

LETTER HOME

Exploring Multiplication

Dear Family Member:

This unit is the first in a series of multiplication and division units distributed throughout the year. The units emphasize the development of multiplication concepts and their use in solving problems, rather than presenting multiplication simply as a series of isolated facts. Research has shown that this approach results in good achievement, good retention, and less time required to master computation skills.

In this unit, students work with multiplication in many settings. They make a class list similar to the one shown here and use it to create multiplication problems. Children will write stories involving multiplication such as, “There are eight legs on a spider. How many legs do six spiders have altogether?” Through exploration, your child will come to understand that there are several possible ways to solve such problems. As the unit progresses, ask your child about problems we worked on in class and some of the strategies used to solve them.

Use the following activities to help your child at home:

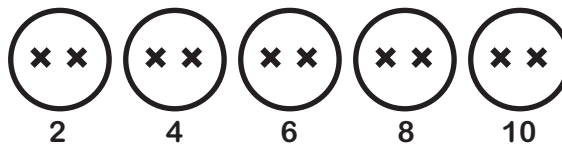
Make lists of groups. Discuss with your child the list of groups the class made at school. Make up problems using items on the list. For example, while you are in the car, you might say, “There are four tires on each car, and I see six cars. How many tires in all?”

Show multiplication and division. Ask your child to draw pictures and complete number sentences to show his or her thinking. For example:

Groups of	Example
two	mittens in a pair
three	corners on a triangle
four	seasons in a year
five	days of a school week

This list may be used by your child to think of multiplication stories.

There are 5 buttons on my shirt.
Each button has two holes.
There are 10 holes in the buttons.



$$5 \text{ buttons} \times 2 \text{ holes} = 10 \text{ holes}$$

Use a variety of strategies. Ask your child how he or she solved a multiplication or related division problem. Some strategies your child might use:

Repeated Addition. $2 + 2 + 2 + 2 + 2 = 10$

Skip counting. 2, 4, 6, 8, 10

Reasoning. $2 \times 5 = 10$, so $10 \div 2 = 5$

Math Facts and Mental Math

This unit continues the review of the subtraction facts and development of the multiplication facts. Help your child using the activities below.

Subtraction Facts. Students review the following subtraction facts to maintain and increase fluency and to learn to apply subtraction strategies to larger numbers:

Group 3: $10 - 4$, $9 - 4$, $11 - 4$, $10 - 8$, $11 - 8$, $9 - 5$, $10 - 6$, $11 - 6$, $11 - 5$

Group 4: $10 - 7$, $9 - 7$, $11 - 7$, $10 - 2$, $9 - 2$, $9 - 3$, $10 - 3$, $11 - 3$, $9 - 6$

You can help your child review these facts using the flash cards the teacher sends home or by making a set of flash cards from index cards or scrap paper. Study the facts in small groups each night. As your child goes through the flash cards, put the cards in three stacks: Facts I Know Quickly, Facts I Can Figure Out, and Facts I Need to Learn.

For Facts I Need to Learn, work on strategies for figuring them out. Good strategies for the facts in Groups 3 and 4 are:

Making Tens and Thinking Addition. Group numbers to make ten. For example, for $11 - 7$: I know if $7 + 3 = 10$, then $7 + 4 = 11$. So $11 - 7 = 4$.

Thinking Addition. To find $10 - 4$, think, "What number plus 4 equals 10?" $4 + 6 = 10$, so $10 - 4 = 6$.

For Facts I Can Figure Out, use the flash cards to practice the facts for fluency.

