Homework 3

Read: page 19 to the top of page 20 of the Lobato and Ellis book. Try solving the Reflect 1.3 Task on your own using composed unit reasoning. Then skip the rest of Page 20 [You'll read that for Homework 4]. Check your work on Reflect 1.3 with the solution on page 21. Then finish reading pp. 21-22.

How to include drawings in a homework assignment. Questions 4 & 5 ask you to submit drawings with your explanations.
- One option is create the drawing electronically using a tablet, an iPad, or the drawing tools in MS Word
- Alternatively you can create drawings by hand on paper and then take a photo with your smartphone (or use a scanner app on your phone, like Notes on an iPhone). Then insert the photo or scan into your MS Word document.
- **Be sure to type the explanation** that goes with your drawing (rather than taking a photo of a hand-written explanation).

Answer the following questions. Do **NOT** include your response to Question 3 when you submit the assignment; instead check your work against the drawing and response included at the end of these instructions.

1. In your own words, define or characterize what it means to form a ratio as a composed unit. Provide an example.

2. **Video** of Kate and Christopher. Go to www.mathtalk.org. Select "Students." Then select "Proportioning Reasoning Unit." Select "Lesson 3"; then select "Episode 4." Watch the 5 minute video. Then answer the question below:

   Describe how Kate and Christopher reasoned with composed units to explain why traveling 15 miles is 6 minutes is the same speed as traveling 10 miles in 4 minutes.

   *Note: I am asking you to present the argument in your own words; you do not need to include their drawing.*

3-5. Solve each of following problems by reasoning with a **composed unit**. Create a **drawing** that you think would be appropriate to use with middle school students. **Explain** your thinking and the drawing in a way that you think would be effective with students. Think like a teacher. Don't use the proportion algorithm or any calculations, such as reducing fractions. If you do perform a calculation, it needs to be shown in the drawing (e.g., multiplying something by 5 can be shown as making 5 groups or copies of that thing).
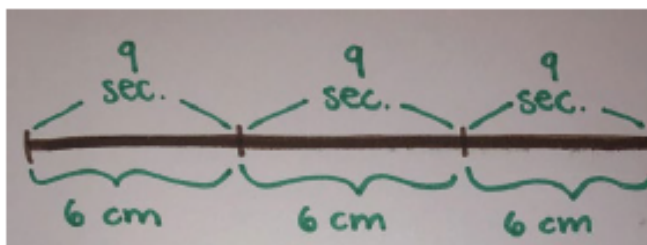
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3. Suppose a frog travels 6 cm in 9 sec. If the frog continues at the same pace, how many seconds will it take to walk 21 cm? [After you are done, check your work against the sample response at the end of this assignment.]

4. Suppose a frog travels 6 cm in 9 sec at a steady pace. How far did the frog walk in 6 seconds?

5. A zookeeper made a batch of Monkey Chow. Two of the ingredients are 4 cups of pumpkin and 9 cups of oatmeal. The zookeeper would like to make a larger batch of monkey chow that will taste the same as the original batch. If she uses 21 cups of pumpkin, how much oatmeal should she use?

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Sample Response to Question 3

We know the frog travels 6 cm in 9 seconds, which we can show in a picture:
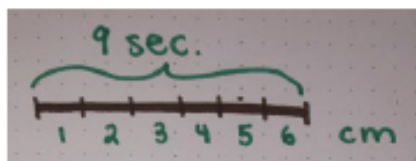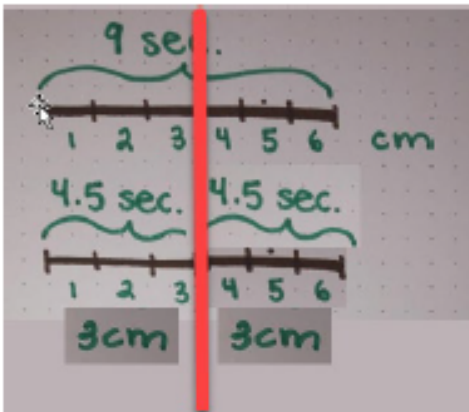

We want to know how many seconds it will take the frog to walk 21 cm, so let's repeat his little journey of 6 cm in 9 seconds a few times:

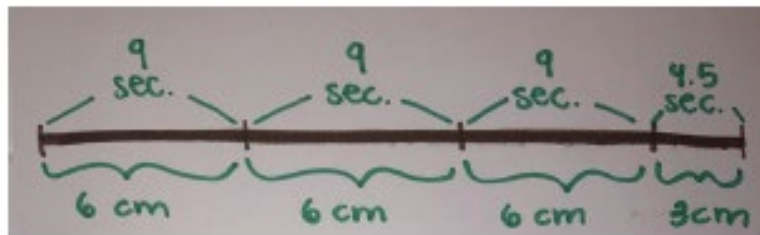Altogether, the frog has walk 18 cm in 27 seconds. But 18 cm is 3 cm short of 21 cm.

To figure out how long it will take to walk 3 cm, we can split the little journey of 6 cm in 9 seconds in half:

From the picture, we can see the frog take 4.5 sec to walk 3 cm.

Now we can add the 3 cm in 4.5 sec chunk to the previous diagram:

Since $27 + 4.5 = 31.5$, we know that it the frog 31.5 seconds to travel 21 cm.