Practice Test 2: Answers and Explanations

So you've completed Practice Test 2? I bet you feel more prepared already. Use this chapter to check your answers and find out just how prepared you are. In this chapter, I provide detailed explanations along with a bare-bones answer key. The answer key is great for when you're checking your answers in a hurry, but I suggest that you review the detailed explanations for each question — even those you answered correctly. The explanations show you how to calculate each problem and often provide tips and tricks.

Mathematics Test

1. **D.** Jackson worked 25 hours for $225, so divide to find out how much he earned per hour:

   $225 \div 25 = 9$

   Now multiply $9 per hour by 40 hours:

   $40 \times 9 = 360$

   Therefore, he would earn $360 in 40 hours.

2. **J.** Each number in the sequence is a bit higher than the one before it, so see how much needs to be added to each number to produce the rest. As you can see, if you add 4, then 5, then 6, and so forth, the numbers add up correctly:

   1 (+ 4 =) 5 (+ 5 =) 10 (+ 6 =) 16 (+ 7 =) 23 (+ 8 =) 31 (+ 9 =) 40

3. **A.** First, plug in 6 for x and –2 for y throughout the expression:

   $3xy + 2x^2 - y^3 = 3(6)(-2) + 2(6)^2 - (-2)^3$

   Now simplify using the order of operations:

   $= 3(6)(-2) + 2(6)(6) - (-2)(-2)(-2) = -36 + 72 + 8 = 44$

4. **H.** Jot down how many people Noreen registered on each day:

   30 34 38 42 46 50 54 58 62 66

   To save time adding all these numbers, notice that the total of the first and 10th numbers is 30 + 66 = 96. This total is the same for the 2nd and 9th, the 3rd and 8th, the 4th and 7th, and the 5th and 6th. Therefore, you have five pairings of days on which Noreen registered 96 people. You can simply multiply to find the total:

   $96 \times 5 = 480$

5. **D.** Use the formula for the area of a circle:

$$A = \pi r^2 = \pi(4)^2 = 16\pi$$

The right angle accounts for 90° of the 360° circle, which is $\frac{1}{4}$ of it. So the shaded region of the circle is $\frac{3}{4}$ the area of the circle:

$$\frac{3}{4}(16\pi) = 12\pi$$

6. **G.** Tara's scores for 3 games were 167, 178, and 186. To find the average, simply place these numbers into the formula for the mean:

$$\text{Mean} = \frac{\text{Sum of values}}{\text{Number of values}} = \frac{167 + 178 + 186}{3} = \frac{531}{3} = 177$$

7. **C.** Start by squaring both sides of the equation to undo the square root:

$$\sqrt{10k + 3} = 5$$
$$10k + 3 = 25$$

Now solve for *k*:

$$10k = 22$$
$$k = 2.2$$

8. **G.** Distribute the left side and combine like terms:

$$-8(x - 2) < 3x - 6$$
$$-8x + 16 < 3x - 6$$
$$-11x + 16 < -6$$
$$-11x < -22$$

To solve for *x*, divide both sides by –11 and reverse the inequality:

$$x > 2$$

9. **D.** List the factors of both 28 and 42:

Factors of 28:	1	2	4	7	14	28		
Factors of 42:	1	2	3	6	7	14	21	42

Now you can see that 1, 2, 7, and 14 are factors of both numbers, so the correct answer is Choice (D).

10. **H.** Plug the values (–4, 1) and (10, –6) into the two-point slope formula:

$$\text{Slope} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-6 - 1}{10 - (-4)} = \frac{-7}{14} = -\frac{1}{2}$$

11. **D.** To begin, factor a 2 out of $(6x + 10y)$:

$$(6x + 10y)(100x + 100y) = 2(3x + 5y)(100x + 100y)$$

Now substitute 4 for $3x + 5y$ and distribute:

$$2(4)(100x + 100y) = 8(100x + 100y) = 800x + 800y$$

12. **J.** Factor the left side of the equation:

$$x^2 - 5x - 14 = 0$$
$$(x + 2)(x - 7) = 0$$

Next, split the equation into two separate equations and solve each for *x:*

$$x + 2 = 0 \qquad x - 7 = 0$$
$$x = -2 \qquad x = 7$$

Because $x > 0$, the value of x is 7.

