

Liberty Mathematics

Level A

Wendy Kramer

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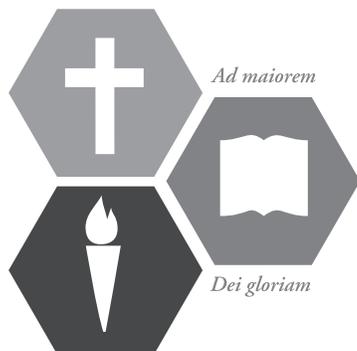
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—Introduction—



The primary goal of math instruction is to help your student comprehend how to utilize mathematics in his everyday life to the glory of God. It is important to teach your student that God is the Author of mathematics and that creation itself testifies of the Lord's genius. In the Bible we learn that all facts and numbers were created by God. It was the Lord alone who gave meaning, purpose, and value to numbers in the beginning when God created our world. May you, as the instructor, approach the teaching of math precepts with genuine enthusiasm and cause your student to become excited about his studies as well.



Although it takes time, it is important to read the materials written for you in the teacher's manual as well as in the opening of each workbook lesson. They will prepare you to be equipped and feel more confident about your task. It is also important to provide extra supplemental drills for each lesson, going beyond what is on each workbook page. What may seem simple to you is brand new to your student. For this reason, we encourage the use of enrichment activities at the blackboard or on the computer, and familiar tools such as flashcards or hands-on math games.

This workbook has been divided into various sections, as the table of contents shows. Thus, it should be noted that the first section of the workbook is essentially a review of the ideas and facts introduced in *Liberty Mathematics Level K*. If some areas are unfamiliar to your student, review them with extra drills.

This book is possible only because of the Lord's constant guidance and blessing. Great appreciation is also expressed to all those, whose assistance and directions were so helpful.

May students who complete these lessons seek to glorify God in their preparation to be our country's future leaders. May teachers pray and labor diligently so that the Lord would bless their teaching efforts.

—Wendy Kramer



Trust in the Lord with all your heart, and do not lean on your own understanding. In all your ways acknowledge Him, and He shall direct your paths.

—Proverbs 3:5-6—

Learning About Number 9

Teach the meaning and value of the number nine. It is an **odd number**, because it cannot be equally divided into two groups. Knowing how to count the odd and even numbers will help in learning the addition of 2 to another number.

Remember: Drill with the appropriate flashcards each day.

 Say the **odd** numbers with your student three times.

0 1 2 3 4 5 6 7 8 9

 Learn the 9s math facts.

This star has nine points.

9	$\begin{array}{r} 9 \\ + 0 \\ \hline 9 \end{array}$	$\begin{array}{r} 0 \\ + 9 \\ \hline 9 \end{array}$	$\begin{array}{r} 8 \\ + 1 \\ \hline 9 \end{array}$	$\begin{array}{r} 1 \\ + 8 \\ \hline 9 \end{array}$
---	---	---	---	---



 Copy this twice on the lines below.

nine 9

$\begin{array}{r} 7 \\ + 2 \\ \hline 9 \end{array}$	$\begin{array}{r} 2 \\ + 7 \\ \hline 9 \end{array}$	$\begin{array}{r} 6 \\ + 3 \\ \hline 9 \end{array}$	$\begin{array}{r} 3 \\ + 6 \\ \hline 9 \end{array}$	$\begin{array}{r} 5 \\ + 4 \\ \hline 9 \end{array}$	$\begin{array}{r} 4 \\ + 5 \\ \hline 9 \end{array}$
---	---	---	---	---	---

 Begin at the top and follow the arrows down and then around as you trace the number 9.



 Answer these problems. Practice saying the answers two times before printing them.

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

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

Learning About Telling Time

Discuss the hour and half hour time on these clocks. The short hand tells the hour. The long hand tells the minutes. It takes the minute hand 5 minutes to move from one number to the next number. As the minute hand moves 5, 10, 15, 20, 25, 30 minutes, bringing it half way around the clock, the hour hand slowly moves half way past the hour number it was pointing to before.

 Listen to your student tell the time on these clocks before the answers are written.



1:00



_____ : _____



_____ : _____



_____ : _____



_____ : _____



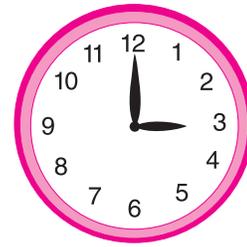
_____ : _____



_____ : _____



_____ : _____



_____ : _____



_____ : _____



_____ : _____



_____ : _____

Learning About Place Value

It is very important that your student understands the different values a numeral has, depending on its place in a number. If he does not understand place value yet, use bundles of craft sticks or toothpicks, as groups of tens or single items.

