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Grade 7

Top 100 Word Problems

1

Proportional Relationships

A recipe for lemonade uses 4 cups of lemon juice for every 6 cups of water. If you use 10 cups of lemon juice, how much water will you need?



Lemon juice : Water = 4 : 6

Water needed for 10 cups

$$= \frac{6}{4} \times 10$$

= _____ cups

2

Unit Rates

A car travels 315 miles on 15 gallons of gas. What is the unit rate in miles per gallon?



Unit rate = Total miles ÷ Total gallons

$$= 315 \div 15$$

= _____ miles per gallon

3

Proportions

If 5 notebooks cost \$7.50, how much will 12 notebooks cost?



5 notebooks → \$7.50

12 notebooks → x

Using proportion:

$$\frac{5}{12} = \frac{7.50}{x}$$

x = _____

4

Scale Drawings

A floor plan is drawn using a scale of 1 cm : 2 m. If a wall measures 6.5 cm on the drawing, what is its actual length?



Scale: 1 cm represents 2 m

Actual length = 6.5 × 2

= _____ m

5

Scale Models

A model of a bridge is built at a scale of 1 : 50. If the model is 24 cm long, what is the actual length of the bridge?



Scale: 1 cm represents 50 cm

Actual length = 24 × 50

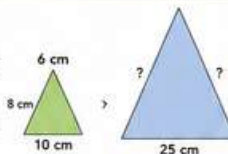
= _____ cm

= _____ m

6

Similar Figures

Two triangles are similar. The sides of the smaller triangle are 6 cm, 8 cm, and 10 cm. The longest side of the larger triangle is 25 cm. Find the scale factor and the other sides.



Scale factor = 25 ÷ 10 = 2.5

Other sides:

$$6 \times 2.5 = \text{_____ cm}$$

$$8 \times 2.5 = \text{_____ cm}$$

7

Percent Increase

The price of a laptop is \$640. It increases by 15%. What is the new price?



Increase = 15% of \$640

$$= 0.15 \times 640 = \text{_____}$$

New price = 640 + _____

= \$ _____

8

Discounts

A jacket originally costs \$85. It is on sale for 25% off. What is the sale price?



Discount = 25% of \$85

$$= 0.25 \times 85 = \text{_____}$$

Sale price = 85 - _____

= \$ _____

9

Tax

The price of a bicycle is \$280 before tax. The sales tax rate is 6.5%. What is the total cost including tax?



Tax = 6.5% of \$280

$$= 0.065 \times 280 = \text{_____}$$

Total cost = 280 + _____

= \$ _____

10

Tips

You had a restaurant bill of \$56. You want to leave a 18% tip. How much tip will you leave?



Tip = 18% of \$56

$$= 0.18 \times 56 = \text{_____}$$

Tip amount = \$ _____

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11. Markup

A store buys a backpack for \$40 and marks it up by 35%. What is the selling price?



$$\begin{aligned}\text{Markup} &= 35\% \text{ of } \$40 \\ &= 0.35 \times 40 = \underline{\hspace{2cm}} \\ \text{Selling price} &= 40 + \underline{\hspace{2cm}} \\ &= \$ \underline{\hspace{2cm}}\end{aligned}$$

12. Commission

A salesperson earns a 6% commission on sales. If she sells \$3,200 worth of products, how much commission does she earn?



$$\begin{aligned}\text{Commission} &= 6\% \text{ of } \$3,200 \\ &= 0.06 \times 3,200 = \underline{\hspace{2cm}} \\ \text{Commission earned} &= \$ \underline{\hspace{2cm}}\end{aligned}$$

13. Simple Interest

Sam invests \$1,500 in a savings account at 4% simple interest per year. How much interest will he earn in 3 years?



$$\begin{aligned}\text{Interest} &= \text{Principal} \times \text{Rate} \times \text{Time} \\ &= 1,500 \times 0.04 \times 3 \\ &= \$ \underline{\hspace{2cm}}\end{aligned}$$

14. Percent Error

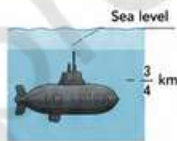
The actual length of a table is 72 cm, but a student measures it as 68 cm. What is the percent error?



$$\begin{aligned}\text{Error} &= |72 - 68| = \underline{\hspace{2cm}} \\ \text{Percent error} &= \frac{\text{Error}}{\text{Actual}} \times 100 \\ &= \left(\underline{\hspace{2cm}} \right) \times 100 \\ &= \underline{\hspace{2cm}} \%\end{aligned}$$