13. **A.** Cross-multiply to get rid of the fractions:

$$\frac{3n}{2} = \frac{4n+3}{3}$$
$$3(3n) = 2(4n+3)$$

Now simplify and solve for *n:*

$$9n = 8n + 6$$
$$n = 6$$

14. **J.** An equilateral triangle divides into two 30-60-90 triangles, whose sides have a ratio of $x : x\sqrt{3} : 2x$. The height of 9 corresponds to the $x\sqrt{3}$, so

$$x\sqrt{3} = 9$$
$$x = \frac{9}{\sqrt{3}}$$

You can simplify this value as I show you in Chapter 4:

$$\frac{9}{\sqrt{3}} = \frac{9}{\sqrt{3}} \bullet \frac{\sqrt{3}}{\sqrt{3}} = \frac{9\sqrt{3}}{3} = 3\sqrt{3}$$

So the base of the triangle is twice this value, which is $6\sqrt{3}$. Plug the lengths of the base and the height into the formula for the area of a triangle:

$$A = \frac{1}{2}bh = \frac{1}{2}\left(6\sqrt{3}\right)(9) = 27\sqrt{3}$$

15. **C.** The question gives you two of the three interior angles of the triangle: $x°$ and $100°$. The remaining interior angle is supplementary with $y°$, so it's $(180 - y)°$. Thus, you can make the following equation:

$$x + 100 + (180 - y) = 180$$

Solve for *y* in terms of *x:*

$$x + 100 + 180 - y = 180$$
$$x + 100 - y = 0$$
$$x + 100 = y$$

16. **G.** Write "15% of n is 300" as an equation:

$$0.15n = 300$$

Now solve for n:

$$n = \frac{300}{0.15} = 2{,}000$$

Twenty-two percent of 2,000 is 440.

17. **E.** Any line perpendicular to $y = \frac{1}{3}x + 9$ has a slope of –3. So you can rule out Choices (A), (B), and (C). Plug this number into the slope-intercept form, along with the *x*- and *y*-coordinates for the point (3, 4):

$$y = mx + b$$
$$4 = -3(3) + b$$
$$4 = -9 + b$$
$$13 = b$$

Now plug the slope $m = -3$ and the *y*-intercept of 13 into the slope-intercept form to get the formula of the line:

$$y = -3x + 13$$

18. **F.** To begin, isolate the absolute value on one side of the equation:

$$|5m - 11| - 3m = 9$$
$$|5m - 11| = 9 + 3m$$

Next, split the equation into two separate equations and remove the absolute value bars:

$$5m - 11 = 9 + 3m \qquad 5m - 11 = -(9 + 3m)$$

Solve both equations for m:

$$5m = 20 + 3m \qquad 5m - 11 = -9 - 3m$$
$$2m = 20 \qquad 5m = 2 - 3m$$
$$m = 10 \qquad 8m = 2$$
$$m = 0.25$$

The product of these two values is $10 \times 0.25 = 2.5$.

19. **A.** Plug the values (–3, –7) and (1, 8) into the midpoint formula:

$$\text{Midpoint} = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right) = \left(\frac{-3+1}{2}, \frac{-7+8}{2}\right) = \left(-1, \frac{1}{2}\right)$$

