Solutions to math questions from the sample practice exam II

51. What is the value of the expression: $7 - 1 \bullet 0 + 3 \div 3$

(A) 0 (B) 1 (C) 3 (D) 6 (E) 8

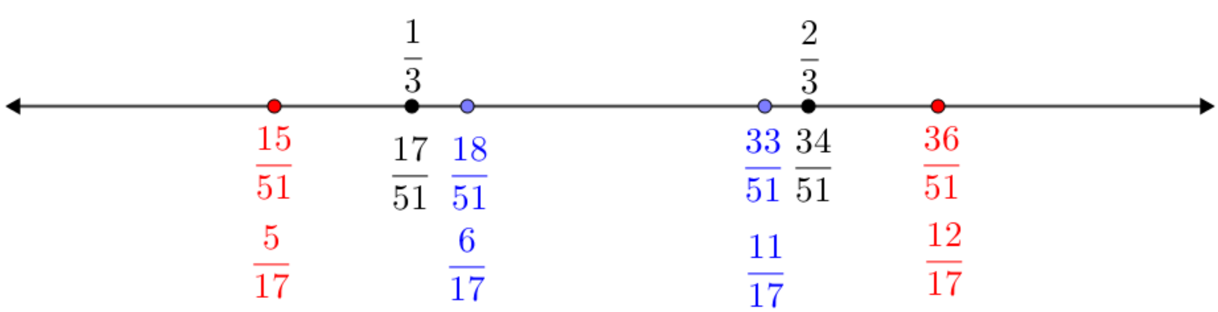
Use order of Operations – PEMDAS. Give yourself room to write this.

$7 - 1 \cdot 0 + 3 \div 3 = 7 - 0 + 1 = 8$ ***(E)***

52. Of all fractions with a denominator of 17 and a whole number numerator, how many are between
$\frac{1}{3}$ and $\frac{2}{3}$?

(A) 1 (B) 3 (C) 5 (D) 6 (E) 7

The least common denominator of 3 and 17 is 51, so we can start by finding fractions equivalent to $\frac{1}{3}$ and $\frac{2}{3}$ that have denominators of 51, $\frac{17}{51}$ and $\frac{34}{52}$ respectively. Neither of those fractions simplify to a fraction with a denominator of 17, but $\frac{18}{51}$ and $\frac{33}{51}$ do (18 and 33 are both divisible by 3, and $51 \div 3 = 17$). $\frac{18}{51}$ and $\frac{33}{51}$ are between $\frac{17}{51}$ and $\frac{34}{51}$, and they simplify to $\frac{6}{17}$ and $\frac{11}{17}$, respectively. One unit fraction below $\frac{6}{17}$ is $\frac{5}{17}$, and one unit fraction above $\frac{11}{17}$ is $\frac{12}{17}$, neither of which is between $\frac{17}{51}$ and $\frac{34}{51}$, as shown in the number line below. COUNTING CAREFULLY (don't merely subtract 6 from 11), there should be ***(D) 6*** *fractions from $\frac{6}{17}$ to $\frac{11}{17}$ ($\frac{6}{17}, \frac{7}{17}, \frac{8}{17}, \frac{9}{17}, \frac{10}{17}, \frac{11}{17}$).*



53. What is 15% of the sum $3\frac{1}{2}+\frac{7}{4}+0.75$?

(A) 0.06 (B) 0.09 (C) 0.9 (D) 6.0 (E) 90

If a number is positive, taking a percent less than 100 of a number "A" yields another number "B" that is less than "A". Using this, Answer choice E looks unlikely.
The number .75 is the same as $3/4$. *I can add numbers in any order, so I will add 7/4 and 0.75 (or 3/4) together first because they have the same denominator.*
$7/4 + 0.75 = 7/4 + 3/4 = 10/4$.

The other fraction has a denominator of 2, so we can reduce 10/4 to 5/2. Now,
$3\ 1/2 + 5/2 = 3 + 1/2 + 5/2 = 3 + 6/2 = 3 + 3 = 6$. *Now we want 15% of 6 (we can kick out D here because we still have stuff to do). Since 10% (1/10) of 6 is .6, we can use this to kick out choices A and B too. The only choice LEFT is (**C).***
Since 5 is half of 10, 5% is half of 10% so 5% = .3, and thus,
15% = 10% + 5% = .6 + .3 = .9. ***(C)***

54. At the bottom is a completed addition problem, with all the digits replaced by letters. Every letter represents a single digit and different letters represent different digits. Which digit might the letter *T* represent?