This is the numeral 1. 

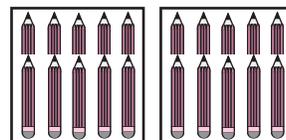
This is the numeral 10. 

=



In the number 10, the numeral 1 is in the tens column.

How many **tens** do you see?



How many **ones** do you see?

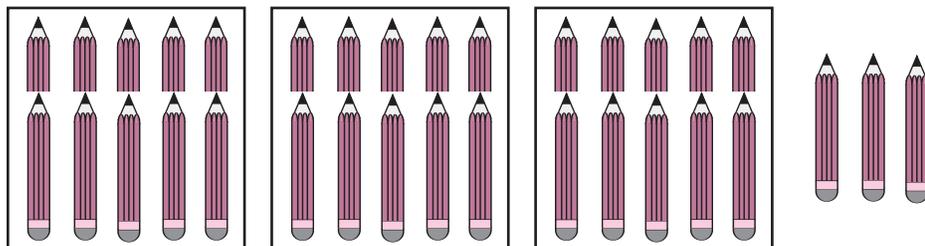


Tens	Ones

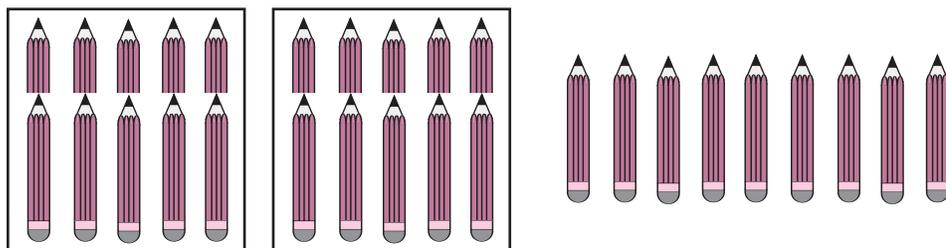
How many pencils do you see all together? 

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 Write the number shown by bundles and singles.



Tens	Ones



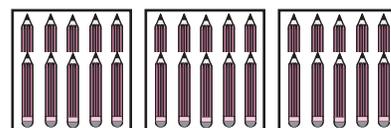
Tens	Ones

How many **ones** (single pencils) are in the last problem?

Add one more pencil. How many pencils are there? 

Do you have enough for another bundle of 10? Yes!

If you bundle them together, you will have another group of 10. You now have 30!



Subtracting From 5

Continue to drill all of the facts that your student has learned so far.

 Say each number fact with your student as you point to it. Do this three times.

$\begin{array}{r} 5 \\ -0 \\ \hline 5 \end{array}$	$\begin{array}{r} 5 \\ -1 \\ \hline 4 \end{array}$	$\begin{array}{r} 5 \\ -2 \\ \hline 3 \end{array}$
--	--	--

Here are 3 new facts to learn. Repeat them several times.



$\begin{array}{r} 5 \\ -3 \\ \hline 2 \end{array}$	$\begin{array}{r} 5 \\ -4 \\ \hline 1 \end{array}$	$\begin{array}{r} 5 \\ -5 \\ \hline 0 \end{array}$
--	--	--

 Practice these subtraction facts.

$\begin{array}{r} 5 \\ -0 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ -1 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ -2 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ -3 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ -4 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ -5 \\ \hline \end{array}$
--	--	--	--	--	--

$\begin{array}{r} 4 \\ -3 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ -2 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ -3 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ -2 \\ \hline \end{array}$	$\begin{array}{r} 1 \\ -1 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ -1 \\ \hline \end{array}$
--	--	--	--	--	--

$\begin{array}{r} 5 \\ -2 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ -3 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ -2 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ -1 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ -2 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ -4 \\ \hline \end{array}$
--	--	--	--	--	--

 Do you remember these addition facts?

$\begin{array}{r} 1 \\ +2 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ +3 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ +4 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ +2 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ +3 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ +4 \\ \hline \end{array}$
--	--	--	--	--	--

$\begin{array}{r} 2 \\ +7 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ +3 \\ \hline \end{array}$	$\begin{array}{r} 1 \\ +5 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ +1 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ +1 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ +3 \\ \hline \end{array}$
--	--	--	--	--	--

Tallies and Charts

Explain to your student that a chart is an easy way to look at and understand information. Use these simple charts to introduce the idea of organizing information.

 Use a coin for the following exercise.