20. **J.** To start, find the values of $f(4)$ and $g(-1)$:

$$f(4) = 4^2 + 9 = 16 + 9 = 25$$
$$g(-1) = 24 + 4(-1) = 24 - 4 = 20$$

Thus:

$$\frac{f(4)}{g(-1)} = \frac{25}{20} = 1.25$$

21. **C.** The two legs of the triangle are of lengths *y* and 3*y,* and the hypotenuse is of length *y.* Plug these values into the Pythagorean theorem:

$$a^2 + b^2 = c^2$$
$$y^2 + (3y)^2 = x^2$$

Simplify and solve for *x* in terms of *y:*

$$y^2 + 9y^2 = x^2$$
$$10y^2 = x^2$$
$$\sqrt{10y^2} = x$$
$$y\sqrt{10} = x$$

22. **K.** The variables *v* and *w* are inversely proportional, so for some constant *k,* the equation $vw = k$ is always true. Thus, when $v = 7$ and $w = 14$:

$$vw = (7)(14) = 98$$

So $k = 98$. When $v = 2$, you can find *w* like this:

$$vw = 98$$
$$2w = 98$$
$$w = 49$$

23. **C.** The ratio of girls to boys was 4 to 5, so write the ratio like this:

$$\frac{\text{Girls}}{\text{Boys}} = \frac{4}{5}$$

If you let *g* equal the number of girls on the trip, you know that the number of boys was $g + 6$. Plug these values into the ratio:

$$\frac{g}{g+6} = \frac{4}{5}$$

Cross-multiply and solve for *g:*

$$5g = 4(g + 6)$$
$$5g = 4g + 24$$
$$g = 24$$

So now you know that 24 girls went on the field trip, and you're ready to find the number of adults. The ratio of adults to girls was 1:4. That is, the number of adults was $\frac{1}{4}$ the number of girls, so you know that 6 adults attended the field trip.

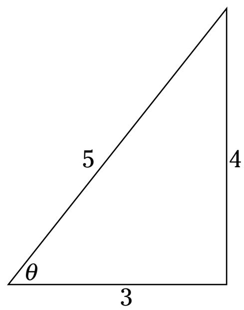
24. **H.** Line *a* goes "down 5, over 8," so its slope is $-\frac{5}{8}$. Line *b* is parallel, so it has the same slope and has a *y*-intercept of –3. Plug these numbers into the slope-intercept form to get the equation:

$$y = mx + b$$
$$y = -\frac{5}{8}x - 3$$

25. **B.** The bag contains a total of 7 + 12 + 17 = 36 socks. Of these, 7 + 17 = 24 are NOT white. Plug these two numbers (the number of colored socks and the total number of socks) into the formula for probability:

$$\text{Probability} = \frac{\text{Target outcomes}}{\text{Total outcomes}} = \frac{24}{36} = \frac{2}{3}$$

26. **H.** Remember that $\tan\theta = \frac{O}{A}$, so if $\tan\theta = \frac{4}{3}$, the opposite and adjacent sides of the triangle are in a ratio of 4:3. Thus, the triangle is a 3-4-5 triangle (you can verify this with the Pythagorean theorem), so you can make the following sketch:



Use this figure and the formula for the sine to answer the question:

$$\sin\theta = \frac{O}{H} = \frac{4}{5}$$

27. **E.** To begin, notice that the first term of $p^3q^4 + p^4q^5$ contains $(pq)^3$ multiplied by an extra q, and the second term contains $(pq)^4$ multiplied by an extra q. As a result, you can factor those values out of each respective term to simplify:

$$p^3q^4 + p^4q^5 = (pq)^3q + (pq)^4q$$

Now you can substitute 3 for pq and simplify:

$$= (3)^3q + (3)^4q$$
$$= 27q + 81q$$
$$= 108q$$

28. **G.** The area of the park is 67,500 square feet. If you let w equal the width of the park, the length is $3w$. Plug these numbers into the area formula for a rectangle and solve for w:

$$A = lw$$
$$67{,}500 = (3w)(w)$$
$$67{,}500 = 3w^2$$
$$22{,}500 = w^2$$
$$150 = w$$

If the width is 150 feet, the length is $150 \times 3 = 450$ feet. Plug these numbers into the formula for the perimeter of a rectangle:

$$P = 2l + 2w = 2(450) + 2(150) = 900 + 300 = 1{,}200$$

The perimeter of the park is 1,200 feet. Jane ran at 10 feet per second, so she ran for 120 seconds (because 1,200 ÷ 10 = 120).

