

math

# MAMMOTH

## Measuring 1



Measuring length



Measuring weight



Measuring volume



Lessons for both  
customary and  
metric units



Many hands-on activities



Maria Miller

Blue  
Series

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# Introduction

*Math Mammoth Measuring 1* is a worktext that covers measuring length, weight, and volume for grades 1-3, both with customary and metric units. The book contains both explanations (the teaching) and exercises and is designed to be very easy to teach from. The lessons require fairly little teacher preparation; however for several lessons you will need to have measurement equipment ready, such as a ruler, a scales, or measuring cups.

Note: If you have the downloadable version of this book (PDF file), you need to print the pages as 100%, not with “shrink to fit,” “print to fit,” or similar settings. If you print with the “shrink to fit” setting, some exercises about measuring in inches and centimeters will not come out right, but the images and lines on the pages will be “shrunk” compared to what was intended, and thus the student’s measurements will not match the answer key.

The lessons in this book come from the Math Mammoth complete curriculum (Light Blue Series) for grades 1-3, and therefore the progression of lessons in this book is in a few places a little awkward. I have grouped the lessons together this way:

- The first two lessons have to do with exploring the concept of measuring (grade 1).
- Then come lessons about measuring in inches and centimeters (grades 1-3).
- Then there are lessons about feet, yards, miles, meters, and kilometers (grades 2-3).
- Next are lessons about measuring weight (grades 2-3).
- And lastly we have lessons about measuring volume (grade 3).

The lessons concentrate on hands-on exercises where the student actually measures things. I have included a few exercises about conversions between measurement units. Those are marked as optional because students are not generally expected to do measurement unit conversions even in grade 3; however, I feel many third graders are ready for some easy conversions.

The lessons on measuring weight have several activities to do at home using a bathroom scales. The goal is to let students become familiar with pounds and kilograms, and have an idea of how many pounds or kilograms some common things weigh.

Similarly, the lessons on volume include many hands-on activities so that the student learns first-hand how “big” the different units for volume are.

When it comes to measurement, experience is the best teacher. We all use various measurement units in our everyday life, and using them is the key to remembering what they are and what the conversion factors are. People in the United States often do not use the metric system, while people elsewhere do not use the customary system. The units your student is *not* using are likely to be forgotten easily. So encourage the student(s) to have free play time with scales, measuring cups, measuring tapes, and rulers—including ones that use metric units.

Math Mammoth Blue Series also includes another worktext, *Math Mammoth Measuring 2*, which is a sequel to this one. In it, students practice conversions between measurement units and problem solving.

*I wish you success in teaching math!*

*Maria Miller, the author*

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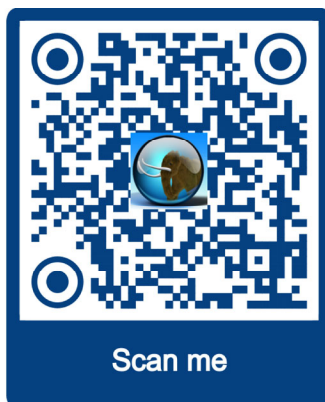
## Helpful Resources on the Internet

We have compiled a list of external Internet resources that match the topics in this book. This list of links includes web pages that offer:

- **online practice** for concepts;
- online **games**, or occasionally, printable games;
- **animations** and interactive **illustrations** of math concepts;
- **articles** that teach a math concept.

We heartily recommend you take a look at the list. Many of our customers love using these resources to supplement the bookwork. You can use the resources as you see fit for extra practice, to illustrate a concept better, and even just for some fun. Enjoy!

<https://l.mathmammoth.com/blue/measuring1>



# Measuring Length

In this lesson, we measure things to find how long or how wide they are as compared to other things. For all measuring, you need a **measuring unit**. You repeat the measuring unit many times, and compare it to the thing you are measuring.

1. Measure how wide or how long things are, using shoes as measuring units.

**You need:** two small shoes and two bigger shoes.

- a. Measure a desk or a table. Place one shoe at the edge of the table and the other one directly behind it. Then move the first shoe in front of the second, and so on. Keep count.



The table is \_\_\_\_\_ small shoes wide.

The table is \_\_\_\_\_ big shoes wide.

- b. Measure two more things now, using both the small shoes and the big shoes.

Some ideas:

- how wide the blackboard is;
- how long your friend is when lying on the floor;
- how tall your chair is;
- how long the room is.

The \_\_\_\_\_ is \_\_\_\_\_ small shoes wide.

The \_\_\_\_\_ is \_\_\_\_\_ big shoes wide.

The \_\_\_\_\_ is \_\_\_\_\_ small shoes wide.

The \_\_\_\_\_ is \_\_\_\_\_ big shoes wide.

2. Ryan noticed that each daddy shoe was about three baby shoes.

Ryan measured his desk and it was four daddy shoes wide, like this:



How many baby-shoes wide is Ryan's desk?

Hint: Draw the baby shoes under the daddy shoes.

3. Ryan measured that his room was 27 shoes wide, using daddy shoes.  
He also measured it using baby shoes.  
Was Ryan's room 81 baby shoes wide, or 9 baby shoes wide?

4. Measure the length of small things with paperclips.  
**You need:** several paperclips that are the same size,  
small things to measure such as an eraser, a pencil,  
crayons, toys, or books.



Write the things below **in order**, from shortest to longest.

\_\_\_\_\_ paperclips

\_\_\_\_\_ paperclips





\_\_\_\_\_ paperclips

\_\_\_\_\_ paperclips

\_\_\_\_\_ paperclips

5. How many crayons long are these pencils? How many paperclips long are they?



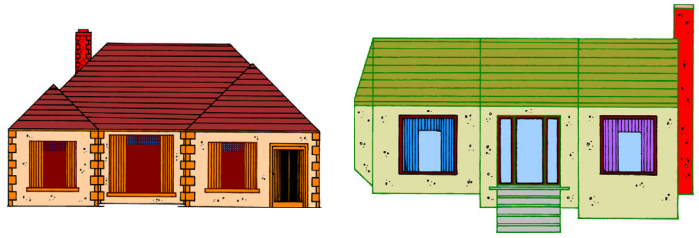
- a. 
- b. 
- c. 
- d. 



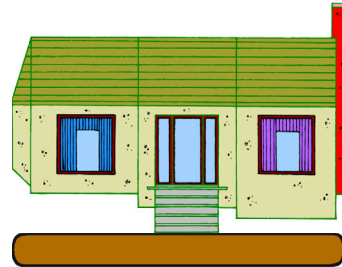
- pencil a. \_\_\_\_\_ crayons long; \_\_\_\_\_ paperclips long
- pencil b. \_\_\_\_\_ crayons long; \_\_\_\_\_ paperclips long
- pencil c. \_\_\_\_\_ crayons long; \_\_\_\_\_ paperclips long
- pencil d. \_\_\_\_\_ crayons long; \_\_\_\_\_ paperclips long



Sometimes we cannot easily tell about two things which one is longer or wider. We can use a third thing as a “measuring stick.” Look at these two houses. Can you tell which one is longer?



Now let’s use this “log” as a measuring stick:



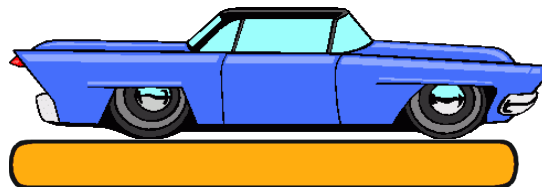
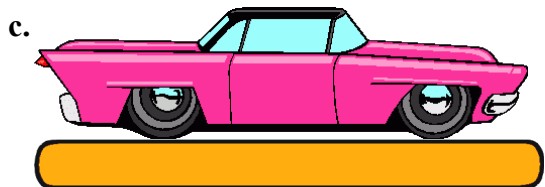
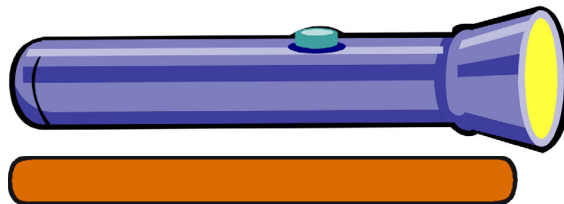
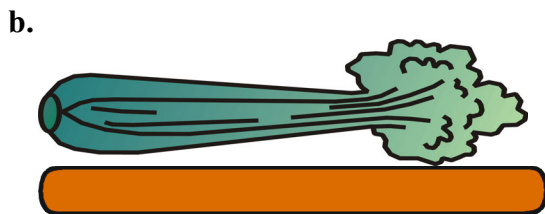
House 1 is a little shorter than our log.

House 2 is a little longer than our log.

Is house 1 longer than house 2? Or the other way around?

House 2 is longer than house 1, because it is longer than our log, whereas house 1 is shorter than the log.

6. Compare the things to the “measuring stick.” Mark the longer of the two.



7. Draw a picture to match the situation. You can use stick figures.

a. Jerry is shorter than the top of the cabinet.  
The top of the cabinet is shorter than Mike.

b. The table is taller than little Kyle. Little Mary is taller than the table.

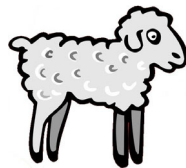
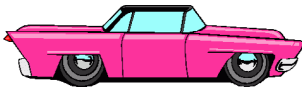
# Exploring Measuring

Besides measuring length, we also measure things to find how heavy something is, how much liquid it holds, or how much space it takes, as compared to other things.

1. Find five things you can carry, some lighter and some heavier. Put them in order from the lightest to the heaviest. You can draw the things or write them in the space below.

2. Order these things from lightest to heaviest by writing 1, 2, and 3 next to them. Don't just go by which picture looks bigger. Think how heavy these things would be in real life.

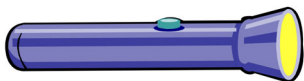
a.



b.



c.



3. If you have a bathroom scale, step on it and measure how much you weigh. Weigh some other things, also. If your scale measures in pounds, write “lb” after the number, such as 45 lb. If it measures in kilograms, write “kg”, such as 22 kg.

I weigh \_\_\_\_\_ .

\_\_\_\_\_ weighs \_\_\_\_\_ .

\_\_\_\_\_ weighs \_\_\_\_\_ .

\_\_\_\_\_ weighs \_\_\_\_\_ .

For all measuring, you need a **measuring unit**. You repeat the measuring unit a lot of times to compare it to the thing you are measuring.

4. Measure how much water a pot holds.

**You need:** water, a large coffee cup, a food jar, and a pot or other big container.

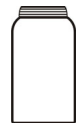
Fill the cup with water and pour into the pot. Repeat until the pot is full. Keep count of how many cups full of water you need to fill the pot.



The pot holds \_\_\_\_\_ cups full of water.

Now do the same using a jar:

The pot holds \_\_\_\_\_ jars of water.



5. Measure how much water a jar or a cup holds.

You need: water, a small measuring cup, a food jar, a drinking glass.

Fill the measuring cup with water and pour it into the food jar. Repeat until the jar is full. Keep count.



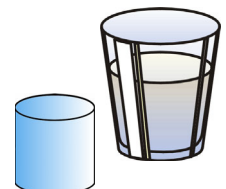
The jar holds \_\_\_\_\_ measuring cups of water.

Now do the same with a large drinking glass.


The glass holds \_\_\_\_\_ measuring cups of water.



6. Peter measured how much water fits into a bucket. First he measured it using a large drinking glass. The bucket holds 32 big drinking glasses. Then he measured it using a smaller drinking glass. Which is correct: did the bucket hold 19 or 53 smaller drinking glasses?



# Measuring Lines in Inches


This line is 1 inch long. 

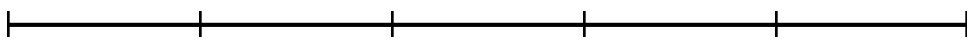
We also write "1 in." for short.

1. How many inches are end-to-end?

a.  \_\_\_\_\_ inches

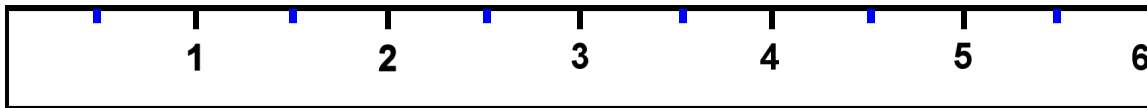
b.  \_\_\_\_\_ inches

c.  \_\_\_\_\_ inches

d.  \_\_\_\_\_ inches

2. How many inches long are these items?

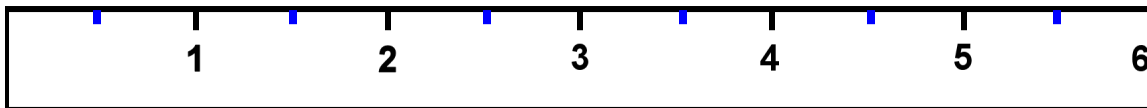
 \_\_\_\_\_ in.

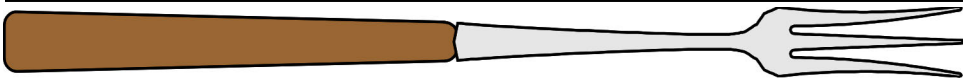


 \_\_\_\_\_ in.

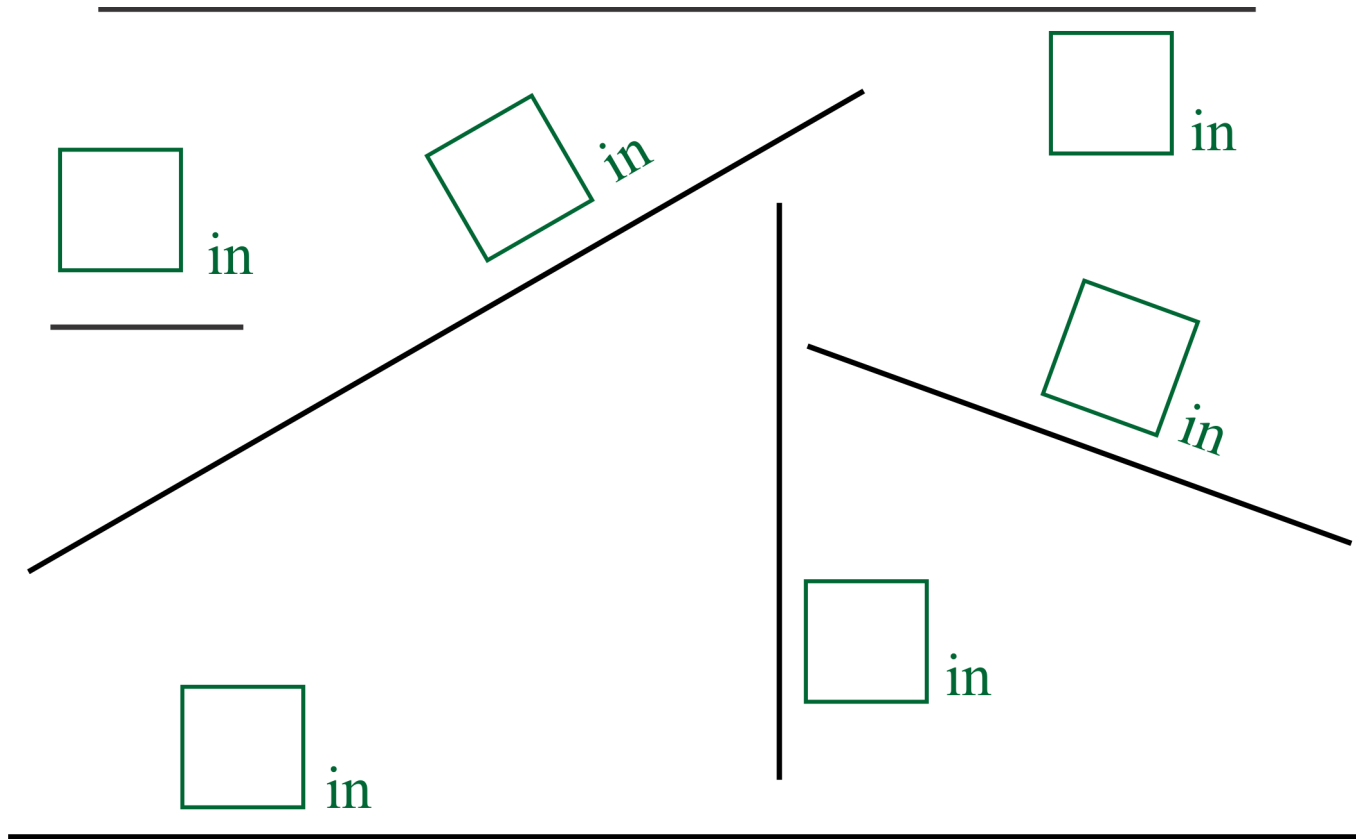
 \_\_\_\_\_ in.

 \_\_\_\_\_ in.

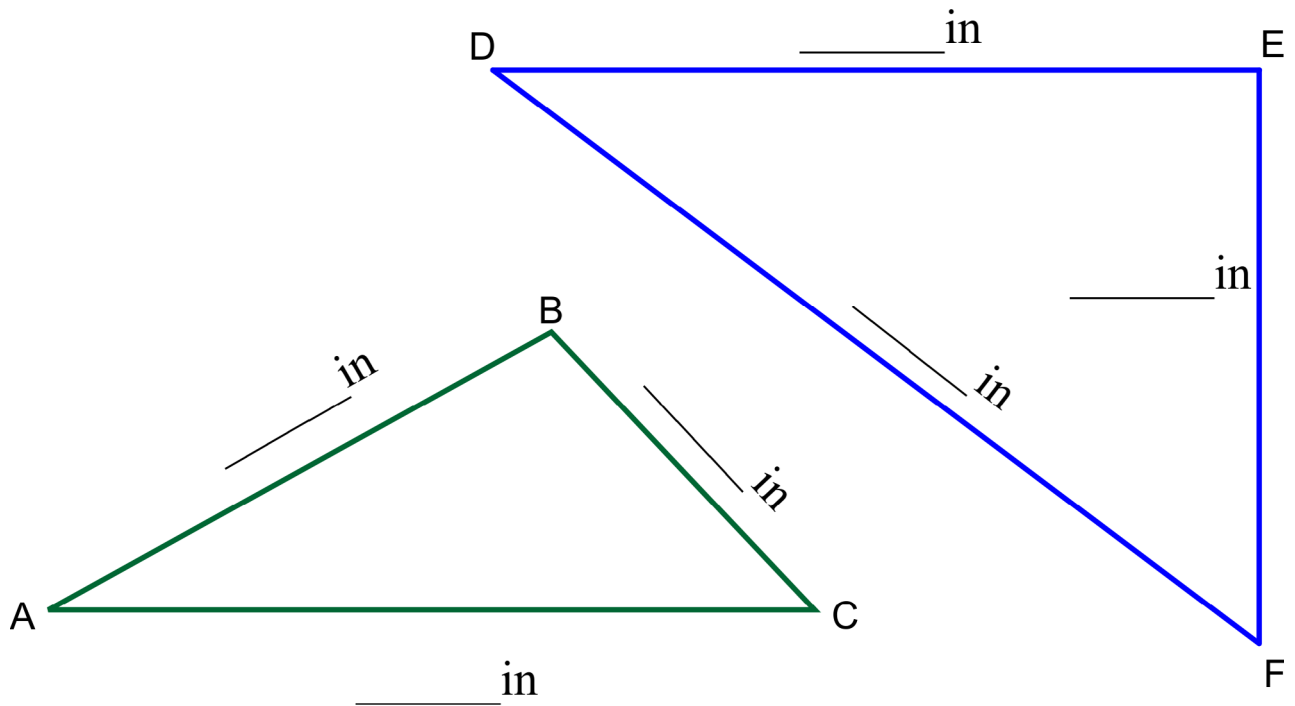


 \_\_\_\_\_ in.

