

Chapter 12

Parent Help

Packet

Measurement

Vocabulary

decimeter (dm) A metric unit for measuring length or distance

fluid ounce (fl oz) A customary unit for measuring liquid volume

line plot A graph that shows the frequency of data along a number line

second A small unit of time

Dear Family,

During the next few weeks, our math class will be learning about customary and metric units of length, weight/mass, and liquid volume. We will also find elapsed time and learn to compute with mixed measures.

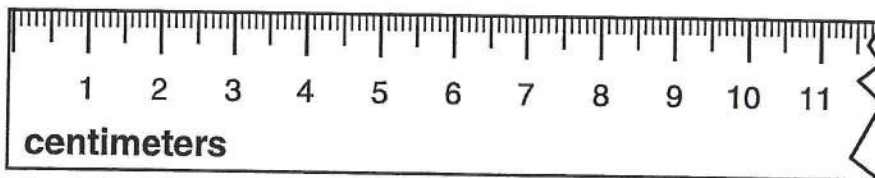
You can expect to see homework on how to use measurement benchmarks and how to compare units.

Here is a sample of how your child will be taught to compare sizes of metric units of length.



MODEL Compare the Relative Size of Centimeters and Millimeters

Look at a centimeter ruler.



Each labeled mark on the ruler is 1 centimeter.

The small marks between centimeters are millimeters.

1 centimeter = 10 millimeters

1 centimeter is 10 times as long as 1 millimeter.

1 millimeter is $\frac{1}{10}$ or 0.1 of a centimeter.

Tips

Estimating Measures

Use benchmarks to help you estimate measures. For example, the width of your finger is about 1 centimeter.







Activity

Have your child commit basic customary and metric units of measure to memory. Work together to make flash cards with measurement units, and have your child practice relating and comparing units. Use daily activities, such as meals and cooking, as opportunities for practice. For example, "If you start with 1 quart of juice and drink 3 cups, how many cups of juice are left?"

Measurement Benchmarks

You can use benchmarks to estimate measurements.







The chart shows benchmarks for customary units of measurement.

Benchmarks for Some Customary Units					
					
1 ft about 1 foot	1 yd about 1 yard	about 1 cup	about 1 gallon	about 1 ounce	about 1 pound

Here are some more examples of estimating with customary units.

- The width of a professional football is about 1 foot.
- A large fish bowl holds about 1 gallon of water.
- A box of cereal weighs about 1 pound.

The chart shows benchmarks for metric units of measurement.

Benchmarks for Some Metric Units					
					
about 1 centimeter	about 1 meter	about 1 milliliter	about 1 liter	about 1 gram	about 1 kilogram

Here are some more examples of estimating with metric units.

- The width of a large paper clip is about 1 centimeter.
- A pitcher holds about 1 liter of juice.
- Three laps around a track is about 1 kilometer.

Name _____

Customary Units of Length

A ruler is used to measure length. A ruler that is 1 foot long shows 12 inches in 1 foot. A ruler that is 3 feet long is called a yardstick. There are 3 feet in 1 yard.

How does the size of a foot compare to the size of an inch?

Step 1 A small paper clip is about 1 inch long. Below is a drawing of a chain of paper clips that is about 1 foot long. Number each paper clip, starting with 1.



Step 2 Complete this sentence.

In the chain of paper clips shown, there are 12 paper clips.

Step 3 Compare the size of 1 inch to the size of 1 foot.

There are 12 inches in 1 foot.

So, 1 foot is 12 times as long as 1 inch.

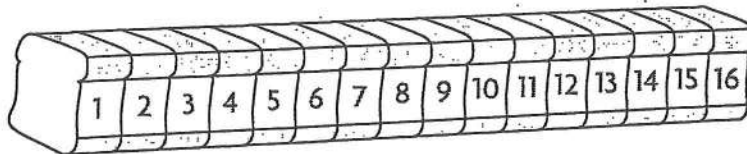
Customary Units of Weight

Ounces and **pounds** are customary units of weight. A **ton** is a unit of weight that is equal to 2,000 pounds.

A slice of bread weighs about 1 ounce. Some loaves of bread weigh about 1 pound.

How does the size of 1 ounce compare to the size of 1 pound?

Step 1 You know a slice of bread weighs about 1 ounce. Below is a drawing of a loaf of bread that weighs about 1 pound. Number each slice of bread, starting with 1.



Step 2 Complete this sentence.

In the loaf of bread shown above, there are 16 slices of bread.

Step 3 Compare the size of 1 ounce to the size of 1 pound.

