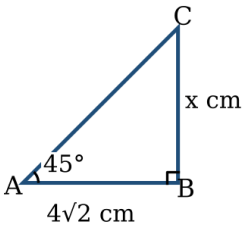
Day 270	S Tier 10-a-day
1 Convert the recurring decimal $0.\dot{0}7\dot{6}$ to a fraction. Give your fraction in its simplest form.	
2 50 deer in a forest are caught, marked and put back. Later, a second sample of 60 deer is caught. 12 of these are marked. (a) Work out an estimate for the number of deer in a forest. (b) State one assumption you have made.	
3 (a) Write $3x^2 - 36x + 116$ in the form $a(x + p)^2 + q$ (b) Write down the coordinates of the turning point of the curve $y = 3x^2 - 36x + 116$	
4 Expand and simplify $(5 + 2\sqrt{2})^2$ Give your answer in the form $p + q\sqrt{2}$	
5 Solve $2x^2 + 16x + 30 > 0$	

Day 270	S Tier 10-a-day

6 ABC is a right-angled triangle.
Work out the exact value of x. Give your answer in its simplest form.
The diagram is not drawn accurately.



7 A population of members of a website starts at 3,000 and grows by 25% each year.
After how many whole years will the population first be at least double its starting value?
(Calculator)

8 Write $\frac{16^{n+2} \times 4^{n+1}}{2^n}$ in the form 2^{an+c}
where a and c are integers.

9 A point A is on level ground in line with the base of a lighthouse. (Calculator)
The angle of elevation of the top of the lighthouse from A is 56°.
B is a point on the same line, 50 m further from the lighthouse than A.
The angle of elevation of the top of the lighthouse from B is 44°.
Work out the height of the lighthouse. Give your answer to 1 decimal place.

10 $2x = 3y$
Work out the ratio $(6x - 3y) : (5x + 4y)$
Give your answer in its simplest form.