3. Measure the lines with a ruler.



4. Measure the sides of the triangles.



5. Use a ruler and draw lines with these lengths:

a. 4 in.

b. 2 in.

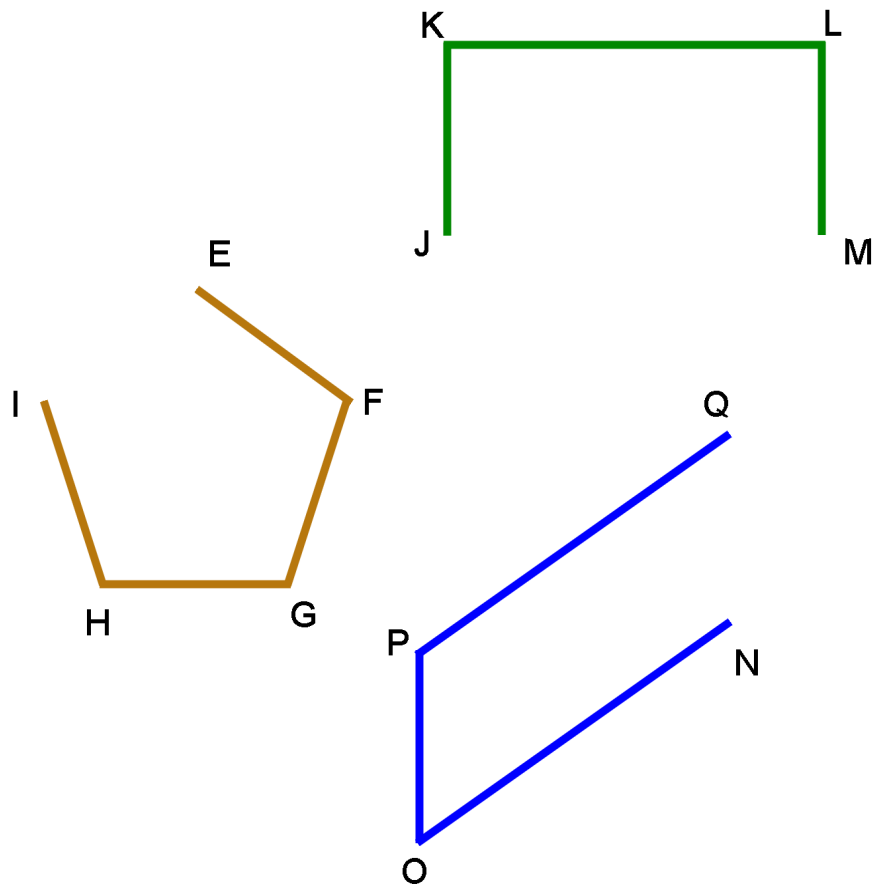
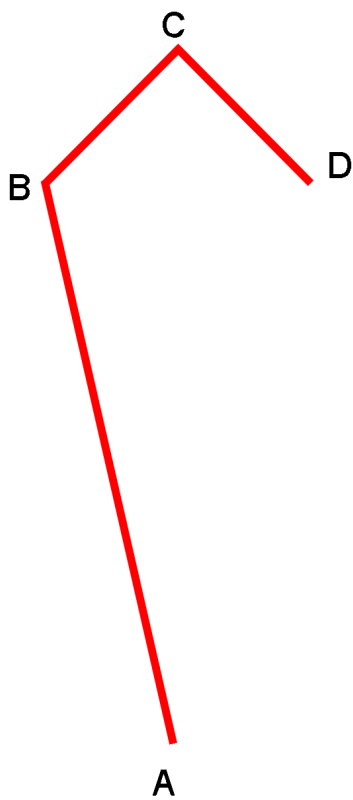
c. 5 in.

d. 7 in.

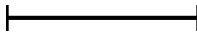

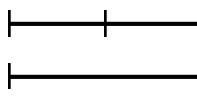

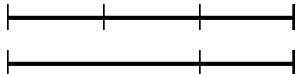
e. 1 in.

f. 8 in.

6. Draw the last side for these figures with a ruler. Then measure all the sides of each figure. Write the measurement next to each side (for example “2 inches” or “2 in.”).





# Inches and Half-Inches

 This line is 1 inch long.  This line is 1/2 inch long.	 Two half-inches make an inch!
 <p>3 inches and a 1/2-inch = 3 1/2 inches (three and a half inches)</p>	 <p>three half-inches = 1 1/2 inches (one and a half inches)</p>

1. How long are the lines of inches and half-inches when placed end-to-end?

a.  \_\_\_\_\_ inches

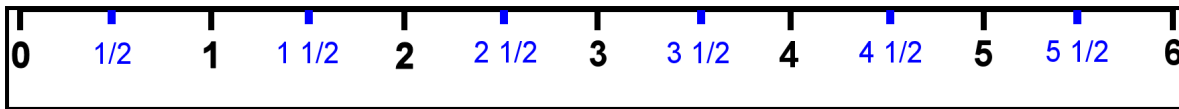
b.  \_\_\_\_\_ inches


c.  \_\_\_\_\_ inches

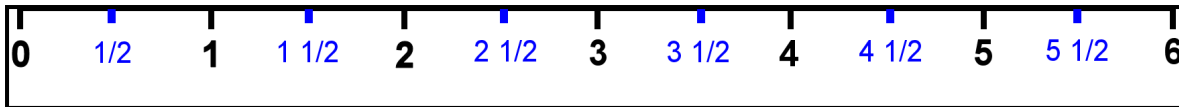
d.  \_\_\_\_\_ in.

2. How long are these things in inches?

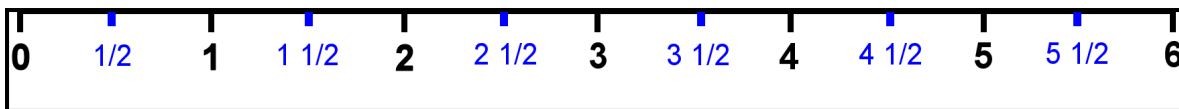
 a. \_\_\_\_\_ inches



 b. \_\_\_\_\_ inches



 c. \_\_\_\_\_ inches

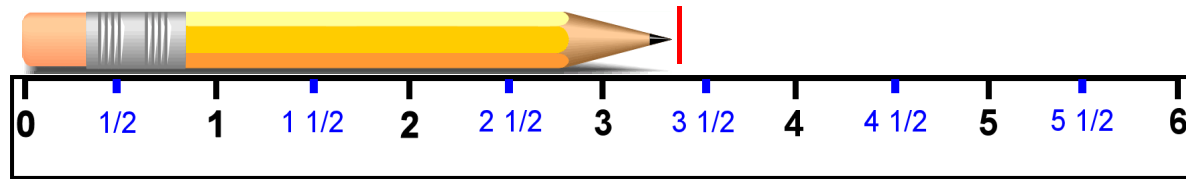
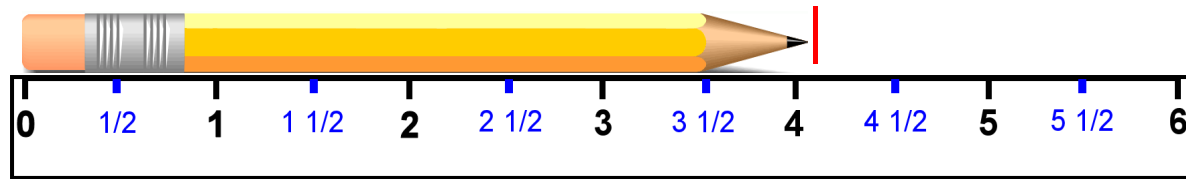


You can cut out one of the rulers in this lesson and tape it on an existing ruler or cardboard after you have finished the exercises on this and the next page!



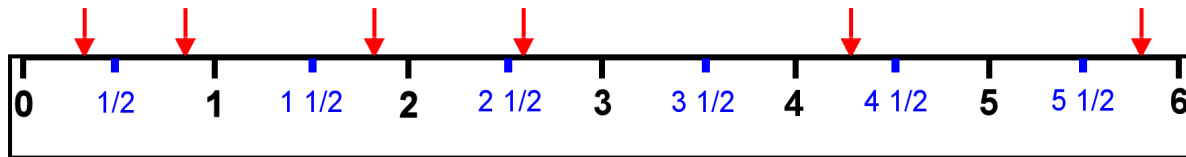
Most objects are NOT exactly a certain number of whole inches, or even whole and half inches. You can measure them to the nearest inch, or to the nearest half-inch.

The pencil below is a little over 4 inches long. It is about 4 inches long.

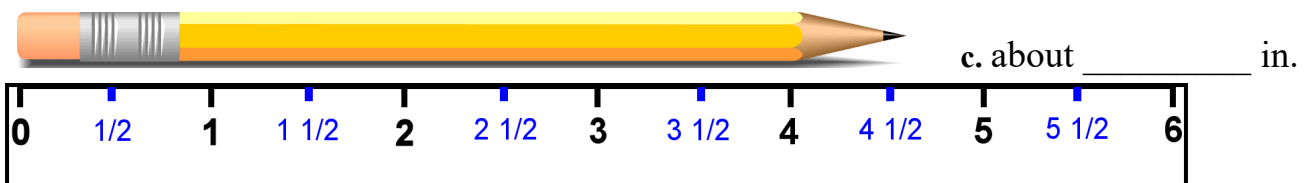
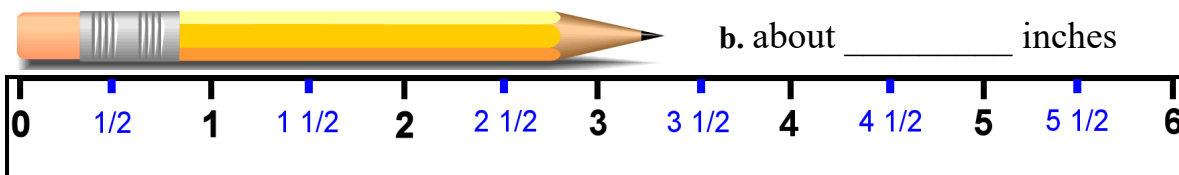
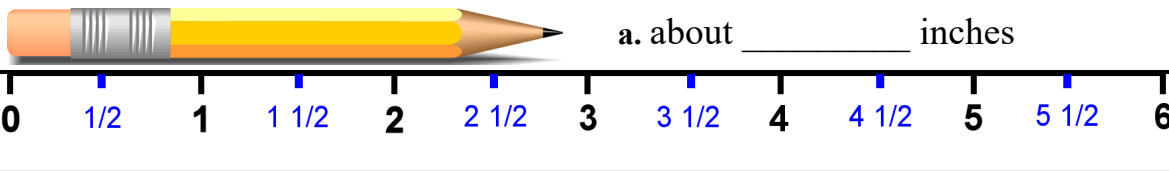


The pencil above is about  $3 \frac{1}{2}$  inches long. The end of the pencil is closer to  $3 \frac{1}{2}$  than to 3.




3. Circle the whole-inch or half-inch number that is nearest to each arrow.



4. Measure the pencils to the nearest half-inch.



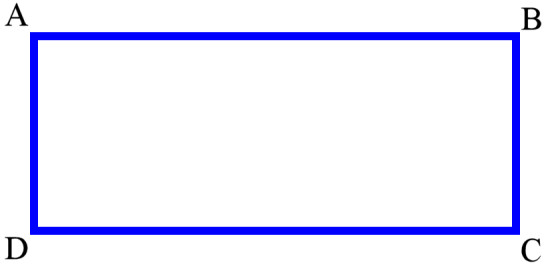
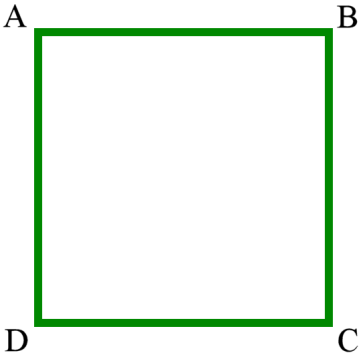
5. First GUESS how long these lines are in inches and half-inches. Write down your guess. After that, measure how long the lines are.

		GUESS	MEASUREMENT
a.		_____ inches	_____ inches
b.		_____ inches	_____ inches
c.		_____ inches	_____ inches

6. Draw some lines on a blank paper. Use a ruler. Hold the ruler down tight with one hand, while drawing the line with the other. It takes some practice!


- a. 5 in. long                      b. 2 in. long
- c. 12 in. long                     d. 9 in. long

7. Write the names of these shapes. Measure the sides of the shapes. “All the way around” means you need to find the *total* length of the four sides (use addition!).

<p>a. _____ ABCD</p> <div style="text-align: center;">  </div> <p>Side AB _____ inches</p> <p>Side BC _____ inches</p> <p>Side CD _____ inches</p> <p>Side DA _____ inches</p> <p>All the way around _____ inches</p>	<p>b. _____ ABCD</p> <div style="text-align: center;">  </div> <p>Side AB _____ inches</p> <p>Side BC _____ inches</p> <p>Side CD _____ inches</p> <p>Side DA _____ inches</p> <p>All the way around _____ inches</p>
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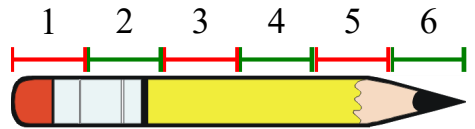
# Measuring Lines in Centimeters

You can find out how long things are in *centimeters*.

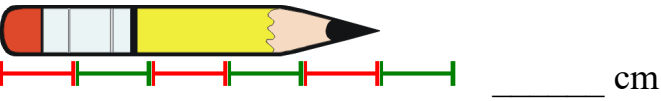
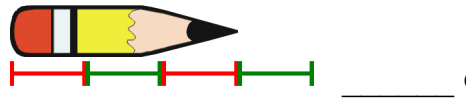
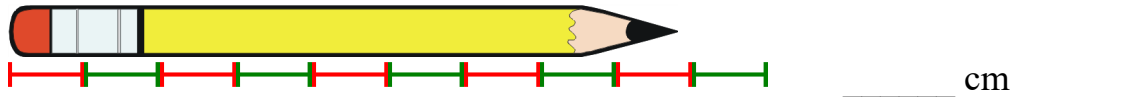
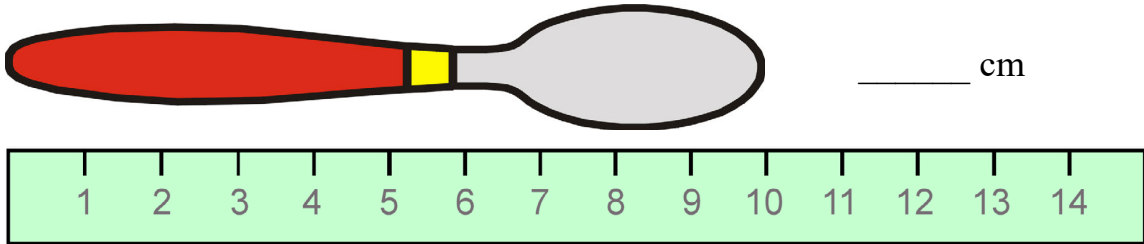
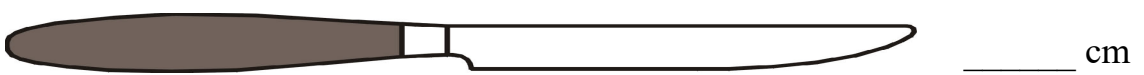
This line is 1 centimeter long: 

A centimeter is written in its short form as “cm.”

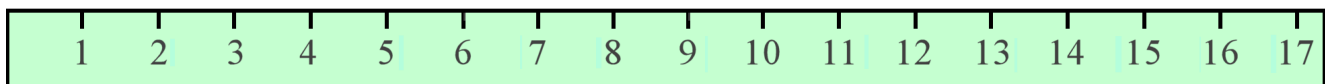
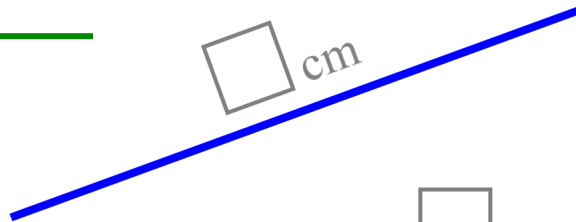
This pencil is 6 cm long.



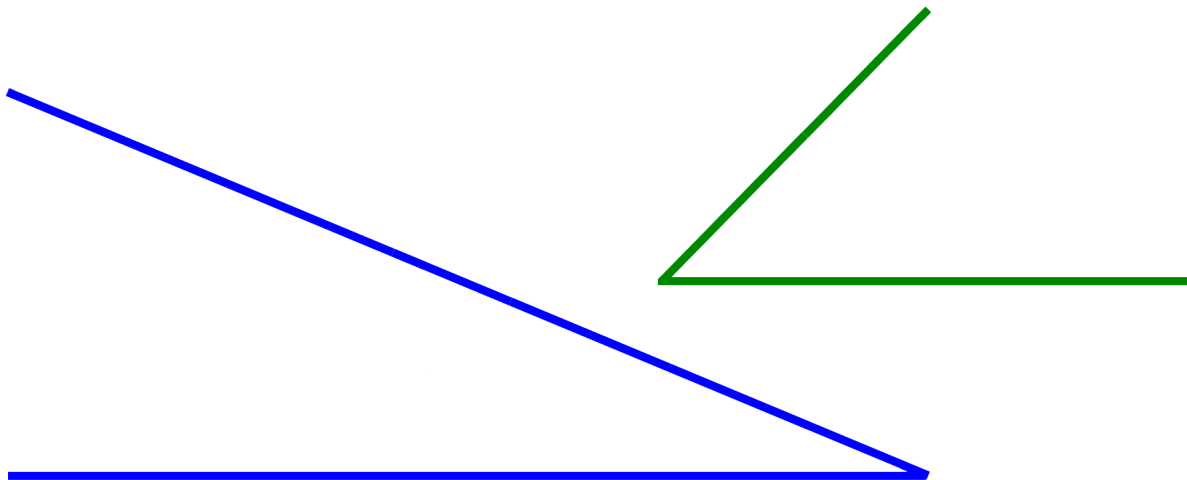
1. How many centimeters long are these things?

<p>a.  _____ cm</p>	<p>b.  _____ cm</p>
<p>c.  _____ cm</p>	
<p>d.  _____ cm</p> <p>e.  _____ cm</p>	

2. Measure the lines with a ruler. (If you don't have one, cut out the ruler at the bottom of the page.)



3. Draw the last side for these figures with a ruler. Then measure all three sides of each figure. Write the measurement next to each line (for example “6 cm”).



4. Use your own ruler and draw lines that are these lengths.

a. 4 cm

b. 5 cm

c. 8 cm


d. 16 cm

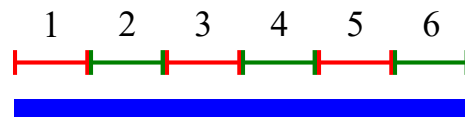
5. Measure some things around you! For example, a book, your pencil, a table, etc.

Thing	How long?

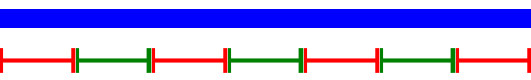


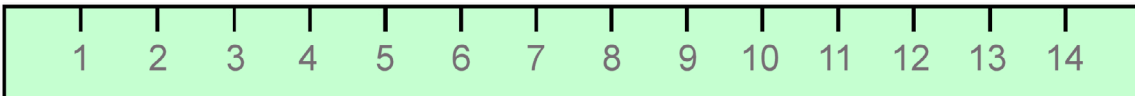

# Measuring to the Nearest Centimeter

Remember? We can measure how long things are using *centimeters*.

