

## Functions Domain & Range

Remember: The domain of a function is the set of values  $x$  can take. The range of a function is the set of values  $f(x)$  can take. If you have a quadratic function the vertex is a particularly useful thing to work out. A sketch of your function ( $y = f(x)$ ) is also vital.

A domain is *always* a statement involving  $x$  (e.g.  $-1 \leq x < 5$ ) and the range is *always* a statement involving  $f(x)$  (e.g.  $f(x) \leq 3$ ).

1. Given  $f(x) = x + 3$ , find the natural domain of  $f(x)$ .
2. Given  $f(x) = \sqrt{x - 5}$ , find the natural domain of  $f(x)$ .
3. Given  $f(x) = \sqrt{2x + 11}$ , find the natural domain of  $f(x)$ .
4. Given  $f(x) = \sqrt{12 - 3x} + 5$ , find the natural domain of  $f(x)$ .
5. Given  $f(x) = (x + 3)^2 + 1$ , find the range of  $f(x)$ .
6. Given  $f(x) = x^2 + 8x + 1$ , find the range of  $f(x)$ .
7. Given  $f(x) = 2x^2 - 12x - 3$ , find the range of  $f(x)$ .
8. Given  $f(x) = -x^2 - 2x + 10$ , find the range of  $f(x)$ .
9. Given  $f(x) = 2 + \sqrt{x + 3}$ , find the natural domain of  $f(x)$ . Find the range of  $f(x)$ .
10. Given  $f(x) = x^2 - 4x + 3$ , where the domain is restricted to  $x \geq 3$ , find the range of  $f(x)$ .
11. Given  $f(x) = x^2 + 8x + 1$ , where the domain is restricted to  $x \leq -1$ , find the range of  $f(x)$ .
12. Given  $f(x) = \sin x$ , where the domain is restricted to  $30 < x < 90$ , find the range of  $f(x)$ .
13. Given  $f(x) = -\tan x$ , where the domain is restricted to  $30 \leq x < 90$ , find the range of  $f(x)$ .
14. Given  $f(x) = \frac{2}{x+1}$ , where the domain is restricted to  $x \geq 0$ , find the range of  $f(x)$ .
15. Given  $f(x) = -10^{x-1}$ , where the domain is restricted to  $x \leq 3$  find the range of  $f(x)$ .
16. Given  $f(x) = x(x - 1)(x + 3)$ , where the domain is restricted to  $x \geq 2$  find the range of  $f(x)$ .
17. Given  $f(x) = (x - 2)^2(x + 2)^2$ , where the domain is restricted to  $-2 \leq x \leq 2$  find the range of  $f(x)$ .