

# DAY 3: Elastic Percent Ruler

## Materials

<i>Copies:</i>	3.1 Elastic Percent Ruler Ticket Out the Door Day 3
<i>Supplies:</i>	Rulers (1 per student) Meter Sticks (1 per pair) Elastic (pre-cut - 1 per student, 20 inches long) Gel Pens (one per student) String (pre-cut - one string per pair, 25 inches long) Scissors Chart Paper Scotch Tape

## Objective

Students will build and label a piece of elastic in increments of 10% and use the elastic to measure and record pictures demonstrating an understanding of the concept of percent in relation to real objects.

## Student Talk Strategy

Think-Pair-Share to consider how to set up scenarios 2 and 3 in 3.1

## Academic Language Use

Percent- “out of 100”. In this unit, percent will be understood as the number of boxes colored out of 100. Percent will be understood as an “elastic” number, meaning that the actual amount of a percent changes depending upon what the whole is.

## Activity Notes

Note: this is a very challenging activity, as it is dealing with the concept that “1” changes. This goes against intuition, as students have come to see 1 as always being 1 object, and now 1 changes depending upon what the whole is.

### **10 minutes: Make the elastic percent ruler**

Students will each make an elastic percent ruler. Distribute a piece of elastic (pre-cut) to each student, 20 inches long, one ruler per student, and one gel pen per student. Pass out tape to each row; each student will need two small pieces. Also pass out activity sheet 3.1.

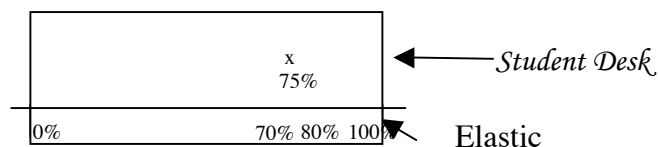
Demonstrate making an elastic percent ruler in front of the class and have the students make theirs with you. Begin by using scotch tape to tape down each end of the elastic on the desk. On the elastic, put a mark about 1 inch from the end using the ruler. Label this mark 0. Note: It is important that students leave the 1 inch at the end of the elastic. The 0 **does not** go at the very end of the elastic. Put fifteen more marks on your elastic at 1 inch intervals from your initial mark. Label the mark 10, then the next 20, etc until

you get to 150. Students now have an Elastic Percent Ruler (EPR). **Note:** Making an accurate elastic percent ruler is very important to the effectiveness of the activity. Be sure to be explicit about this with students.

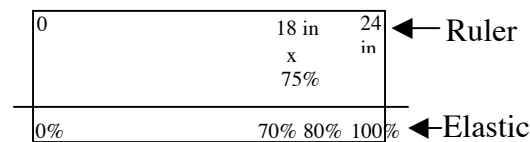
### 10 minutes: Model problem #1

Put students into groups of 2 for the remainder of this activity. Direct the students' attention to problem #1.

Stand in front of the class at a student desk so all can see (or use the shortest length of a student table). Let the students know that the width of the desk needs to represent 100%. Show them how you hold the elastic to the left of 0 and to the right of 100% and stretch it so that 0 is at one end of the desk and 100% is at the other end. Then ask the students what it is the problem is asking. They should reply with, "How much is 75%?" Ask a volunteer to come place their finger (or a small object) on the desk where 75% is on the EPR. Now remove the EPR and draw the following picture (and have the students draw this on Activity Sheet 3.1 as well).

