Section 1 (12 Questions)

Arithmetic

1. Question: If $(35x-2=1), \text{whatis}(x)(53x-2=1), whatis(x)$**?**

Explanation: Add 2 to both sides to get $(35x=3)(53x=3)$*. Then multiply both sides by* $(53)(35)$ *to get (x = 5).*

Answer: (x = 5)

2**. Question: What is the sum of the first 20 positive integers?**

Explanation: Use the formula for the sum of the first (n) positive integers: $(n(n+1)2)(2n(n+1))$*. For (n = 20):*

$[20\times212=210][220\times21=210]$

Answer: 210

Algebra

3. Question: Solve for $(y):(y2-9=0).(y):(y2-9=0).$

Explanation: Factor the quadratic equation:

[(y - 3)(y + 3) = 0]

Set each factor to zero:

$[y=3ory=-3][y=3ory=-3]$

Answer: (y = 3) or (y = -3)

4. **Question: If** $(f(x)=x3-4x+1)(f(x)=x3-4x+1)$**, find (f(-2)).**

Explanation: Substitute -2 for (x):

$[f(-2)=(-2)3-4(-2)+1=-8+8+1=1][f(-2)=(-2)3-4(-2)+1=-8+8+1=1]$

Answer: 1

Geometry

5. Question: What is the volume of a rectangular prism with length 5 cm, width 3 cm, and height 4 cm?

Explanation: Use the formula for the volume of a rectangular prism:

$[Volume=length\times width\times height=5\times3\times4=60][Volume=length\times width\times height=5\times3\times4=60]$

Answer: 60 cm³

6. Question: Find the area of a trapezoid with bases of 6 cm and 10 cm, and height of 4 cm.

Explanation: Use the formula for the area of a trapezoid:

$[textArea=12(base1+base2)\times height=12(6+10)\times4=32][textArea=21(base1+base2)\times height=21(6+10)\times4=32]$

Answer: 32 cm²

Data Analysis

7. Question: A dataset contains the numbers 4, 6, 8, 10, and 12. What is the mean?

Explanation: Calculate the sum of the numbers and divide by the number of values:

$[4+6+8+10+125=405=8][54+6+8+10+12=540=8]$

Answer: 8

8. Question: In a survey, 70% of respondents preferred product A over product B. If 140 people preferred product A, how many people were surveyed in total?

Explanation: Let (x) be the total number of people surveyed. Then (0.7x = 140). Divide both sides by 0.7 to get (x = 200).

Answer: 200 people

9. Question: Simplify the expression (4(x - 3) + 5).

Explanation: Distribute the 4:

[4x - 12 + 5 = 4x - 7]

Answer: (4x - 7)

10. Question: If (x) is inversely proportional to (y) and (x = 8) when (y = 2), what is (x) when (y = 4)?

Explanation: Since (x) is inversely proportional to (y), $(x×y=k)(x×y=k)$ *where (k) is a constant. Given (x = 8) and (y = 2):*

$[8×2=16⟹k=16][8×2=16⟹k=16]$

When (y = 4):

$[x×4=16⟹x=4][x×4=16⟹x=4]$

Answer: 4

11. Question: Solve for (x) if (3x + 2 = 14).

Explanation: Subtract 2 from both sides to get (3x = 12). Then divide by 3 to get (x = 4).

Answer: (x = 4)

12. Question: A right triangle has legs of length 9 cm and 12 cm. What is the length of the hypotenuse?

Explanation: Use the Pythagorean theorem:

$[92+122=81+144=225=15][9^2+12^2=81+144=225=15]$

Answer: 15 cm

Section 2 (15 Questions)

Arithmetic

1. Question: If a car travels 300 miles in 5 hours, what is the average speed in miles per hour?

Explanation: Divide the total distance by the total time:

[300 \div 5 = 60]

Answer: 60 miles per hour

2. Question: **If(47x=8),whatis(x)***If*(74*x*=8),*whatis*(*x*)

Explanation: Multiply both sides by *(74)(47)**to solve for (x):*

[x=8×74=14][x=8×47=14]

Answer: (x = 14)

3. Question: What is the least common multiple (LCM) of 12 and 15?

Explanation: The prime factorizations are 12 = 2² × 3 and 15 = 3 × 5. The LCM is the product of the highest powers of all prime factors:

[22×3×5=60][22×3×5=60]

Answer: 60

Algebra

4. Question: Solve for (x): **(x2−6x+9=0).(*x*2−6*x*+9=0).**

Explanation: Factor the quadratic equation:

