Elementary Algebra Sample Questions

Answers with Explanations and Ratings

1. Rating: Easy

Explanation: In order to find the total value of the purchase, you need to account for the price of each type of fruit and how many were bought.

Total value of the apples = (Price of the apples)*(number of apples)
Total value of the bananas = (Price of the bananas)*(number of bananas)
Total value of the fruit = Total value of the apples + Total value of the bananas

Answer: 15A + 10B D

2. Rating: Easy

Explanation: Square roots can be distributed across multiplication or division, so you can multiply these directly.

**Important note: roots do NOT distribute across addition and subtraction. You cannot add/subtract roots unless they match.

Answer: $\sqrt{2} \times \sqrt{15} = \sqrt{30}$ C

3. Rating: Easy

Explanation: To find the value of the expression, you simply plug in the given x and y values to the expression.

Answer: $2(2)^2 + 3(2)(-4) - 4(-4)^2 = 2(4) + 3(2)(-4) - 4(16) = 8 - 24 - 64 = -80$ A

4. Rating: Medium/Hard

Explanation: To find the area of the shaded region, you need to think of this as a doughnut or a washer. You have two separate circles; the smaller one has been "cut out" of the larger one. You need to find the area of each circle, then subtract to find the difference between them. In other words, you have to find what is left of the large circle after cutting out the smaller one.

Answer: The radius of the larger circle is R, so the area of the larger circle is πR^2.
The radius of the smaller circle is 3 less than R, so the area of the smaller circle is $\pi(R-3)^2$

Therefore, the area of the shaded region is $\pi R^2 - \pi(R-3)^2$ D

5. Rating: Medium

Explanation: This is polynomial multiplication. To do this problem, we will distribute and use the FOIL method (First, Outer, Inner, Last).

Answer: $(3x-2y)^2 = (3x-2y)(3x-2y) = 9x^2 - 12xy + 4y^2$

F: $(3x)(3x) = 9x^2$
O: $(3x)(-2y) = -6xy$
I: $(3x)(-2y) = -6xy$
L: $(-2y)(-2y) = 4y^2$

6. Rating: Medium

Explanation: This is a factoring problem, and you must factor both the top of the fraction and the bottom of it. Once it is factored, you can cancel anything that matches to simplify the fraction.
To factor the top of the fraction, which is a trinomial, look for 2 number which multiply to -6 and have difference of 1.
To factor the bottom of the fraction, we have a difference of squares. In factored form, this fraction becomes $\frac{(x-3)(x+2)}{(x-2)(x+2)}$

Answer: Simplify the factored form by canceling to get $\frac{(x-3)}{(x-2)}$ B

7. Rating: Easy

Explanation: The only thing to be careful of here is the signs.

Answer: $\frac{4-(-6)}{-5} = \frac{4+6}{-5} = \frac{10}{-5} = -2$ D

8. Rating: Medium

Explanation:First you need to distribute the -3 to get rid of the parentheses, and the combine like terms. Once this is done, you can isolate the x to solve.

Answer:
$$2x - 3(x+4) = -5$$
$$2x - 3x - 12 = -5$$
$$-x - 12 = -5$$
$$-x = 7, so x = -7$$

9. Rating: Easy

Explanation: Remember to use order of operations for this problem, and watch your signs.

Answer: $-3(5-6) - 4(2-3) = -3(-1) - 4(-1) = 3 + 4 = 7$ A

10. Rating: Medium

Explanation: An inequality is solved the same way an equation would be. You need to isolate the x. The only thing that is different is that when you multiply or divide by a negative number in an equality, you must remember to flip the inequality symbol.

$$20 - \frac{4}{5}x \geq 16$$

Answer: $$-\frac{4}{5}x \geq -4$$ A

$$4x \leq 20$$

$$x \leq 5$$

11. Rating: Easy/Medium

Explanation: In order to put fractions in order, you need a way to compare them. The easiest way to compare them is to create all of them with a common denominator. The common denominator here is 3 * 5 = 15

$$\frac{-1}{3} = \frac{-5}{15}, -\frac{3}{5} = \frac{-9}{15}, \frac{2}{3} = \frac{10}{15}, \frac{3}{5} = \frac{9}{15}$$

Using these fractions with common denominators to compare, you can put the oringinal fractions from least to greatest.