Toss a coin 20 times. Use tally marks to record how many times the coin landed on heads, and how many times it landed on tails.



Heads
Tails

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Use this chart to compare the number of times that the coin landed on heads and tails.

How many times did it land on heads? Color in the chart up to that number.

How many times did it land on tails? Color in the chart up to that number.



20		
19		
18		
17		
16		
15		
14		
13		
12		
11		
10		
9		
8		
7		
6		
5		
4		
3		
2		
1		
	Heads	Tails

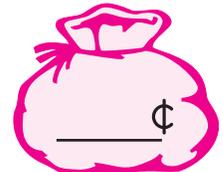
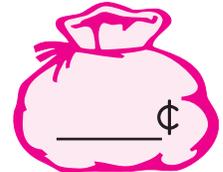
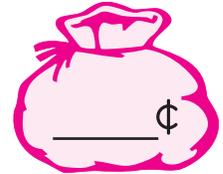
Counting Dimes

A dime is smaller in size than a penny or a nickel, but it is worth 10 cents. A dime is the same as 10 pennies or 2 nickels ($5 + 5 = 10$). Counting dimes is the same as counting by 10s.

1 Dime = 10¢



Count these coins.



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When counting dimes, nickels, and pennies, first count the dimes (by 10s), then the nickels (by 5s), and finally the pennies (by 1s). Study the example below, then solve the following problem. (Help your student as necessary.)



10¢

20¢

25¢

30¢

31¢

32¢



Count these coins.



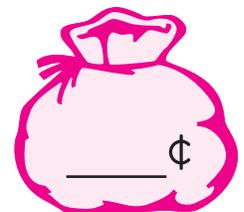
10 ¢

¢

¢

¢

¢



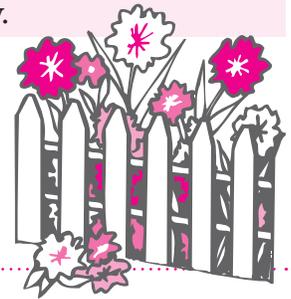
Calendars

Help your student study the following information about the number of days in a year, the number of days in a month, and the order of the months in a year. Use a calendar to learn the different number of days in each month, especially the month of February.

1 year = 365 days

1 leap year = 366 days

A leap year happens every 4 years.



Seven months have 31 days. These months are: January, March, May, July, August, October, and December.

Four months have 30 days. These months are: April, June, September, and November.

One month has only 28 days. That month is February. But, do you remember that leap year has an extra day? That extra day is added on to February. So every 4 years February has 29 days.



1. What month were you born in? _____
2. How many days are in that month? _____
3. What month is before your birthday month? _____
4. What month is after your birthday month? _____

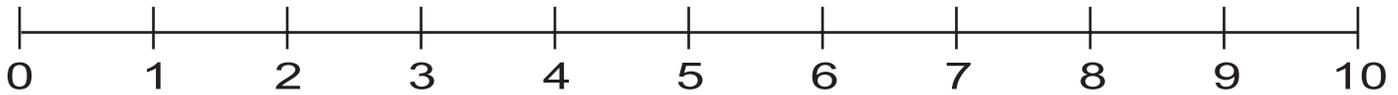
 Write how many days are in each of the following months.

January	_____	May	_____	September	_____
February	_____	June	_____	October	_____
March	_____	July	_____	November	_____
April	_____	August	_____	December	_____

> and <

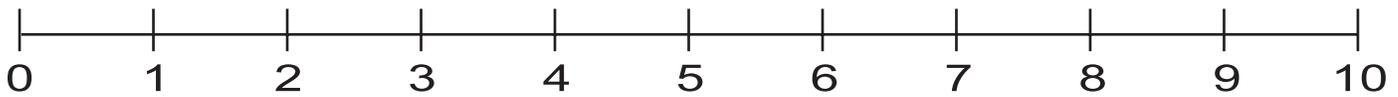
Explain to your student that the symbols $>$ and $<$ are often used in math. The symbol $>$ means “greater than.” The symbol $<$ means “less than.” These symbols have to do with comparing numbers. These symbols ask: “Which number is more, or larger ($>$)?” “Which number is less, or smaller ($<$)?” This lesson gives two ways to remember what these symbols stands for.

Look at this number line.



The symbol $>$ points forward toward bigger numbers.

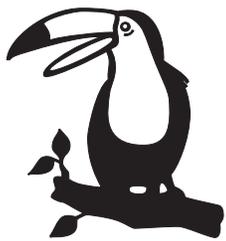
It says “greater than.” The symbol $>$ means “greater than.”



