

ANSWERS FOR TEST 2

1. C
2. D
3. B
4. B
5. E
6. D
7. E
8. D
9. D
10. D
11. E
12. D
13. D
14. A
15. D
16. E
17. E
18. D
19. B
20. C

SOLUTIONS TO TEST 2

1. If $x = -1$ and $y = 3$, what is the value of the expression $3x^3 - 2xy$?

Answer C

$$\begin{aligned}3(-1)^3 - 2(-1)(3) &= \\3(-1) - 2(-1)(3) &= \\-3 - (-6) &= \\-3 + 6 &= \\3 &= \end{aligned}$$

2. Which of the following expressions represents the product of three less than x and five more than twice x ?

Answer D

This question asks to multiply the binomials “3 less than x ” ($x - 3$) and “five more than twice x ” ($2x + 5$)

$$(x - 3)(2x + 5) = 2x^2 + 5x - 6x - 15 = 2x^2 - x - 15$$

3. A student earned scores of 83, 78, and 77 on three of four tests. What must the student score on the fourth test to have an average (arithmetic mean) of exactly 80?

Answer B

$$\begin{aligned}\frac{83 + 78 + 77 + x}{4} &= 80 \\ 4 \cdot \frac{83 + 78 + 77 + x}{4} &= 80 \cdot 4 \\ 83 + 78 + 77 + x &= 320 \\ 238 + x &= 320 \\ x &= 320 - 238 \\ x &= 82\end{aligned}$$

4. What is the equation of the line that contains the points (2, 3) and (14, -6)?

Answer B

- Note that all of the answers are presented in $y = mx + b$ format. Find the slope first. This eliminates every answer except for A and B.

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{3 - (-6)}{2 - 14} = \frac{9}{-12} = -\frac{3}{4}$$

- Now we must find the value of b . We could plug either ordered pair into the equation. Let's choose (2, 3) since the numbers are smaller and we will not have to worry about negative signs.

$$\begin{aligned}y &= mx + b \\ (3) &= -\frac{3}{4}(2) + b \\ 3 &= -\frac{3}{2} + b \\ 3 + \frac{3}{2} &= b \\ \frac{6}{2} + \frac{3}{2} &= b \\ \frac{9}{2} &= b\end{aligned}$$

- Therefore, the answer is B.
- Note that if you did not remember the slope formula and the slope intercept for the line, you could just plug in both points into all five choices until you eliminate four of them.

5. For all $x \neq \pm 4$, $\frac{x^2 - x - 20}{x^2 - 16} = ?$

Answer E

- ▶ This problem is both a rational expression problem and a factoring problem.

Factor the numerator:
 $x^2 - x - 20 = (x - 5)(x + 4)$

Factor the denominator:
 $x^2 - 16 = (x + 4)(x - 4)$

- ▶ The $(x + 4)$ cancel and you are left with answer E.
- ▶ Pay close attention to the signs. Every possibility is covered in the distractors.

6. A rope 36 feet long is cut into three pieces. The second piece is four feet longer than the first, and the last piece is three times as long as the second. If x represents the length of the first piece, then which equation determines the length of the first piece?

Answer D

- ▶ Let x represent the first length. Then $(x + 4)$ represents the second. The third length is 3 times the second (not 3 times the first): $3(x + 4)$. Therefore, the equation is D.

$$x + (x + 4) + 3(x + 4) = 36$$

- ▶ If you have some alternate way of finding that the length of the shortest rope is 4, you can plug it in until you find the equation that works.

7. The product $(x^2 + 3)(x - 1)$ is

Answer E

- ▶ This is just a binomial times a binomial, which is a FOIL problem.

$$(x^2 + 3)(x - 1) = x^3 - x^2 + 3x - 3$$

8. If n is an integer, which expression must be an even integer?

Answer D

Most people will do a problem like this by process of elimination.

- ▶ If you plug any number into A or B you always get an odd number so we can eliminate them as possible answers.
- ▶ If you plug 3 into C you get an even number, but if you plug 4 into C you get an odd number, so eliminate it.
- ▶ If you plug any odd number into E you get an odd number.
- ▶ Therefore, the only possible answer is D.

Some people will think about the definition of even (any integer divisible by 2) and see that since $2n^2$ is a product of some number (n^2) and 2 that it will always be even.

9. If $x = -3$, what is the value of $2x^2 + 3x - 5$?

Answer D

$$\begin{aligned}2(-3)^2 + 3(-3) - 5 &= \\2(9) + 3(-3) - 5 &= \\18 - 9 - 5 &= \\4 &= \end{aligned}$$

10. Which of the following is the complete factorization of $2x^2 - 13x - 24$?

Answer D

► If you cannot factor, just FOIL out each of the distractors.

11. Which of these is the product of $(a + 2b)$ and $(c - d)$?

Answer E

$$\text{FOIL}(a + 2b)(c - d) = ac - ad + 2bc - 2bd$$

► Watch out for signs when you select your answer.

12. If $a = -2$ and $b = 3$, what is the value of the expression $3(a + b)(a - b)$?

Answer D

$$\begin{aligned}3(a + b)(a - b) &= \\3((-2) + (3))((-2) - (3)) &= \\3(1)(-5) &= \\3(-5) &= -15\end{aligned}$$

► Check your work carefully. Suppose you left the three off the beginning of the multiplication. Distractor A = -5 is there and would look very good to you. You could select that, think you had the correct answer, and never know it was wrong just because of that sneaky 3 in front of the FOIL.

13. This is a graph of which equation?

Answer D

► Do this problem by process of elimination.