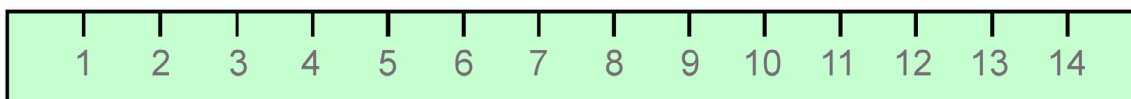
This line is 1 centimeter long:   
 A centimeter is written in short form as “cm.”  
 The blue line on the right is 6 cm long. →



1. How many centimeters long are these lines?

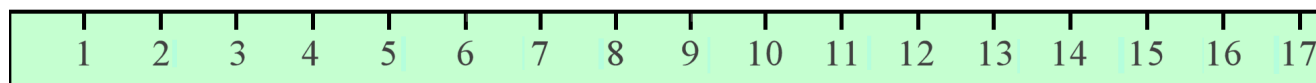
<p>a.  _____ cm</p>	<p>b.  _____ cm</p>
<p>c.  _____ cm</p> 	
<p>d.  _____ cm</p>	

2. Measure the pencils with a centimeter ruler. If you don't have one, you can cut out the one from the bottom of this page. Then answer the questions.



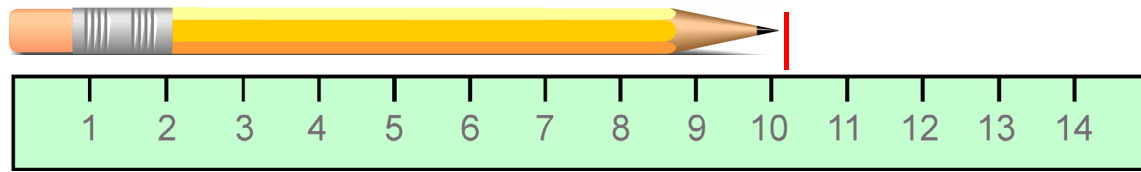
a. How much longer is pencil #1 than pencil #2? \_\_\_\_\_ cm

b. How much longer is pencil #3 than pencil #2? \_\_\_\_\_ cm

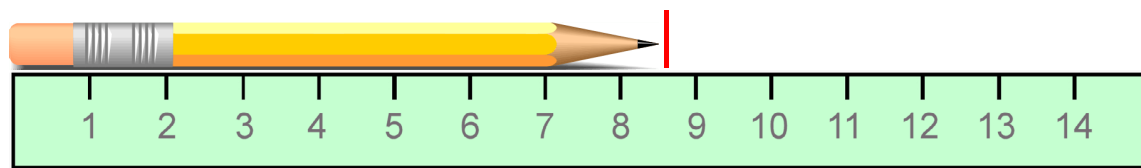


Most things are NOT exactly a certain number of whole centimeters. You can measure them to the nearest centimeter.

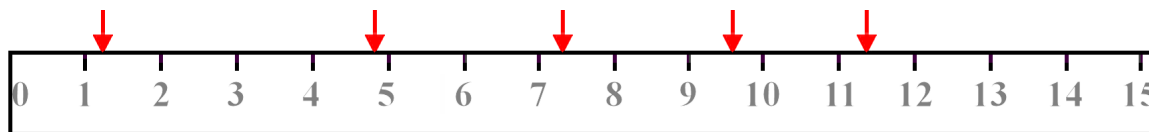
The pencil below is a little over 10 cm long. It is *about 10 cm long*.



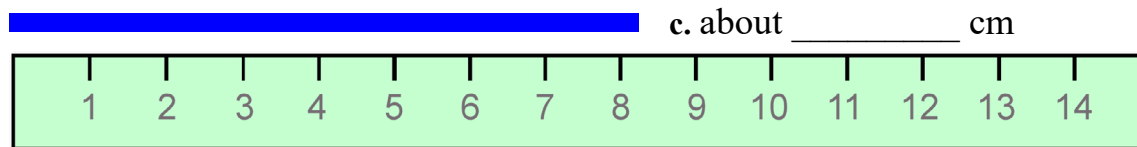
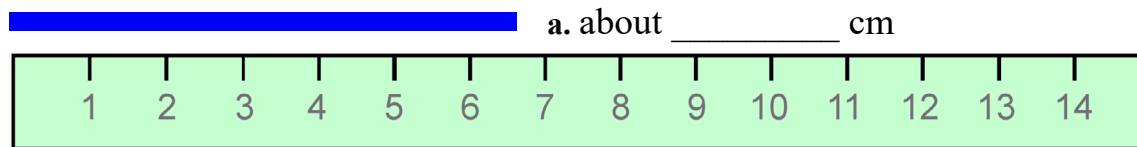
This pencil is about 9 cm long. The end of the pencil is closer to 9 cm than to 8 cm.







3. Circle the number that is nearest to each arrow.



4. Measure the lines to the nearest centimeter.



5. This line is 1 cm long: . Your finger is probably about that wide; put it on top of the 1-cm line and check! Guess how long these lines are. Then measure.

	<u>My guess:</u>	<u>Measurement:</u>
a. 	about _____ cm	about _____ cm
b. 	about _____ cm	about _____ cm
c. 	about _____ cm	about _____ cm

6. a. Find two small objects. Measure to find *about* how many centimeters longer one is than the other.

The \_\_\_\_\_ is *about* \_\_\_\_\_ cm longer than the \_\_\_\_\_.

b. Find other two small objects. Measure to find *about* how many centimeters longer one is than the other.

The \_\_\_\_\_ is *about* \_\_\_\_\_ cm longer than the \_\_\_\_\_.

7. Draw some lines here or on blank paper. Use a ruler. Hold the ruler down tight with one hand, while drawing the line with the other. It takes some practice!

a. 6 cm long

b. 3 cm long

c. 12 cm long

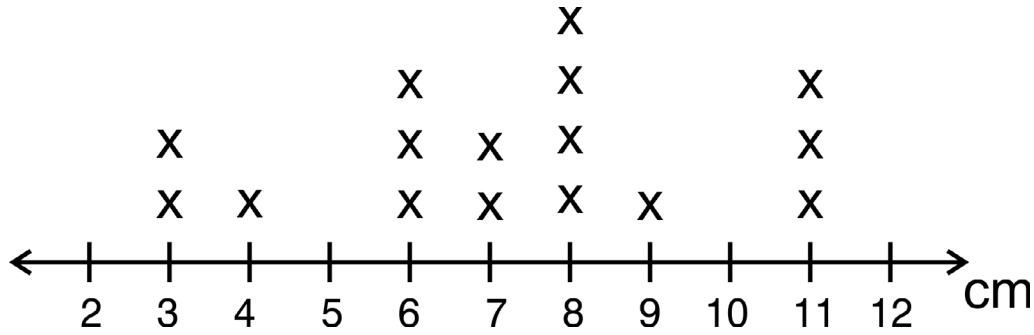
d. 17 cm long

8. Find some small objects. First GUESS how long or tall they are. Then measure. If the item is not exactly so-many centimeters long, then measure it to the nearest centimeter and write “about” before the centimeter-amount, such as *about 8 cm*.

Item	GUESS	MEASUREMENT
	cm	cm
	cm	cm
	cm	cm
	cm	cm
	cm	cm

## Some More Measuring

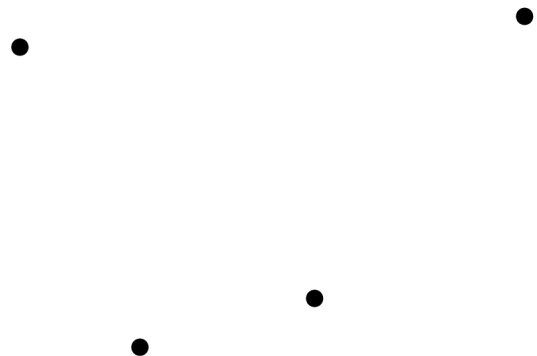
1. Jackie measured the length of a bunch of pencils at her home. She recorded her results in a line plot below. For each pencil, she put an “x” mark above the number line, to show how many centimeters long it was.



- How many of Jackie's pencils were 3 cm long?
- How many were 8 cm long?
- How many pencils were 9 cm *or* longer?
- How many pencils were 5 cm or shorter?
- Find how long Jackie's longest pencil is and her shortest pencil is.

How much longer is the longest pencil than the shortest pencil?

2. Join these dots with lines to form a four-sided shape. What is the name for the shape?



\_\_\_\_\_

Measure its sides to the nearest centimeter.  
Write “about \_\_\_ cm” next to each side.

How many centimeters is the *perimeter*?

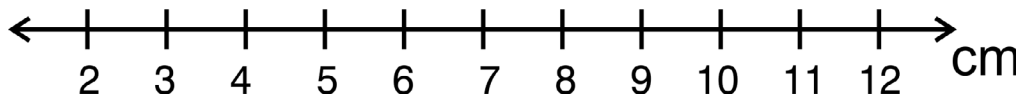
(all the way around the shape) It is \_\_\_\_\_ cm.



3. Measure many pencils of different lengths to the *nearest* whole centimeter.  
Write the lengths below. (You don't have to measure as many pencils as there are empty lines.)

\_\_\_\_\_ cm, \_\_\_\_\_ cm, \_\_\_\_\_ cm, \_\_\_\_\_ cm, \_\_\_\_\_ cm, \_\_\_\_\_ cm  
 \_\_\_\_\_ cm, \_\_\_\_\_ cm, \_\_\_\_\_ cm, \_\_\_\_\_ cm, \_\_\_\_\_ cm, \_\_\_\_\_ cm  
 \_\_\_\_\_ cm, \_\_\_\_\_ cm, \_\_\_\_\_ cm, \_\_\_\_\_ cm, \_\_\_\_\_ cm, \_\_\_\_\_ cm

Now, make a line plot about your pencils like what Jackie made. Write an “X” mark for each pencil.



- a. How much longer is your longest pencil than your shortest pencil?
- b. If you take your three longest pencils and put them end-to-end, how long is your line of pencils? Add to find out.

It is \_\_\_\_\_ cm. (If you can, measure to check your answer.)

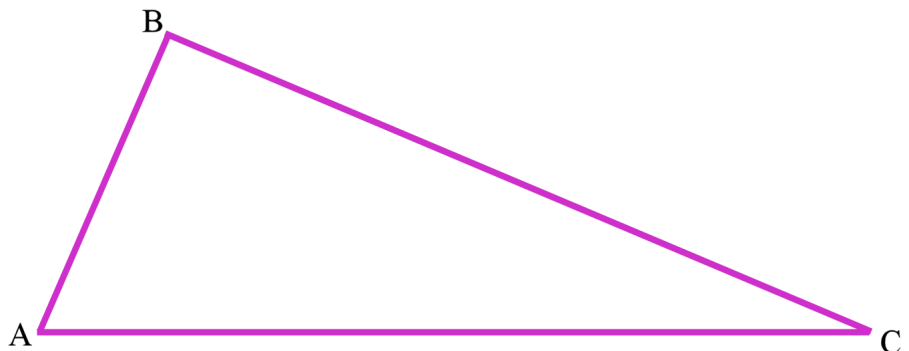
4. Measure all the sides of this triangle to the nearest half-inch.  
Also, find the *perimeter* (all the way around the triangle).

Side AB \_\_\_\_\_ in.

Side BC \_\_\_\_\_ in.

Side CA \_\_\_\_\_ in.

Perimeter \_\_\_\_\_ in.



5. Measure some things in your classroom or at home *two times*. First measure them in inches, to the nearest half-inch. Then measure them in centimeters, to the nearest whole centimeter. Remember to write “about” if the thing is not exactly so many inches or centimeters. Write your results in the table below.

Item	in inches	in centimeters
	in.	cm
	in.	cm
	in.	cm
	in.	cm
	in.	cm

- a. Which numbers are bigger, the centimeter-amounts or the inch-amounts?  
 b. Which measuring unit is bigger, one centimeter or one inch?

**Notice:** If your measuring unit is small (like 1 cm), you need MORE of them THAN if you use a longer measuring unit (inch).

- c. Megan measured a spoon. It was 13 cm long. If she measures it in inches, will the result be more than 13 inches, or less than 13 in.?  
 d. Harry measured a toy car in inches. It was 3 in. If he measures it in centimeters, will the result be more than 3 cm, or less than 3 cm?

6. Draw three dots on a blank paper so you can join them and make a triangle. Then, measure its sides BOTH in inches (to the nearest half-inch) and in centimeters (to the nearest centimeter). Write your results in the table.

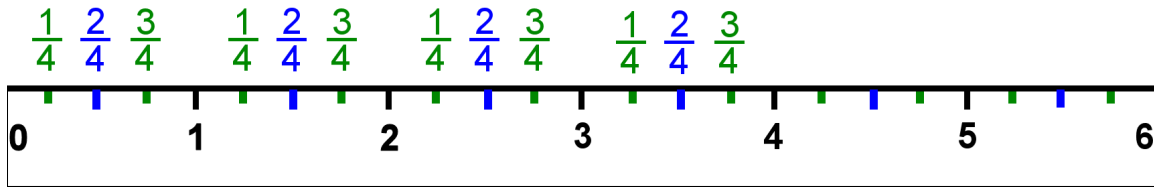
My Triangle	in inches	in centimeters
Side 1	in.	cm
Side 2	in.	cm
Side 3	in.	cm

How many centimeters is the *perimeter* (all the way around the shape)? \_\_\_\_\_ cm

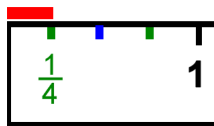
How many inches is the *perimeter* (all the way around the shape)? \_\_\_\_\_ in.

# Measuring to the Nearest Fourth-Inch

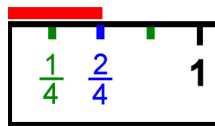
This ruler measures in inches. You can see three lines between each two numbers on the ruler. Those three lines divide each inch *into four parts*. The parts are *fourth parts* or *quarters* of an inch. We have marked those quarters with fractions.



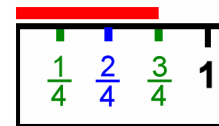
The  $\frac{2}{4}$  mark is also the  $\frac{1}{2}$  mark. We normally use  $\frac{1}{2}$  instead of  $\frac{2}{4}$ .



This line is  $\frac{1}{4}$  of an inch long.

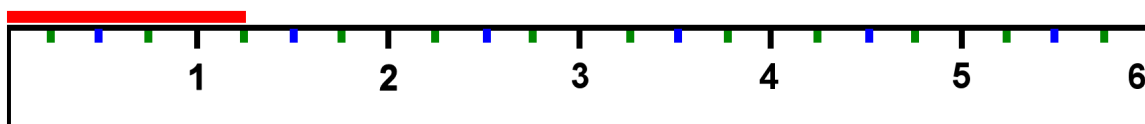


This line is two quarters of an inch long. It is also a half inch long.

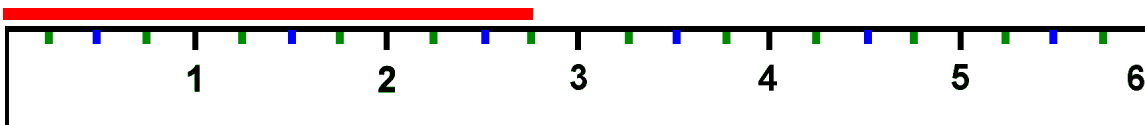


This line is  $\frac{3}{4}$  of an inch long.

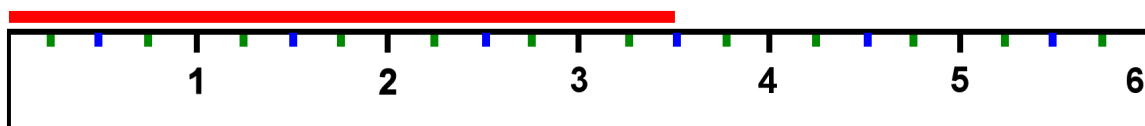
If a line reaches to the  $\frac{1}{4}$ -inch mark after the number 1, the line is 1 inch *and*  $\frac{1}{4}$  inches long. But when writing it, we omit the “and” and write: The line is  $1 \frac{1}{4}$  inches long.



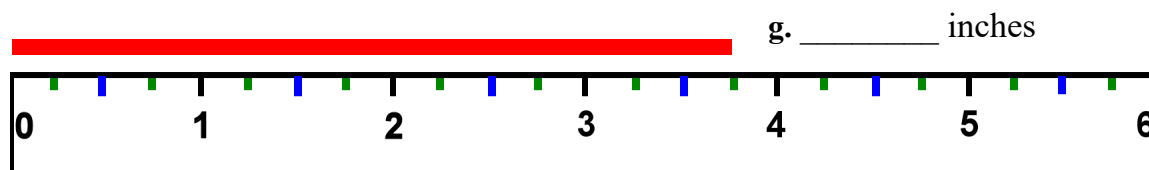
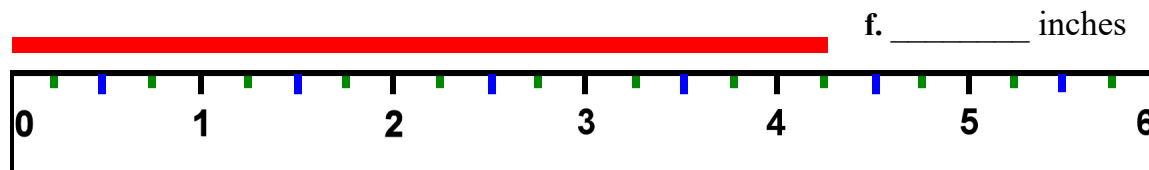
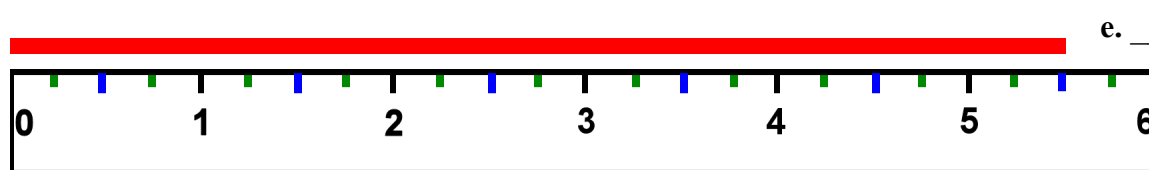
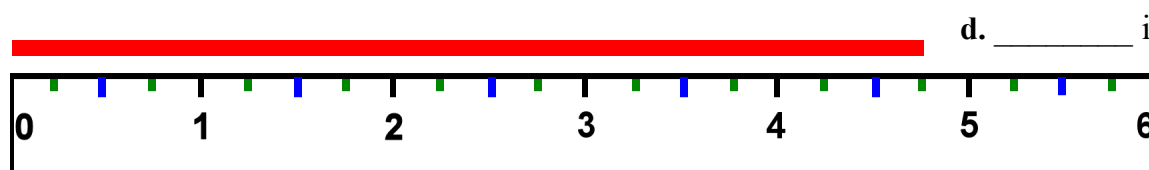
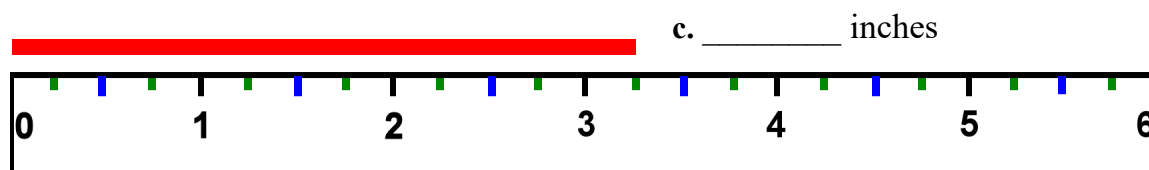
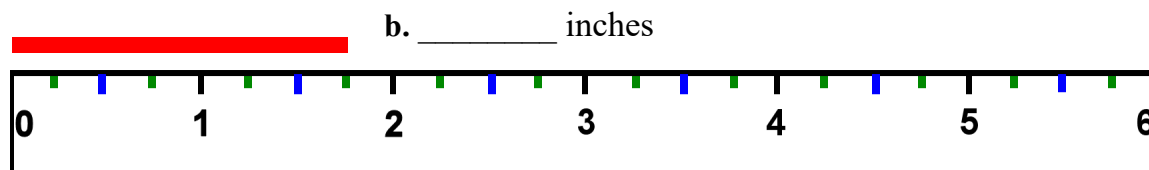
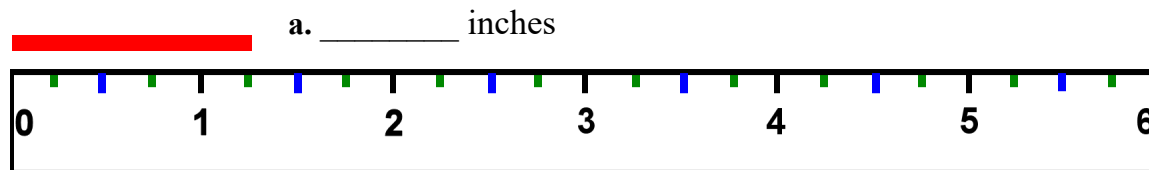
If a line reaches the  $\frac{3}{4}$ -inch mark after the number 2, then the line is 2 inches *and*  $\frac{3}{4}$  inch long, but we write it as  $2 \frac{3}{4}$  inches long.



