Incorrect marks:
Overlapping mark:
Cross-out mark:
Smudged erasure:
Mark is too light:

fill in the corresponding oval at the right.

TEST 1

1 A B C D	14 F G H J	27 A B C D	40 F G H J	53 A B C D	66 F G H J
2 F G H J	15 A B C D	28 F G H J	41 A B C D	54 F G H J	67 A B C D
3 A B C D	16 F G H J	29 A B C D	42 F G H J	55 A B C D	68 F G H J
4 F G H J	17 A B C D	30 F G H J	43 A B C D	56 F G H J	69 A B C D
5 A B C D	18 F G H J	31 A B C D	44 F G H J	57 A B C D	70 F G H J
6 F G H J	19 A B C D	32 F G H J	45 A B C D	58 F G H J	71 A B C D
7 A B C D	20 F G H J	33 A B C D	46 F G H J	59 A B C D	72 F G H J
8 F G H J	21 A B C D	34 F G H J	47 A B C D	60 F G H J	73 A B C D
9 A B C D	22 F G H J	35 A B C D	48 F G H J	61 A B C D	74 F G H J
10 F G H J	23 A B C D	36 F G H J	49 A B C D	62 F G H J	75 A B C D
11 A B C D	24 F G H J	37 A B C D	50 F G H J	63 A B C D	
12 F G H J	25 A B C D	38 F G H J	51 A B C D	64 F G H J	
13 A B C D	26 F G H J	39 A B C D	52 F G H J	65 A B C D	

TEST 2

1 A B C D E	11 A B C D E	21 A B C D E	31 A B C D E	41 A B C D E	51 A B C D E
2 F G H J K	12 F G H J K	22 F G H J K	32 F G H J K	42 F G H J K	52 F G H J K
3 A B C D E	13 A B C D E	23 A B C D E	33 A B C D E	43 A B C D E	53 A B C D E
4 F G H J K	14 F G H J K	24 F G H J K	34 F G H J K	44 F G H J K	54 F G H J K
5 A B C D E	15 A B C D E	25 A B C D E	35 A B C D E	45 A B C D E	55 A B C D E
6 F G H J K	16 F G H J K	26 F G H J K	36 F G H J K	46 F G H J K	56 F G H J K
7 A B C D E	17 A B C D E	27 A B C D E	37 A B C D E	47 A B C D E	57 A B C D E
8 F G H J K	18 F G H J K	28 F G H J K	38 F G H J K	48 F G H J K	58 F G H J K
9 A B C D E	19 A B C D E	29 A B C D E	39 A B C D E	49 A B C D E	59 A B C D E
10 F G H J K	20 F G H J K	30 F G H J K	40 F G H J K	50 F G H J K	60 F G H J K

TEST 3

1 A B C D	8 F G H J	15 A B C D	22 F G H J	29 A B C D	36 F G H J
2 F G H J	9 A B C D	16 F G H J	23 A B C D	30 F G H J	37 A B C D
3 A B C D	10 F G H J	17 A B C D	24 F G H J	31 A B C D	38 F G H J
4 F G H J	11 A B C D	18 F G H J	25 A B C D	32 F G H J	39 A B C D
5 A B C D	12 F G H J	19 A B C D	26 F G H J	33 A B C D	40 F G H J
6 F G H J	13 A B C D	20 F G H J	27 A B C D	34 F G H J	
7 A B C D	14 F G H J	21 A B C D	28 F G H J	35 A B C D	

TEST 4

1 A B C D	8 F G H J	15 A B C D	22 F G H J	29 A B C D	36 F G H J

2	F	G	H	J	15	A	B	C	D	28	F	G	H	J	41	A	B	C	D	54	F	G	H	J	67	A	B	C	D
3	A	B	C	D	16	F	G	H	J	29	A	B	C	D	42	F	G	H	J	55	A	B	C	D	68	F	G	H	J
4	F	G	H	J	17	A	B	C	D	30	F	G	H	J	43	A	B	C	D	56	F	G	H	J	69	A	B	C	D
5	A	B	C	D	18	F	G	H	J	31	A	B	C	D	44	F	G	H	J	57	A	B	C	D	70	F	G	H	J
6	F	G	H	J	19	A	B	C	D	32	F	G	H	J	45	A	B	C	D	58	F	G	H	J	71	A	B	C	D
7	A	B	C	D	20	F	G	H	J	33	A	B	C	D	46	F	G	H	J	59	A	B	C	D	72	F	G	H	J
8	F	G	H	J	21	A	B	C	D	34	F	G	H	J	47	A	B	C	D	60	F	G	H	J	73	A	B	C	D
9	A	B	C	D	22	F	G	H	J	35	A	B	C	D	48	F	G	H	J	61	A	B	C	D	74	F	G	H	J
10	F	G	H	J	23	A	B	C	D	36	F	G	H	J	49	A	B	C	D	62	F	G	H	J	75	A	B	C	D
11	A	B	C	D	24	F	G	H	J	37	A	B	C	D	50	F	G	H	J	63	A	B	C	D					
12	F	G	H	J	25	A	B	C	D	38	F	G	H	J	51	A	B	C	D	64	F	G	H	J					
13	A	B	C	D	26	F	G	H	J	39	A	B	C	D	52	F	G	H	J	65	A	B	C	D					

TEST 2

1	A	B	C	D	E	11	A	B	C	D	E	21	A	B	C	D	E	31	A	B	C	D	E	41	A	B	C	D	E	51	A	B	C	D	E
2	F	G	H	J	K	12	F	G	H	J	K	22	F	G	H	J	K	32	F	G	H	J	K	42	F	G	H	J	K	52	F	G	H	J	K
3	A	B	C	D	E	13	A	B	C	D	E	23	A	B	C	D	E	33	A	B	C	D	E	43	A	B	C	D	E	53	A	B	C	D	E
4	F	G	H	J	K	14	F	G	H	J	K	24	F	G	H	J	K	34	F	G	H	J	K	44	F	G	H	J	K	54	F	G	H	J	K
5	A	B	C	D	E	15	A	B	C	D	E	25	A	B	C	D	E	35	A	B	C	D	E	45	A	B	C	D	E	55	A	B	C	D	E
6	F	G	H	J	K	16	F	G	H	J	K	26	F	G	H	J	K	36	F	G	H	J	K	46	F	G	H	J	K	56	F	G	H	J	K
7	A	B	C	D	E	17	A	B	C	D	E	27	A	B	C	D	E	37	A	B	C	D	E	47	A	B	C	D	E	57	A	B	C	D	E
8	F	G	H	J	K	18	F	G	H	J	K	28	F	G	H	J	K	38	F	G	H	J	K	48	F	G	H	J	K	58	F	G	H	J	K
9	A	B	C	D	E	19	A	B	C	D	E	29	A	B	C	D	E	39	A	B	C	D	E	49	A	B	C	D	E	59	A	B	C	D	E
10	F	G	H	J	K	20	F	G	H	J	K	30	F	G	H	J	K	40	F	G	H	J	K	50	F	G	H	J	K	60	F	G	H	J	K

