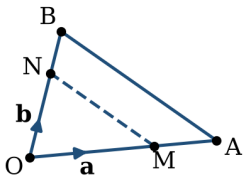
Day 199 **IGCSE 10-a-day**

1 In triangle OAB, $\mathbf{OA} = \mathbf{a}$ and $\mathbf{OB} = \mathbf{b}$.
M is on OA so that OM : MA = 2 : 1.
N is on OB so that ON : NB = 2 : 1.
Find $\mathbf{MN}$ in terms of $\mathbf{a}$ and $\mathbf{b}$.



2 The volume, V cm^3, of a cube of edge x cm is $V = x^3$.

(a) Find $\frac{dV}{dx}$ when x = 5.

(b) Find the value of x when $\frac{dV}{dx} = 12$.

3 The interior angles of a pentagon are
x°, (x + 40)°, (x − 20)°, (x + 20)°, (2x − 40)°
(a) Work out the value of x.
(b) Work out the size of the largest angle.

4 Work out $(2 \times 10^2) + (2.1 \times 10^1)$
Give your answer in standard form.

5 Simplify fully $\frac{5x^2 - 125}{x^2 - 13x + 40}$

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6 The curve $y = x^3 + ax^2 + bx$ has gradient 6 when $x = 0$ and gradient 9 when $x = 3$. Find the values of a and b.	
7 $A = \begin{pmatrix} 1 & -3 \\ 3 & 0 \end{pmatrix}$ and $B = \begin{pmatrix} 1 \\ 12 \end{pmatrix}$. $AX = B$, where X is a 2×1 matrix. Find X.	
8 $y = x(x + 2)(2x - 1)$ Work out the gradient of the curve at the point where $x = 1$.	
9 A shop mixes two types of coffee. Type A costs £6.00 per kg and type B costs £9.00 per kg. They are mixed in the ratio A : B = 1 : 2. The mixture is sold for £14.40 per kg. Work out the percentage profit.	
10 A sector of a circle has radius 30 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.	