
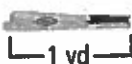






Name _____

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.

Use benchmarks to choose the customary unit you would use to measure each.

1. length of a school bus

2. weight of a computer

Use benchmarks to choose the metric unit you would use to measure each.

3. the amount of liquid a bottle of detergent holds

4. distance between two cities

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.

Complete.

1. 5 feet = _____ inches

2. 3 yards = _____ feet

3. 5 yards = _____ feet

4. 4 feet = _____ inches

5. 6 feet = _____ inches

6. 8 yards = _____ feet

Name _____

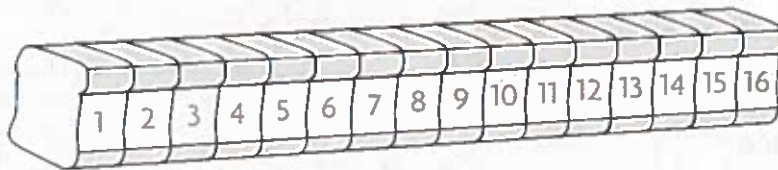
Customary Units of Weight

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.

Complete.

1. 2 pounds = _____ ounces

2. 2 tons = _____ pounds

Think: $2 \times 16 = 32$

3. 7 pounds = _____ ounces

4. 4 pounds = _____ ounces

5. 3 tons = _____ pounds

6. 10 pounds = _____ ounces

Name _____

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.



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



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.



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.

Complete. Draw a model to help.

1. 2 quarts = _____ pints

2. 1 gallon = _____ cups

3. 1 pint = _____ fluid ounces

4. 3 pints = _____ cups

5. 3 quarts = _____ cups

6. 1 half gallon = _____ pints

Name _____

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.

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

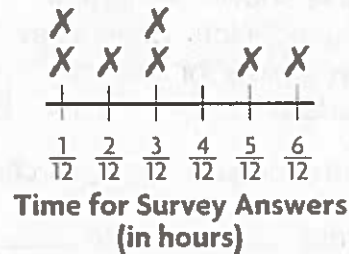
Step 3 Label the fractions of an hour on the number line from least to greatest. Notice that $\frac{4}{12}$ is included even though it is not in the data.

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.



Use the line plot above for 1 and 2.

- How many of the surveys that Howard gave to his friends were answered? _____
- What is the difference in hours between the longest time and the shortest time that it took Howard's friends to answer the survey?

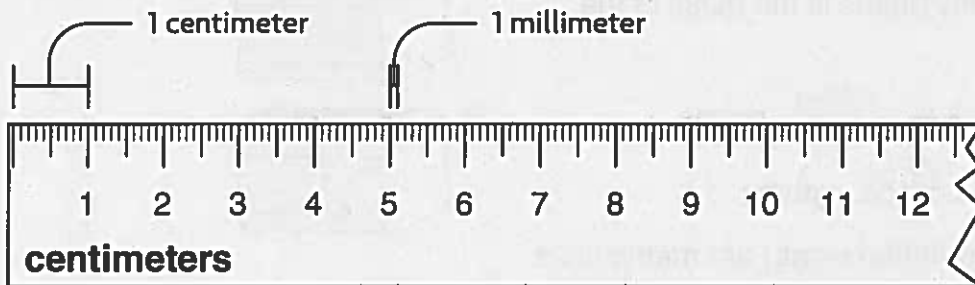
Name _____

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.

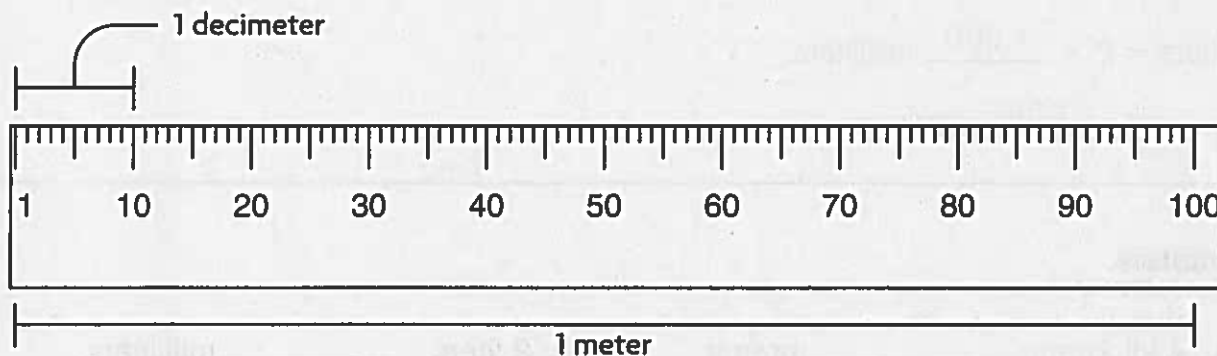
Materials: ruler, meterstick

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

Complete.

