

29th May



Corbettmaths

The first five terms of a sequence are shown below.

$$-9, -4, 3, 12, 23 \dots$$

$$\begin{array}{ccccccc} & & 5 & & 7 & & 9 & & 11 \\ & & \downarrow & & \downarrow & & \downarrow & & \downarrow \\ & & 2 & & 2 & & 2 & & 2 \end{array}$$

Work out an expression for the  $n$ th term of the sequence

$$t_n = an^2 + bn + c$$

$$2a = 2 \Rightarrow a = 1$$

$$3a + b = 5 \Rightarrow b = 2$$

$$a + b + c = -9 \Rightarrow c = -12$$

$$\underline{t_n = n^2 + 2n - 12}$$

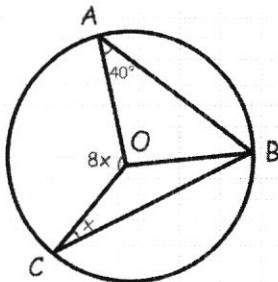
Make  $c$  the subject of

$$\frac{3}{abc} = 6 + \frac{5}{a}$$

$$3 = 6abc + 5bc$$

$$3 = bc(6a + 5)$$

$$\underline{c = \frac{3}{b(6a+5)}}$$



Find  $x$

$$\hat{A}BC = 4x$$

$$\hat{A}BO = 40^\circ$$

$$\hat{O}BC = 4x - 40$$

$$4x - 40 = x$$

$$\underline{x = \frac{40}{3}}$$

Given  $(x - 1)$  is a factor of  $3x^3 - 15x^2 + ax + a = f(x)$

Find the value of  $a$

$$f(1) = 3 - 15 + a + a = 0$$

$$2a - 12 = 0$$

$$\underline{a = 6}$$

A curve has equation  $y = 20 + 3x^2 - 4x^3$

Find the values of  $x$  for which  $y = 20 + 3x^2 - 4x^3$  is an increasing function.

$$\frac{dy}{dx} = 6x - 12x^2$$

$$\text{Increasing} \Rightarrow 6x - 12x^2 > 0$$

$$\Rightarrow 6x(1 - 2x) > 0$$

$$\Rightarrow \underline{0 < x < \frac{1}{2}}$$