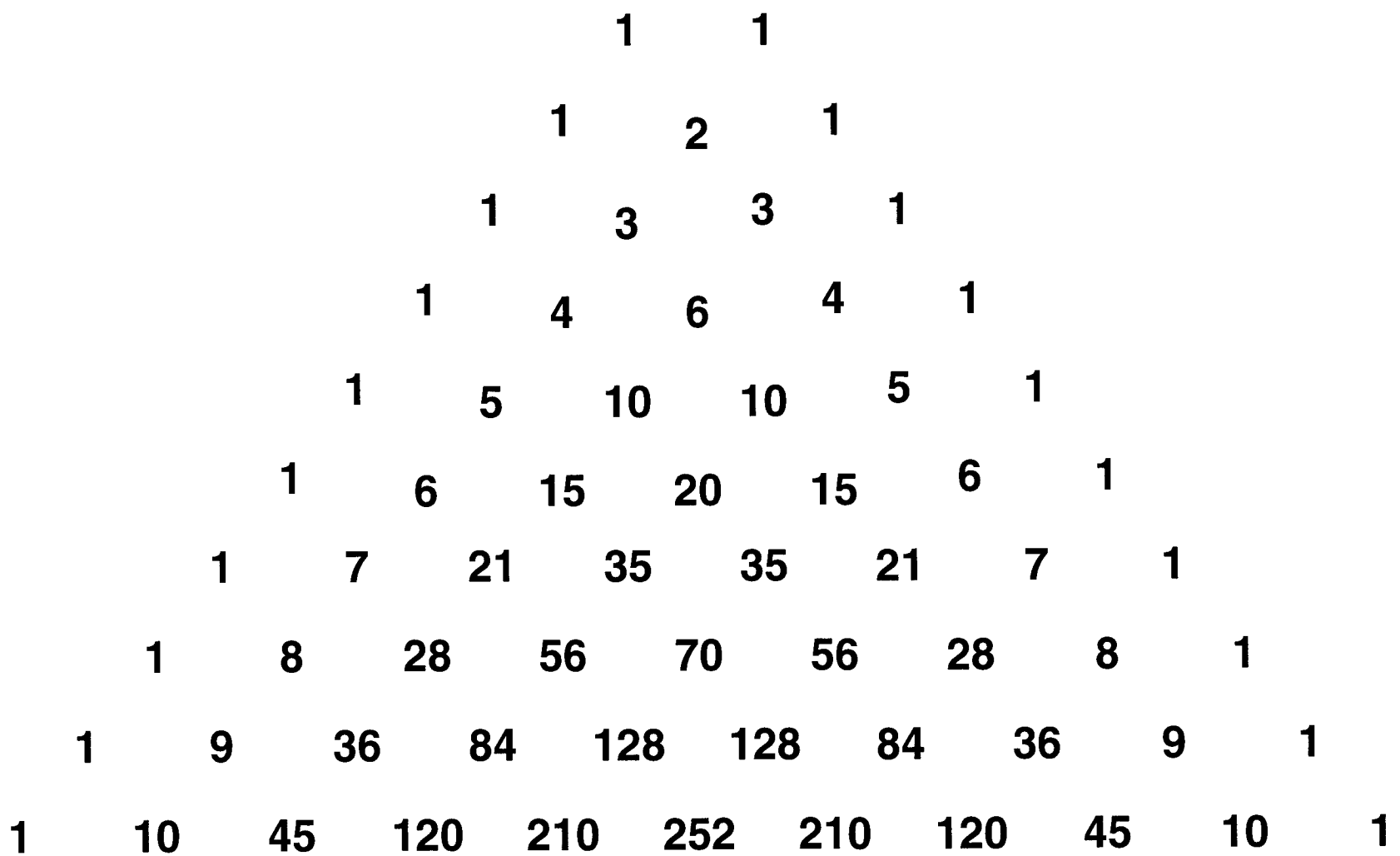
Morse Code

A •–	N –•	1 •– – – –
B –•••	O – – –	2 ••– – –
C –•–•	P •– – •	3 •••– –
D –••	Q – –•–	4 ••••–
E •	R •–•	5 •••••
F ••–•	S •••	6 –••••
G – –•	T –	7 – –•••
H ••••	U ••–	8 – – –••
I ••	V •••–	9 – – – –•
J •– – –	W •– –	0 – – – – –
K –•–	X –••–	
L •–••	Y –•– –	
M – –	Z – –••	


80
20
Muskrat
Swamp
30
B
10
20
Sylvia's
House
A
10
10
C
D
10
20
Beach
Ferry
Michelle's
House
Calypso
Island

P2

Pascal's Triangle

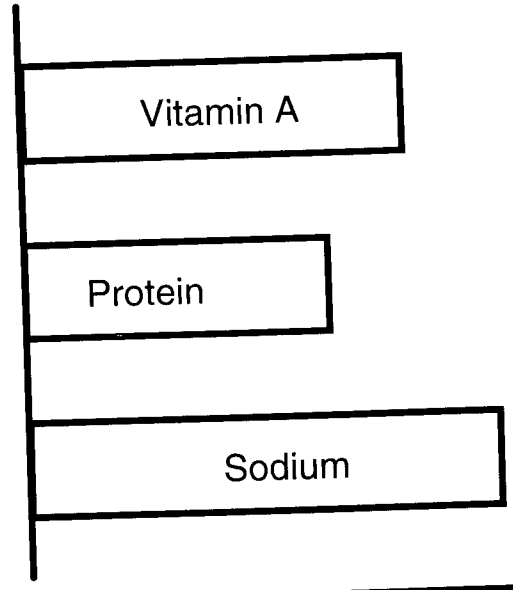


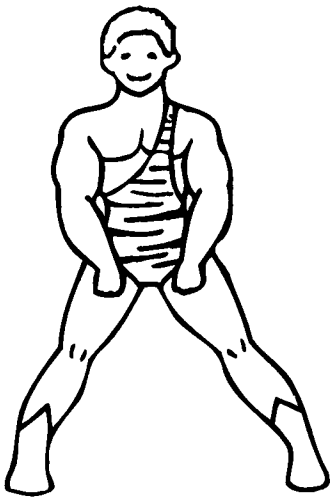
P7

P8

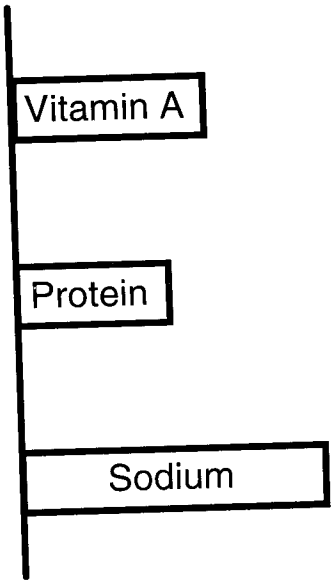
"4 of 5 people prefer Nutribest!"