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  MH
  MH
 +MH
  TM
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(A) 2 (B) 3 (C) 4 (D) 5 (E) 6

Note that the result triple the two-digit number MH is also a two-digit number. That means when all three M's are added together in the tens' column, there should be no carry. That means M can only be 1, 2, or 3 (if M was 4 or greater, the sum would have two digits, requiring a carry).

If M = 1, in the units/ones column, the three H's added together should have a units digit of 1. What number tripled will have a ones digit of 1? 7! ($7\times 3=21$*) That would make MH = 17, and TM = 51, making T =* ***5 (D)***

Note: The equations 24 + 24 + 24 = 72 and 31 + 31 + 31 = 93 would have also worked, but T = 7 and T = 9 are not answer choices.

55. An operation on two real numbers is defined by the rule $a \text{Ä} b = b^a + 2ab$. Compute $2 \otimes (1 \otimes 3)$

(A) 77 (B) 117 (C) 155 (D) 156 (E) 273

Correction: *in the original question the rule states:* $a \otimes b = b^a + 2ab$.

Since we are looking for $2 \otimes (1 \otimes 3)$, *we find the value of the expression in the parentheses first. We plug-in the numbers in the exact place they appear in the expression.*

$(1 \otimes 3) = 3^1 + 2(3)(1) = 3 + 6 = 9.$

Now, we evaluate $2 \otimes 9 = 9^2 + 2(2)(9) = 81 + 36 = 117$. ***(B)***

56. When all of the whole numbers between 100 and 350 are written down, how many times does the digit 4 appear?

(A) 50 (B) 51 (C) 52 (D) 55 (E) 56

Let's start by counting how many times 4 appears in the ones place. Here, we're looking at numbers like <u>10</u>4, <u>11</u>4, <u>12</u>4, …, <u>34</u>4. That would be the equivalent of counting all the numbers from 10 to 34 (the underlined portions of the numbers on that list). COUNTING CAREFULLY, that should give us <u>25</u> numbers(do not just subtract 10 from 34).

Now let's count how many times 4 appears in the tens place. We can start with 140, 141, 142, …, 149, which gives us 10 numbers (don't worry about double counting 144; we're counting how many times 4 appears, not how many numbers have a 4 in them). We also have the 240's, which gives us another 10 numbers. The 340's will give us yet another 10 numbers. In total there should be <u>30</u> 4's in the tens place.

Since the numbers only go up to 350, we don't have to worry about 4's appearing in the hundreds place. Adding the <u>25</u> 4's in the ones places to the <u>30</u> 4's in the tens places, we get ***(D) 55*** *4's in total written down.*

57. Mike (a boy) and Kate (a girl) are siblings. Mike has as many brothers as sisters. Kate has twice as many brothers as sisters. How many girls, counting the children only, are in the family?

(A) 2 (B) 3 (C) 4 (D) 5 (E) 6

We can use the answer choices in figuring out the problem.

(A) does not work since it would mean that Mike and Kate are only children and Kate should have twice as many brothers as she has sisters, 0 sisters means 0 brothers. It is a contradiction.

*If Kate is Mike's ONLY sister, then he has one brother and Kate has two brothers. It works! So, **(B)** works.*

This is a moment when You move on to the next question and when there will be time to check Your answers. You can eliminate other answers.

58. Alla and Balla together drink 750 milliliters (ml) of water. If Alla drinks 50% more than Balla, how much does Alla drink?

(A) 250 ml (B) 375 ml (C) 400 ml (D) 450 ml (E) 500 ml

If Alla drinks 50% more than Balla, that means the ratio of what Alla drinks to what Balla drinks is 3:2 (for example, if Alla drinks 10 ml of water, then Balla drinks 15 ml of water since 15 is 50% more than 10. 15:10 = 3:2). If we divide the 750 milliliters of water in 5 portions, Alla would get three of those portions and Balla would get 2. $750 \div 5 = 150$*, and Alla would get 3 of those 150 ml portions,* 150×3 = ***450 ml. (D)***

59. Robert has been on the road for one hour and fifty minutes. He has been traveling at a constant rate. So far, he has traveled one-sixth of the way to his destination. If he continues at the same rate, he will arrive at his destination at 3:30 PM. At what time did Robert start?

(A) 2:30 AM (B) 3:40 AM (C) 4:30 AM (D) 5:20 AM (E) 8:10 AM

Robert has been traveling for 10 minutes less than 2 hours. He has traveled 1/6 of the distance, so he needs to travel for 6 times the amount of time he's traveled already in TOTAL. This means he is traveling for 60 fewer minutes than 12 hours – or 11 hours, because $6 \cdot (2\,h - 10\,min) = 12\,h - 60\,min = 11\,h.$ *12 hours before 3:30 PM would be 3:30 AM, so 11 hours is one hour after 3:30AM, namely 4:30AM.* ***(C)***

60. Let's agree to call a number *nice* if it is **NOT** divisible by either 4 or 9. Which of these statements is always true?