TEST 3

1	A	B	C	D	8	F	G	H	J	15	A	B	C	D	22	F	G	H	J	29	A	B	C	D	36	F	G	H	J
2	F	G	H	J	9	A	B	C	D	16	F	G	H	J	23	A	B	C	D	30	F	G	H	J	37	A	B	C	D
3	A	B	C	D	10	F	G	H	J	17	A	B	C	D	24	F	G	H	J	31	A	B	C	D	38	F	G	H	J
4	F	G	H	J	11	A	B	C	D	18	F	G	H	J	25	A	B	C	D	32	F	G	H	J	39	A	B	C	D
5	A	B	C	D	12	F	G	H	J	19	A	B	C	D	26	F	G	H	J	33	A	B	C	D	40	F	G	H	J
6	F	G	H	J	13	A	B	C	D	20	F	G	H	J	27	A	B	C	D	34	F	G	H	J					
7	A	B	C	D	14	F	G	H	J	21	A	B	C	D	28	F	G	H	J	35	A	B	C	D					

TEST 4

1	A	B	C	D	8	F	G	H	J	15	A	B	C	D	22	F	G	H	J	29	A	B	C	D	36	F	G	H	J
2	F	G	H	J	9	A	B	C	D	16	F	G	H	J	23	A	B	C	D	30	F	G	H	J	37	A	B	C	D
3	A	B	C	D	10	F	G	H	J	17	A	B	C	D	24	F	G	H	J	31	A	B	C	D	38	F	G	H	J
4	F	G	H	J	11	A	B	C	D	18	F	G	H	J	25	A	B	C	D	32	F	G	H	J	39	A	B	C	D
5	A	B	C	D	12	F	G	H	J	19	A	B	C	D	26	F	G	H	J	33	A	B	C	D	40	F	G	H	J
6	F	G	H	J	13	A	B	C	D	20	F	G	H	J	27	A	B	C	D	34	F	G	H	J					
7	A	B	C	D	14	F	G	H	J	21	A	B	C	D	28	F	G	H	J	35	A	B	C	D					

MATHEMATICS • PRACTICE TEST 1 • EXPLANATORY ANSWERS

Question 1. The correct answer is E. To find the total distance, in miles, Kaya ran, you need the sum of $1\frac{2}{5}$ and $2\frac{1}{3}$. To add mixed numbers together, each fraction must have a common denominator. Because 3 and 5 do not have any common factors besides 1, the least common denominator is 3(5), or 15. To convert $\frac{2}{5}$, you multiply by $\frac{3}{3}$. The result is $\frac{6}{15}$. To convert $\frac{1}{3}$, you multiply by $\frac{5}{5}$. The result is $\frac{5}{15}$. To add $1\frac{6}{15}$ and $2\frac{5}{15}$, you first add 1 and 2 and then $\frac{6}{15} + \frac{5}{15}$. The result is $3\frac{6+5}{15}$, or $3\frac{11}{15}$.

B is the most popular incorrect answer and comes from adding the whole number parts and adding the numerators and the denominators separately: $\frac{2+1}{5+3}$. If you chose A, you may have added the whole number parts and multiplied the fractions. If you chose D, you could have incorrectly converted $\frac{2}{5}$ to $\frac{2}{15}$ or $\frac{1}{3}$ to $\frac{1}{15}$ and then added.

Question 2. The correct answer is H. To find an equivalent expression, you can multiply the constants ($3 \cdot 2 \cdot 4$), combine the x terms ($x^3x^2x^2 \Rightarrow x^{3+2+2} \Rightarrow x^7$, because when you have a common base you use the base and add the exponents), and combine the y terms ($y \cdot y \Rightarrow y^1y^1 \Rightarrow y^{1+1} \Rightarrow y^2$). The result is $24x^7y^2$.

K is the most common incorrect answer and comes from multiplying the exponents on the x terms instead of adding. If you chose F, you probably added the constants instead of multiplying. If you chose G, you could have added the constants and multiplied the exponents on the x terms instead of adding. If you chose J, possibly you multiplied the exponents on the x terms and y terms instead of adding.

Question 3. The correct answer is A. To find Mr. Dietz's pay per day, you can divide his salary, $22,570, by the number of days he works, 185. His pay per day is $\frac{22,570}{185}$, or $122. When Mr. Dietz takes a day off without pay and the school pays a substitute $80, the school district saves the difference in these amounts, 122 – 80, or $42.

If you chose B, you probably just picked a number from the problem. If you got E, you probably found Mr. Dietz's pay per day and stopped.

Question 4. The correct answer is J. To find what the student needs to score on the fifth 100-point test to average a score of 80, you need to find the point total for the student so far by adding 65, 73, 81, and 82. That sum is 301. Averaging 80 points on 5 tests means the student must earn 400 points ($80 \cdot 5$). The score needed on the last test is the difference, 400 – 301, or 99.

F is the average of the 4 scores, rounded to the nearest whole point. If you chose H, you probably took the average of 65, 73, 81, and 82, averaged that average with 80, and rounded to the nearest whole point. If you chose K, you possibly thought you needed 5(100) or 500 points total, and this total is not possible when adding a number 100 or less to 301.

Question 5. The correct answer is D. To find the oxygen saturation loss, you divide the current number of milligrams of dissolved oxygen per liter of water by the dissolved oxygen capacity in milligrams per liter of water, or $\frac{7.3}{9.8}$. Then, you approximate that fraction as a decimal, 0.7449, then convert to a percent, 74.49%, and round to 74%.

If you chose A, you probably divided 9.8 by 7.3, subtracted 1, converted to a percent, and rounded to the nearest whole percent. If you chose B, you probably rounded to the nearest 10%, that is, 74.49% to 70%. If you chose C, you probably just used numbers from the problem.

Question 6. The correct answer is J. To find the length of fence needed to fence a rectangular lot 150 ft by 200 ft, you need to find the perimeter. The formula for the perimeter of a rectangle is 2 times the sum of the length and width, or $P = 2(l + w)$. $2(150 + 200) = 2(350) = 700$.

If you chose G, you probably added the dimensions, but didn't double the sum. If you chose F or H, possibly you used only one dimension and doubled it.

Question 7. The correct answer is A. To find an equivalent expression, multiply a by $b + c - d$. This results in $a(b) + a(c) + a(-d)$, or $ab + ac - ad$.

If you chose E, you probably forgot to distribute the a to c and d.

Question 8. The correct answer is F. To solve for x in the equation $4x + 3 = 9x - 4$, you could subtract $4x$ and add 4 to both sides. That results in the equation $7 = 5x$. Then, dividing both sides by 5, the result is $\frac{7}{5} = x$.

If you chose G, you probably got to $7 = 5x$ and then divided 5 by 7. If you chose H, you probably added $4x$ to $9x$, resulting in $7 = 13x$, and then divided by 13. If you chose J, you might have combined the 3 and –4 and somehow got 1, then got to $1 = 5x$ and divided both sides by 5.

Question 9. The correct answer is C. These 4 numbers will be an arithmetic sequence. In an arithmetic sequence, each pair of successive terms differs by the same amount. To find the difference, you can define d as that difference and let 17 be the first term and 41 the fourth term. By definition, the second term is $17 + d$ and the third term is $(17 + d) + d$. The fourth term, 41, can also be written as $(17 + d + d) + d$. Using that expression you obtain the equation $41 = 17 + d + d + d$, or $41 = 17 + 3d$. After subtracting 17 from both sides, you can then divide by 3, resulting in $8 = d$. The difference is 8. Then, the second term is 17 + 8, or 25. The third term is 17 + 8 + 8, or 33.

