

Mathematics – 6th grade

Use of Measurement in Interior Design

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CTE Partnership Project
2011-2012

Lesson Overview: For my participation in the summer externship program sponsored by the Sacramento-Yolo Technical Education Partnership, I was partnered with BJWilliamsDesign: Williams School of Interior Design. My experience with this business opened my eyes to several facts: 1) there are many career choices involved in this field and 2) there is an extreme amount of mathematics required for this business—especially in measurement. Since I have found measurement to be a weak spot in most students' math education, I thought this would be a good topic to work on.

Since lessons in measurement alone can be rather boring and rather unmotivating, I felt it would be a more meaningful experience to “sneak” it into a project. I developed an Interior Design Project where students would be designing a bedroom of a celebrity of their choosing. Since there are many skills required in order to accomplish this task, I broke it into three parts. Part 1 will be to choose the celebrity and learn about precise measurement. Part 2 will be to take the measurement skills and apply them in making a scale drawing of their bedroom, including arrangement of furniture. Part 3 will be to use their measurement and scaling skills to design the bedroom of their celebrity, including figuring all costs involved. Included with each part will be discussions of careers involved in this task.

In trying to keep this as meaningful and timely as possible for the student, I have scheduled these units to coincide with the curriculum as presented throughout the year; therefore, part one will be implemented during the first quarter of the school year when we are working with rational numbers, part two will be implemented during the third quarter when we are working with ratio/proportions, including scale factor, and part three will be implemented during the fourth quarter when we are working with percentages, markup, discounts and sales tax.

Materials Needed: For part One of project: math lab notebook, worksheets, butcher paper, rulers/yard (meter) sticks, scissors, colors (color markers, color pencils, crayons, etc.), magazines and other research materials.

Skills the Student will Learn in Part One:

- The student will know the breakdown of the increments of the inch.
- The student will be able to measure accurately to 1/8-th inch.
- The student will know the relationship between inches, feet and yards.
- The student will understand and demonstrate ability to cooperate within a team setting.

Foundation Academic Standards:

- 6.NS.3 – Add, subtract, multiply and divide rational numbers
- 6.NS.6 – Understand rational numbers
- 6.NS.7.1 – Add and subtract rational numbers
- 6.EE.4 – Identify equal expressions

CTE Pathway Standards:

- NS 1.1 – Compare and order positive and negative fractions.
- NS 2.1 – Solve problems involving addition, subtraction, multiplication and division of positive fractions
- AF 1.4 – Solve problems by using the correct order of operations
- AF 2.0 – Convert one unit of measurement to another
- MR 1.1 – Analyze problems by identifying relationships
- MR 2.1 – Use estimation to verify the reasonableness of calculated results
- MR 2.7 – Make precise calculations and check the validity of the results from the context of the problem

Length of Lesson: This will take place over a period of 6-7 class sessions (50 minutes) in a math lab class that meets every other day.

Unit objectives:

- Given individual clues, the student will work with other members on the team to find a solution to a given problem. (team building)
- The student will use a ruler to find precise measurements of given lines to 1/8-th inch.
- The student will participate in discussions regarding career options in given field.

Lesson-Day One:

- Introduction: “What I did on my summer vacation and why...” to introduce purpose of year-long project. Include an overview and importance of three parts of project.
Main points to get across to students:
Careers: Even though the common perception of interior design as a career is of interest primarily for girls, there are many occupations involved in this field that would be of interest to both females and males alike. We will be exploring these many occupation choices throughout this project.
Skills needed: It is a known fact that a good strong foundation of math skills is required for at least 85% of all careers/occupations. This project will show how what we are learning in class this year will be used in the occupation one chooses.
Student will see how it is used on the job.
- Team-building: Since most of this project (Parts 1, 2, and 3) will depend upon team work, it is important to establish the criteria for good teamwork. Today will be spent establishing good team work. Activity: Three sets of problems from “Get It Together” for each group of 4.

- Assignment: Think of several celebrity figures you admire. Be prepared to share next class session.

Lesson-Day Two:

- Team Building: After the class selects a celebrity figure (movies, music, sports, history, etc.), each team will determine who and how to research information regarding the chosen celebrity. (likes, dislikes, colors, fashion, residence(s), hobbies, family, etc. They will need to bring in magazines, articles, pictures, etc. Appropriate time will be given each group to collaborate and make assignments within group.
- Individual: Hand out a worksheet showing the breakdown of a ruler into parts. Work two worksheets together (measure the inch and $\frac{1}{2}$ inch lines) in class.
- Class: Career discussion (for example: what/who is involved in making a sofa?)
- Assignment: 2-sided worksheet on comparing feet and inches and measuring lines to the nearest $\frac{1}{2}$ inch.

Lesson-Day Three:

- Team building: Draw the outline of students on butcher paper. I plan to have students line up by height and count off by 4's. I will select all number ones to be drawn. (NOTE: In part 2 of the project, we will be exploring average body sizes and the amount of space required with furniture (use and placement) and we will need different sizes of drawings to find the average, so I want small, medium, and large included)
Draw outlines and cut out.
Do NOT identify person drawn. Simply label it group 1, group 2, etc. on the back of the drawing.
- Individual:
 - 1) take paper ruler and break it down into fourths. Go over what was completed yesterday.
 - 2) measuring objects/lines.....2 worksheets...work these in class in pairs.
- Class: Career discussion
- Assignment: 2 worksheets: yards, feet, inches and measuring with a ruler – $\frac{1}{4}$ th inch.

