MTH-2010, SPRING 2015
DR. GRAHAM-SQUIRE

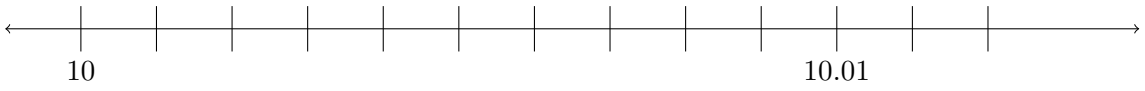
FINAL EXAM REVIEW

- The final exam will cover all of Chapters 1 through 9, as well as Chapters 15 and 16. While there will be a few easier, MyMathLab-type questions on the test, the bulk of the questions will be closer to the types of things we have covered in class and the questions that you find at the end of each section of the textbook. There will also be 5-7 questions similar to the types of questions you will have on the MTEL licensure test.
- I estimate the final exam will take about 2 hours for most students, but you will have the full 3 hours to take it.
- To prepare, I recommend you look over the materials we have used in class and end-of-section problems (there are also end-of-section practice exercises that also have answers in the textbook, and these are good too. I will focus on the problems, though, since those don't have answers).

Below are some questions that touch on material we have covered this semester. There is no way that I can cover all of the material that we have learned this semester in one review sheet, so you should not assume that just knowing how to do these problems will be enough for you to do well on the final exam. In particular, if you think that the final exam will be these exact same problems, but with some numbers changed, then you are a fool. With that said, these problems are intended to be representative of the kinds of problems that could be on the test, both in the topics covered and the expected difficulty level.

1. Chapters 1-4

(1) Label the tick marks between the decimal numbers:



(2) Laurie rounded 4.35851 to 4.4 by using the following method: She said that she rounded from right to left, either up or down depending on whether the number was less than five or greater than or equal to five. So 4.35851 rounded down to 4.3585, which rounded upto 4.359, which rounded up to 4.36, which rounded up to 4.4.
   (a) Is Laurie's answer correct?
   (b) Is Laurie's method correct?

(3) Use the location of $\frac{3}{8}$ on the number line to find the position of $\frac{2}{3}$ on the number line. Explain your reasoning.

(4) There are 70 red plastic cats in a bucket, and they make up 40% of the plastic cats in the bucket. If 25 red plastic cats are removed from the bucket, what percentage of the plastic cats will then be red?

(5) Which of the following are word problems for $\frac{2}{3} - \frac{1}{2}$? If a problem does not match $\frac{2}{3} - \frac{1}{2}$, explain why it does not.

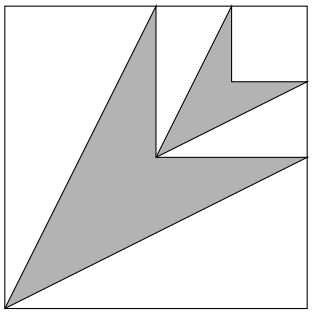
(I) Bob pours $\frac{2}{3}$ cup of water into a pot, then pours out $\frac{1}{2}$. How much water is in the pot now?

(II) Yesterday Jane ate $\frac{2}{3}$ of a chocolate bar, and today she ate $\frac{1}{2}$ of a chocolate bar the same size. How much more did Jane eat yesterday than today?

(III) $\frac{2}{3}$ of a bridge has been paved. $\frac{1}{2}$ of the paved part of the bridge already has guard rails. What fraction of the bridge has guard rails?

(IV) Jack keeps $\frac{2}{3}$ of his money in a savings account. He decides to take $\frac{1}{2}$ of his money and put it in the stock market. If he takes it all out of his savings account, what fraction of his money does he still have in the savings account?

(6) What fraction of the diagram is shaded?



(7) The design on a roll of wrapping paper is made up a repeated swatch, 3 inches by 5 inches, which has 11 beautiful butterflies on it. If the wrapping paper is 42 inches by 10 feet, how many butterflies would there be if the paper was rolled out completely?

(8) A student calculates 28×40 in the following way: "3 times 4 is 12, so 30 times 40 is 1200. Then 2 times 4 is 8, so it should be 1200-80, which is 1120."

(a) Is the student's calculation correct?

(b) Explain the student's calculation using symbols and equations to demonstrate why/how the work is correct or incorrect.

2. Chapters 5-8

(1) Which of the following are word problems for $\frac{3}{4} \times \frac{1}{5}$ and which are not? Explain your reasoning.

(a) $\frac{1}{5}$ of the students in the class are at the art station. $\frac{3}{4}$ of the students at the art station are painting. How many students are painting?

(b) $\frac{3}{4}$ of the students in the class are having a dance party. $\frac{1}{5}$ of the students having a dance party are doing the robot dance. What fraction of the class is doing the robot dance?

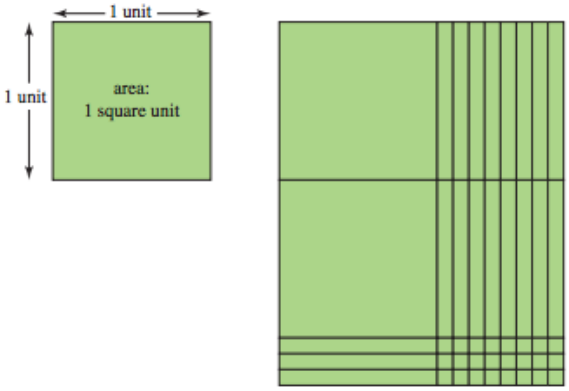
(c) Jenny has $\frac{3}{4}$ of a cake left. $\frac{1}{5}$ of her friends want some cake. What fraction of the cake does each friend get?

