

College Admission SAT

Mathematics, Critical Reading, Writing

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Question: 1

The ratio of new car sales to used car sales at the car lot is 3 : 5. If the total car sales were \$287,400 last month, what was the total of the used car sales?

A. See the solution below with Step by Step in Explanation.

Answer: A

Explanation:

The ratio of new car sales to used car sales is 3 : 5. This means that the total number of cars sold (both new and used) is $3 + 5 = 8$. The used car sales are $\frac{5}{8}$ of the total sales:

$$\frac{5}{8} \times \$287,400 = \$179,625$$

Question: 2

A company has been asked to design a building for an athletic event. The building is in the shape of a square pyramid. The pyramid has a height of 481 feet, and the length of each side of the base is 756 feet. What is the approximate volume of the pyramid?

A.

$$1.21 \times 10^5 \text{ ft}^3$$

B.

$$4.85 \times 10^5 \text{ ft}^3$$

C.

$$9.16 \times 10^7 \text{ ft}^3$$

D.

$$2.75 \times 10^8 \text{ ft}^3$$

Answer: C

Explanation:

The formula for the volume of a pyramid is $V = \frac{1}{3}Bh$, where B is the area of the base and h is the height of the pyramid. The base is a square with a length of 756 feet on each side. So, the area of the base is $A = s^2 = (756 \text{ ft})^2 = 571,536 \text{ ft}^2$. With a base of $571,536 \text{ ft}^2$ and a height of 481 ft, the volume of the pyramid is $V = \frac{1}{3}(571,536 \text{ ft}^2)(481 \text{ ft}) \approx 9.16 \times 10^7 \text{ ft}^3$.

Question: 3

Simplify the following expression:

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

A.

$$x^2 + x + 5$$

B.

$$x^2 + x - 1$$

C.

$$x^2 + 5x + 5$$

D.

$$x^2 + 5x - 1$$

Answer: A

Explanation:

$(2x^2 + 3x + 2) - (x^2 + 2x - 3) = (2x^2 + 3x + 2) + (-1)(x^2 + 2x - 3)$. First, distribute the -1 to remove the parentheses: $2x^2 + 3x + 2 - x^2 - 2x + 3$. Next, combine like terms: $(2x^2 - x^2) + (3x - 2x) + (2 + 3) = x^2 + x + 5$.

Question: 4

Simplify the following:

$$\frac{x^2}{y^2} + \frac{x}{y^3}$$

A.

$$\frac{x^3 + x}{y^3}$$

B.

$$\frac{x^2 + xy}{y^3}$$

C.

$$\frac{x^2y + xy}{y^3}$$

D.

$$\frac{x^2y + x}{y^3}$$

Answer: D

Explanation:

To add the two fractions, first rewrite them with the least common denominator, which is in this case y^3 . This is already the denominator in $\frac{x}{y^3}$, and we can rewrite $\frac{x^2}{y^2}$ as $\frac{x^2 \times y}{y^2 \times y} = \frac{x^2y}{y^3}$. Thus, $\frac{x^2}{y^2} +$

$$\frac{x}{y^3} = \frac{x^2y}{y^3} + \frac{x}{y^3} = \frac{x^2y + x}{y^3}.$$

Question: 5

The graph of $y = -x^2 + 5x$ intersects the graph of $y = 2x$ at $(0, 0)$ and (a, b) . What is the value of b ?

A. See the solution below with Step by Step in Explanation.

Answer: A

Explanation:

We can find the points of intersection by setting the two equations equal to each other.

$$-x^2 + 5x = 2x$$

We combine like terms by subtracting $2x$ from each side.

$$-x^2 + 3x = 0$$

We can factor the left side of the equation.

$$(-x)(x - 3) = 0$$

Setting the first term equal to 0 yields $-x = 0$. Thus, $x = 0$. This corresponds with the point we were given, $(0, 0)$. Now we set the second term equal to 0: $x - 3 = 0$. We add 3 to each side to yield $x = 3$. This is a . To find b , we plug in 3 for x to either of the two equations and solve for y . Using the second equation: $y = 2(3)$, or $y = 6$. So, our point is $(3, 6)$ and $b = 6$.

Question: 6

Max reads three books averaging 360 pages. Lucy reads five books averaging 200 pages. What is the average length of all the books that Max and Lucy read?