For Facts I Know Quickly, help your child use strategies to solve problems like these using mental math:


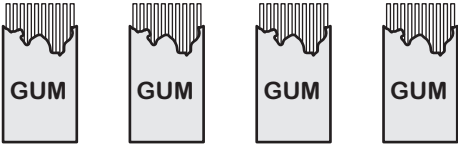
Subtracting 10s and 100s: $100 - 40$, $900 - 700$, $110 - 30$

Two-digit minus one-digit problems based on the fact groups: $29 - 5$ (practices $9 - 5$), $70 - 8$ (practices $10 - 8$), $51 - 6$ (practices $11 - 6$)

Multiplication Facts. Students work on developing number sense for the multiplication facts for the 5s and 10s in this unit. This will help them remember the facts as they develop fluency. Ask your child to write a story, draw a picture, and complete number sentences for one or two facts each night. Follow these examples:

Example: $3 \times 5 = \square$

Example: $\square \times 10 = 40$

<p>There are 3 flower pots. Each holds 5 flowers. There are 15 flowers.</p>  <p>5 10 15</p> <p>$3 \text{ pots} \times 5 \text{ flowers} = 15 \text{ flowers}$</p>	<p>There are 10 pieces of gum in a pack. Lorelei needs 40 pieces.</p>  <p>10 20 30 40</p> <p>$4 \times 10 = 40 \text{ pieces}$ So, $40 \div 10 = 4$</p>
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Grade 3 Math Facts Overview

The goal of the math facts development in *Math Trailblazers* is for students to learn the basic facts efficiently, gain fluency with their use, and retain that fluency over time. A large body of research supports an approach in which students develop strategies for figuring out the facts rather than relying on rote memorization. This not only leads to more effective learning and better retention but also to the development of mental math skills. In fact, too much drill before conceptual understanding may interfere with a child's ability to understand concepts at a later date. Therefore, the teaching of the basic facts in *Math Trailblazers* is characterized by the following elements:

Use of Strategies. Students first approach the basic facts as problems to be solved rather than as facts to be memorized. In all grades, students are encouraged to use strategies to find facts, so they become confident that they can find answers to facts problems that they do not immediately recall. In this way, students learn that math is more than memorizing facts and rules which “you either get or you don't.”

Distributed Facts Practice. Students study small groups of facts that can be found using similar strategies. In third grade, they review the multiplication facts to develop mental math strategies and gain fluency. See Figure 1. In Units 3–9, Students focus on developing mental math strategies for each multiplication facts group. In Units 10–13, students use flash cards to gain fluency with these strategies.

Unit	Multiplication Facts Group	Focus
3	5s and 10s	Development of mental strategies and number sense
4	2s and 3s	
5	Square Numbers	
6	9s	
7	Last Six Facts	
8	5s and 10s	Use strategies fluently
9	2s and 3s	
10	Square Numbers	
11	9s	
12	Last Six Facts	
13	Last Six Facts	

Figure 1: *Development of Multiplication Facts in Grade 3*

Practice in Context. Students continue to practice the facts as they use them to solve problems, investigate math concepts, and play math games.

Appropriate Assessment. Students are regularly assessed to see if they can find answers to facts problems quickly and accurately and retain this skill over time. They take a short quiz on each group of facts. Students record their progress on *Facts I Know* charts and determine which facts they need to study.

A Multiyear Approach. In Grades 1 and 2, the curriculum emphasizes the use of strategies that enable students to develop proficient strategies for the addition and subtraction facts by the end of second grade. In Grade 3, students review the subtraction facts and develop proficiency with the multiplication facts. In Grade 4, the addition and subtraction facts are checked, the multiplication facts are reviewed, and students develop fluency with the division facts. In Grade 5, students review the multiplication and division facts.

Facts Will Not Act as Gatekeepers. Use of strategies and calculators allows students to continue to work on interesting problems and experiments while learning the facts. Lacking quick recall of the facts does not prevent students from learning more complex mathematics.

Thank you for taking time to talk with your child about what he or she is doing in math.

Sincerely,

Unit 3: Home Practice

Part 1 Subtraction Practice

- A. $9 - 5 = \underline{\quad}$ 2. A. $90 - 50 = \underline{\quad}$

B. $11 - 7 = \underline{\quad}$ B. $110 - 70 = \underline{\quad}$

C. $10 - 2 = \underline{\quad}$ C. $100 - 20 = \underline{\quad}$
3. When the school bus arrived at school, Carla counted the number of people on it. There were twenty-four people. This was sixteen more than when she first got on. How many people were on the bus when Carla got on? Show or tell how you know.