15. Positive and Negative Fractions

A submarine is at $-\frac{3}{4}$ km below sea level. It descends another $1\frac{1}{2}$ km. What is its new position?



$$\begin{aligned}\text{New position} &= -\frac{3}{4} - 1\frac{1}{2} \\ &= -\frac{3}{4} - \frac{3}{2} \\ &= -\underline{\hspace{2cm}} \\ &= -\underline{\hspace{2cm}} \text{ km}\end{aligned}$$

16. Decimal Operations

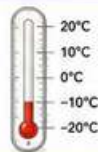
A recipe calls for 2.75 cups of flour and 1.4 cups of sugar. How many cups of dry ingredients are needed in all?



$$\begin{aligned}\text{Total} &= 2.75 + 1.4 \\ &= \underline{\hspace{2cm}} \text{ cups}\end{aligned}$$

17. Integer Operations

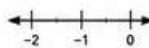
The temperature drops 7°C in the morning and then rises 12°C in the afternoon. If it started at -5°C , what is the temperature now?



$$\begin{aligned}\text{Final temperature} &= -5 - 7 + 12 \\ &= -12 + 12 \\ &= \underline{\hspace{2cm}} ^\circ\text{C}\end{aligned}$$

18. Rational Number Comparisons

Compare the numbers $-\frac{3}{4}$ and $-\frac{2}{3}$. Which number is greater?



$$\begin{aligned}-\frac{3}{4} &= \underline{\hspace{2cm}} \\ -\frac{2}{3} &= \underline{\hspace{2cm}} \\ \text{Since } \underline{\hspace{2cm}} &> \underline{\hspace{2cm}}, \\ -\frac{3}{4} &\text{ is greater.}\end{aligned}$$

19. Real-World Temperature

The temperature in the morning was -8°C . By noon, it increased by 15°C . By evening, it decreased by 6°C . What was the temperature in the evening?



$$\begin{aligned}\text{Temperature at noon} &= -8 + 15 = \underline{\hspace{2cm}} ^\circ\text{C} \\ \text{Temperature in evening} &= \underline{\hspace{2cm}} - 6 \\ &= \underline{\hspace{2cm}} ^\circ\text{C}\end{aligned}$$

20. One-Step Equation

A number increased by 15 is 42. What is the number?



$$\begin{aligned}x + 15 &= 42 \\ x &= 42 - 15 \\ x &= \underline{\hspace{2cm}}\end{aligned}$$

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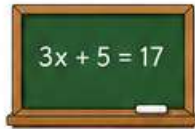


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21. Two-Step Equation

Three times a number plus 5 is 17.
What is the number?



$$3x + 5 = 17$$

$$3x = 17 - 5$$

$$3x = 12$$

$$x = \underline{\hspace{2cm}}$$

22. Multi-Step Equation

The sum of twice a number, 7, and the number is 25.
What is the number?



$$2x + 7 + x = 25$$

$$3x + 7 = 25$$

$$3x = 25 - 7$$

$$3x = 18$$

$$x = \underline{\hspace{2cm}}$$

23. Equation with Fractions

Three-fourths of a number minus 2 equals 5.
What is the number?



$$\frac{3}{4}x - 2 = 5$$

$$\frac{3}{4}x = 5 + 2$$

$$\frac{3}{4}x = 7$$

$$x = \underline{\hspace{2cm}}$$

24. Equation with Decimals

A number divided by 2.5 is 8. What is the number?



$$x \div 2.5 = 8$$

$$x = 8 \times 2.5$$

$$x = \underline{\hspace{2cm}}$$

25. One-Step Inequality

A number added to 7 is less than 15.
Write and solve the inequality.



$$x + 7 < 15$$

$$x < 15 - 7$$

$$x < \underline{\hspace{2cm}}$$

26. Two-Step Inequality

Twice a number minus 3 is greater than 9.
Write and solve the inequality.



$$2x - 3 > 9$$

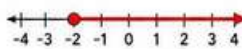
$$2x > 9 + 3$$

$$2x > 12$$

$$x > \underline{\hspace{2cm}}$$

27. Graphing Inequality

Graph the inequality on the number line.
 $x \geq -2$



Graph the solution on the number line.

28. Real-World Inequality

You must be at least 13 years old to ride a roller coaster.
Write an inequality for the ages that can ride.



