

Foundation GCSE: Writing Formulas

Name: _____

Class: _____

Instructions: Answer all questions. Questions are ordered from easiest (1) to hardest (20). Working out should be shown where appropriate.

1. Write a formula for the total cost (C) of buying p pens priced at 3 each.
2. A rectangle has a width of x cm and a length that is 4 cm greater than its width. Write a formula for its perimeter (P).
3. Write a formula for the total pay (W) of an employee who earns 12 per hour for h hours, plus a fixed weekly bonus of 50.
4. The cost of hiring a car is a fixed charge of 45 plus 0.15 per mile driven (m). Write a formula for the total cost (C).
5. Write a formula for the sum (S) of three consecutive integers, where the smallest integer is n .
6. Write a formula for the total perimeter (P) of a regular pentagon with side length s .
7. A taxi firm charges a base fare of 3.00 plus 1.50 per kilometer (k). Write a formula for the total fare (F).
8. Write a formula for the average speed (s) of an object travelling a distance (d) in time (t).
9. The height of a plant is h cm. It grows by 3 cm every week (w). Write a formula for its total height (H) after w weeks, starting from an initial height of 10 cm.
10. Write a formula for the total number of wheels (W) on c cars and b bicycles.
11. A phone company charges 20 per month plus 0.10 per text message (t) and 0.20 per minute of calls (m). Write a formula for the monthly bill (B).
12. Write a formula for the surface area (A) of a cube with edge length x .
13. The n th term of an arithmetic sequence is given by $T_n = an + b$. Write a formula for the 10th term when the first term is 3 and the common difference is 4.
14. Write a formula for the total cost (C) of purchasing x adult tickets at 12 each and y child tickets at 7 each.
15. A tank contains V liters of water. Water leaks out at a rate of r liters per minute for m minutes. Write a formula for the remaining volume (R).
16. Write a formula for the area (A) of a trapezium with parallel sides a and b , and perpendicular height h .
17. The sum of angles in a polygon with n sides is given by a formula. Write the formula for the interior angle sum (S).
18. Write a formula for the compound interest total amount (A) for a principal (P) invested at an annual interest rate of $r\%$ for 1 year.
19. A cylindrical tank has radius r and height h . Write a formula for the total outer surface area (A), including both circular ends.
20. Write a general formula for the sum of the first n odd positive integers.

Answers & Worked Solutions

1. $C = 3p$ – Multiply the price per pen (£3) by the number of pens (p).
2. $P = 4x + 8$ – Perimeter equals $2(\text{width} + \text{length}) = 2(x + (x + 4)) = 4x + 8$.
3. $W = 12h + 50$ – Multiply hourly rate by hours worked ($12h$) and add the fixed bonus (50).
4. $C = 45 + 0.15m$ – Combine the fixed standing charge with the variable mileage cost.
5. $S = 3n + 3$ – The integers are n , $n + 1$, and $n + 2$. Their sum simplifies to $3n + 3$.
6. $P = 5s$ – A regular pentagon has 5 equal sides of length s .
7. $F = 3.00 + 1.50k$ – Add the fixed base fare to the variable distance charge.
8. $s = \frac{d}{t}$ – Speed is defined as distance divided by time.
9. $H = 10 + 3w$ – Initial height plus weekly growth multiplied by number of weeks.
10. $W = 4c + 2b$ – Cars have 4 wheels and bicycles have 2 wheels.
11. $B = 20 + 0.10t + 0.20m$ – Sum the fixed monthly tariff and variable text/call costs.
12. $A = 6x^2$ – A cube has 6 identical square faces, each with area x^2 .
13. $T_{10} = 3 + 9(4) = 39$ – Using $T_n = a + (n - 1)d$ with $a = 3, d = 4, n = 10$.
14. $C = 12x + 7y$ – Total cost is adult ticket cost plus child ticket cost.
15. $R = V - rm$ – Subtract the total leaked volume from the initial volume.
16. $A = \frac{1}{2}(a + b)h$ – Standard area formula for a trapezium.
17. $S = 180(n - 2)$ – Multiply the number of triangles ($n - 2$) by 180° .
18. $A = P \left(1 + \frac{r}{100}\right)$ – Principal multiplied by the percentage multiplier for 1 year.
19. $A = 2\pi r^2 + 2\pi rh$ – Area of two circular bases plus the curved surface area.
20. $S = n^2$ – The sum of the first n odd numbers is always equal to n^2 .