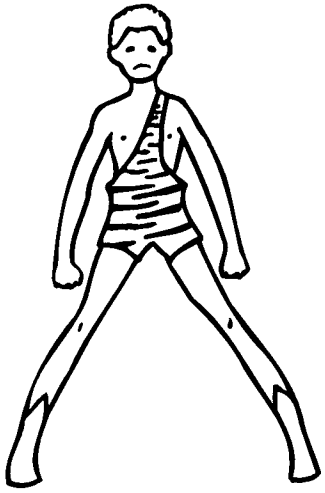
Nutribest Cereal $1.38





Brand X $1.60





W2(a)

Arcade of Problems #1
(16-7458R)

Student Name _____
Date _____

		Responses
Arrows	p.4 (+9, –6)	10 _____
	p.7 (+☐ and composition)	8 _____
	p.10 (arrow road with decimals)	5 _____
	p.11 (+☐, x☐ patterns)	14 _____
	p.13 (is less than)	13 _____
	p.16 (+☐, –☐ with decimals)	14 _____
	p.20 (matching arrows for composition)	6 _____
	p.23 (+☐ with decimals)	9 _____
	p.29 (fraction times)	12 _____
Minicomputer/Abaci	p.8 (weighted checkers)	7 _____
Strings	p.3 (less than, multiples, positive divisors)	10 _____
	p.12 (*String Game* with numbers)	12 _____
	p.27 (story problem with strings)	4 _____
Calculations with +, –, x, ÷	p.5 (algorithm puzzles)	10 _____
	p.17 (story problems with mult. & div.)	3 _____
	p.28 (algorithm puzzles)	50 _____
Fractions	p.6 (fractional parts of shapes)	12 _____
	p.9 (fractional parts of shapes)	5 _____
	p.18 (fraction times as composition)	6 _____
	p.25 (locate on number line, is less than)	13 _____
Geometry and Measurement	p.19 (volume)	3 _____
	p.14 (fill up with shapes)	4 _____
Detective Stories	p.2 (Minicomputer, calculator relations)	8 _____
	p.15 (fraction times, string picture)	7 _____
	p.21 (arrow roads, number line)	4 _____
	p.24 (arrow pict, calc. relation, string pict.)	13 _____
	p.30, 31 (composition, MC, parentheses)	13 _____
Number Sense/Combinations	p.22 (restricted calculator)	9 _____
	p.26 (coin problems)	25 _____
	p.32 (names with restricted symbols)	18 _____

W2(b)

Dear Parent/Guardian:

With this letter, we are sending home your child's *Arcade of Problems #1* Workbook. It contains pages with problems from various areas of our mathematics curriculum. During the past couple weeks, the students have been working independently in this booklet.

Please be aware that the workbook pages become progressively more difficult. Time constraints and individual understanding, skills, and experiences will influence how much of the booklet a student completes. We do not expect every student to complete every page, especially since the last one-third of the booklet is designed for extra challenge. You may wish to discuss pages that were difficult for your child or practice some of these concepts at home.

Other workbooks will be sent home later in the year. These should give you an idea of some of the topics and concepts being introduced in our mathematics curriculum as well as help you monitor your child's progress.

Sincerely,

W4

Arcade of Problems #2
(16-7466R)

Student Name _____
Date _____

			Responses
Arrows	p.3	(label arrows in two ways)	14 _____
	p.5	(+7, –4)	15 _____
	p.7	(arrow road)	3 _____
	p.8	(–□, +□ with decimals)	8 _____
	p.14	(÷10 composition)	13 _____
	p.16	(fraction times and composition)	8 _____
	p.18	(+□, –□ with decimals)	10 _____
	p.21	(story problem with an arrow road)	3 _____
	p.27	(fraction times and ⅟- equiv.)	8 _____
	p.31	(calculator relations with decimals)	4 _____
Minicomputer/Abaci	p.11	(weighted checkers)	5 _____
Strings	p.4	(multiples of 5 and 6)	6 _____
	p.23	(fractions and decimals in strings)	11 _____
Calculations with +, –, x, ÷	p.9	(algorithm puzzles)	17 _____
	p.12	(multiplication and division patterns)	16 _____
	p.17	(story problem)	1 _____
	p.20	(algorithm puzzles)	14 _____
	p.26	(best buy problems)	3 _____
	p.29	(match names)	6 _____
Fractions	p.6	(fractional parts of shapes)	8 _____
	p.10	(equivalent fractions and subtraction)	8 _____
Geometry and Measurement	p.15	(compass construction)	1 _____
Detective Stories	p.2	(Minicomputer, string picture)	5 _____
	p.13	(string picture, calculator relation)	5 _____
	p.19	(parentheses, weighted checkers)	6 _____
	p.22	(arrow road, Minicomputer)	7 _____
	p.25	(pos. divisors, calculator relations)	12 _____
	p.28	(LCM and GCD)	5 _____
	p.30	(order, string pictures, fraction times)	8 _____
Number Sense/Combinations	p.24	(calculator sentences)	8 _____
	p.32	(fair game)	3 _____

W6(a)

Arcade of Problems #3
(16-7474R)

Student Name _____
Date _____

			Responses
Arrows	p.4	(label arrows in two ways)	14 _____
	p.6	(pair tags)	5 _____
	p.9	(+☐ and composition)	10 _____
	p.12	(arrow road)	3 _____
	p.15	(+☐, –☐ with decimals)	11 _____
	p.17	(pair tags)	6 _____
	p.26	(☐x and composition)	7 _____
Minicomputer/Abaci	p.3	(weighted checkers)	7 _____
Strings	p.2	(multiples, positive divisors)	10 _____
	p.18	(*String Game* with numbers)	14 _____
	p.24	(multiples of 5 and 6)	12 _____
	p.27	(multiples of 5 and 9)	8 _____
	p.29	(*String Game* with numbers)	14 _____
Calculations with +, –, x, ÷	p.11	(algorithm puzzles)	16 _____
	p.16	(algorithm puzzles)	22 _____
	p.22	(story problems)	2 _____
Fractions	p.5	(fractional parts of shapes)	12 _____
Geometry and Measurement	p.8	(compass construction)	1 _____
	p.13	(ordered pairs)	22 _____
	p.19	(compass construction)	3 _____
	p.25	(length)	7 _____
Detective Stories	p.10	(arrow pict, string pict, calc. relation)	14 _____
	p.20	(Minicom, decimals on number line)	10 _____
	p.23	(arrow picture, GCD, LCM)	11 _____
	p.28	(parentheses, GCD, LCM)	12 _____
	p.30	(calc. relations, string picture)	1 _____
	p.31	(GCD, LCM, Minicomputer)	7 _____
Number Sense/Combinations	p.7	(placing decimal points)	5 _____
	p.14	(balance)	2 _____
	p.21	(necklaces w/6 white and 3 red beads)	7 _____
	p.32	(number patterns)	6 _____

W6(b)

Dear Parent/Guardian:

We are continuing to use paper/pencil methods (algorithms) for addition, subtraction, multiplication, and division in our math class, mostly as we solve interesting problems. The puzzles below are designed to focus on understanding the methods. In problem situations, games, and puzzles, we hope to review, maintain, and extend our understanding of addition, subtraction, multiplication, and division concepts. In fact we believe that earlier experiences with concrete objects, with the Minicomputer, with mental arithmetic, and so on have made the paper/pencil methods mostly just recordings. An algorithm suggests we use a sequence of steps, and those earlier experiences help us understand reasons for the steps. At this time our instruction emphasizes the meaningful use of addition, subtraction, multiplication and division in problem contexts. Home practice will further help your child.

In doing calculations at home, remember that a paper/pencil method is only one. Sometimes we might better use mental methods or a calculator or a number pattern. We hope that a variety of methods will help children develop the ability to check their work and recognize reasonable answers. We hope also that paper/pencil will not inhibit a child's desire and/or ability to estimate, do mental arithmetic, use patterns, and so on. Calculation should be a tool for solving interesting problems rather than simply a chore done for its own sake.

