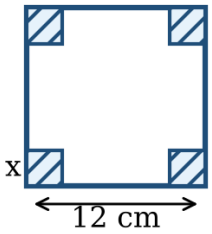
Day 285	IGCSE 10-a-day
1 $\mathbf{a} = \begin{pmatrix} 2 \\ -1 \end{pmatrix}$, $\mathbf{b} = \begin{pmatrix} 1 \\ 1 \end{pmatrix}$ and $\mathbf{c} = \begin{pmatrix} 1 \\ -2 \end{pmatrix}$ $\mathbf{a} + k\mathbf{b}$ is parallel to $\mathbf{c}$. Work out the value of k.	
2 Differentiate $x^3 + x + \frac{8}{x^3}$ with respect to x.	
3 (a) Solve $4 - 6x < -14$ (b) n is an integer. Write down all the values of n that satisfy $-20 \leq 4n \leq 8$	
4 A runner covers 380 m, correct to the nearest 10 m, in 6.7 seconds, correct to 1 decimal place. Work out the upper bound and the lower bound of the runner's average speed, in m/s. Give each answer correct to 3 significant figures. (Calculator)	
5 In one country, income tax is worked out like this: The first £12,000 of income is not taxed. The next £25,000 is taxed at 20%. All income above that is taxed at 40%. Ivan earns £75,500 in a year. Work out how much income tax Ivan pays.	

Day 285 **IGCSE 10-a-day**

6 $f(x) = \sqrt{-x + 6}$.
(a) State the largest possible domain of f.
(b) State the range of f for this domain.

7 Squares of side x cm are cut from the corners of a 12 cm square cardboard sheet, which is folded into an open box of volume V cm^3.
(a) Show that $V = 4x^3 - 48x^2 + 144x$.
(b) Find x for the maximum volume, and this volume.



8 The table gives information about the ages of some people.
Work out an estimate for the mean age.
Give your answer correct to 1 decimal place.
(Calculator)

Age, a (years)	Frequency density
$0 < a \leq 5$	0.6
$5 < a \leq 15$	2
$15 < a \leq 30$	0.2
$30 < a \leq 50$	0.4

9 The curve C has equation $y = 2x^2 - 3x - 6$.
The points A and B on C have x coordinates -3 and 0.
The tangents to C at A and at B meet at the point T. Find the coordinates of T.

10 A sector of a circle has radius 20 cm and angle 72°.
The sector is made into a cone by joining the two straight edges together.
(a) Work out the radius of the base of the cone.
(b) Work out the exact volume of the cone.
Give your answer in terms of π, as a surd if necessary.