MTH-2010, SPRING 2015
DR. GRAHAM-SQUIRE

TEST 3 REVIEW KEY

For the following problems, I either put the answer in or refer you to the video answer (in case I cannot do it justice with just a simple answer).

- Section 6.3: #5: (a) She did $(800+34) \div 25 = 800 \div 25 + 34 \div 25 = 32 + 1$, with remainder of 9.

  (b)$700 \div 25 = 28$, $81 \div 25 = 3$ remainder 6, so get 31 remainder 6. In words, would be "25 goes into 100 4 times, so there will be 7*4=28 25s in 700. There is 81 remaining, and 25 goes into that 3 times, with remainder of 6. So the final answer is 31, remainder 6."

  #20: Jessica is wrong, because it is 2 1/3, she would need to do $1 \div 3$ to get the decimal. She just put the remainder into the tenths place, but the 1 is not a "tenth", it is a "third".

  #22: (a) 480/40 is a better approximation, better to round both of them up. You can check the divisions as follows: That correct calculation is 459/38=12.079, and the two approximations give you 480/40=12 versus 440/40=11. In general, if you round a numerator up then you make the result *larger*, and if you round a denominator up you make the result *smaller* (because you are dividing by a larger number). So if you round both top and bottom up, the smaller and larger cancel each other out to give you something close to the correct result. If you round the top down (makes the result smaller) and also round the bottom down (makes the result smaller), you end up with a result that is much smaller than the original.

  (b) 440/40 is better, better to round both down.

  (c) 660/60 is good, rounding both up. 630/60 is also pretty good, but 660/60 is a better approximation.

  (d) 600/60 is good, though 630/60 is better.

  #24: It is not normal practice to use negatives in the scaffold method, but it is mathematically legitimate. You could explain it as follows: I want to divide 6998 dollars between 7 people. I start by trying to put \$1000 in seven piles, but I end up two dollars short. To make things even, then, I take 5 dollars away, then even out the dollars so everyone has \$999 in their pile, and I have \$5 left over.

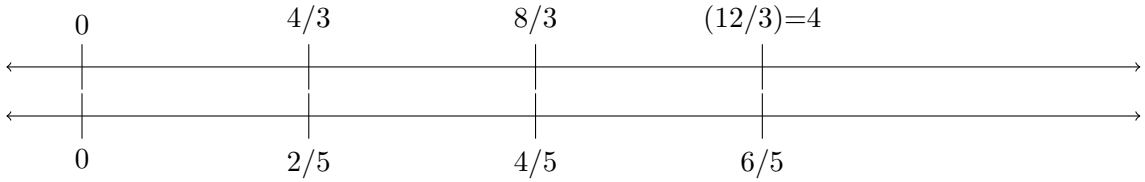
- Section 6.4: (#7) 6 2/3 loads. Solving with a table:

Cups of detergent	3/4	1 1/2	2 1/4	3	3 3/4	4 1/2	5 1/4
Number of loads	1	2	3	4	5	6	7

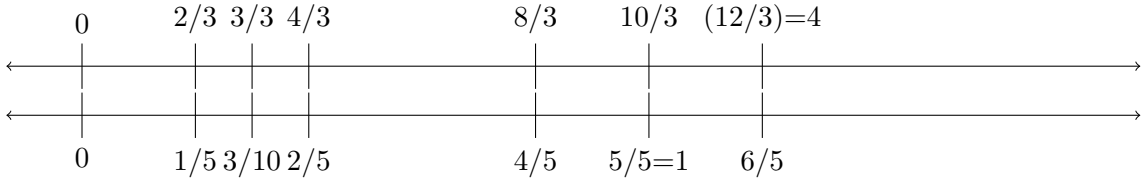
From the table, you can see that there is enough detergent for 6 full loads, but not enough for seven (because we only have 5 cups). So that is 6 full loads with 1/2 cup of detergent left over (because 5-(4 1/2)=1/2). That 1/2 cup of detergent is equal to (1/2)÷(3/4) of a load, because you have to divide the remainder by what would be a whole load. (1/2)÷(3/4)=2/3, so the final answer is 6 and 2/3 loads.

(#14) See video.

- Section 6.5: (#7) Here is the double number line. On top is the cans of paint and below is the fraction of the room.



To figure out how many cans of paint you would need to paint the whole room, you can put a hash mark in between the 4/5 and 6/5 of the room, and also calculate halfway between the cans of paint. Halfway between 8/3 and 12/3 is 10/3, so you would need 3 and 1/3 cans of paint. To figure out what fraction of the room you could paint with one can, it is easiest (in my mind) to first break the 4/3 in half to get to 2/3, then find halfway between 2/3 and 4/3 to get to one can of paint. On the bottom, halving the 2/5 gives you 1/5, and halfway between 1/5 and 2/5 is the same as halfway between 2/10 and 4/10, which is 3/10. See below:



(#11) (a) 67.5 minutes. He needs to mow another 1/3 of his lawn, which will take him half as much time as he has already spent. Half of 45 is 22.5, and when you add that 22.5 to 45, you get 67.5 total minutes.

(b) **Ans**: 8/9 of the lawn. We need to figure out how much he can mow in the next 15 minutes. 15 minutes is 1/3 of what he has already mowed, which would be (1/3)*(2/3)=2/9 of the lawn. Adding the 2/9 to the 2/3 he has already mowed gives (2/9)+(6/9)=8/9 of the lawn.

- Section 6.6: (#4) see video.

(#12) (a) **Ans**: 8 2/3 cups. 1 serving equals 1/4 of a cup and 78 servings in the bag means that there is 78/4=39/2=19.5 cups of flour in the bag. The bag is 2.26 kg, which is approximately 2.25=9/4 kg. So 1 kilogram would be 4/9 of the bag. We now multiply $\frac{4}{9} \times \frac{39}{2} = \frac{78}{9}$ cups. Simplifying gives 8 and 6/9, or 8 and 2/3 cups

(b) 8 cups, then two scoops of 1/3 cup.