Part 2 T-Shirt Problems

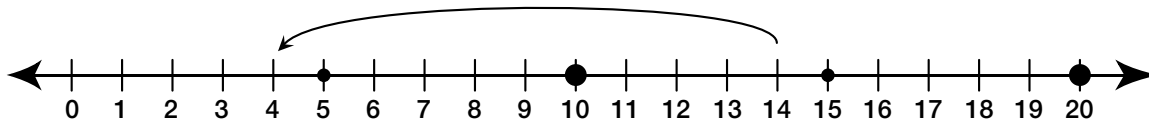
Five students are competing in a math contest. They each bought a shirt with "MATH" printed on the front. Show or tell how you solve each problem.

1. How many letters were printed in all?
2. If each letter costs 10¢, how much did it cost to have "MATH" printed on all five shirts?

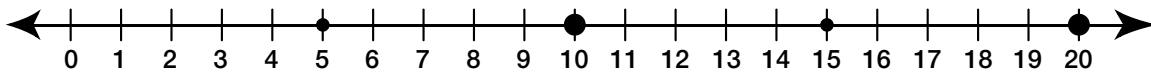
Part 3 Number Line Subtraction

Use the number lines to show how you can use ten to help you solve the subtraction number sentences.

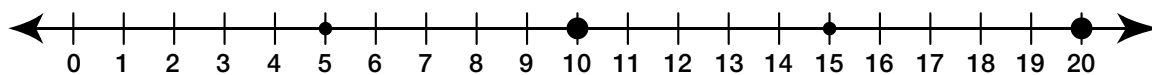
1. Here is a solution for solving $14 - 10$.



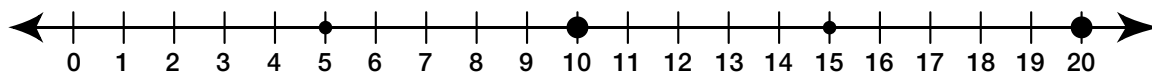
A. Solve $13 - 10 = \square$ on the number line.



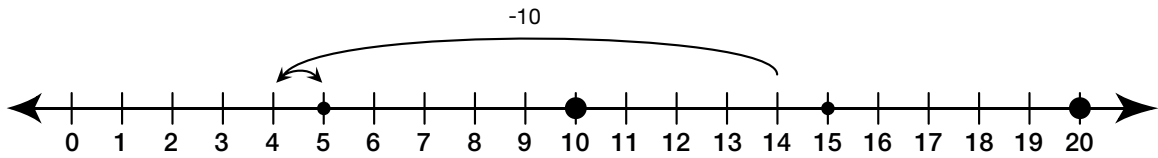
B. Solve $16 - 10 = \square$ on the number line.



C. Solve $19 - 10 = \square$ on the number line.



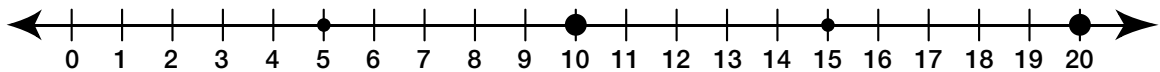
2. Here is a solution that uses ten for solving $14 - 9$.



A. Complete the number sentence to show the strategy used.

$$14 - 9 = 14 - \square + 1$$

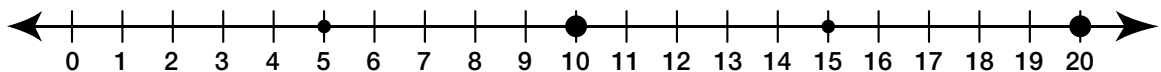
B. Solve $17 - 9 = \square$ using the same strategy.