The symbol $<$ points backward toward smaller numbers.

It says “less than.” The symbol $<$ means “less than.”

A helpful hint is to pretend the $>$ $<$ are a bird's beak. The open part faces the bigger number so the bird can eat it up!



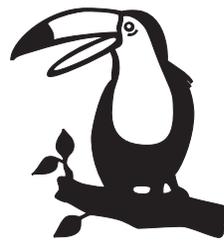
$$6 > 4$$

6 is greater than 4. The greedy bird will eat the 6.



$$5 < 8$$

5 is less than 8. The greedy bird will eat the 8.



$$16 > 11$$

16 is greater than 11. The greedy bird will eat the 16.



$$40 < 50$$

40 is less than 50. The greedy bird will eat the 50.

Thermometers

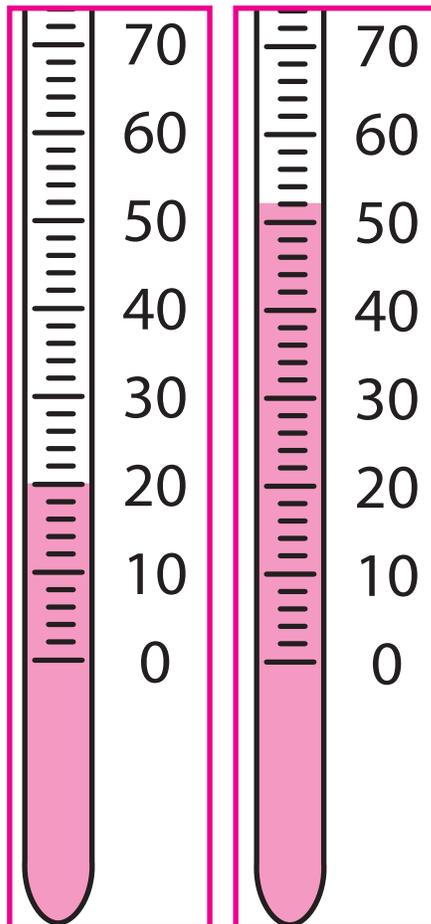
In the United States, temperature is measured by the **Fahrenheit** (fâr'ân•hīt) scale. It is written like this: °F. Another type of temperature measurement is the **Celsius** (sĕl'sĕ•s) scale. It is written like this: °C.

 Study these thermometers carefully.

Can you read these three thermometers?

The first thermometer shows that the temperature is **cold**.

It is **20° F**.
It would be icy outside.



The thermometer in the middle shows a **cool temperature**.

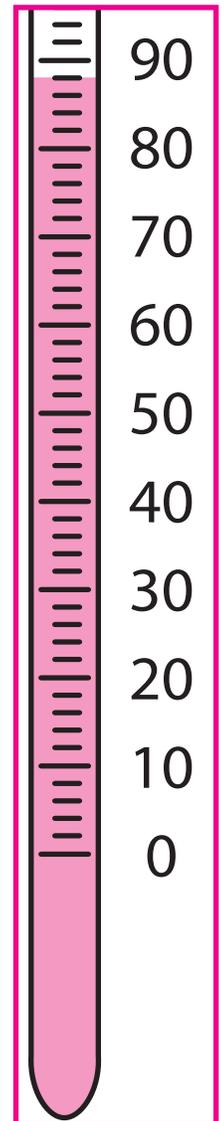
It is **52° F**.

You would have to wear a sweater or light jacket outside.

The thermometer on the right shows a **warm temperature**.

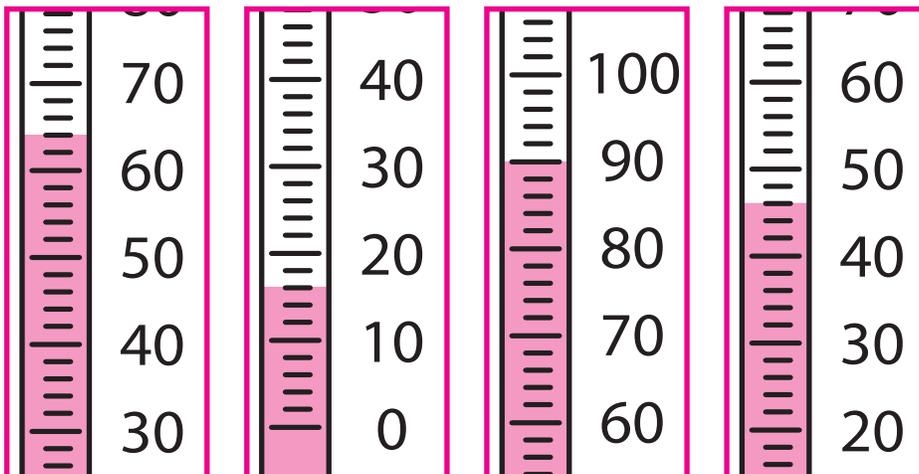
It is **88° F**.