If you chose A, you probably reasoned that because 41 is the fourth term, the relationship is $4d = 24$ (rather than $3d = 24$) and so the difference is 6. If you chose B, you probably added 7 to the first term and subtracted 7 from the fourth term. If you chose E, you probably added 10 to the first term and subtracted 10 from the fourth term.

Question 10. The correct answer is **H.** To find what $x^2 + \sqrt{x}$ equals, you need to solve $x^3 = 64$ for x. The solution is $\sqrt[3]{64}$, which is 4. Then, substituting into the original expression, you get $4^2 + \sqrt{4}$. This expression simplifies to 16 + 2, or 18.

If you chose **F**, you probably solved $x^3 = 64$ for x and stopped. If you chose **G**, you could have gotten $x = 4$, used 4(2) for 4^2, and added 4(2) and 2 to get 10. If you chose **J**, possibly you got $x = 4$ and then simplified $\sqrt{4}$ to be 4.

Question 11. The correct answer is **C.** To find the volume, you substitute $\frac{5}{4}$ for r in the equation $V = \frac{4}{3}\pi r^3$. This yields $\frac{4}{3}\pi\left(\frac{5}{4}\right)^3$, or $\frac{125\pi}{48}$. This expression is about 8.18, or 8 to the nearest cubic inch.

If you chose **A**, you might have substituted to get $\frac{4}{3}\pi\left(\frac{5}{4}\right)$, yielding π, which is about 5. If you chose **B**, you probably substituted to get $\frac{4}{3}\pi\left(\frac{5}{4}\right)\left(\frac{5}{4}\right)$, yielding $\frac{25}{12}\pi$, or about 7. If you chose **D**, you probably substituted to get $\frac{4}{3}\pi\left(\frac{5}{4}\right)(3)$, yielding 5π, or about 16.

Question 12. The correct answer is **K.** The probability that the marble chosen will not be white when 8 marbles are red, 6 are blue, and 6 are white is the number of favorable outcomes divided by the total number of possible outcomes. The number of *favorable* outcomes is 14 because there are 8 red marbles and 6 blue marbles—a total of 14 marbles. The total number of *possible* outcomes is 8 + 6 + 6 = 20, the total number of marbles. Thus, the probability of the marble NOT being white is $\frac{8+6}{8+6+6} = \frac{14}{20} = \frac{7}{10}$.

If you chose **G**, you probably added the number of blue marbles and the number of white marbles and divided by the total number of marbles: $\frac{6+6}{20} = \frac{12}{20} = \frac{3}{5}$. If you chose **H**, you probably found $\frac{8+8}{8+6+6} = \frac{16}{20} = \frac{4}{5}$. If you chose **J**, you probably found the probability of choosing a white marble: $\frac{6}{8+6+6} = \frac{6}{20} = \frac{3}{10}$.

Question 13. The correct answer is D. To find the number of sports awards earned, the number of participants in each sport is multiplied by the ratio for that sport and then the 4 products are added. This is a matrix multiplication.

$$[40\ 60\ 80\ 80]\begin{bmatrix}0.3\\0.4\\0.2\\0.5\end{bmatrix} = 40(0.3) + 60(0.4) + 80(0.2) + 80(0.5) = 12 + 24 + 16 + 40 = 92$$

If you chose B, you probably reversed the order on the first matrix to get $80(0.3) + 80(0.4) + 60(0.2) + 40(0.5) = 24 + 32 + 12 + 20 = 88$. If you chose C, you probably totaled the number of athletes and multiplied it by the average of the ratios, $260(0.35)$, which is 91.

Question 14. The correct answer is H. To find the average number of students enrolled per section of Algebra I, you add up the students in all the sections and divide by the number of sections. Thus, you add 24 + 25 + 29 and get 78, then divide by 3. This results in an average of 26 students enrolled per section in Algebra I.

If you chose G, you could have found the median (or middle number) of 24, 25, and 29. Sometimes *average* can mean the median or the mode. For this test, the directions say that, unless otherwise stated, "The word *average* indicates arithmetic mean." If you chose J, you likely found the average of 25 and 29.

Question 15. The correct answer is C. The total number of calculators available is $30 - 2 + 30 - 6 = 52$. To find the class periods for which there are not enough school calculators, find the total needed for each period, as given in the table below.

Period	1	2	3	4	6
Calculators needed	21	46	48	57	19

The only entry in the table more than 52 is 57 for Period 4.

If you chose D, possibly you looked at the Algebra I rows in the table and saw that Section B and Section C could not both be covered by the available calculators, and these sections are in Period 3 and Period 4. If you chose E, you probably used 60 for the available number of calculators and did not take into account the 8 calculators that are being repaired and are unavailable.

Question 16. The correct answer is H. Because the sum of each row is equivalent, the sum of Row 1 is the same as the sum of Row 2.

Row 1: $x + 8x + (-3x) \Rightarrow 6x$

Row 2: $-2x + \ ? \ + \ 6x \Rightarrow 4x + \ ?$

The question mark must represent $2x$. You could have done this with other rows, columns, or diagonals.

If you chose G, you probably just added the first and last entries in either Row 2, Column 2, or one of the diagonals. If you chose K, you may have thought that each sum must be 0 and found that $-4x$ would make the sums of Row 2, of Column 2, and of both diagonals be 0.

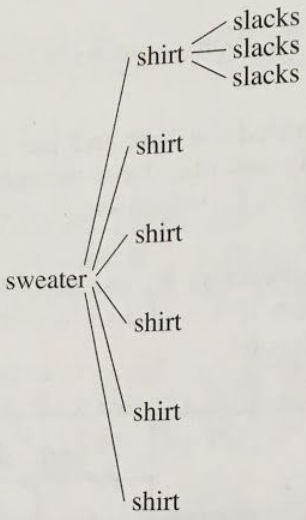
Question 17. The correct answer is E. The x-coordinate is positive if A is to the right of the y-axis. The y-coordinate is positive if A is above the x-axis. The table below shows the sign of x and the sign of y in the four quadrants.

Quadrant	Sign of:	
	x	y
I	+	+
II	−	+
III	−	−
IV	+	−

Thus, the signs are opposite in Quadrants II and IV only.

If you chose C or D, you probably got confused about where x and y are positive and negative or about the order of the quadrants.

Question 18. The correct answer is J. To find the number of distinct outfits that Kareem can select from 4 sweaters, 6 shirts, and 3 pairs of slacks, multiply the numbers of the 3 different clothing pieces together. Thus, there are 4(6)(3), or 72 distinct outfits that Kareem can select. The figure below shows that for each sweater, there are 6 shirts, and for each shirt, there are 3 pairs of slacks.

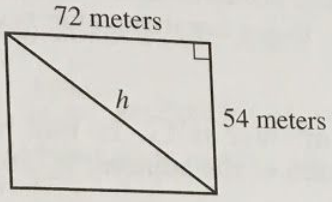


If you chose F, you probably added the 3 numbers together, getting 4 + 6 + 3 = 13.

Question 19. The correct answer is A. To find the number of tons of sand needed to produce 3,000 barrels of a tarry material that requires 100,000 tons of sand for 60,000 barrels, you can set up a proportion with ratios of tons of sand to barrels of tarry material, such as $\frac{100{,}000}{60{,}000} = \frac{\text{tons of sand}}{3{,}000}$, which results in 5,000 tons of sand.

If you chose B, you probably calculated $\frac{60{,}000(30{,}000)}{100{,}000}$.