C. Complete the number sentence to show what your strategy was on the number line.

$$17 - 9 = 17 - 10 + \square$$

D. Solve $18 - 7 = \square$ on the number line using a strategy that uses ten.



E. Complete the number sentence to show your strategy.

$$18 - 7 = 18 - \square + 3$$

Part 4 **Story Solving**

1. Write a story and draw a picture about 10×9 . Write a number sentence about your picture.

2. You have twenty-seven stickers to share equally with your four friends. How many stickers does each friend get? Draw a picture and use a number sentence to show how you decided.

$$\begin{array}{r} 10 \\ - 4 \\ \hline \end{array}$$

Group 3

$$\begin{array}{r} 9 \\ - 4 \\ \hline \end{array}$$

Group 3

$$\begin{array}{r} 11 \\ - 4 \\ \hline \end{array}$$

Group 3

$$\begin{array}{r} 10 \\ - 8 \\ \hline \end{array}$$

Group 3

$$\begin{array}{r} 11 \\ - 8 \\ \hline \end{array}$$

Group 3

$$\begin{array}{r} 9 \\ - 5 \\ \hline \end{array}$$

Group 3

$$\begin{array}{r} 10 \\ - 6 \\ \hline \end{array}$$

Group 3

$$\begin{array}{r} 11 \\ - 6 \\ \hline \end{array}$$

Group 3

$$\begin{array}{r} 11 \\ - 5 \\ \hline \end{array}$$

Group 3

7

Group 3

5

Group 3

6

Group 3

4

Group 3

3

Group 3

2

Group 3

6

Group 3

5

Group 3

4

Group 3

$$\begin{array}{r} 10 \\ - 7 \\ \hline \end{array}$$

Group 4

$$\begin{array}{r} 9 \\ - 7 \\ \hline \end{array}$$

Group 4

$$\begin{array}{r} 11 \\ - 7 \\ \hline \end{array}$$

Group 4

$$\begin{array}{r} 10 \\ - 2 \\ \hline \end{array}$$

Group 4

$$\begin{array}{r} 9 \\ - 2 \\ \hline \end{array}$$

Group 4

$$\begin{array}{r} 9 \\ - 3 \\ \hline \end{array}$$

Group 4

$$\begin{array}{r} 10 \\ - 3 \\ \hline \end{array}$$

Group 4

$$\begin{array}{r} 11 \\ - 3 \\ \hline \end{array}$$