Lesson-Day Four:

- Team-building: The cutout will become the celebrity figure. Students are to make a collage on this cutout of the celebrity figure, using materials they have collected from research assigned day 2.
NOTE: Have supplies out and handy for students to use.

- Individual work:
 - 1) take paper ruler and break it down into eighths. Go over what was completed yesterday.
 - 2) measuring objects/line....2 worksheets...work these in class in pairs.
- Assignment: 2 worksheets: measuring with a ruler, comparing inches and feet

Lesson – Day Five:

- Team-building: each group will complete their celebrity figure and make a presentation to the class before attaching it to the wall for display. Have supplies out for students to use.
- Individual work: talk about measurement comparisons. Work in and out boxes: Measurement. Do this either together or in pairs.
- Class: Career discussion
- Assignment: comparing inches, feet and yards

Lesson – Day Six:

- Individual (in pairs): Activity of measuring items teacher has put out on display. Work in pairs to check each other's measurements for accuracy.
- Individual - test: worksheet – measuring lines

Enrichment Suggestion: Continue with the project:

Part 2: The student will find the “average” size of the human body to establish space requirements for furniture and placement of furniture.

The student will use furniture templates to place items on room drawing (from blueprints) establishing correct space requirements.

The student will take measurements of own bedroom and create a scale drawing (blueprint) of their bedroom.

The student will be involved in developing list of careers involved in interior design field.

Part 3: The student (working in a group of four) will design a bedroom for a celebrity of their choosing. They will create a scale drawing of the bedroom, a design board of design aspects of the room, and a financial cost analysis for the project.

The student will be involved in discussions of different careers connected to interior design.

Lesson Plan Relevance to Externship:

My students have a very limited exposure to a variety of careers, especially those careers not seen in public. They do not have experience with connecting different aspects of careers together. This experience really opened my eyes to this situation. I was amazed at how many occupations are involved in the field of interior design.....of interest to both male and female. I hope that the many discussions we will be able to have during this three-part project will make my students aware of the many possibilities open to them (not only in interior design but all fields) and how what they are learning in the classroom on a daily basis will be an important factor in their future career choices.

Name: _____

Linear Measurement

Your teacher will have all of these items on a table for you. Measure the items with your ruler. Record the lengths on this paper. Be sure you measure carefully and label the units.

yellow marker - _____ piece of yarn - _____

nail - _____ envelope - _____

green crayon - _____ strip of paper - _____

paintbrush - _____ key - _____

book (width) - _____ book (height) - _____

index card (width) - _____ index card (height) - _____

calculator (width) - _____ calculator (height) - _____

Now choose two items from your school supplies that are not listed above. Measure them and record the lengths.

_____ - _____
item #1 length item #2 length

What's My Number?

The number has two digits.

Use the clues to figure out the mystery number.

What's My Number?

The sum of the digits is a multiple of five.

Use the clues to figure out the mystery number.

What's My Number?

The difference of the digits is three.

Use the clues to figure out the mystery number.

What's My Number?

The number is prime.

Use the clues to figure out the mystery number.

What's My Number?

* The sum of the digits is odd.

Use the clues to figure out the mystery number.

What's My Number?

* The number is smaller than seventy-five.

Use the clues to figure out the mystery number.

Once upon a time...

Two days ago, Jaime was supposed to turn in his lab report.

Laura opened her presents on her birthday.

Use the clues to figure out what day of the week it is.

Once upon a time...

The day after Jaime's lab report was due was Laura's birthday.

Use the clues to figure out what day of the week it is.

Once upon a time...

Paul got his guitar string replaced on Saturday, one day before his lesson.

Use the clues to figure out what day of the week today is.

Once upon a time...

Laura opened all her presents four days before Paul's guitar lesson.

Use the clues to figure out what day of the week it is.

Once upon a time...

* Jaime turned in his report today, one day after Laura's birthday.

Use the clues to figure out what day of the week it is.

Once upon a time...

* The lab report was due on Tuesday.

Use the clues to figure out what day of the week it is.

What's the Sequence?

The fifth number in the sequence is five more than the fourth number and is nine more than the third number.

Find the first five terms of the sequence!

What's the Sequence?

Only the third and fourth numbers in the sequence are even.

The first number is 1.

Find the first five terms of the sequence!

What's the Sequence?

The sum of the first three number is equal to ten.

Find the first five terms of the sequence!

What's the Sequence?

The second number of the sequence is half the third.

Find the first five terms of the sequence!

What's the Sequence?

