MTEL REVIEW, FALL 2014
DR. GRAHAM-SQUIRE

NON-MULTIPLE CHOICE QUESTIONS

1. Area and Volume

1) If 1 yard is equal to 3 feet, does this mean that 1 square yard is equal to 3 square feet? Make a drawing to show how many square feet are in a square yard.

2) A garden is 4 yards long and 2 yards wide. What is the area of the garden in square yards? What is the area of the garden in square feet? Show two different ways to solve this problem.

3) A pile of pebbles is contained in a box 2 yards long, 2 yards high, and 2 yards wide. Does this mean that the pebble pile has a volume of 2 cubic yards? Explain. What is the volume of the pile in cubic feet?

2. Averages

1) You have 3 plates of cookies, one with 2 cookies, one with 5 cookies, and one with 3 cookies. How could you arrange two more plates so that there is an average of 4 cookies on each plate?

2) Explain how you could quickly calculate the average of the following test scores:

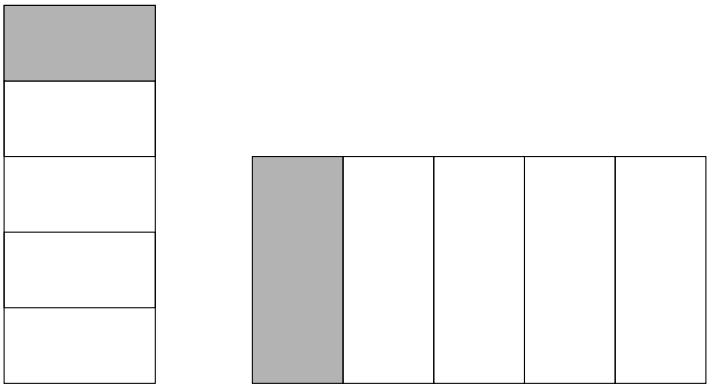
$$86, 88, 91, 92, 94, 89$$

3) Suppose you are in a class that meets 5 days a week, and there is homework every day of class. If you scored an average of 70% on the homework the first week, and then and average of 100% the next two weeks, what will your average be for that whole 3-week period?

Before you start to solve the problem, explain why your average over the 3-week period is NOT just the average of 70 and 100–namely, 85. Should your average be *more* than 85 or *less* than 85? Explain how to answer that without a precise calculation, then do the full calculation to check that your answer is correct.

3. Fractions

Below is a map of Steve's garden. He has two rectangular plots, each divided up into 5 equal pieces. The shaded parts show where he has planted tomatoes. What fraction of Steve's garden is planted with tomatoes?



Spend a few minutes thinking about what the answer should be, then look at the responses from how some students tried to answer the question. Is their method correct? If not, what is wrong about it?

- Ellie said: "There are 2 parts shaded out of 10 total, so that is the fraction $\frac{2}{10}$. That reduces to $\frac{1}{5}$, so one-fifth of the garden is planted with tomatoes."
- Eva said: "If you take the two shaded pieces, you can arrange them to make an L shape. If you take the other pieces in the same way, you can make four more unshaded L shapes that are the same size. Since there are five identical L shapes and one of them is shaded, $\frac{1}{5}$ of the garden is planted with tomatoes."
- Dominic said: "$\frac{1}{5}$ of the first plot is shaded, and $\frac{1}{5}$ of the second plot is shaded, so the total shaded amount is $\frac{1}{5}+\frac{1}{5}=\frac{2}{5}$. So two-fifths of the garden is planted with tomatoes."

4. Marbles

There are 200 marbles in a bucket. Of the 200 marbles, 60% have swirled colors and 40% have solid colors. How many swirled marbles must be added to the bucket so that 80% of the total marbles are swirled?