MTH-2010, FALL 2014
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MINITEST 4 REVIEW ANSWERS

While many of the answers are listed below, there are some that I will make videos for if I feel they are better explained in that format.

- Section 9.1: #8: 6×10 or $(4+2)(5+3+2)$ or $4 \times 5 + 4 \times 3 + 4 \times 2 + 2 \times 5 + 2 \times 3 + 2 \times 2$

    #10: Addition: (a) $20 + 21 + 22 + 23 + \cdots + 67 + 68 + 69$ or Multiplication: 25×89. For explanation, see video.

    (b) 2225 seats

    #15: see video for AWESOME picture. And explanation.

    #19: You can only cancel the 11 out of the 22 on top and bottom if you can factor an 11 out of BOTH terms in the numerator. Since 11 is not a factor of 2, this cannot be done. Another way of thinking about it is this: Suppose you broke up the original fraction into two fractions and then reduced:

$$\frac{22+3}{77} = \frac{22}{77} + \frac{3}{77} = \frac{2}{7} + \frac{3}{77}$$

the $\frac{3}{77}$ cannot be reduced at all, which is why the original method did not work..

    To correctly evaluate the fraction, you should add the two numbers in the numerator to get $\frac{25}{77}$. This fraction cannot be reduced any further.

- Section 9.2: #8: (a) There are a number of possible answers. Some are $cd - a(d - b)$, $bc + (d - b)(c - a)$, and $d(c - a) + ab$. These correspond to (respectively): Finding the area of the large rectangle and then subtracting the smaller rectangle, cutting the shape into two rectangles horizontally, and cutting the shape into two rectangles vertically.

    (b) $d + c + b + a + (d - b) + (c - a)$ and $2d + 2c$

    (c) If you multiply out each expression, they all simplify to the same thing. For example, distributing the a in the first expression gives $cd - ad + ba$. Foiling out the second expression gives $bc + dc - ad - bc + ab$, and when the bc cancels, you are left with $dc - ad + ab$, same as before.

    #16: $M - \frac{1}{3}M - \frac{3}{4}(M - \frac{1}{3}M) - 20$

    #19: see video

- Section 9.3: #6: $W = 1.5R$, where W is the amount of water you need and R is the amount of rice. The equation makes sense because you take the amount of rice and multiply by 1.5 to get the amount of water you need.

    #12: $B - \frac{1}{6}B + 12 = 47$

- Section 9.4: #1: (a) Take 3 from 490 to give you 487. This means that $x + 3$ must equal 176, so $x = 173$.

(b) 333 is 3×111, so A must be equal to 213 times 3, which is 639.

see video for selected others.

#7: You can't divide by $x - 1$, because $x - 1$ could be equal to zero, and it is against the laws of mathematics to divide by zero (that is, the result is undefined). So when you divide by $x - 1$ you end up with a result that makes no sense.

- Section 9.5: #4, 16, 22, 28: see video for all of these.
- Section 9.6: #2: (a) It will be a yellow square. Triangles fall on multiples of 5, so the 1000th position will be a triangle. The one before it is a square.

(b) 600

(c) The sequence is 1, 6, 11, 16, 21, ..., which is arithmetic, it can be represented by the linear formula $5N - 4$. If you plug in any positive whole-number value for N, you will get a number that has a circle above it.

(d) The sequence is 2, 3, 4, 7, 8, 9, 12, 13, 14, ..., which is not arithmetic because the difference between each entry is not always the same. Sometimes it is 1 and sometimes it is 3.

#7: see video

#18: (a) At the end of the first month you will owe 500×1.016, which is your original amount plus the 1.6 percent charge. After the second month, you will owe $500 \times 1.016 \times 1.016 = (1.016)^2 \cdot 500$, which is the amount from the first month plus the 1.6 percent charge on the amount from the first month. Each month, you will multiply the amount you owe times 1.016, which gives the expression $(1.016)^N \cdot 500$.

(b) after 2 years (24 months) you will owe \$731.84.

- Section 9.7: #6: see video

#8: (a) (7.5, 55). 55 mg/ml is the maximum amount of the drug in the bloodstream and it occurs at about 7.5 minutes.

(b) (22.5, 5). 5 mg/ml is the minimum amount of the drug in the bloodstream, it occurs at 22.5 minutes.

(c) There is an initial spike of the drug concentration not long after it is administered, after which the amount of the drug drops to a minimum. Soon after that, the amount of the drug in the bloodstream levels off and remains at a steady 15 mg/ml.

#19: The object will hit the ground when the height is equal to zero, which will be when one of the factors 16, $(8 + t)$, or $(5 - t)$ is equal to zero. Since 16 is never zero, and $8+t$ is only zero when $t = -8$ (and negative time is just plain silly), the only option is that $5 - t = 0$, which solves to $5 = t$. So the object hits at 5 seconds.

- Section 9.8: #1: see video

#11: see video