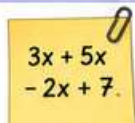
Let a = age (in years)

Inequality: $a \geq \underline{\hspace{2cm}}$

Ages that can ride: $\underline{\hspace{2cm}}$ and above

29. Combining Like Terms

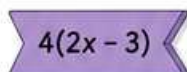
Simplify the expression
 $3x + 5x - 2x + 7$.



$$\begin{aligned} 3x + 5x - 2x + 7 \\ = (3x + 5x - 2x) + 7 \\ = \underline{\hspace{2cm}} + 7 \\ = \underline{\hspace{2cm}} \end{aligned}$$

30. Distributive Property

Use the distributive property to simplify $4(2x - 3)$.



$$\begin{aligned} 4(2x - 3) &= 4 \cdot 2x - 4 \cdot 3 \\ &= \underline{\hspace{2cm}} - \underline{\hspace{2cm}} \\ &= \underline{\hspace{2cm}} \end{aligned}$$

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31. Evaluating Expressions

Evaluate the expression
 $3x^2 - 2x + 5$ when $x = -2$.

$$3x^2 - 2x + 5$$

$$x = -2$$

$$3(-2)^2 - 2(-2) + 5$$

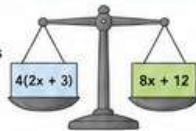
$$= 3(4) + 4 + 5$$

$$= 12 + 4 + 5$$

$$= \underline{\hspace{2cm}}$$

32. Equivalent Expressions

Determine whether the expressions
 $4(2x + 3)$ and $8x + 12$
 are equivalent. Explain.



$$4(2x + 3) = 4 \cdot 2x + 4 \cdot 3$$

$$= 8x + 12$$

Since $8x + 12 = 8x + 12$,
 the expressions are _____.

33. Area of a Rectangle

A rectangle has a length of 15 cm
 and a width of 8 cm.
 What is its area?



$$\text{Area of rectangle} = \text{length} \times \text{width}$$

$$= 15 \times 8$$

$$= \underline{\hspace{2cm}} \text{ cm}^2$$

34. Circumference of a Circle

A circular garden has a radius
 of 7 m. What is its circumference?
 (Use $\pi = \frac{22}{7}$)



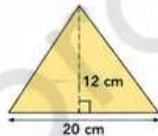
$$\text{Circumference} = 2\pi r$$

$$= 2 \times \frac{22}{7} \times 7$$

$$= \underline{\hspace{2cm}} \text{ m}$$

35. Area of a Triangle

A triangle has a base of 20 cm
 and a height of 12 cm.
 What is its area?



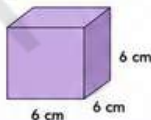
$$\text{Area of triangle} = \frac{1}{2} \times \text{base} \times \text{height}$$

$$= \frac{1}{2} \times 20 \times 12$$

$$= \underline{\hspace{2cm}} \text{ cm}^2$$

36. Surface Area of a Cube

A cube has an edge length of 6 cm.
 What is its surface area?



$$\text{Surface area of cube} = 6s^2$$

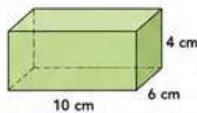
$$= 6(6^2)$$

$$= 6(36)$$

$$= \underline{\hspace{2cm}} \text{ cm}^2$$

37. Volume of a Rectangular Prism

A rectangular prism has a length
 of 10 cm, a width of 6 cm,
 and a height of 4 cm.
 What is its volume?



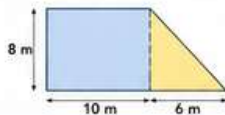
$$\text{Volume} = \text{length} \times \text{width} \times \text{height}$$

$$= 10 \times 6 \times 4$$

$$= \underline{\hspace{2cm}} \text{ cm}^3$$

38. Composite Figure (Area)

Find the area of the figure
 composed of a rectangle and
 a triangle.



$$\text{Area of rectangle} = 10 \times 8 = 80 \text{ m}^2$$

$$\text{Area of triangle} = \frac{1}{2} \times 6 \times 8 = 24 \text{ m}^2$$

$$\text{Total area} = 80 + 24 = \underline{\hspace{2cm}} \text{ m}^2$$

39. Scale Drawing

A map uses a scale of 1 cm : 5 km.
 If the distance between two cities
 on the map is 6.4 cm, what is the
 actual distance between the cities?



