College Admission

SSAT-Upper-Level
SSAT Upper Level Certification Exam

Latest Version: 6.0

Question: 1

Mrs. Patterson's classroom has sixteen empty chairs. All the chairs are occupied when every student is present. If 2/5 of the students are absent, how many students make up her entire class?

a. 16
b. 32
c. 24
d. 40
e. 36

Answer: D

Explanation:

Since 16 chairs are empty, and this represents 2/5 of the total enrollment, then the full class must consist of $\frac{5}{2} \times 16 = 40$ students.

Using proportions:

$$\frac{2}{5} = \frac{16}{x} \quad \text{Cross multiply}$$
$$2x = 80 \quad \text{Divide each side by 2}$$
$$x = 40$$

Question: 2

Rachel spent $24.15 on vegetables. She bought 2 lbs of onions, 3 lbs of carrots, and 1 ½ lbs of mushrooms. If the onions cost $3.69 per lb, and the carrots cost $ 4.29 per lb, what is the price per lb of mushrooms?

a. $2.60
b. $2.25
c. $2.80
d. $3.10
e. $2.75

Answer: A

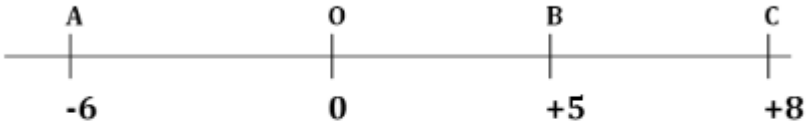
Explanation:

Begin by determining the total cost of the onions and carrots, since these prices are given. This will equal $(2 \times \$3.69) + (3 \times \$4.29) = \$20.25$. Next, this sum is subtracted from the total cost of the vegetables to determine the cost of the mushrooms: $\$24.15 - \$20.25 = \$3.90$. Finally, the cost of the mushrooms is divided by the quantity (lbs) to determine the cost per pound:

$$\text{Cost per lb} = \frac{\$3.90}{1.5} = \$2.60$$

Question: 3

In the figure, A, B, and C are points on the number line, where 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
e. 8:6

Answer: D

Explanation:

- Since the figure represents the number line, the distance from point A to point B will be the difference, $B - A$, which is $5 - (-6) = 11$. The distance from point B to point C will also be the difference, $C - B$, otherwise $8 - 5 = 3$. So, the ratio $BC{:}AB$ will be 3:11.

Question: 4

In an election in Kimball County, Candidate A obtained 36,800 votes. His opponent, Candidate B, obtained 32,100 votes. 2,100 votes went to write-in candidates. What percentage of the vote went to Candidate A?

a. 51.8%
b. 53.4%
c. 45.2%
d. 46.8%
e. 56.2%

Answer: A

Explanation:

- Candidate A's vote ratio is the number of votes that he obtained divided by the total number of votes cast. Then, multiply that decimal by 100 to convert the decimal into a percentage. Therefore, Candidate A's Vote is: $\frac{36,800}{36,800+32,100+2,100} \times 100 = 51.8\%$

Question: 5

Lauren had $80 in her savings account. When she received her paycheck, she made a deposit which brought the balance up to $120. By what percentage did the total amount in her account increase as a result of this deposit?

a. 50%
b. 40%
c. 35%
d. 80%
e. 120%

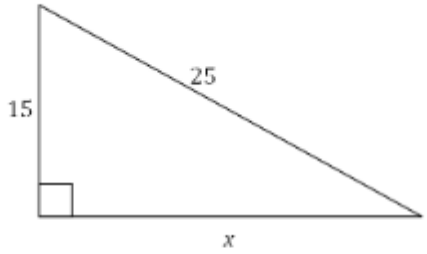
Answer: A

Explanation:

The rate of increase equals the change in the account balance divided by the original amount, \$80. Multiply that decimal by 100 to yield the percentage of increase. To determine the change in the balance, subtract the original amount from the new balance: Change = \$120 − \$80 = \$40. Now, determine the percentage of increase as described above: Percent = $\frac{\$40}{\$80} \times 100 = 50\%$.