There are 16 ounces in 1 pound.

So, 1 pound is 16 times as heavy as 1 ounce.

Customary Units of Liquid Volume

Liquid volume is the measure of the space a liquid occupies. Some basic units for measuring liquid volume are **gallons, half gallons, quarts, pints, cups, and fluid ounces**. The table at the right shows the relationships among some units of liquid volume.

1 cup = 8 fluid ounces
1 pint = 2 cups
1 quart = 2 pints
1 half gallon = 2 quarts
1 gallon = 4 quarts

How does the size of a gallon compare to the size of a pint?

Step 1 Use the information in the table.

Draw a bar to represent
1 gallon.

1 gallon

Step 2 The table shows that 1 gallon is equal to 4 quarts. Draw a bar to show 4 quarts.

1 quart	1 quart	1 quart	1 quart
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Step 3 The table shows that 1 quart is equal to 2 pints. Draw a bar to show 2 pints for each of the 4 quarts.

1 pint	1 pint	1 pint	1 pint	1 pint	1 pint	1 pint	1 pint
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Step 4 Compare the size of 1 gallon to the size of 1 pint.

There are 8 pints in 1 gallon.

So, 1 gallon is 8 times as much as 1 pint.

Line Plots

Howard gave a piece of paper with several survey questions to his friends. Then he made a list to show how long it took for his friends to answer the survey. Howard wants to know how many surveys took longer than $\frac{2}{12}$ hour.

Time for Survey Answers (in hours)

$\frac{1}{12}$ $\frac{3}{12}$ $\frac{1}{12}$ $\frac{2}{12}$ $\frac{6}{12}$ $\frac{3}{12}$ $\frac{5}{12}$

Make a line plot to show the data.

Step 1 Order the data from least to greatest.

$\frac{1}{12}$ $\frac{1}{12}$ $\frac{2}{12}$ $\frac{3}{12}$ $\frac{3}{12}$ $\frac{5}{12}$ $\frac{6}{12}$

Step 2 Make a tally table of the data.

Step 3 Label the fractions of an hour on the number line from least to greatest. Notice that $\frac{4}{12}$ is included even though it is not in the data.

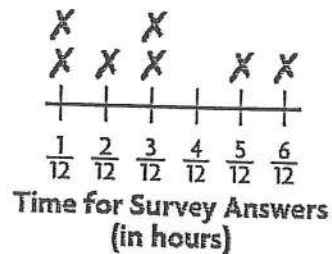
Step 4 Plot an X above the number line for each piece of data. Write a title for the line plot.

Step 5 Count the number of Xs that represent data points greater than $\frac{2}{12}$ hour.

There are 4 data points greater than $\frac{2}{12}$ hour.

So, 4 surveys took more than $\frac{2}{12}$ hour.

Survey	
Time (in hours)	Tally
$\frac{1}{12}$	
$\frac{2}{12}$	
$\frac{3}{12}$	
$\frac{5}{12}$	
$\frac{6}{12}$	

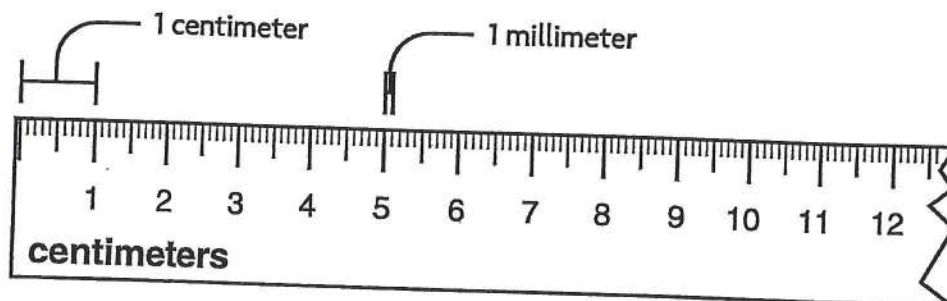


Metric Units of Length

Meters (m), **decimeters** (dm), centimeters (cm), and **millimeters** (mm) are all metric units of length. You can use a ruler and a meterstick to find out how these units are related.

