

**(1)** What type of sequence would make the second term 48?

**(2)** What type of sequence would make the mean of the first four terms equal their median?

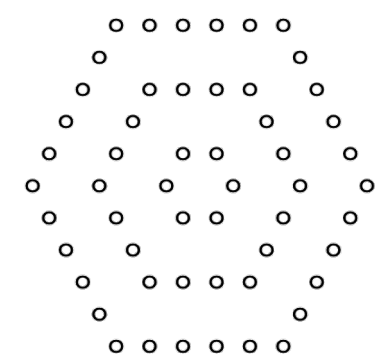
**(3)** What type of sequence would make the second and fourth terms sum to 180?

**(7)** For each sequence in **(2)** to **(5)**, find the  $n^{\text{th}}$  term.

**Sequences**

,  ,  ,  , ...

**(4)** What type of sequence would make the third term look like this?



**(6)** For each sequence in **(1)** to **(5)**, find the 8<sup>th</sup> term.

**(5)** What type of sequence would make the fourth term 81?

**(1)** Fill the gap to make the mean equal to 9.

**(2)** Fill the gap to make the mode equal to half the range.

**(3)** Fill the gap in two different ways to make the range equal to the median.

**(8)** Fill in the gap to make the range 10 times the size of the mean.

**Averages**

□ 3 □ , □ 9 □ , □ 7 □ , □

**(4)** Fill the gap in two different ways to make the range equal to 9.

**(7)** What values could fill the gap to make the range less than the median?

**(6)** Fill the gap to make the mean and median add up to as close to 11 as possible.

**(5)** Fill the gap to make the mean, median, mode and range four consecutive numbers.

**(1)** What values could fill the gap so that the quadratic factorises nicely?

**(2)** What must fill the gap if the point  $(2, 15)$  lies on the curve?

**(3)** Fill in the gap if the graph is symmetrical about the  $y$ -axis.

**(8)** As the value in the gap changes, what curve does the parabola's vertex trace out?

**Quadratics 1**

$$y = x^2 + \square x - 9$$

**(4)** Fill the gap in two different ways to make the minimum value of  $y$  equal  $-13$ .

**(7)** What could fill the gap if the difference between the two roots is  $6.5$ ?

**(6)** Fill the gap in two different ways to make the line  $y = x - 10$  a tangent to the curve.

**(5)** What point always lies on the curve, whatever number fills in the gap?

**(1)** Fill the gap so that the  $y$ -intercept of the curve is at  $(0, 36)$ .

**(2)** Fill the gap so that  $y \geq 0$  for all values of  $x$ .

**(3)** Find the minimum value of  $y$  if the curve goes through the point  $(11, 12)$ .

**(8)** What values could go in the gap if the line  $y = -1$  intersects the curve twice?

## Quadratics 2

$$y = (x - \square)(x - 9)$$

**(4)** Fill the gap if the graph has equation  $y = x^2 - 4x$  after being translated by the vector  $\begin{pmatrix} -4 \\ 5 \end{pmatrix}$ .