1. 3 meters = _____ decimeters

2. 5 meters = _____ centimeters

3. 4 centimeters = _____ millimeters

4. 9 decimeters = _____ centimeters

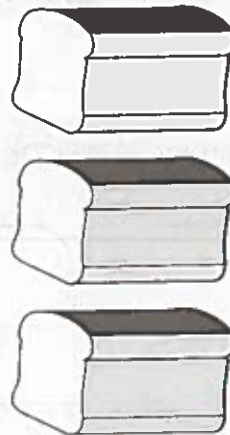
Name _____

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.

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

Complete.

1. 4 kilograms = _____ grams

2. 9 liters = _____ milliliters

3. 3 liters = _____ milliliters

4. 7 kilograms = _____ grams

5. 5 kilograms = _____ grams

6. 8 liters = _____ milliliters

Name _____

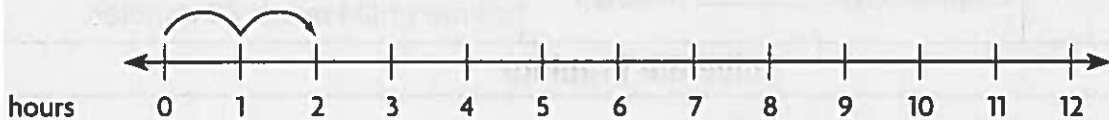
Units of Time

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

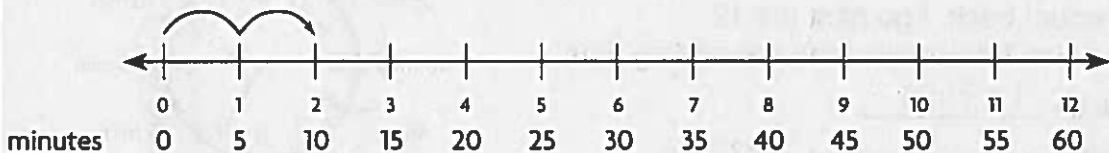
There are 60 seconds in a minute. The second hand makes 1 full turn every minute. There are 60 minutes in an hour. The minute hand makes 1 full turn every hour. The hour hand makes 1 full turn every 12 hours.



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

Complete.

1. 3 hours = _____ minutes
2. 2 years = _____ weeks
3. 6 days = _____ hours
4. 5 weeks = _____ days
5. 8 minutes = _____ seconds
6. 7 years = _____ months

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?

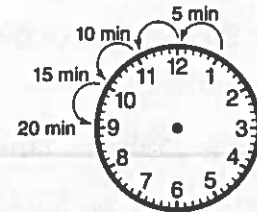
Read the Problem		
What do I need to find?	What information do I need to use?	How will I use the information?
I need to find Opal's start time.	End time: <u>2:25 P.M.</u> Elapsed time: <u>50</u> minutes	I can draw a diagram of a clock. I can then count back 5 minutes at a time until I reach 50 minutes.
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>		



Draw hands on the clock to help you solve the problem.

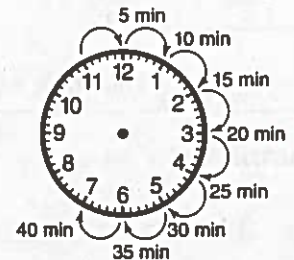
1. Bill wants to be at school at 8:05 A.M. It takes him 20 minutes to walk to school. At what time should Bill leave his house?

Bill should leave his house at _____.



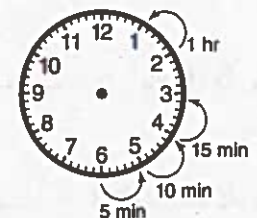
2. Mr. Gleason's math class lasts 40 minutes. Math class starts at 9:55 A.M. At what time does math class end?

Math class ends at _____.



3. Hannah rode her bike for 1 hour and 15 minutes until she got a flat tire at 2:30 P.M. What time did Hannah start riding her bike?

Hannah started riding her bike at _____.



Name _____

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.

Complete.

1. 4 yd 2 ft = _____ ft 2. 1 hr 20 min = _____ min 3. 4 qt 1 pt = _____ pt

Add or subtract.

4.
$$\begin{array}{r} 2 \text{ gal } 1 \text{ qt} \\ + 3 \text{ gal } 2 \text{ qt} \\ \hline \end{array}$$

5.
$$\begin{array}{r} 3 \text{ lb } 12 \text{ oz} \\ - 1 \text{ lb } 8 \text{ oz} \\ \hline \end{array}$$

6.
$$\begin{array}{r} 4 \text{ yr } 9 \text{ mo} \\ - 1 \text{ yr } 10 \text{ mo} \\ \hline \end{array}$$

Name _____

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 pound = 16 ounces	1 cup = 8 fluid ounces	1 minute = 60 seconds
1 yard = 3 feet	1 ton = 2,000 pounds	1 pint = 2 cups	1 hour = 60 minutes
1 yard = 36 inches		1 quart = 2 pints	1 day = 24 hours
		1 gallon = 4 quarts	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.

Each table shows a pattern for two customary units. Label the columns of the table.

1.

1	12
2	24
3	36
4	48

2.

1	2,000
2	4,000
3	6,000
4	8,000