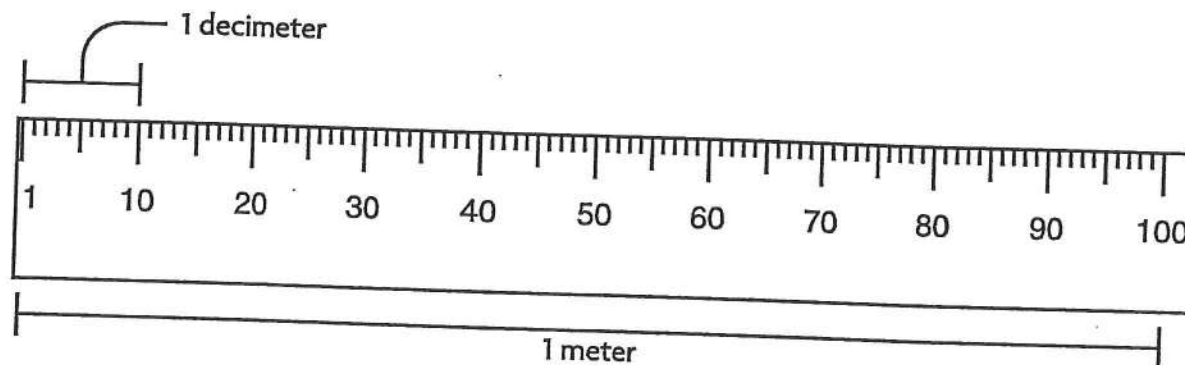
Materials: ruler, meterstick

Step 1 Look at a metric ruler. Most look like the one below.



The short marks between each centimeter mark show millimeters.
1 centimeter has the same length as a group of 10 millimeters.

Step 2 Look at a meterstick. Most look like the one below.



1 decimeter has the same length as a group of 10 centimeters.

Step 3 Use the ruler and the meterstick to compare metric units of length.

1 centimeter = 10 millimeters

1 decimeter = 10 centimeters

1 meter = 10 decimeters

1 meter = 100 centimeters

Metric Units of Mass and Liquid Volume

Mass is the amount of matter in an object. Metric units of mass include grams (g) and kilograms (kg). 1 kilogram represents the same mass as 1,000 grams.

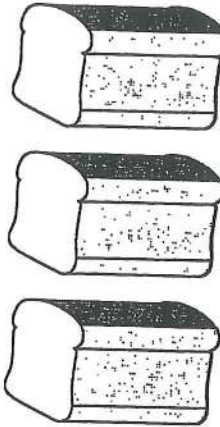
One large loaf of bread has a mass of about 1 kilogram. Jacob has 3 large loaves of bread. About how many grams is the mass of the loaves?

$$\begin{aligned} 3 \text{ kilograms} &= 3 \times \underline{1,000} \text{ grams} \\ &= \underline{3,000} \text{ grams} \end{aligned}$$

Liters (L) and milliliters (mL) are metric units of liquid volume. 1 liter represents the same liquid volume as 1,000 milliliters.

A large bowl holds about 2 liters of juice. Carmen needs to know the liquid volume in milliliters.

$$\begin{aligned} 2 \text{ liters} &= 2 \times \underline{1,000} \text{ milliliters} \\ &= \underline{2,000} \text{ milliliters} \end{aligned}$$



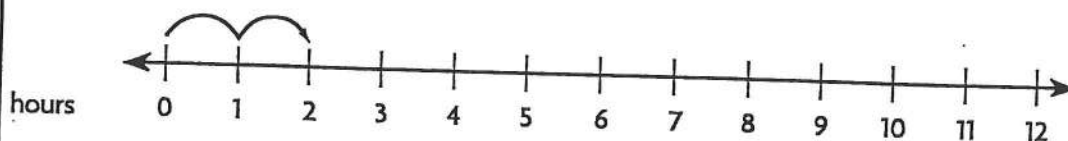
Units of Time

Some analog clocks have an hour hand, a minute hand, and a **second** hand.

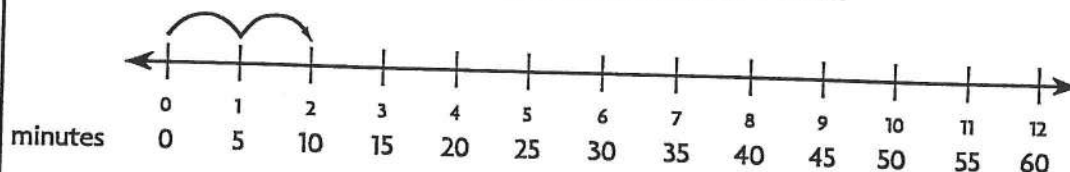
There are 60 seconds in a minute. The second hand makes 1 full turn every minute. There are 60 minutes in an hour. The minute hand makes 1 full turn every hour. The hour hand makes 1 full turn every 12 hours.