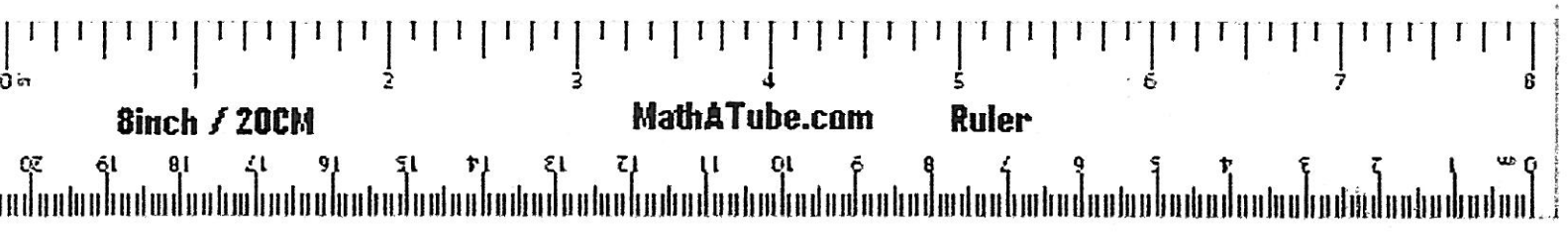
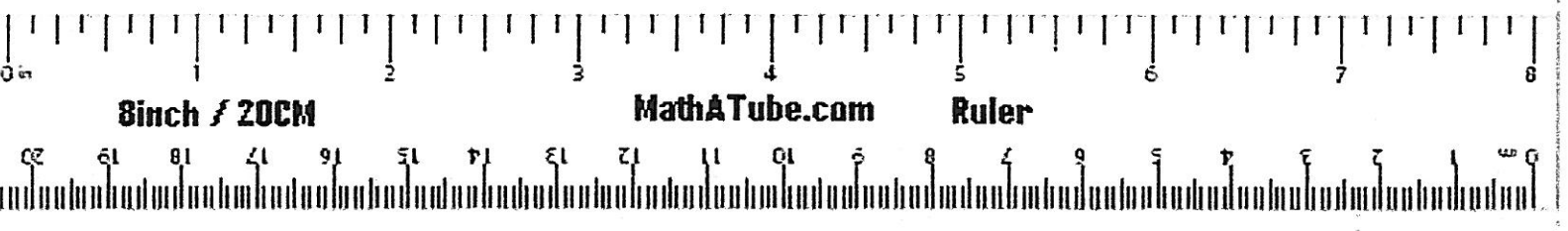
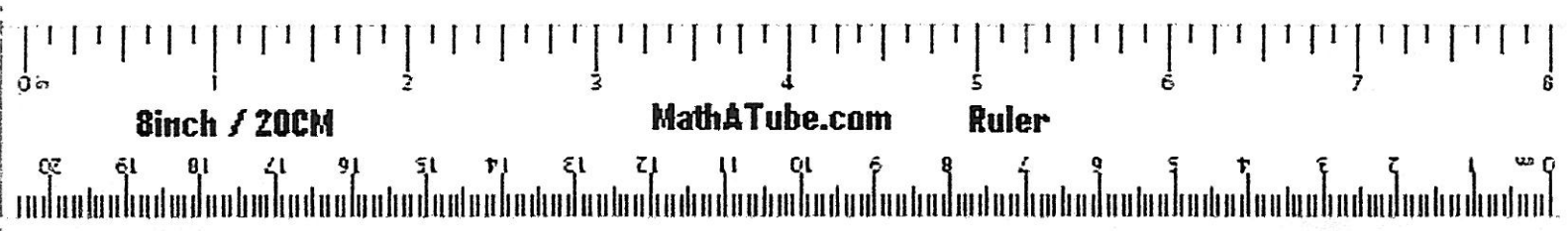
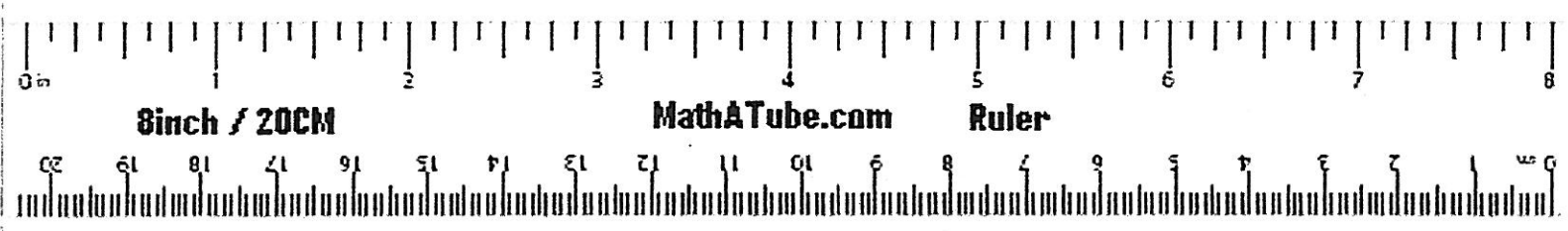
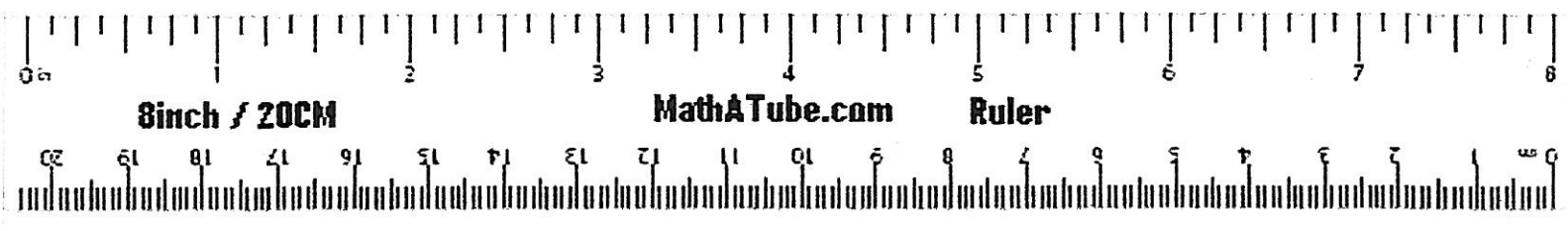
* The second number of the sequence is two more than the first number.

Find the first five terms of the sequence!

What's the Sequence?

* The sum of all five numbers in the sequence is 35.

