Day 66 **IGCSE 10-a-day**

1 A particle P moves in a straight line. After t seconds its displacement from a fixed point O is s metres, where

$s = 2t^3 + 6t^2 + 5t + 1$ $(t > 0)$

Find (a) the velocity of P, (b) the acceleration of P, when $t = 3$.

2 $f(x) = -4x - 3$.

(a) Find $f^{-1}(x)$.

(b) Find $f^{-1}(-1)$.

3 $y = \dfrac{3x^3 - 2x}{x}$

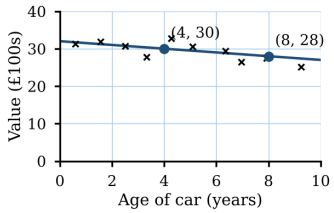
Find $\dfrac{dy}{dx}$.

4 The scatter graph shows age of car (x) and value (y).

The equation of the line of best fit is $y = -0.5x + 32$.

(a) Estimate y when $x = 3$.

(b) Explain why an estimate of y when $x = 15$ may be unreliable.



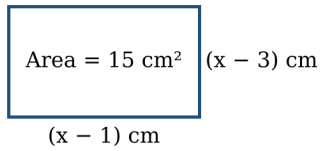
5 B is 5% less than Q.

Q is 30% more than P.

Work out B as a percentage of P.

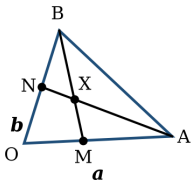
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6 The diagram shows a rectangle of length $(x - 1)$ cm, width $(x - 3)$ cm and area 15 cm^2.
(a) Show that $x^2 - 4x - 12 = 0$.
(b) Work out the length of the diagonal of the rectangle. Give your answer correct to 3 significant figures.



7 The tangent to the curve $y = 3x^2 - 5x - 5$ at the point where $x = -2$ meets the axes at A and B.
Work out the area of triangle OAB, where O is the origin.

8 OAB is a triangle. OA = **a** and OB = **b**.
M is on OA with OM : MA = 2 : 3. N is on OB with ON : NB = 1 : 1. AN and BM intersect at X.
(a) Find BM in terms of **a** and **b**.
(b) Find OX in terms of **a** and **b**.
The diagram is not drawn accurately.



9 $A = \begin{pmatrix} 4 & -2 \\ 6 & 5 \end{pmatrix}$.
$A^2 = pA + qI$, where I is the 2 × 2 identity matrix.
Find the value of p and the value of q.

10 Solve $x - 6\sqrt{x} + 8 = 0$