You can think of the clock as unrolling to become a number line.



The hour hand moves from one number to the next in 1 hour.



The minute hand moves from one number to the next in 5 minutes.

Use the table at the right to change between units of time.

1 hour = 60 minutes, or 60×60 seconds, or 3,600 seconds.

So, 1 hour is 3,600 times as long as 1 second.

1 day = 24 hours, so 3 days = 3×24 hours, or 72 hours.

1 year = 12 months, so 5 years = 5×12 months, or 60 months.

Units of Time

1 minute = 60 seconds

1 hour = 60 minutes

1 day = 24 hours

1 week = 7 days

1 year = 12 months

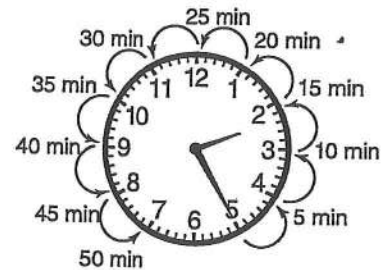
1 year = 52 weeks

Name _____

Problem Solving • Elapsed Time

Opal finished her art project at 2:25 P.M. She spent 50 minutes working on her project. What time did she start working on her project?

Read the Problem		
What do I need to find?	What information do I need to use?	How will I use the information?
I need to find Opal's start time.	End time: <u>2:25 P.M.</u> Elapsed time: <u>50</u> minutes	I can draw a diagram of a clock. I can then count back 5 minutes at a time until I reach 50 minutes.
Solve the Problem		
<p>I start by showing 2:25 P.M. on the clock. Then I count back 50 minutes by 5s.</p> <p>Think: As I count back, I go past the 12. The hour must be 1 hour less than the ending time. The hour will be <u>1 o'clock</u>.</p> <p>So, Opal started on her project at <u>1:35 P.M.</u></p>		



Mixed Measures

Gabrielle's puppy weighs 2 pounds 7 ounces. What is the weight of the puppy in ounces?

Step 1 Think of 2 pounds 7 ounces as 2 pounds + 7 ounces.

Step 2 Change the pounds to ounces.

Think: 1 pound = 16 ounces

So, 2 pounds = 2×16 ounces, or 32 ounces.

Step 3 Add like units to find the answer.

$$\begin{array}{r} 32 \text{ ounces} \\ + 7 \text{ ounces} \\ \hline 39 \text{ ounces} \end{array}$$

So, Gabrielle's puppy weighs 39 ounces.

Gabrielle played with her puppy for 2 hours 10 minutes yesterday and 1 hour 25 minutes today. How much longer did she play with the puppy yesterday than today?

Step 1 Subtract the mixed measures. Write the subtraction with like units lined up.

Think: 25 minutes is greater than 10 minutes.

$$\begin{array}{r} 2 \text{ hr } 10 \text{ min} \\ - 1 \text{ hr } 25 \text{ min} \\ \hline \end{array}$$

Step 2 Rename 2 hours 10 minutes to subtract.

1 hour = 60 minutes

So, 2 hr 10 min = 1 hr + 60 min + 10 min, or 1 hr 70 min.

$$\begin{array}{r} 1 \quad 70 \\ \cancel{2} \text{ hr } \cancel{10} \text{ min} \\ - 1 \text{ hr } 25 \text{ min} \\ \hline 0 \text{ hr } 45 \text{ min} \end{array}$$

Step 3 Subtract like units.

1 hr - 1 hr = 0 hr; 70 min - 25 min = 45 min

So, she played with the puppy 45 minutes longer yesterday than today.

Algebra • Patterns in Measurement Units

Use the relationship between the number pairs to label the columns in the table.

?	?
1	8
2	16
3	24
4	32

Step 1 List the number pairs. 1 and 8; 2 and 16; 3 and 24; 4 and 32

Step 2 Describe the relationship between the numbers in each pair.

The second number is 8 times as great as the first number.

Step 3 Look for a relationship involving 1 and 8 in the table below.

Length	Weight	Liquid Volume	Time
1 foot = 12 inches 1 yard = 3 feet 1 yard = 36 inches	1 pound = 16 ounces 1 ton = 2,000 pounds	1 cup = 8 fluid ounces 1 pint = 2 cups 1 quart = 2 pints 1 gallon = 4 quarts	1 minute = 60 seconds 1 hour = 60 minutes 1 day = 24 hours 1 week = 7 days 1 year = 12 months 1 year = 52 weeks

So, the label for the first column is Cups

The label for the second column is Fluid Ounces