Sincerely,

Algorithm Puzzles

Fill in the boxes with one-digit numbers.

$$\begin{array}{r} 3\,6\,\Box \\ +\,4\,\Box\,4 \\ \hline \Box\,7\,2 \end{array} \qquad \begin{array}{r} 5\,\Box\,9\,2 \\ +\,\Box\,3\,\Box\,\Box \\ \hline 7\,8\,0\,6\,5 \end{array} \qquad \begin{array}{r} 6\,\Box\,5 \\ +\,\Box\,3\,8 \\ \hline 3\,2\,\Box \end{array} \qquad \begin{array}{r} 5\,\Box\,2\,2 \\ +\,\Box\,6\,4\,\Box \\ \hline 2\,1\,\Box\,6 \end{array}$$

$$\begin{array}{r} \Box\,5\,\Box \\ \times\,\Box\,3 \\ \hline 4\,\Box\,\Box \\ +3\,\Box\,\Box\,\Box \\ \hline \Box\,4\,\Box\,6 \end{array} \qquad \begin{array}{r} 2\,\Box\,8 \\ \times\,1\,\Box \\ \hline 1\,\Box\,6\,2 \\ +\,\Box\,1\,\Box\,\Box \\ \hline \Box\,\Box\,\Box\,\Box \end{array}$$

$$\begin{array}{rl} \Box\,\Box\,\Box & R = \Box \\ 17\overline{)3\,\Box\,6\,\Box} & \\ -\,\Box\,4\,\Box\,\Box & \Box 00 \\ \hline 2\,\Box\,\Box & \\ -\,\Box\,7\,\Box & \Box 0 \\ \hline \Box\,4 & \\ -\,8\,\Box & \Box \\ \hline \Box & \end{array}$$

W9

Arcade of Problems #4
(16-7482R)

Student Name _____
Date _____

		Responses
Arrows	p.3 (arrow roads)	4 _____
	p.5 (match tags)	6 _____
	p.13 (+□, −□ with decimals)	10 _____
	p.17 (composition)	10 _____
Minicomputer/Abaci	p.10 (adding checkers)	6 _____
Strings	p.2 (positive divisors and multiples)	10 _____
	p.23 (fractions and decimals in strings)	10 _____
	p.27 (story problems with strings)	4 _____
	p.30 (*String Game* with numbers)	18 _____
Calculations with +, −, x, ÷	p.6 (algorithms)	9 _____
	p.12 (story problems)	4 _____
	p.14 (multiplication and division)	9 _____
	p.18 (story problems)	4 _____
	p.21 (probability story problem)	4 _____
	p.26 (match names for numbers)	6 _____
Fractions	p.8 (equivalent fractions)	8 _____
	p.16 (fractional parts of shapes)	7 _____
Geometry and Measurement	p.4 (length story problem)	3 _____
	p.7 (compass constructions)	6 _____
	p.11 (area of triangles)	8 _____
	p.22 (compass constructions, length)	3 _____
Detective Stories	p.15 (Minicomputer, arrow picture)	18 _____
	p.20 (GCD, LCM, calculator relations)	10 _____
	p.25 (Minicom, decimals on number line)	10 _____
	p.29 (Minicom, calc. relations, parentheses)	14 _____
	p.32 (GCD, calc. relations, 10x)	14 _____
Number Sense/Combinations	p.9 (missing decimal points)	5 _____
	p.19 (multiples of 9)	9 _____
	p.24 (exponents)	12 _____
	p.28 (*Guess My Rule*)	11 _____
	p.31 (arrangements of beads on pole)	2 _____

W12

Arcade of Problems #5
(16-7490R)

Student Name _____
Date _____

			Responses
Arrows	p.3	(arrow road)	3 _____
	p.4	(+☐, –☐)	10 _____
	p.12	(+☐, –☐ with decimals)	8 _____
	p.27	(greatest number in arrow picture)	12 _____
Minicomputer/Abaci	p.5	(adding checkers)	4 _____
	p.29	(weighted checkers)	6 _____
Strings	p.6	(positive divisors, greater than)	2 _____
	p.18	(greater and less than)	11 _____
	p.20	(*String Game* with numbers)	14 _____
	p.26	(greater and less than)	8 _____
	p.30	(*String Game* with numbers)	12 _____
Calculations with +, –, x, ÷	p.7	(addition, subtraction with decimals)	4 _____
	p.16	(story problems)	5 _____
	p.17	(division)	10 _____
	p.32	(number names with special symbols)	8 _____
Fractions and Percents	p.9	(adding and subtracting fractions)	6 _____
	p.14	(equivalent fractions and addition)	8 _____
	p.15	(percent of a shape)	6 _____
Geometry and Measurement	p.10	(length and area)	10 _____
	p.13	(compass constructions)	3 _____
	p.19	(area story problem)	5 _____
	p.22	(length and division)	5 _____
Detective Stories	p.2	(Minicomputer, string picture)	5 _____
	p.11	(GCD, LCM, calculator relation)	7 _____
	p.24	(LCM, string pictures, calc. relation)	7 _____
	p.28	(string picture, order, mult. of 5, GCD)	15 _____
Number Sense/Combinations	p.8	(prime factor relation)	9 _____
	p.21	(*Guess My Rule*)	8 _____
	p.23	(comparison problems)	6 _____
	p.25	(prime factor relation)	6 _____
	p.31	(prime factor relation)	18 _____

W14

Arcade of Problems #6
(16-7508R)

Student Name _____
Date _____

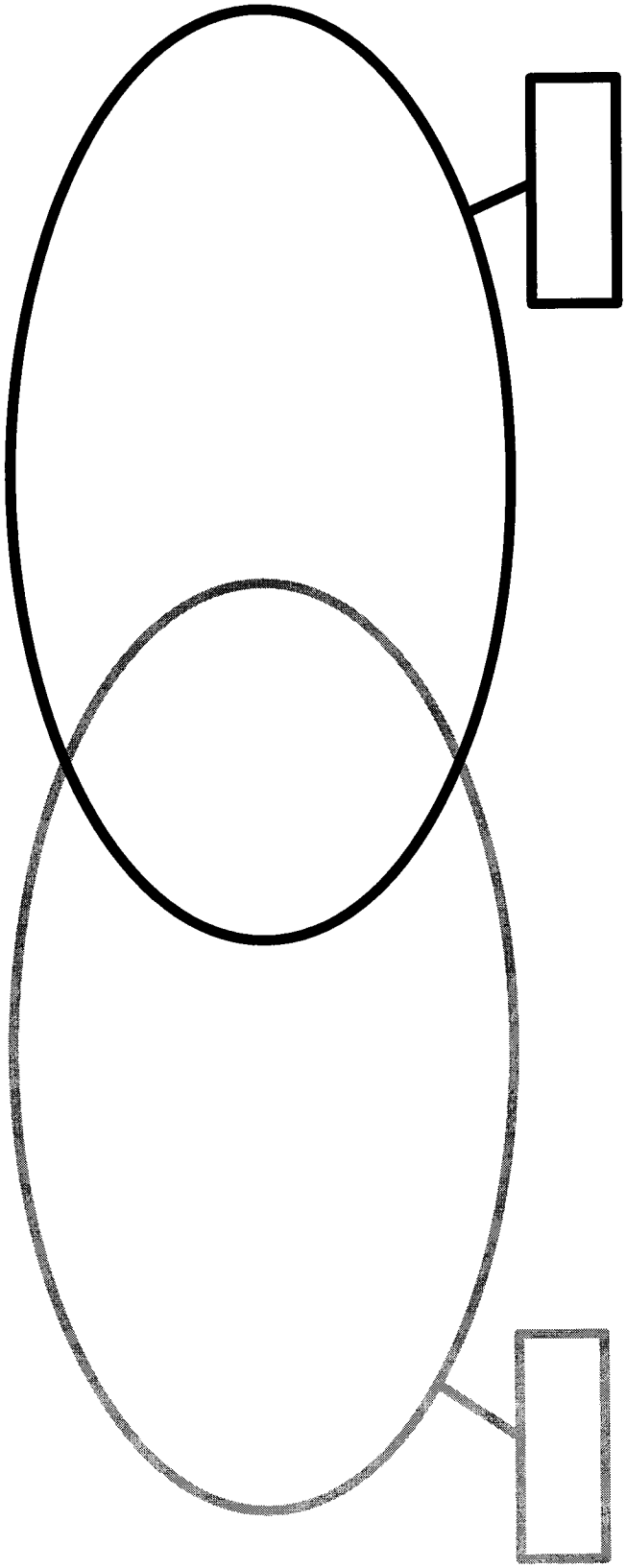
			Responses
Arrows	p.3	(label arrows in two ways)	14 _____
	p.4	(arrow road)	4 _____
	p.7	(+□ composition)	8 _____
	p.13	(arrow road)	8 _____
	p.24	(fraction times and composition)	7 _____
	p.27	(greatest number in arrow pictures)	12 _____
Minicomputer/Abaci	p.12	(special checkers)	2 _____
Strings	p.11	(*String Game* with numbers)	12 _____
	p.17	(greater and less than)	11 _____
	p.29	(*String Game* with numbers)	12 _____
Calculations with +, –, x, ÷	p.8	(algorithm puzzles)	10 _____
	p.10	(story problem)	11 _____
	p.14	(addition and subtraction with decimals)	4 _____
	p.32	(story problems)	2 _____
Fractions	p.6	(addition and subtraction of fractions)	4 _____
	p.15	(fractional parts of shapes)	10 _____
	p.20	(locate on number line)	13 _____
Geometry and Measurement	p.9	(area of rectangles and triangles)	13 _____
	p.16	(compass constructions)	5 _____
	p.23	(length on map)	5 _____
	p.30	(volume and surface area)	8 _____
Detective Stories	p.2	(Minicomputer, string picture)	6 _____
	p.5	(Minicomputer, arrow picture)	17 _____
	p.22	(arrow picture, GCD, max)	9 _____
	p.25	(divisibility)	8 _____
	p.26	(string picture, arrow picture, $T_<$)	2 _____
	p.28	(GCD, calculator relations)	7 _____
	p.31	(GCD, LCM, max)	10 _____
Number Sense/Combinations	p.18	(balance problems)	1 _____
	p.19	(Cartesian graph)	6 _____
	p.21	(Pascal's triangle)	1 _____

