

Foundation GCSE: Writing Your Own Equations

Name: _____

Class: _____

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

1. Write an equation for: 'Think of a number x , add 4, and the result is 10.'
2. Write an equation for: 'Think of a number x , multiply by 3, and the result is 21.'
3. Write an equation for: 'Think of a number x , subtract 7, and the answer is 5.'
4. Write an equation for: 'A number x divided by 4 is equal to 6.'
5. Write and solve an equation for: 'Double a number x and add 5 to get 17.'
6. Write and solve an equation for: 'Three times a number x minus 4 equals 11.'
7. Write an equation for the perimeter of a rectangle with width x and length $x + 3$, if the perimeter is 26 cm.
8. Write and solve an equation to find x if the angles in a triangle are x , $2x$, and $3x$.
9. Write an equation for: 'Tom has x marbles. Sarah has 3 more than double Tom's marbles. Together they have 21 marbles.'
10. Write and solve an equation: 'I think of a number x , subtract 5, multiply the result by 4, and get 24.'
11. Write an equation for: 'The sum of three consecutive integers where the smallest is x .'
12. Write and solve an equation: 'The sum of three consecutive integers is 72. Find the middle integer.'
13. Write an equation for: 'A rectangle has length $2x + 1$ and width x . Its area is 36.'
14. Write an equation for: 'Alice is x years old. Her mother is three times as old. In 10 years, her mother will be twice as old as Alice will be then.'
15. Write and solve an equation: 'A car travels at x mph for 3 hours and covers 150 miles.'
16. Write an equation for: 'The cost of a ticket is $\pounds x$ for an adult and $\pounds(x - 5)$ for a child. 2 adults and 3 children cost $\pounds 45$.'
17. Write and solve an equation for the previous question to find the adult ticket price.
18. Write an equation: 'The angles on a straight line are $2x$, $3x$, and $4x$.'
19. Write and solve an equation for the angles on a straight line measuring x , $3x$, and $5x$.
20. Write an equation for: 'A bookshelf holds x paperback books and hardback books which number 4 fewer than triple the paperbacks. Total books is 68.'

Answers & Worked Solutions

1. $x + 4 = 10$
Translate words directly into algebraic expression and set equal to 10.
2. $3x = 21$
Multiplication is written adjacent to the variable: $3x$.
3. $x - 7 = 5$
Subtraction of 7 from x gives $x - 7$.
4. $\frac{x}{4} = 6$
Division can be represented as a fraction.
5. $2x + 5 = 17 \implies x = 6$
Set up $2x + 5 = 17$, subtract 5 then divide by 2.
6. $3x - 4 = 11 \implies x = 5$
Set up $3x - 4 = 11$, add 4 then divide by 3.
7. $2(x) + 2(x + 3) = 26$ (or $4x + 6 = 26$)
Perimeter = $2 \times (\text{length} + \text{width})$.
8. $x + 2x + 3x = 180 \implies x = 30$
Angles in a triangle sum to 180° : $6x = 180 \implies x = 30$.
9. $x + (2x + 3) = 21$ (or $3x + 3 = 21$)
Tom = x , Sarah = $2x + 3$, sum is 21.
10. $4(x - 5) = 24 \implies x = 11$
Expand or divide by 4: $x - 5 = 6 \implies x = 11$.
11. $x + (x + 1) + (x + 2) = 3x + 3$
Consecutive integers increase by 1 each time.
12. $3x = 72 \implies x = 24$
Let middle be x , sum is $3x = 72 \implies x = 24$. (Or $x - 1 + x + x + 1 = 72$).
13. $x(2x + 1) = 36$ (or $2x^2 + x = 36$)
Area = length $\times$ width.
14. $3x + 10 = 2(x + 10)$
Future ages are $3x + 10$ and $x + 10$.
15. $3x = 150 \implies x = 50$
Distance = Speed $\times$ Time, so $3x = 150$.
16. $2x + 3(x - 5) = 45$
Total cost = $2 \times \text{adult} + 3 \times \text{child}$.
17. $5x - 15 = 45 \implies 5x = 60 \implies x = 12$
Expand: $2x + 3x - 15 = 45 \implies 5x = 60 \implies x = 12$.
18. $2x + 3x + 4x = 180$
Angles on a straight line sum to 180° .
19. $9x = 180 \implies x = 20$
Sum is 180° , so $9x = 180 \implies x = 20$.
20. $x + (3x - 4) = 68$ (or $4x - 4 = 68$)
Set sum of paperbacks and hardbacks to 68.