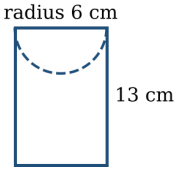
Day 86 **IGCSE 10-a-day**

1 A curve has equation $y = x^3 - 3x^2 - x - 1$.
Find the equations of the two tangents to the curve that are parallel to the line $y = 8x + 6$.

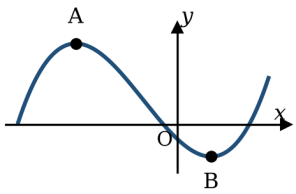
2 $A = \begin{pmatrix} 6 \\ 5 \end{pmatrix}$ and $B = \begin{pmatrix} 0 \\ -2 \end{pmatrix}$.
(a) Work out A + B.
(b) Work out 2A − 2B.

3 A solid cylinder of radius 6 cm and height 13 cm has a hemispherical hollow of the same radius cut out of the top.
Work out the volume of the solid that is left.
Give your answer in terms of π.



4 A = (2, −2), B = (5, 5), C = (6, 1) and D = (k, 15).
AB is parallel to **CD**.
Find the value of k.

5 A fuel tank is $\frac{3}{5}$ full.
48 more litres of petrol are added and the fuel tank is then $\frac{9}{10}$ full.
Work out the capacity of the fuel tank.

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6 The graph of y = f(x) has a minimum point at (−1, −4). Write down the coordinates of the turning point of the graph of (a) y = f(x) − 2 (b) y = f(2x) + 2	
7 A shop mixes two types of flour. Type A costs £11.00 per kg and type B costs £5.00 per kg. They are mixed in the ratio A : B = 3 : 2. The mixture is sold for £10.75 per kg. Work out the percentage profit.	
8 The diagram shows a sketch of the curve $y = 2x^3 + 6x^2 - 18x - 8$. The curve has turning points at A and B. Find the coordinates of A and B and state whether each is a maximum or a minimum. 	
9 Prove that n(n + 1)(n + 2)(n + 3) + 1 is a square number for all positive integer values of n.	
10 A closed cylinder (a container) has radius r cm, height h cm and total surface area 384π cm^2. (a) Show that its volume, V cm^3, is $V = 192\pi r - \pi r^3$. (b) Find the maximum value of V in terms of π, and show that h = 2r when V is a maximum.	