Question: 6

Find the length of the side labeled *x*. The triangle represented in the figure is a right triangle, as shown.



a. 18
b. 20
c. 22
d. 24
e. 25

Answer: B

Explanation:

Since the figure is a right triangle, the Pythagorean Theorem may be applied. The side which is 25 units long is the hypotenuse, and its square will equal the sum of the squares of the other two sides. That is, $25^2 = 15^2 + x^2$. Solve for x^2 by subtracting 15^2 from each side of this equation, and then take the square root to determine *x*.

$$x = \sqrt{25^2 - 15^2} = \sqrt{625 - 225} = \sqrt{400} = 20$$

Question: 7

A motorcycle manufacturer offers 3 different models, each available in 6 different colors. How many different combinations of model and color are available?

a. 9
b. 6
c. 12
d. 18
e. 24

Answer: D

Explanation:

Since each of the 3 models is available in each of the 6 different colors, there are $6 \times 3 = 18$ different combinations available.

Question: 8

Which of the following expressions is equivalent to x^3x^5?

a. $2x^8$
b. x^{15}
c. x^2
d. x^8
e. $2x^{15}$

Answer: D

Explanation:

In order to multiply two powers that have the same base, add their exponents because of the exponent rule $a^m \times a^n = a^{m+n}$. Therefore, $x^3x^5 = x^{3+5} = x^8$.

Question: 9

If $\frac{12}{x} = \frac{30}{6}$, what is the value of x?

a. 3.6
b. 2.4
c. 3.0
d. 2.0
e. 2.75

Answer: B

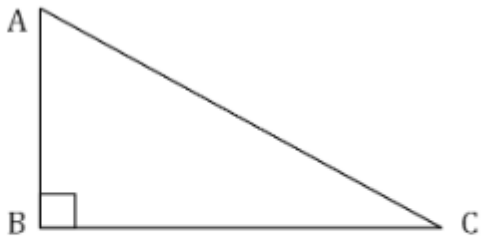
Explanation:

A proportion such as this can be solved by taking the cross product of the numerators and denominators from either side.

$$\frac{12}{x} = \frac{30}{6} \quad \text{Cross multiply}$$
$$72 = 30x \quad \text{Divide each side by 30}$$
$$2.4 = x$$

Question: 10

ΔABC is a right triangle, and $\angle ACB = 30°$. What is the measure of $\angle BAC$?



a. 40°
b. 50°
c. 60°
d. 45°
e. 70°

Answer: C

Explanation:

The internal angles of a triangle always add up to 180°. Since ΔABC is a right triangle, then $\angle ABC = 90°$, and $\angle ACB$ is given as 30°. The middle letter represents the vertex. By using triangle addition theorem, the answer must be: $\angle BAC = 180 - (90 + 30)$ which equals 60°.

Question: 11

Carrie wants to decorate her party with bundles of balloons containing three balloons each. Balloons are available in 4 different colors. There must be three different colors in each bundle. How many different kinds of bundles can she make?

a. 18
b. 12
c. 4
d. 6
e. 10

Answer: C

Explanation:

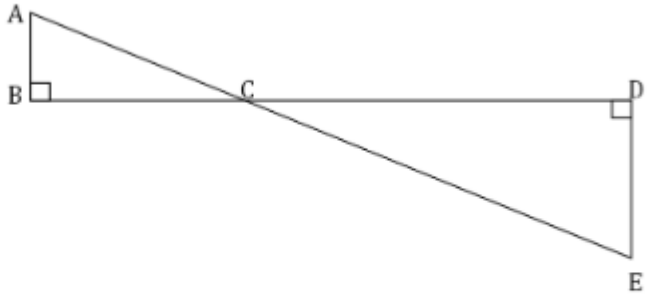
Since there are four different colors, one color must be excluded from each balloon bundle. Therefore, there is one color set for each excluded color, or four in all.