(A) If a *nice* number is multiplied by 5, then the result is *nice*.

(B) If 5 is added to a *nice* number, the result is *nice*.

(C) The sum of two *nice* numbers is nice.

(D) The product of two *nice* numbers is nice.

(E) If a *nice* number is multiplied by 3, then the result is *nice*.

We can eliminate an answer choice if we can find a counterexample, or an example that doesn't work. *You can use other counterexamples to eliminate answer choices. Below are just some samples.*

(B) 3 is a nice number (not divisible by 4 or 9), but 3 + 5 = 8, which is not a nice number since it is divisible by 4.

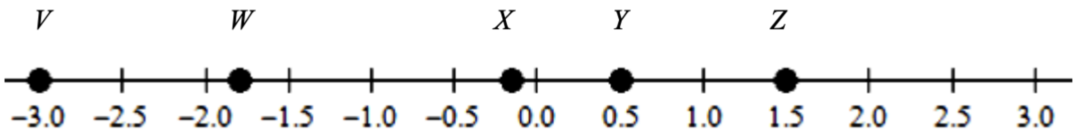
(C) 1 and 3 are both nice numbers, but 1 + 3 = 4, which is not a nice number since 4 is divisible by 4.

(D) 2 and 6 are both nice numbers, but $2\times 6=12$*, which is not a nice number since 12 is divisible by 4.*

(E) 6 is a nice number, but $6\times 3=18$*, which is not a nice number since 18 is divisible by 9.*

That leaves us with ***(A)****. The reason why that statement is always true is if a number is not already divisible by 4 or 9, multiplying it by 5 won't make it divisible by 4 or 9 since 5 is not a factor of either of those numbers. Multiplying a nice number by a multiple of 2 may make that number divisible by 4 though. Similarly, multiplying a nice number by a multiple of 3 may make that number divisible by 9.*

61. Numbers V, W, X, Y, and Z are placed on the number line as shown below. Which expression has the greatest numerical value?



(A) $X \cdot Y$ (B) $V \div X$ (C) V^2 (D) $Y + Z$ (E) $Z - W$

Never underestimate the power of estimation.

If we approximate X to be -0.25, then:

(A) $X \cdot Y \approx -0.25 \cdot 0.5 = -\frac{1}{4} \cdot \frac{1}{2} = -\frac{1}{8} = -0.125$;

(B) $\frac{V}{X} \approx \frac{-3}{-0.25} = 12$

(C) $V^2 \approx 9$

(D) *V+Z*≈ -1.5

(E) *Z-W*≈ 3.25 *We pick (**B**).*

62. A magic square is a square where the sum of the entries in any row, column or diagonal is the same. For the magic square below, the value of A is

$2x + 10$		A
$3x + 3$		$x + 7$

(A) 0 (B) 2 (C) 4 (D) 6 (E) 14

This is truly magical! Does the value of x matter?
Call the center value C and check the square if x = 0.

10		A
	C	
3		7

Since the sums in the diagonals must be equal, so 10+C+7 = 3+C+A or 17+C = 3+C+A. See how the center value does not count and if A = 14, we have 17+C = 17+C.

Try another value for x, e.g. x = 1 and
12+C+8 = 6+C+A or 20+C = 6+C+A, A = 14. ***(E)***

12		A
	C	
6		8

63. Miki prepared two gallons of a beverage that contains tea and lemonade in the ratio tea:lemonade = 3:1. If Miki then added one-half gallon of lemonade to the mixture, what was the ratio of tea to lemonade in the new mixture?

(A) 1:1 (B) 2:1 (C) 3:2 (D) 4:3 (E) 9:11

*We can say that the 2 gallons are made of 4 parts of tea and lemonade. Each part, being one half-gallon. We only add one half-gallon of lemonade, so now we have 5 parts in all. 3 tea, 2 lemonade. Pick **(C)**!*

64. Ann's watch runs 2 minutes per hour too slow. Beth's watch runs 1 minute per hour too fast. For example, if both watches were correct at 12:00 PM on a given day, then at 1:00 PM, Ann's watch would read 12:58 PM and Beth's would read 1:01 PM.
Ann and Beth set their watches to the correct time at noon on Sunday. The next time they met, one of the watches was one hour ahead of the other. What was the earliest time this could have been?