Question 20. The correct answer is H. The figure below shows the rectangle and a diagonal. To find the length of the diagonal, you could use the Pythagorean theorem because the sides of the rectangle are the legs of a right triangle and the diagonal of the rectangle is the hypotenuse of the right triangle. Then $h^2 = 72^2 + 54^2 \Rightarrow h = 90$.



G is the average of 54 and 72. If you chose J, you probably added 54 and 72.

Question 21. The correct answer is A. To find an equivalent expression for $\frac{x}{y}$, you must either multiply or divide both the numerator and the denominator by the same value.

Multiplying $\frac{x}{y}$ by $\frac{z}{z}$ yields $\frac{x \cdot z}{y \cdot z}$.

If you chose B, you probably thought you could multiply by the expression and obtain an equivalent expression, but if $\frac{x}{y} = \frac{2}{3}$, then $\frac{x^2}{y^2} = \frac{4}{9} \neq \frac{2}{3}$. If you chose C, you probably thought you could multiply by the reciprocal and obtain an equivalent expression, but if $\frac{x}{y} = \frac{2}{3}$, then $\frac{x \cdot y}{y \cdot x} = \frac{2 \cdot 3}{3 \cdot 2} = 1 \neq \frac{2}{3}$. If you chose E, you probably thought you could add the same number to both the numerator and the denominator and obtain an equivalent expression, but if $\frac{x}{y} = \frac{2}{3}$ and $z = 2$, then $\frac{x + 2}{y + 2} = \frac{2 + 2}{3 + 2} = \frac{4}{5} \neq \frac{2}{3}$.

Question 22. The correct answer is H. To find the slope-intercept form of the equation $8x - y - 6 = 0$, you could first add 6 and subtract $8x$ from both sides of the equation to get $-y = -8x + 6$. Then, multiply by -1 to get $y = 8x - 6$.

If you chose F, you probably forgot to switch the sign on $8x$ when you multiplied by -1. If you chose G, you probably just dropped the sign on $-y$. If you chose J, you probably forgot to multiply 6 by -1 in the last step.

Question 23. The correct answer is **B.** To solve the quadratic equation $x^2 - 36x = 0$ for x, you could factor the left side to $x(x - 36) = 0$ and apply the zero product rule. Thus, $x = 0$ or $x - 36 = 0$, which implies $x = 0$ or $x = 36$. The solution given as an answer choice is 36.

If you chose C, you probably divided 36 by 2. If you chose D, you probably dropped the x in the second term and solved $x^2 = 36$ for a positive value. If you chose E, you probably dropped the x in the second term and solved $x^2 = 36$ for negative value because there was a negative sign in the original equation.

Question 24. The correct answer is **G.** To find $\tan R$ in $\triangle RST$, take the ratio of the length of the opposite leg to the length of the adjacent leg, or ST to RS, or r to t, or $\frac{r}{t}$.

F is $\sin R$, H is $\cot R$, J is $\cos R$, and K is $\sec R$. If you did not get the correct answer, it would be wise to review trigonometric ratios in a right triangle.

Question 25. The correct answer is **D.** To find the radius, you can use the right triangle shown on the diagram. Half the length of the chord is 12 inches, which is the length of one leg. The other leg is 5 inches long, and the hypotenuse is r inches long. (This is a right triangle because the distance between a point and a line must be measured perpendicular to the line.) Using the Pythagorean theorem $r^2 = 12^2 + 5^2 \Rightarrow r^2 = 169 \Rightarrow r = 13$ inches.

A is $24 + 5$, which is clearly much longer than the radius. If you chose B, you probably used 24 and 5 for the leg lengths and got $r = \sqrt{601}$, which is about $r = 24.5$ inches. Choice C is closest to $5 + 12$. Going along the radius line must be shorter than going along the 2 legs of the triangle.

Question 26. The correct answer is **H.** To find the force F (in newtons) corresponding to a spring length, L, of 0.18 meters when the relationship is given by the equation $L = \frac{2}{3}F + 0.03$, you would substitute 0.18 for L to get $0.18 = \frac{2}{3}F + 0.03$. After subtracting 0.03 from both sides, you'd get $0.15 = \frac{2}{3}F$. Then, after multiplying by $\frac{3}{2}$, you'd get $0.225 = F$.

G is the result of replacing F by 0.18 and solving for L. If you chose J, possibly you got $0.225 = F$ and added 0.03.

Question 27. The correct answer is B. To find the uniform depth the 10,000 cubic yards of snow would be on the rectangular football field with dimensions 120 yards by 53.5 yards, you would substitute in the formula for volume, V, of a rectangular prism with the height h, length l, and width w, which is $V = lwh$. After substituting you should have $10{,}000 = 120(53.5)(h)$, or $10{,}000 = 6{,}420h$. Thus, $h = \frac{10{,}000}{6{,}420}$, or about 1.558. And 1.558 is between 1 and 2.

If you chose **A**, you probably took $\frac{6{,}420}{10{,}000}$ and got 0.642, which is less than 1. If you chose **C** or **D**, you probably used the wrong dimensions or made a mistake in calculations.

Question 28. The correct answer is G. To find the length of $\overline{QR}$ in $\triangle PQR$, where $\overline{PR}$ is 16 feet long and $\sin \angle P = \frac{3}{5}$, use the definition of sine: the ratio of the length of the opposite side to the length of the hypotenuse. In $\triangle PQR$, $\sin \angle P = \frac{QR}{PR}$. After substituting for $\sin \angle P$ and PR, the length of the hypotenuse, you obtain $\frac{3}{5} = \frac{QR}{16} \Rightarrow 5 \cdot QR = 48 \Rightarrow QR = 9.6$ feet.

F is $\frac{1}{2}$ of PR. If you chose **H**, you probably found $\cos \angle P = 0.8$ and then multiplied 16(0.8) to get 12.4.

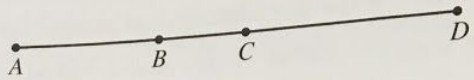
Question 29. The correct answer is B. To find the fraction of cars assembled in Coupeville, you would divide the number assembled in Coupeville by the total number assembled. The table below shows the conversion of car symbols to numbers for the 4 cities and the total.

City	Number of cars assembled
Car Town	40,000
Coupeville	25,000
Truck City	20,000
Sedan Falls	15,000
All	100,000

The fraction assembled in Coupeville is $\frac{25{,}000}{100{,}000}$, or $\frac{1}{4}$.

If you chose **A**, you probably found the fraction for Truck City, $\frac{20{,}000}{100{,}000}$, or $\frac{1}{5}$. If you chose **C**, you may have thought a half car represented 10,000, so your fraction was $\frac{30{,}000}{110{,}000}$, or $\frac{3}{11}$. If you chose **D**, you probably used the fraction $\frac{30{,}000}{100{,}000}$, or $\frac{3}{10}$. If you chose **E**, you probably used the number in Coupeville divided by the total number from the other 3 cities, $\frac{25{,}000}{75{,}000}$, or $\frac{1}{3}$.

Question 30. The correct answer is G. To find BC when AD is 30 units, AC is 16 units, BD is 20 units, and the points are along $\overline{AD}$ as shown below, you must notice that $\overline{BC}$ is the intersection of $\overline{AC}$ and $\overline{BD}$.



So, the sum of the lengths of $\overline{AC}$ and $\overline{BD}$ is the same as the sum of the lengths of $\overline{AD}$ and $\overline{BC}$. Because $AC = AB + BC$, $BD = BC + CD$, and $AD = AB + BC + CD$, by substitution $AC + BD = AB + BC + BC + CD = AB + BC + CD + BC = AD + BC$.