$$\text{Scale: } 1 \text{ cm represents } 5 \text{ km}$$

$$\text{Actual distance} = 6.4 \times 5$$

$$= \underline{\hspace{2cm}} \text{ km}$$

40. Simple Probability

A bag has 3 red marbles, 4 blue
 marbles, and 5 green marbles.
 What is the probability of drawing
 a blue marble?



$$\text{Total marbles} = 3 + 4 + 5 = 12$$

$$\text{Favorable outcomes (blue)} = 4$$

$$\text{Probability} = \frac{4}{12} = \frac{1}{\underline{\hspace{1cm}}}$$

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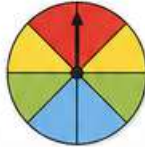


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41. Experimental Probability

A spinner is divided into 8 equal sections. It is spun 40 times and lands on red 15 times. What is the experimental probability of landing on red?



$$\begin{aligned}\text{Experimental probability} &= \frac{\text{Number of times it occurs}}{\text{Total number of trials}} \\ &= \frac{15}{40} = \underline{\hspace{2cm}}\end{aligned}$$

42. Theoretical Probability

A bag has 3 red balls, 5 blue balls, and 2 green balls. What is the theoretical probability of picking a green ball?



$$\begin{aligned}\text{Total balls} &= 3 + 5 + 2 = 10 \\ \text{Favorable outcomes (green)} &= 2 \\ \text{Probability} &= \frac{2}{10} = \underline{\hspace{2cm}}\end{aligned}$$

43. Probability Comparison

A card is drawn from a standard deck of 52 cards. Is it more likely to draw a heart or a king? Explain.



$$\begin{aligned}\text{Hearts in deck} &= 13 & P(\text{heart}) &= \frac{13}{52} \\ \text{Kings in deck} &= 4 & P(\text{king}) &= \frac{4}{52} \\ \text{Since } \underline{\hspace{2cm}} &> \underline{\hspace{2cm}}, & & \\ \text{it is more likely to draw a } \underline{\hspace{2cm}} & & & \end{aligned}$$

44. Mean

The scores on a quiz are 78, 85, 92, 88, and 77. What is the mean score?



$$\begin{aligned}\text{Mean} &= \frac{\text{Sum of all scores}}{\text{Number of scores}} \\ &= \frac{78 + 85 + 92 + 88 + 77}{5} \\ &= \underline{\hspace{2cm}}\end{aligned}$$

45. Median

Find the median of the data set: 12, 18, 15, 20, 17.



$$\begin{aligned}\text{Order the data: } \underline{\hspace{2cm}}, \underline{\hspace{2cm}}, \underline{\hspace{2cm}}, \underline{\hspace{2cm}}, \underline{\hspace{2cm}} \\ \text{The middle value is } \underline{\hspace{2cm}} \\ \text{Median} &= \underline{\hspace{2cm}}\end{aligned}$$

46. Range

A class recorded the number of pages read in a week: 45, 32, 28, 50, 38, 42. What is the range?



$$\begin{aligned}\text{Range} &= \text{Highest value} - \text{Lowest value} \\ &= \underline{\hspace{2cm}} - \underline{\hspace{2cm}} \\ &= \underline{\hspace{2cm}}\end{aligned}$$

47. Sampling

A jar has 100 jelly beans. A sample of 20 is taken. Is this sample likely to be representative of the whole jar? Why or why not?



Since the sample (20) is _____ of the population (100), it is _____ likely to be a representative sample. Reason: _____

48. Population

A town has 2,500 households. A survey is conducted on 150 randomly selected households. What is the population and what is the sample?



Population = _____
Sample = _____

49. Data Distribution

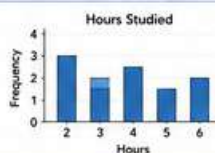
The number of hours students spent studying last week is: 2, 3, 5, 2, 4, 3, 6, 2, 4, 5. Create a frequency table.



Hours Studied	Frequency
2	_____
3	_____
4	_____
5	_____
6	_____

50. Data Distribution (Analysis)

From the data in problem 49, which number of hours was studied most often?



The number of hours studied most often is _____ hours.