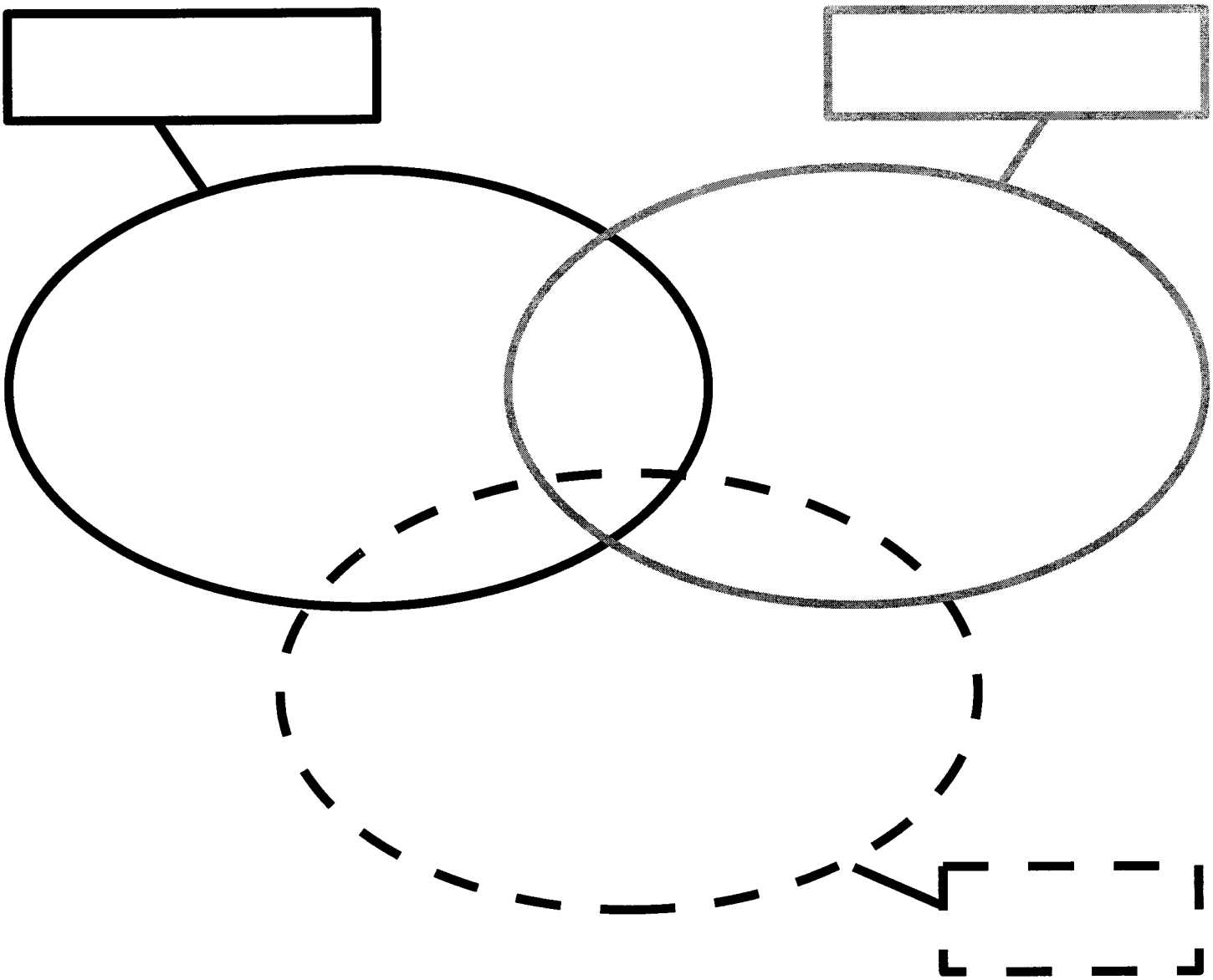
0–109 Numeral Chart

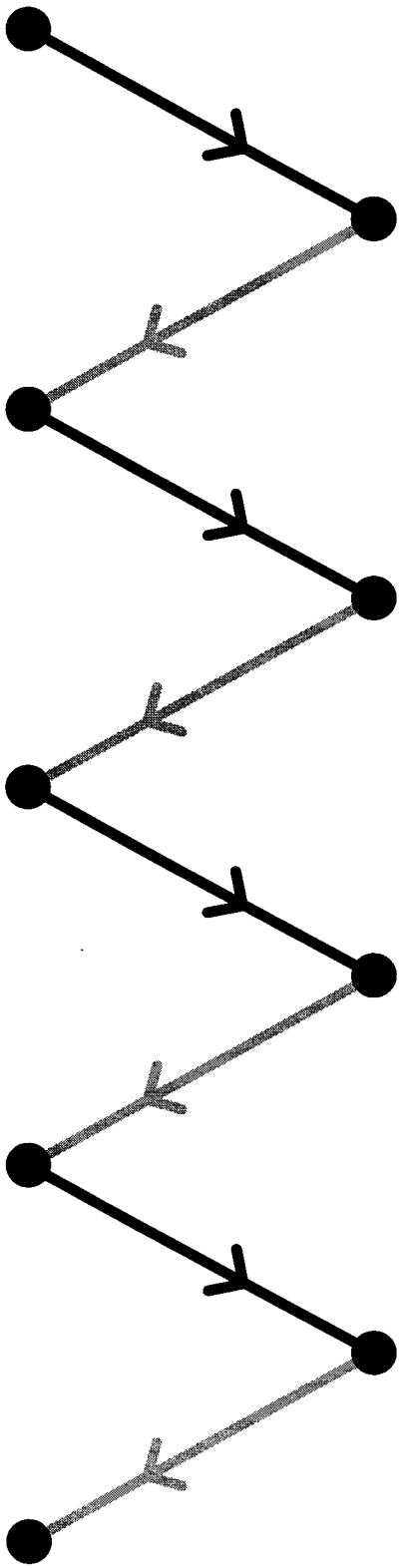
0	1	2	3	4	5	6	7	8	9
10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28	29
30	31	32	33	34	35	36	37	38	39
40	41	42	43	44	45	46	47	48	49
50	51	52	53	54	55	56	57	58	59
60	61	62	63	64	65	66	67	68	69
70	71	72	73	74	75	76	77	78	79
80	81	82	83	84	85	86	87	88	89
90	91	92	93	94	95	96	97	98	99
100	101	102	103	104	105	106	107	108	109