It would be time to go swimming!



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 Use the thermometers to answer the questions. Remember, each tiny line is counted by twos.



What is the **coldest** temperature? _____

What is the **warmest** temperature? _____

What temperature is **nearest 70° F**? _____

Subtracting From 15

Explain that $15 - 10 = 5$, so $15 - 9$ is one more, or 6. Have your student memorize these facts.

Can you find 15 coins
or some other
objects to show
these facts?



$\begin{array}{r} 15 \\ - 9 \\ \hline 6 \end{array}$	$\begin{array}{r} 15 \\ - 6 \\ \hline 9 \end{array}$
--	--

Subtract to solve these problems. Use columns when you can.

$\begin{array}{r} 15 \\ - 6 \\ \hline \end{array}$	$\begin{array}{r} 15 \\ - 9 \\ \hline \end{array}$	$\begin{array}{r} 15 \\ - 5 \\ \hline \end{array}$	$\begin{array}{r} 15 \\ - 10 \\ \hline \end{array}$	$\begin{array}{r} 15 \\ - 4 \\ \hline \end{array}$	$\begin{array}{r} 15 \\ - 11 \\ \hline \end{array}$
--	--	--	---	--	---

$\begin{array}{r} 15 \\ - 3 \\ \hline \end{array}$	$\begin{array}{r} 15 \\ - 12 \\ \hline \end{array}$	$\begin{array}{r} 15 \\ - 2 \\ \hline \end{array}$	$\begin{array}{r} 15 \\ - 13 \\ \hline \end{array}$	$\begin{array}{r} 15 \\ - 1 \\ \hline \end{array}$	$\begin{array}{r} 15 \\ - 14 \\ \hline \end{array}$
--	---	--	---	--	---

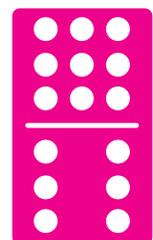
$\begin{array}{r} 15 \\ - 15 \\ \hline \end{array}$	$\begin{array}{r} 15 \\ - 0 \\ \hline \end{array}$	$\begin{array}{r} 14 \\ - 7 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ - 4 \\ \hline \end{array}$	$\begin{array}{r} 12 \\ - 5 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ - 7 \\ \hline \end{array}$
---	--	--	--	--	--

Draw 9 dots here.

Draw 6 dots here.

How many dots are there altogether? _____

If you have 9 dots, and 6 dots are taken away,
how many dots are left? _____



Adding Two Columns

Your student has memorized all of the math facts that he needs to learn for this course. In this lesson he will learn to use these facts to add larger numbers.

Jamie has 2 dimes and 3 pennies. Ken has 4 dimes and 5 pennies.

How many coins do Jamie and Ken have together?

$$2 + 3 + 4 + 5 = \underline{\hspace{2cm}}$$

How many dimes do they have? _____

$$2 + 4 = \underline{\hspace{2cm}}$$

How many pennies do they have? _____

$$3 + 5 = \underline{\hspace{2cm}}$$

How many cents do Jamie and Ken have?

Remember: A dime is worth 10¢, and a penny is worth 1¢.

Jamie has 2 dimes and 3 pennies = 23¢
Ken has 4 dimes and 5 pennies = 45¢

Now we can add up the dimes and pennies separately to find out how many cents there are all together.

Always add the ones column first. That is the pennies.

Next add the tens column. That is the dimes.

Dimes	:	Pennies
2	:	3¢
+ 4	:	5¢

	:	

Complete this addition problem.

Use pennies and dimes to make up problems like the one above.

Make sure that nine or less pennies are used and nine or less dimes are used. This will make the problems easy for your student to solve. You may want to follow the problems below.

Solve these addition problems.