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51. Unit Rates (Speed)

A train travels 420 miles in 6 hours. What is the unit rate in miles per hour?



$$\begin{aligned}\text{Unit rate} &= \text{Total distance} \div \text{Total time} \\ &= 420 \div 6 \\ &= \underline{\hspace{2cm}} \text{ miles per hour}\end{aligned}$$

52. Proportions (Recipe)

A recipe uses 3 cups of sugar for every 4 cups of flour. If you use 10 cups of flour, how many cups of sugar do you need?



$$\begin{array}{rcl}\text{Sugar} & \text{Flour} & \\ 3 & = & 4 \\ x & & 10 \\ 3 \times 10 & = & 4x \\ x & = & \underline{\hspace{2cm}} \text{ cups of sugar}\end{array}$$

53. Scale Model

A model car is made at a scale of 1 cm : 20 cm. If the model car is 7.5 cm long, what is the actual length of the car?



$$\begin{aligned}\text{Scale: } 1 \text{ cm represents } 20 \text{ cm} \\ \text{Actual length} &= 7.5 \times 20 \\ &= \underline{\hspace{2cm}} \text{ cm} \\ &= \underline{\hspace{2cm}} \text{ m}\end{aligned}$$

54. Percent Increase

The price of a smartphone is \$360. It increases by 12%. What is the new price?



$$\begin{aligned}\text{Increase} &= 12\% \text{ of } \$360 \\ &= 0.12 \times 360 = \underline{\hspace{2cm}} \\ \text{New price} &= 360 + \underline{\hspace{2cm}} \\ &= \$ \underline{\hspace{2cm}}\end{aligned}$$

55. Discounts

A jacket originally costs \$120. It is on sale for 30% off. What is the sale price?



$$\begin{aligned}\text{Discount} &= 30\% \text{ of } \$120 \\ &= 0.30 \times 120 = \underline{\hspace{2cm}} \\ \text{Sale price} &= 120 - \underline{\hspace{2cm}} \\ &= \$ \underline{\hspace{2cm}}\end{aligned}$$

56. Tax

A bicycle costs \$240. The sales tax rate is 8%. What is the total cost including tax?



$$\begin{aligned}\text{Tax} &= 8\% \text{ of } \$240 \\ &= 0.08 \times 240 = \underline{\hspace{2cm}} \\ \text{Total cost} &= 240 + \underline{\hspace{2cm}} \\ &= \$ \underline{\hspace{2cm}}\end{aligned}$$

57. Simple Interest

Maria invests \$1,800 in a savings account that earns 5% simple interest per year. How much interest will she earn in 2 years?



$$\begin{aligned}\text{Interest} &= \text{Principal} \times \text{Rate} \times \text{Time} \\ &= 1,800 \times 0.05 \times 2 \\ &= \$ \underline{\hspace{2cm}}\end{aligned}$$

58. Decimal Operations

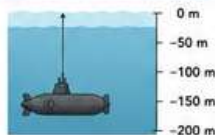
A store sells 2.35 kg of apples and 1.75 kg of oranges. How many kilograms of fruit did it sell in all?



$$\begin{aligned}\text{Total} &= 2.35 + 1.75 \\ &= \underline{\hspace{2cm}} \text{ kg}\end{aligned}$$

59. Integer Operations

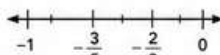
A submarine is at a depth of -120 meters. It rises 75 meters and then descends 30 meters. What is its new depth?



$$\begin{aligned}\text{New depth} &= -120 + 75 - 30 \\ &= -45 - 30 \\ &= \underline{\hspace{2cm}} \text{ meters}\end{aligned}$$

60. Rational Number Comparison

Compare $-\frac{2}{3}$ and $-\frac{3}{5}$. Which number is greater?



$$\begin{aligned}\text{Since } \underline{\hspace{2cm}} &> \underline{\hspace{2cm}}, \\ -\frac{2}{3} &\text{ is } \underline{\hspace{2cm}}.\end{aligned}$$

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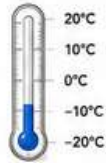


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61. Real-World Temperature

At 6:00 a.m., the temperature was -5°C . By noon, it had risen 9°C . By midnight, it dropped 12°C . What was the temperature at midnight?



$$\text{Temperature at noon} = -5 + 9 = 4^{\circ}\text{C}$$

$$\begin{aligned}\text{Temperature at midnight} &= 4 - 12 \\ &= -8^{\circ}\text{C}\end{aligned}$$

62. One-Step Equation

A number decreased by 9 is 18. What is the number?