29. **A.** Danielle pays \$0.10 per minute, so the function includes $0.1x$. However, she gets 200 minutes with her initial \$30, so the input x needs to be changed to $x - 200$ to account for this. Therefore, the function includes $0.1(x - 200)$. Additionally, she's charged \$30, so the function is:

$$f(x) = 0.1(x - 200) + 30$$

Simplify by distributing and combining to get the final function:

$$f(x) = 0.1x - 20 + 30$$

$$f(x) = 0.1x + 10$$

30. **H.** Use the function you found for Question 29:

$$f(x) = 0.1x + 10$$

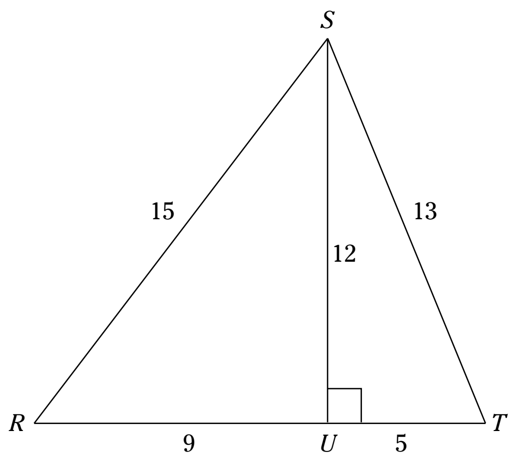
Plug in 100 for x and solve for x:

$$100 = 0.1x + 10$$

$$90 = 0.1x$$

$$900 = x$$

31. **A.** To begin, note that ΔSUR is a right triangle with a leg the length of 9 and a hypotenuse the length of 15, so it's a 9-12-15 version of a 3-4-5 triangle; therefore, $SU = 12$. ΔTUS is a right triangle with a leg the length of 12 and a hypotenuse the length of 13, so it's a 5-12-13 triangle; therefore, $UT = 5$.



So the base of ΔRST is 14, and its height is 12. Plug these values into the formula for the area of a triangle to get your answer:

$$A = \frac{1}{2}bh = \frac{1}{2}(14)(12) = 84$$

32. **G.** Let x be the original price of the guitar before tax. Antoine paid \$588.60 with a 9% percent increase on top of the original price. Therefore, Antoine paid 109% of the original price, so you can create this equation:

$$1.09x = 588.60$$

Solve for x:

$$x = \frac{588.60}{1.09} = 540$$

33. **C.** The x-intercept of a line is the point where it crosses the x-axis — that is, where $y = 0$ — so the second coordinate must equal 0. Therefore, you can rule out Choices (A) and (B). To choose correctly among the three remaining answers, substitute 0 for y in the equation and solve for x:

$$y = 2x - 8$$
$$0 = 2x - 8$$
$$8 = 2x$$
$$4 = x$$

Thus, the x-intercept is (4, 0).

34. **G.** The determinant of a matrix is a number, not a matrix, so rule out Choices (H), (J), and (K). To determine which of the remaining answers is correct, use the determinant formula $ad - bc$:

$$(3 \times 2) - (-6 \times 1)$$

Simplify:

$$= 6 - (-6) = 6 + 6 = 12$$

35. **C.** Plug the values (–12, –7) and (12, 3) into the distance formula:

$$\text{Distance} = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} = \sqrt{(12 - (-12))^2 + (3 - (-7))^2}$$

Now simplify to get the answer:

$$= \sqrt{(24)^2 + (10)^2} = \sqrt{576 + 100} = \sqrt{676} = 26$$

36. **J.** Put both sides of the equation in terms of powers of 7:

$$\left(\frac{1}{49}\right)^{n+3} = \sqrt{7}$$
$$\left(7^{-2}\right)^{n+3} = 7^{\frac{1}{2}}$$