<table style="border-collapse: collapse; margin: 0 auto;"> <tr><td style="padding: 0 5px;">Tens</td><td style="padding: 0 5px;">:</td><td style="padding: 0 5px;">Ones</td></tr> <tr><td style="text-align: center;">2</td><td style="text-align: center;">:</td><td style="text-align: center;">3</td></tr> <tr><td style="text-align: center;">+ 1</td><td style="text-align: center;">:</td><td style="text-align: center;">2</td></tr> <tr><td colspan="3" style="text-align: center;">-----</td></tr> </table>	Tens	:	Ones	2	:	3	+ 1	:	2	-----			<table style="border-collapse: collapse; margin: 0 auto;"> <tr><td style="padding: 0 5px;">Tens</td><td style="padding: 0 5px;">:</td><td style="padding: 0 5px;">Ones</td></tr> <tr><td style="text-align: center;">3</td><td style="text-align: center;">:</td><td style="text-align: center;">1</td></tr> <tr><td style="text-align: center;">+ 4</td><td style="text-align: center;">:</td><td style="text-align: center;">2</td></tr> <tr><td colspan="3" style="text-align: center;">-----</td></tr> </table>	Tens	:	Ones	3	:	1	+ 4	:	2	-----			<table style="border-collapse: collapse; margin: 0 auto;"> <tr><td style="padding: 0 5px;">Tens</td><td style="padding: 0 5px;">:</td><td style="padding: 0 5px;">Ones</td></tr> <tr><td style="text-align: center;">4</td><td style="text-align: center;">:</td><td style="text-align: center;">0</td></tr> <tr><td style="text-align: center;">+ 2</td><td style="text-align: center;">:</td><td style="text-align: center;">1</td></tr> <tr><td colspan="3" style="text-align: center;">-----</td></tr> </table>	Tens	:	Ones	4	:	0	+ 2	:	1	-----			<table style="border-collapse: collapse; margin: 0 auto;"> <tr><td style="padding: 0 5px;">Tens</td><td style="padding: 0 5px;">:</td><td style="padding: 0 5px;">Ones</td></tr> <tr><td style="text-align: center;">5</td><td style="text-align: center;">:</td><td style="text-align: center;">4</td></tr> <tr><td style="text-align: center;">+ 3</td><td style="text-align: center;">:</td><td style="text-align: center;">3</td></tr> <tr><td colspan="3" style="text-align: center;">-----</td></tr> </table>	Tens	:	Ones	5	:	4	+ 3	:	3	-----			<table style="border-collapse: collapse; margin: 0 auto;"> <tr><td style="padding: 0 5px;">Tens</td><td style="padding: 0 5px;">:</td><td style="padding: 0 5px;">Ones</td></tr> <tr><td style="text-align: center;">1</td><td style="text-align: center;">:</td><td style="text-align: center;">7</td></tr> <tr><td style="text-align: center;">+ 5</td><td style="text-align: center;">:</td><td style="text-align: center;">1</td></tr> <tr><td colspan="3" style="text-align: center;">-----</td></tr> </table>	Tens	:	Ones	1	:	7	+ 5	:	1	-----		
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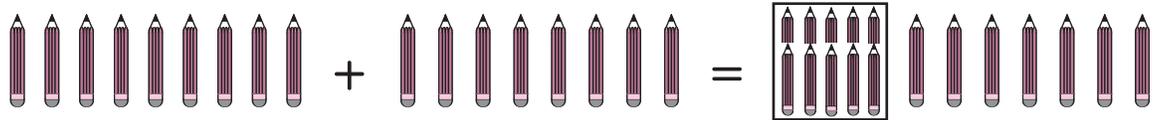
Carrying

Ask your student, "What happens when you add numbers in the ones column, and the answer is more than nine?" Explain that he ends up with a number that has a numeral in the ones column and another in the tens column. Remind him that he has done this many times before.

$$\begin{array}{r} 9 \\ + 8 \\ \hline 17 \end{array}$$

Nine ones and eight ones equal one ten and seven ones.

If these were pencils that you gathered and bundled up in groups of ten, how would it look?



$$\begin{array}{r} 6 \\ + 6 \\ \hline 12 \end{array}$$

Six ones and six ones equal one ten and two ones.

If these were pencils that you gathered and bundled up in groups of ten, how would it look?



Now you are ready to "carry." This is a way to add numbers with more than one column. When the ones add up to more than 9, just **carry the tens over to the tens column**. Study the following examples:

$$\begin{array}{r} \boxed{1} \\ 2 \quad \vdots \quad 6 \\ + 1 \quad \vdots \quad 5 \\ \hline 4 \quad \vdots \quad 1 \end{array}$$

First add the ones column: $6 + 5 = 11$.

Eleven is **one** ten and **one** one.

Put the **one** one in the ones column.

Carry the **one** ten to the top of the tens column.