[(x−3)2=0][(x−3)2=0]

Set the factor to zero:

[x = 3]

Answer: (x = 3)

5. Question: If **(g(x)=2x2−5x+3)(*g*(*x*)=2*x*2−5*x*+3), find (g(2))**.

Explanation: Substitute 2 for (x):

[g(2)=2(2)2−5(2)+3=8−10+3=1][g(2)=2(2)2−5(2)+3=8−10+3=1]

Answer: 1

Geometry

6. Question: What is the area of a circle with a diameter of 10 cm? (Use(π≈3.14))(*Use*(*π*≈3.14))

Explanation: The radius is half of the diameter:

[r=102=5][r=210=5]

Use the formula for the area of a circle:

[Area=πr2=3.14×52=3.14×25=78.5][Area=πr2=3.14×52=3.14×25=78.5]

Answer: 78.5 cm²

7. Question: Find the surface area of a cube with side length 4 cm.
Explanation: Use the formula for the surface area of a cube:
$[\text{textSurfaceArea}=6a2=6\times42=6\times16=96]$ $[\text{textSurfaceArea}=6a^2=6\times4^2=6\times16=96]$
Answer: 96 cm²

Data Analysis

8. Question: A dataset contains the numbers 12, 15, 18, 20, and 25. What is the range?
*Explanation:** The range is the difference between the highest and lowest values:*
[25 - 12 = 13]
Answer: 13

9. Question: A company's sales increased from $1,500,000 to $2,000,000 in one year. What was the percentage increase?
Explanation: Use the formula for percentage increase:
$[\text{new value}-\text{old value}\text{old value}\times100=2,000,000-1,500,0001,500,000\times100=500,0001,500,000\times100=33.33\%]$ $[\text{old value}\text{new value}-\text{old value}\times100=1,500,0002,000,000-1,500,000\times100=1,500,000500,000\times100=33.33\%]$
Answer: 33.33%

10. Question: Simplify the expression ((3x - 2)(2x + 5)).
Explanation: Use the distributive property (FOIL method):
$[(3x-2)(2x+5)=3x\cdot2x+3x\cdot5-2\cdot2x-2\cdot5=6x2+15x-4x-10=6x2+11x-10]$ $[(3x-2)(2x+5)=3x\cdot2x+3x\cdot5-2\cdot2x-2\cdot5=6x^2+15x-4x-10=6x^2+11x-10]$
Answer: $(6x2+11x-10)(6x^2+11x-10)$

11. Question: Solve for (z) if (4z - 7 = 3z + 5).
Explanation: Subtract 3z from both sides to get (z - 7 = 5). Then add 7 to both sides to get (z = 12).
Answer: (z = 12)

12. Question: What is the value of (x) in the equation (2(x + 3) = 5x - 4)?
Explanation: Distribute the 2 and then solve for (x):
$[2x+6=5x-4\Longrightarrow6+4=5x-2x\Longrightarrow10=3x\Longrightarrow x=103]$ $[2x+6=5x-4\Longrightarrow6+4=5x-2x\Longrightarrow10=3x\Longrightarrow x=310]$
Answer: $(x=103)(x=310)$

13. Question: If the probability of an event occurring is 0.25, what is the probability that the event does not occur?
Explanation: The probability of an event not occurring is (1 -) the probability of the event occurring:
[1 - 0.25 = 0.75]
Answer: 0.75

14. Question: Find the median of the dataset: 8, 12, 15, 22, 26, 29.
Explanation: The median is the middle value in an ordered list. For an even number of values, it is the average of the two middle values:
[Median=15+222=18.5][Median=215+22=18.5]
Answer: 18.5

15. Question: What is the standard deviation of the dataset: 3, 7, 7, 8, 10, 15?
Explanation: To find the standard deviation, follow these steps:

- *Find the mean: (3+7+7+8+10+156=8.33)(63+7+7+8+10+15=8.33)*
- *Calculate each value's deviation from the mean, square it, sum the squared deviations, divide by the number of values, and then take the square root:*

[Variance=(3−8.33)2+(7−8.33)2+(7−8.33)2+(8−8.33)2+(10−8.33)2+(15−8.33)26=28.69+1.77+1.77+0.11+2.77+43.366=13.0][Variance=6(3−8.33)2+(7−8.33)2+(7−8.33)2+(8−8.33)2+(10−8.33)2+(15−8.33)2=628.69+1.77+1.77+0.11+2.77+43.36=13.0]
[Standard Deviation=13.08≈3.62][Standard Deviation=13.08≈3.62]
Answer: Approximately 3.62