► First, the slope is negative. That eliminates B and C. Second, the y intercept is +6, which eliminates E. So we must decide between A and D. Select any other point on the graph, (9, 0) for example, and plug it into both equations.

$$\text{A. } 0 = -\frac{3}{2}(9) + 6$$

$$0 = -\frac{27}{2} + \frac{12}{2}$$

$$0 = -\frac{15}{2} \quad \text{False}$$

$$\text{D. } 0 = -\frac{2}{3}(9) + 6$$

$$0 = -\frac{18}{3} + 6$$

$$0 = -6 + 6 \quad \text{True}$$

14. What is the solution to the equation $2(x + 3) - 3(x + 5) = 13$?

Answer A

$$2(x + 3) - 3(x + 5) = 13$$

$$2x + 6 - 3x - 15 = 13$$

$$-x - 9 = 13$$

$$-x = 22$$

$$x = -22$$

- Make certain in a distribution problem like this, that you distribute to every term with the correct sign. Many people miss the $-3(5)$ multiplication in the second binomial and solve incorrectly as follows:

$$2(x + 3) - 3(x + 5) = 13$$

$$2x + 6 - 3x - 5 = 13$$

$$-x + 1 = 13$$

$$-x = 12$$

$$x = -12 \quad \text{INCORRECT}$$

- This happens to be distractor B. The other distractors contain similar small errors. Take your time and don't commit the small fatal error.

15. Peggy gets paid a weekly salary of D dollars a week plus a commission of 8% on her total sales S . Which expression below best describes Peggy's weekly pay?

- A. $D + S$
- B. $8D + S$
- C. $D + 8S$
- D. $D + .08S$
- E. $.08(D + S)$

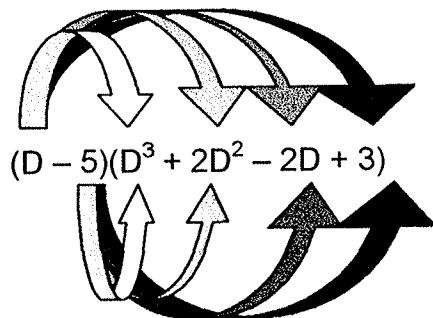
Answer D

- This is another process of elimination problem.
 - A. Does not work because there is no 8% involved.
 - B. Does not work because the 8% is on the D salary. Also, the % conversion is wrong.
 - C. Does not work because the % conversion is wrong.
 - E. Does not work because the 8% is on the D salary.
 - D. Does work.

16. Which of these is the product of $(D^3 + 2D^2 - 2D + 3)$ and $(D - 5)$?

Answer E

- ▶ The word “product” indicates that you need to multiply the polynomial by the binomial. This means that there will be a total of eight multiplications before you are finished. Make sure each term of the binomial is multiplied by each term of the polynomial.



- ▶ Sometimes it helps to rewrite this type of multiplication as a monomial times a polynomial plus a monomial times a polynomial:

$$D(D^3 + 2D^2 - 2D + 3) = D^4 + 2D^2 + 3D$$

(notice that each exponent went up by 1)

+

$$(-5)(D^3 + 2D^2 - 2D + 3) = -5D^3 - 10D^2 + 10D - 15$$

(notice that each term changed signs because of the negative 5)

- ▶ And carefully and watch signs.

$$\begin{array}{r} D^4 + 2D^3 - 2D^2 + 3D \\ + \quad -5D^3 - 10D^2 + 10D - 15 \\ \hline D^4 - 3D^3 - 12D^2 + 13D - 15 \end{array}$$

- ▶ Look carefully at the difference between the choices given. Choices B and E are almost identical:

B. $D^4 - 3D^3 - 8D^2 + 13D - 15$

E. $D^4 - 3D^3 - 12D^2 + 13D - 15$

- ▶ When selecting your answer, make sure you get the one that you want and not just the one that looks like the answer you want.

17. What is the distance from point A to point B?

Answer E

- ▶ There are two ways to do this problem: with the Distance Formula or the Pythagorean Theorem.

Distance Formula

- ▶ First you have to find out what the points are: A (-4, 2) and B (3, -4) then plug those points into the distance formula.

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$d = \sqrt{(3 - (-4))^2 + ((-4) - 2)^2}$$

$$d = \sqrt{(7)^2 + (-6)^2} = \sqrt{49 + 36} = \sqrt{85}$$

Pythagorean Theorem

- ▶ Notice that segment AB could be the hypotenuse of a right triangle with a vertex at (-4, -4). You can count the legs of this triangle as 6 and 7 units. Then plug this into the Pythagorean equation.

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

$$6^2 + 7^2 = c^2$$

$$36 + 49 = c^2$$

$$85 = c^2$$

$$\sqrt{85} = c$$

18. For all $a \neq 0$ and $b \neq 0$, $\frac{a^{-3}b^2}{a^5b^{-4}}$

Answer D

$$\frac{a^{-3}b^2}{a^5b^{-4}} = \frac{b^2b^4}{a^5a^3} = \frac{b^6}{a^8}$$

- ▶ First make all of the exponents positive, then add the exponents of like bases.

19. For all a , b , and c , $(a^3b^2c)^2$

Answer B

- ▶ When taking a power to a power, just multiply the exponents. Since we are raising the expression to the second power, each exponent gets doubled.

20. For all x , $3(2x + 5) - 4(x - 2) = 3(2x + 2) + 1$

Answer C

$$3(2x + 5) - 4(x - 2) = 3(2x + 2) + 1$$

$$6x + 15 - 4x + 8 = 6x + 6 + 1$$

$$2x + 23 = 6x + 7$$

$$23 - 7 = 6x - 2x$$

$$16 = 4x$$

$$4 = x$$