Answer: $-\frac{3}{5}, -\frac{1}{3}, \frac{3}{5}, \frac{2}{3}$ C

12. Rating: Easy

Explanation: Solve by isolating t.

$$5t + 2 = 6$$

Answer: $$5t = 4$$ C

$$t = \frac{4}{5}$$

13. Rating: Medium

Explanation: You can do this problem one of two ways. You can either factor any answers that factor to solve, or you can create the factors that would give you these solutions and multiply them. The second way is easier, and less likely to make a mistake.

If x = 5 then x-5 = 0 and is x = -5 then x + 5 = 0

Answer: $(x - 5)(x + 5) = x^2 - 25$ so the answer is D.

14. Rating: Easy

Explanation: To add or subtract fractions, you need to create common denominators, which in this case would be 5x.

Answer: $\frac{5u}{5x} + \frac{25u}{5x} - \frac{u}{5x} = \frac{29u}{5x}$ C

15. Rating: Medium

Explanation: The line is shaded up to and including 2, so this is the set $x \leq 2$

Answer: The only answer choice with this solution set is C.

16. Rating: Medium/Hard

Explanation: To determine how many solutions the system has, you need to determine how many times the graphs of the equations cross. These equations are linear, so the graph straight lines.

Notice that the left side of the equations are multiples of each other, but the same cannot be said of the right sides. This means that the lines are parallel and do not cross.

Answer: None A

17. Rating: Medium

Explanation: To do this problem, you need to factor both trinomials. In the first trinomial, you are looking for two numbers which will multiply to 6 and have a difference of 1. Because both signs are negative, the factors will have different signs, and the larger one will be negative. For the second, you are looking for two numbers which will multiply to 6 and add to 5. Because the first sign is negative and the second is positive, the factors will have the same sign, and they will both be negative.

In factored form, the first trinomial is (x – 3)(x + 2) and the second trinomial is (x – 3)(x – 2)

Answer: The factor they have in common is (x-3) A

18. Rating: Medium

Explanation: The easiest way to attack this problem is to split the fraction and simplify each piece.

Answer: $\frac{10x^6}{2x^2} + \frac{8x^4}{2x^2} = 5x^4 + 4x^2$ C

19. Rating: Hard

Explanation: This problem gives you information you need to use to build what you are looking for. They tell you the area of the rectangular yard is 96 square feet. You need to remember that the area of a rectangle can be found using A = L x W. You are looking for the perimeter of the rectangle, which can be found using P = 2L + 2W.
You don't know the length or the width, but they do tell you the relationship between them. The width is 4 feet less than the length, so if the length is L, then the width is W=L – 4. You can use this information to solve this problem.

Answer: $A = LW = L(L-4) = 96$

$L^2 - 4L = 96$

$L^2 - 4L - 96 = 0$

(L-12)(L+8) = 0 so L=12 feet (keep in mind that the length cannot be negative)

This means W = 12 – 4 = 8 feet so the perimeter is P = 2(12) + 2(8) = 40 feet A

20. Rating: Hard

Explanation: For this problem, you will want to use the information they give you to find the number of exercises in terms of Monday's rate, then apply that to solve for Tuesday's rate.

Keep in mind that the average rate (in exercises per hour) would be found by taking the total number of exercises and dividing it by the hours that it took her to complete them.

Answer: If p is Monday's average rate, then

$$p = \frac{Total\ number\ of\ exercises}{3\ hours}$$

Therefore, multiplying both sides of the equation by 3, the total number of exercises = 3p.

Using this information, Tuesday's average rate can be found.

Taking the total number of exercises and dividing it by the hours that it took her to complete them, Tuesday's average rate is

$$\frac{3p\ exercises}{2\ hours}$$

$\frac{3}{2}$ p exercises per hour is D.