**Day 113** **IGCSE 10-a-day**

**1** $f(x) = x^2 - 6x + 7$

(a) Find $f'(x)$.

(b) Work out the value of $f'(-3)$.

**2** Simplify fully $\dfrac{6x^{\frac{4}{3}} \times 2x^{-\frac{1}{2}}}{3x^{\frac{3}{2}}}$

**3** A curve has equation $y = -2x^3 + 6x^2 + 3$.

The point A (3, k) lies on the curve. Work out the value of k and the gradient of the curve at A.

**4** $f(x) = \dfrac{-4x + 5}{3x - 4}$, $x \neq \dfrac{4}{3}$.

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

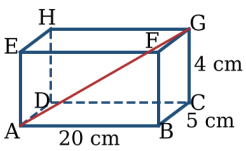
**5** The diagram shows a cuboid ABCDEFGH.

(Calculator)

(a) Work out the length of the diagonal AG.

(b) Work out the angle between AG and the base ABCD, to 1 decimal place.

The diagram is not drawn accurately.

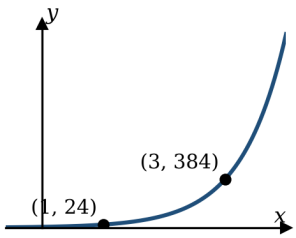


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**6** $y = 2x + \frac{2}{x}$

Find the coordinates of the stationary points and determine whether each is a maximum or a minimum.

**7** The diagram shows the graph of $y = ka^x$, where k and a are constants and $a > 0$.
The curve passes through the points (1, 24) and (3, 384).
Find the value of k and the value of a.




**8** A rectangle has area $(1 + \sqrt{5})$ cm$^2$ and length $(2 + \sqrt{5})$ cm.
Find the width of the rectangle.
Give your answer in the form $a + b\sqrt{5}$

**9** P is directly proportional to the square of v and inversely proportional to the square of t.
When v = 3 and t = 1, P = 36.
Work out the value of P when v = 5 and t = 1.

**10** x and y satisfy $x \geq 0$, $y \geq 0$,
$6x + 4y \leq 84$ and $2x + 4y \leq 44$.
Find the greatest value of $P = 5x + 7y$ and the values of x and y that give it.