Day 104 **IGCSE 10-a-day**

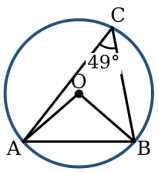
1 $\mathbf{p} = \begin{pmatrix} 0 \\ -5 \end{pmatrix}$, $\mathbf{q} = \begin{pmatrix} 1 \\ 4 \end{pmatrix}$ and $\mathbf{r} = \begin{pmatrix} -6 \\ 5 \end{pmatrix}$.

Work out $\mathbf{p} + 2\mathbf{q} - \mathbf{r}$.

2 $y = 8x^{5/2} - 2\sqrt{x}$

Find $\frac{dy}{dx}$. Give each term of your answer in the form ax^n.

3 A, B and C are points on a circle, centre O.
Angle ACB = 49°.
(a) Work out the size of angle AOB.
(b) Work out the size of angle OAB.
The diagram is not drawn accurately.



4 Solve $12x^2 + 17x = -6$

5 The temperature, T °C, of a cup of tea t minutes after it is removed from a heat source is modelled by

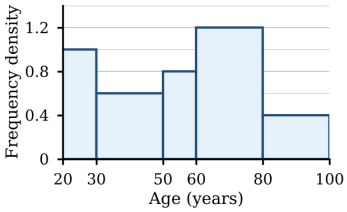
$T = 20 + \frac{16}{t}$ $(t \geq 1)$

(a) Find $\frac{dT}{dt}$ when t = 2.

(b) Find the value of t when the temperature is falling at 1 °C per minute.

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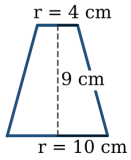
6 The histogram shows the ages of visitors to a museum.
(a) Work out the total number of visitors.
(b) Estimate the number of visitors with an age between 40 years and 55 years.



7 $y = x^3 + 3x^2 - 9x + 3$
At the point where $x = -2$, is the curve increasing or decreasing? You must show your working.

8 y is directly proportional to the square root of x.
x is increased by 125%.
Work out the percentage change in y.

9 A cone is cut parallel to its base to make a smaller cone and a frustum.
The frustum has height 9 cm, top radius 4 cm and base radius 10 cm.
Work out the volume of the frustum. Give your answer in terms of π.



10 A trader buys a games console for £40.
It adds a 30% mark-up to get the selling price.
In a sale the selling price is reduced by 10%.
Work out the percentage profit or loss on the original cost.