

FUNCTIONS

Do **not** use a calculator. **Show all working!**

- If $f(x) = 4x^2 - 13$ evaluate: (a) $f(1)$ (b) $f(3)$ (c) $f(-1)$ (d) $f(\frac{1}{2})$
- If $g(t) = 12 - 4t^2$ evaluate: (a) $g(0)$ (b) $g(2)$ (c) $g(-2)$ (d) $g(\frac{3}{2})$
- If $h(u) = 3u - u^3$ evaluate: (a) $h(1)$ (b) $h(2)$ (c) $h(-1)$ (d) $h(-2)$
- If $V(r) = \frac{12}{4-r}$, $r \neq 4$ evaluate: (a) $V(0)$ (b) $V(1)$ (c) $V(-2)$ (d) $V(6)$
Explain why r cannot equal 4 if V is a function.
- If $P(n) = \frac{3n}{n+2}$, $n \neq -2$ evaluate: (a) $P(0)$ (b) $P(1)$ (c) $P(-1)$ (d) $P(-5)$
Explain why n cannot equal -2 if P is a function.

In each of the following find a, b and c.

- $f(x) = 6x - 5$ (a) $f(a) = 19$ (b) $f(b) = -17$ (c) $f(c) = -3$
- $g(t) = 20 - 4t$ (a) $g(a) = 8$ (b) $g(b) = 28$ (c) $g(c) = 18$
- $h(u) = \frac{1}{2}(u - 4)$ (a) $h(a) = 3$ (b) $h(b) = -2$ (c) $h(c) = -3$
- $V(r) = \frac{8}{3-r}$, $r \neq 3$ (a) $V(a) = 4$ (b) $V(b) = -4$ (c) $V(c) = 2$
- $P(n) = \frac{4n}{n-3}$, $n \neq 3$ (a) $P(a) = 6$ (b) $P(b) = -2$ (c) $P(c) = 3$

Write expressions for each of the following, leaving your answers in simplest form.

- If $f(x) = x + 1$ (a) $f(a + 1)$ (b) $f(b + 1) - f(b - 1)$
- If $f(x) = x - 3$ (a) $f(a + 3)$ (b) $f(b + 3) + f(3 - b)$
- If $f(x) = 5 - x$ (a) $f(a + 5)$ (b) $f(b + 5) + f(5 - b)$
- If $f(x) = x^2 - 4x$ (a) $f(-a)$ (b) $f(-b) - f(b)$
- If $f(x) = x^2 - 2x$ (a) $f(a + 2)$ (b) $f(b + 2) - f(b)$
- If $f(x) = x^2 - 2x + 1$ (a) $f(a + 1)$ (b) $f(b + 1) - f(-b)$
- If $f(x) = \frac{1}{x-1}$, $x \neq 1$ (a) $f(a + 1)$ (b) $f(b + 1) + f(1 - b)$
- If $f(x) = \frac{1}{1-x}$, $x \neq 1$ (a) $f(a + 1)$ (b) $f(b + 1) - f(1 - b)$

ANSWERS

1. (a) -9 (b) 23 (c) -9 (d) -12
2. (a) 12 (b) -4 (c) -4 (d) 3
3. (a) 2 (b) -2 (c) -2 (d) 2
4. (a) 3 (b) 4 (c) 2 (d) -6
4 has no image under V as cannot divide by 0.
5. (a) 0 (b) 1 (c) -3 (d) 5
-2 has no image under P as cannot divide by 0.
6. (a) 4 (b) -2 (c) $\frac{1}{3}$
7. (a) 3 (b) -2 (c) $\frac{1}{2}$
8. (a) 10 (b) 0 (c) -2
9. (a) 1 (b) 5 (c) -1
- 10.(a) 9 (b) 1 (c) -9
- 11.(a) $a + 2$ (b) 2
- 12.(a) a (b) 0
- 13.(a) $-a$ (b) 0
- 14.(a) $a^2 + 4a$ (b) $8b$
- 15.(a) $a^2 + 2a$ (b) $4b$
- 16.(a) a^2 (b) $-2b - 1$
- 17.(a) $\frac{1}{a}$ (b) 0
- 18.(a) $-\frac{1}{a}$ (b) $-\frac{2}{b}$