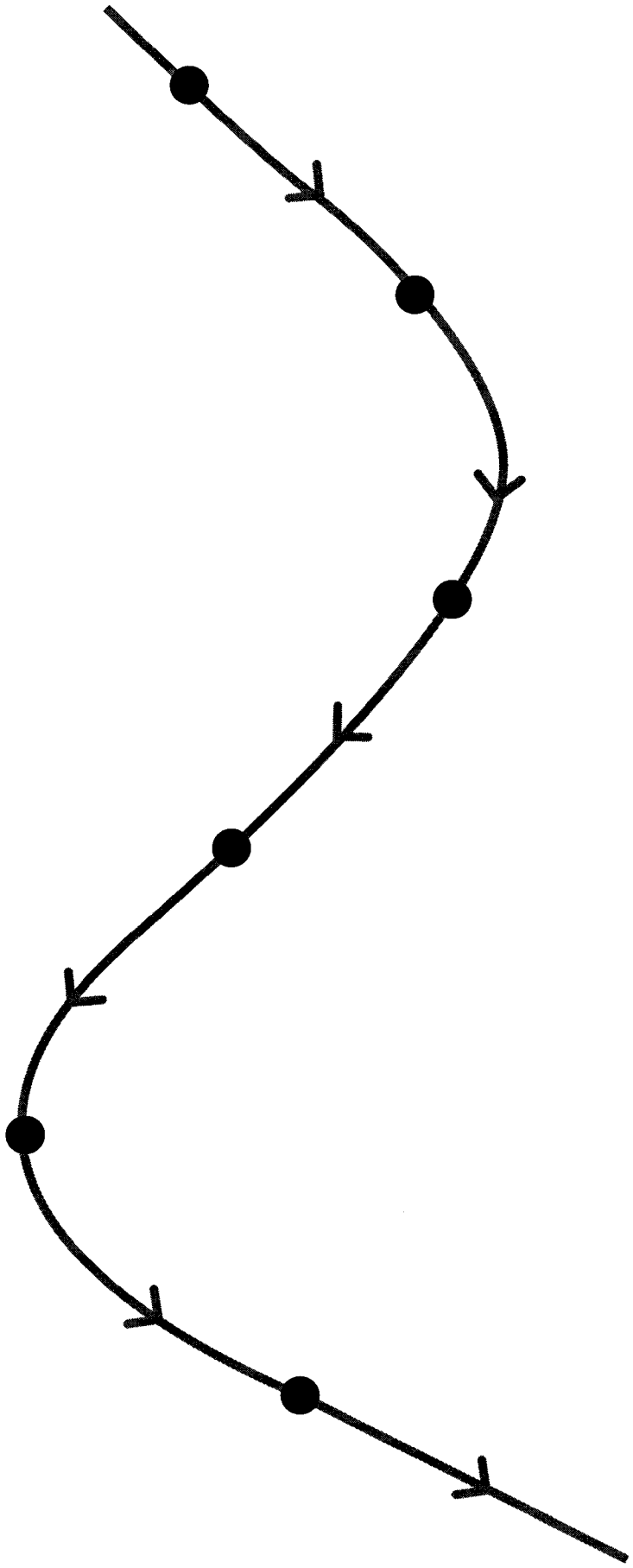
Multiplication Table

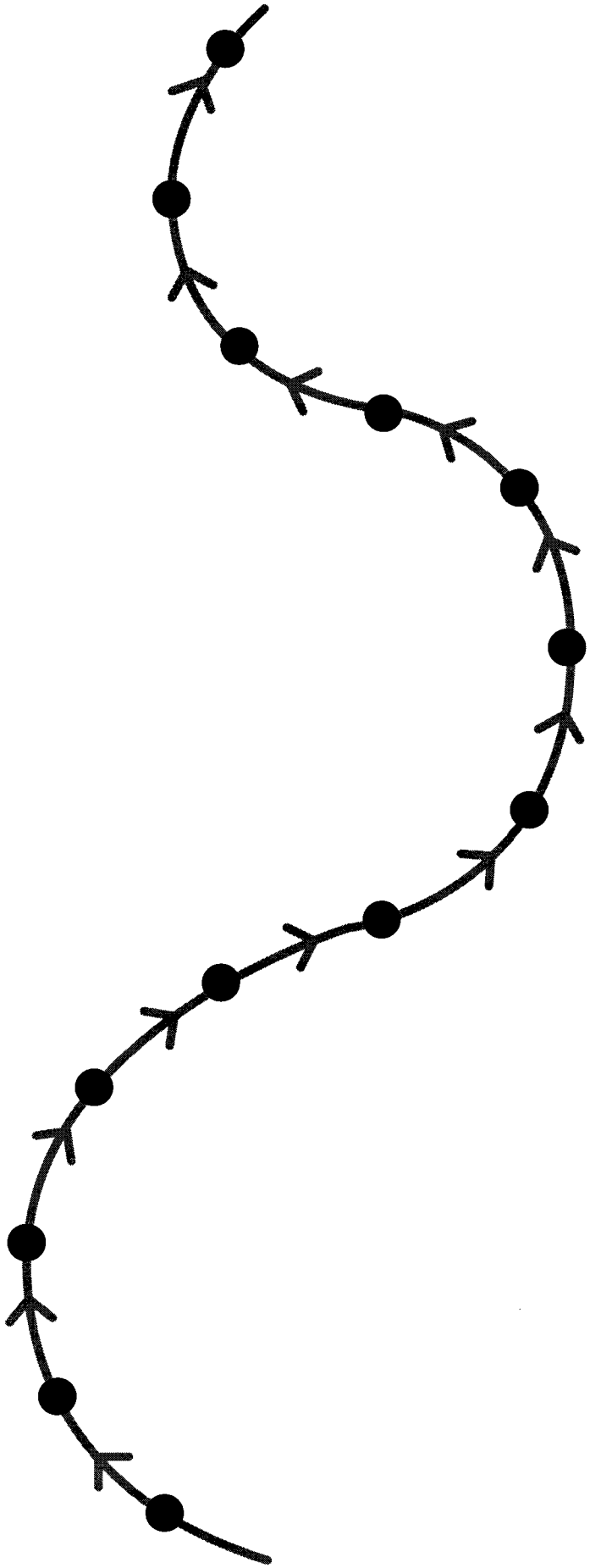
1	2	3	4	5	6	7	8	9	10
2	4	6	8	10	12	14	16	18	20
3	6	9	12	15	18	21	24	27	30
4	8	12	16	20	24	28	32	36	40
5	10	15	20	25	30	35	40	45	50
6	12	18	24	30	36	42	48	54	60
7	14	21	28	35	42	49	56	63	70
8	16	24	32	40	48	56	64	72	80
9	18	27	36	45	54	63	72	81	90
10	20	30	40	50	60	70	80	90	100