- Section 7.1: (#5) The first box is a better buy. A ratio table would show that 720 loads of the first box would cost \$114.75, and 720 loads of the second box would cost \$135.

  (#8) (a) they are all wrong. The important consideration is not the amounts going into each mixture, but the ratio of the amounts going into each mixture.

  (b) The first mixture is more yellow than the second, because it has a higher percentage (62.5) yellow than the second mixture (60 percent). You could also make two ratio tables, and you would see that the first mixture is equivalent to 12 parts red to 20 parts yellow, whereas the second mixture is 12 parts red to 18 parts yellow. Since the first one has more yellow (20 to 18) for an equal number parts of red (12), it is the more yellow paint.
- Section 7.2: (#3) 27 emperor penguins. Draw out a strip diagram with two boxes for King and three boxes for Emperor penguins. Total there are 5 boxes and 45 penguins, so that means each box represents 45/5=9 penguins. 9 penguins each in three boxes gives 27 emperor penguins. To use a ratio table, you would have a row for 2 and a row for 3, then a row with five below to represent the total number of penguins. We need to figure out what to multiply 5 by to get to 45, which is 9. We then multiply the 3 by nine (=27) to get the number of emperor penguins.

  (#13) 1.04 liters. I would solve it by setting up the fraction $\dfrac{1.3}{2.7} = \dfrac{0.5}{x}$. That is, the ratio of 1.3 to 2.7 is the ratio of ingredient A to ingredient B is the ratio of 0.5 to x, where x is the extra amount of ingredient B we must put in. Solving the equation gives $x = (2.7)(.5)/1.3 = (1.35/1.3) = 13.5/13 = 1.03846\ldots$

  (#19) see video
- Section 7.3: (#8) Dividing (2 1/2) by (3/4) tells you that you get $\frac{5}{2} \div \frac{3}{4} = \frac{5}{2} \times \frac{4}{3} = \frac{10}{3} =$ 3 1/3 truckloads per acre. This would give 10 truckloads for 3 acres, and a total of 11 2/3 truckloads for 3.5 acres (multiply 10/3 by 7/2 to get 35/3).
- Section 7.4: (#6) No, that proportion is wrong because you should be comparing areas. Should be (3.5/100)=(x/225)

  (#12) **Ans**: 6 minutes. One way to figure this out is to choose a number for the amount of gallons that are in the vat. You should choose a number that is easily divisible by both 15 and 10, so maybe choose 30 gallons in the vat. Then hose A fills the vat at a rate of 30/15=2 gallons per minute, and hose B fills the vat at a rate of 30/10=3 gallons per minute. Together, both hoses would put in 2+3=5 gallons per minute, so it would take them 30/5=6 minutes to fill the vat together.
- Section 7.5: (#5) Bob's method is not correct, he took 25 percent of the new price instead of the old. What he should do is notice that if 1500 is 1/4 less than the original price, you could also say that 1500 is 3/4 *of* the original price. This makes the equation $\frac{3}{4}$x=1500. Multiplying both sides by $\frac{4}{3}$ gives x=2000, which is the correct answer.

  (#9) (a) (c) and (d) are all the same, 53% of old price

  (b) is 153% of old price, and (e) is 53% of new price.

  (#24) see video.

- Section 8.1: (#7) (a) If B is a factor of A, then all of B's factors are also factors of A. So if $A = B \times k$, and $B = m \times n$, then n and m are factors of B. Substituting in for B, we have $A = m \times n \times k$, so m and n are also factors of A. For example, 6 is a factor of 12. So this means that every factor of 6 (1, 2, 3, 6) is also a factor of 12.
  (b) If A is a multiple of B, then all of A's multiples are also multiples of B. Since 12 is a multiple of 6, every multiple of 12 (12, 24, 36, 48, 60, ...) is also a multiple of 6.
- Section 8.2: (#7) You will always get an odd number. Since the even number can be put in pairs, doing it three times you will still be able to make pairs for all the items. Adding one means there is one left over, so it is odd.
- Section 8.3: (#9) see video
  (#15) (a) Never. Since you will add an even and an odd number, the result will always be odd, and thus NOT divisible by two.
  (b) Always. $x + (x + 1) + (x + 2) = 3x + 3 = 3(x + 1)$ is always divisible by three.
  (c) Never. You will always have a remainder of 2. Mathematically, we can say $x + (x + 1) + (x + 2) + (x + 3) = 4x + 6$. The $4x$ is evenly divisible by 4, but the 6 will always give a remainder of 2.
  (d) Always. $x + (x + 1) + (x + 2) + (x + 3) + (x + 4) = 5x + 10 = 5(x + 2)$ which is divisible by 5 because 5 is a factor. (e) For odd N it will always be true, for even N it will never be true.
- Section 8.4: (#5) Because 19×23 is divisible by 19, if you try to divide $19 \cdot 23 + 1$ by 19, you will get a remainder of 1, and 19 does not divide into 1. Same argument goes for 23.
- Section 8.5: (#13) see video.
  (#21) see video
- Section 8.6: (#4)(a) see video
  (#11) (a) Could be either, no way to tell just from the display. I would probably guess that it is rational, though.
  (b) Could be $0.\overline{23}$ or $0.\overline{232323232}$
  (c) 0.232323232010010001000001...
- Section 8.7: (#1) The calculation 3-7 uses only whole numbers, but has an answer that is a negative integer. Similarly, the calculation 3÷7 uses only whole numbers but has an answer that is not a whole number (it is a fraction).