Using the actual lengths, $AC + BD = AD + BC \Rightarrow 16 + 20 = 30 + BC \Rightarrow 36 = 30 + BC \Rightarrow BC = 6$.

If you chose F, you probably subtracted 16 from 20. If you chose K, you probably thought you needed more information to solve the problem, which is not the case.

Question 31. The correct answer is B. To find the x-coordinate where the 2 lines $y = 2x + 6$ and $y = 3x + 4$ intersect, you could substitute $y = 2x + 6$ into $y = 3x + 4$ to get $2x + 6 = 3x + 4$. Subtracting $2x$ and 4 from both sides results in the equation $2 = x$.

Another strategy is to graph the equations and estimate the coordinates of the intersection point.

If you chose C, you probably used the constant from the second equation. If you chose D, you probably used the constant from the first equation. If you chose E, you probably found the y-coordinate instead of the x-coordinate.

Question 32. The correct answer is J. To solve the equation $M = 3V + 6$ for V, you could subtract 6 from both sides to get $M - 6 = 3V$, and then divide by 3 on both sides to get $\frac{M - 6}{3} = V$.

If you chose F, you did not divide the 6 by 3. If you chose G, you might have moved the 6 from the right side to the left and also forgotten to divide it by 3. If you chose H, you possibly transferred the 3 from the V to the M. If you chose K, you probably made a sign error.

Question 33. The correct answer is B. The area is bh for a parallelogram with base b and corresponding height h. For parallelogram $ABCD$, base $\overline{AD}$ is 3 + 6, or 9 inches long, and the corresponding height is 4 inches. So the area is 9(4), or 36 square inches.

The most common wrong answer is D, which comes from multiplying the two side lengths: $(3 + 6)(5) = 9(5) = 45$.

Question 34. The correct answer is K. To find $(b - a)^4$ given $a = b + 2$, you could solve the equation for $b - a$. By subtracting a and 2 from both sides, you get $-2 = b - a$. Substituting -2 for $b - a$ in $(b - a)^4$ yields $(-2)^4$, or 16.

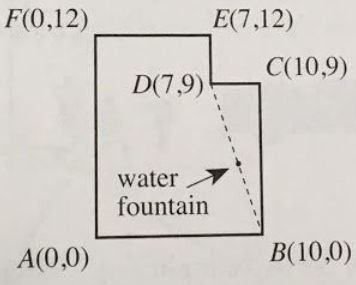
If you got stuck working this one, you could try choosing a specific value for b, say $b = 3$. Then a must be $3 + 2 = 5$. And $(b - a)^4 = (3 - 5)^4 = (-2)^4 = 16$.

If you chose F, you probably got -2 for $b - a$ but then replaced $(-2)^4$ by -2^4, or -16. Be careful $(-2)^4 = (-2)(-2)(-2)(-2) = 16$, but $-2^4 = -(2 \cdot 2 \cdot 2 \cdot 2) = -16$.

If you chose H, you probably got $b - a = 1$ or $b - a = -1$, and either $(1)^4$ or $(-1)^4$ is 1. Choices G and J come from calculating 2^4 as $2 \cdot 4$ and, for G, making a minus sign mistake.

Because $(b - a)^4$ is an even power of the number $(b - a)$, you can eliminate any negative numbers (F and G). This kind of observation can help you catch mistakes even when your problem is not multiple-choice.

Question 35. The correct answer is D. To find the location of the water fountain located halfway between points B and D, it makes sense to give coordinates to the points relative to point A (see the diagram below). The first coordinate is the number of blocks east and the second coordinate is the number of blocks north.



The water fountain is at the midpoint of $\overline{BD}$, and so the midpoint formula applies. For points with coordinates (x_1,y_1) and (x_2,y_2), the midpoint has coordinates $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$. For B (10,0) and D (7,9), the midpoint is $\left(\frac{10 + 7}{2}, \frac{0 + 9}{2}\right) \Rightarrow \left(\frac{17}{2}, \frac{9}{2}\right) \Rightarrow \left(8\frac{1}{2}, 4\frac{1}{2}\right)$.

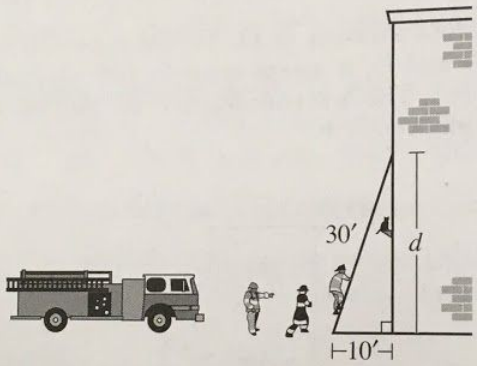
B is halfway between A and C. Choice C is halfway between B and F. If you chose E, you may have found the wrong coordinates for C, D, or E.

Once you put coordinates on the picture, you can see that only one answer choice is reasonable.

Question 36. The correct answer is J. One strategy for solving this problem is to find equations. You can let y be the larger number and obtain the equation $y = 2x + 8$ from the first sentence. The second sentence says that $2y + 3x = 65 \Rightarrow 2(2x + 8) + 3x = 65$.

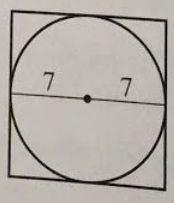
If you chose F, you probably took 3 times the larger number and added it to twice the smaller number to get 65, rather than the other way around. If you chose G, you probably defined y as $y = 2x - 8$ and then also made the same error as in F. Choice H can come from distributing the 2 in $2(2x + 8)$ as $2(2x) + 8$ and doing everything else correctly.

Question 37. The correct answer is C. To find out how far a 30-foot ladder 10 feet away from the base of a building reaches up the building, you can use the Pythagorean theorem. Let the length of the ladder be the hypotenuse, and let the legs be the distances away from the base of the building and from the ground to the top of the ladder along the building (see the figure below). This gives the equation $30^2 = 10^2 + d^2$, where d is the distance the ladder reaches up the building. Simplifying, you get $900 = 100 + d^2 \Rightarrow 800 = d^2 \Rightarrow d$ is about 28 feet.



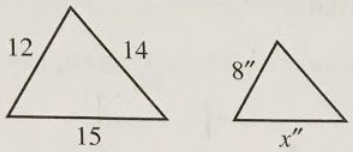
B comes from subtracting 10 from 30 or "simplifying" $\sqrt{900 - 100}$ to $\sqrt{900} - \sqrt{100}$.

Question 38. The correct answer is K. The most common way of finding the area of a square involves finding the side length of the square. If you draw radius lines in different positions, as shown below, you can see a relation between the radius of the circle and the side length of the square. The side length of the square is twice the radius, or $2(7) = 14$ feet. To find the area of the square, you square the side length, to get $14^2 = 196$ square feet.



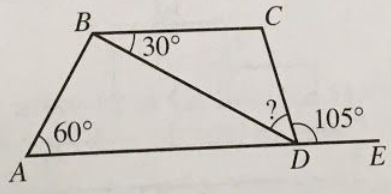
If you chose F, you probably thought 7 feet was the side length and squared 7 to get 49. If you chose J, you probably found the area of a circle, πr^2, where r is the radius, to get $\pi(7)^2 = 49\pi$.