On the left side, multiply the two exponents:

$$7^{-2(n+3)} = 7^{\frac{1}{2}}$$

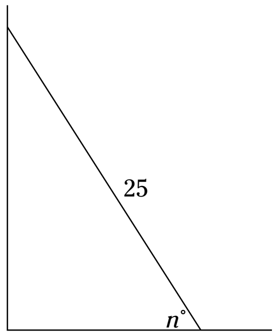
The two bases are equal, so the two exponents are equal as well:

$$-2(n+3) = \frac{1}{2}$$

Multiply both sides by 2 to eliminate the fraction, and then simplify and solve for n:

$$-4(n+3) = 1$$
$$-4n - 12 = 1$$
$$-4n = 13$$
$$n = -\frac{13}{4}$$

37. **D.** Begin by drawing a picture of the ladder and wall:



Note that the question asks you to find the distance from the base of the ladder to the wall, which is the adjacent side of this triangle. Begin by using the sine of *n,* which is the ratio of the opposite side over the hypotenuse:

$$\sin n = \frac{O}{H} = \frac{4}{5}$$

The hypotenuse is 25, so you can set up a proportion to find the length of the opposite side:

$$\frac{O}{25} = \frac{4}{5}$$
$$5O = 100$$
$$O = 20$$

Now use the Pythagorean theorem to find the length of the adjacent side:

$$20^2 + b^2 = 25^2$$
$$400 + b^2 = 625$$
$$b^2 = 225$$
$$b = 15$$

38. **F.** Begin by plugging the height and the two bases into the formula for the area of a trapezoid:

$$\text{Area} = \frac{b_1 + b_2}{2}h$$
$$144 = \frac{6x + 12x}{2}(4x)$$
$$144 = \frac{18x}{2}(4x)$$

Continue simplifying and solve for *x:*

$$144 = 9x(4x)$$
$$144 = 36x^2$$
$$4 = x^2$$
$$2 = x$$

39. **C.** Ansgar writes for at least 4 hours a day, so in 7 days he writes for at least 28 hours (because $4 \times 7 = 28$). On any day that he wrote for 8 hours, he would have written for an additional 4 hours over the minimum. Thus, the week he wrote 46 hours, he wrote for an extra 18 hours (because $46 - 28 = 18$). As a result, he could have written for an additional 4 hours on no more than 4 different days. For example, here's one possible schedule:

Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	**Total**
8	8	8	8	6	4	4	46

40. **H.** The equation $5x^2 - 10x + 4 = 0$ can't be solved for x by factoring, so use the quadratic equation, using $a = 5$, $b = -10$, and $c = 4$:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{-(-10) \pm \sqrt{(-10)^2 - 4(5)(4)}}{2(5)}$$

Start by simplifying:

$$= \frac{10 \pm \sqrt{100 - 80}}{10} = \frac{10 \pm \sqrt{20}}{10} = \frac{10 \pm \sqrt{4}\sqrt{5}}{10} = \frac{10 \pm 2\sqrt{5}}{10}$$

Now split the fraction into two fractions and reduce both separately:

$$= \frac{10}{10} \pm \frac{2\sqrt{5}}{10} = 1 \pm \frac{\sqrt{5}}{5}$$

41. **A.** Let x be the number, and then translate the words into the following equation:

$$3x + 40 = 2(x + 17)$$

Simplify and solve for x:

$$\begin{aligned} 3x + 40 &= 2x + 34 \\ x + 40 &= 34 \\ x &= -6 \end{aligned}$$

If you subtract 9 from x and then multiply by 4, the result is:

$$4(-6 - 9) = 4(-15) = -60$$

42. **F.** To solve, you want to multiply each equation by a number so that one of the two variables ends up with the same coefficient in both equations. The easiest way to do so is to multiply every term in $3x + y = -3$ by 4, and then subtract one equation from the other:

$$\begin{array}{rl} 7x + 4y = & 18 \\ -\ \ 12x + 4y = & -12 \\ \hline -5x \qquad = & 30 \end{array}$$

Next, solve for x:

$$-6 = x$$

Finally, plug –6 for x into one of the original equations and solve:

$$\begin{aligned} 3x + y &= -3 \\ 3(-6) + y &= -3 \\ -18 + y &= -3 \\ y &= 15 \end{aligned}$$

Now you know that $x + y = -6 + 15 = 9$.

