**Day 353** **IGCSE 10-a-day**

**1** OA = $\mathbf{a}$ and OB = $\mathbf{b}$.
OP = $-3\mathbf{a} + 5\mathbf{b}$, OQ = $3\mathbf{a} + 7\mathbf{b}$ and OR = $6\mathbf{a} + 8\mathbf{b}$.
(a) Show that P, Q and R lie on a straight line.
(b) Work out the ratio PQ : QR in its simplest form.

**2** The table shows the daily visitors over six periods.
The 3-point moving average centred on Wed is 19.
(a) Work out the value of x.
(b) Work out the 3-point moving average centred on Thu.

| | Mon | Tue | Wed | Thu | Fri | Sat |
|---|---|---|---|---|---|---|
| Value | 21 | 14 | x | 29 | 23 | 11 |

**3** A curve has equation $y = x^3 + 9x^2 + 27x + 4$.
Find the minimum value of the gradient of the curve, and the value of x at which it occurs.

**4** $f(x) = 2x + 5$ and $g(x) = \frac{-4}{x - 2}$, $x \neq 2$.
(a) Write fg(x) as a single fraction.
(b) Write gf(x) in its simplest form.

**5** Here are the first five terms of a quadratic sequence.
$2, -1, -2, -1, 2$
Find an expression for the nth term.

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|---|---|
| **6** A curve has equation $y = ax^2 + \frac{b}{x}$, where a and b are constants.<br>The point $(1, -2)$ lies on the curve and the gradient of the curve at this point is 14.<br>Find the values of a and b. | |
| **7** (a) Show that the equation $x^2 - 8x - 31 = 0$ has a solution between $x = 10$ and $x = 11$.<br>(b) Show that the equation can be rearranged to give $x = 8 + \frac{31}{x}$ | |
| **8** A particle moves in a straight line. After t seconds, its displacement from a fixed point O is s metres, where<br>$s = -t^3 + 15t^2 + t$ for $t \geq 0$<br>Find the greatest speed of the particle, and the value of t at which it occurs. | |
| **9** The volume of a cube is 708 $cm^3$, correct to the nearest $cm^3$.<br>Work out the lower bound of the edge length of the cube.<br>Give your answer correct to 3 significant figures. (Calculator) | |
| **10** £5,000 is invested for 2 years at r% per year compound interest.<br>At the end of 2 years the investment is worth £5,832.<br>Work out the value of r. (Calculator) | |