Question 39. The correct answer is B. It might be good to sketch a picture, something like the diagram below. To find the length of the longest side of the second triangle, you can use the ratios of corresponding sides of each triangle. For example, $\frac{12}{8} = \frac{15}{x}$, where x is the length of the longest side of the second triangle. After cross multiplying, you get $12x = 120$. Then, you divide by 12 to get $x = 10$ inches.



If you chose **A**, you probably noticed that the first triangle's longest side is 3 units longer than its shortest side. If this same relation held in the second triangle, its longest side would be 8 + 3 = 11. This additive relation does not hold. If you chose **E**, you may have thought you needed the length of the middle side of the second triangle to solve the problem.

Question 40. The correct answer is K. To find the measure of $\angle BDC$ in the figure below, it is helpful to recognize that $\overline{AD}$ and $\overline{BC}$ are parallel and are connected by transversal $\overline{BD}$. Then $\angle CBD$ and $\angle ADB$ are alternate interior angles and so each measures 30°. (Go ahead and write in "30°" for $\angle ADB$ on the figure.)

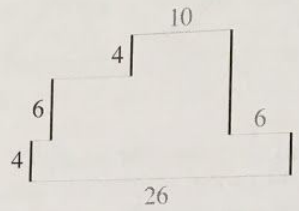


By definition, $\angle ADE$ is a straight angle and has a measure of 180°. Because $\angle ADE$ is made up of $\angle ADB$, $\angle BDC$, and $\angle CDE$, you know that the measures of those 3 angles add up to 180°. You might write this, using m to represent *measure*, as $m\angle ADB + m\angle BDC + m\angle CDE = 180°$. Substituting the measures you know gives $30° + m\angle BDC + 105° = 180° \Rightarrow m\angle BDC + 135° = 180° \Rightarrow m\angle BDC = 45°$.

If you chose **H**, you might have thought $\triangle BDC$ is isosceles. If you chose **J**, possibly you estimated the measure of $\angle BDC$ or made a subtraction error.

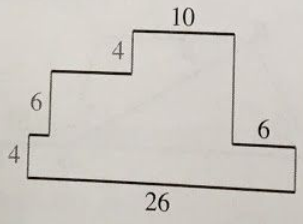
Question 41. The correct answer is E. This figure has 10 sides, but lengths are given for only 6 of the sides. Those lengths add up to $4 + 6 + 4 + 10 + 6 + 26 = 56$ inches. The perimeter is longer than this because of the missing 4 sides.

Then you should find the lengths of the missing sides, right? The figure below focuses on the vertical sides. The vertical sides that face left have lengths 4, 6, and 4. The lengths of the sides that face right are unknown. But, the vertical distance that the left-facing sides cover is the same as the vertical distance that the right-facing sides cover.



So, since the total length of the left-facing sides is $4 + 6 + 4 = 14$ inches, the total length of the right-facing sides is also 14 inches.

Finding the lengths of the horizontal sides (see the figure below) is a similar process. The horizontal distance covered by the top-facing sides must be 26 inches because that's what's covered by the bottom-facing sides.



This makes the perimeter the sum of the lengths of the left-facing, right-facing, top-facing, and bottom-facing sides, which is $14 + 14 + 26 + 26 = 80$ inches. You can't know the length of each side, but you can find the perimeter.

If you chose C, you probably just found the sum of the side lengths shown: $4 + 6 + 4 + 10 + 6 + 26 = 56$. If you chose D, you may have left out the right-facing sides, or you may have estimated the lengths of the 4 missing sides and been too low. Estimation is a reasonable strategy for this question.

Question 42. The correct answer is F. To find out how many of the 804 seniors in a certain high school are going to a state university when approximately $\frac{2}{5}$ of the seniors are going to college, and when $\frac{1}{4}$ of those going to college are going to a state university, you could first find how many of the 804 seniors are going to college. This is $\frac{2}{5}(804)$, or almost 322 seniors. Then, find the number of those 322 seniors going to college who are going to a state university, which is $\frac{1}{4}(322)$, or about 80 seniors that are going to a state university.

J is closest to $\frac{1}{4}$ of 804.

Question 43. The correct answer is E. You could take a brute-force approach and test all the given values of y and see if you could find an x that worked. For example, if $y = 45$ from A, then the two numbers are $x^2 \cdot 45^2$ and $x \cdot (45)^3$. You can see that 45^2 is a common factor of these two numbers, so 45 can't be the *greatest* common factor.

Maybe it will be productive to be more general and avoid having to test all 5 values of y. Notice that xy^2 is a common factor of x^2y^2 and xy^3. Because it is a common factor, it must be a factor of 45 (the greatest common factor). Because 45 factors as $5 \cdot 3^2$, it seems natural to see whether $x = 5$ and $y = 3$ is a possible solution. In this case, the two numbers are $5^2 \cdot 3^2$ and $5 \cdot 3^3$, and then the greatest common factor is $5 \cdot 3^2 = 45$. It works.

B is a possible value of xy, C is a possible value of y^2, D is a possible value of x, and E is a possible value of x (when $y = 1$). If you don't see right away what to do, dig in and test some numbers to see what happens.

Question 44. The correct answer is G. Because 115% of "the number" is 460, then "the number" is $\frac{460}{1.15}$, which is 400. Next, 75% of "the number" 400 is 300.

You can also solve this with equations. Let n be "the number." Then $1.15n = 460$ and you want to find $0.75n$.

J is 75% of 460 $\Rightarrow (0.75)460 \Rightarrow 345$. If you chose K, you probably found "the number" but not 75% of that.

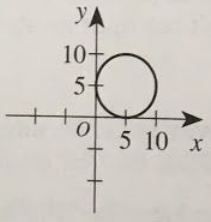
Question 45. The correct answer is **E.** To find the distance between 2 points in the standard (x,y) coordinate plane, you can use the distance formula, $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$. So the distance is $\sqrt{(5 - 0)^2 + (0 - 1)^2} \Rightarrow \sqrt{5^2 + 1^2} \Rightarrow \sqrt{26}$ coordinate units.

A can come from mixing x and y coordinates: $\sqrt{(5 - 1)^2 + (0 - 0)^2}$. If you chose **B**, you probably added $1 + 5$ or simplified the radical expression incorrectly.

Question 46. The correct answer is **G.** To find the ratio of the circumferences of 2 circles for which the ratio of their radii is 4:9, you would recognize that both circumference and radius are 1-dimensional attributes of a circle. Because of that, the ratios should be the same, 4:9. Another way is to use the ratio of the radii and let $4x$ be the radius of the first circle and $9x$ be the radius of the second circle. Then, the circumferences would be $2\pi(4x)$ and $2\pi(9x)$, respectively. Setting them in a ratio, you get $8\pi x{:}18\pi x$, which simplifies to 4:9.

If you chose **F**, you probably thought that you should take the ratio of the square roots, $\sqrt{4}{:}\sqrt{9}$, or 2:3. If you chose **H**, you probably thought that you should take the ratio of the squares, $4^2{:}9^2$, or 16:81 (which is the ratio of the circles' areas).

Question 47. The correct answer is **D.** You may want to have a picture of this situation in your mind, or even sketch it out in the space in your test booklet. Your picture might look something like this.