Find the first five terms of the sequence!



Name: _____ Date: _____

Measuring Lines (Inches)

Measure each line to the nearest inch.

① _____

② _____

③ _____

④ _____

⑤ _____

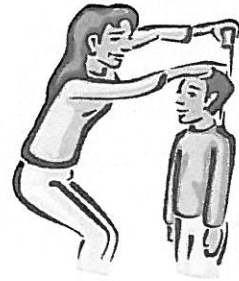
⑥ _____

Score: _____

Name: _____

Feet and Inches

Memorize this: There are 12 inches in a foot.



Complete the table. Then, use the table to answer the questions below.

1 foot	2 feet	3 feet	4 feet	5 feet
12 inches				

1. Which is longer: 2 feet or 28 inches?

2. Which is less: 4 feet or 40 inches?

3. How many inches are in 5 feet?

4. James is five feet tall. Caroline is 53 inches tall. Who is taller?

5. Marley caught a fish that was two feet three inches long. How many inches long was her fish?

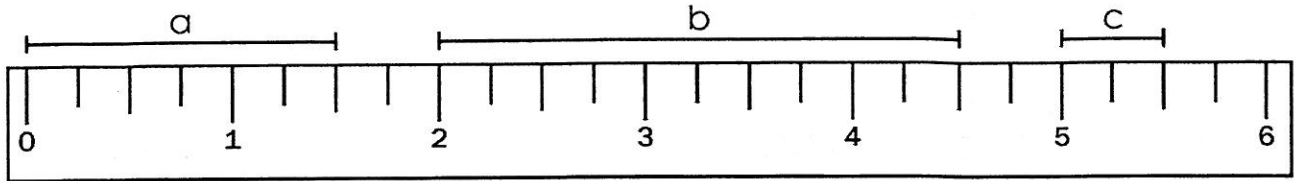
6. Arnold is four feet, six inches tall. How many inches tall is Arnold?

7. Peter measured the width of his refrigerator. It was 32 inches wide. Is the fridge more or less than three feet wide?

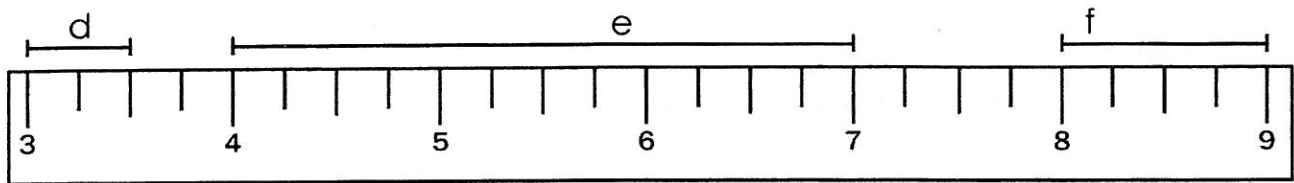
Name: _____

Measuring With a Ruler

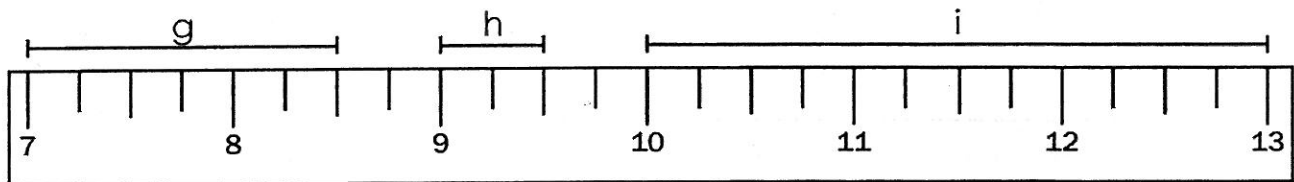
Measure to the nearest $\frac{1}{2}$ inch for each line segment using the ruler shown.



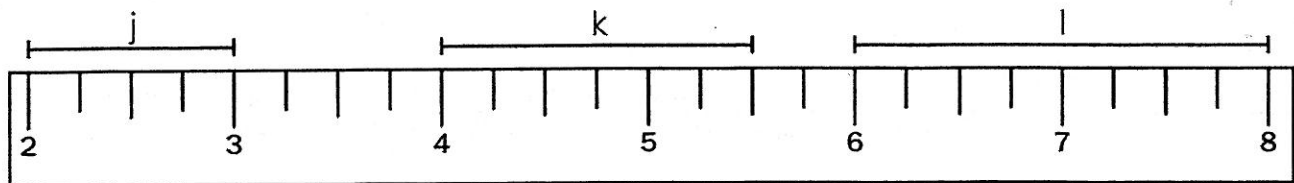
a = _____ b = _____ c = _____



d = _____ e = _____ f = _____



g = _____ h = _____ i = _____



j = _____ k = _____ l = _____

Name: _____ Date: _____

Measuring Lines (Inches)

Measure each line to the nearest 1/2 inch.