Group 4

$$\begin{array}{r} 9 \\ - 6 \\ \hline \end{array}$$

Group 4

4

Group 4

2

Group 4

3

Group 4

6

Group 4

7

Group 4

8

Group 4

3

Group 4

8

Group 4

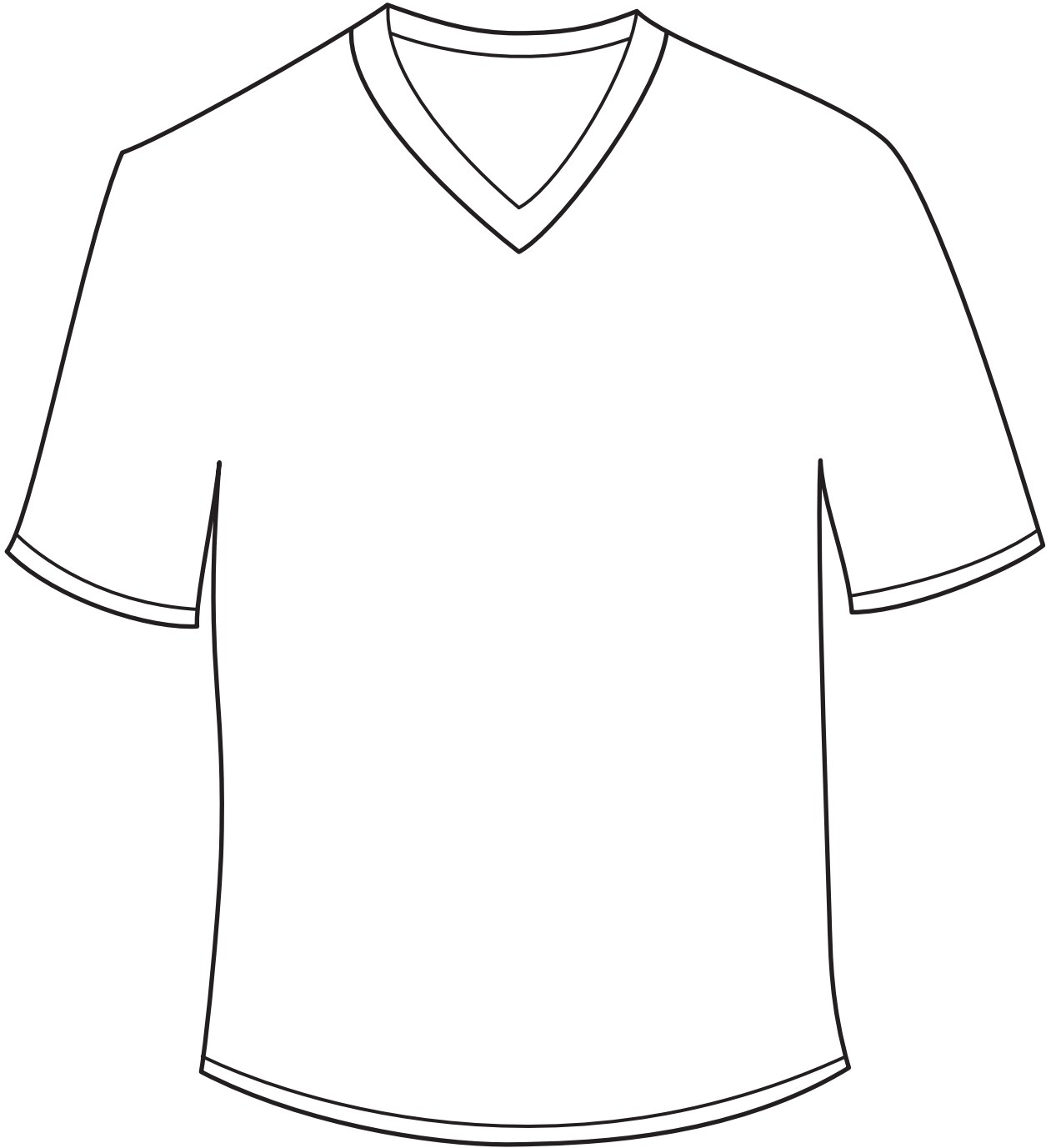
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Group 4

Name _____

Date _____

Design Your Own T-Shirt



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Name _____ Date _____

T-Shirt Factory Problems Check-In: Question 8 Feedback Box

	Expectation	Check In	Comments
Multiply using mental math strategies.	E3		
Solve two-step word problems involving multiplication.	E4		

	Yes ...	Yes, but ...	No, but ...	No...
MPE1. Know the problem. I read the problem carefully. I know the questions to answer and what information is important.				
MPE4. Check my calculations. If I make mistakes, I correct them.				
MPE5. Show my work. I show or tell how I arrived at my answer so someone else can understand my thinking.				

Name _____ Date _____

In Twos, Threes, and More Check-In: Questions 8–9 Feedback Box

Assessment Master

	Expectation	Check In	Comments
Multiply using mental math strategies (e.g., reasoning, repeated addition).	E3		
Represent solution strategies for problems involving the multiplication facts using number sentences and drawings.	E5		

TG • Grade 3 • Unit 3 • Lesson 2

	Yes ...	Yes, but ...	No, but ...	No ...
MPE1. Know the problem. I read the problem carefully. I know the questions to answer and what information is important.				

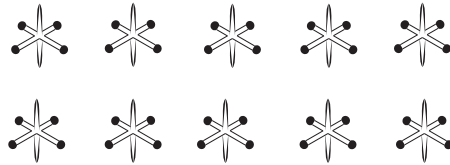
Subtraction Facts I Know

Circle the subtraction facts you know and can answer quickly. Underline the facts you can figure out using a strategy. Do nothing to the facts you still need to learn.