Now add the **one** ten to the other tens.

$$\begin{array}{r} \boxed{1} \\ 4 \quad \vdots \quad 3 \\ + 2 \quad \vdots \quad 9 \\ \hline 7 \quad \vdots \quad 2 \end{array}$$

First add the ones column: $3 + 9 = 12$.

Twelve is **one** ten and **two** ones.

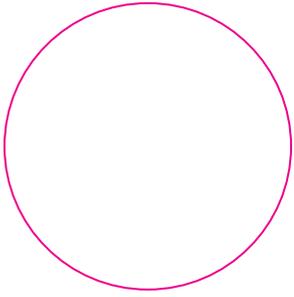
Put the **two** ones in the ones column.

Carry the **one** ten to the top of the tens column.

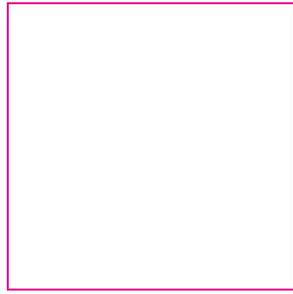
Now add the **one** ten to the other tens.

Review Shapes

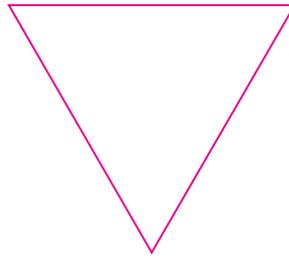
Review shapes with your student, and have him learn the 3 new ones.



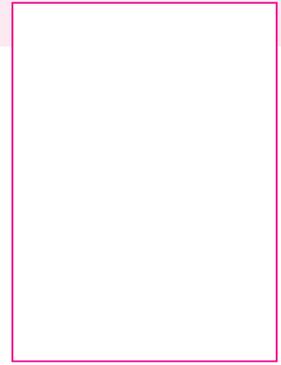
Circle



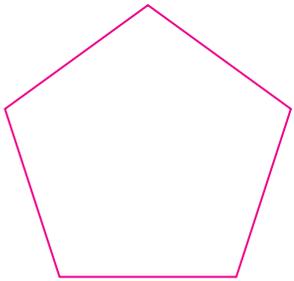
Square



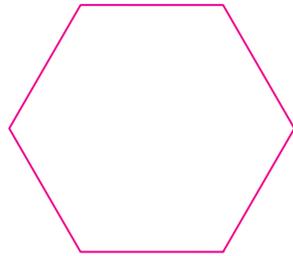
Triangle



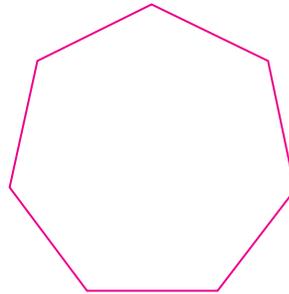
Rectangle



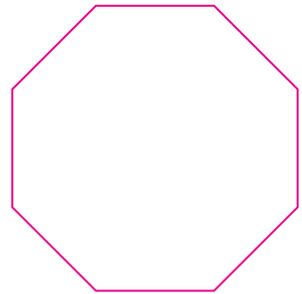
Pentagon



Hexagon



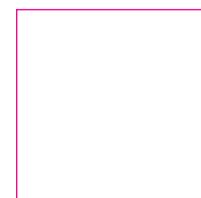
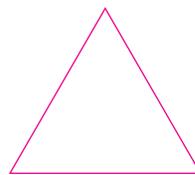
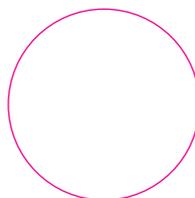
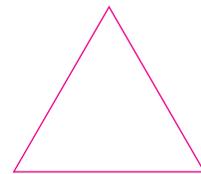
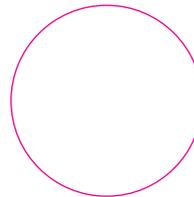
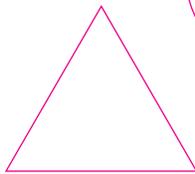
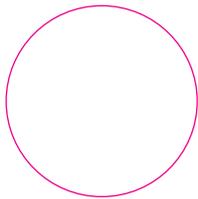
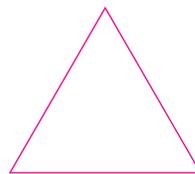
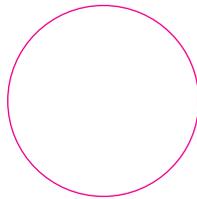
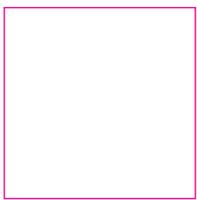
Heptagon



Octagon

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 Color the circles red, squares yellow, triangles green, and rectangles blue.

