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 _____

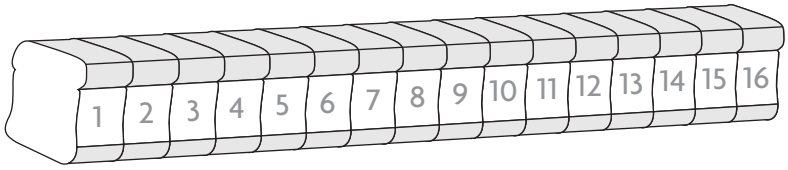
Customary Units of Weight

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

Think: 2 × 16 = 32

2. 2 tons = _____ pounds

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.

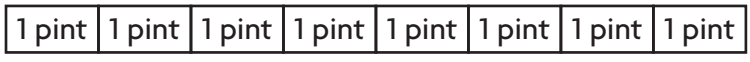
1 cup = 8 fluid ounces
1 pint = 2 cups
1 quart = 2 pints
1 half gallon = 2 quarts
1 gallon = 4 quarts

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.

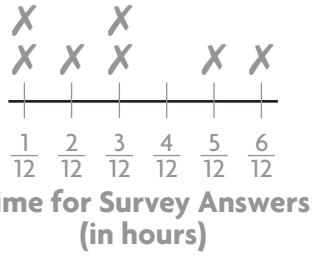
$\frac{1}{12}, \frac{1}{12}, \frac{2}{12}, \frac{3}{12}, \frac{3}{12}, \frac{5}{12}, \frac{6}{12}$

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 *X*s 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.

1. How many of the surveys that Howard gave to his friends were answered? _____

2. What is the difference in hours between the longest time and the shortest time that it took Howard's friends to answer the survey?

_____

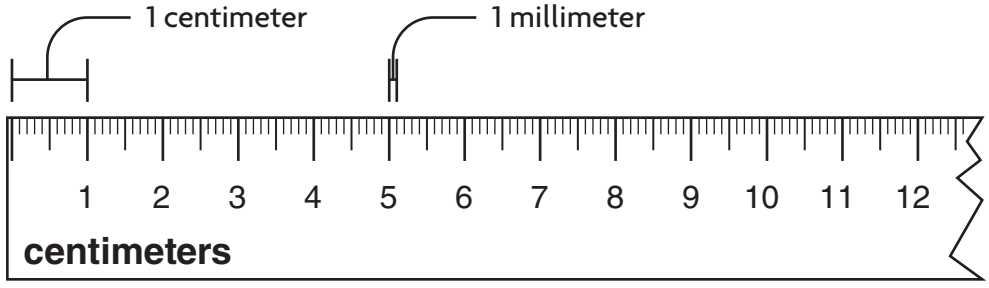
Name _____

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.

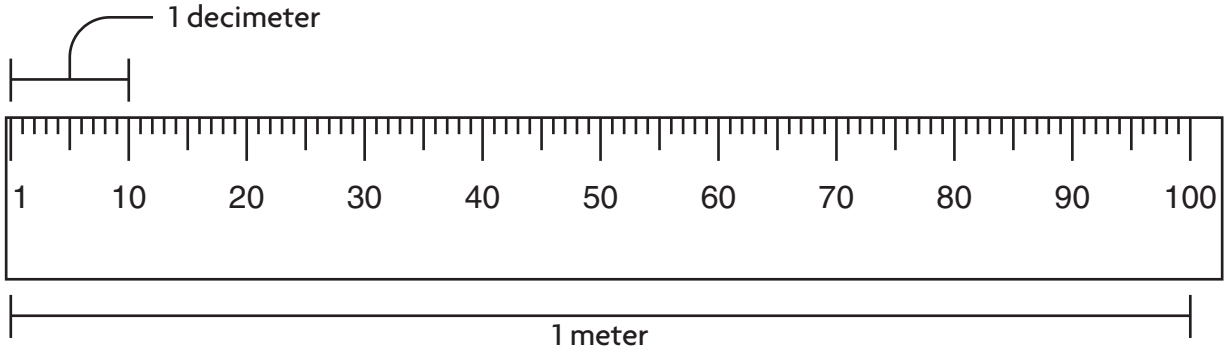
Materials: ruler, meterstick

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

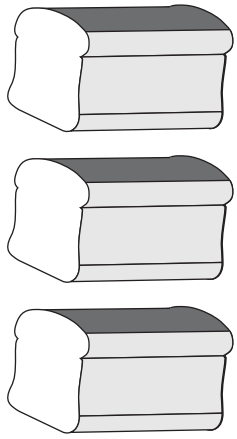
4. 9 decimeters = _____ centimeters

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?



