

Cambridge International AS & A Level

Mathematics

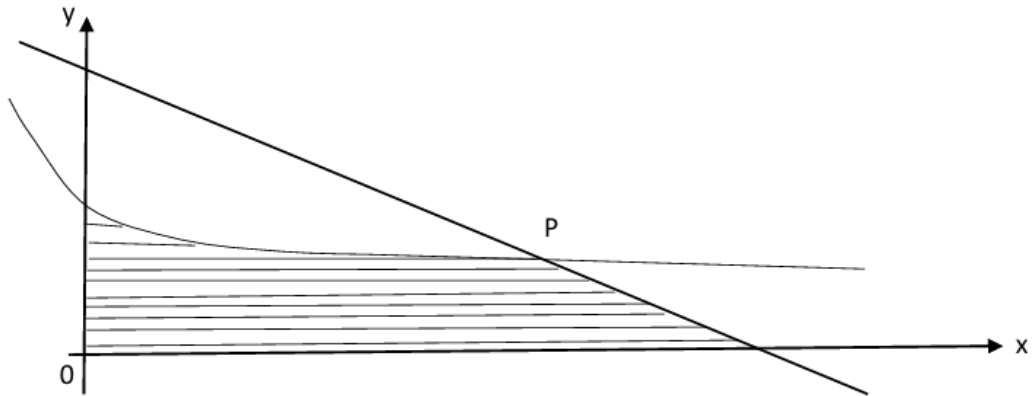
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Paper 1 Pure Mathematics 1

May/June 2025

Question No (6)

<http://kingcambridgesolutions.com>

Question No (6)

The diagram shows the curve with equation $y = \frac{9}{(5x+4)^{\frac{1}{2}}}$ and the line $y = 6 - 3x$. The line and the curve intersect at the point P which has y-coordinate 3.

Find the area of the shaded region.

Solution:

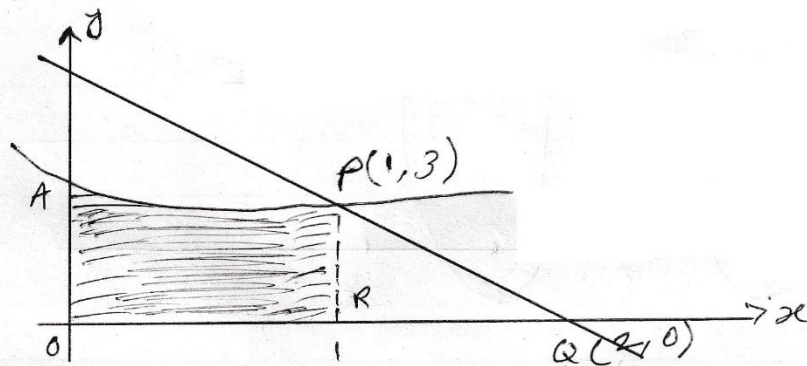
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Given equation of curve

$$y = \frac{9}{(5x+4)^{1/2}} \rightarrow (1)$$

and line

$$y = 6 - 3x \rightarrow (2)$$



As at P y-coordinate is 3, so equation (2) becomes

$$y = 6 - 3x$$

$$3 = 6 - 3x$$

$$3x = 6 - 3$$

$$x = 3/3 = 1$$

$$P(1, 3)$$

$$\therefore y = 3 \text{ at } P$$

As for Q point, $y = 0$, put this value in equation of line

$$y = 6 - 3x$$

$$\Rightarrow 0 = 6 - 3x \Rightarrow 3x = 6$$

$$x = 2$$

$$Q(2, 0)$$

DATE :-

Area under the curve AP

$$A = \int_0^1 y \, dx$$

Formula when
a limits are
given for
curve.

$$= \int_0^1 \frac{9}{(5x+4)^{1/2}} \, dx$$

$$= \int_0^1 9 (5x+4)^{-1/2} \, dx$$

$$= 9 \int_0^1 (5x+4)^{-1/2} \, dx$$

$$= 9 \left[\frac{(5x+4)^{-1/2+1}}{5(-1/2+1)} \right]_0^1$$

$$= 9 \left[\frac{(5x+4)^{1/2}}{5(1/2)} \right]_0^1$$

$$= \frac{9 \times 2}{5} \left[(5x+4)^{1/2} \right]_0^1$$

$$= \frac{18}{5} \left[(5(1)+4)^{1/2} - (5(0)+4)^{1/2} \right]$$

$$= \frac{18}{5} \left[(3^2)^{1/2} - (2^2)^{1/2} \right] = \frac{18}{5} [3-2] = \frac{18}{5} \rightarrow \textcircled{A}$$

Area of Triangle PQR

$$= \frac{1}{2} \text{ Base} \times \text{height}$$

$$= \frac{1}{2} \times |PR| \times |RQ|$$

$$= \frac{1}{2} \times 3 \times (2-1)$$

$$= \frac{3}{2}$$

Total shaded area

$$= \text{Area under curve AP} + \text{area of Triangle PQR}$$

$$= \frac{18}{5} + \frac{3}{2}$$

$$= \frac{36+15}{10} = \frac{51}{10}$$