43. **B.** The area of the shaded region is 20% of the whole circle, so $d°$ is 20% of 360°:

$$d = (0.2)(360) = 72$$

Use the formula for converting degrees to radians, and plug in 72 for *degrees* and r for *radians:*

$$\frac{180}{\pi} = \frac{\text{degrees}}{\text{radians}}$$

$$\frac{180}{\pi} = \frac{72}{r}$$

Cross-multiply and solve for r:

$$\begin{aligned} 180r &= 72\pi \\ r &= \frac{72\pi}{180} \\ r &= \frac{2}{5}\pi \end{aligned}$$

44. **F.** Each side of the large square has a length of $x + 2x = 3x$. The area of the large square is 81, so each side of the square is $\sqrt{81} = 9$. So one side of the square is $3x$, which is equal to 9. Thus:

$$\begin{aligned} 3x &= 9 \\ x &= 3 \end{aligned}$$

So each triangle has legs of $x = 3$ and $2x = 6$. Plug these values into the Pythagorean theorem:

$$a^2 + b^2 = c^2$$

$$3^2 + 6^2 = c^2$$

Because c is the side of the shaded square, c^2 is the area of this square. So solve for c^2:

$$\begin{aligned} 9 + 36 &= c^2 \\ 45 &= c^2 \end{aligned}$$

Thus, the area of the shaded square is 45.

45. **A.** The function $g(x)$ is the transformation that moves $f(x) = x^2 + 10x + 2$ one unit up and one unit to the right. To move one unit up, add 1 to the entire function. And to move one unit to the right, substitute $x - 1$ for x in the function. Thus

$$g(x) = f(x - 1) + 1$$

Thus, you need to substitute $x - 1$ for x throughout the $f(x)$ and to add 1 to $f(x)$:

$$g(x) = (x - 1)^2 + 10(x - 1) + 2 + 1$$

Now simplify:

$= (x - 1)(x - 1) + 10(x - 1) + 2 + 1$

$= x^2 - 2x + 1 + 10x - 10 + 2 + 1$

$= x^2 + 8x - 6$

46. **J.** Cross-multiply to get the two fractions out of the equation:

$$\frac{a+b}{10} = \frac{a-0.1b^2}{a-b}$$
$$(a+b)(a-b) = 10\left(a-0.1b^2\right)$$

FOIL the left side and distribute the right side:

$a^2 - b^2 = 10a - b^2$

Add b^2 to both sides of the equation, and then divide by a:

$a^2 = 10a$

$a = 10$

47. **C.** The first character must be a letter, so 26 possibilities exist for this character. The last (6th) character must be a digit, so 10 possibilities exist for this one. The remaining four characters can be either a letter or a digit, so 36 possibilities exist for each of these. The following chart organizes this information:

1st	2nd	3rd	4th	5th	6th
26	36	36	36	36	10

Multiply these results:

$26 \times 36 \times 36 \times 36 \times 36 \times 10 = 436{,}700{,}160$

This result has 9 digits, so it's between 10^8 (100,000,000) and 10^9 (1,000,000,000).

48. **J.** The formula for a circle of radius r is $(x - h)^2 + (y - k)^2 = r^2$. So in the equation $(x + 3)^2 + (y - 4)^2 = 49$:

