Arithmetic

1. Question: If $(23x-5=13x+7)(32x-5=31x+7)$**, what is the value of (x)?**

Explanation: Subtract$(13x)(31x)$ *from both sides to get* $(13x-5=7)(31x-5=7)$.
Add 5 to both sides to get$(13x=12)(31x=12)$. *Multiply both sides by 3 to get (*
x = 36).
Answer: (x = 36)

2. Question: The average (arithmetic mean) of five numbers is 14. If four of the numbers are 10, 12, 18, and 20, what is the fifth number?
Answer: 10
Explanation: Let the fifth number be (x). The sum of the numbers is (5 \times 14 = 70). The sum of the given four numbers is (10 + 12 + 18 + 20 = 60). Therefore, (x = 70 - 60 = 10).

3. Question: If a car travels at an average speed of 55 miles per hour for the first 2 hours and 65 miles per hour for the next 3 hours, what is the total distance traveled?
Answer: 305 miles
Explanation: Calculate the distance for each segment and then sum them: (55 \times 2 = 110) and (65 \times 3 = 195). Total distance = (110 + 195 = 305) miles.

4. Question: Simplify the expression $(5x+32x).(x5+2x3)$.
Explanation: Find a common denominator
$(2x):(5\times22x+32x=10+32x=132x).(2x):(2x5\times2+2x3=2x10+3=2x13)$.
Answer: $(132x)(2x13)$

Algebra

5. Question: Solve for (y): (4y - 3(2y + 1) = 5).
Answer: (y = -4)
Explanation: Distribute the -3: (4y - 6y - 3 = 5). Combine like terms: (-2y - 3 = 5). Add 3 to both sides: (-2y = 8). Divide by -2: (y = -4).

6. Question: If $(f(x)=2x2-3x+1),(f(x)=2x2-3x+1)$, **find (f(-1)).**
Answer: 6
Explanation: Substitute -1 for (x):
$(f(-1)=2(-1)2-3(-1)+1=2+3+1=6).(f(-1)=2(-1)2-3(-1)+1=2+3+1=6)$.

7. Question: Expand the expression ((2x - 3)(x + 4)).
Answer: $(2x2+5x-12)(2x2+5x-12)$
Explanation: Use the distributive property:
$(2x2+8x-3x-12=2x2+5x-12).(2x2+8x-3x-12=2x2+5x-12)$.

8. Question: If (x^2 - 5x + 6 = 0), what are the possible values of (x)?

Answer: (x = 2) or (x = 3)

Explanation: Factor the quadratic equation: ((x - 2)(x - 3) = 0). Therefore, (x = 2) or (x = 3).

Geometry

9. Question: What is the area of a trapezoid with bases of lengths 6 cm and 10 cm, and a height of 5 cm?

Answer: 40 cm²

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

$\frac{1}{2} \times (base_1 + base_2) \times height = \frac{1}{2} \times (6 + 10) \times 5 = \frac{1}{2} \times 16 \times 5 = 40$.

10. Question: What is the volume of a cone with a radius of 3 cm and a height of 4 cm? $(Use(\pi \approx 3.14))$

Answer: 37.68 cm³

Explanation: Use the formula for the volume of a cone:

$\frac{1}{3}\pi r^2 h = \frac{1}{3} \times 3.14 \times 3^2 \times 4 = \frac{1}{3} \times 3.14 \times 9 \times 4 = \frac{1}{3} \times 3.14 \times 36 = 37.68$.

11. Question: Find the length of the diagonal of a rectangle with length 8 cm and width 6 cm.

Answer: 10 cm

Explanation: Use the Pythagorean theorem: $\sqrt{8^2 + 6^2} = \sqrt{64 + 36} = \sqrt{100} = 10$.

12. Question: What is the surface area of a sphere with a radius of 5 cm? $(Use(\pi \approx 3.14))$

Answer: 314 cm²

Explanation: Use the formula for the surface area of a sphere:

$4\pi r^2 = 4 \times 3.14 \times 5^2 = 4 \times 3.14 \times 25 = 314$.

Data Analysis

13. Question: A dataset contains the numbers 5, 7, 9, 11, 13, and 15. What is the standard deviation?

Answer: 3.74

Explanation: Calculate the mean: $\frac{5+7+9+11+13+15}{6} = 10$. *Calculate the squared differences from the mean, sum them, and divide by the number of values minus one:*

$\sqrt{\frac{(5-10)^2+(7-10)^2+(9-10)^2+(11-10)^2+(13-10)^2+(15-10)^2}{5}} = \sqrt{\frac{25+9+1+1+9+25}{5}} = \sqrt{14} = 3.74$

14. Question: A survey of 300 people found that 180 like coffee, 120 like tea, and 90 like both. How many people like only coffee?

Answer: 90

Explanation: Use the principle of inclusion and exclusion: (180 - 90 = 90).

15. Question: A pie chart shows the distribution of expenses for a household: 25% for housing, 15% for food, 20% for transportation, and the rest for other expenses. What percentage is spent on other expenses?

Explanation: Calculate the total percentage for housing, food, and transportation: (25 + 15 + 20 = 60). Therefore, the percentage spent on other expenses is (100 - 60 = 40).

Answer: 40%

16. Question: A company's revenue increased from $200,000 in 2019 to $250,000 in 2020. What is the percentage increase?

Explanation: Use the percentage increase formula:

$(\frac{250,000-200,000}{200,000}\times100=\frac{50,000}{200,000}\times100=25\%).$

Answer: 25%

Mixed

17. Question: Simplify the expression: $(\frac{3}{x}-\frac{4}{x}+\frac{2}{x}+\frac{5}{x}).$

Explanation: Combine the fractions: $(\frac{3-4+2+5}{x}=\frac{5+1}{x}=\frac{5+1}{x}).$

Answer: $(\frac{5+1}{x})$

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

Explanation: If (x) is inversely proportional to (y), $(x=\frac{k}{y}).$ *Using (x = 10) and (y = 2), (k = 20). Therefore, when (y = 8),* $(x=\frac{20}{8}=2.5).$

Answer: 2.5

19. Question: If (4x + 7 = 3x + 12), what is the value of (x)?

Explanation: Subtract 3x from both sides to get (x + 7 = 12). Then subtract 7 from both sides to get (x = 5).

Answer: (x = 5)

20. Question: A right triangle has one leg of 8 cm and a hypotenuse of 17 cm. What is the length of the other leg?

Explanation: Use the Pythagorean theorem: Let the other leg be (y). Then $(8^2+y^2=17^2).(8^2+y^2=17^2).$ *Simplify to get* $(64+y^2=289)(64+y^2=289).$ *Subtract 64 to get* $(y^2=225)(y^2=225).$ *Take the square root to get (y = 15).*

Answer: 15 cm