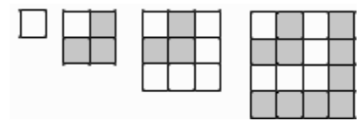
(A) 7:00 PM on Monday
(B) 8:00 AM on Monday
(C) 4:00 AM on Tuesday
(D) midnight on Wednesday
(E) 10:00 PM on Saturday

It may be helpful to visualize this using a table that keeps track of the times on Ann's and Beth's watches, and how far apart they are at any given time.

Time Passed since noon on Sunday	*Ann's time(2 minutes per hour too slow)*	*Beth's time(1 minute per hour too fast)*	*Difference between Ann and Beth's times*
Start	*12:00 PM*	*12:00 PM*	*0 minutes*
1 hour	*12:58 PM*	*1:01 PM*	*3 minutes*
2 hours	*1:56 PM*	*2:02 PM*	*6 minutes*
3 hours	*2:54 PM*	*3:03 PM*	*9 minutes*

*You may notice that each hour, the difference between their times increases by 3 minutes. By the time they meet again, there should be a 1 hour, or 60 minute difference. If the difference increases by 3 minutes each hour, the difference should be 60 minutes 20 hours past noon Sunday ($60 \div 3 = 20$). 20 hours can be broken up into 12 hours and 8 hours. 12 hours past Sunday 12:00 PM Monday 12:00 AM, and 8 hours past that is **8:00 AM on Monday (B)**.*

65. Examine the pattern and determine how many more shaded squares than unshaded squares will be in the 100x100 square in the sequence shown in the diagram on the right.



(A) 85 (B) 100 (C) 115 (D) 130 (E) 145

This is a tricky problem. ***When you see tricky problems on the test don't forget you can answer it later – skip it and come back if you need to.***

There are 10,000 squares in all, $100 \cdot 100 = 10,000$*. There would be a lot of work to do if we sum it all. Instead, we'll* ***start small and look for a pattern****.*

100 is an even number, so let's look at squares 2 and 4 on the diagram. At square 2 there are 2 more shaded squares than unshaded ones. At square 4, there are 4 more shaded squares. It looks like there are as many more shaded squares as there are in rows of the square (the length in units). Our square is 100 x 100. We should expect 100 more squares that are shaded compared to unshaded. ***(B)***

66. Lena and three of her friends bought just enough food so they could go for a 12-day camping trip. Pete and Jane surprised them by showing up at the start of the trip and asking to join, but they brought no food. By what percent would the time for the trip shorten if everyone ate their normal daily portions?

(A) 4 (B) 8 (C) $33\frac{1}{3}$ (D) 50 (E) $66\frac{2}{3}$

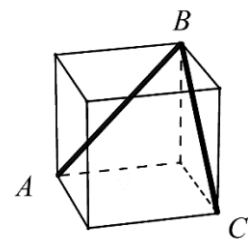
Let's pretend that everyone eats only 1 meal a day. If Lena and her three friends (total 4 people) brought just enough food for 12 days, that means they brought 48 meals ($4\times 12=48$*). When Pete and Jane join, those 48 meals must be divided equally among 6 people. That means each person can only each for 8 days (*$48\div 6=8$*).*
The trip was shortened by 4 days ($12\text{ days} - 8\text{ days} = 4\text{ days}$*).*
4 days is $\frac{1}{3}$ *of the original 12 days, and* $\frac{1}{3} = \frac{1}{3}\cdot 100\% = 33\frac{1}{3}\%$*.* ***(C)***

67. Rory loves chocolate. In one hour, he eats half of any amount of chocolate that he has. His sister, Kara, decided to treat him by giving him a bar of chocolate every hour.
How many chocolate bars had Rory eaten at the end of the 2nd hour, just before Kara gave him the third chocolate bar?

(A) $\frac{1}{2}$ (B) $\frac{3}{4}$ (C) 1 (D) $1\frac{1}{4}$ (E) $1\frac{1}{2}$

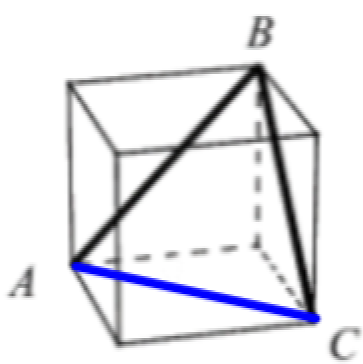
Rory eats half a bar of chocolate at hour one. Now in the second hour, he gets 1 more bar. He only eats half of the one and a half bars he has now. So he eats 3/4 of a bar on top of the 1/2 he ate before. So now, after hour 2, Rory has eaten 1 ¼ bars of chocolate. ***(D)***

68. The three-dimensional shape in the diagram on the right is a cube. What is the degree measure of the angle at point B (the angle formed by $\overline{AB}$ and $\overline{CB}$).