This line is  $3 \frac{1}{2}$  inches long.



1. Measure the lines using the ruler.



2. Draw lines using a ruler. Your own ruler may have many more little lines between the whole-inch marks. If you find your own ruler confusing, you can cut out one of the rulers from the previous pages, and use that. Glue it on cardboard, or place it on top of your ruler.

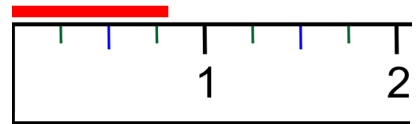
a. 4 1/2 inches long

b. 2 1/4 inches long

c. 5 1/4 inches long

d. 4 3/4 inches long

This line is not exactly 3/4 inch long, nor exactly 1 inch long, but its length is between those two. The endpoint of the line is closer to the 3/4-inch mark than it is to the 1-inch mark. We say the line is *about* 3/4 of an inch long, or *approximately* 3/4 of an inch long.



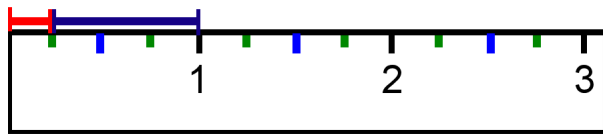
3. Measure items using the ruler that has the 1/4, 1/2, and 3/4-inch marks (quarters of an inch). If the item is not exactly as long as the markers on the ruler show, choose the nearest mark as the length, and write “about 5 1/4 inches,” etc.

Item	Length

This page is optional.

Let's use the plus sign "+" to mean that we place two lines end-to-end.

$$\frac{1}{4} \text{ inch} + \frac{3}{4} \text{ inch} = 1 \text{ inch}$$



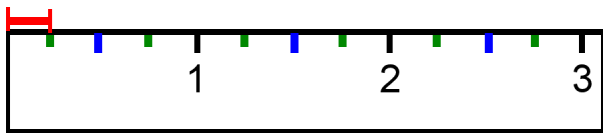
Here, the second line "covers" three short 1/4-inch segments, so it is 3/4 of an inch long.

$$\frac{1}{4} \text{ inch} + 1 \text{ inch} = 1 \frac{1}{4} \text{ inches}$$

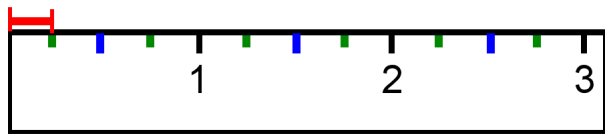


Here, the second line "covers" four short 1/4-inch segments, so that is why it is 1 inch long.

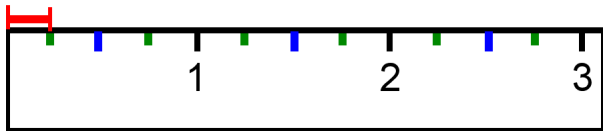
4. Draw another line after the 1/4-inch line. Add the lengths and find the total length.



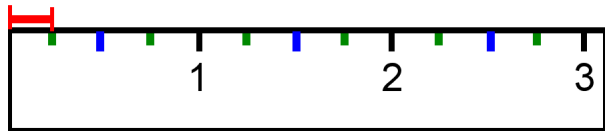
a.  $\frac{1}{4} \text{ inch} + \frac{1}{4} \text{ inch} = \underline{\hspace{2cm}}$  inches



b.  $\frac{1}{4} \text{ inch} + \frac{1}{2} \text{ inch} = \underline{\hspace{2cm}}$  inches



c.  $\frac{1}{4} \text{ inch} + 1 \frac{1}{4} \text{ inch} = \underline{\hspace{2cm}}$  inches



d.  $\frac{1}{4} \text{ inch} + 2 \text{ inch} = \underline{\hspace{2cm}}$  inches

5. Work out these "line additions". You can use the ruler below to help. Or, you can draw the lines.

a.  $\frac{1}{4} \text{ in} + \frac{1}{4} \text{ in} = \underline{\hspace{2cm}}$

$1 \frac{1}{4} \text{ in} + \frac{1}{4} \text{ in} = \underline{\hspace{2cm}}$

b.  $\frac{1}{4} \text{ in} + \frac{3}{4} \text{ in} = \underline{\hspace{2cm}}$

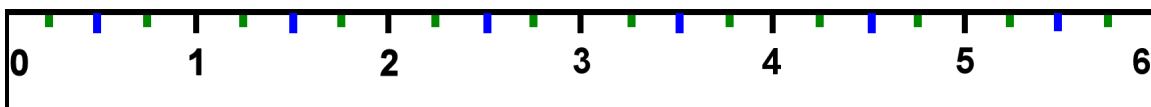
$4 \frac{1}{4} \text{ in} + \frac{1}{4} \text{ in} = \underline{\hspace{2cm}}$

c.  $5 \frac{1}{4} \text{ in} + \frac{3}{4} \text{ in} = \underline{\hspace{2cm}}$

$7 \frac{3}{4} \text{ in} + \frac{1}{4} \text{ in} = \underline{\hspace{2cm}}$

d.  $\frac{1}{2} \text{ in} + \frac{1}{4} \text{ in} = \underline{\hspace{2cm}}$

$2 \frac{1}{2} \text{ in} + \frac{1}{4} \text{ in} = \underline{\hspace{2cm}}$



# Centimeters and Millimeters

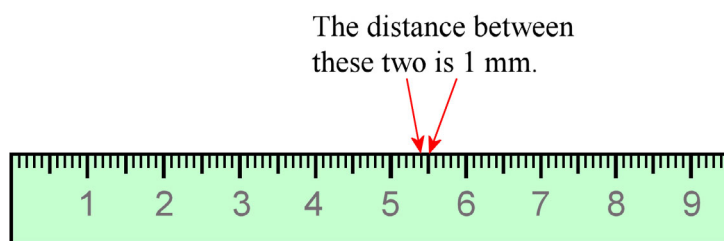
This ruler measures in centimeters. The numbers signify whole centimeters. All the shorter lines between those are for *millimeters*.

The distance from one short line to the next is 1 millimeter.

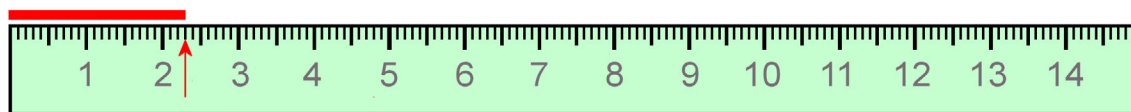
We write 1 mm.

Millimeters are very tiny!

Look at the ruler: **there are 10 millimeters in each centimeter.**

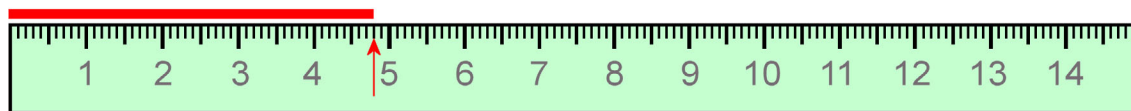


**Measuring lines:** First see how many whole centimeters long the line is. Then count how many little millimeter-lines beyond that it reaches.



This line is 2 cm 3 mm long. At the same time, it is 23 mm long. Why?

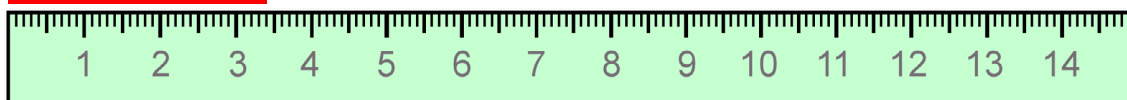
Each centimeter is 10 mm, so 2 cm is 20 mm. That means 2 cm 3 mm makes 23 mm in total.



This line is 4 cm 8 mm long. At the same time, it is 48 mm long.

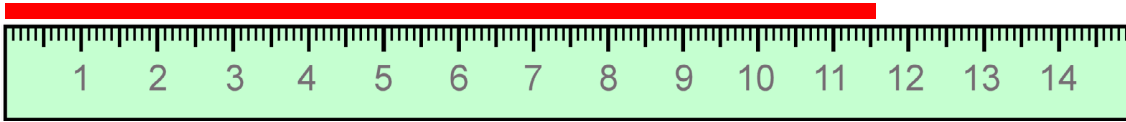
1. Measure the lines using the ruler, first in whole centimeters and millimeters. Then write their lengths using millimeters only.

a. \_\_\_\_\_ cm \_\_\_\_\_ mm = \_\_\_\_\_ mm

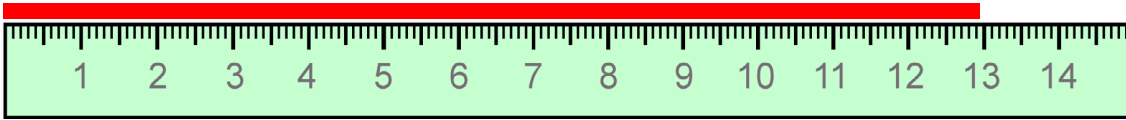


b. \_\_\_\_\_ cm \_\_\_\_\_ mm = \_\_\_\_\_ mm

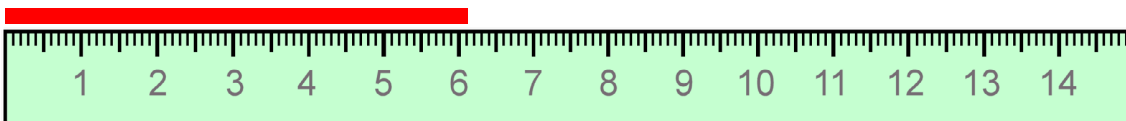




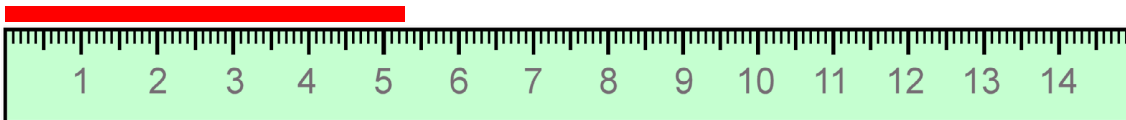
c. \_\_\_\_\_ cm \_\_\_\_\_ mm = \_\_\_\_\_ mm



d. \_\_\_\_\_ cm \_\_\_\_\_ mm = \_\_\_\_\_ mm



e. \_\_\_\_\_ cm \_\_\_\_\_ mm = \_\_\_\_\_ mm



f. \_\_\_\_\_ cm \_\_\_\_\_ mm = \_\_\_\_\_ mm

2. Draw lines using a ruler.

a. 7 cm 8 mm

b. 10 cm 5 mm

c. 14 mm

d. 55 mm

e. 126 mm



3. Measure items you can find at home, using a centimeter-millimeter ruler.  
If the item is not exactly as long as the markers on the ruler, choose the nearest mark.

Item	Length

4. Change between centimeters and millimeters.

a.	b.	c.
1 cm = _____ mm	1 cm 1 mm = <u>11</u> mm	4 cm 5 mm = _____ mm
2 cm = _____ mm	1 cm 2 mm = _____ mm	2 cm 5 mm = _____ mm
5 cm = _____ mm	1 cm 8 mm = _____ mm	7 cm 8 mm = _____ mm
8 cm = _____ mm	2 cm 3 mm = _____ mm	10 cm 4 mm = _____ mm

5. Change between millimeters and centimeters.

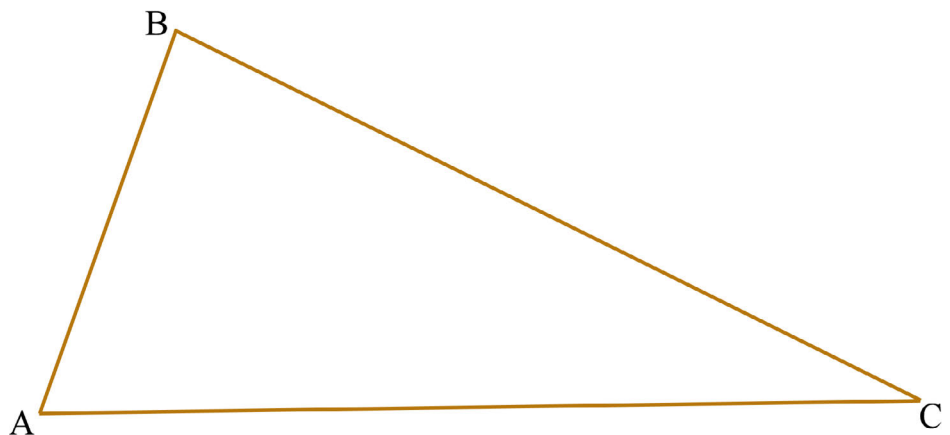
a.	b.	c.
70 mm = _____ cm	12 mm = ____ cm ____ mm	89 mm = ____ cm ____ mm
100 mm = _____ cm	45 mm = ____ cm ____ mm	102 mm = ____ cm ____ mm

6. Measure the sides of this triangle in millimeters.

Side AB \_\_\_\_\_ mm

Side BC \_\_\_\_\_ mm

Side CA \_\_\_\_\_ mm



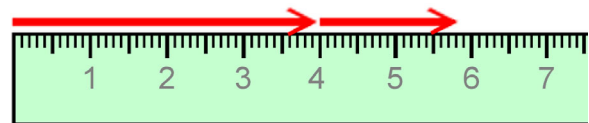
7. Find the perimeter of the triangle in the previous exercise.

8. Draw the third side of this triangle.  
Then measure its sides.  
Lastly, find its perimeter in millimeters.



The first arrow is 4 cm. The second arrow is 1 cm 8 mm. How long are they together?  
Add, giving your answer in millimeters.

$$4 \text{ cm} + 1 \text{ cm } 8 \text{ mm} = 5 \text{ cm } 8 \text{ mm} = 58 \text{ mm}$$



Add centimeters with centimeters, and millimeters with millimeters.  
Remember that 10 millimeters makes 1 centimeter.

$$9 \text{ mm} + 6 \text{ cm} + 2 \text{ mm} = 6 \text{ cm } 11 \text{ mm} = 7 \text{ cm } 1 \text{ mm} = 71 \text{ mm}$$

If you have both millimeters and centimeters, change the centimeters to millimeters first:

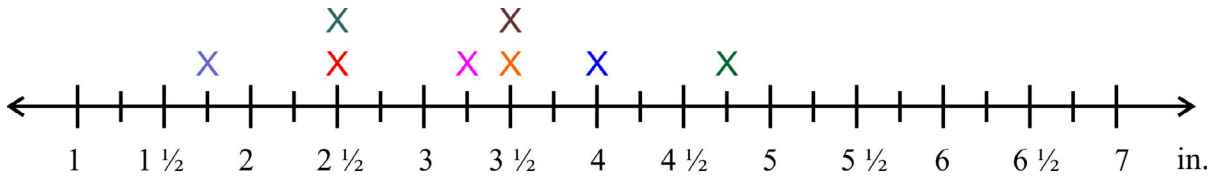
$$84 \text{ mm} + \underline{3 \text{ cm}} + 9 \text{ mm} = 84 \text{ mm} + \underline{30 \text{ mm}} + 9 \text{ mm} = 123 \text{ mm} \text{ (which is also } 12 \text{ cm } 3 \text{ mm)}$$

9. Work out these “line additions.” Give your answers in millimeters.

a. $1 \text{ cm } 5 \text{ mm} + 5 \text{ mm}$	b. $28 \text{ mm} + 7 \text{ cm}$
c. $5 \text{ mm} + 5 \text{ cm } 8 \text{ mm}$	d. $2 \text{ cm } 4 \text{ mm} + 4 \text{ cm } 5 \text{ mm}$
e. $52 \text{ mm} + 2 \text{ cm } 4 \text{ mm}$	f. $6 \text{ cm} + 8 \text{ mm} + 17 \text{ mm}$
g. $9 \text{ mm} + 17 \text{ mm} + 2 \text{ cm}$	h. $139 \text{ mm} + 50 \text{ cm} + 2 \text{ mm}$

# Line Plots and More Measuring

1. Amanda measured the length of some of her colored pencils. She recorded her results in a **line plot** below. For each pencil, she put an “x” mark above the number line to show how many inches long it was.



Look carefully at the line plot, and find the X-marks:

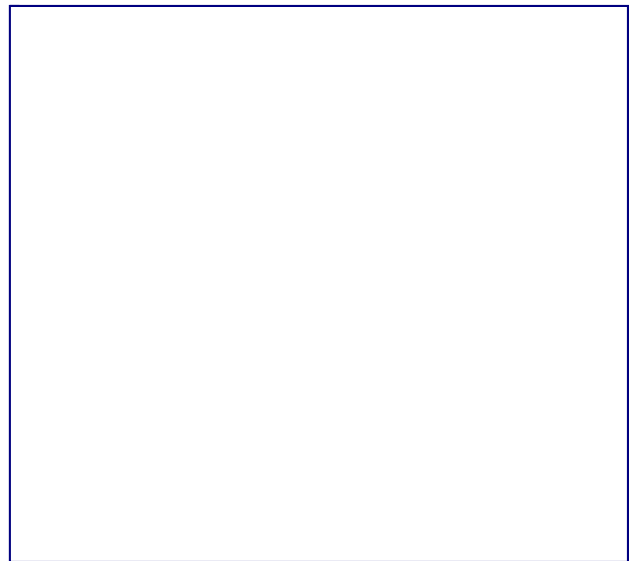
- There is one pencil that is 4 inches long.
  - There are two pencils that are 3 1/2 inches long
  - There are two pencils that are 2 1/2 inches long.
- a. There is one pencil whose X-mark is between 3 and 3 1/2 inches.  
How long is it?
- b. How long is the pencil whose X-mark is between 4 1/2 and 5?
- c. How long is the pencil whose X-mark is between 1 1/2 and 2?