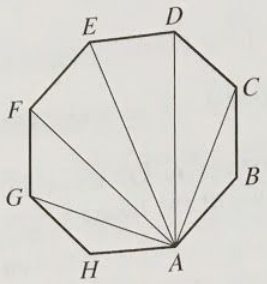


One way to find an equation for a circle is to know the coordinates of the center, (h,k), and the radius, r. Then, an equation is $(x - h)^2 + (y - k)^2 = r^2$. For this circle, the center is at (5,5) and the radius is 5. (It's fairly easy to see that. If you needed to prove those are exactly right, you could use symmetry or you could use the fact that a tangent line is perpendicular to the radius that goes through the point of tangency.) Given center (5,5) and radius 5, the circle has equation $(x - 5)^2 + (y - 5)^2 = 5^2$.

Another way to solve this problem is to find the coordinates of points on the circle and see which equation(s) each point satisfies. The points (0,5), (5,0), (5,10), and (10,5) are all on the circle. Testing these points in all the equations would probably take longer than the first method, but testing the points in the equation you think is correct would be a good check of your answer.

B is a circle centered at (0,0) instead of (5,5). If you chose **C**, you probably forgot to square the radius on the right side of the equation. If you chose **E**, you likely used $(x + h)$ and $(y + k)$ in the equation. Testing (10,5) would have helped you eliminate these incorrect answers.

Question 52. The correct answer is H. You can use symmetry to solve this problem. A picture might be useful. As shown below, there are 5 diagonals coming into each vertex point.



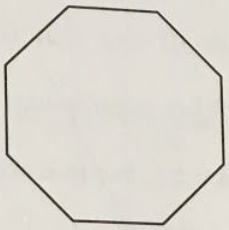
Because there are 8 vertex points, you might be tempted to conclude that there are $8 \cdot 5 = 40$ diagonals. But this method counts each diagonal exactly twice. (It counts $\overline{AD}$ as a diagonal coming into vertex A and counts $\overline{DA}$ as a diagonal coming into vertex D, but these are the same diagonal.) Because each diagonal is counted exactly twice, there are $\frac{40}{2} = 20$ diagonals.

If you like other kinds of patterns, you might choose a different solution path. You can list the diagonals. But, to be sure you list them all, organize them into a pattern such as the one below.

$\overline{AC}$
$\overline{AD}$ $\overline{BD}$
$\overline{AE}$ $\overline{BE}$ $\overline{CE}$
$\overline{AF}$ $\overline{BF}$ $\overline{CF}$ $\overline{DF}$
$\overline{AG}$ $\overline{BG}$ $\overline{CG}$ $\overline{DG}$ $\overline{EG}$
$\overline{BH}$ $\overline{CH}$ $\overline{DH}$ $\overline{EH}$ $\overline{FH}$
$\overline{CA}$ $\overline{DA}$ $\overline{EA}$ $\overline{FA}$ $\overline{GA}$
$\overline{DB}$ $\overline{EB}$ $\overline{FB}$ $\overline{GB}$ $\overline{HB}$
$\overline{EC}$ $\overline{FC}$ $\overline{GC}$ $\overline{HC}$
$\overline{FD}$ $\overline{GD}$ $\overline{HD}$
$\overline{GE}$ $\overline{HE}$
$\overline{HF}$

The ones that are light gray are already listed. You wouldn't have to write those down. Now you can tell there are $5 + 5 + 4 + 3 + 2 + 1 = 20$ diagonals.

Alternately, you could draw in every diagonal and count them. This method would work if you were careful to draw in every diagonal and to count every one you drew in. Try it below.



If you chose **F**, you probably reasoned that because the pentagon (a 5-sided figure) has 5 diagonals, then an octagon (an 8-sided figure) has 8 diagonals. As you can see from the picture above, this pattern doesn't hold. If you chose **G**, you may have tried to count all of the diagonals directly and missed a few. Choice **K** is the result of counting each diagonal twice.

Question 53. The correct answer is B. Douglas will count any color other than red, blue, green, and purple in the Other sector. The table below gives percentages of friends who picked red, blue, green, and purple.

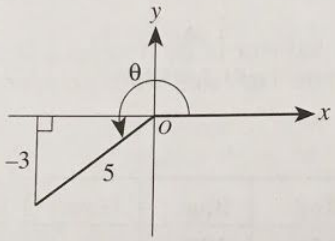
Color	Red	Blue	Green	Purple	Other
Percentage	25%	30%	20%	10%	

The 4 known percentages add up to 85%. That leaves 15% for the Other sector. That means 15% of the 360° in the circle belong in the Other sector. This is $(0.15)(360°) = 54°$.

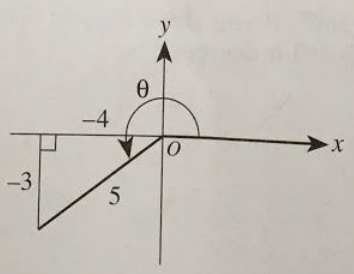
C is 15% of 180° rather than of 360°. If you chose **D**, you probably found the correct percent for the Other sector and then just labeled it degrees.

Question 54. The correct answer is **J.** One way to find tan θ, given that $\sin\theta = -\frac{3}{5}$ and $\pi < \theta < \frac{3\pi}{2}$, is to first find cos θ, then find $\frac{\sin\theta}{\cos\theta}$ (which is equivalent to tan θ). To find cos θ, use the facts that cos θ < 0 in Quadrant III and that $\sin^2\theta + \cos^2\theta = 1$. Substituting, you get $\left(-\frac{3}{5}\right)^2 + \cos^2\theta = 1$, or $\frac{9}{25} + \cos^2\theta = 1$. After subtracting $\frac{9}{25}$, you get $\cos^2\theta = \frac{16}{25}$. After taking the square root of both sides, you get $\cos^2\theta = \pm\frac{4}{5}$. Because cos θ < 0, $\cos\theta = -\frac{4}{5}$. Substituting into $\frac{\sin\theta}{\cos\theta}$ gives you $\frac{-\frac{3}{5}}{-\frac{4}{5}}$, which simplifies to $\frac{3}{4}$.

Another way you could do this problem is to construct an angle in Quadrant III with $\sin\theta = -\frac{3}{5}$. (Recall that sine is the ratio of opposite to hypotenuse.) Such an angle is shown below.



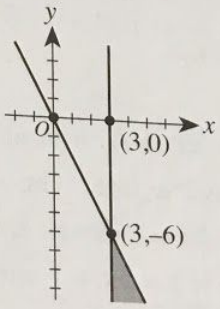
By the Pythagorean theorem, the missing side of the right triangle is 4 coordinate units long, and the directed distance along the side is –4. The figure below shows this.



From this right triangle, knowing that tangent is $\frac{\text{opposite}}{\text{adjacent}}$, you can get $\tan\theta = \frac{-3}{-4} = \frac{3}{4}$.

G comes from using $\frac{4}{5}$ for cos θ instead of $-\frac{4}{5}$. If you chose **H**, you might have mixed up the definition of sine or tangent in the right triangle.

Question 55. The correct answer is A. To find the system of inequalities represented by the shaded region of the graph below,

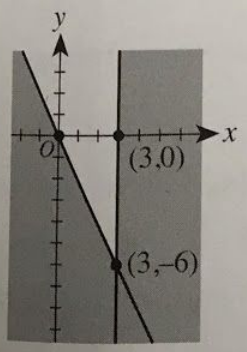


you could first find the equations of the line through (0,0) and (3,–6) and the line through (3,0) and (3,–6). Those are $y = -2x$ and $x = 3$. It is clear from the graph that the inequality that represents the shaded side of $x = 3$ is $x \geq 3$. For the other line, if you test (3,0), you find it satisfies $y > -2x$. Because (3,0) is on the wrong side (the unshaded side) of $y = -2x$, the correct inequality is $y \leq -2x$.

