2 Given that $y = 6x^{\frac{3}{2}}$, find $\dfrac{dy}{dx}$ and $\dfrac{d^2y}{dx^2}$.

Show, without using a calculator, that when $x = 36$ the value of $\dfrac{d^2y}{dx^2}$ is $\frac{3}{4}$. [5]

9 The equation of a cubic curve is $y = 2x^3 - 9x^2 + 12x - 2$.

(i) Find $\dfrac{dy}{dx}$ and show that the tangent to the curve when $x = 3$ passes through the point $(-1, -41)$. [5]

(ii) Use calculus to find the coordinates of the turning points of the curve. You need not distinguish between the maximum and minimum. [4]

(iii) Sketch the curve, given that the only real root of $2x^3 - 9x^2 + 12x - 2 = 0$ is $x = 0.2$ correct to 1 decimal place. [3]

10

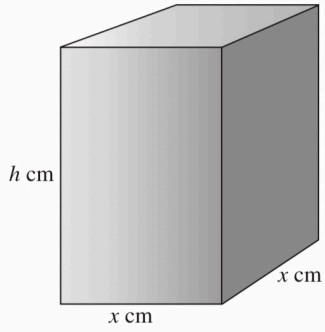

Fig. 10

Fig. 10 shows a solid cuboid with square base of side x cm and height h cm. Its volume is $120\,\text{cm}^3$.

(i) Find h in terms of x. Hence show that the surface area, $A\,\text{cm}^2$, of the cuboid is given by $A = 2x^2 + \dfrac{480}{x}$. [3]

(ii) Find $\dfrac{dA}{dx}$ and $\dfrac{d^2A}{dx^2}$. [4]

(iii) Hence find the value of x which gives the minimum surface area. Find also the value of the surface area in this case. [5]