College Admission
PSAT-10
PSAT 10 Certification Exam (Preliminary SAT Test)

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Question: 1

Five families go on a camping trip together. The Brown family has 4 members, the Emerson family has 3 members, the Garcia family has 4 members, the Moreno family has 2 members, and the Williams family has 6 members. Four people are randomly selected to prep dinner. Two are from the Williams family and one is from the Brown family. What is the probability that the fourth person will also be from the Williams family?

A. $\frac{1}{2}$

B. $\frac{1}{4}$

C. $\frac{1}{5}$

D. $\frac{1}{8}$

Answer: B

Explanation:

The probability of selecting a person from any family is proportional to the number of people in that family, divided by the total number of people. We add the number from each family to find the total number: $4 + 3 + 4 + 2 + 6 = 19$. Since 3 have already been selected, there are 16 people left to choose from. Four of these are from the Williams family, so the probability of choosing one of them is $\frac{4}{16}$, or $\frac{1}{4}$.

Question: 2

A taxi ride costs $4.25 for the first mile and $0. 70 for each mile after the first. Which of the following functions c (d) gives the total cost (in dollars) of traveling d miles (d ≥ 1) ?

A. c (d) = 3.55 + 0.70(d + 1)
B. c (d) = 3.55 + 0.70(d - 1)
C. c (d) = 4.25 +0.70d
D. c (d) = 4.25 + 0.70 (d -1)

Answer: D

Explanation:

The function for the cost of a taxi ride is a combination of a constant function for the first mile and a linear function for the rest of the ride. The constant function is $c_1(d) = 4.25$ since the cost of the first mile is $4.25. For the linear part, subtract 1 from d to exclude the first mile, and then multiply the result by 0.70 since it costs $0.70 per mile. The result is $c_2(d) = 0.70(d - 1)$. Finally, write the function for the total cost of the taxi ride by adding the two functions.

$$c(d) = 4.25 + 0.70(d - 1)$$

Question: 3

A jeweler sells a certain type of necklace for $50. She estimates that she can sell 200 necklaces for this price and that she will sell 10 fewer necklaces for every dollar the price is raised and 10 more necklaces for every dollar the price is lowered. Write a function r(x) for the estimated revenue if she raises the price by x dollars.

A. $r(x) = -10x^2 - 300x + 10,000$

B. $r(x) = 10x^2 + 300x + 10,000$

C. $r(x) = -10x^2 + 300x + 10,000$

D. $r(x) = 10x^2 - 300x + 10,000$

Answer: A

Explanation:
Revenue is the total amount of money the jeweler makes from necklace sales. In this case, the revenue is the price of each necklace multiplied by the total number of necklaces sold. So, to find the estimated revenue, find the price and the number of necklaces sold after the price is raised by x dollars. Then multiply the quantities together. If the price of a necklace starts at $50, then the price after it is raised by x dollars will be 50 + x dollars. In addition, we are told that the jeweler sells 10 fewer necklaces for every dollar the price is raised. Therefore, the total number of necklaces that are sold will be 200 — lox. Calculate the revenue function r(x) by multiplying the expressions and simplify the result:

$$r(x) = (50 + x)(200 - 10x)$$
$$= 10,000 - 500x + 200x - 10x^2$$
$$= -10x^2 - 300x + 10,000$$

Question: 4

Simplify the expression $\frac{x^2+2x-24}{5x-20}$.

A. $\frac{x-4}{5}$

B. $\frac{x+6}{5}$

C. $\frac{(x-4)(x+6)}{5(x-4)}$

D. $\frac{(x+4)(x+6)}{5(x-4)}$

Explanation:
To simplify the expression, first factor the numerator and the denominator. To factor the numerator, use trial-and-error to find two numbers whose sum is 2 and whose product is -24, and then put those numbers into the form (x + _)(x + _). For the denominator, factor out the common factor, which is 5.