$r^2 = 49$

$r = 7$

You now plug this value into the formula for the area of a circle to get your answer:

$$A = \pi r^2 = \pi (7)^2 = 49\pi$$

49. **A.** First, use the reciprocal identity $\sec x = \frac{1}{\cos x}$ to substitute for sec x:

$$\sin x \sec x = \frac{\sin x}{\cos x}$$

Now recall the following identity:

$$\frac{\sin x}{\cos x} = \tan x$$

50. **G.** The height of the tank is h and its diameter is $3h$, so its radius is $1.5h$. The volume of the tank is approximately 231.5 cubic meters. Use 3.14 as an approximation of π and plug these values into the formula for a cylinder:

$$V = \pi r^2 h$$
$$231.5 \approx (3.14)(1.5h)^2 h$$

Simplify and solve for h:

$$231.5 \approx (3.14)(2.25h^2)h$$
$$231.5 \approx 7.065h^3$$
$$32.767 \approx h^3$$
$$3.2 \approx h$$

Thus, the height of the tank is closest to 3 meters.

51. **D.** Let p, q, and r equal the amounts that Paulette, Quentin, and Rosie gave, respectively. Then you can set up the following three equations:

$$p = q + r \qquad 3q = p + 40 \qquad 2(r - 20) = p$$

Simplify the third equation

$$p = q + r \qquad 3q = p + 40 \qquad 2r - 40 = p$$

Substitute $q + r$ for p into the second and third equations:

$$3q = q + r + 40 \qquad 2r - 40 = q + r$$

Simplify both equations:

$$2q = r + 40 \qquad r - 40 = q$$

Now substitute $r - 40$ for q into the equation $2q = r + 40$ and solve for r:

$$2(r - 40) = r + 40$$
$$2r - 80 = r + 40$$
$$r - 80 = 40$$
$$r = 120$$

Substitute 120 for r in the equation $2r - 40 = p$ and solve for p:

$$2(120) - 40 = p$$
$$240 - 40 = p$$
$$200 = p$$

52. **G.** Zach registered 12 clients, Yolanda registered 16, Xavier registered 19, Wanda registered 13, and Victoria registered 20. Add these together to find the total number of clients registered:

$$12 + 16 + 19 + 13 + 20 = 80$$

So Yolanda registered:

$$\frac{16}{80} = \frac{1}{5} = 20\%$$

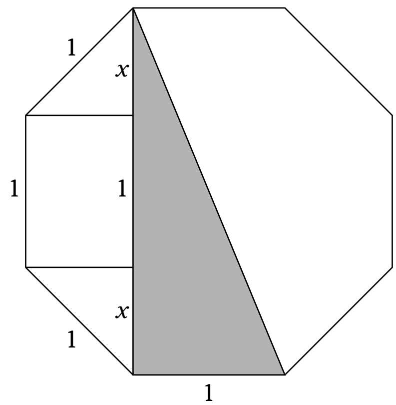
53. **B.** If Victoria doubles her registration to 40 and the others keep the same numbers, the sum of registrations will be:

$$12 + 16 + 19 + 13 + 40 = 100$$

Thus, Victoria's registration will be:

$$\frac{40}{100} = 40\%$$

54. **H.** The octagon is regular, so the shaded region is a right triangle. It has a base of 1, so you need to know its height to find its area. Draw a few lines as follows to help find the height of the triangle:



If you let x equal the unknown length, the height of the shaded region is $2x + 1$. To find the value of x, notice that the length x is the leg of a 45-45-90 triangle with a hypotenuse of 1. The ratio of a leg of this triangle to its hypotenuse is $1:\sqrt{2}$ Thus:

$$\frac{1}{\sqrt{2}} = \frac{x}{1}$$

Therefore:

$$x = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$$

So

$$2x + 1 = \sqrt{2} + 1$$

Plug this value as the height into the formula for the area of a triangle, with a base of 1:

$$A = \frac{1}{2}bh = \frac{1}{2}(1)\left(\sqrt{2} + 1\right) = \frac{\sqrt{2} + 1}{2}$$

55. **B.** Begin by multiplying all three terms by a common denominator of abc to get rid of the fractions:

$$\frac{a}{c} - \frac{a}{b} = \frac{b-c}{a}$$
$$(abc)\frac{a}{c} - (abc)\frac{a}{b} = (abc)\frac{b-c}{a}$$

