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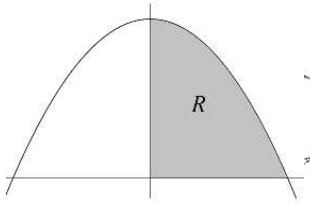
A LEVEL MATHS

# (77) Integration (Basic Areas Under Curves)

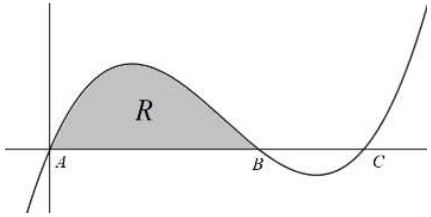
## WORKING AT D/E

(1) The diagram below shows part of the curve with equation $y = 9 - x^2$




(a) Write down where the graph cuts the $x$ axis.
The shaded region R is bounded by the curve with equation $y = 9 - x^2$, the positive $x$ axis and the positive $y$ axis as shown above.
(b) Use integration to show that the area of the region $R$ is 18.

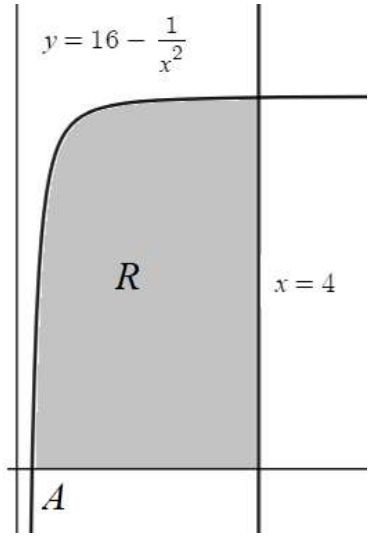
(2) (a) Factorise $x^3 - 5x^2 + 6x$ fully.
Part of the graph of $y = x^3 - 5x^2 + 6x$ is shown below. $A, B$ and $C$ are the points where the graph crosses the $x$ axis.




(b) Write down the coordinates of $A, B$ and $C$
(c) Use calculus to find the area of the shaded region $R$ bounded between the curve and the $x$ axis.

## WORKING AT B/C

(1) The diagram below shows part of the curve with equation $y = 16 - \frac{1}{x^2}$, $x > 0$ and the line with equation $x = 4$.



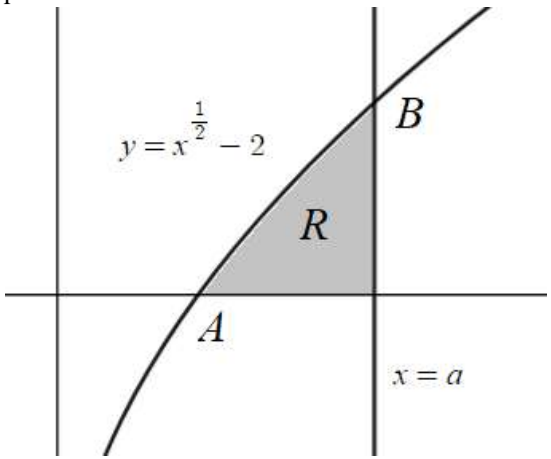

The graph of $y = 16 - \frac{1}{x^2}$ cuts the $x$ axis at $A$.
(a) Find the coordinates of $A$.
The region $R$ is bounded by the curve with equation $y = 16 - \frac{1}{x^2}$, the $x$ axis and the line $x = 4$.
(b) Use calculus to show that the area of $R$ is $\frac{225}{4}$

(2) (a) Sketch the curve of $y = x(4 - x)$
(b) Use calculus to find the **area** trapped between the curve and the positive $x$ axis.

## WORKING AT A*/A

(1) (a) Express $(x^2 - 1)(x^2 - 4)$ in the form $(x + a)(x + b)(x + c)(x + d)$
(b) Hence, sketch the graph of $y = (x^2 - 1)(x^2 - 4)$ showing the coordinates of the points where the graph crosses the coordinate axes.
(c) Find the area of the region trapped between the curve, the $x$ axes and the lines $x = -1$ and $x = 1$

(2) The graph below shows part of the curve with equation $y = x^{\frac{1}{2}} - 2,\ x \geq 0$ and the line with equation $x = a$ where $a$ is a constant.




The curve crosses the $x$ axis at the point $A$.
(a) Find the coordinates of $A$
The line and the curve meet at the point $B$.
(b) Given that the coordinates of $B$ are $(a, 1)$, find the value of $a$.
The region $R$ is trapped between the $x$ axis, the curve with equation $y = x^{\frac{1}{2}} - 2$ and the line $x = a$.
(c) Find the exact area of the region $R$.