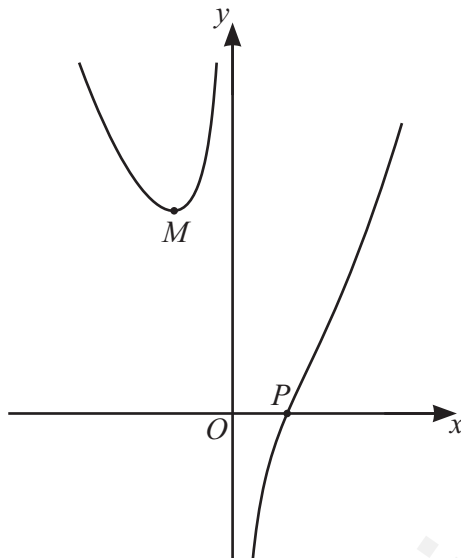


- 11 (a)** Find the coordinates of the minimum point of the curve $y = \frac{9}{4}x^2 - 12x + 18$. [3]

[illegible]

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- This image shows a full page of primary-ruled paper. It features multiple sets of horizontal dotted lines for writing. A large, light-grey watermark with the text "pastpaperpenquin.com" is oriented diagonally from the bottom-left towards the top-right across the entire page. The background is white, and there are no other markings or text present.



The diagram shows the curve with equation $y = 2x^2 - \frac{5}{x} + 3$. The curve crosses the x -axis at the point $P(1, 0)$ and M is a minimum point.

- (a) Find the gradient of the curve at P . [2]

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- (b) Find the coordinates of M . Give each coordinate correct to 3 significant figures. [3]

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- 3** A curve has equation $y = ax^{\frac{1}{2}} - 2x$, where $x > 0$ and a is a constant. The curve has a stationary point at the point P , which has x -coordinate 9.

Find the y -coordinate of P .

[5]

[illegible]

- 10** The function f is defined by $f(x) = x^2 + \frac{k}{x} + 2$ for $x > 0$.

- (a) Given that the curve with equation $y = f(x)$ has a stationary point when $x = 2$, find k . [3]

[illegible]

(b) Determine the nature of the stationary point.

[2]

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(c) Given that this is the only stationary point of the curve, find the range of f .

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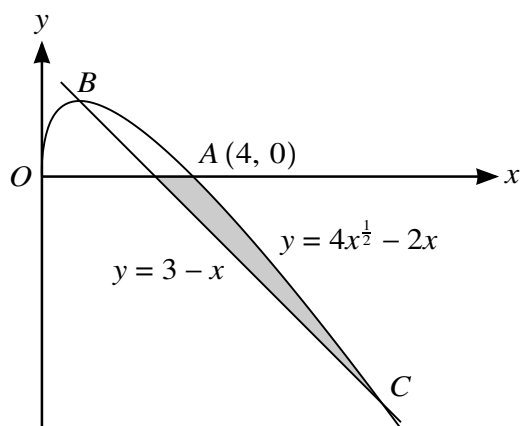
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12



The diagram shows a curve with equation $y = 4x^{\frac{1}{2}} - 2x$ for $x \geq 0$, and a straight line with equation $y = 3 - x$. The curve crosses the x -axis at $A(4, 0)$ and crosses the straight line at B and C .

- (a) Find, by calculation, the x -coordinates of B and C . [4]

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- (b) Show that B is a stationary point on the curve. [2]

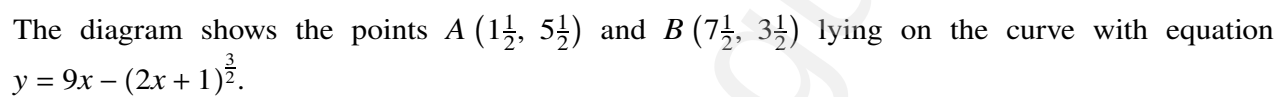
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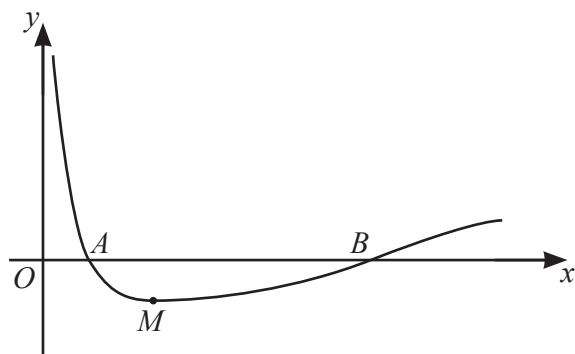
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- [illegible]



(a) Find the exact coordinates of M . [4]

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10 The equation of a curve is $y = 54x - (2x - 7)^3$.

- (a) Find $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$. [4]

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- (b) Find the coordinates of each of the stationary points on the curve. [3]

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- (c) Determine the nature of each of the stationary points. [2]

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- 11 The gradient of a curve is given by $\frac{dy}{dx} = 6(3x - 5)^3 - kx^2$, where k is a constant. The curve has a stationary point at $(2, -3.5)$.

(c) Find $\frac{d^2y}{dx^2}$. [2]

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(d) Determine the nature of the stationary point at $(2, -3.5)$. [2]

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11 The equation of a curve is $y = 2\sqrt{3x + 4} - x$.

(b) Find the coordinates of the stationary point.

[3]

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(c) Determine the nature of the stationary point.

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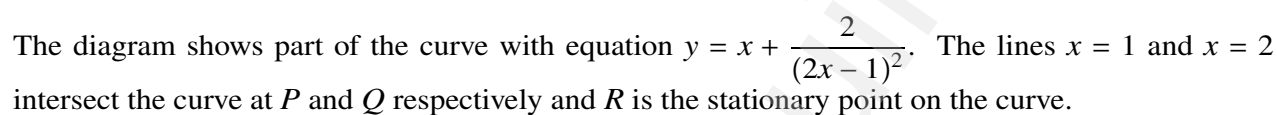
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- This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and extend across the width of the page. A faint, diagonal watermark reading "Pastpaper.net" is visible across the center.

8 The equation of a curve is $y = 2x + 1 + \frac{1}{2x+1}$ for $x > -\frac{1}{2}$.

(a) Find $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$. [3]

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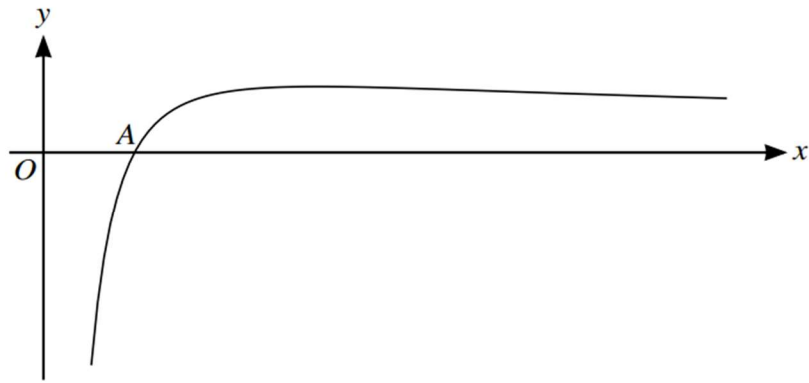
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[illegible]



The diagram shows the curve with equation $y = 9(x^{-\frac{1}{2}} - 4x^{\frac{3}{2}})$. The curve crosses the x -axis at the point A.

- (c) Find the x -coordinate of the maximum point of the curve. [2]

[illegible]