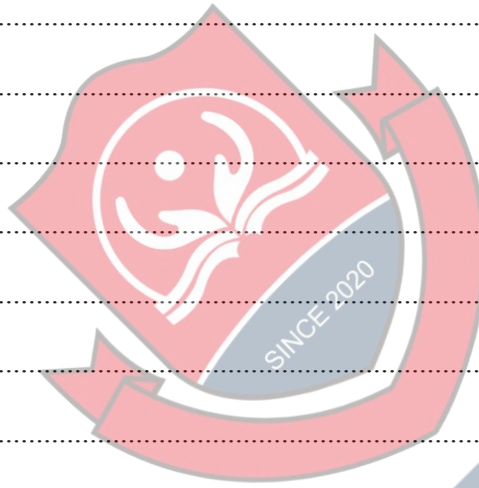
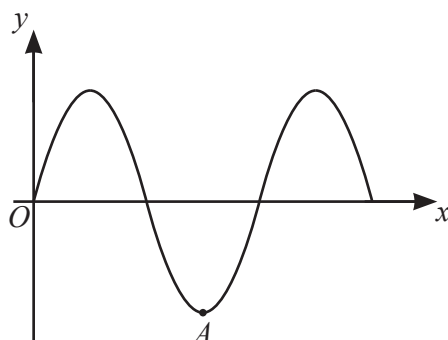


Cambridge International AS & A Level

- 1 Find the exact value of $\int_3^{\infty} \frac{2}{x^2} dx$. [3]



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(a) State the coordinates of A . [1]

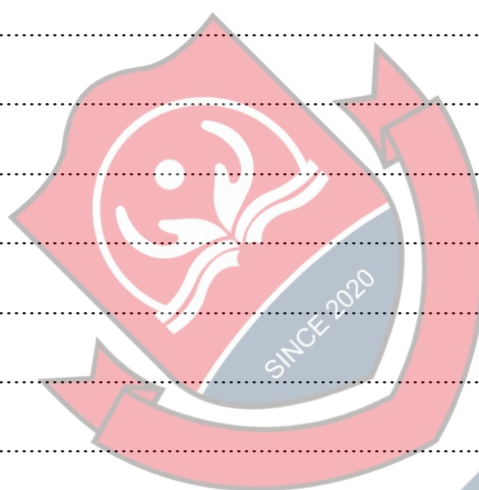
Reflection in the x -axis

Find the equation of the new curve and determine the coordinates of the point on the new curve corresponding to A . [3]

- 3 A curve is such that $\frac{dy}{dx} = 3(4x+5)^{\frac{1}{2}}$. It is given that the points $(1, 9)$ and $(5, a)$ lie on the curve.

Find the value of a .

[5]



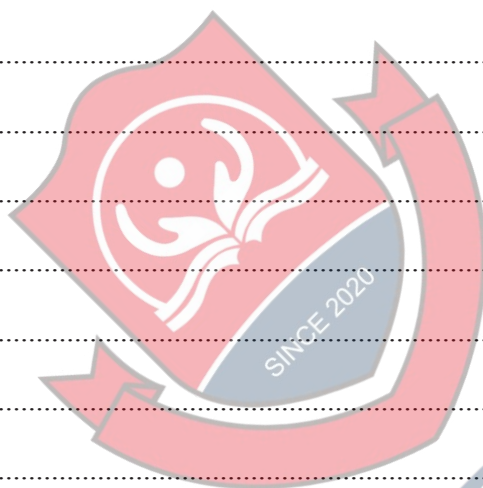
- 4 (a)** Prove that $\frac{(\sin \theta + \cos \theta)^2 - 1}{\cos^2 \theta} \equiv 2 \tan \theta$. [3]

- (b) Hence solve the equation $\frac{(\sin \theta + \cos \theta)^2 - 1}{\cos^2 \theta} = 5 \tan^3 \theta$ for $-90^\circ < \theta < 90^\circ$. [3]

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- 5** A curve has the equation $y = \frac{3}{2x^2 - 5}$.

Find the equation of the normal to the curve at the point $(2, 1)$, giving your answer in the form $ax + by + c = 0$, where a , b and c are integers. [6]

The image features a large, light blue watermark reading "4U Admission" diagonally across the center. In the top left corner, there is a partial view of the University of Utah logo, which includes a red shield with a white stylized flower and the text "SINCE 2020" in white. The background is white with horizontal dotted lines.

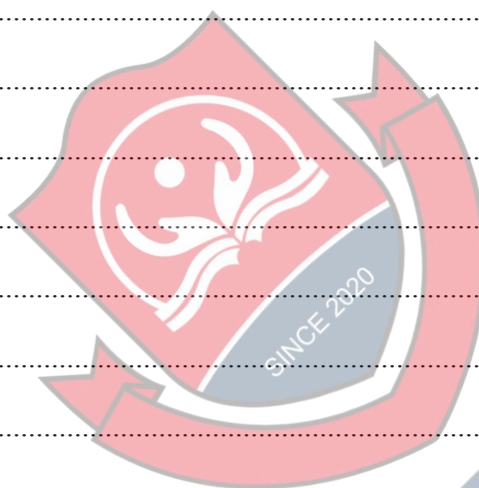
- 6 It is given that the coefficient of x^3 in the expansion of

$$(2 + ax)^4(5 - ax)$$

is 432.