(A) 30° (B) 45° (C) 60°

(D) 75° (E) 90°



$\overline{AB}$ and $\overline{CB}$ are both diagonals of congruent squares, meaning the lengths of $\overline{AB}$ and $\overline{CB}$ are equal. If you were to connect points A and C (done in blue in the diagram), $\overline{AC}$ would also be the diagonal of a congruent square, therefore having the same length as $\overline{AB}$ and $\overline{CB}$. That makes $\triangle ABC$ an equilateral triangle. Each angle of an equilateral triangle is $60°$ (The sum of the angles of a triangle is $180°$, and $180° \div 3 = 60°$).

The degree measure of the angle at point B is 60°. ***(C)***

69. The rectangular floor of a room is 4 feet 6 inches wide and 8 feet 3 inches long. How many square yards of floor covering will be necessary to cover the floor of the room? Reminder: 1 yard is equivalent to 3 feet and 1 foot is equivalent to 12 inches.

(A) $4\frac{1}{8}$ (B) $4\frac{1}{6}$ (C) $9\frac{3}{8}$ (D) $12\frac{3}{8}$ (E) $12\frac{3}{4}$

Since we have feet and inches, we will have some fractions to handle here. Since we're multiplying fractions, it'll be easier if I write them in improper form.

4 feet 6 inches -> 4 ½ feet or 9/2 feet.
8 feet 3 inches -> 8 ¼ feet or 33/4 feet.

*We want to find the area of the floor so we will multiply these fractions giving us 33/4 * 9/2 = 297/8 square feet. Now we need to turn this into square yards. If we have an area in square feet, to turn it into square yards we multiply by 9. Yes, there are 3 feet in 1 year, but square feet is feet*feet, so to convert both of the feet, we need to multiply by 3 twice.*

*Thankfully, 297 is divisible by 9 giving us 33. So we have 33/8 square yards or 4 ⅛ square yards giving **(A)**.*

70. In the last step in solving a problem, Jerry divided by 0.4 instead of multiplying by 0.4 and thus arrived at an answer of 400. If Jerry's calculations were otherwise correct, what was the correct answer to the problem?

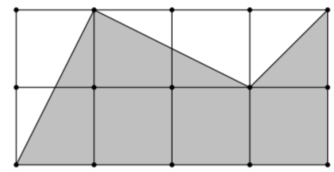
(A) 64 (B) 100 (C) 160 (D) 1000 (E) 2500

Let's work backwards.** If Jerry arrived at 400 by dividing by 0.4, we'll undo that division by multiplying 400 and 0.4.* $400\times 0.4=160$. *Since he was supposed to multiply by 0.4 in his last step, let's multiply the 160 he had by 0.4.* $160\times 0.4=64$. ***(A)

71. What fraction of the area of the large rectangle is the area of the shaded region?

(A) $\frac{9}{16}$ (B) $\frac{11}{16}$ (C) $\frac{5}{8}$

(D) $\frac{3}{4}$ (E) $\frac{2}{3}$



We can look at the individual squares to help us. We can see that we get unit squares and sections that are fractions of whole squares. Looking at the two larger triangular regions, they look like they're half of the 2 rectangles meaning each triangle is half of the area of 2 or 1. The square in the upper right is cut in half. Giving us 1/2 of 1 square. We now have 5 full squares and one half square. Since we get 5 full squares plus some extra we can get rid of answer choice C and A since those fractions are less than the fraction of the area we get. Each square is 1/8 of the area of the rectangle, the tiny triangle is half of the square or half of 1/8, giving 1/16 we add to 5 / 8. Thus, giving us 11/16 or ***(B)****.*

72. How many numbers **<u>less than</u>** 51 are a product of two different prime numbers?
Reminders:

- A number is a prime number if it is only divisible by 1 and itself and no other numbers.
- The number 1 is not considered to be a prime number.

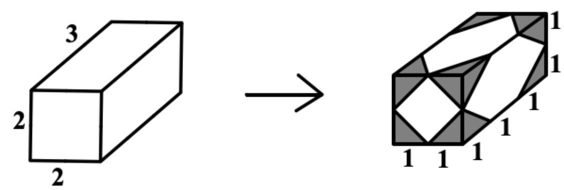
(A) 13 (B) 14 (C) 17 (D) 18 (E) 26

Product is a result of multiplication*. A nice way to organize this is to list prime numbers and multiply them with other prime numbers in a multiplication table. Let's list some prime numbers and look at their products. Note, we want to multiply* ***different*** *primes, so we will not count* $2 \cdot 2 = 4$.