	A	B	C	D	E	F	G	H
2	$\begin{array}{r} 4 \\ -2 \\ \hline 2 \end{array}$	$\begin{array}{r} 5 \\ -2 \\ \hline 3 \end{array}$	$\begin{array}{r} 6 \\ -2 \\ \hline 4 \end{array}$	$\begin{array}{r} 7 \\ -2 \\ \hline 5 \end{array}$	$\begin{array}{r} 8 \\ -2 \\ \hline 6 \end{array}$	$\begin{array}{r} 9 \\ -2 \\ \hline 7 \end{array}$	$\begin{array}{r} 10 \\ -2 \\ \hline 8 \end{array}$	$\begin{array}{r} 11 \\ -2 \\ \hline 9 \end{array}$
3	$\begin{array}{r} 5 \\ -3 \\ \hline 2 \end{array}$	$\begin{array}{r} 6 \\ -3 \\ \hline 3 \end{array}$	$\begin{array}{r} 7 \\ -3 \\ \hline 4 \end{array}$	$\begin{array}{r} 8 \\ -3 \\ \hline 5 \end{array}$	$\begin{array}{r} 9 \\ -3 \\ \hline 6 \end{array}$	$\begin{array}{r} 10 \\ -3 \\ \hline 7 \end{array}$	$\begin{array}{r} 11 \\ -3 \\ \hline 8 \end{array}$	$\begin{array}{r} 12 \\ -3 \\ \hline 9 \end{array}$
4	$\begin{array}{r} 6 \\ -4 \\ \hline 2 \end{array}$	$\begin{array}{r} 7 \\ -4 \\ \hline 3 \end{array}$	$\begin{array}{r} 8 \\ -4 \\ \hline 4 \end{array}$	$\begin{array}{r} 9 \\ -4 \\ \hline 5 \end{array}$	$\begin{array}{r} 10 \\ -4 \\ \hline 6 \end{array}$	$\begin{array}{r} 11 \\ -4 \\ \hline 7 \end{array}$	$\begin{array}{r} 12 \\ -4 \\ \hline 8 \end{array}$	$\begin{array}{r} 13 \\ -4 \\ \hline 9 \end{array}$
5	$\begin{array}{r} 7 \\ -5 \\ \hline 2 \end{array}$	$\begin{array}{r} 8 \\ -5 \\ \hline 3 \end{array}$	$\begin{array}{r} 9 \\ -5 \\ \hline 4 \end{array}$	$\begin{array}{r} 10 \\ -5 \\ \hline 5 \end{array}$	$\begin{array}{r} 11 \\ -5 \\ \hline 6 \end{array}$	$\begin{array}{r} 12 \\ -5 \\ \hline 7 \end{array}$	$\begin{array}{r} 13 \\ -5 \\ \hline 8 \end{array}$	$\begin{array}{r} 14 \\ -5 \\ \hline 9 \end{array}$
6	$\begin{array}{r} 8 \\ -6 \\ \hline 2 \end{array}$	$\begin{array}{r} 9 \\ -6 \\ \hline 3 \end{array}$	$\begin{array}{r} 10 \\ -6 \\ \hline 4 \end{array}$	$\begin{array}{r} 11 \\ -6 \\ \hline 5 \end{array}$	$\begin{array}{r} 12 \\ -6 \\ \hline 6 \end{array}$	$\begin{array}{r} 13 \\ -6 \\ \hline 7 \end{array}$	$\begin{array}{r} 14 \\ -6 \\ \hline 8 \end{array}$	$\begin{array}{r} 15 \\ -6 \\ \hline 9 \end{array}$
7	$\begin{array}{r} 9 \\ -7 \\ \hline 2 \end{array}$	$\begin{array}{r} 10 \\ -7 \\ \hline 3 \end{array}$	$\begin{array}{r} 11 \\ -7 \\ \hline 4 \end{array}$	$\begin{array}{r} 12 \\ -7 \\ \hline 5 \end{array}$	$\begin{array}{r} 13 \\ -7 \\ \hline 6 \end{array}$	$\begin{array}{r} 14 \\ -7 \\ \hline 7 \end{array}$	$\begin{array}{r} 15 \\ -7 \\ \hline 8 \end{array}$	$\begin{array}{r} 16 \\ -7 \\ \hline 9 \end{array}$
8	$\begin{array}{r} 10 \\ -8 \\ \hline 2 \end{array}$	$\begin{array}{r} 11 \\ -8 \\ \hline 3 \end{array}$	$\begin{array}{r} 12 \\ -8 \\ \hline 4 \end{array}$	$\begin{array}{r} 13 \\ -8 \\ \hline 5 \end{array}$	$\begin{array}{r} 14 \\ -8 \\ \hline 6 \end{array}$	$\begin{array}{r} 15 \\ -8 \\ \hline 7 \end{array}$	$\begin{array}{r} 16 \\ -8 \\ \hline 8 \end{array}$	$\begin{array}{r} 17 \\ -8 \\ \hline 9 \end{array}$
9	$\begin{array}{r} 11 \\ -9 \\ \hline 2 \end{array}$	$\begin{array}{r} 12 \\ -9 \\ \hline 3 \end{array}$	$\begin{array}{r} 13 \\ -9 \\ \hline 4 \end{array}$	$\begin{array}{r} 14 \\ -9 \\ \hline 5 \end{array}$	$\begin{array}{r} 15 \\ -9 \\ \hline 6 \end{array}$	$\begin{array}{r} 16 \\ -9 \\ \hline 7 \end{array}$	$\begin{array}{r} 17 \\ -9 \\ \hline 8 \end{array}$	$\begin{array}{r} 18 \\ -9 \\ \hline 9 \end{array}$
10	$\begin{array}{r} 12 \\ -10 \\ \hline 2 \end{array}$	$\begin{array}{r} 13 \\ -10 \\ \hline 3 \end{array}$	$\begin{array}{r} 14 \\ -10 \\ \hline 4 \end{array}$	$\begin{array}{r} 15 \\ -10 \\ \hline 5 \end{array}$	$\begin{array}{r} 16 \\ -10 \\ \hline 6 \end{array}$	$\begin{array}{r} 17 \\ -10 \\ \hline 7 \end{array}$	$\begin{array}{r} 18 \\ -10 \\ \hline 8 \end{array}$	$\begin{array}{r} 19 \\ -10 \\ \hline 9 \end{array}$