① _____

② _____

③ _____

④ _____

⑤ _____

⑥ _____

⑦ _____

⑧ _____

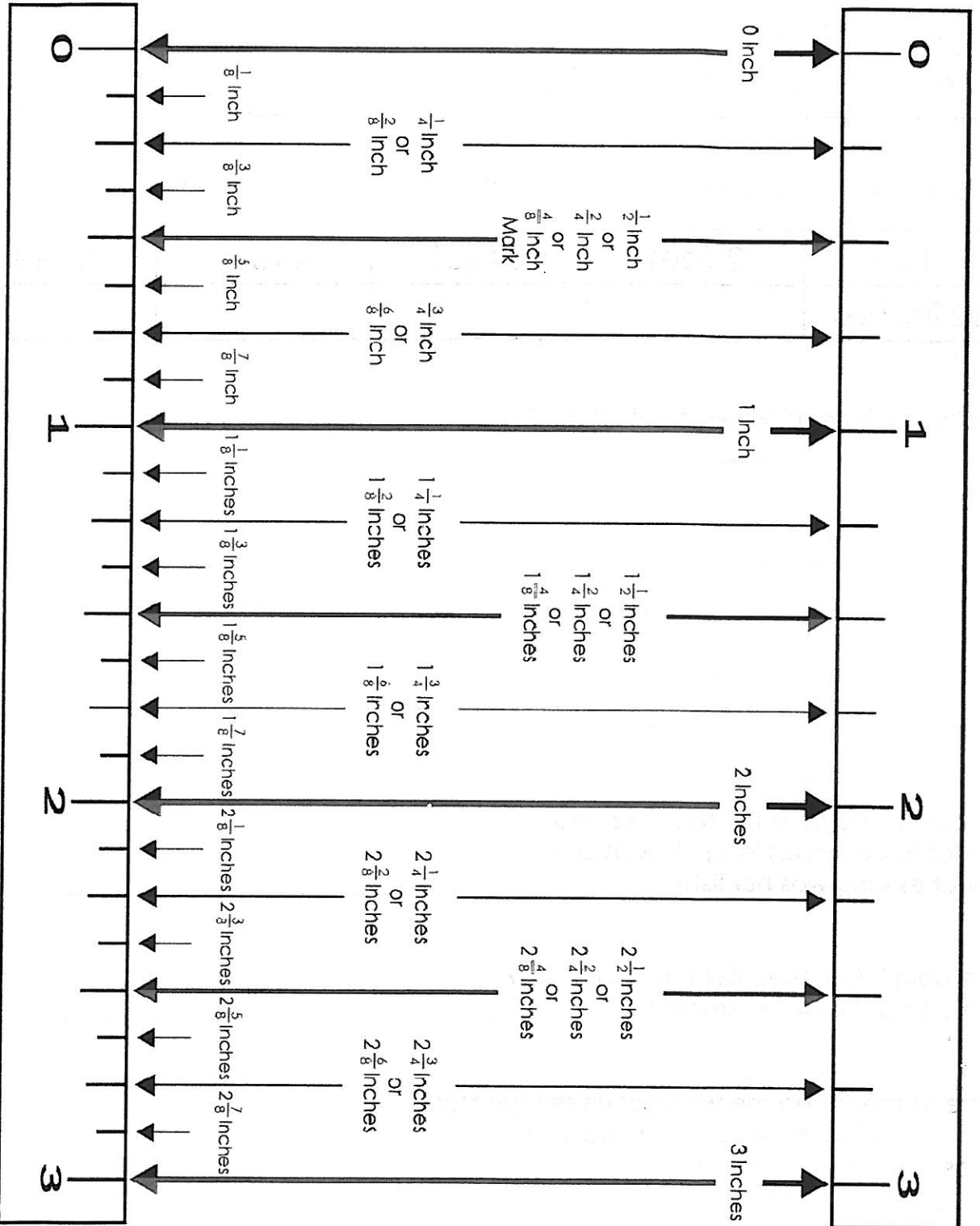
⑨ _____

⑩ _____

⑪ _____

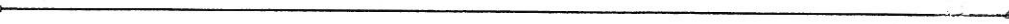
Score: _____

Name: _____



Measuring Length

Instructions: Measure the length of each line segment to the nearest $\frac{1}{4}$ -inch.

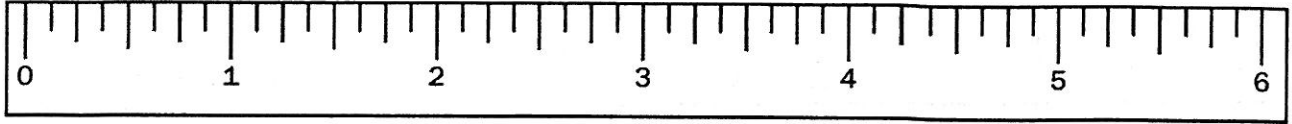
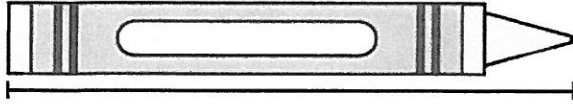


Name: _____

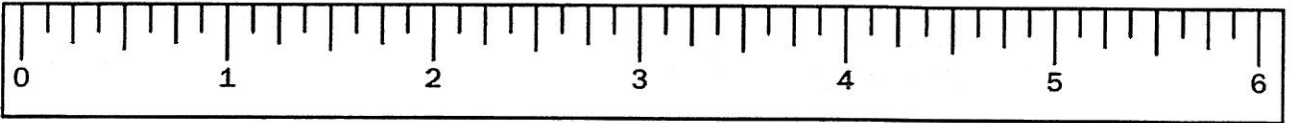
Measuring Inches

Measure to the nearest $\frac{1}{4}$ inch using the ruler shown.