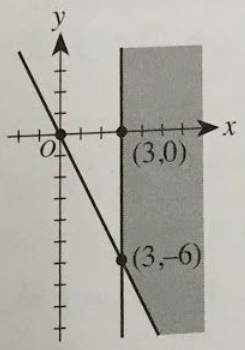
The graphs of the incorrect answer choices are shown below.

Choice C is the most popular incorrect answer (about as many people choose this as choose the correct answer). The inequality sign is backwards for the line $y = -2x$.

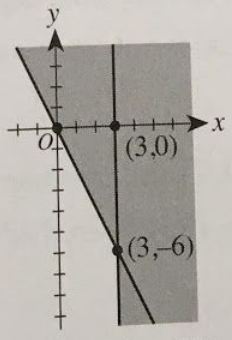
Choice B differs from the correct answer only in the "or" connector. The graph of B includes points that satisfy one of the inequalities but not necessarily the other inequality, while the "and" connector means the graph can only include points that satisfy both inequalities.



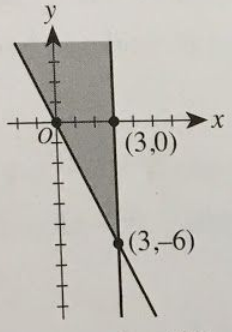
Graph of B



Graph of C



Graph of D



Graph of E

Question 56. The correct answer is **K.** To find $f(x + h)$ when $f(x) = x^2 - 2$, you would substitute $(x + h)$ for x in $f(x) = x^2 - 2$. The result is $(x + h)^2 - 2$. Multiplying out $(x + h)^2$ yields $x^2 + xh + xh + h^2$, or $x^2 + 2xh + h^2$. Then add -2 to the result.

If you chose **G**, you interpreted $f(x + h)$ as $f(x) + h$. If you chose **H**, you replaced $(x + h)^2$ with $x^2 + h^2$. If you chose **J**, you found $(x + h)^2$.

Question 57. The correct answer is **A.** It might be surprising to see that the graph of this complicated function looks almost like a line. The equation $y = \frac{2x^2 + x}{x}$ can be written as $y = \frac{x(2x + 1)}{x}$. This is equivalent to $y = 2x + 1$ except when $x = 0$. When $x = 0$, the original equation is undefined. So the correct graph is $y = 2x + 1$ with a point removed where $x = 0$.

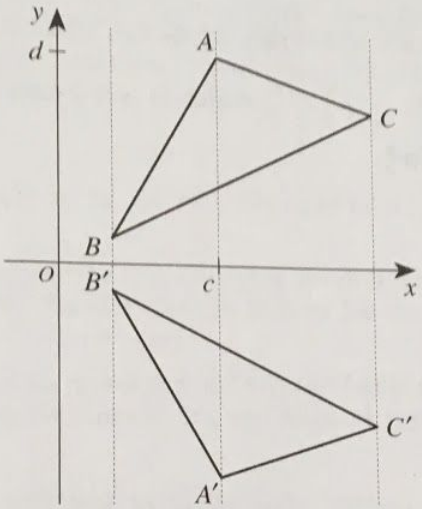
If you noticed that the function was undefined when $x = 0$, you may have thought the open dot belonged at (0,0). That leaves **B** as the only answer choice that also goes through (1,3).

Choice **C** is the only one that involves (0,2), and you may have gotten this by substituting $x = 0$ to get $y = \frac{2(0^2) + 0}{0}$, and decided all the zeros could be dropped to yield $y = 2$.

If you chose **D**, you may have "cancelled" x's as $y = \frac{2x^2 + x}{x}$ to get $y = 2x^2 + 1$. You could have eliminated this answer by testing $(-1,3)$ in the original equation, but testing (1,3) would not have been enough.

Choice **E** can come from "cancelling" x's as $y = \frac{2x^2 + x}{x}$ to get $y = 2x^2$. You could have eliminated this answer by testing (1,2) in the original equation.

Question 58. **The correct answer is F.** To find the coordinates of vertex A after it is reflected across the x-axis, notice that a reflection across the x-axis does not change the x-coordinate but does change the sign of the y-coordinate. You might sketch or imagine a figure like the one below. Thus, the reflection of $A(c,d)$ across the x-axis is $A'(c,-d)$.



G gives A reflected across the y-axis. H gives A reflected across $(0,0)$. J gives A reflected over the line $y = x$ and is the most popular answer.

Question 59. **The correct answer is A.** To obtain an expression for y in terms of x when $x = 2t - 9$ and $y = 5 - t$, you can first solve $x = 2t - 9$ for t by adding 9 to both sides to get $x + 9 = 2t$. Then, divide both sides by 2 to get $\frac{x + 9}{2} = t$. Substitute that expression for t into $y = 5 - t$ to get $y = 5 - \frac{x + 9}{2}$. To simplify the right side, rewrite 5 as $\frac{10}{2}$ and then combine the 2 fractions together to get $y = \frac{10 - (x + 9)}{2}$. You can then distribute and combine like terms to get $y = \frac{1 - x}{2}$.

If you chose B, you probably got $y = \frac{10 - (x + 9)}{2}$ and simplified it to $y = \frac{19 - x}{2}$. If you chose C, you may have substituted $2x - 9$ for t in $y = 5 - t$, which results in $y = 5 - (2x - 9)$. After distributing, this would be $y = 5 - 2x + 9$, or $y = 14 - 2x$.

Question 60. The correct answer is K. To find $\sin \frac{\pi}{12}$ using $\sin(\alpha - \beta) = (\sin \alpha)(\cos \beta) - (\cos \alpha)(\sin \beta)$ given that $\frac{\pi}{12} = \frac{\pi}{3} - \frac{\pi}{4}$, you can first substitute $\frac{\pi}{3}$ for α and $\frac{\pi}{4}$ for β and get $\sin \frac{\pi}{12} = \sin\left(\frac{\pi}{3} - \frac{\pi}{4}\right) = \left(\sin\frac{\pi}{3}\right)\left(\cos\frac{\pi}{4}\right) - \left(\cos\frac{\pi}{3}\right)\left(\sin\frac{\pi}{4}\right)$. Using the table of values to substitute in that equation, you get $\sin \frac{\pi}{12} = \left(\frac{\sqrt{3}}{2}\right)\left(\frac{\sqrt{2}}{2}\right) - \left(\frac{1}{2}\right)\left(\frac{\sqrt{2}}{2}\right) = \frac{\sqrt{6}}{4} - \frac{\sqrt{2}}{4} = \frac{\sqrt{6} - \sqrt{2}}{4}$.

H comes from calculating $\left(\frac{\sqrt{3}}{2}\right)\left(\frac{1}{2}\right) - \left(\frac{\sqrt{2}}{2}\right)\left(\frac{\sqrt{2}}{2}\right)$, which is $\left(\sin \frac{\pi}{3}\right)\left(\cos \frac{\pi}{3}\right) - \left(\sin \frac{\pi}{4}\right)\left(\cos \frac{\pi}{4}\right)$. If you chose J, you probably just used $\sin \frac{\pi}{3} - \sin \frac{\pi}{4}$.