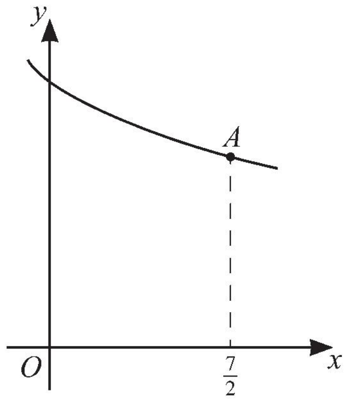
Q1

5 The equation of a curve is such that $\frac{dy}{dx} = 4x - 3\sqrt{x} + 1$.

**(a)** Find the $x$-coordinate of the point on the curve at which the gradient is $\frac{11}{2}$. [3]

**(b)** Given that the curve passes through the point (4, 11), find the equation of the curve. [4]




The diagram shows part of the curve with equation $y = \dfrac{12}{\sqrt[3]{2x+1}}$. The point $A$ on the curve has coordinates $\left(\frac{7}{2}, 6\right)$.

**(a)** Find the equation of the tangent to the curve at $A$. Give your answer in the form $y = mx + c$. [4]

**(b)** Find the area of the region bounded by the curve and the lines $x = 0$, $x = \frac{7}{2}$ and $y = 0$. [4]

7 **(a)** By expressing $-2x^2+8x+11$ in the form $-a(x-b)^2+c$, where $a$, $b$ and $c$ are positive integers, find the coordinates of the vertex of the graph with equation $y=-2x^2+8x+11$. [3]

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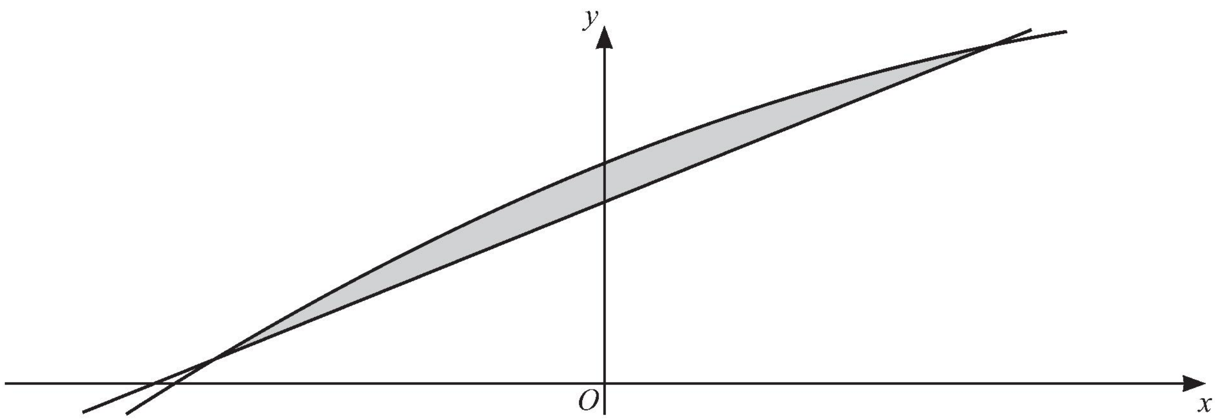
**(b)**




The diagram shows part of the curve with equation $y=-2x^2+8x+11$ and the line with equation $y=8x+9$.

Find the area of the shaded region. [5]

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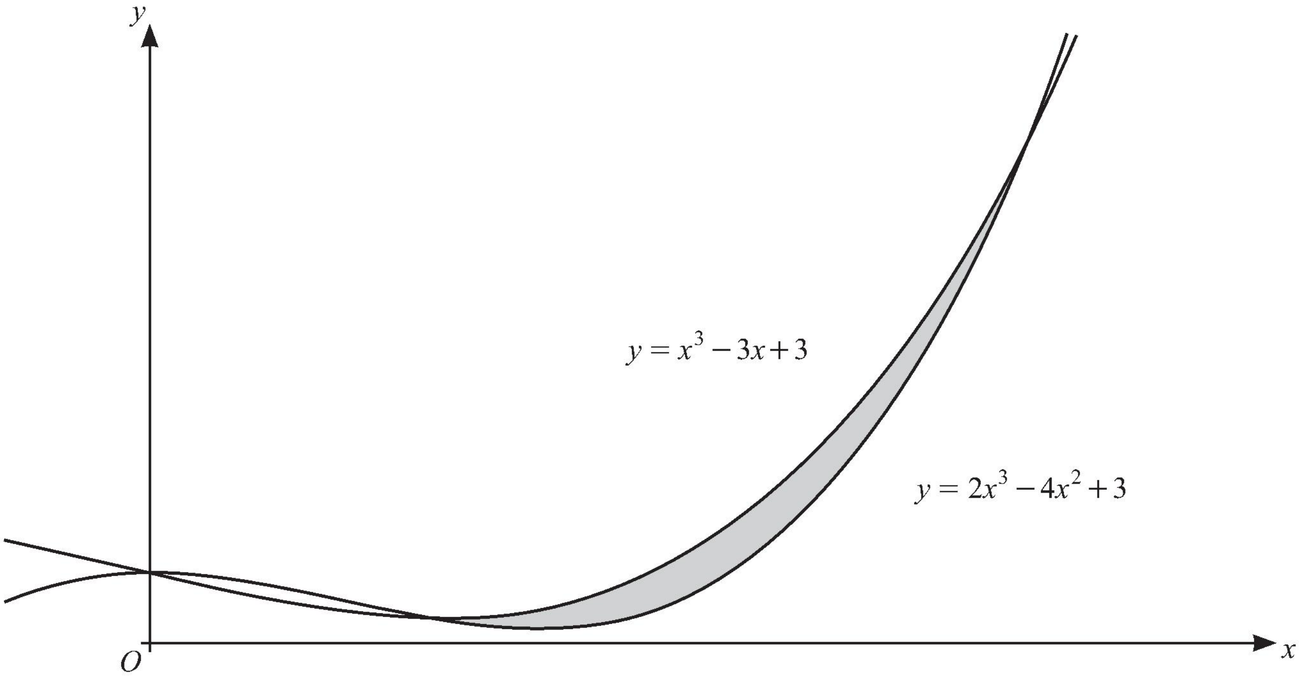


The diagram shows the curves with equations $y = x^3 - 3x + 3$ and $y = 2x^3 - 4x^2 + 3$.

**(a)** Find the $x$-coordinates of the points of intersection of the curves. [3]

**(b)** Find the area of the shaded region. [4]