

Foundation GCSE: Functions

Name: _____

Class: _____

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

1. Given $f(x) = 4x - 5$, find $f(3)$.
2. Given $g(x) = x^2 + 2x$, find $g(-3)$.
3. Find the inverse function $f^{-1}(x)$ for $f(x) = 3x + 7$.
4. Given $f(x) = 2x$ and $g(x) = x + 5$, find the composite value $fg(3)$.
5. Find the inverse function $g^{-1}(x)$ given $g(x) = \frac{x-4}{2}$.
6. Given $f(x) = 5x$, find $f(4)$.
7. Given $h(x) = x + 3$, find $h(-2)$.
8. Given $f(x) = x^2 - 4$, find $f(5)$.
9. Given $g(x) = 3x - 2$, find x when $g(x) = 13$.
10. Find the inverse of $f(x) = x - 6$.
11. Given $f(x) = 2x + 1$, find $f^{-1}(9)$.
12. Given $f(x) = x + 2$ and $g(x) = 3x$, find $fg(4)$.
13. Given $f(x) = x^2$, find $ff(2)$.
14. Find the inverse of $f(x) = \frac{x}{4}$.
15. Given $g(x) = 4 - x$, find $g(7)$.
16. Find the inverse of $f(x) = 5x - 2$.
17. Given $f(x) = x^2 + 1$ and $g(x) = x - 3$, find $gf(2)$.
18. Find the inverse of $f(x) = \frac{x+1}{2}$.
19. Given $f(x) = 3x - 1$, find an expression for $ff(x)$.
20. Find the inverse of $f(x) = \frac{2x}{x-1}$ (for $x \neq 1$).

Answers & Worked Solutions

1. $7 - 4(3) - 5 = 12 - 5 = 7$.
2. $3 - (-3)^2 + 2(-3) = 9 - 6 = 3$.
3. $f^{-1}(x) = \frac{x-7}{3}$ – Swap and solve.
4. $16 - g(3) = 8, f(8) = 16$.
5. $g^{-1}(x) = 2x + 4$ – Multiply by 2, add 4.
6. $20 - 5(4) = 20$.
7. $1 - -2 + 3 = 1$.
8. $21 - 5^2 - 4 = 25 - 4 = 21$.
9. $x = 5 - 3x - 2 = 13 \implies 3x = 15$.
10. $f^{-1}(x) = x + 6$ – Inverse operation.
11. $4 - \text{Set } 2x + 1 = 9 \implies 2x = 8 \implies x = 4$.
12. $14 - g(4) = 12, f(12) = 14$.
13. $16 - f(2) = 4, f(4) = 16$.
14. $f^{-1}(x) = 4x$ – Multiply by 4.
15. $-3 - 4 - 7 = -3$.
16. $f^{-1}(x) = \frac{x+2}{5}$ – Add 2, divide by 5.
17. $2 - f(2) = 5, g(5) = 2$.
18. $f^{-1}(x) = 2x - 1$ – Multiply by 2, subtract 1.
19. $9x - 4 - 3(3x - 1) - 1 = 9x - 3 - 1 = 9x - 4$.
20. $f^{-1}(x) = \frac{x}{x-2}$ – Rearrange $y = \frac{2x}{x-1}$.