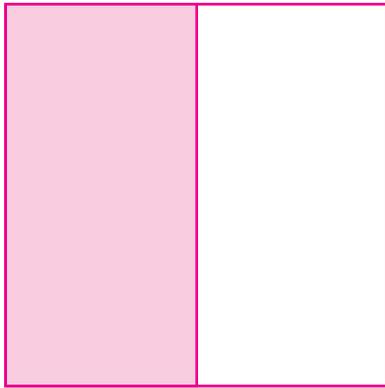


Fractions

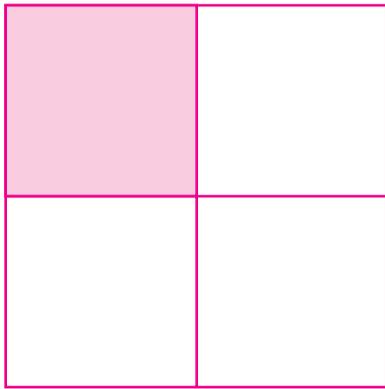
A fraction is a part of something. A piece of a pizza is a fraction of a pizza. A part of someone's money is a fraction of all of his money. One minute is a fraction of an hour, and so on.

Fractions can be written like this: $1/2$ or $\frac{1}{2}$

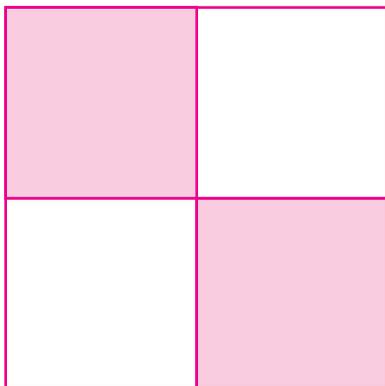
The **bottom number** in a fraction tells how many sections or parts the whole is divided into. The **top number** tells how many pieces or parts of the whole we are talking about.



← This **square** is divided into **2 parts**. One part is shaded. The part that is shaded is **one half**. It is written like this: $1/2$ or $\frac{1}{2}$. Something divided into two equal parts is in half.



← This **square** is divided into **4 parts**. One part is shaded. The fraction that is shaded is $1/4$ or **one fourth** or **one quarter**. Something divided into four equal parts has been quartered.



← This **square** has **2** out of four sections shaded. It is $2/4$ or $\frac{2}{4}$ of the whole.

Practice with Story Problems

 Read these stories and solve them.

Susan had 5 friends over.
Three had to go home.
How many friends stayed at
Susan's house? _____

Why? $\square - \square = \square$

Josey's hen laid a dozen
eggs one week and 10 eggs
the next week.

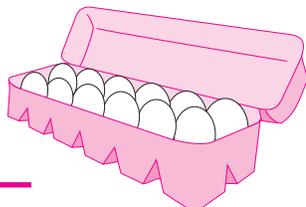
How many eggs
did it lay? _____



Why? $\square + \square = \square$

Mom bought a dozen eggs.
She used 2 eggs for a cake.
Barry ate 3 of the eggs for
breakfast.

How many eggs
were left? _____



Why? (This is a 2 step problem.)

Step 1. How many eggs were used?

$$\square + \square = \square$$

Step 2. How many were left?

$$\square - \square = \square$$

Jen's mother asked her to
baby-sit when Jen's aunt came
to visit. Jen baby-sat her 3
brothers and 2 sisters. She
also baby-sat her 4 cousins.

How many children did Jen
baby-sit? _____

Why? (This is a 2 step problem.)

Step 1. How many siblings does Jen
have?

$$\square + \square = \square$$

Step 2. How many children did she
baby-sit?

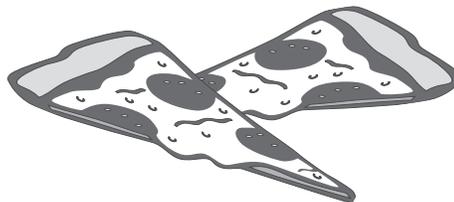
$$\square + \square = \square$$

Now do the problem this way!

$$\square + \square + \square = \square$$

Gavin's family ordered a
pizza. The pizza was cut into
8 pieces. They ate 5 pieces.
What fraction of the pizza
was left?

$$\square - \square = \frac{\square}{\square}$$



$$\frac{\square}{8}$$