This problem can also be solved mathematically as follows. An arrangement such as this, in which the order of the individual components is not important, is called a combination. The number of combinations of n objects taken k at a time is given by $C = \frac{n!}{(n-k)!k!}$. The ! notation indicates a *factorial* product, where $n! = 1 \times 2 \times 3 \times \ldots \times (n-1) \times n$. In this case, $n = 4$ colors, and $k = 3$ balloons per bundle. Substituting into the equation above, and simplifying:

$$C = \frac{4!}{(4-3)! \times 3!} = \frac{1 \times 2 \times 3 \times 4}{(1)(1 \times 2 \times 3)} = 4$$

Question: 12

In the figure below, $\overline{BC}$ is 4 units long, $\overline{CD}$ is 8 units long, and $\overline{DE}$ is 6 units long. What is the length of $\overline{AC}$?



a. 7 units
b. 5 units
c. 3 units
d. 2.5 units
e. 4 units

Answer: B

Explanation:

The two right triangles are similar because they share a pair of vertical angles. Vertical angles are always congruent ($\angle ACB$ and $\angle DCE$). Obviously both right angles ($\angle B$ and $\angle D$) are congruent. Thus, $\angle A$ and $\angle E$ are congruent because of the triangular sum theorem.

With similar triangles, corresponding sides will be proportional. Segment $\overline{BC}$ is half the length of $\overline{CD}$, therefore $\overline{AC}$ will be half the length of $\overline{CE}$. The length of $\overline{CE}$ can be computed from the Pythagorean theorem, since it is the hypotenuse of a right triangle for which the lengths of the other two sides are known: $\overline{CE} = \sqrt{6^2 + 8^2} = \sqrt{100} = 10$.

The length of $\overline{AC}$ will be ½ of this value, or 5 units.

Question: 13

In a game of chance, 3 dice are cast simultaneously. What is the probability that all three will land with a 6 showing?

a. 1 in 6
b. 1 in 18
c. 1 in 216
d. 1 in 30
e. 1 in 36

Answer: C

Explanation:

For each die there is 1 chance in 6 that a 6 will emerge on top, since the die has 6 sides. The probability that a 6 will show for each die is not affected by the results obtained for any other. Since these probabilities are independent, the overall probability of throwing 3 sixes is the product of the individual probabilities, or

$$P = \frac{1}{6} \times \frac{1}{6} \times \frac{1}{6}$$
$$= \frac{1}{6^3}$$
$$= \frac{1}{216}$$

Question: 14

Arrange the following numbers in order from the least to greatest $2^3, 4^2, 6^0, 9, 10^1$.

a. $2^3, 4^2, 6^0, 9, 10^1$
b. $6^0, 9, 10^1, 2^3, 4^2$
c. $10^1, 2^3, 6^0, 9, 4^2$
d. $6^0, 2^3, 9, 10^1, 4^2$
e. $9, 6^0, 10^1, 4^2, 2^3$

Answer: D

Explanation:

When a number is raised to a power, it is multiplied by itself as many times as the power indicates. For example, $2^3 = 2 \times 2 \times 2 = 8$. A number raised to the power of 0 is always equal to 1, so 6^0 is the smallest number shown. Similarly, for the other numbers: $9 = 9^1 = 9$; $10^1 = 10$; $4^2 = 4 \times 4 = 16$.

Question: 15

A combination lock uses a 3-digit code. Each digit can be any one of the ten available integers 0-9. How many different combinations are possible?

a. 9
b. 1000
c. 30
d. 81
e. 100

Answer: B

Explanation:

In this probability problem, there are three independent events (the codes for each digit), each with ten possible outcomes (the numerals 0-9). Since the events are independent, the total possible outcomes equals the product of the possible outcomes for each of the three events, that is $P = P_1 \times P_2 \times P_3 = 10 \times 10 \times 10 = 1{,}000$.

This makes sense when you also relate the problem to a sequence, beginning with the combinations 0-0-0, 0-0-1, 0-0-2.....In ascending order, the last 3 digit combination would be 9-9-9. Although it may seem that there would be 999 possible combinations, you must include the initial combination, 0-0-0.

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