

Foundation GCSE: Formulas and Functions Problems

Name: _____

Class: _____

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

1. A mobile tariff charges 15 plus 0.05 per minute. Write formula C for minutes m , and find cost for 120 mins.
2. Convert temperature using $F = \frac{9}{5}C + 32$. Rearrange to make C the subject.
3. Find Celsius temperature when $F = 77^\circ\text{F}$ using your formula.
4. A machine produces items given by $N(t) = 15t - t^2$. Find output after 4 hours.
5. Evaluate $h(7)$ for $h(x) = \frac{2x}{x-3}$.
6. A rectangle has length $L = 2x + 3$ and width $W = x$. Write formula for perimeter P .
7. Using Q6, find P when $x = 5$.
8. A function is defined as $f(x) = x^2 - 3x$. Find $f(4)$.
9. Rearrange $v = u + at$ to find a .
10. Calculate acceleration a when $v = 20$, $u = 5$, and $t = 3$.
11. The cost C of hiring a hall is $C = 50 + 15h$. Find hours h if cost is 125.
12. Given $f(x) = 3x - 2$ and $g(x) = x^2$, find $fg(2)$.
13. Rearrange $A = \pi r^2 + \pi rl$ to isolate l .
14. Find l when $A = 200$, $\pi \approx 3.14$, $r = 5$.
15. A bacterial culture grows via $N(t) = 100 \times 2^t$. Find population at $t = 3$.
16. Find inverse of function $f(x) = \frac{x}{2} + 5$.
17. The surface area of a sphere is $S = 4\pi r^2$. Find r when $S = 100\pi$.
18. Given $f(x) = \frac{1}{x+1}$, find $ff(1)$.
19. The kinetic energy is $E = \frac{1}{2}mv^2$. Rearrange to make v the subject.
20. A projectile's height is $h(t) = 20t - 5t^2$. Find maximum height by evaluating at vertex $t = 2$.

Answers & Worked Solutions

1. $C = 21 - 15 + 0.05(120) = 21$.
2. $C = \frac{5(F - 32)}{9}$ – Standard rearrangement.
3. $25^{\circ}\text{C} - \frac{5(77 - 32)}{9} = 25$.
4. $44 - 15(4) - 4^2 = 44$.
5. $3.5 - \frac{14}{4} = 3.5$.
6. $P = 6x + 6 - 2(2x + 3 + x) = 6x + 6$.
7. $36 - 6(5) + 6 = 36$.
8. $4 - 4^2 - 3(4) = 16 - 12 = 4$.
9. $a = \frac{v - u}{t}$ – Standard rearrangement.
10. $5 - (20 - 5)/3 = 5$.
11. $h = 5 - 125 = 50 + 15h \implies 75 = 15h$.
12. $10 - g(2) = 4, f(4) = 10$.
13. $l = \frac{A - \pi r^2}{\pi r}$ – Rearrange area formula.
14. $l \approx 7.73 - (200 - 25\pi)/5\pi$.
15. $800 - 100 \times 2^3 = 800$.
16. $f^{-1}(x) = 2(x - 5)$ – Inverse steps.
17. $r = 5 - 100\pi = 4\pi r^2 \implies r^2 = 25$.
18. $\frac{2}{3} - f(1) = 0.5, f(0.5) = \frac{1}{1.5} = \frac{2}{3}$.
19. $v = \sqrt{\frac{2E}{m}}$ – Multiply by 2, divide by m , root.
20. $20 - h(2) = 20(2) - 5(4) = 40 - 20 = 20$.