Outcome 1 – Restrictions on the domain (for fractions)

Bronze example

Examples...

State a suitable domain, on the set of real numbers, for the function;

$$f(x) = \frac{2-x}{x^2+9x-36}$$

A fraction cannot have zero as the denominator!

If $f(x) = \frac{1}{x}$, then $x \neq 0$

$x^2 + 9x - 36 \neq 0$

$(x - 3)(x + 12) \neq 0$

$x \neq 3 \quad x \neq -12$

Domain is... ...the full set of INPUT values for a function.

Bronze questions

State a suitable domain, on the set of real numbers, for the following functions;

1. $f(x) = \frac{11}{x}$
2. $g(x) = \frac{8x}{x+1}$
3. $k(x) = \frac{x+9}{5x-1}$
4. $f(x) = \frac{4x+1}{x^2+8x+15}$
5. $h(x) = \frac{x+4}{x^2-4x-21}$
6. $g(x) = \frac{12}{49x^2-64}$
7. $k(x) = \frac{7-x}{3x^2-5x-2}$
8. $f(x) = \frac{x-4}{x^5+x^4}$

Outcome 2 – Restrictions on the domain (for square roots)

Silver example

Examples...

State a suitable domain, on the set of real numbers, for the function;

$$f(x) = \sqrt{4x-1}$$

You cannot square root a negative!

If $f(x) = \sqrt{x}$, then $x \geq 0$

$4x - 1 \geq 0$

$4x \geq 1$

$x \geq \frac{1}{4}$

Domain is... ...the full set of INPUT values for a function.

Silver questions

State a suitable domain, on the set of real numbers, for the following functions;

1. $f(x) = \sqrt{x+10}$
2. $g(x) = \sqrt{x-15}$
3. $k(x) = \sqrt{5x-2}$
4. $f(x) = \sqrt{7x+1}$
5. $h(x) = \frac{6-x}{\sqrt{x}}$
6. $g(x) = \frac{8}{\sqrt{2x+3}}$
7. $k(x) = \frac{5+x}{\sqrt{x^2+9x+20}}$

Notice that qu's 5-6 have a square root AND a fraction!

Outcome 3 – Domain and range of trigonometric functions

Gold example

Examples...

State a suitable domain and range, on the set of real numbers, for the function;

$$f(x) = 5\sin\sqrt{2x+9}$$

Domain:

$2x + 9 \geq 0$

$2x \geq -9$

$x \geq -\frac{9}{2}$

What RANGE of numbers can I put INTO my function?

What RANGE of numbers could I get OUT of my function?

The graph of $y = \sin x$ goes between 1 and -1.

Range:

$-5 \leq f(x) \leq 5$

Gold questions

State a suitable domain and range, on the set of real numbers, for the following functions;

1. $f(x) = \sin\sqrt{x-1}$
2. $g(x) = 9\cos\sqrt{x+3}$
3. $h(x) = 4\cos\sqrt{9x-2}$
4. $k(x) = 1 + 6\sin\sqrt{3x+1}$
5. $g(x) = \cos^2\sqrt{8x+5}$

Bronze Answers

1. $x \neq 0$
2. $x \neq -1$
3. $x \neq 1/5$
4. $x \neq -3, -5$
5. $x \neq 7, -3$
6. $x \neq 8/7, -8/7$
7. $x \neq -1/3, 2$
8. $x \neq 0, -1$

Silver Answers

1. $x \geq -10$
2. $x \geq 15$
3. $x \geq 2/5$
4. $x \geq -1/7$
5. $x > 0$
6. $x > -3/2$
7. $x < -5, x > -4$

Gold Answers

1. Domain; $x \geq 1$ Range; $-1 \leq f(x) \leq 1$
2. Domain; $x \geq -3$ Range; $-9 \leq g(x) \leq 9$
3. Domain; $x \geq 2/9$ Range; $-4 \leq h(x) \leq 4$
4. Domain; $x \geq -1/3$ Range; $-5 \leq k(x) \leq 7$
5. Domain; $x \geq -5/8$ Range; $0 \leq g(x) \leq 1$