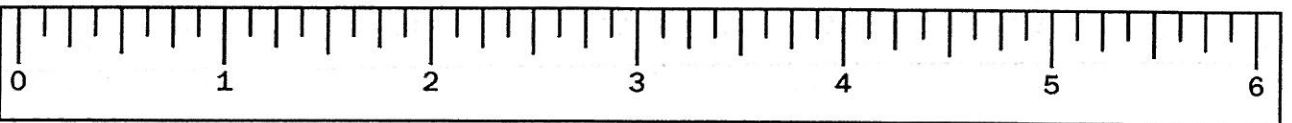
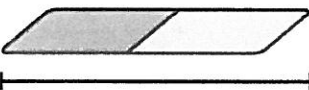
a.



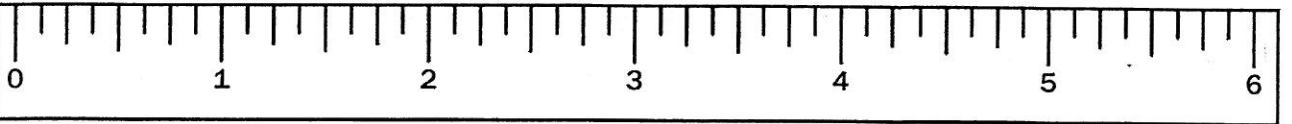
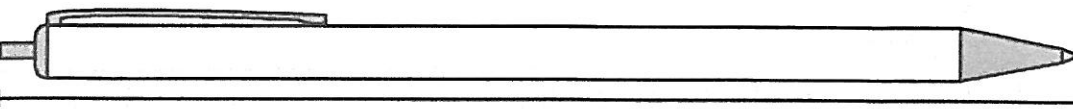
b.



c.



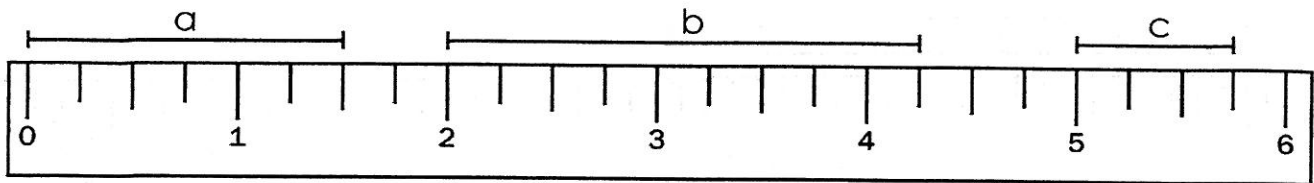
d.



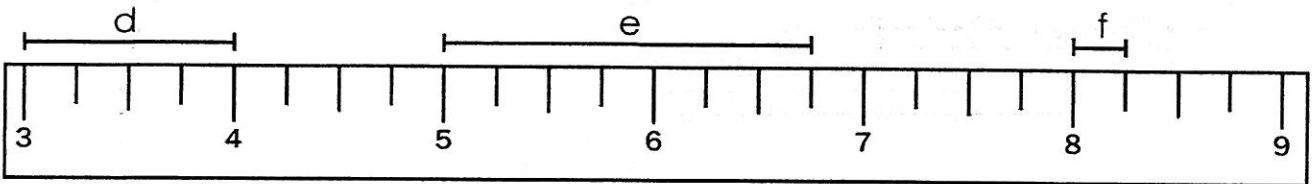
Name: _____

Measuring With a Ruler

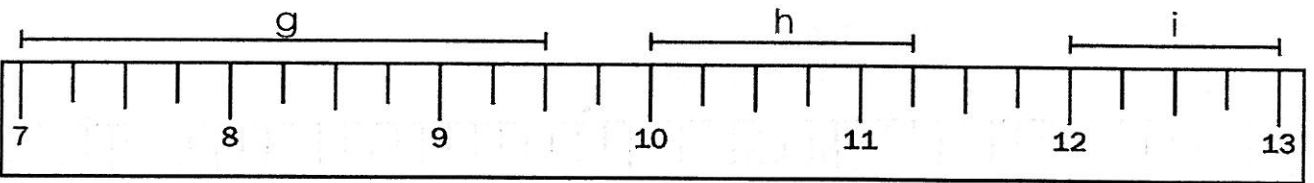
Measure to the nearest $\frac{1}{4}$ inch for each line segment using the ruler shown.



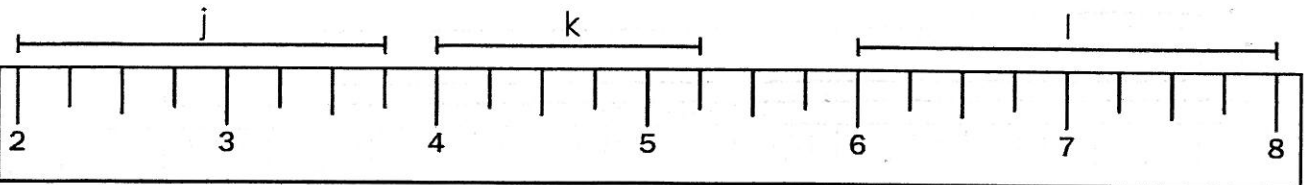
a = _____ b = _____ c = _____



d = _____ e = _____ f = _____



g = _____ h = _____ i = _____



j = _____ k = _____ l = _____

Name: _____

Yards, Feet, and Inches

Memorize this: There are 12 inches in a foot.

There are 3 feet in a yard.

There are 36 inches in a yard.

Complete the table. Then, use the table to fill in the blank lines below.

