

1. Basic Arithmetic

- (a) The temperature was -3°C . The temperature decreases by 7°C . Find the temperature after this change.
- (b) On another day, the temperature increases from -4°C to 2°C . Work out the increase in temperature.

2. Percentages

- Find 25% of \$2.40.

3. Fractions

- Write these fractions in order of size, starting with the smallest: $\frac{3}{4}$, $\frac{7}{12}$, $\frac{5}{8}$, $\frac{1}{2}$.

4. Measurement and Bearings

- The diagram shows the position of two ships, X and Y. On the diagram 1 cm represents 50 m. (a) Find, by measurement, the actual distance of Y from X. (b) Measure the bearing of Y from X.

5. Rounding Numbers

- (a) Write 457.329 correct to 2 decimal places. (b) Write 457.329 correct to 2 significant figures.

6. Powers and Simplification

- (a) Write $3^4 \times 3^2 \times 3$ as a power of 3. (b) Simplify $8^3 \div 8^2$.

7. Operations with Fractions

- (a) Work out $\frac{5}{6} - \frac{1}{3}$. (b) Work out $\frac{2}{3} \times \frac{4}{5}$. Give your answer as a mixed number in its lowest terms.

8. Factorization

- Factorize $2x^2 + 8x$.

9. Venn Diagrams

- (a) In the Venn diagram, shade the region represented by $A \cap B$. (b) This Venn diagram shows information about the number of students who study Math (M), Science (S), and English (E). (i) Find the number of students who study Math and Science but not English. (ii) Find $n(M \cup S)$.

10. Standard Form

- (a) Write the number 75,000,000 in standard form. (b) Evaluate $\frac{4 \times 10^5}{2 \times 10^3}$. Give your answer in standard form.

11. Prime Factors

- (a) Write 180 as a product of its prime factors. (b) Use the prime factorization of 180 to find the smallest integer value of n such that $180n$ is a square number.

12. Expansion and Simplification

- (a) Expand and simplify $(2x + 3)(x - 4)$. (b) Expand and simplify $(x + 5)(x - 2)$.

13. Sequences

- (a) The n th term of a sequence is $2n + 1$. Find the first three terms of the sequence. (b) These are the first five terms of a different sequence: 2, 6, 18, 54, 162. Find an expression, in terms of n , for the n th term of this sequence.

14. Circle Theorems

- In the diagram, A, B, and C are points on the circumference of a circle, center O. AB is a diameter and $\angle BAC = 90^\circ$. Find $\angle AOC$.

15. Similar Triangles

- Triangle XYZ is similar to triangle PQR. If $XY = 8$ cm, $YZ = 10$ cm, and $QR = 6$ cm, find PR.

16. Graphing and Gradients

- (a) Find the gradient of the line passing through the points (2, 3) and (4, 7). (b) Write down the equation of the line in part (a).

17. Speed-Time Graphs

- The diagram shows the speed-time graph of Jane's journey from home to school. (a) Calculate the acceleration for the first 3 minutes of Jane's journey. (b) Calculate Jane's average speed for the whole journey.

18. Proportionality

- y is directly proportional to the square of x . When $x = 4$, $y = 32$. Find y when $x = 6$.

19. Congruence

- Triangle DEF is congruent to triangle GHI. If $\angle DEF = 45^\circ$, $DE = 5$ cm, and $EF = 7$ cm, show that triangle DEF is congruent to triangle GHI.

20. Histograms

- The mass of some objects is summarized in a table and illustrated in a histogram. Use the histogram to find the frequency density for a given mass range.

21. Matrices

- (a) Find the inverse of matrix $A = \begin{pmatrix} 2 & 3 \\ 1 & 4 \end{pmatrix}$. (b) Calculate $A \times \begin{pmatrix} 5 \\ 7 \end{pmatrix}$.

22. Quadratic Equations

- (a) Expand and simplify $(x + 2)(x - 3)$. (b) Hence solve the equation $x^2 - x - 6 = 0$.

23. Volumes and Surface Areas

- A cylinder has radius r cm and height h cm. A sphere has the same radius r . If the surface area of the cylinder is equal to the surface area of the sphere, show that $h = 2r$. Calculate the volume of the cylinder in terms of r .