

Finding roots using functions

A LEVEL LINKS

Scheme of work: 1b. Quadratic functions – factorising, solving, graphs and the discriminants

Practice questions

1 Find the roots of the function

a $f(x) = x^6 - 9x^3 + 8$

b $f(x) = x^8 - 17x^4 + 16$

2 Solve the equation $2^{2x} - 5(2^x) + 4 = 0$

3 a Given $y = 2^x$, show that

$$2^{2x+1} - 17(2^x) + 8 = 0$$

can be written in the form

$$2y^2 - 17y + 8 = 0$$

b Hence solve

$$2^{2x+1} - 17(2^x) + 8 = 0$$

Answers

1 a 1, 2

b 1, -1, 2, -2

2 $x = 2, x = 0$

3 a Replaces 2^{2x+1} with $2^{2x} \times 2$

or

states $2^{2x+1} = 2^{2x} \times 2$

or

states $(2^x)^2 = 2^{2x}$

$$2^{2x+1} - 17 \times 2^x + 8 = 0$$

$$\Rightarrow 2y^2 - 17y + 8 = 0^*$$

b $2y^2 - 17y + 8 = 0 \Rightarrow (2y - 1)(y - 8) = 0 \Rightarrow y = \dots$

or

$$2(2^x)^2 - 17(2^x) + 8 = 0 \Rightarrow (2(2^x) - 1)((2^x) - 8) = 0 \Rightarrow 2^x = \dots$$

$$(y =) \frac{1}{2}, 8 \quad \text{or} \quad (2^x =) \frac{1}{2}, 8$$

$$\Rightarrow 2^x = \frac{1}{2}, 8 \Rightarrow x = -1, 3$$