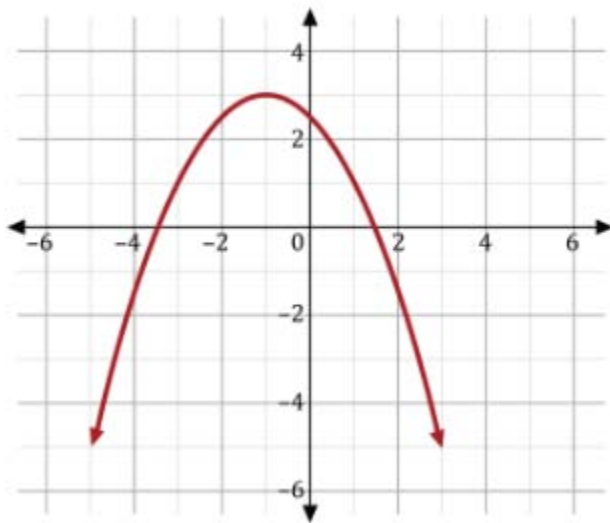$$\frac{x^2 + 2x - 24}{5x - 20} = \frac{(x + 6)(x - 4)}{5(x - 4)}$$

Now there is a common factor, (x — 4), in both the numerator and the denominator. Therefore, you can further simplify the expression by cancelling it out.

$$\frac{(x + 6)(x - 4)}{5(x - 4)} = \frac{x + 6}{5}$$

Therefore, the simplified form of the expression is $\frac{x+6}{5}$.

Question: 5

Which of these is the equation graphed below?

A. $y = -2x^2 - 4x + 1$

B. $y = -x^2 - 2x + 5$

C. $y = -x^2 - 2x + 2$

D. $y = -\frac{1}{2}x^2 - x + \frac{5}{2}$

Explanation:

The vertex form of a quadratic equation is $y = a(x - h)^2 + k$, where $x = h$ is the parabola's axis of symmetry and (h, k) is the parabola's vertex. The vertex of the graph is $(-1,3)$, so the equation can be written as $y = a(x + 1)^2 + 3$. The parabola passes through point $(1,1)$. Substitute $x = 1$ and $y = 1$ into the equation. So, $1 = a(1 + 1)^2 + 3$. Solve for a.

$$1 = a(1 + 1)^2 + 3$$
$$1 = a(2)^2 + 3$$
$$1 = 4a + 3$$
$$-2 = 4a$$
$$-\frac{1}{2} = a$$

The vertex form of the parabola is $y = -\frac{1}{2}(x + 1)^2 + 3$. Write the equation in standard form, $y = ax^2 + bx + c$.
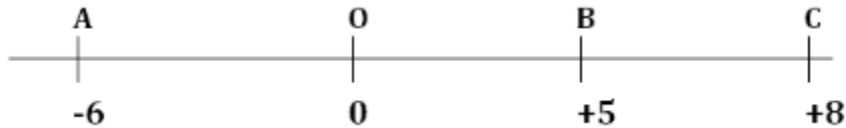
$$y = -\frac{1}{2}(x + 1)^2 + 3$$
$$y = -\frac{1}{2}(x^2 + 2x + 1) + 3$$
$$y = -\frac{1}{2}x^2 - x - \frac{1}{2} + 3$$
$$y = -\frac{1}{2}x^2 - x + \frac{5}{2}$$

Question: 6

In the figure, A, B, and C are points on the number line, and O is the origin. What is the ratio of the distance BC to distance AB?

A. 3:5
B. 8:5
C. 8:11
D. 3:11

Answer: D

Explanation:
The figure is a number line. So, the distance from point A to point B will be the difference of B — A. This is 5 — (—6) = 5 + 6 = 11. Also, the distance from point B to point C will be the difference of C - B, which is 8 - 5 = 3. So, the ratio BC : AB will be 3 : 11.

Question: 7

Simplify the expression $x^3 \cdot (16x)^{\frac{1}{2}}$.

A. $8x^{\frac{7}{2}}$

B. $4x^{\frac{7}{2}}$

C. $8x^{\frac{3}{2}}$

D. $4x^{\frac{3}{2}}$

Answer: B

Explanation:

To simplify the expression, first simplify the expression with parentheses. To raise $16x$ to the $\frac{1}{2}$ power, raise both 16 and x to the $\frac{1}{2}$ power separately.

$$x^3 \cdot (16x)^{\frac{1}{2}} = x^3 \cdot 16^{\frac{1}{2}} \cdot x^{\frac{1}{2}}$$

To raise something to the $\frac{1}{2}$ power is the same as taking the square root, so $16^{\frac{1}{2}} = 4$. We then combine like terms by adding exponents:

$$x^3 x^{\frac{1}{2}} = x^{\frac{6}{2}} x^{\frac{1}{2}} = x^{\frac{7}{2}}$$

Finally, we rewrite the equation as $4x^{\frac{7}{2}}$.

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