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Question: 1

Michaela can finish 3 problems in 10 minutes. How many problems can she complete in 3 hours?

A. 90
B. 54
C. 18
D. 9

Answer: B

Explanation:

We need to find how many problems Michaela can finish in 3 hours, so we start with converting the 3 hours to minutes. Because 1 hour is 60 minutes, 3 hours is $3 \times 60 = 180$ minutes. We can set up a ratio: $\frac{3 \text{ problems}}{10 \text{ minutes}} = \frac{x \text{ problems}}{180 \text{ minutes}}$. To solve for x, we cross-multiply and divide: $10x = 3(180)$, so $x = \frac{3(180)}{10} = 54$. Therefore, Michaela can complete 54 problems in 3 hours.

Question: 2

If 120 customers purchased coffee today, and this is $\frac{1}{4}$ less than yesterday, how many people purchased coffee yesterday?

A. 90
B. 150
C. 160
D. 240

Answer: C

Explanation:

If 120 is $\frac{1}{4}$ less than yesterday's number, we can write this as: $120 = y - \frac{1}{4}y$, where y is yesterday's number. We combine terms on the right to solve: $120 = \frac{3}{4}y$, so $y = 120\left(\frac{4}{3}\right) = 160$. Therefore, 160 people purchased coffee yesterday.

Question: 3

If $\frac{3}{s} = 7$ and $\frac{4}{t} = 12$, then what is the value of $s - t$?

A. $-\frac{1}{7}$
B. $\frac{2}{7}$
C. $\frac{2}{12}$
D. $\frac{2}{21}$

A. Option A
B. Option B
C. Option C
D. Option D

Answer: D

Explanation:

Multiply both sides of the first equation by s to get $3 = 7s$. Then divide both sides by 7 to find that $s = \frac{3}{7}$. Multiply both sides of the second equation by t to get $4 = 12t$. Then divide both sides by 12 to find that $t = \frac{4}{12}$, which reduces to $\frac{1}{3}$. To find the difference, we must convert to a common denominator. In this case, the common denominator is 21. Multiplying by appropriate fractional equivalents of 1, we find that $\frac{3}{7}\left(\frac{3}{3}\right) = \frac{9}{21}$ and $\frac{1}{3}\left(\frac{7}{7}\right) = \frac{7}{21}$. Therefore, $s - t = \frac{9}{21} - \frac{7}{21} = \frac{2}{21}$.

Question: 4

If the average of 7 and x is equal to the average of 9, 4, and x, what is the value of x?

A. x = 4
B. x = 5
C. x = 6
D. x = 7

Answer: B

Explanation:

The average of 7 and x is $\frac{7+x}{2}$. The average of 9, 4, and x is $\frac{9+4+x}{3}$.

$$\frac{7+x}{2} = \frac{13+x}{3}$$

To solve, start by cross-multiplying.

$$3(7+x) = 2(13+x)$$

Then, distribute and solve for x.

$$21 + 3x = 26 + 2x$$
$$3x = 5 + 2x$$
$$x = 5$$

Question: 5

If a number is increased by 30% and then decreased by 25%, how does the final number differ from the original?

A. It is 5% greater than the original.
B. It is 7.5% greater than the original.
C. It is the same as the original.
D. It is 2.5% less than the original.

Answer: D

Explanation:

We can choose a value for the original number and calculate the increase and decrease. For example, we can let the original value equal 100. We increase this by 30% by multiplying by 1.3: $100(1.3) = 130$. Then we decrease it by 25% by multiplying by 0.75: $130(0.75) = 97.5$. This is 2.5 less than 100, and 2.5 out of 100 is 2.5%, so the final value is 2.5% less than the original.

Question: 6

Abram rolls a 6-sided die with each side labeled 1-6. What is the probability he rolls an even number or a number greater than 4?

A. $\frac{1}{6}$
B. $\frac{2}{3}$
C. $\frac{3}{4}$
D. $\frac{5}{6}$

A. Option A
B. Option B
C. Option C
D. Option D

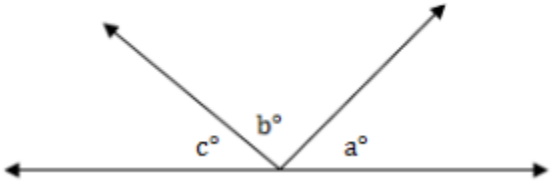
Answer: B

Explanation:

The probability of non-mutually exclusive events A and B occurring may be written as $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$. There are 3 even numbers on the die, so the probability of rolling an even number is $\frac{3}{6}$. There are 2 numbers greater than 4, so this probability is $\frac{2}{6}$. There is 1 number, 6, that is both even and greater than 4, so this probability is $\frac{1}{6}$. Thus, $P(A \text{ or } B) = \frac{3}{6} + \frac{2}{6} - \frac{1}{6} = \frac{4}{6} = \frac{2}{3}$.

Question: 7

In the following figure, if $\frac{b}{a+b+c} = \frac{3}{5}$, then what is the value of b?



A. 60
B. 72
c. 108
D. 120

Answer: C

Explanation:

The angles a, b, and c form a straight line, so $a + b + c = 180$. Substituting 180 for $a + b + c$ in the proportion, we have $\frac{b}{180} = \frac{3}{5}$. By cross-multiplying, we can solve for b.

$$5b = 3(180)$$
$$b = 108$$

Question: 8

A communications company charges \$5.00 for the first 10 minutes of a call and \$1.20 for each minute thereafter. Which of the following equations correctly relates the price in dollars, d, to the number of minutes, m (when $m \geq 10$)?

A. $d = 5 + 1.2m$
B. $d = 5 + 1.2(m - 10)$
C. $d = 5m + 1.2(m + 10)$
D. $d = (m + 10)(5 + 1.2)$

A. Option A

B. Option B
C. Option C
D. Option D

Answer: B

Explanation:

The charge is \$1.20 for each minute after the first ten minutes. The number of minutes after the first ten minutes is $m - 10$, so \$1.20 per minute charged for the part of the phone call exceeding 10 minutes is $1.2(m - 10)$. Adding this to the \$5.00 charge for the first ten minutes gives $d = 5 + 1.2(m - 10)$.

Question: 9

If an item with an original price of \$25.98 is marked down by 25%, and a coupon for 20% off is additionally applied, what is the final price?

A. \$19.49
B. \$17.77
C. \$15.59
D. \$13.28

Answer: C

Explanation:

An item is first marked down by 25% and then by an additional 20%. If 25% is taken off the price, the remaining cost is 75% of the original price, so we can calculate the first markdown: $25.98(0.75) = 19.485$. If 20% is taken off this price, the remaining cost is 80% of this price, so we can calculate the second and final markdown: $19.485(0.8) = 15.588$. We round to the hundredths place to find the final cost: \$15.59.

Question: 10

If the ratio of the measures of the three angles in a triangle are 2 : 6 : 10, what is the actual measure of the smallest angle?

A. 20 degrees
B. 40 degrees
C. 60 degrees
D. 80 degrees

Answer: A

Explanation:

The sum of the measures of the three angles of any triangle is 180 degrees. The equation for the sum of the angles of this triangle can be written as $2x + 6x + 10x = 180$, or $18x = 180$. Therefore, $x = 10$. We multiply 2 by 10 to find that the measure of the smallest angle is 20 degrees.

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