(d) $\frac{1}{5}$ of the surface of Lake Washington is covered with houseboats. $\frac{3}{4}$ of the surface of Lake Octavia is covered with houseboats. What fraction of the surface of *both* lakes is covered with houseboats?

(2) (a) Multiply 2.3×1.8

(b) To solve 2.3×1.8, a student multiplies 23 times 18, but he can't remember where to put the decimal place. Explain how to reason where the decimal place should go by looking at the sizes of the numbers 2.3 and 1.8.

(c) Explain how to use the diagram below to calculate 2.3×1.8:



(3) (a) Use the fact that every division problem can be rewritten as a multiplication to explain why $5 \div 0$ is undefined.

(b) Use a word problem to show how $5 \div 0$ does not make any sense.

(c) Both $5 \div 0$ and $0 \div 0$ are undefined mathematical expressions, but for different reasons. Explain how/why they are different.

(4) Rachel biked 12 miles in $\frac{3}{4}$ of an hour.

(a) Assuming she continues at the same speed, how many miles can Rachel bike in one hour?

(b) At that pace, how long does it take Rachel to bike one mile?

(5) The ratio of Ron's candy to Lindsay's candy is 5 to 2. After Ron gives Lindsay 34 pieces of candy, the ratio is now 3 to 4 (with Lindsay having more candy). How many pieces of candy does Lindsay have now?

(6) (a) Dominic is building cubes out of blocks. He uses 8 cubes to make a cube with two blocks on each side. He now wants to know how many blocks he would need to build a cube with 6 blocks on each side, so he sets up the proportion

$$\frac{\text{length of side}}{\text{number of blocks}} = \frac{2}{8} = \frac{6}{x}$$

Is this correct? If so, solve it. If not, explain why not and then explain how to solve the problem.

(b) Eva knows that it takes four kids 10 minutes to build a sand castle. She wants to know how long it would take 6 kids to build a sand castle, so she sets up the proportion

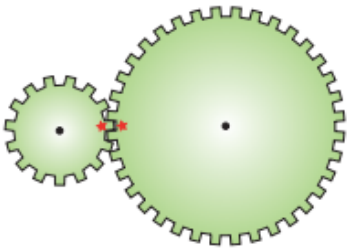
$$\frac{4}{10} = \frac{6}{x}$$

Is this correct? If so, solve it. If not, explain why not and then explain how to solve the problem.

(7) Use divisibility rules to decide which of the following numbers are divisible by 36:

72 18 189 450 93132 8891380

(8) Two gears are meshed, with two stars lined up on the gears (similar to on the diagram below). The smaller gear has 126 teeth, and the larger gear has 300 teeth. How many rotations must the smaller gear make before the two stars are once again in alignment?



(9) Without simplifying the fractions, how you can quickly tell that the fractions $\frac{4242}{9999}$ and $\frac{424242}{999999}$ are equal?

3. Chapters 9, 15 and 16

(1) A student picks a secret number, x. They then encode the number by doing the following:

- Multiply the secret number by 4
- Subtract 2 from the result.
- Multiply the result by 5.
- Add 12 to the result.

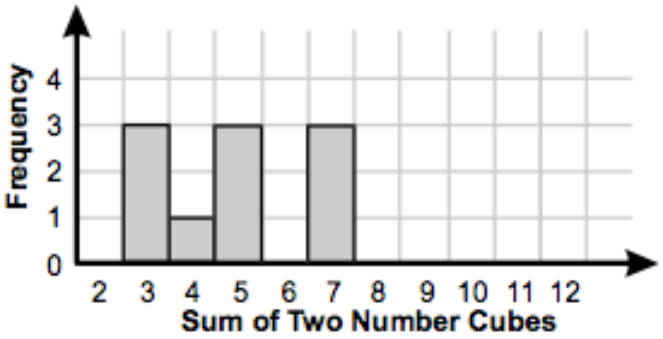
The final result is the student's *encoded* secret number. They give it to their partner, who decodes it by doing the following:

- Subtract 2 from the encoded number.
- Divide the result by 10.
- Divide the result by 2.

The final result should be the original student's secret number. Use algebra to explain why this works.

(2) Originally, there were L cups of liquid in a container. After $\frac{3}{4}$ of the liquid was poured out, another $4\frac{1}{2}$ cups of the liquid were added to the container. When $\frac{1}{3}$ of the liquid is poured out, 5 cups remained. What was the original amount of liquid in the container?

(3) Use the histogram below to answer the question that follows.



Two 6-sided number cubes are rolled simultaneously 10 times. The sums are recorded in the histogram shown above. Are the mean and the median equal? If not, which one is greater, and by how much? Explain your reasoning and/or show your work.

(4) A teacher gives a quiz to a class of 7 students, whose scores can range from 1 to 10, only whole numbers.

(a) If the median score was a 6, what is the *lowest* possible mean score? What is the *highest* possible mean score?

(b) If the mean score was a 6, what is the *lowest* possible median score? What is the *highest* possible median score?

(5) There are six balls in a bag–two red and four green. Six children take turns picking a ball out of the bag without looking. They do not return any balls to the bag. What is the probability that the first two children to pick from the bag pick the red balls? Explain your reasoning.

(6) (a) A club has 30 members, and they are going to elect a president and a vice-president. How many different ways can they elect a president and a vice-president?

(b) A club has 30 members, and they are going to elect two co-presidents. How many different ways can they elect two co-presidents?

(c) Are your answers for (a) and (b) the same? If not, explain why they are not the same.