2. Draw three dots and join them to get a triangle.

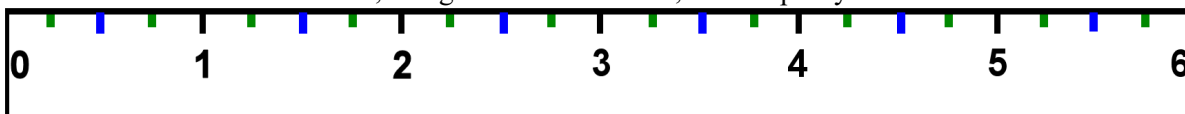
Measure its sides to the nearest quarter inch.  
Write the measurement next to each side.

If you can, figure out the *perimeter*.  
(all the way around the shape)

It is \_\_\_\_\_ inches.



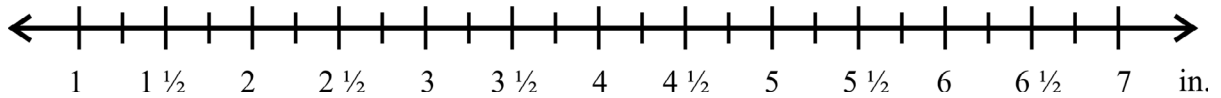
You can cut out the ruler below, and glue it on cardboard, or on top of your ruler.



3. Measure many pencils of different lengths to the nearest quarter inch.  
Write the lengths below.

\_\_\_\_\_ in    \_\_\_\_\_ in    \_\_\_\_\_ in    \_\_\_\_\_ in    \_\_\_\_\_ in  
 \_\_\_\_\_ in    \_\_\_\_\_ in    \_\_\_\_\_ in    \_\_\_\_\_ in    \_\_\_\_\_ in  
 \_\_\_\_\_ in    \_\_\_\_\_ in    \_\_\_\_\_ in    \_\_\_\_\_ in    \_\_\_\_\_ in

Now, make a line plot about your pencils. Write an “X” mark for each pencil.



- a. If you take your two longest pencils and put them end-to-end, how long is your line of pencils?

It is \_\_\_\_\_ in. (You can measure to check your answer!)

- b. If you take your two shortest pencils and put them end-to-end, how long is your line of pencils?

It is \_\_\_\_\_ in. (You can measure to check your answer!)

4. Measure all the sides of this shape in centimeters and millimeters.  
Can you figure out the perimeter? It can be a little tricky, but try!

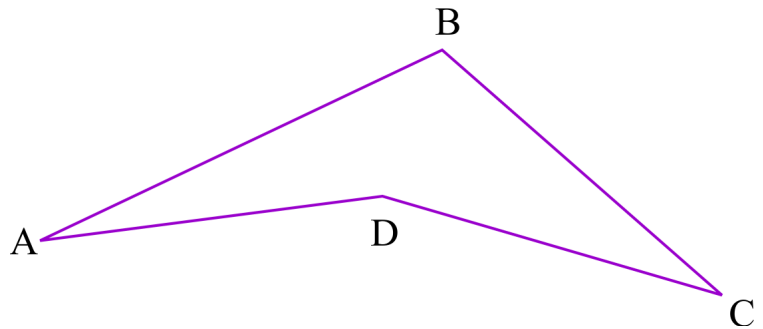
Side AB \_\_\_\_\_ cm \_\_\_\_\_ mm

Side BC \_\_\_\_\_ cm \_\_\_\_\_ mm

Side CD \_\_\_\_\_ cm \_\_\_\_\_ mm

Side DA \_\_\_\_\_ cm \_\_\_\_\_ mm

Perimeter \_\_\_\_\_ cm \_\_\_\_\_ mm



5. Measure some things in your classroom or at home *two times*. First measure them in inches, to the nearest quarter-inch. Then measure them in centimeters and millimeters. Each time, GUESS before you actually measure. Write your results in the table below.

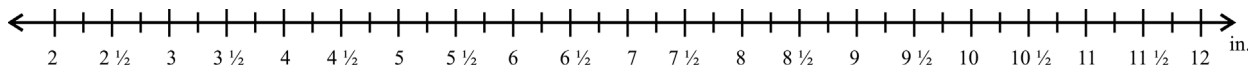
Item	GUESS in inches	LENGTH in inches	GUESS in cm / mm	Length in cm / mm
	in.	in.	___ cm ___ mm	___ cm ___ mm
	in.	in.	___ cm ___ mm	___ cm ___ mm
	in.	in.	___ cm ___ mm	___ cm ___ mm
	in.	in.	___ cm ___ mm	___ cm ___ mm
	in.	in.	___ cm ___ mm	___ cm ___ mm

6. Measure a collection of similar items to the *nearest* quarter inch. For example, you can measure some spoons, lots of stuffed animals, or the width of lots of books. Or, ask some people to draw a line 6 inches long without using a ruler (in other words, guess and draw it), and then measure their lines and check who guessed the closest.

(You Don't have to find as many items as there are empty lines below.)

\_\_\_\_\_ in \_\_\_\_\_ in \_\_\_\_\_ in \_\_\_\_\_ in \_\_\_\_\_ in.  
 \_\_\_\_\_ in \_\_\_\_\_ in \_\_\_\_\_ in \_\_\_\_\_ in \_\_\_\_\_ in.  
 \_\_\_\_\_ in \_\_\_\_\_ in \_\_\_\_\_ in \_\_\_\_\_ in \_\_\_\_\_ in.  
 \_\_\_\_\_ in \_\_\_\_\_ in \_\_\_\_\_ in \_\_\_\_\_ in \_\_\_\_\_ in.

Now, make a line plot. Write an "X" mark for each item.



# Feet and Miles

This is a tape measure. The numbers 1, 2, 3, and so on, are inches.



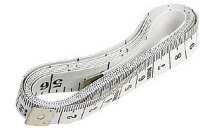
Above number 12 you see “1F”. That means 1 foot. 12 inches equals 1 foot.

Unroll the tape measure some more, until you find “2 F” or “2 ft” (which means two feet), and “3 ft” (three feet), and so on. Stretch out the tape measure as far as you can. What is the most number of feet it has?

This tape measure has both inches and centimeters. The numbers on the top part are inches, and the numbers on the bottom part are centimeters. The number 60 means 60 cm, and the “1” after it means 61 cm.



You use feet as your measuring unit when you measure the width of a room or of a table, the length of a house, or of a swimming pool.



People often use both feet and inches. For example, a table can be 5 feet 10 inches long. Or, a boy can be 4 ft 7 in tall. How tall are you in feet and inches?

1. Use the tape measure to find distances in feet, or feet and inches. Let an adult help you.

Thing or distance	How long / tall
the room you are in	
a table	

2. How tall are these people? Ask your mom, dad, or others.

You: \_\_\_\_\_ ft \_\_\_\_\_ in \_\_\_\_\_: \_\_\_\_\_ ft \_\_\_\_\_ in

Your mom: \_\_\_\_\_ ft \_\_\_\_\_ in \_\_\_\_\_: \_\_\_\_\_ ft \_\_\_\_\_ in

3. Find three things you can measure in feet. But wait! First *guess* how long or tall they are. Then, check your guess by measuring.

Thing or distance	My guess	How long / tall

4. Now, measure again some of the things you already measured in feet, but this time measure them in centimeters. Or, you can still find new things to measure.

Thing or distance	centimeters	feet & inches

5. Which is a bigger (or longer) measuring unit, 1 centimeter or 1 foot?

Jared measured the height of a fridge twice, first in feet and then in centimeters.

It was 5 ft tall. How tall was it in centimeters? a. 15 cm b. 150 cm c. 3 cm

6. He also measured the height of a bucket twice, in feet and then in centimeters.

It was 60 cm tall. How tall was it in feet? a. 6 ft b. 100 ft c. 2 ft

7. Which is a longer measuring unit, a meter or a foot?

Jared measured the length of his room twice, first using feet and then using meters.

It was 4 m wide. How many feet wide was it? a. 2 ft b. 5 ft c. 12 ft

Distances between towns or between countries are measured in *miles*. 1 mile is 5,280 feet (five-thousand two-hundred eighty)! That is a lot of feet—many, many more than your tape measure has.

8. Can you think of familiar distances in everyday life or in your neighborhood that are so many miles? An adult can help. You can also look in your social studies book.

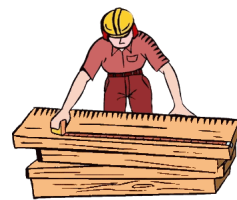
Distance	How many miles

9. Aaron went on a trip with his family. On the first day, they drove 80 miles and visited a nature park. On the second day, they drove 200 miles. On the third day, they drove 110 miles back home.

- a. How long a distance did the family drive in all?
- b. How much longer distance did they drive on the second day than on the first day?

10. Which unit would you use to find the following distances: inches (in), feet (ft), miles (mi), or feet and inches (ft in)?

Distance	Unit
from New York to Los Angeles	
from a house to a neighbor's	
the width of a notebook	
the distance around the earth	
how tall a refrigerator is	
the width of a porch	
the length of a board	



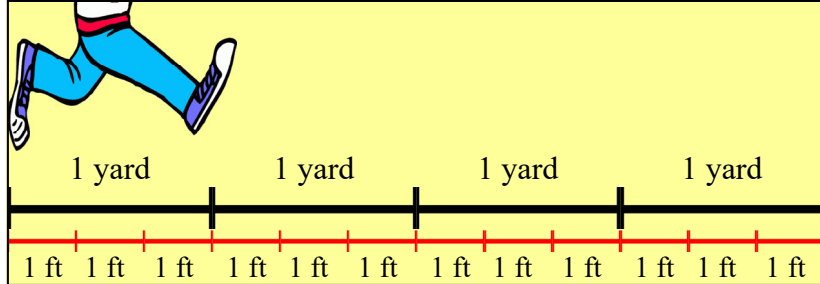
Distance	Unit
the length of a train	
the length of a playground	
from a train station to the next	
the width of a computer screen	



# Feet, Yards, and Miles

Feet and yards are used to measure the length of medium-size objects and distances. A foot is abbreviated with “ft” and a yard is abbreviated with “yd”.

Three feet make one yard.  
3 ft = 1 yd.



A *mile* is used to measure long distances, such as between towns or countries.  
1 mile is 5,280 feet. An adult can typically walk 1 mile in about 15-20 minutes.

1. Outside, using a measuring tape, mark the distances of 1 yard, 2 yards, 3 yards, and so on. Measure also, using feet: there are three feet in each yard.

Take steps that are 1 foot long. That should be easy.

How about steps that are 2 feet long each?

Lastly, try to take steps 1 yard long (three feet). Can you?

2. Write or say these units in order from the smallest to the biggest:

yard   mile   inch   foot

3. Use a tape measure to measure lengths of some objects and distances in feet and inches.

Item	How long
	_____ ft _____ in.

4. Fill in the blanks, using the units in, ft, or mi.

a. Mark drove his car 15 \_\_\_\_\_.

b. The table is 24 \_\_\_\_\_ tall.

c. Annie's house is 32 \_\_\_\_\_ long.

d. The pen is 5 \_\_\_\_\_ long.

e. Mr. Green is 6 \_\_\_\_\_ tall.

f. Matt jogged 3 \_\_\_\_\_.

5. Find the area and perimeter of a rectangular yard that is 30 ft by 10 ft.

Hint: Make a sketch (a picture) of it.

---

*This section is optional.*

12 inches makes 1 foot.



6. Convert between feet and inches.

a. 1 ft = \_\_\_\_\_ in

b. 1 ft 2 in = \_\_\_\_\_ in

c. 2 ft 4 in = \_\_\_\_\_ in

3 ft = \_\_\_\_\_ in

1 ft 8 in = \_\_\_\_\_ in

2 ft 6 in = \_\_\_\_\_ in

5 ft = \_\_\_\_\_ in

1 ft 11 in = \_\_\_\_\_ in

3 ft 3 in = \_\_\_\_\_ in

7. Emma is 4 ft 2 in. tall. How tall is she in inches?

8. Mary is 3 ft 9 in. and Rebecca is 48 inches tall.  
Who is taller? How much taller?

9. Alex put three pencils end-to-end that each were 8 inches long.  
How many feet long is his line of pencils?

10. Find the perimeter of a rectangle with one side 2 ft 2 in.  
and the other side 3 ft 8 in.



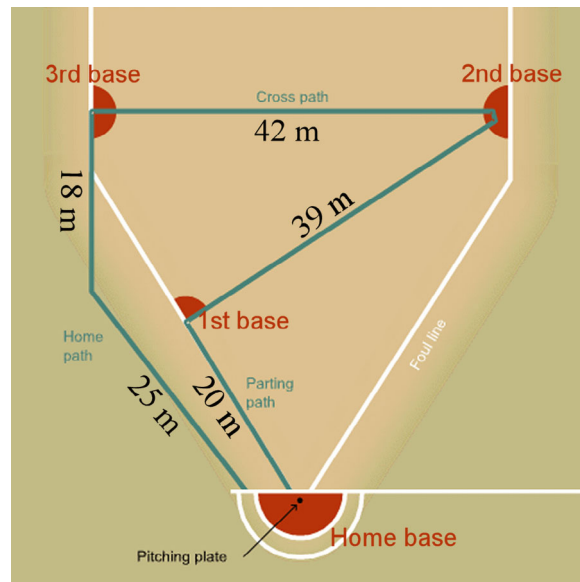
Distances between towns or between countries are measured in *kilometers*.  
1 kilometer is 1 000 meters (one thousand meters)!

4. Write in the table below **three distances** that are important in your life and are measured in kilometers. Ask an adult to help you. Examples include: from home to the library, from home to downtown, from home to Grandmother's, from your town to the capital city, etc.

From ... to	distance in km

5. The picture shows the field for Finnish baseball game (“pesäpallo”). How many meters do you run with these “routes”?

- You run from the home base to the 1st base and then return to the home base.
- You run from the home base to the 1st base and on to the 2nd base, plus one meter over, because you cannot stop in time.
- (Challenge) You run all the way around the field.



6. Which unit would you use to find these below: centimeters (cm), meters (m), or kilometers (km)?

Distance	Unit
the length of a park	
from Tshwane to the North Pole	
the length of a cell phone	
the length of a bus	

Distance	Unit
around your wrist	
the height of a room	
the length of an airplane trip	
the length of a grasshopper	

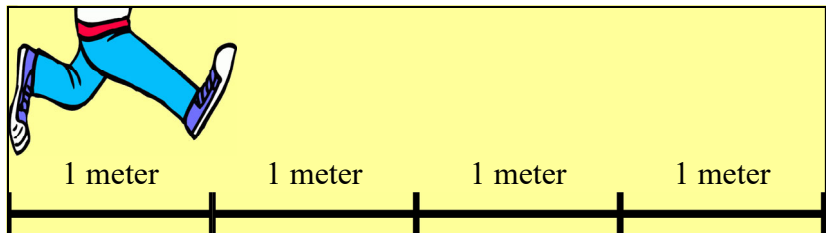
# Common Metric Units of Length

Besides feet, yards, and miles, we can also use millimeters (mm), centimeters (cm), meters (m), and kilometers (km) to measure length.

Notice how all of those units have the word *meter* in them. These units form a part of the *metric system* of measuring units.

<b>kilometer</b>	for long distances
<b>meter</b>	for medium-sized objects and distances
<b>millimeter</b> <b>centimeter</b>	} for small objects

1. Outside, mark the distances of 1 meter, 2 meters, 3 meters, and so on, using a measuring tape. Try to take steps 1 meter long. Can you?



If you can't, try to take small steps so that two steps would be exactly 1 meter.

Notice: one meter is very close to one yard, but a little longer.

2. Use a tape measure to measure lengths of objects and distances in meters and centimeters

Item	How long
	_____ m _____ cm.

3. Fill in the blanks, using the units “cm”, “km”, “mm”, and “m”.

- |  |  |
|--|--|
| a. The Jackson's living room is 4 _____ wide | d. It is about 3 _____ to the nearest library. |
| b. A moth was 38 _____ wide.                 | e. The window was about 1 _____ wide.          |
| c. Dad is 178 _____ tall.                    | f. The book was 25 _____ long.                 |

4. Use a measuring tape or a tape measure, and measure how tall you and some other people are in meters and centimeters.

Person	How tall
	1 m _____ cm.

5. Write or say these units in order from smallest to greatest, using their full names:

m   cm   km   mm

*This section is optional.*

1 meter = 100 cm
------------------

6. Convert between meters and centimeters.

a. 1 m = _____ cm	b. 1 m 20 cm = _____ cm	c. 5 m 85 cm = _____ cm
2 m = _____ cm	1 m 14 cm = _____ cm	2 m 17 cm = _____ cm
5 m = _____ cm	1 m 58 cm = _____ cm	3 m 8 cm = _____ cm

7. One pillow is 40 cm long. If you put five such pillows end-to-end, how many meters long is your line of pillows?

8. Ellie is 162 cm tall, and Meredith is 1 m 55 cm tall. Who is taller? How much taller?

9. A sandbox is 1 m 40 cm by 1 m 40 cm (a square). Find its perimeter.

# Review 1

1. Which unit or units would you use for the following distances: inches (in.), feet (ft), miles (mi), centimeters (cm), or meters (m)? If two different units work, write both.

Distance	Unit or units
from your house to the grocery store	
from Miami to New York	
the distance across the room	
the height of a bookcase	

2. Measure this line to the nearest centimeter and to the nearest half-inch.

 about \_\_\_\_\_ cm *or* about \_\_\_\_\_ in.

3. a. Draw a line that is  $3 \frac{1}{2}$  inches long.

- b. Draw a line that is 9 cm long.

4. Measure these two pencils to the nearest centimeter, *and* to the nearest half-inch. Then fill in:



The longer pencil is about \_\_\_\_\_ cm longer than the shorter one.

The longer pencil is about \_\_\_\_\_ inches longer than the shorter one.

5. Measure the width and length of the room you are in. First, measure them using feet and inches. Then, measure them using meters and centimeters.

Width: \_\_\_\_\_ ft \_\_\_\_\_ in *or* \_\_\_\_\_ m \_\_\_\_\_ cm

Length: \_\_\_\_\_ ft \_\_\_\_\_ in *or* \_\_\_\_\_ m \_\_\_\_\_ cm

# Weight in Pounds

Weight means *how heavy* something is. You can measure weight using a scale. A bathroom scale measures weight in *pounds* or in *kilograms*.

In this lesson you will need:

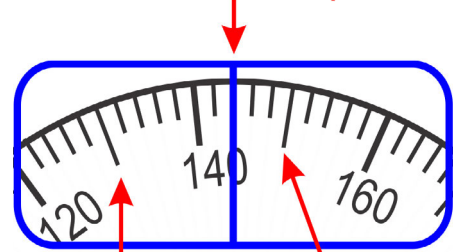


- a bathroom scale that measures in pounds
- a bucket and water
- encyclopedias or some other fairly heavy books
- a plastic bag or some other bag
- a backpack

The numbers on your scale may go up by twenties, and not by tens. In the picture here, the longer line halfway in-between the two numbers is TEN more than the smaller of the two numbers. Each little line means 2 pounds more than the previous line.