$2 \cdot 3 = 6$		
$2 \cdot 5 = 10$	$3 \cdot 5 = 15$	
$2 \cdot 7 = 14$	$3 \cdot 7 = 21$	$5 \cdot 7 = 35$
$2 \cdot 11 = 22$	$3 \cdot 11 = 33$	
$2 \cdot 13 = 26$	$3 \cdot 13 = 39$	
$2 \cdot 17 = 34$		
$2 \cdot 19 = 38$		
$2 \cdot 23 = 46$		

We have together 13 such products, so ***(A)*** *is the answer.*

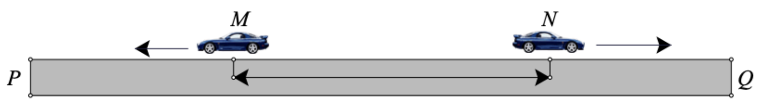
73. A wooden block measures 2 inches by 2 inches by 3 inches. A wedge is cut off from each corner of the block by slicing at points that are 1 inch from each corner. How many edges does the resulting solid have? Note that the wedges to be discarded are shaded gray and the solid is white.



(A) 10 (B) 24 (C) 28 (D) 32 (E) 36

If we count the number of edges formed at the corners of the solid, at each corner we get 3 edges at each corner. This means so far we have 24 edges which IS a choice. But, let's consider this. According to the image we get some extra edges on the faces surrounding the square base. We still get 4 more edges at each of these faces, so we get 4 more than 24 or 28. ***(C)***

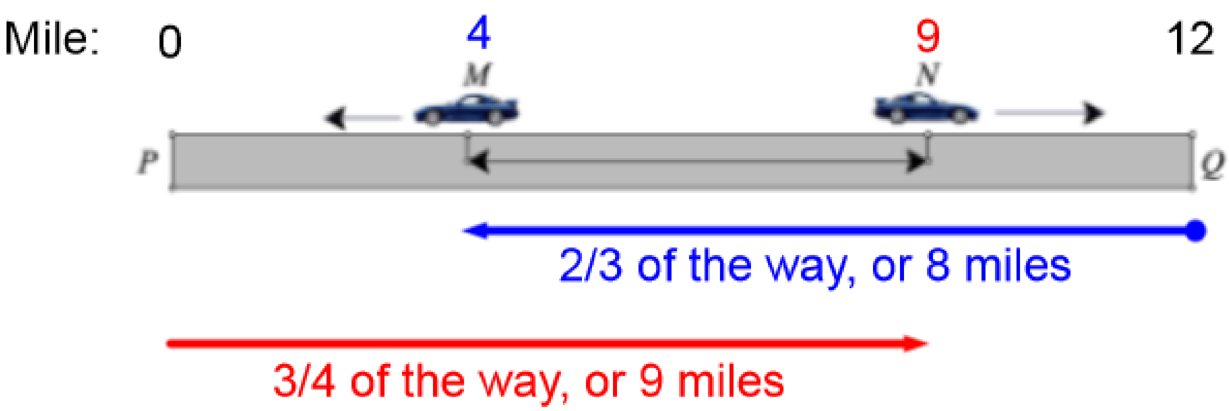
74. Car M left town Q and car N left town P at the same time. At noon, car M traveled $\frac{2}{3}$ of the distance from Q to P and car *N* had traveled $\frac{3}{4}$ of the distance from P to Q. What fraction of the distance between the two towns is the distance between the two cars at noon?



(A) $\frac{1}{12}$ (B) $\frac{3}{8}$ (C) $\frac{5}{7}$

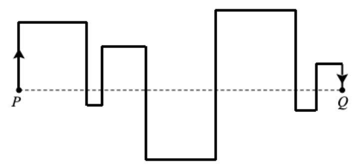
(D) $\frac{1}{2}$ (E) $\frac{5}{12}$

$\frac{2}{3}$ and $\frac{3}{4}$ are mentioned in the problem. The least common denominator of those 2 fractions is 12, so let's pretend that towns P and Q are 12 miles apart. Furthermore, let's say that town P is at mile 0 and town Q is at mile 12. If car M is $\frac{2}{3}$ of the way from Q to P, that means M is 8 miles away from Q ($\frac{2}{3}$ of 12 is 8), and M is at mile 4 (12 - 8 = 4). If car N is $\frac{3}{4}$ of the way from P to Q, that means N is 9 miles away from P ($\frac{3}{4}$ of 12 is 9), and N is at mile 9 (0 + 9 = 9). All of this is shown in the diagram below.



*Here, cars M and N are 5 miles apart (9 - 4 = 5) when the towns are 12 miles apart. That means the distance between the cars is $\frac{5}{12}$ the distance between the towns. **(E)***

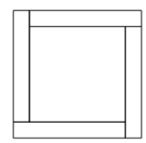
75. The length of the dashed horizontal line segment is 12 in. Seven squares are constructed as shown in the diagram – four above and three below the horizontal dashed line. What is the length, in inches, of the continuous solid path from P to Q?