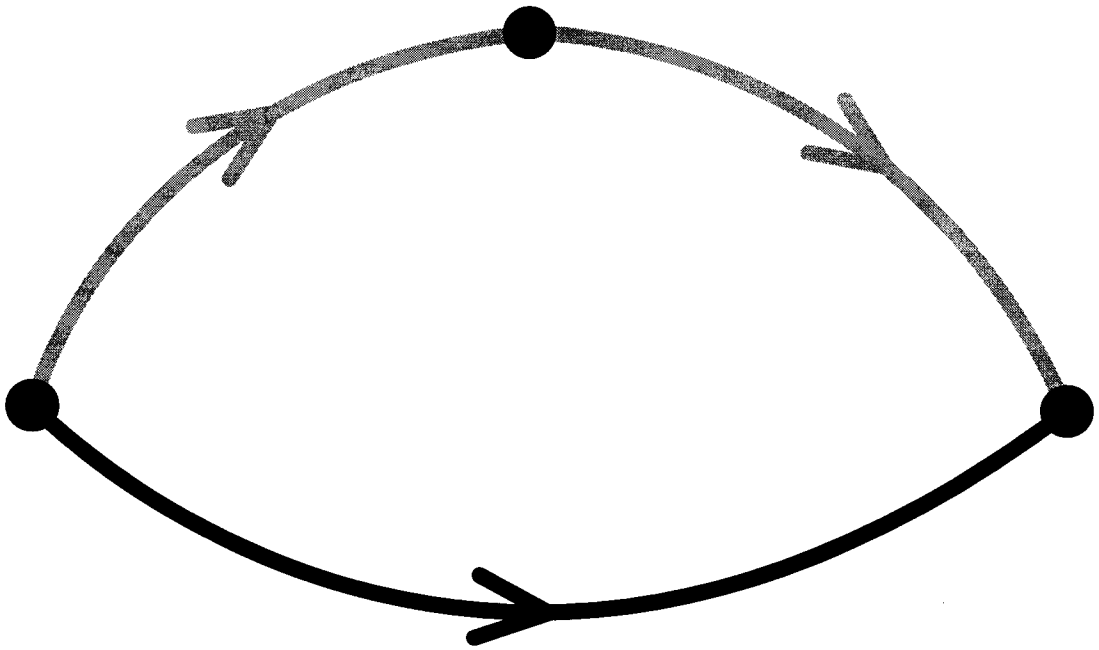


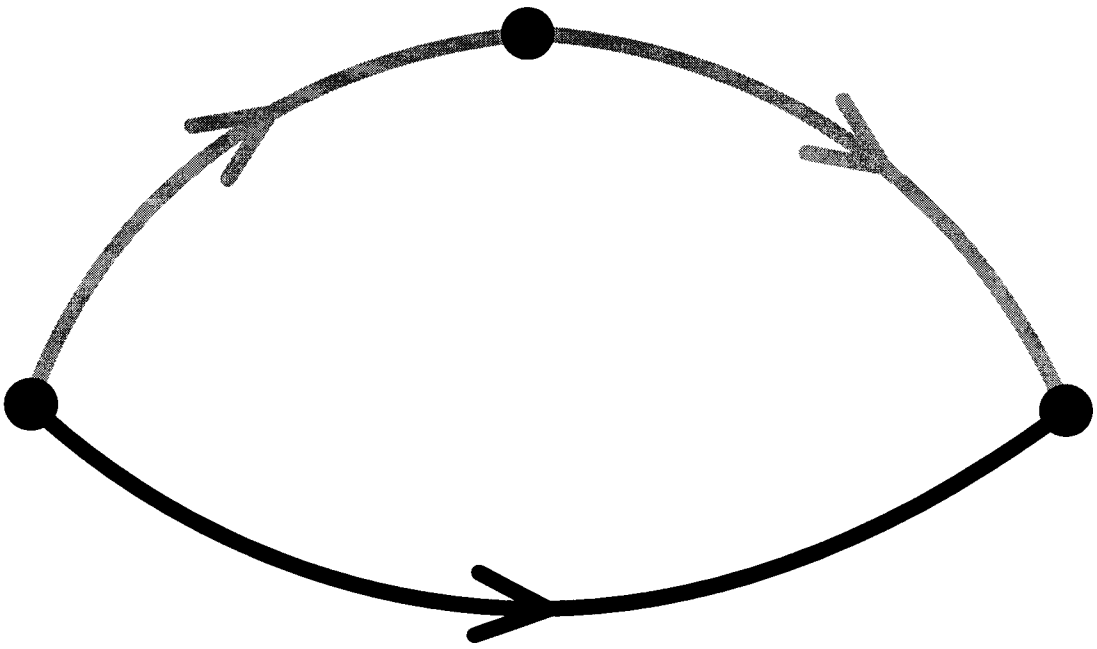


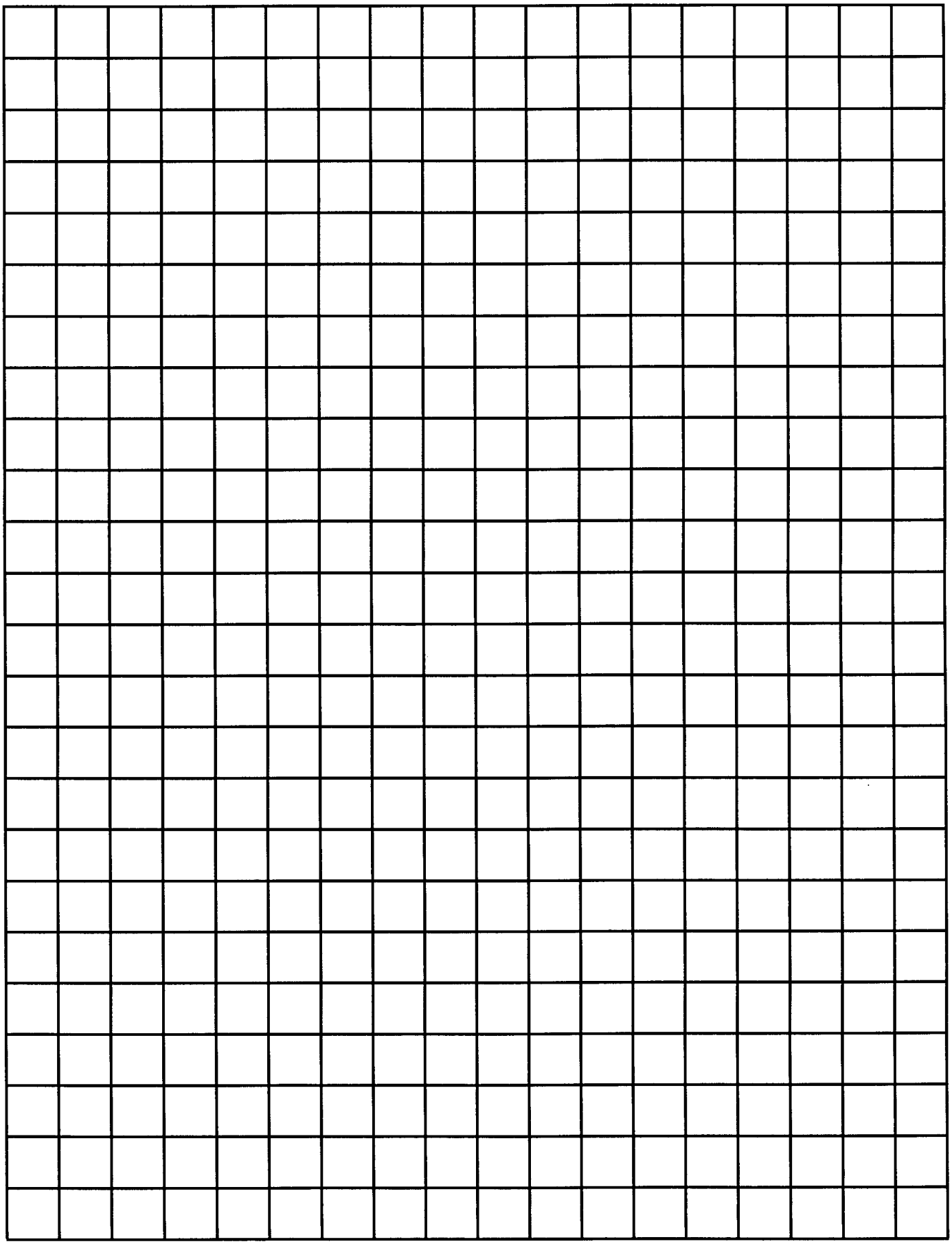


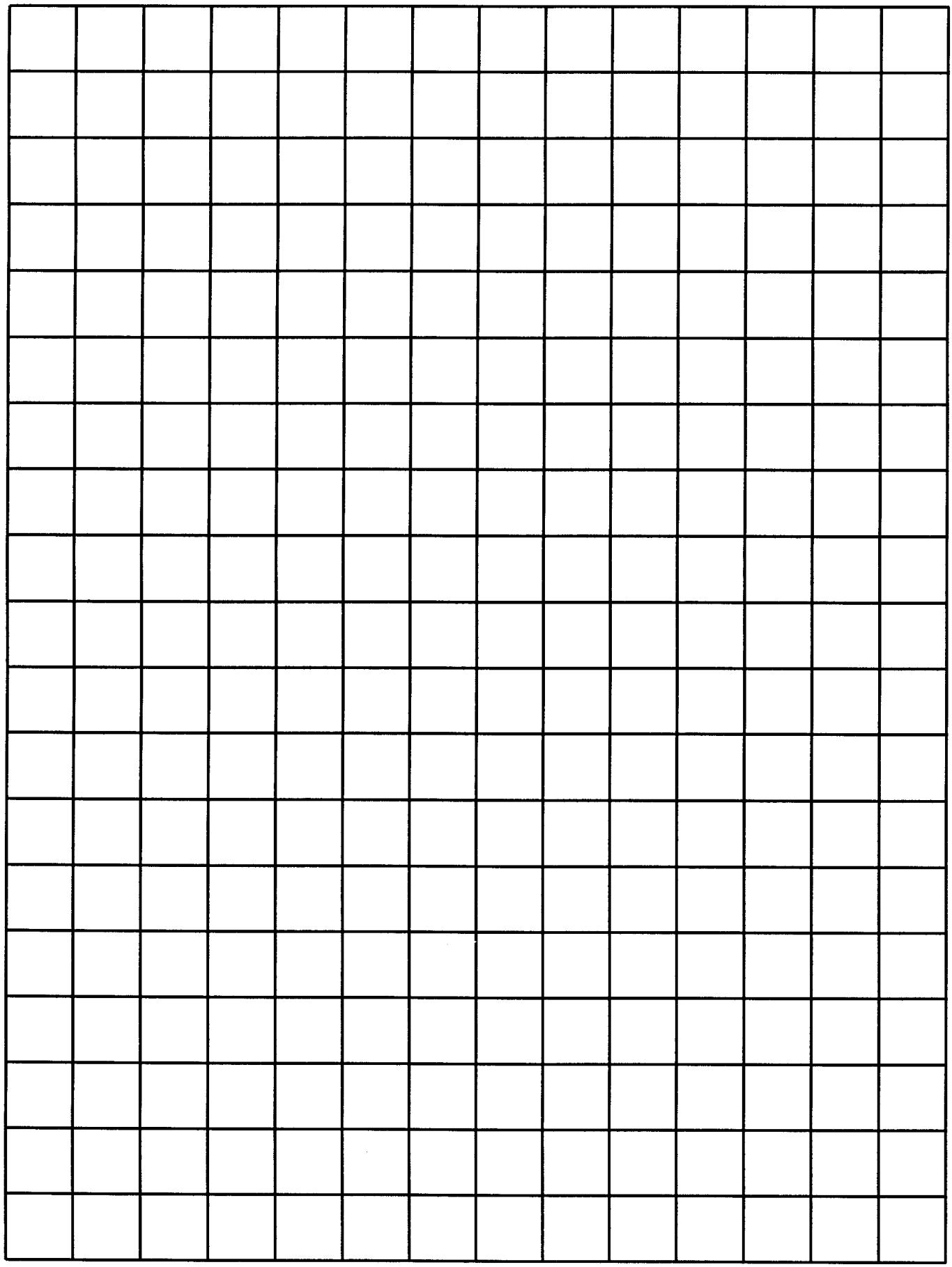


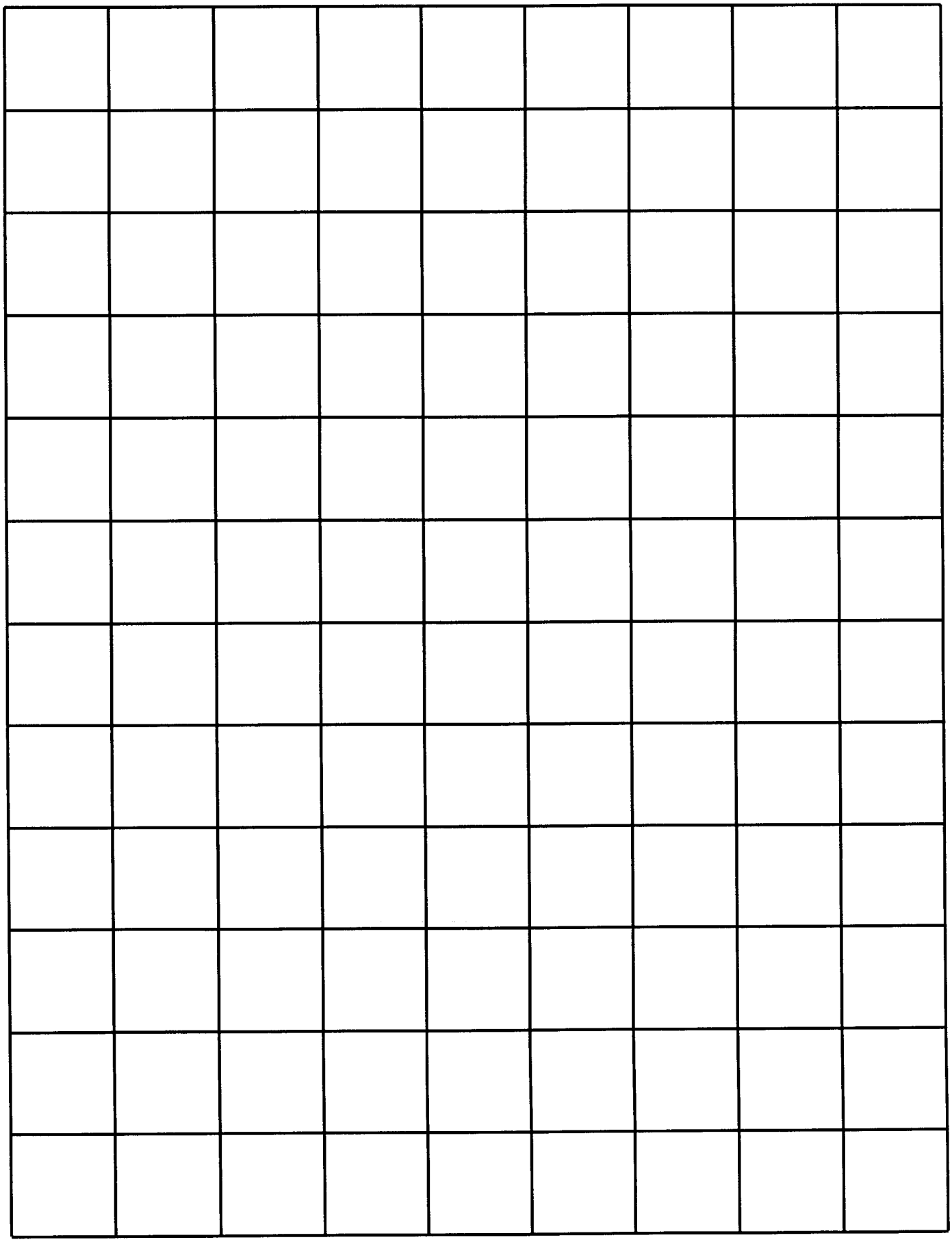


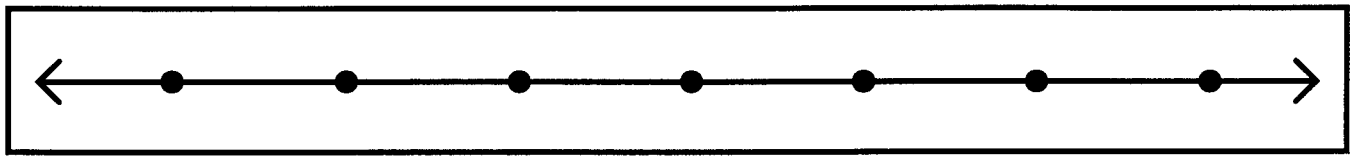


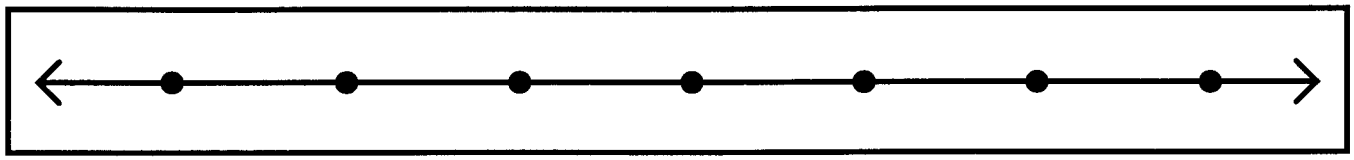


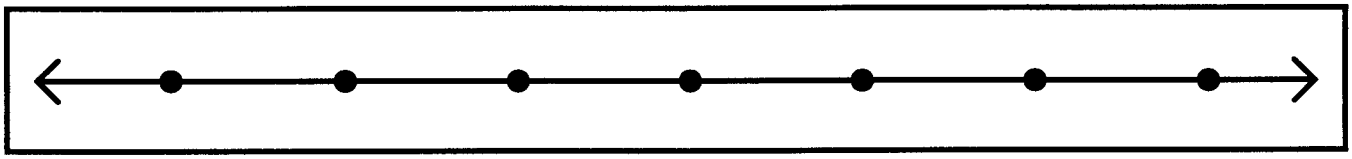


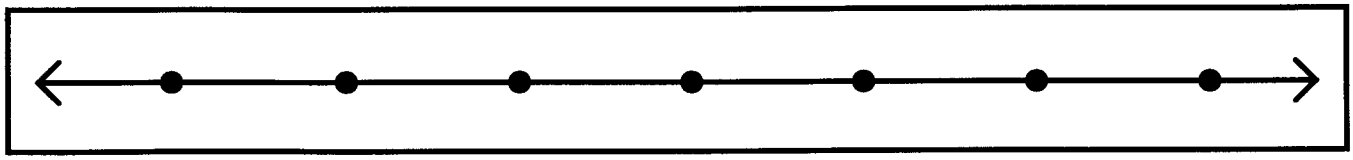


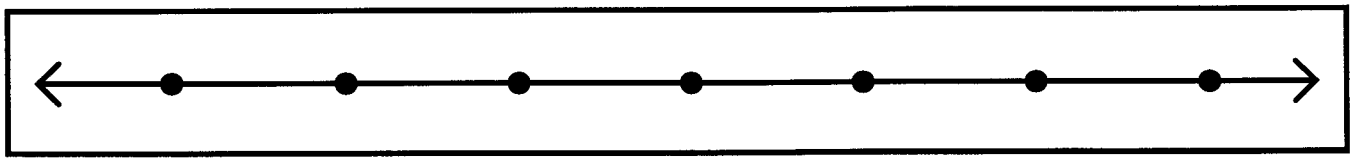