The scale on the right is stopped at the second little line after 140 pounds, which means  $140 + 2 + 2$  pounds, or 144 pounds.

$$140 + 2 + 2 = 144 \text{ pounds}$$

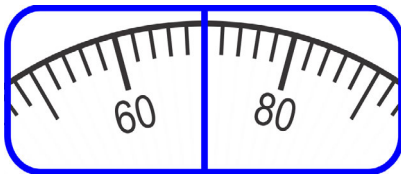


130 pounds 150 pounds

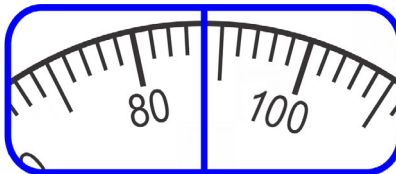
We use “lb” to abbreviate the word pounds. 15 pounds = 15 lb.

The “lb” comes from the Latin word *libra*, which also means a pound.

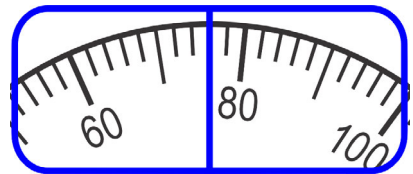
1. How many pounds is the scale showing? You can mark the in-between ten-numbers on the scale to help.



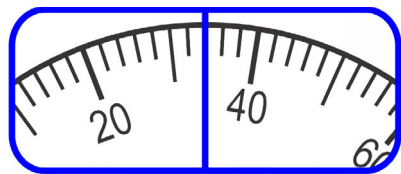
a. \_\_\_\_\_ lb



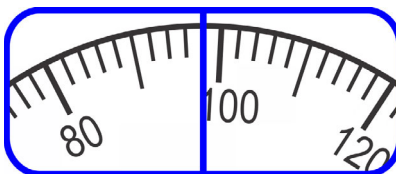
b. \_\_\_\_\_ lb



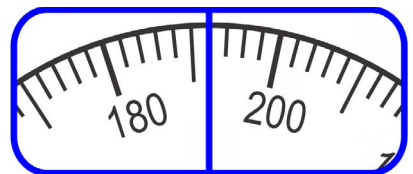
c. \_\_\_\_\_ lb



d. \_\_\_\_\_ lb



e. \_\_\_\_\_ lb



f. \_\_\_\_\_ lb



2. Step onto the scale. I weigh \_\_\_\_\_ pounds.

3. Find out how many pounds your family members weigh. Write a list below.

\_\_\_\_\_ lb      \_\_\_\_\_ lb  
\_\_\_\_\_ lb      \_\_\_\_\_ lb  
\_\_\_\_\_ lb      \_\_\_\_\_ lb

4. Weigh some other items. Note that on a bathroom scale, you cannot weigh very light items, nor very big and bulky ones because you can't place them on the scales.

a bucket full of water	_____ lb	Mom's skillet	_____ lb
a bucket half full of water	_____ lb	_____	_____ lb
a stack of heavy books	_____ lb	_____	_____ lb

5. Find out how many pounds of water you can carry. Can you carry the bucket when it is full? If not, pour out some water until you can carry the bucket.

I can carry a bucket of water that weighs \_\_\_\_\_ lb.

6. a. Find out how many pounds of books you can carry in a bag. Fill the bag with books and weigh it. Can you carry it? If not, take out some books until you are able to carry the bag.

I can carry a bagful of books that weighs \_\_\_\_\_ lb.

b. The same as above, but use a backpack. (Do you think you can carry more or less?)

I can carry a backpack that weighs \_\_\_\_\_ lb.

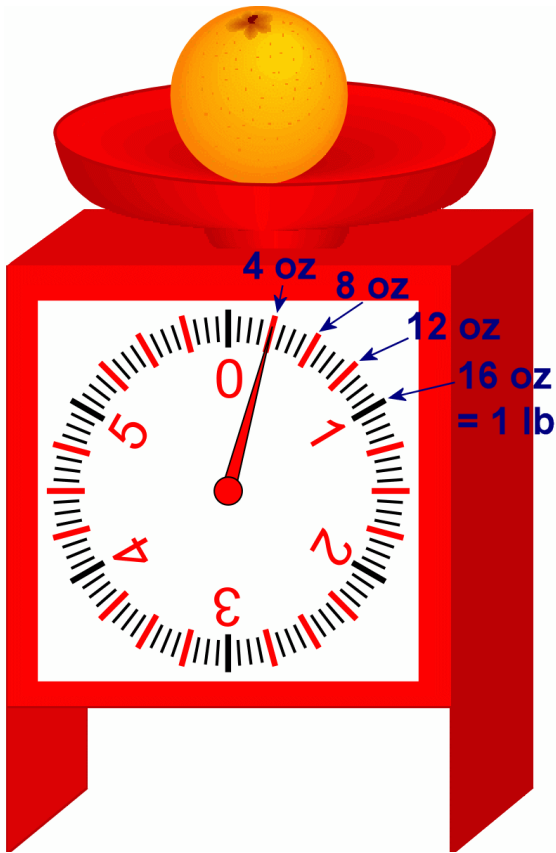
c. Weigh yourself with and without a heavy bag of books.

I weigh \_\_\_\_\_ lb. I weigh \_\_\_\_\_ lb with the heavy bag.

What is the difference? \_\_\_\_\_ lb.

d. Use the method above with a heavy book. The book weighs \_\_\_\_\_ lb.

# Pounds and Ounces



The orange weighs 4 ounces.

This is a kitchen scale that measures in *pounds* and *ounces*. We use it to measure the weight of small items.

This scale can measure items from 0 to 6 pounds. The numbers 0, 1, 2, 3, 4, and 5 refer to whole pounds. Number 6 is not marked, but if the pointer went all the way around one time and was pointing to 0, it would actually mean 6 pounds.

Each pound is divided into 16 ounces. So, an ounce is a small unit of weight.

In between the whole pounds are lines to mark the ounces. Some are longer and thicker (red), and some are shorter.

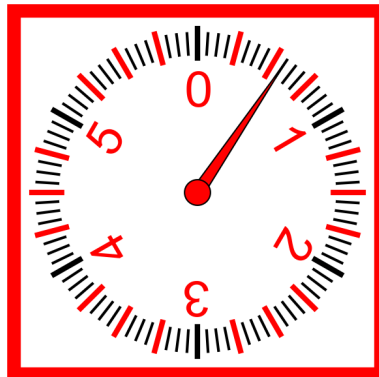
The thicker lines mark the 4-ounce, 8-ounce, and 12-ounce points, and the shorter lines mark the individual ounces.

A pound or pounds is abbreviated with “lb.” An ounce or ounces is abbreviated with “oz.” So, 2 lb 13 oz means 2 pounds 13 ounces.

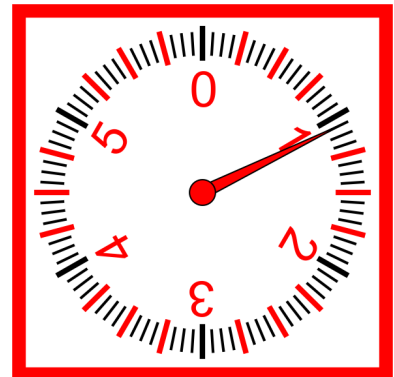
1. Write the pounds and the ounces the scale is showing.



a. \_\_\_ lb \_\_\_ oz

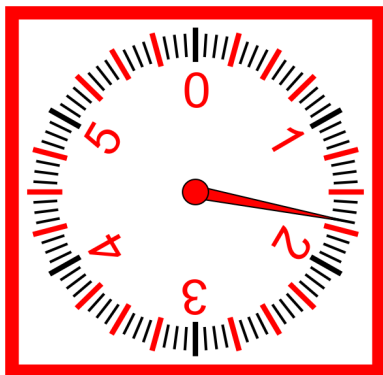


b. \_\_\_ lb \_\_\_ oz

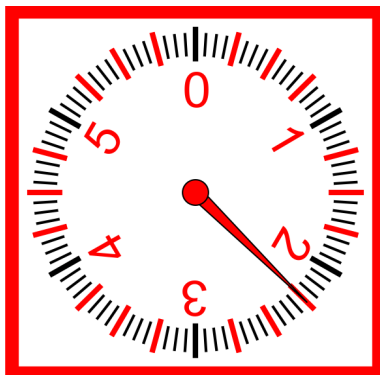


c. \_\_\_ lb \_\_\_ oz

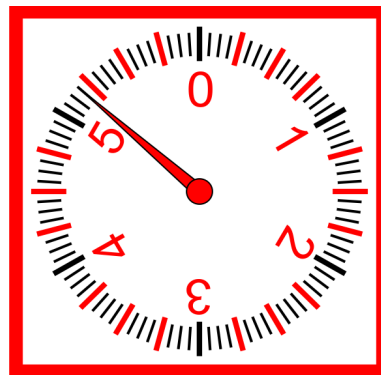
2. Write the pounds and the ounces the scale is showing.



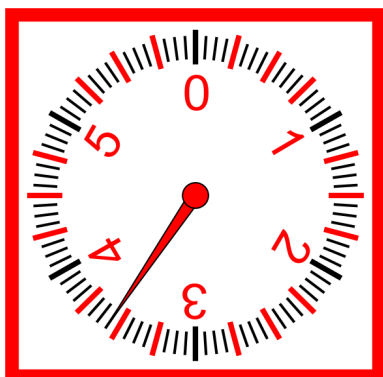
a. \_\_\_ lb \_\_\_ oz



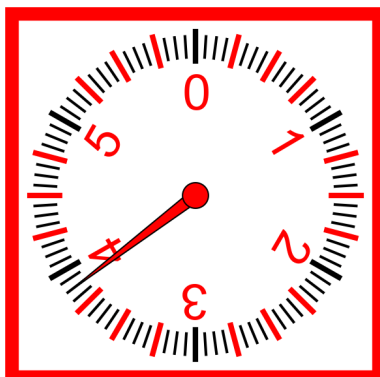
b. \_\_\_ lb \_\_\_ oz



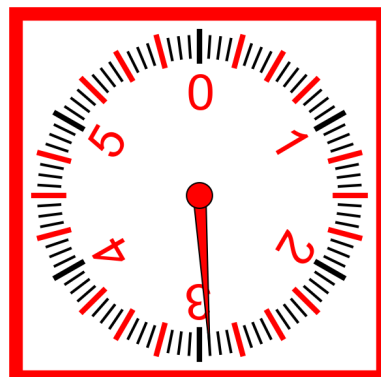
c. \_\_\_ lb \_\_\_ oz



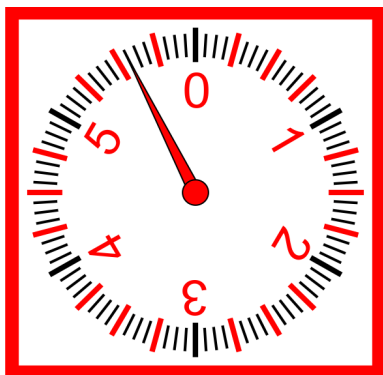
d. \_\_\_ lb \_\_\_ oz



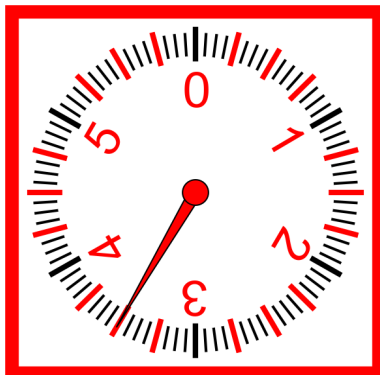
e. \_\_\_ lb \_\_\_ oz



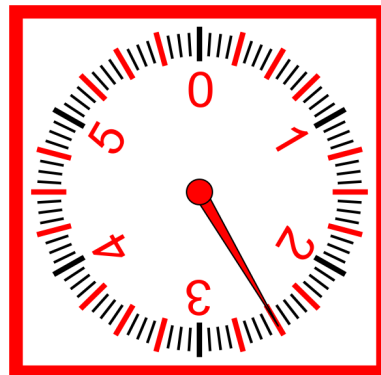
f. \_\_\_ lb \_\_\_ oz



g. \_\_\_ lb \_\_\_ oz



h. \_\_\_ lb \_\_\_ oz



i. \_\_\_ lb \_\_\_ oz

3. Weigh light items with a kitchen scale. Write your results here.

Item	Weight
	_____ lb _____ oz



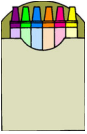

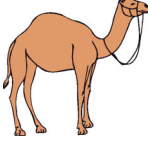

4. Weigh things and people with a bathroom scale that uses pounds. Write your results here.  
First, guess how much the thing or person weighs. Then weigh using the scales.

Thing/person	Guess	Weight
	_____ lb	_____ lb

5. At home, find food products that show the weight on the label, using ounces or pounds and ounces. Write the items in order from lightest to heaviest.

Item	Weight

6. Which is the best estimate of weight?

<p>a. </p> <p>2 lb    15 lb    2 oz</p>	<p>b. </p> <p>16 lb    160 lb    16 oz</p>	<p>c. </p> <p>1 lb    13 oz    2 oz</p>
<p>d. </p> <p>70 lb    7 lb    7 oz</p>	<p>e. </p> <p>600 lb    6 lb    60 lb</p>	<p>f. </p> <p>2 lb    6 oz    30 oz</p>

7. Fill in the blanks with a reasonable unit of weight (either lb or oz).

- a. A computer weighs 3 \_\_\_\_\_.
- b. A newborn baby weighed 8 \_\_\_\_\_.
- c. Sam ate two bananas. Together they weighed 12 \_\_\_\_\_.
- d. Abby's cell phone weighs 3 \_\_\_\_\_.
- e. Matthew weighs 170 \_\_\_\_\_.

*The following section is optional.*

**In the following problems, use the fact that 1 lb = 16 oz.**

8. Convert between pounds and ounces.

a. 2 lb = _____ oz	b. 1 lb 1 oz = _____ oz	c. 2 lb 4 oz = _____ oz
3 lb = _____ oz	1 lb 7 oz = _____ oz	3 lb 9 oz = _____ oz
4 lb = _____ oz	2 lb 11 oz = _____ oz	5 lb 4 oz = _____ oz

9. A label on a big tuna can says: “Net weight 1 lb. Drained weight 11 oz.”  
How much does the liquid in the can weigh?

10. Mary sent “Thank you” letters to people who had attended a birthday party for her fiftieth birthday. Each letter weighed two ounces.

- a. How many 2 oz letters will weigh a total of 1 pound?
- b. She sent 15 letters. What was their total weight, in pounds/ounces?

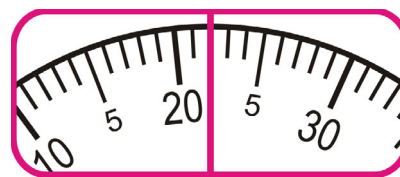
# Weight in Kilograms

Weight means *how heavy* something is. You can measure weight using a *scale*. A bathroom scale measures weight in *kilograms* (abbreviated kg).

The scale usually has short lines for each kilogram increment, and long lines for each 10 kilograms. In the picture below, the in-between numbers ending in “5” are marked with the number 5.

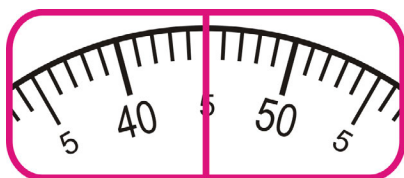
In this lesson, you need to use a bathroom scale that measures weight in kilograms. You will also need

- a bucket and water
- encyclopedias or some other fairly heavy books
- a plastic bag or some other bag
- a backpack

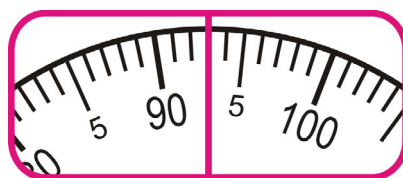


The scale is showing 22 kg.

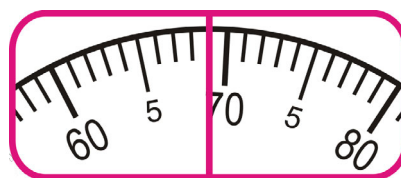
1. How many kilograms is the scale showing?



a. \_\_\_\_\_



b. \_\_\_\_\_



c. \_\_\_\_\_

2. Step onto the scale. How much do you weigh? \_\_\_\_\_ kg

3. Find out how many kilograms your family members weigh. Write a list below.

\_\_\_\_\_ kg \_\_\_\_\_ kg

\_\_\_\_\_ kg \_\_\_\_\_ kg

\_\_\_\_\_ kg \_\_\_\_\_ kg

4. Also, weigh some of your family members together.

\_\_\_\_\_ and \_\_\_\_\_ together weigh \_\_\_\_\_ kg.

\_\_\_\_\_ and \_\_\_\_\_ together weigh \_\_\_\_\_ kg.

5. Now weigh some other items with the bathroom scale. Note: you cannot weigh very light items on it. You also cannot weigh very big and bulky items (such as tables) on it because you can't place them fully on the scale. Try to find objects that are not very big.

a bucket full of water \_\_\_\_\_ kg      Mom's frying pan \_\_\_\_\_ kg

a bucket half full of water \_\_\_\_\_ kg      \_\_\_\_\_ kg

a stack of heavy books \_\_\_\_\_ kg      \_\_\_\_\_ kg

6. Find out how many kilograms of water you can carry. Can you carry the bucket when it is full? If not, pour out some water until you can carry the bucket.

I can carry a bucket of water that weighs \_\_\_\_\_ kg.

7. a. Find out how many kilograms of books you can carry in a bag. Fill the bag with books and weigh it. Can you carry it? If not, take out some books until you are able to carry the bag.

I can carry a bagful of books that weighs \_\_\_\_\_ kg.

b. The same as above, but use a backpack.

I can carry a backpack that weighs \_\_\_\_\_ kg.

c. Weigh yourself with and without the heavy bag of books.

I weigh \_\_\_\_\_ kg. I weigh \_\_\_\_\_ kg with the heavy bag.

What is the difference? \_\_\_\_\_ kg.

You can use this method to weigh items that cannot easily be placed on the scales, but that you can hold.

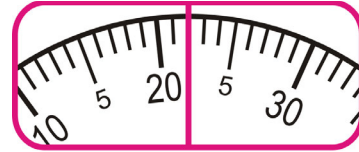
d. Weigh yourself with and without a heavy book.

I weigh \_\_\_\_\_ kg. I weigh \_\_\_\_\_ kg with the heavy book.

What is the difference? \_\_\_\_\_ kg. So, the book weighs \_\_\_\_\_ kg.

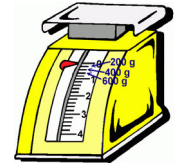
# Grams and Kilograms

In this lesson you will need a bathroom scale that measures weight in *kilograms* (abbreviated kg).

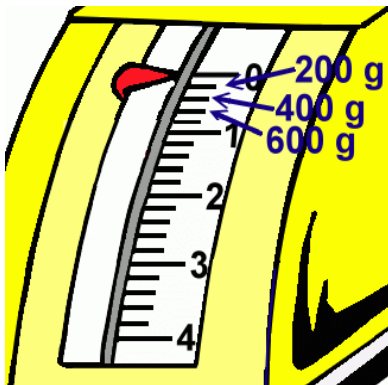


The scale on the right is showing 22 kg.

You will also need a kitchen scale that measures in grams. A *gram* is a very small unit of weight. A gram is abbreviated with “g”.



A thousand grams make one *kilogram* (1 kg): **1,000 g = 1 kg.**



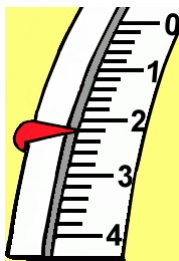
Look carefully at the kitchen scale. The numbers 0, 1, 2, 3, and 4 on this scale refer to the whole kilograms.