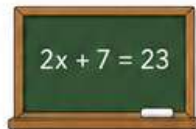
$$x - 9 = 18$$

$$x = 18 + 9$$

$$x = \underline{\hspace{2cm}}$$

63. Two-Step Equation

Twice a number plus 7 is 23. What is the number?



$$2x + 7 = 23$$

$$2x = 23 - 7$$

$$2x = 16$$

$$x = \underline{\hspace{2cm}}$$

64. Multi-Step Equation

The sum of three times a number and 4, minus 5, is 16. What is the number?



$$3x + 4 - 5 = 16$$

$$3x - 1 = 16$$

$$3x = 17$$

$$x = \underline{\hspace{2cm}}$$

65. Equation with Fractions

One-half of a number plus $\frac{1}{3}$ is $\frac{5}{6}$. What is the number?



$$\frac{1}{2}x + \frac{1}{3} = \frac{5}{6}$$

$$\frac{1}{2}x = \frac{5}{6} - \frac{1}{3}$$

$$\frac{1}{2}x = \frac{5}{6} - \frac{2}{6} = \frac{3}{6} = \frac{1}{2}$$

$$x = \underline{\hspace{2cm}}$$

66. Equation with Decimals

0.8 times a number minus 1.4 is 3. What is the number?



$$0.8x - 1.4 = 3$$

$$0.8x = 3 + 1.4$$

$$0.8x = 4.4$$

$$x = \underline{\hspace{2cm}}$$

67. One-Step Inequality

A number increased by 6 is less than 14. Write and solve the inequality.



$$x + 6 < 14$$

$$x < 14 - 6$$

$$x < \underline{\hspace{2cm}}$$

68. Two-Step Inequality

Three times a number minus 2 is greater than 7. Write and solve the inequality.



$$3x - 2 > 7$$

$$3x > 7 + 2$$

$$3x > 9$$

$$x > \underline{\hspace{2cm}}$$

69. Graphing Inequality

Graph the solution of the inequality on the number line. $x \geq -3$



Graph the solution.

70. Real-World Inequality

Tickets to a concert cost t dollars each. You have a budget of \$120 for tickets. Write an inequality to represent how many tickets you can buy. Then, solve it for t .



$$\text{Inequality: } t \leq 120$$

Maximum number of tickets you can buy: $t \leq \underline{\hspace{2cm}}$

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71. Combining Like Terms

Simplify the expression by combining like terms.

$$4x + 7 - 3x + 2$$



Group like terms:

$$\begin{aligned}(4x - 3x) + (7 + 2) \\ = 1x + 9 \\ = x + 9\end{aligned}$$

72. Distributive Property

Use the distributive property to simplify the expression.

$$5(2x - 7)$$



$$\begin{aligned}5(2x - 7) &= 5(2x) + 5(-7) \\ &= 10x - 35\end{aligned}$$

73. Evaluating ExpressionsEvaluate the expression for $x = -3$ and $y = 4$.

$$2x^2 - 3xy + y$$

Substitute $x = -3$, $y = 4$.

$$\begin{aligned}2(-3)^2 - 3(-3)(4) + 4 \\ = 2(9) - 3(-12) + 4 \\ = 18 + 36 + 4 \\ = 58\end{aligned}$$

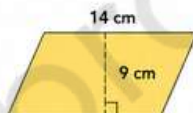
74. Equivalent ExpressionsAre the expressions $3(x + 4)$ and $3x + 12$ equivalent? Explain.

$$3(x + 4) = 3x + 12 \text{ (using distributive property)}$$

Since both expressions are the same, they are equivalent.

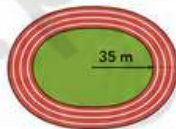
75. Area of a Parallelogram

A parallelogram has a base of 14 cm and a height of 9 cm. What is its area?



$$\text{Area} = \text{base} \times \text{height}$$

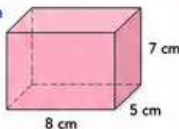
$$\begin{aligned}&= 14 \times 9 \\ &= 126 \text{ cm}^2\end{aligned}$$

76. Circumference of a CircleA circular track has a radius of 35 m. What is its circumference? (Use $\pi = \frac{22}{7}$)

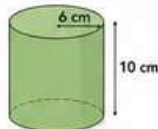
$$\begin{aligned}C &= 2\pi r \\ &= 2 \times \frac{22}{7} \times 35 \\ &= 2 \times 22 \times 5 \\ &= 220 \text{ m}\end{aligned}$$

77. Surface Area of a Rectangular Prism

A rectangular prism has a length of 8 cm, a width of 5 cm, and a height of 7 cm. Find its surface area.



