

Solid **A** and solid **B** are similar.

The ratio of the height of solid **A** to the height of solid **B** is 2 : 5.

The volume of solid **A** is 12 cm<sup>3</sup>.

Work out the volume of solid **B**.

3 marks

At the start of year  $n$  the population of a species is  $P_n$ .

At the start of the following year the population of the species is given by  $P_{n+1} = kP_n$  where  $k$  is a positive constant.

The population of the species at the start of year 1 is 8 million.

The population of the species at the start of year 2 is 6 million.

Work out the population of the species at the start of year 3.

3 marks

Spinner **A** and spinner **B** are each spun once.

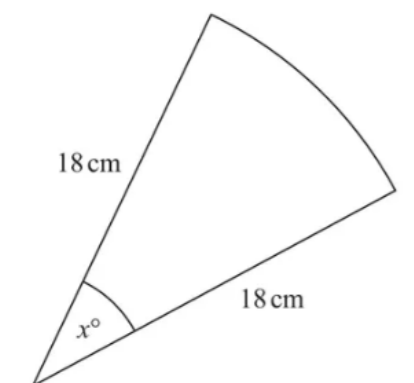
The probability that spinner **A** lands on red is  $\frac{1}{4}$

The probability that both spinner **A** and spinner **B** land on red is  $\frac{1}{24}$

Work out the probability that one spinner lands on red and the other spinner does **not** land on red.

4 marks

The diagram shows a sector of a circle of radius 18cm



The length of the arc is  $4\pi$  cm.

Work out the value of  $x$ .

3 marks

$y$  is directly proportional to the square root of  $t$ .

$y = 15$  when  $t = 9$

$t$  is inversely proportional to the cube of  $x$ .

$t = 8$  when  $x = 2$

Find a formula for  $y$  in terms of  $x$ .

Give your answer in its simplest form.

4 marks

Work out the value of  $\frac{\left(5\frac{4}{9}\right)^{-\frac{1}{2}} \times \left(4\frac{2}{3}\right)}{2^{-3}}$

You must show all your working

4 marks

The 2nd term of a geometric sequence is  $3 + 2\sqrt{2}$ .

The 3rd term of the sequence is  $13 + 9\sqrt{2}$ .

Find the value of the common ratio of the sequence.

Give your answer in the form  $a + \sqrt{b}$  where  $a$  and  $b$  are integers.

You must show all your working.

4 marks

The centre of a circle is the point with coordinates  $(-1,3)$

The point  $A$  with coordinates  $(6,8)$  lies on the circle.

Find an equation of the tangent to the circle at  $A$ .

Give your answer in the form  $ax + by + c = 0$  where  $a, b$  and  $c$  are integers.

4 marks

Find the set of possible values of  $x$  for which

$$4x^2 - 25 < 0 \quad \text{and} \quad 12 - 5x - 3x^2 > 0$$

You must show all your working.

5 marks