In between each two numbers there are four little lines. They divide each kilogram into *five* parts. This means that each little line marks a 200-gram increment.

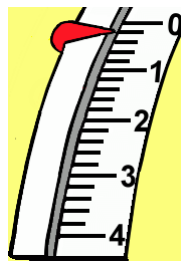
(200 g + 200 g + 200 g + 200 g + 200 g = 1,000 g = 1 kg.)

The first little line after the 0-kg mark means 200 g. The next little line means 400 g, the next one 600 g, and so on. Each time, one little line more means 200 g more.

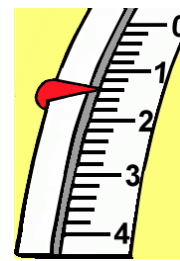
1. Write the amount of kilograms and grams that the scales are showing.



a. 2 kg 200 g



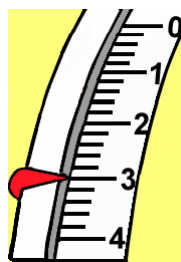
b. \_\_\_\_\_ kg \_\_\_\_\_ g



c. \_\_\_\_\_ kg \_\_\_\_\_ g



d. \_\_\_\_\_ kg \_\_\_\_\_ g



e. \_\_\_\_\_ kg \_\_\_\_\_ g



f. \_\_\_\_\_ kg \_\_\_\_\_ g



2. Weigh things and people with a bathroom scale that uses kilograms. Write your results here. First, guess how much the thing or person weighs. Then weigh using the scales.

Thing/person	Guess	Weight
	_____ kg	_____ kg





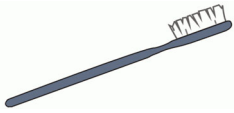
3. Measure light items with a kitchen scale that uses grams. Write your results here.

Item	Weight

4. At home, find food products or personal care products that show the weight on the label using grams. Write the items in order from the lightest to the heaviest.

Item	Weight
	_____ g

5. Which is the best estimate of weight?

<p>a. </p> <p>500 g 5 g</p>	<p>b. </p> <p>70 kg 7 kg</p>	<p>c. </p> <p>1 kg 200 g</p>	<p>d. </p> <p>1 kg 150 g</p>
<p>e. </p> <p>30 g 300 g</p>	<p>f. a CD</p> <p>15 g 300 g</p>	<p>g. A car</p> <p>100 kg 2,000 kg</p>	<p>h. an apple</p> <p>1 kg 100 g</p>
<p>i. A bucket full of water</p> <p>8 kg 50 kg</p>	<p>j. A spoonful of sand</p> <p>10 g 100 g</p>	<p>k. a baby</p> <p>500 g 5 kg</p>	<p>l. flashlight</p> <p>300 g 2,000 g</p>

6. Match the things and their weights.

An adult woman	55 kg
A puppy	1 kg
A pencil	500 g
A school book	25 kg
A magazine	50 g
A 9-year-old boy	150 g

7. Fill in the blanks with a reasonable unit of weight (either g or kg).

- Mom got a package in the mail that weighed 3 \_\_\_\_\_. It had books in it.
- Jane got a package in the mail that weighed 300 \_\_\_\_\_. It had a puzzle in it.
- Mark's dog weighs 30 \_\_\_\_\_.
- A cell phone weighs 300 \_\_\_\_\_.
- Mary bought 3 \_\_\_\_\_ of strawberries at the marketplace.
- Audrey weighs 60 \_\_\_\_\_.
- The teddy bear weighs 250 \_\_\_\_\_.

**Convert between kilograms and grams** \*

(\*This section is optional.)

Just remember that 1 kg = 1000 grams, 3 kg = 3,000 g  
and use that when changing between

kilograms and grams.  $1 \text{ kg } 500 \text{ g} = 1,000 \text{ g} + 500 \text{ g} = 1,500 \text{ g}$

8. Convert between kilograms and grams.

a. 1 kg = _____ g	b. 1 kg 600 g = _____ g	c. 9 kg = _____ g
2 kg = _____ g	1 kg 80 g = _____ g	8 kg 600 g = _____ g
3 kg = _____ g	2 kg 450 g = _____ g	5 kg 8 g = _____ g
4 kg = _____ g	8 kg 394 g = _____ g	7 kg 41 g = _____ g

9. A t-shirt weighs 200 g. How many of those would weigh 1 kg?

10. A math book weighs 1 kg 300 g. An English book weighs 1 kg 700 g.  
How much do they weigh together?

11. Anne's school books weigh 800 g, 700 g, and 600 g.

- What is their total weight in grams?
- What is their total weight in kilograms and grams?

12. Marlene bought 2 kg 400 g of potatoes. She used 500 grams in soup.  
How much do the remaining potatoes weigh?

13. Greg has a post office box that allows him to receive 10 kg of mail each month. So far this month he has received packages that weighed 1 kg 500 g, 4 kg 800 g, and 2 kg.

- What is the total weight of the packages he has received this month?
- What is the total weight of mail he is still allowed to receive this month?

# Cups, Pints, Quarts, and Gallons

Volume means how much space something takes.

A sandcastle takes a certain amount of space. A bottle of water takes space. A book takes space. But how much?

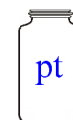
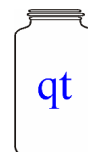
In this lesson you will learn how we measure the volume of water (or other liquids).

You will need

- water in a bucket or other big container
- a few food containers
- a coffee cup
- a drinking glass



- a quart jar
- a pint jar

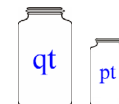


- a 1-cup measuring cup



1. Fill the pint jar with water. Pour it all into the quart jar. Then fill the pint jar again and pour it into the quart jar. Is it now full (or close to full)?

It should be. It takes \_\_\_\_\_ pints of water to fill 1 quart jar.



2. Pour out water from your full quart jar back into the pint jar until the pint jar is full.

Is your quart jar now half full? (It should be.)

How much water is left in the quart jar? \_\_\_\_\_ pint.

3. Find out how many times you need to fill the one-cup measuring cup with water and pour it into the pint jar until the pint jar is full. \_\_\_\_\_ times.

One pint is \_\_\_\_\_ cups.

4. Find out how many times you need to fill the one-cup measuring cup with water and pour it into the quart jar until the quart jar is full. \_\_\_\_\_ times.

One quart is \_\_\_\_\_ cups.

5. Find out if a coffee cup measures MORE or LESS than the a 1-cup measuring cup—or exactly 1 cup. Do the same with a drinking glass.

6. Find three different empty food containers. Measure water into them, and find out how many whole cups of water you can fit into them. If you can still fit a little more, write YES.

	how many whole cups	Can you fit a little more?
Container 1		
Container 2		
Container 3		

7. At the next supper or breakfast time, do a little experiment. Before eating, measure exactly one cup of the food you are going to eat and then put it on your plate. Will it fill you up? Is it too much or too little food?








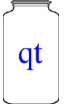
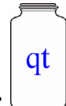
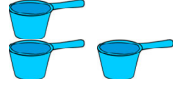
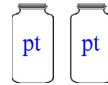
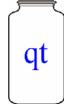
*This section is optional.*

• A quart is abbreviated with “qt”.	5 qt means 5 quarts.
• A pint is abbreviated with “pt”.	3 pt means 3 pints.
• A cup is abbreviated with “C”.	2 C means 2 cups.

8. Fill in numbers on the blank lines. You will get help from your work on the previous page.

a. 1 qt = _____ pt	b. 1 qt = _____ C	c. 1 pt = _____ C
--------------------	-------------------	-------------------

9. Circle the amount that holds more liquid volume. Circle both if they hold the same amount.

a.  OR 	b.  OR 	c.  OR 
d.  OR 	e.  OR 	f.  OR 

10. Fill in with the words cup, pint, or quart.

- Mary drank 2 \_\_\_\_\_s of tea at the party.
- Mom bought 1 \_\_\_\_\_ of yogurt for the four children.
- Ron was quite thirsty and so he drank a whole \_\_\_\_\_ of water.
- The large pitcher can hold 2 \_\_\_\_\_s of juice.

## Gallons

One gallon is a large measure of volume. You use gallons when the liquid or other substance takes a lot of space, even more than a few quarts.

You might have heard about these items. Fill in some more items that you have heard the word “gallon” used with.

- a 5-gallon bucket
- a 1-gallon carton of milk
- a 1/2-gallon carton of milk
- a car's gas tank is so many gallons
- a water heater can hold so many gallons
- a bathtub can hold so many gallons
- A very large pot can hold 1 gallon of soup or stew.
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_



One gallon of water is so much that you can fill FOUR quarts out of it.



It would be a lot to drink!

### 11. Test yourself!

Put one gallon of water into a bucket, preferably a 5-gallon bucket.  
(Four quarts make one gallon.) Can you carry it?

Put another gallon of water into the same bucket. Can you still carry it?

Now put 1 gallon of water into another bucket as well, and try to carry one such bucket in each hand. Can you?

How many gallons of water can you carry using two buckets?

Water can get pretty heavy!

How many quarts of water fit into a 5-gallon bucket?

Puzzle Corner

Hint: Think first how many quarts of water fit into 1 gallon, 2 gallons, and so on.

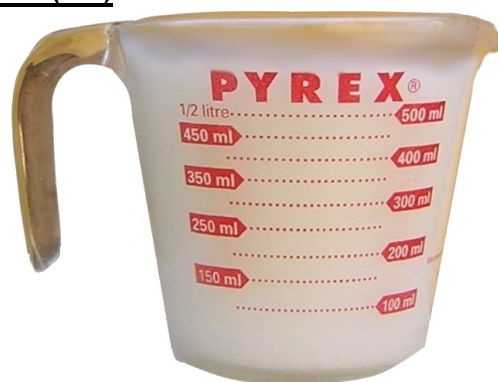
# Milliliters and Liters

This is a measuring cup that measures volume in **milliliters (ml)**. Milliliters are very tiny units—you need lots of them to measure, for example, the volume of a glass.

This measuring cup goes up to 500 ml. And, 500 ml is exactly 1/2 liter. You can see that written near the top of the measuring cup.

A **liter** is 1,000 milliliters. A liter is abbreviated **l**, or sometimes with a capital **L**.

One liter is very close to a quart (just a little bit more).



1. Measure the volume of a few cups, glasses, jars, and other small containers. You will need a measuring cup that measures in milliliters.

Item	Volume in milliliters

2. Measure 1 liter of water into a pan. Then *guess* how many liters of water will fit into your pan.

My Guess: the pan will hold \_\_\_\_\_ liters of water.

Now, measure another liter of water into the pan, and another, until it is full. In the end, you can pour in 100 ml of water at a time.

The pan holds \_\_\_\_\_ L \_\_\_\_\_ ml of water.

3. Measure the volume of another pan using the same method. First *guess* how many liters of water will fit into your pan.

My Guess: the pan will hold \_\_\_\_\_ liters of water.

Measurement: the pan holds \_\_\_\_\_ L \_\_\_\_\_ ml of water.

4. At home, find food products or personal care products that show the volume on the label using milliliters and/or liters.

Item	Volume

*This section is optional.*

5. Remember that 1 liter is 1,000 milliliters. Convert between liters and milliliters.

a.	b.	c.
1 L = _____ ml	1 L 200 ml = _____ ml	7 L 70 ml = _____ ml
2 L = _____ ml	5 L 490 ml = _____ ml	4 L 3 ml = _____ ml
6 L = _____ ml	4 L 230 ml = _____ ml	9 L 409 ml = _____ ml

6. One shampoo bottle contains 1 liter of shampoo. Another one contains 478 ml. How much more does the bigger one contain?

*Hint: Change the 1 liter into milliliters.*

7. How much liquid is in three water bottles that contain 450 ml each?

Give your answer in liters and milliliters.

8. How many 250-ml glasses can you fill from a 1-liter bottle of juice?

And how many 200-ml glasses?

9. Out of a 2-liter pitcher full of juice, Mom poured 5 glasses of 250 ml each.

How much liquid is left in the pitcher?



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## Review 2

1. Draw lines of these lengths:

a.  $4 \frac{1}{4}$  in

b. 5 cm 7 mm

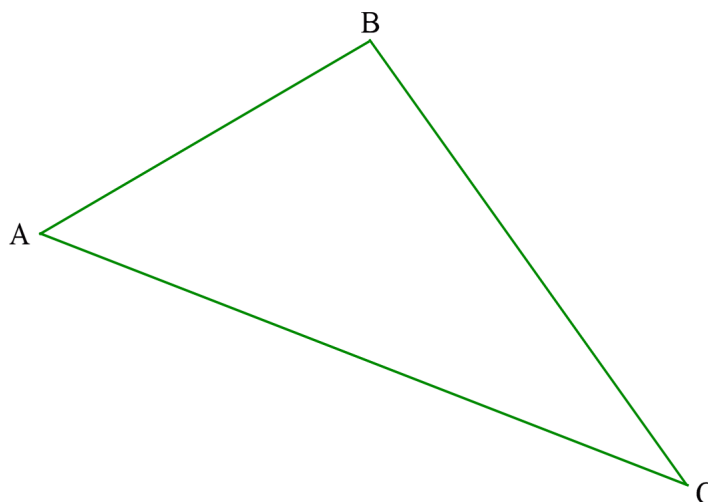
2. Measure the sides of this triangle in centimeters and millimeters, and find its perimeter.

AB: \_\_\_\_\_ cm \_\_\_\_\_ mm

BC: \_\_\_\_\_ cm \_\_\_\_\_ mm

CA: \_\_\_\_\_ cm \_\_\_\_\_ mm

perimeter: \_\_\_\_\_ cm \_\_\_\_\_ mm

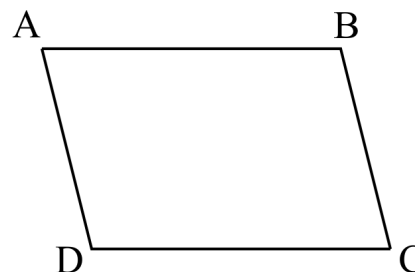


3. Measure the sides of this quadrilateral to the nearest quarter inch, and find its perimeter.

AB: \_\_\_\_\_ in.      BC: \_\_\_\_\_ in.

CA: \_\_\_\_\_ in.      DA: \_\_\_\_\_ in.

perimeter: \_\_\_\_\_ in.



4. Write or say in order from the smallest to the biggest unit: cm km m mm

5. Write or say in order from the smallest to the biggest unit: ft in yd mi

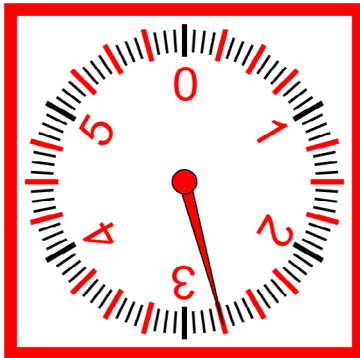
6. Write or say in order from the smallest to the biggest unit: gal pt C qt

7. Name two different units you can use to measure the weight of people.

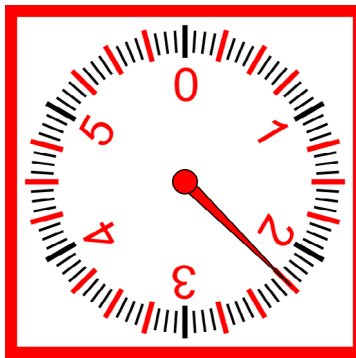
8. Fill in the blanks with suitable units of length. Sometimes several different units are possible

- a. A butterfly's wings were 6 \_\_\_\_\_ wide.
- b. Sherry is 66 \_\_\_\_\_ tall.
- c. Jessica jogged 5 \_\_\_\_\_ yesterday.
- d. The box was 60 \_\_\_\_\_ tall.
- e. The distance from the city to the little town is 80 \_\_\_\_\_.
- f. The room was 4 \_\_\_\_\_ wide.
- g. The eraser is 3 \_\_\_\_\_ long

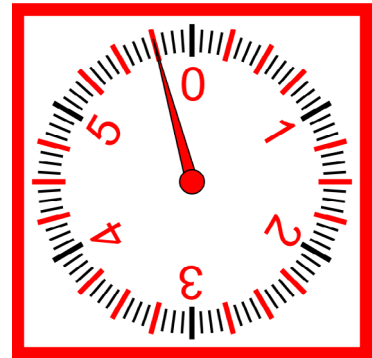
9. Write the weight the scales are showing.



a. \_\_\_\_\_ lb \_\_\_\_\_ oz



b. \_\_\_\_\_ lb \_\_\_\_\_ oz



c. \_\_\_\_\_ lb \_\_\_\_\_ oz

10. Have your teacher give you a small object. Use the scale to find out how much it weighs in either pounds and ounces, or in grams.

It weighs \_\_\_\_\_.

11. Have your teacher give you a small container. Use a measuring cup to find out how much water it can hold in milliliters.

It holds \_\_\_\_\_ ml.

12. Fill in the blanks with suitable units of weight and volume. Sometimes several different units are possible

- a. Mom bought 5 \_\_\_\_\_ of apples.
- b. Mary drank 350 \_\_\_\_\_ of juice.
- c. Dr. Smith weighs about 70 \_\_\_\_\_.
- d. The banana weighed 3 \_\_\_\_\_.
- e. The pan holds 2 \_\_\_\_\_ of water.
- f. A cell phone weighs about 100 \_\_\_\_\_.

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# Answer Key

## Measuring Length, pp. 7-10

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### Page 7

- a. Please check the student's answers.  
b. Please check the student's answers.
- The desk was about 12 baby shoes wide.

### Page 8

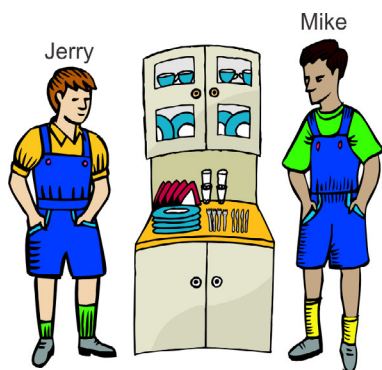
- Ryan's room was 81 baby shoes wide.  
Since baby shoes are smaller than daddy shoes, we know the number will be larger than 27.
- Answers will vary.
- pencil a. 5 crayons long; 10 paperclips long  
pencil b. 6 crayons long; 12 paperclips long  
pencil c. 4 crayons long; 8 paperclips long  
pencil d. 3 crayons long; 6 paperclips long

### Page 9

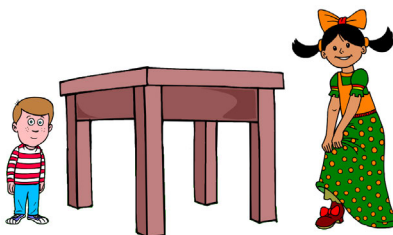
- a. The pen is longer than the measuring stick. The pencil is the same length as the stick.  
b. The measuring stick is longer than the celery. The flashlight is longer than the stick.  
c. The pink car is shorter than the measuring stick. The blue car is longer than the stick.  
d. The toothbrush is longer than the measuring stick. The pencil is shorter than the stick.

### Page 10

7. a.



b.