$$\begin{aligned}SA &= 2(lw + lh + wh) \\ &= 2(8 \times 5 + 8 \times 7 + 5 \times 7) \\ &= 2(40 + 56 + 35) \\ &= 2(131) \\ &= 262 \text{ cm}^2\end{aligned}$$

78. Volume of a CylinderA cylinder has a radius of 6 cm and a height of 10 cm. Find its volume. (Use $\pi = 3.14$)

$$\begin{aligned}V &= \pi r^2 h \\ &= 3.14 \times 6^2 \times 10 \\ &= 3.14 \times 36 \times 10 \\ &= 1130.4 \text{ cm}^3\end{aligned}$$

79. Composite Figure (Area)

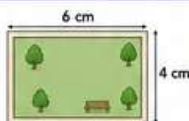
The figure is composed of a rectangle and a semicircle. The rectangle has a length of 16 cm and a width of 8 cm. The semicircle has a diameter of 8 cm. Find the total area.



$$\begin{aligned}\text{Area of rectangle} &= 16 \times 8 = 128 \text{ cm}^2 \\ \text{Radius of semicircle} &= \frac{8}{2} = 4 \text{ cm} \\ \text{Area of semicircle} &= \frac{1}{2} \pi r^2 = \frac{1}{2} \times 3.14 \times 4^2 = 25.12 \text{ cm}^2 \\ \text{Total area} &= 128 + 25.12 = 153.12 \text{ cm}^2\end{aligned}$$

80. Scale Drawing (Perimeter)

A rectangular park is 6 cm long and 4 cm wide on a map. The scale is 1 cm represents 25 m. Find the actual perimeter of the park.



$$\begin{aligned}\text{Scale: } 1 \text{ cm represents } 25 \text{ m} \\ \text{Length} &= 6 \times 25 = 150 \text{ m} \\ \text{Width} &= 4 \times 25 = 100 \text{ m} \\ \text{Perimeter} &= 2(L + W) = 2(150 + 100) = 500 \text{ m}\end{aligned}$$

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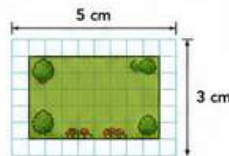


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81. Scale Drawing (Area)

A garden is drawn on a scale of 1 cm represents 2 m. The area of the garden on the drawing is 15 cm². What is the actual area of the garden?



Scale: 1 cm represents 2 m
 So, 1 cm² represents (2 m)² = 4 m²
 Actual area = 15 cm² × 4 m²/cm²
 = 60 m²

82. Simple Probability

A bag has 4 red marbles, 3 blue marbles, and 5 green marbles. What is the probability of picking a blue marble?



Total marbles = 4 + 3 + 5 = 12
 Favorable outcomes (blue) = 3
 Probability = $\frac{3}{12} = \frac{1}{4}$

83. Experimental Probability

A coin is flipped 60 times and lands on heads 36 times. What is the experimental probability of getting heads?



Experimental probability = $\frac{\text{Number of times it occurs}}{\text{Total number of trials}}$
 = $\frac{36}{60} = \frac{3}{5}$

84. Theoretical Probability

A box has 2 white balls, 3 black balls, and 1 red ball. What is the theoretical probability of picking a red ball?



Total balls = 2 + 3 + 1 = 6
 Favorable outcomes (red) = 1
 Probability = $\frac{1}{6}$

85. Probability Comparison

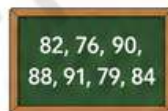
A spinner has 6 equal sections numbered 1 to 6. Which is more likely: spinning an even number or a multiple of 3? Explain.



Even numbers: {2, 4, 6} → 3 outcomes → $\frac{3}{6} = \frac{1}{2}$
 Multiples of 3: {3, 6} → 2 outcomes → $\frac{2}{6} = \frac{1}{3}$
 Since $\frac{1}{2} > \frac{1}{3}$, spinning an even number is more likely.

86. Mean

The scores of 7 students on a test are: 82, 76, 90, 88, 91, 79, 84. What is the mean score?



Mean = $\frac{\text{Sum of all scores}}{\text{Number of scores}}$
 = $\frac{82 + 76 + 90 + 88 + 91 + 79 + 84}{7}$
 = $\frac{590}{7} = 84.29$

87. Median

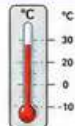
Find the median of the data set: 24, 18, 31, 27, 14, 20, 29.