- A. 212 pages
- B. 232 pages
- C. 260 pages
- D. 295 pages

Answer: C

Explanation:

To find the average, we need to add up each part and divide by the number of parts. If Max reads 3 books and Lucy reads 5 books, there are 8 books in total. We can find the total number of pages by multiplying 360 by 3 and 200 by 5, and then dividing the sum by 8.

$$\frac{360 \times 3 + 200 \times 5}{8} = \frac{1,080 + 1,000}{8} = \frac{2,080}{8} = 260$$

Therefore, the average length of all the books that Max and Lucy read is 260 pages.

Question: 7

Solve: $7x^2 + 6x = -2$.

A.

$$x = \frac{-3 \pm \sqrt{23}}{7}$$

B.

$$x = \pm i\sqrt{5}$$

C.

$$x = \pm \frac{2i\sqrt{2}}{7}$$

D.

$$x = \frac{-3 \pm i\sqrt{5}}{7}$$

Answer: D

Explanation:

There are many ways to solve quadratic equations in the form $ax^2 + bx + c = 0$. However, some methods, such as graphing and factoring, are not useful for equations with irrational or complex roots. Solve this equation by using the quadratic formula, $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$. Set the given equation equal to zero, so $7x^2 + 6x + 2 = 0$. Substitute the values $a = 7$, $b = 6$, and $c = 2$ into the quadratic formula.

$$\begin{aligned}x &= \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \\x &= \frac{-6 \pm \sqrt{6^2 - 4(7)(2)}}{2(7)} \\x &= \frac{-6 \pm \sqrt{36 - 56}}{14} \\x &= \frac{-6 \pm \sqrt{-20}}{14} \\x &= \frac{-6 \pm 2i\sqrt{5}}{14} \\x &= \frac{-3 \pm i\sqrt{5}}{7}\end{aligned}$$

Question: 8

Ride Service A charges a flat rate of \$10 for the first 10 miles, plus 25 cents per mile for anything over 10 miles. Ride Service B charges 40 cents per mile. Both services charge the same for a trip that is how long?

- A. 40 miles
- B. 45 miles
- C. 50 miles
- D. 55 miles

Answer: C

Explanation:

The expression representing the charge for Ride Service A is $\$10 + \$0.25(m - 10)$, where m is the number of miles. Set this expression equal to the charge for Ride Service B, which is $\$0.40m$. Solve for m to find the number of miles the two companies charge the same amount.

$$\$10 + \$0.25(m - 10) = \$0.40m$$

$$\$10 + \$0.25m - \$2.50 = \$0.40m$$

$$\$7.50 = \$0.15m$$

$$m = 50$$

So, the cost of the two services would be the same for a 50-mile ride.

Question: 9

What is the perimeter of a 45–45–90 triangle if the hypotenuse is 4 inches?

A. 4 inches

B. 8 inches

C.

$$4 + 4\sqrt{2} \text{ inches}$$

D.

$$4 + 2\sqrt{2} \text{ inches}$$

Answer: C

Explanation:

In a 45-45-90 triangle, the legs can be found by dividing the hypotenuse by $\sqrt{2}$, so one leg is $\frac{4}{\sqrt{2}}$.

We simplify $\frac{4}{\sqrt{2}}$ by multiplying by $\frac{\sqrt{2}}{\sqrt{2}}$.

$$\frac{4\sqrt{2}}{\sqrt{2}\sqrt{2}} = \frac{4\sqrt{2}}{2} = 2\sqrt{2}$$

Therefore, the three sides of the triangle are $2\sqrt{2}$, $2\sqrt{2}$, and 4. We add these sides together to obtain the perimeter: $4 + 4\sqrt{2}$.

Answer choice A is incorrect because it is the area rather than the perimeter. Answer choice B is incorrect because it is the area without the last step of dividing by 2. Answer choice D is incorrect because it is only two of the three sides.

Question: 10

Which of the following is equivalent to

$$x^2 + 3 > 2x + 2?$$

A. $x < -1$

- B. $x \neq 1$
- C. $x > 1$
- D. $x < -1$ or $x > 1$

Answer: B

Explanation:

To simplify the given inequality, first move all the terms to one side.

$$\begin{aligned}x^2 + 3 &> 2x + 2 \\x^2 + 3 - 2x - 2 &> 0 \\x^2 - 2x + 1 &> 0\end{aligned}$$

Now, factor the left-hand side.

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

The original inequality is equivalent to $(x - 1)^2 > 0$. Since the square of a negative number is positive, $(x - 1)^2 > 0$ everywhere except where $x - 1 = 0$, i.e. at $x = 1$. Therefore, $x \neq 1$ is equivalent to $x^2 + 3 > 2x + 2$.

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