**(7)** Find two ways to fill the gap if the line  $x + y = 5$  is a tangent to the curve.

**(6)** Fill the gap so that the curve has the same line of symmetry as  $y = x^2 - 15x + 60$ .

**(5)** Fill the gap so that the curve has the same roots as  $y = 4x^2 - 41x + 45$ .

**(1)** Find two numbers to fill the gap if the point  $(12, 7)$  lies on the curve.

**(2)** Find two numbers to fill the gap if one of the roots of the curve is 3.

**(3)** What is the minimum value of  $y$ ? Explain your answer.

**(8)** Show that the difference between the two roots of the curve is always 6.

**Quadratics 3**

$$y = (x - \square)^2 - 9$$

**(4)** What values could fill the gap so that the curve has two negative roots?

**(7)** Find two numbers to fill the gap if the vertex of the curve is 15 units from the origin.

**(6)** Fill the gap if the reflection of the curve in the line  $x = 5$  has equation  $y = x^2 - 6x$ .

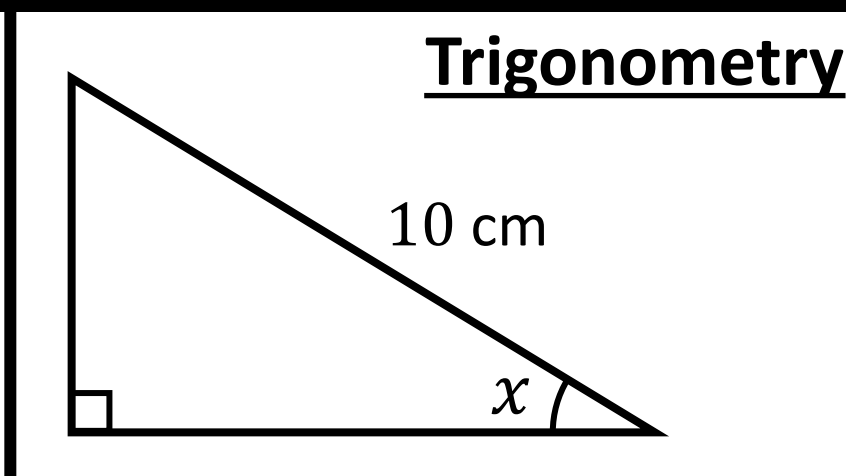
**(5)** What must fill the gap if the line  $y = -18x$  intersects the curve at its vertex?

(1) Find the perimeter of the triangle when  $x$  is  $13^\circ$ .

(2) Find the area of the triangle when  $x$  is  $23^\circ$ .

(3) Find a value of  $x$  that makes the perimeter of the triangle 22.4 cm.

(8) For what values of  $x$  is the triangle's area (in  $\text{cm}^2$ ) greater than its perimeter (in cm)?



(4) Find a value of  $x$  that makes the area of the triangle  $14 \text{ cm}^2$ .

(7) Find the greatest possible perimeter that the triangle can have.

(6) Find the greatest possible area that the triangle can have.

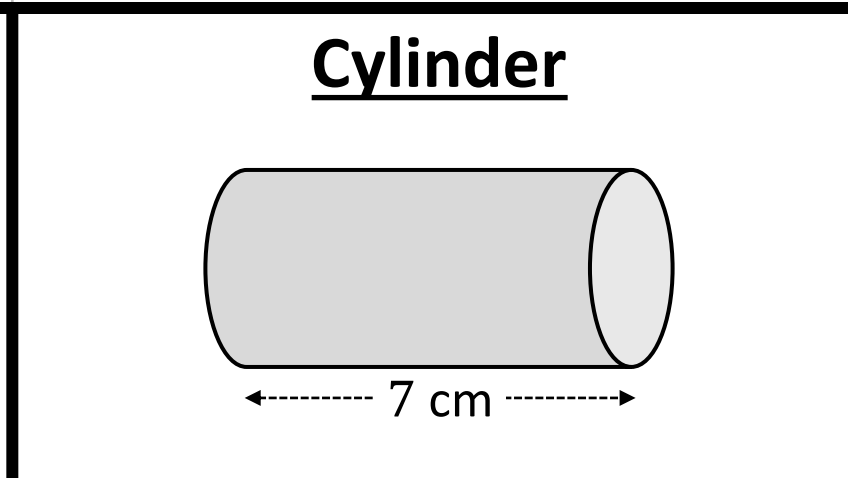
(5) Find the area of the triangle when the perimeter is 24 cm.

**(1)** What would be the volume of the cylinder if the radius was 15 cm?

**(2)** What would be the surface area of the cylinder if the radius was 5 cm?

**(3)** What would be the radius of the cylinder if the volume was  $1237 \text{ cm}^3$ ?

**(8)** For what values of the radius is the volume (in  $\text{cm}^3$ ) less than the surface area (in  $\text{cm}^2$ )?



**(4)** What would be the surface area of the cylinder if the volume was  $717 \text{ cm}^3$ ?

**(7)** Find the radius when the volume (in  $\text{cm}^3$ ) is 5% bigger than the surface area (in  $\text{cm}^2$ )?

**(6)** Find the volume when the area of the curved face is  $\frac{1}{4}$  of the total surface area?

**(5)** Find the radius when the volume (in  $\text{cm}^3$ ) is three times the surface area (in  $\text{cm}^2$ ).