3 kilograms = 3 × 1,000 grams

= 3,000 grams

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.

2 liters = 2 × 1,000 milliliters

= 2,000 milliliters

Complete.

1. 4 kilograms = _____ grams

2. 9 liters = _____ milliliters

3. 3 liters = _____ milliliters

4. 7 kilograms = _____ grams

5. 5 kilograms = _____ grams

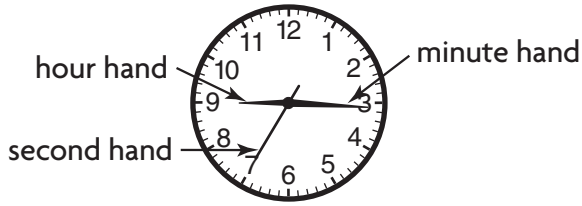
6. 8 liters = _____ milliliters

Name _____

Units of Time

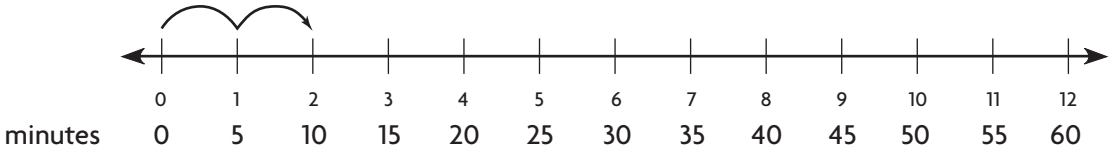
Some analog clocks have an hour hand, a minute hand, and a **second** hand.

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.

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

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.

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: 2:25 P.M. Elapsed time: 50 minutes	I can draw a diagram of a clock. I can then count back 5 minutes at a time until I reach 50 minutes.

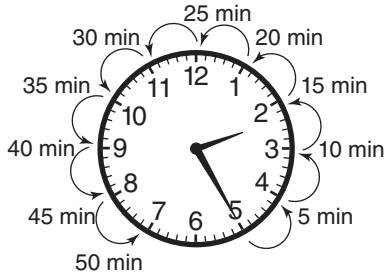
Solve the Problem

I start by showing 2:25 P.M. on the clock.
Then I count back 50 minutes by 5s.

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 1 o'clock.

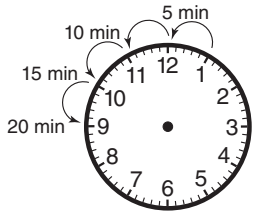
So, Opal started on her project at 1:35 P.M.



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

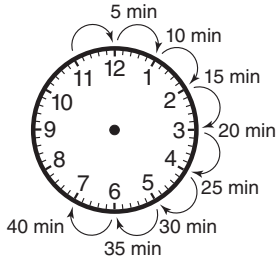
1. Bill wants to be at school at 8:05 A.M. It takes him 20 minutes to walk to school. At what time should Bill leave his house?

Bill should leave his house at _____.



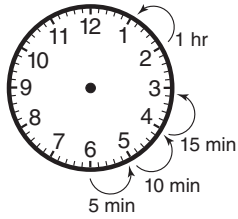
2. Mr. Gleason's math class lasts 40 minutes. Math class starts at 9:55 A.M. At what time does math class end?

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.

So, Gabrielle's puppy weighs 39 ounces.

```
 32 ounces
+ 7 ounces
 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.

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.

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.

```
  2 hr 10 min
− 1 hr 25 min
```

```
    1    70
  ~~2~~ hr ~~10~~ min
− 1 hr  25 min
  0 hr  45 min
```

Complete.

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

Add or subtract.

4. 2 gal 1 qt + 3 gal 2 qt
5. 3 lb 12 oz − 1 lb 8 oz
6. 4 yr 9 mo − 1 yr 10 mo

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 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.

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