## Exploring Measuring, pp. 11-12

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### Page 11

- Answers will vary. Check student's answers.
- a. sheep 1, car 2, dinosaur 3    b. crayon 1, carrot 2, celery 3    c. paperclip 1, toothbrush 2, flashlight 3

### Page 12

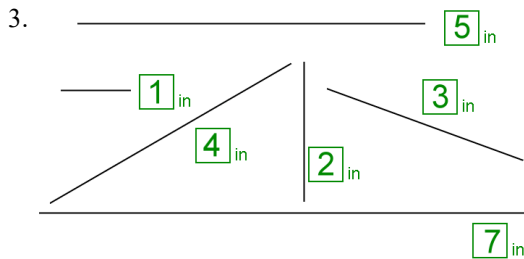
- Answers will vary.
- Answers will vary.
- Answers will vary.
- The bucket held 53 smaller drinking glasses. It will hold more small glassfuls than large ones.

## Measuring Lines in Inches, pp. 13-15

### Page 13

- a. 2 in.   b. 4 in.   c. 3 in.   d. 5 in.
- 1 in., 5 in., 3 in., 6 in., 5 in.

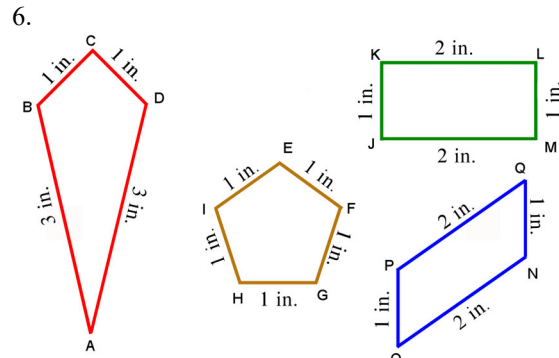
### Page 14



- Triangle ABC: AB is 2 in., BC is 3 in., AC is 4 in.  
Triangle DEF: DF is 5 in., DE is 4 in., EF is 3 in.

### Page 15

- Check the student's lines.

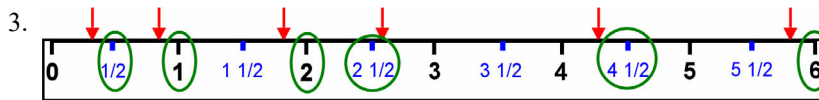


## Inches and Half-Inches, pp. 16-18

### Page 16

- a. 2 inches   b. 1 1/2 inches   c. 2 1/2 inches   d. 4 1/2 inches
- a. 3 1/2 inches   b. 1 1/2 inches   c. 5 inches

### Page 17



- a. 3 inches   b. 3 1/2 inches   c. 4 1/2 inches   d. 5 inches

### Page 18

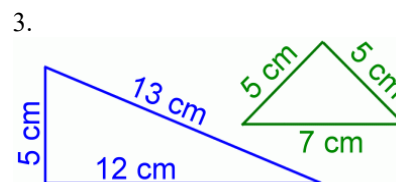
- a. 3 1/2 inches   b. 2 inches   c. 5 1/2 inches
- Please check the student's work, as c. and d. are too long for the width of this page to show an example.
- a. Rectangle, Side AB 2 1/2 inches, Side BC 1 inch, Side CD 2 1/2 inches, Side DA 1 inch.  
All the way around 7 inches.  
b. Square, Side AB 1 1/2 inches, Side BC 1 1/2 inches, Side CD 1 1/2 inches, Side DA 1 1/2 inches.  
All the way around 6 inches.

## Measuring Lines in Centimeters, pp. 19-20

### Page 19

- a. 5 cm   b. 3 cm   c. 9 cm   d. 10 cm   e. 12 cm
- 

### Page 20



- Check the student's lines.

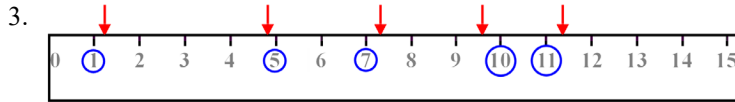
## Measuring to the Nearest Centimeter, pp. 21-23

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### Page 21

- a. 7 cm    b. 3 cm    c. 6 cm    d. 11 cm
- a. 8 cm    b. 6 cm





### Page 22



### Page 22

- a. about 7 cm    b. about 4 cm    c. about 8 cm
- a. about 6 cm    b. about 2 cm    c. about 4 cm

### Page 23

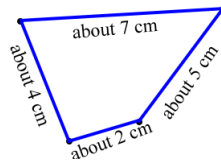
- Answers will vary. Please check the student's work.
- a.   
b.   
c.   
d. 

## Some More Measuring, pp. 24-26

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### Page 24

- a. 2 pencils    b. 4 pencils  
c. 4 pencils    d. 3 pencils  
e. The shortest pencil is 3 cm and the longest pencil is 11 cm. The longest pencil is 8 cm longer than the shortest.
- It is a quadrilateral. The perimeter is about 18 cm.



### Page 25

- Answers will vary.
- Side AB about  $1\frac{1}{2}$  in. Side BC 4 in.  
Side CA  $4\frac{1}{2}$  in. Perimeter about 10 in.

### Page 26

- a. the centimeter-amounts    b. one inch    c. less than 13 inches    d. more than 3 cm
- Answers will vary.

## Measuring to the Nearest Fourth-Inch, pp. 27-30

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### Page 28

- a.  $1\frac{1}{4}$  inches    b.  $1\frac{3}{4}$  inches    c.  $3\frac{1}{4}$  inches    d.  $4\frac{3}{4}$  inches  
e.  $5\frac{1}{2}$  inches    f.  $4\frac{1}{4}$  inches    g.  $3\frac{3}{4}$  inches

## Measuring to the Nearest Fourth-Inch, cont.

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### Page 29

2. Check student's answers. The answers below may not be the right length when printed from the download version, because many printers will print with "shrink to fit" or "fit to printable area."

- a. \_\_\_\_\_
- b. \_\_\_\_\_
- c. \_\_\_\_\_
- d. \_\_\_\_\_

3. Answers will vary.

### Page 30

4. The images are not to scale.



1/2 inch



3/4 inch



1 1/2 inches



2 1/4 inches

5. a. 1/2 in.; 1 1/2 in.    b. 1 in.; 4 1/2 in.    c. 6 in.; 8 in.    d. 3/4 in.; 2 3/4 in.

## Centimeters and Millimeters, pp. 31-34

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### Page 31

1. a. 3 cm 4 mm = 34 mm    b. 7 cm 7 mm = 77 mm    c. 11 cm 6 mm = 116 mm  
d. 12 cm 9 mm = 129 mm    e. 6 cm 1 mm = 61 mm    f. 5 cm 3 mm = 53 mm

### Page 32

2. Check student's answers. The answers below may not be the right length when printed from the download version, because many printers will print with "shrink to fit" or "fit to printable area."

- a. \_\_\_\_\_
- b. \_\_\_\_\_
- c. \_\_\_\_\_
- d. \_\_\_\_\_
- e. \_\_\_\_\_

### Page 33

3. Answers will vary. Check the student's work.

4. a. 10 mm; 20 mm; 50 mm; 80 mm    b. 11 mm; 12 mm; 18 mm; 23 mm  
c. 45 mm; 25 mm; 78 mm; 104 mm

5. a. 7 cm; 10 cm    b. 1 cm 2 mm; 4 cm 5 mm    c. 8 cm 9 mm; 10 cm 2 mm

6. The answers below may not match what you measure, if you have printed from the download version, because many printers will print with "shrink to fit" or "fit to printable area."  
side AB 53 or 54 mm    side BC 110 mm    side CA 117 mm

## **Centimeters and Millimeters, cont.**

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### **Page 34**

7. 280 or 281 mm
8. The answers below may not match what you measure, if you have printed from the download version, because many printers will print with “shrink to fit” or “fit to printable area.”  
The sides measure 22 mm, 65 mm, and 79 mm. The perimeter is 166 mm.
9. a. 20 mm    b. 98 mm    c. 63 mm    d. 69 mm  
   e. 76 mm    f. 85 mm    g. 46 mm    h. 641 mm

## **Line Plots and More Measuring, pp. 35-37**

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### **Page 35**

1. a.  $3\frac{1}{4}$  in.    b.  $4\frac{3}{4}$  in.    c.  $1\frac{3}{4}$  in.
2. Answers will vary. Please check the student’s work.

### **Page 36**

3. Answers will vary. Please check the student’s work.
4. The answers below may not quite match the student's measures, if you have printed from the download version, because many printers will print with “shrink to fit” or “fit to printable area.”
- Side AB 5 cm 7 mm    Side BC 4 cm 7 mm  
Side CD 4 cm 5 mm    Side DA 4 cm 5 mm  
Perimeter 19 cm 4 mm

### **Page 37**

5. Answers will vary.
6. Answers will vary.

## **Feet and Miles, pp. 38-40**

---

### **Page 38**

1. Answers will vary.

### **Page 39**

- 2-4. Answers will vary.
5. 1 foot is longer than 1 cm. It was about 150 cm tall.
6. It was about 2 feet tall.
7. c. 12 feet.

### **Page 40**

8. Answers will vary.
9. a. 390 miles    b. 120 miles

## Feet and Miles, cont.

---

### Page 40

10.

Distance	Unit
from New York to Los Angeles	mi
from a house to a neighbor's house	ft
the width of a notebook	in.
the distance around the earth	mi
how tall a refrigerator is	ft. in.
the width of a porch	ft
the length of a board	ft. in.

Distance	Unit
the length of a train	ft
the length of a playground	ft
from a train station to the next	mi
the width of a computer screen	in.

## Feet, Yards, and Miles, pp. 41-42

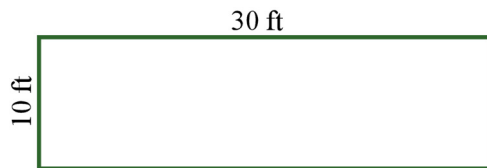
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### Page 41

- Answers will vary.
- inch, foot, yard, mile
- Answers will vary.

### Page 42

- a. mi. b. in. c. ft. d. in. e. ft. f. mi.
- perimeter =  $30\text{ ft} + 30\text{ ft} + 10\text{ ft} + 10\text{ ft} = 80\text{ ft}$ ; area =  $10\text{ ft} \times 30\text{ ft} = 300\text{ ft}^2$



6.

a. 1 ft = 12 in. 3 ft = 36 in. 5 ft = 60 in.	b. 1 ft 2 in. = 14 in. 1 ft 8 in. = 20 in. 1 ft 11 in. = 23 in.	c. 2 ft 4 in. = 28 in. 2 ft 6 in. = 30 in. 3 ft 3 in. = 39 in.
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- Emma is 50 inches tall.
- Rebecca is three inches taller.
- His train of pencils is two feet long.
- The perimeter of the rectangle is 11 ft 8 in.



## Meters and Kilometers, pp. 43-44

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### Page 43

1. a. You might not be able to, but the teacher can. b. Answers will vary.  
2-3. Answers will vary.

### Page 44

4. Answers will vary.  
5. a.  $20\text{ m} + 20\text{ m} = 40\text{ m}$  b.  $20\text{ m} + 39\text{ m} + 1\text{ m} = 60\text{ m}$  c.  $20\text{ m} + 39\text{ m} + 42\text{ m} + 18\text{ m} + 25\text{ m} = 144\text{ m}$   
6.

Distance	Unit
the length of a park	m
from Miami to the North Pole	km
the length of a cell phone	cm
the length of a bus	m & cm

Distance	Unit
around your wrist	cm
the height of a room	m & cm
the length of an airplane trip	km
the length of a grasshopper	cm

## Common Metric Units of Length, pp. 45-46

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### Page 45

1. Answers will vary.  
2. Answers will vary.  
3. a. m b. mm c. cm d. km e. m f. cm

### Page 46

4. Answers will vary.  
5. mm, cm, m, km  
6.

a. $1\text{ m} = 100\text{ cm}$ $2\text{ m} = 200\text{ cm}$ $5\text{ m} = 500\text{ cm}$	b. $1\text{ m } 20\text{ cm} = 120\text{ cm}$ $1\text{ m } 14\text{ cm} = 114\text{ cm}$ $1\text{ m } 58\text{ cm} = 158\text{ cm}$	c. $5\text{ m } 85\text{ cm} = 585\text{ cm}$ $2\text{ m } 17\text{ cm} = 217\text{ cm}$ $3\text{ m } 8\text{ cm} = 308\text{ cm}$
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7. The train of pillows would be two meters long.  
8. Ellie is 7 cm taller.  
9. The perimeter is 5 m 60 cm.

## Review 1, p. 47

---

### Page 47



- 1.

Distance	Unit or units
from your house to the grocery store	mi or km
from Miami to New York	mi or km
the distance across the room	m or ft
the height of a bookcase	ft, in, m, or cm

## Review 1, cont.

---

### Page 47

2. About 6 cm *or* about 2 1/2 in.
3. a.   
b. 
4. The longer pencil is about 7 cm longer than the shorter one.  
The longer pencil is about 2.5 inches longer than the shorter one.
5. Answers will vary.

## Weight in Pounds, pp. 48-49

---

### Page 48

1. a. 70 pounds   b. 88 pounds   c. 76 pounds   d. 34 pounds   e. 98 pounds   f. 192 pounds

### Page 49

- 2-6. Answers will vary.

## Pounds and Ounces, pp. 50-53

---

### Page 50

1. a. 4 lb 0 oz   b. 0 lb 9 oz   c. 1 lb 1 oz

### Page 51

2. a. 1 lb 11 oz   b. 2 lb 4 oz   c. 5 lb 3 oz   d. 3 lb 9 oz  
e. 3 lb 14 oz   f. 2 lb 15 oz   g. 5 lb 9 oz   h. 3 lb 8 oz   i. 2 lb 8 oz

### Page 52

3. Answers will vary.
4. Answers will vary.
5. Answers will vary.

### Page 53

6. a. 2 lb   b. 160 lb   c. 2 oz   d. 70 lb   e. 600 lb   f. 6 oz
7. a. lb   b. lb   c. oz   d. oz   e. lb
- 8.

a. 2 lb = 32 oz 3 lb = 48 oz 4 lb = 64 oz	b. 1 lb 1 oz = 17 oz 1 lb 7 oz = 23 oz 2 lb 11 oz = 43 oz	c. 2 lb 4 oz = 36 oz 3 lb 9 oz = 57 oz 5 lb 4 oz = 84 oz
---	---	--

9. The liquid weighs five ounces
10. a. 8 letters   b. 1 lb 14 oz

## **Weight in Kilograms, pp. 54-55**

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### **Page 54**

1. a. 45 kilograms    b. 93 kilograms    c. 69 kilograms  
2-4. Answers will vary.

### **Page 55**

- 5-7. Answers will vary.

## **Grams and Kilograms, pp. 56-59**

---

### **Page 56**

1. a. 2 kg 200 g    b. 0 kg 200 g    c. 1 kg 400 g    d. 0 kg 800 g    e. 3 kg 0 g    f. 3 kg 400 g

### **Page 57**

2. Answers will vary.  
3. Answers will vary.  
4. Answers will vary.

### **Page 58**

5. a. 5 g    b. 70 kg    c. 1 kg    d. 1 kg    e. 30 g    f. 15 g  
g. 2,000 kg    h. 100 g    i. 8 kg    j. 10 g    k. 5 kg    l. 300 g  
6. An adult woman - 55 kg; A puppy - 1 kg; A pencil - 50 g;  
A school book - 500 g; A magazine - 150 g; A 9-year-old boy - 25 kg  
7. a. kg    b. g    c. kg    d. g    e. kg    f. kg    g. g

### **Page 59**

8.

a. 1 kg = 1,000 g 2 kg = 2,000 g 3 kg = 3,000 g 4 kg = 4,000 g	b. 1 kg 600 g = 1,600 g 1 kg 80 g = 1,080 g 2 kg 450 g = 2,450 g 8 kg 394 g = 8,394 g	c. 9 kg = 9,000 g 8 kg 600 g = 8,600 g 5 kg 8 g = 5,800 g 7 kg 41 g = 7,041 g
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9. Five t-shirts would weigh 1 kg.  
10. Their combined weight is 3 kg.  
11. a. Their total weight is 2,100 grams.  
b. Their total weight is 2 kg 100 g.  
12. The remaining potatoes weigh 1 kg 900 g.  
13. a. The total weight of the packages he has received this month is 8 kg 300 g.  
b. He is still allowed to receive 1 kg 700 g of mail this month.

## Cups, Pints, Quarts, and Gallons, pp. 60-62

---

### Page 60

1. It takes 2 pints of water to fill 1 quart jar.
2. How much water is left in the quart jar? 1 pint.
3. Two times. One pint is two cups.
4. Four times. One quart is four cups.
5. Answers will vary.

### Page 61

- 6-7. Answers will vary.
8. a. 2 pt   b. 4 C   c. 2 C
9. a. A pint is more.   b. Two cups are equal to a pint.   c. 3 cups are more.  
d. A quart is more.   e. 1 quart is more.   f. 2 pints are equal to 1 quart.
10. a. Mary drank 2 cups of tea at the party.  
b. Mom bought 1 quart of yogurt for the four children.  
c. Ron was quite thirsty and so he drank a whole pint of water.  
d. The large pitcher can hold 2 quarts of juice.

### Page 62

11. Answers will vary.
- Puzzle corner: 20 quarts

## Milliliters and Liters, pp. 63-64

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### Page 63

- 1-3. Answers will vary.

### Page 64

4. Answers will vary.
- 5.

a. 1 L = 1,000 ml 2 L = 2,000 ml 6 L = 6,000 ml	b. 1 L 200 ml = 1,200 ml 5 L 490 ml = 5,490 ml 4 L 230 ml = 4,230 ml	c. 7 L 70 ml = 7,070 ml 4 L 3 ml = 4,003 ml 9 L 409 ml = 9,409 ml
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6. It contains 522 more ml of shampoo.
7. They contain 1 L 350 ml of water.
8. You can fill four 250 ml glasses or five 200 ml glasses from one liter.
9. There is 750 ml left in the pitcher.

## Review 2, pp. 65-66

---

### Page 65

1. a. \_\_\_\_\_  
b. \_\_\_\_\_

2. AB: 5 cm 1 mm  
BC: 7 cm 2 mm  
CA: 9 cm 2 mm  
perimeter: 21 cm 5 mm

However, if you printed the lesson yourself, and didn't print at 100% but with "shrink to fit," "print to fit," or similar, the measurements will be smaller numbers than those given above. Please check the student's answers.

For example, the student might get:

- AB: 4 cm 7 mm  
BC: 6 cm 8 mm  
CA: 8 cm 6 mm  
perimeter: 20 cm 1 mm

3. AB: 1 1/2 in      BC: 1 in  
CD: 1 1/2 in      DA: 1 in  
perimeter: 5 in

However, if you printed the lesson yourself, and didn't print at 100% but with "shrink to fit," "print to fit," or similar, the measurements will be smaller numbers than those given above. Please check the student's answers.

4. mm, cm, m, km  
5. in, ft, yd, mi  
6. C, pt, qt, gal  
7. pounds or kilograms

### Page 66

8. a. A butterfly's wings were 6 cm wide.  
c. Jessica jogged 5 km or mi yesterday.  
e. The distance from the city to the little town is 80 km or mi .
9. a. 2 lb 12 oz    b. 2 lb 4 oz    c. 5 lb 12 oz
10. Answers will vary.
11. Answers will vary.
12. a. Mom bought 5 kg or lb of apples.  
c. Dr. Smith weighs about 70 kg.  
e. The pan holds 2 qt or L of water.
- b. Sherry is 66 in tall.  
d. The box was 60 cm tall.  
f. The room was 4 m wide.  
g. The eraser is 3 cm long.
- b. Mary drank 350 ml of juice.  
d. The banana weighed 3 oz.  
f. A cell phone weighs about 100 g.



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