(A) 18 (B) 24 (C) 36 (D) 42 (E) 48

Strategy, pick numbers for side lengths of squares. There are 7 squares, so we want 7 numbers that add up to 12. Make them easy, I'll pick 3, 1, 2, 2, 2, 1, 1. Yes, the scale is going to be weird and off but remember drawings might not be to scale. Note the squares, Each square has sides all of the same length, First square would have 4 sides of 3. The second one, having 4 sides of length 1 and so on. But noticing the path containing a length triple to that of the part on segment PQ – this means our path would be triple the length of PQ in all. Since PQ = 12, the length would be 36. ***(C)***

76. Four congruent rectangles are placed around a square to form a larger square, as in the diagram. The perimeter of each of those rectangles is 20 units. What is the area, in square units, of the larger square (the sum of the areas of the four rectangles and the smaller square)?

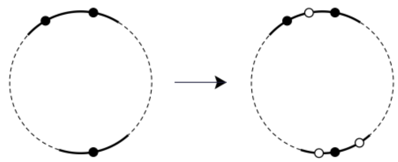


(A) 10 (B) 20 (C) 30

(D) 100 (E) 400

What are possible sides of a small rectangle with the perimeter of 20 units?
Let's use 1 by 9, because 1+9+1+9 = 20. Write those numbers on the diagram and notice that the side length of a big square becomes 10 units. If the sides of a small rectangle are 2 and 8 or 3 and 7, the side length of the big square will always be 10 (WHY?). So, the area of the square is $10 \cdot 10 = 100$ *squared units.* ***(D)***

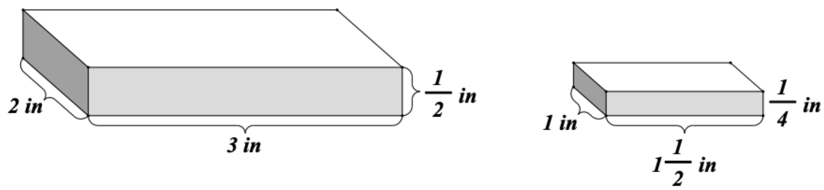
77. I placed some black marbles along a circle with circumference 72 yards so that the centers of neighboring marbles (the black dots in the diagram) are 3 yards apart along the circumference. Then my friend showed up and put white marbles along the same circle so that there is one white marble between any two black marbles and one black marble between any two white marbles. What is the total number of marbles placed along the circumference of that circle?



(A) 46 (B) 47 (C) 48 (D) 50 (E) 60

We are putting the marbles so that the centers of any two neighboring ones are 3 yd. apart. If we imagine putting these around in a circle we get 24 of these marbles. Now we're putting white marbles in the middle of two neighboring black marbles. If we imagine this happening with two black marbles around a circle we can see we get 2 more white marbles. With 3 black marbles, we'd get 3 more white marbles and this goes on and on. So we get 24 white marbles between the 24 black marbles giving 48 marbles in all ***(C)****.*

78. A soap bar was in a shape of a rectangular prism with dimensions $(3\ in)\times(2\ in)\times\left(\frac{1}{2}\ in\right)$ originally. Each day, the same volume of soap was used. After the 7th day, the bar was reduced to a rectangular prism as shown in the diagram below.



For how many more days could the soap be used in the same amount per day as during the first 7 days?