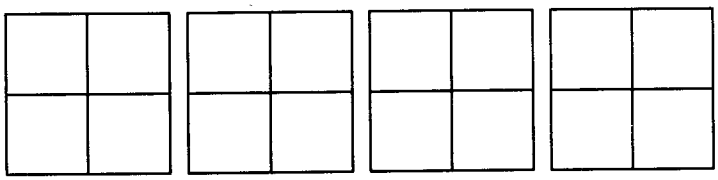


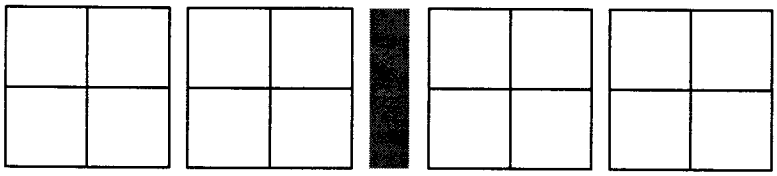






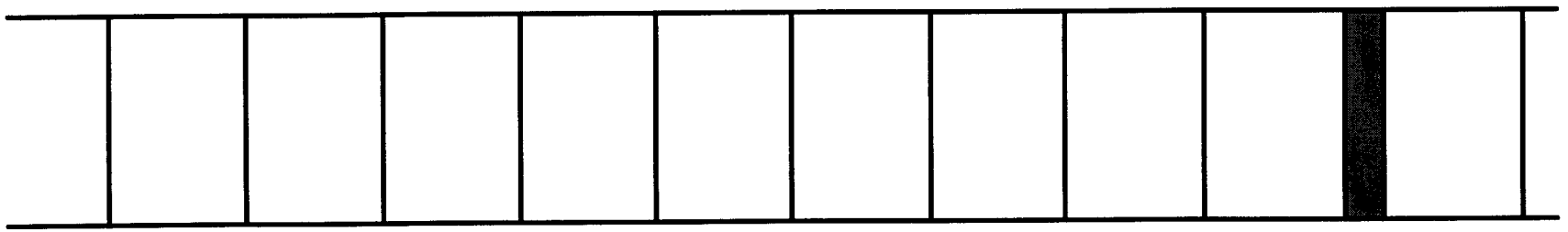






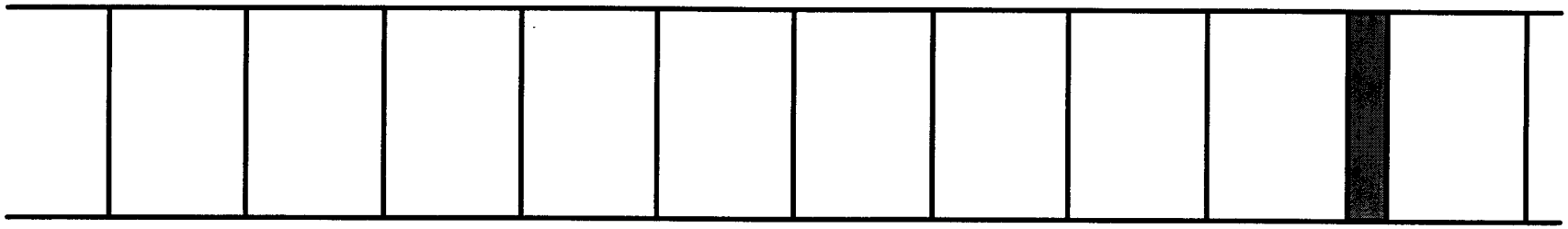
Base Five Abacus

Five checkers on a board
trade for
one checker on the next board to the left.



Base _____ Abacus

_____ checkers on a board
trade for
one checker on the next board to the left.



Name _____ Date _____

Lesson Notes

Things I learned in the math lesson today:

An example:

Name _____ Date _____

Lesson Notes

Things I need to remember from the math lesson today:

Definitions:

Name _____ Date _____

Lesson Notes

Make up your own problem and find a solution. Show the steps and work that you need to do.

Name _____ Date _____

Lesson Notes

Explain in your own words what we did in the math lesson today.