1 yard	2 yards	3 yards	4 yards	5 yards
3 feet			12 feet	
36 inches	72 inches	108 inches		

1. _____ yards = 6 feet = _____ inches

2. 4 yards = _____ feet = _____ inches

3. 180 _____ = 5 _____ = _____ feet

4. 3 _____ = 1 _____ = 36 _____

5. 9 feet = 108 _____ = 3 _____

★ 6 yards = _____ feet = _____ inches

Name: _____ Date: _____

Measuring Lines (Inches)

Measure each line to the nearest $\frac{1}{8}$ inch

① _____

② _____

③ _____

④ _____

⑤ _____

⑥ _____

⑦ _____

⑧ _____

⑨ _____

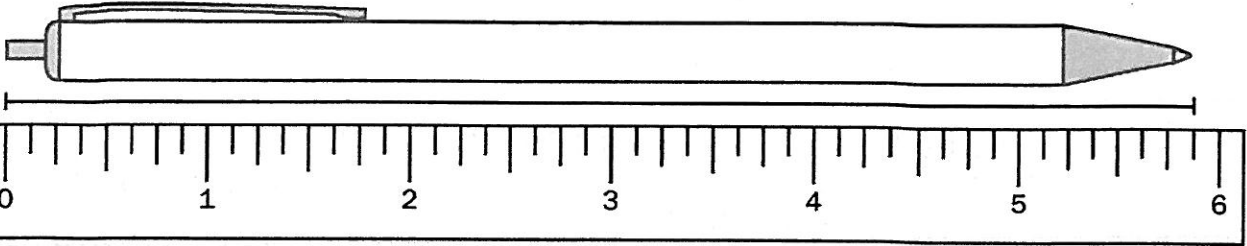
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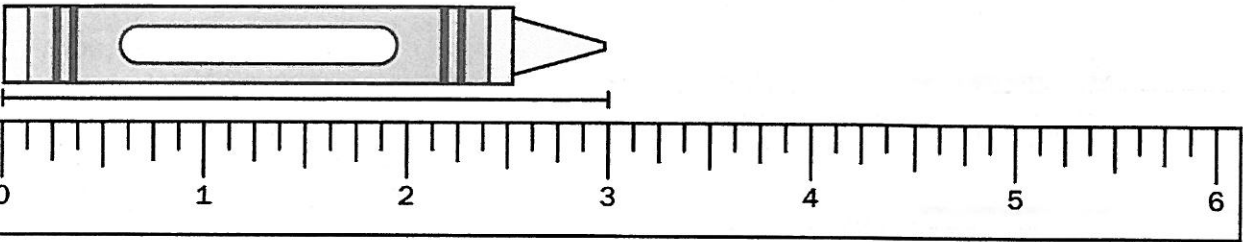
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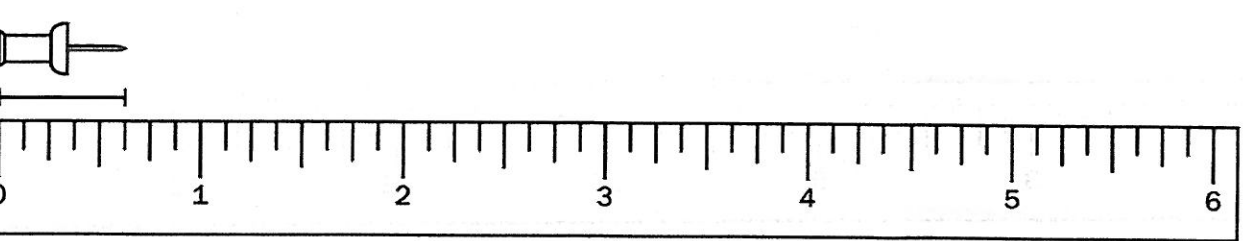
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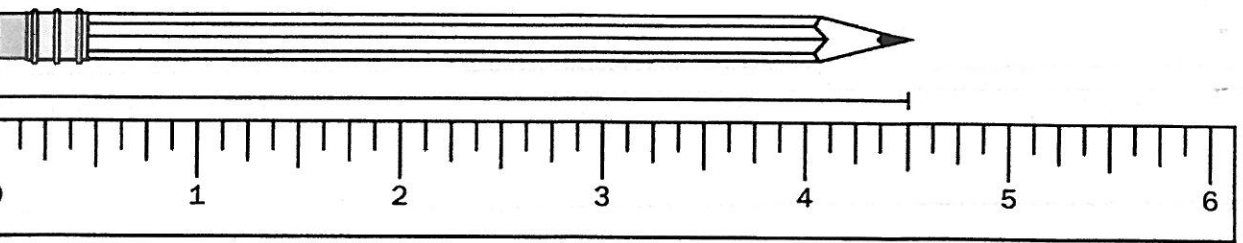
Measuring Inches

Measure to the nearest $\frac{1}{8}$ inch using the ruler shown.

a. 

b. 

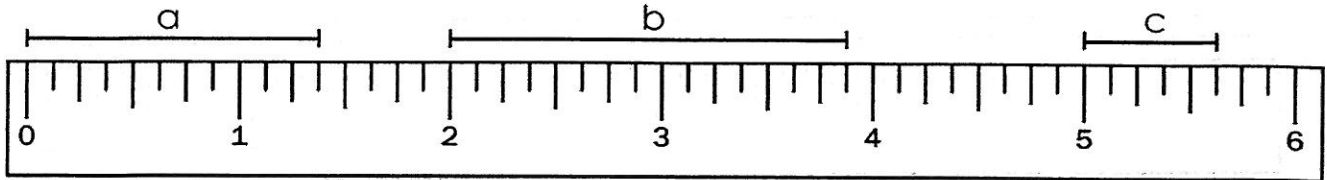
c. 

d. 