When the denominators are canceled out, the result is the following equation:

$$a^2b - a^2c = bc(b - c)$$

Factor out a^2 on the left side of the equation:

$$a^2(b - c) = bc(b - c)$$

Now divide both sides of the equation by $(b - c)$ and cancel:

$$\frac{a^2(b-c)}{(b-c)} = \frac{bc(b-c)}{(b-c)}$$
$$a^2 = bc$$

Finally, take the square root of both sides:

$$a = \sqrt{bc}$$

56. **K.** If you let x be the speed at which Angela ran, you can let $x - 4$ be the speed at which Angela and Kathleen walked. The distance in each direction was 2 miles, and the total time was 45 minutes, which is $\frac{3}{4}$ of an hour. Place all of this information into a Rate-Time-Distance chart:

	Rate	***Time***	***Distance***
Running	x		2
Walking	$x - 4$		2
Total		$\frac{3}{4}$	

Rate × Time = Distance, so, in your chart, calculate Time = Distance ÷ Rate:

	Rate	***Time***	***Distance***
Running	x	$\frac{2}{x}$	2
Walking	$x - 4$	$\frac{2}{x-4}$	2
Total		$\frac{3}{4}$	

Adding the Time column, set up the following equation:

$$\frac{2}{x} + \frac{2}{x-4} = \frac{3}{4}$$

Use $x(x - 4)$ as a common denominator on the left side of the equation to add the two fractions and simplify:

$$\frac{2(x-4)+2x}{x(x-4)} = \frac{3}{4}$$
$$\frac{2x-8+2x}{x^2-4x} = \frac{3}{4}$$
$$\frac{4x-8}{x^2-4x} = \frac{3}{4}$$

Now cross-multiply and simplify again:

$$4(4x - 8) = 3(x^2 - 4x)$$
$$16x - 32 = 3x^2 - 12x$$
$$0 = 3x^2 - 28x + 32$$

Solve the resulting quadratic equation for x using either factoring or the quadratic formula (I use factoring):

$$(3x - 4)(x - 8) = 0$$
$$3x - 4 = 0 \qquad x - 8 = 0$$

The first equation solves for x as a number that's less than 4 ($x = \frac{4}{3}$), which isn't correct in the context of the question because their speed on the way back would be negative. The second equation solves as $x = 8$, so the correct answer is Choice (K).

57. **C.** The function $f(x)$ is symmetrical, so if you reflect it horizontally across the y-axis and then shift it 6 units to right, it returns to where it started. To reflect it horizontally, change x to $-x$:

$$f(-x)$$

Now, to move this function 6 units to the right, change x in this new function to $x - 6$ and simplify:

$$f(-(x - 6)) = f(-x + 6) = f(6 - x)$$

58. **G.** Convert the log into an exponent:

$$\log_9 n = \frac{1}{2} \qquad \text{means} \qquad 9^{\frac{1}{2}} = n$$

Simplify, keeping in mind that $9^{\frac{1}{2}} = \sqrt{9}$:

$$\sqrt{9} = n$$
$$3 = n$$

Thus, $\sqrt{n} = \sqrt{3}$

59. **D.** The conjugate of $2 + 7i$ is $2 - 7i$, so you're looking for the value of $(2 + 7i)(2 - 7i)$. Begin by FOILing to remove the parentheses:

$$(2 + 7i)(2 - 7i) = 4 - 14i + 14i - 49i^2 = 4 - 49i^2$$

Now, because $i = \sqrt{-1}$, you can substitute -1 for i^2:

$$4 - 49(-1) = 4 + 49 = 53$$

60. **K.** The water level decreases and then rises again, which rules out Choices (F) and (H). The pool is full to capacity at the beginning of the shift, so it can't have more water at the end of the shift; therefore, Choice (J) is also wrong. Finally, the pool drains in 2 hours but takes 7 hours to fill, so the downward slope at the beginning of the shift is greater than the upward slope at the end; as a result, you can rule out Choice (G), leaving Choice (K) as the correct answer.