Groupings and Number Sentences

The game Jacks is played with ten jacks, which are small metal stars. A player throws a small ball into the air, picks up one jack, and catches the ball before it bounces twice. The player continues, picking up one jack at a time until all 10 jacks have been picked up. If successful, the player picks up groups of two, three, and so on. The first person to complete all group sizes is the winner.



Ten Objects

Fill in the missing drawings, numbers, and number sentences. You will be working with ten objects. Use counters or connecting cubes if you need to.

Group Size	Drawings and Words	Number Sentence
1	 10 groups of 1 with 0 left over	$10 \times 1 = 10$
2	 5 groups of 2 with 0 left over	$5 \times 2 = 10$
3	 3 groups of 3 with 1 left over	$\underline{\quad} \times 3 + 1 = 10$
4	___ groups of 4 with ___ left over	$\underline{\quad} \times 4 + \underline{\quad} = 10$
5	___ groups of 5 with ___ left over	$\underline{\quad} \times 5 + \underline{\quad} = 10$
6	___ groups of 6 with ___ left over	$\underline{\quad} = 10$

Fifteen Objects

Fill in the missing drawings, numbers, and number sentences. You will be working with fifteen objects. Use counters or connecting cubes if you need to.

Group Size	Drawings and Words	Number Sentence
1	* * * * * 15 groups of 1 with 0 left over	$15 \times 1 = \underline{\quad}$
2	** ** ___ groups of 2 with ___ left over	$\underline{\quad} \times 2 + 1 = 15$
3	*** ** ___ groups of 3 with ___ left over	$\underline{\quad} \times 3 + \underline{\quad} = 15$
4	___ groups of 4 with ___ left over	$\underline{\quad} \times 4 + \underline{\quad} = 15$
5	___ groups of 5 with ___ left over	$\underline{\quad} \times 5 + \underline{\quad} = 15$
6	___ groups of 6 with ___ left over	$\underline{\quad} \times 6 + \underline{\quad} = 15$
7	___ groups of 7 with ___ left over	$\underline{\quad} \times 7 + \underline{\quad} = 15$
8	___ groups of 8 with ___ left over	$\underline{\quad} \times 8 + \underline{\quad} = 15$