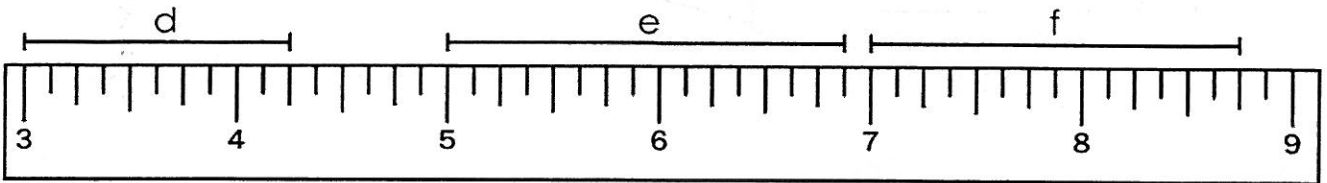
Name: _____

Measuring With a Ruler

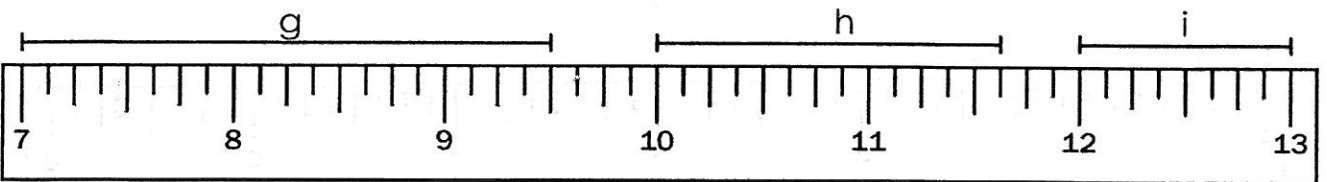
Measure to the nearest $\frac{1}{8}$ inch for each line segment using the ruler shown.



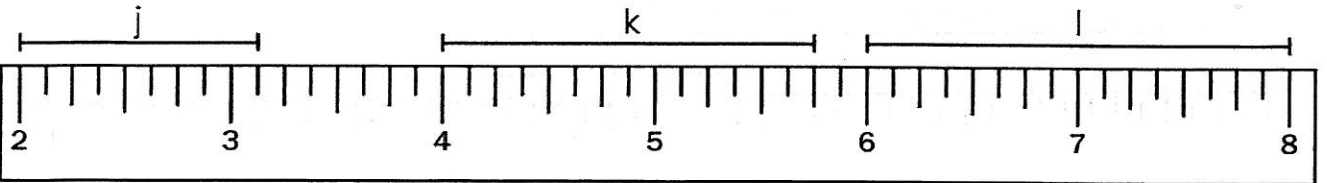
a = _____ b = _____ c = _____



d = _____ e = _____ f = _____



g = _____ h = _____ i = _____



j = _____ k = _____ l = _____

Name: _____

Comparing Inches and Feet

Compare inches to feet. Use the symbols $<$, $>$, and $=$.

6 feet _____ 74 inches

2 feet _____ 20 inches

12 inches _____ 1 foot

36 inches _____ 3 feet

9 feet _____ 100 inches

10 feet _____ 129 inches

72 inches _____ 6 feet

7 feet _____ 90 inches

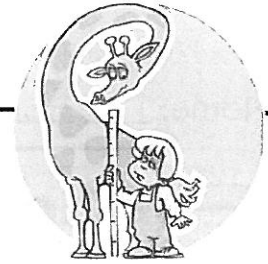
Carlita and Sam each made a paper clip chain.
Carlita's chain was 60 inches long. Sam's
chain was 4 feet long. Whose chain was longer?

Gina is 59 inches tall. Is she more or less
than 5 feet tall?

Mike's paper airplane flew 121 inches.
He said that his plane flew "about 12 feet."
Is he correct? Explain.

Name: _____

In and Out Boxes: Measurement



Complete the tables below and answer the questions that follow.

yards	1	4	7	
feet				27

rule: multiply by 3

feet	1		3	10
inches	12	24		

rule: _____

a. How many feet are in 1 yard? _____

b. How many feet are in 36 inches? _____

c. How many yards are in 27 feet? _____

d. How many inches are in 3 feet? _____

*. How many feet are in 5 yards? _____

*. How many feet are in 48 inches? _____

Use the table below to answer the questions.

yards	1	2	3	4	5	6
inches	36	?	108	144	180	216

e. How many inches are in 5 yards? _____

f. How many inches are in 2 yards? _____

g. On the lines below, describe the rule you can use to find the number of inches in a given number of yards.

Name: _____

Comparing Inches, Feet, & Yards

For each set of measurements, circle the one that is not equal to the others.

- a. 48 inches, 4 feet, 2 yards
- b. 3 yards, 112 inches, 9 feet
- c. 4 yards, 7 feet, 84 inches
- d. 12 feet, 180 inches, 5 yards
- e. 12 yards, 144 inches, 36 feet
- f. 8 feet, 72 inches, 2 yards



Rachel, Kim, and Lori each measure the length of a rope. Rachel says the rope is 15 feet long. Kim says it's 180 inches long. Lori says it's 5 yards long. Do the girls all agree? Explain.

Jerry, Barry, and Harry went fishing and they each caught a giant fish! Jerry's fish is 62 inches long. Barry's fish is 7 feet long. Harry's fish is 2 yards long. Who caught the longest fish?
