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Question: 1

Simplify: $|7 - 5| - |5 - 7|$

- a. -2
- b. 0
- c. 2
- d. 4

Answer: B

Explanation:

The vertical operators indicate absolute values, which are always positive. Start by simplifying the expressions inside the absolute value bars.

$$|7 - 5| - |5 - 7|$$

$$|2| - |-2|$$

Then, evaluate the absolute values and subtract. Since absolute value is always positive, both $|2|$ and $|-2|$ are equal to 2.

$$2 - 2 = 0$$

Question: 2

The Charleston Recycling Company collects 50,000 tons of recyclable material every month. The chart shows the kinds of materials that are collected by the company's five trucks. What is the second most common material that is recycled?

Cardboard
Glass
Paper
Plastic

Answer: B

Explanation:

This pie chart shows the percentage of the total recyclable material that each material represents. The larger percentages have larger slices of the circle. Also, the percentage for each material is shown next to each slice. In this chart, paper is the most recycled material because it has the largest slice. This is 40% of the total. The next most common is glass at 25% of the total. All of the other materials stand for smaller portions of the total.

Question: 3

Which of the following expressions represents the ratio of the area of a circle to its circumference?

- a. πr^2
- b. $\frac{\pi r^2}{2\pi}$
- c. $\frac{r^2}{2\pi r}$
- d. $\frac{r}{2}$

Answer: D

Explanation:

The area of the circle is πr^2 , while the circumference is $2\pi r$. Taking the ratio of these two expressions gives $\frac{\pi r^2}{2\pi r}$. To reduce the ratio, cancel the common π and r from both the numerator and denominator. This results in the ratio $\frac{r}{2}$.

Question: 4

Francine can ride 16 miles on her bicycle in 45 minutes. At this speed, how many minutes would it take Francine to ride 60 miles?

Answer: 168.75

Explanation:

Solve this problem using a proportion.

$$\frac{16 \text{ miles}}{45 \text{ min}} = \frac{60 \text{ miles}}{x \text{ min}}$$

From here, cross multiply.

$$16x = 2,700$$

Then, divide each side by 16.

$$x = 168.75$$

Therefore, it would take Francine 168.75 minutes to ride 60 miles.

Question: 5

If $a = 4$, $b = 3$, and $c = 1$, then what is the value of $\frac{a(b-c)}{b(a+b+c)}$?

- a. $\frac{4}{13}$
- b. $\frac{1}{3}$
- c. $\frac{1}{4}$
- d. $\frac{1}{6}$

Answer: B

Explanation:

Substitute the given values and solve. Simplify the operations inside parentheses first.

$$\begin{aligned}\frac{a(b-c)}{b(a+b+c)} &= \frac{4(3-1)}{3(4+3+1)} \\ &= \frac{4(2)}{3(8)} \\ &= \frac{8}{24} \\ &= \frac{1}{3}\end{aligned}$$

Question: 6

John buys 100 shares of stock at \$100 per share. The price goes up by 10%, and he sells 50 shares. Then, prices drop by 10%, and he sells his remaining 50 shares. How much did he get for the last 50 shares?

- \$4,900
- \$4,950
- \$5,000
- \$5,500

Answer: B

Explanation:

The stock first increased by 10%, or \$10 (10% of \$100), to \$110 per share. Then, the price decreased by \$11 (10% of \$110), so that the sell price was $\$110 - \$11 = \$99$ per share, and the sell price for 50 shares was $99 \times 50 = \$4,950$.

Question: 7

Which of the following expressions is equivalent to the equation $3x^2 + 4x - 15$?

- a. $(x-3)(x+5)$
- b. $(x+5)(3+x^2)$
- c. $x(3x^2+4-15)$
- d. $(3x-5)(x+3)$

Answer: D

Explanation:

To factor this equation, we need to think of things using the reverse of the FOIL method. Start by setting up two empty parentheses.

$$3x^2 + 4x - 15 = (\quad)(\quad)$$

First, determine what go in the first part of each set of parentheses. The only way to multiply with integers and get $3x^2$ is $3x \cdot x$. Put these in each of the first parts of the sets of parentheses.

$$3x^2 + 4x - 15 = (3x \quad)(x \quad)$$

Next, determine what numbers multiply to -15 and will make the middle term of the multiplied expression equal to $4x$.

$$3x^2 + 4x - 15 = (3x - 5)(x + 3)$$

Notice that it is important to make sure -5 goes in the left set of parentheses and $+3$ goes in the right set of parentheses. If they were switched, using the FOIL method on the two binomials would result in $(3x + 3)(x - 5) = 3x^2 - 12x - 15$, which is not the desired expression. Therefore, the correct factorization of the expression is $(3x - 5)(x + 3)$.

Question: 8

Factor the following expression: $x^2 + x - 12$

- a. $(x - 2)(x + 6)$
- b. $(x + 6)(x - 2)$
- c. $(x - 4)(x + 3)$
- d. $(x + 4)(x - 3)$

Answer: D

Explanation:

Recall that the general form of a quadratic expression is $ax^2 + bx + c$. A great way to factor quadratic expression like this, where $a = 1$ and all the answer choices are integer factors, would be to consider the factors of the last term, c . Specifically, any two factors of c that would add to b . Essentially: $f_1 \times f_2 = -12$ and $f_1 + f_2 = 1$. We can check the factors of -12 .

f_1	f_2	$f_1 + f_2$
12	-1	11
6	-2	4
4	-3	1
3	-4	-1
2	-6	-4
1	-12	-11

From this the only option that works is 4 and -3 , which means the expression factors as $(x + 4)(x - 3)$.

Question: 9

A circle has a circumference of 35 feet. Approximately what is its diameter?

- a. 3.5 feet
- b. 5.57 feet
- c. 6.28 feet
- d. 11.14 feet

Answer: D

Explanation:

The circumference of a circle can be found using the formula $C = \pi d$, where d is the diameter of the circle.

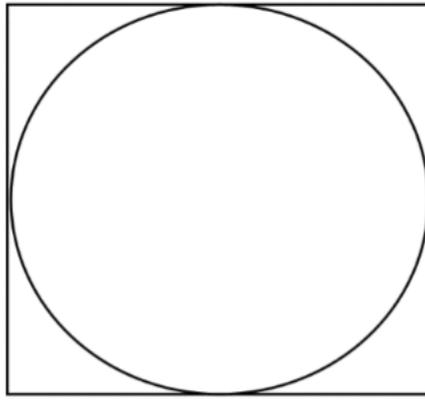
$$35 = \pi d$$

$$d = \frac{35}{\pi} \approx 11.14$$

Therefore, the diameter of the circle is approximately 11.14 feet.

Question: 10

A circle is inscribed within a square, as shown. What is the difference between the area of the square and that of the circle, where r is the radius of the circle?



- a. 2π
- b. $\frac{4}{3}\pi r^3$
- c. $r^2(4 - \pi)$
- d. $2\pi r$

Answer: C

Explanation:

The side of the square is equal to the diameter of the circle, or twice the radius, $2r$. The area of the square is this quantity squared, or $4r^2$. The area of the circle is πr^2 . Subtracting the area of the circle from the area of the square gives the difference between the two areas.

$$4r^2 - \pi r^2$$

A common r^2 can be factored out of each term to get the expression $r^2(4 - \pi)$.



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