(A) 1 (B) 3 (C) 5 (D) 7 (E) 14

APPROACH #1

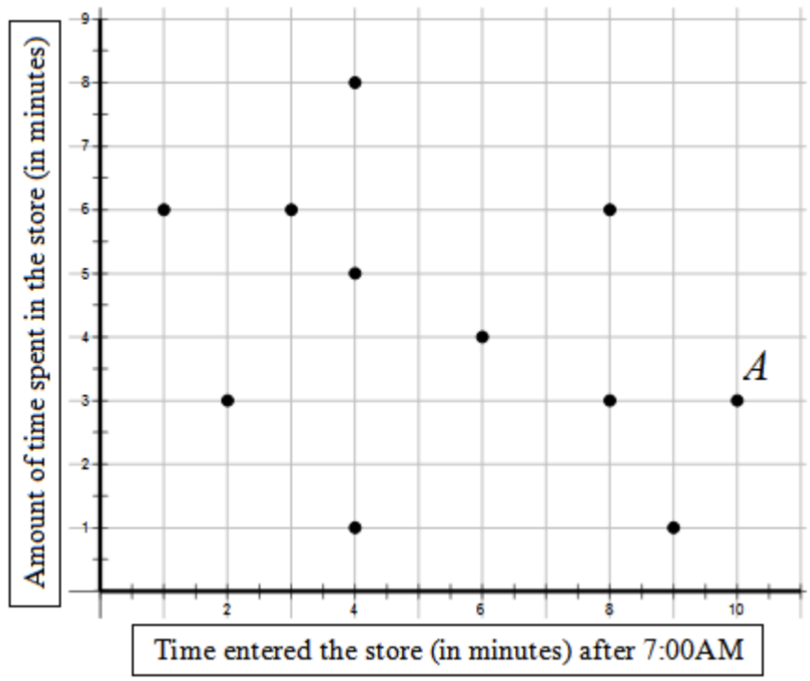
Let's start by calculating the volumes of both soap bars. The volume of a rectangular prism is the product of the three dimensions or $length \times width \times height.$
At the start, there was $2\ in \times 3\ in \times \frac{1}{2}\ in = 3$ *cubic inches of soap. After the 7th day, there was* $1\ in \times \frac{3}{2}\ in \times \frac{1}{4}\ in = \frac{3}{8}$ *cubic inches of soap left (note it's much easier to multiply improper fractions than it is to multiply mixed numbers). In those 7 days, a total of* $3 - \frac{3}{8} = \frac{21}{8}$ *cubic inches of soap was used. That means* $\frac{3}{8}$ *cubic inches of soap was used each day because* $\frac{21}{8} \div 7 = \frac{21}{8} \times \frac{1}{7} = \frac{3}{8}$*). After the 7th day, there is still* $\frac{3}{8}$ *cubic inches remaining soap, meaning there is enough soap for* ***(A) 1*** *more day.*

APPROACH #2

After calculating the 3 cubic inches of soap at the beginning and the $\frac{3}{8}$ *cubic inches after 7 days, you may recognize that* $\frac{1}{8}$ *of the original amount of soap remains (since* $\frac{3}{8}$ *is* $\frac{1}{8}$ *of 3). That means* $\frac{7}{8}$ *of the original soap had to be used in the first 7 days, leaving the remaining* $\frac{1}{8}$ *good for* ***(A) 1*** *more day.*

79. Use the graph below to determine how many people who entered the store before 7:05 A.M. were still in the store at 7:08 A.M. Each dot represents one person.

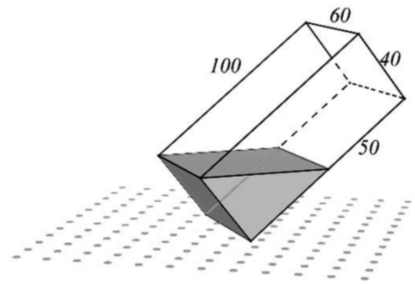
Example: Person A entered the store at 7:10AM and spent three minutes in the store.



(A) 2 (B) 3 (C) 4 (D) 5 (E) 6

We just need to read the graph carefully. At 7:04 AM we had 3 people, one who spent 1 minute, one who spent 5 and one who spent 8 minutes. This gives us 2 people who were in the store after 7:08 AM. At 7:03 AM we had 1 person in the store who stayed for 6 minutes, this means they're in the store after 7:08 AM so we get 1 person to add onto the 2 from before. Every other person from 7:02 AM and 7:01 AM leaves before 7:08 AM. We don't count them. Thus, there are only 3 people ***(B)****.*

80. A fish tank, in a shape of rectangular prism, measures 100 cm × 60 cm × 40 cm. The water level reached the midpoint of the base (the 50 cm mark), when the tank was tilted to rest on a 60 cm edge, as shown in the diagram on the right. What would be the depth of the water, if the tank is returned to its horizontal position (resting on its 60 cm × 100 cm base)?



(A) 5 cm (B) 10 cm (C) 15 cm

(D) 20 cm (E) 25 cm

Consider all the numbers of side lengths and draw. Can You draw a line on the tank to see that the water takes one quarter of the tank's volume? Now, it is important that we see which side (face) is the base. The problem gently hints that the base is a side with side lengths of 100 cm and 60 cm. So, the height of the tank is 40 cm long.
The total volume of the tank is $100\ cm \times 60\ cm \times 40\ cm$ *and since the amount of the water is one fourth of its volume, water takes* $\frac{1}{4} \times 100\ cm \times 60\ cm \times 40\ cm$ *of volume.*
We only care for the depth of the water when the tank is standing on its base,
100 cm by 60 cm, so it is enough to multiply 40 cm by $\frac{1}{4}$ *to get the wanted value.* ***(B)***