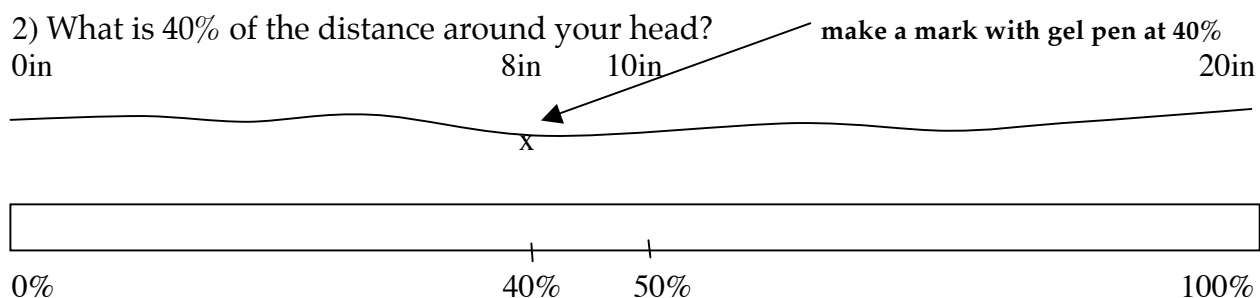


Now take out a ruler (or 2 rulers or a meter stick) and lay it across the width of the desk. On the picture you have drawn, label two numbers for the students: 0 inches and the total width of the desk (in the example below, the width was 24 inches). Ask the students to estimate how many inches 75% would be (using the picture). If it helps, feel free to also label 50% and the corresponding inches for that. Then look at the ruler to determine exactly what 75% is (note: this is still an estimate) and record this on the diagram (see below). Use random selection to call on a volunteer to explain what you just did (to ensure all understand).



### 10 minutes: Setting up scenarios 2 and 3

Direct the students' attention to problem #2. Call on a student to come up front to model problem #2. Use Think-Pair-Share to have the students try to understand how to use the elastic for this scenario. To do this, give the class 30 seconds to think silently about how to use the elastic to find 40% of the distance around the head. Then give them 1 minute to discuss with a partner and then select a few students to share ideas. Then model how to do this. Use a piece of string to determine the circumference of the students' head. Cut the string so that it is exactly the circumference of the head. Place the string flat on the document camera or use magnets to display on the white board. Now it is time to use the elastic percent ruler (EPR) to find the answer to the question below (problem #2 on Activity Sheet 3.1). In the example below, the student's head circumference is 20".



Measure the length of the string with a ruler in inches. (Students may need to two rulers to complete the measurement, or they can use meter sticks.) In the picture above, the string is 20 in long. Stretch the EPR across the length of the string so that the 0 on the EPR corresponds with the left end of the string and 100% corresponds with the right side of the string. **VERY IMPORTANT NOTE: When using the EPR, students must always hold the left end BEFORE the 0 and the right end AFTER 100% or the highest percent they need greater than 100.**

Ask the following questions to the students (you may want to write the questions ahead of time on a piece of paper to display on the Elmo as you are asking them):

- ❑ Why is the 0% at the end of the string?
- ❑ Why is the 100% at the other end of the string?
- ❑ If the string (or distance around head) is 20 in (this value will vary), what will 50% of the distance around your head be?
- ❑ If 50% is 10 in, what is your prediction for 40% of the distance around you head? Why?
- ❑ Can anyone think of a reason why the EPR exceeds 100%? When would we need that?

Look at the 40% mark on the EPR and use the gel pen to mark a spot at that point on the string. Then use a ruler to determine how many inches 40% of the string is. In the example above, 40% of the distance around a 20 inch circumference is 8 inches. These answers will vary depending upon the individual person. Note: Using the EPR does not always result in precise answers for a variety of reasons. This exercise is centered around number sense and giving students a clearer picture of what percent means, how it is used, and the ability to estimate and narrow their answers on the CST exam.

Give each pair a piece of string that is 25 inches long. Have the students follow the same process you used up front, but this time have them measure one of the partner's heads. **Make sure students draw a picture each time.**

Follow the same process for scenario #3: have the students use think-pair-share to discuss ideas for how to set it up and then model how to set it up.

### 20 minutes: students work on scenarios 4-7

Instruct partners to complete problem 3 and then try problems 4-7 together while walking around helping students. Note: #5 is more difficult than the others, as the

students will need to hold the end of the EPR and pull it until 60% is at the end of their shoe. When a pair finishes all their problems correctly, have them draw their picture on the whiteboard in the front of the room (or on chart paper to hang around the room) for one of the problems. Do this so that you have numbers 3-7 worked out and shown around the room. Note: Problems 5 and 7 require the students to extend the elastic.

**5 minutes: Pairs present their work**

When most are done with number 7, have the pairs who solved the problems on the whiteboard share how they set up their problems, how they made the picture and what answer they got.

**5 minutes: Ticket out the Door**

Pass out the Ticket out the Door and have the students raise their hands when finished (so that you can check it and then dismiss them).

**NOTE: SAVE the EPRs as students will need them on Day 4!!!!**