Order the data: 14, 18, 20, 24, 27, 29, 31
 The middle value is 24.
 Median = 24

88. Range

The daily high temperatures (°C) for a week are: 18, 22, 25, 19, 23, 20, 17. What is the range?



Range = Highest value - Lowest value
 = 25 - 17
 = 8°C

89. Sampling

A school has 1,200 students. A random sample of 60 students is selected for a survey. Is this likely to be a representative sample? Why or why not?



Since the sample (60) is 5% out of 1,200, which is 5% of the population, it is likely to be a representative sample.

90. Population

A city has 85,000 households. A survey is conducted on 1,000 randomly selected households. Is this sample likely to represent the population? Why or why not?



Sample = 1,000 out of 85,000 = about 1.18%
 Since the sample is randomly selected and includes a reasonably large number of households, it is likely to represent the population.

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91. Data Distribution (Frequency Table)

The table shows the number of books read by students in a class last month. How many students read 6 or more books?

Books Read	Number of Students
0 – 2	5
3 – 5	8
6 – 8	10
9 – 11	6
12 – 14	3

Students who read 6 or more books are in the last three groups.

$$\begin{aligned}\text{Total} &= 10 + 6 + 3 \\ &= 19 \text{ students}\end{aligned}$$

92. Mean of a Data Set

The ages of 6 players on a team are: 13, 15, 14, 16, 12, 15. What is the mean age?



$$\begin{aligned}\text{Mean} &= \text{Sum of ages} / \text{Number of players} \\ &= \frac{13 + 15 + 14 + 16 + 12 + 15}{6} = \frac{85}{6} \\ &= 14.17 \text{ years}\end{aligned}$$

93. Median of a Data Set

The number of hours 9 students spent studying in a week are: 3, 5, 2, 6, 4, 7, 3, 5, 2. Find the median.



Order the data: 2, 2, 3, 3, 4, 5, 5, 6, 7
There are 9 values, so the median is the 5th value.
Median = 4 hours

94. Range of a Data Set

The test scores of 8 students are: 68, 72, 85, 90, 76, 88, 65, 93. What is the range of the scores?



$$\begin{aligned}\text{Range} &= \text{Highest score} - \text{Lowest score} \\ \text{Highest score} &= 93 \\ \text{Lowest score} &= 65 \\ \text{Range} &= 93 - 65 = 28\end{aligned}$$

95. Sampling vs. Population

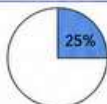
A zoo has 1,500 animals. A random sample of 75 animals is weighed to find the average weight. Is this a sample or the population? Explain.



Since only 75 animals are weighed out of the 1,500 animals in the zoo, this is a sample, not the population.

96. Percent of a Quantity

What is 25% of 340?



$$\begin{aligned}25\% \text{ of } 340 &= 0.25 \times 340 \\ &= 85\end{aligned}$$

97. Commission

A salesperson earns a 8% commission on sales. If her total sales are \$7,250, how much commission does she earn?



$$\begin{aligned}\text{Commission} &= 8\% \text{ of } \$7,250 \\ &= 0.08 \times 7,250 \\ &= \$580\end{aligned}$$

98. Simple Interest

John invests \$2,000 at an annual simple interest rate of 6%. How much simple interest will he earn in 3 years?



$$\begin{aligned}\text{Interest} &= \text{Principal} \times \text{Rate} \times \text{Time} \\ &= 2,000 \times 0.06 \times 3 \\ &= \$360\end{aligned}$$

99. Percent Error

The actual length of a table is 120 cm. A student measured it as 125 cm. What is the percent error of the measurement?



$$\begin{aligned}\text{Percent error} &= \frac{|\text{Measured} - \text{Actual}|}{\text{Actual}} \times 100\% \\ &= \frac{|125 - 120|}{120} \times 100\% \\ &= \frac{5}{120} \times 100\% = 4.17\%\end{aligned}$$

100. Real-World Multi-Step Problem

A laptop originally priced at \$850 is on sale for 20% off. An 8% sales tax is added to the sale price. What is the final price of the laptop?



$$\begin{aligned}1. \text{ Discount} &= 20\% \text{ of } \$850 = 0.20 \times 850 = \$170 \\ \text{Sale price} &= 850 - 170 = \$680 \\ 2. \text{ Tax} &= 8\% \text{ of } \$680 = 0.08 \times 680 = \$54.40 \\ 3. \text{ Final price} &= 680 + 54.40 = \$734.40\end{aligned}$$

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