Find the value of the constant a .

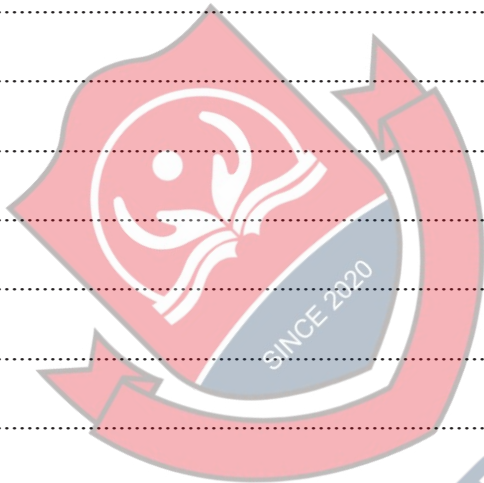
[5]



- 7 The straight line $y = x + 5$ meets the curve $2x^2 + 3y^2 = k$ at a single point P .

(a) Find the value of the constant k .

[4]



(b) Find the coordinates of P .

[2]

4U

- Find the sum of the first 100 terms of this arithmetic progression.

[4]

A stylized pink rose with a white outline, positioned at the bottom center of the page.

- The sum to infinity of this geometric progression is denoted by S . The sum to infinity of the even-numbered terms (i.e. $a_2, a_4, a_6, \dots$) is denoted by S_E .

Find the values of S and S_E .

[4]

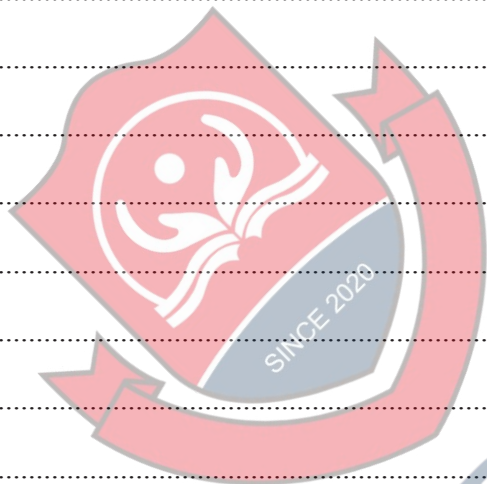
4Uadmin

- 9** The functions f and g are defined for all real values of x by

$$f(x) = (3x-2)^2 + k \quad \text{and} \quad g(x) = 5x-1,$$

where k is a constant.

- (a) Given that the range of the function gf is $gf(x) \geq 39$, find the value of k . [4]

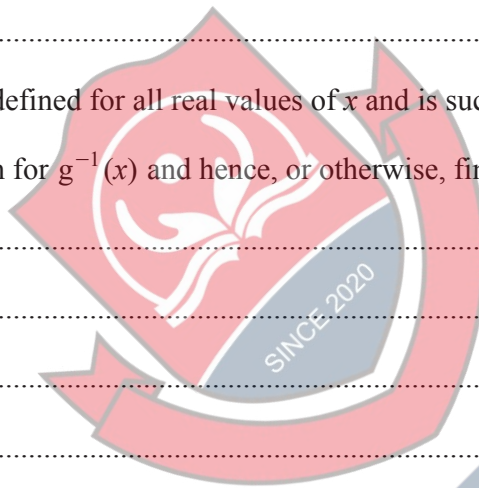


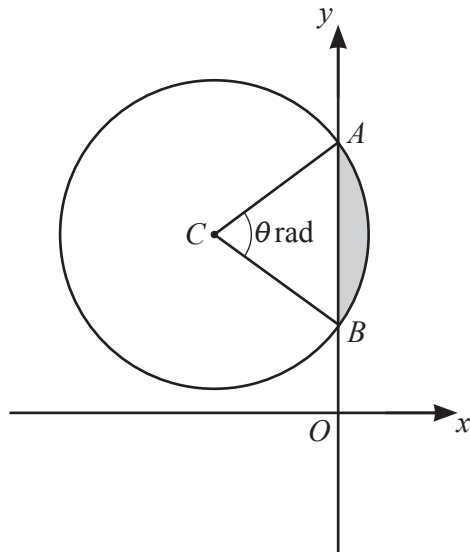
- (b)** For this value of k , determine the range of the function f g. [2]

[illegible]

- (c) The function h is defined for all real values of x and is such that $gh(x) = 35x + 19$.

Find an expression for $g^{-1}(x)$ and hence, or otherwise, find an expression for $h(x)$. [3]





The diagram shows the circle with centre $C(-4, 5)$ and radius $\sqrt{20}$ units. The circle intersects the y -axis at the points A and B . The size of angle ACB is θ radians.

- (a) Find the equation of the tangent to the circle at the point $(-6, 9)$. [3]

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- (b) Find the equation of the circle in the form $x^2 + y^2 + ax + by + c = 0$. [2]

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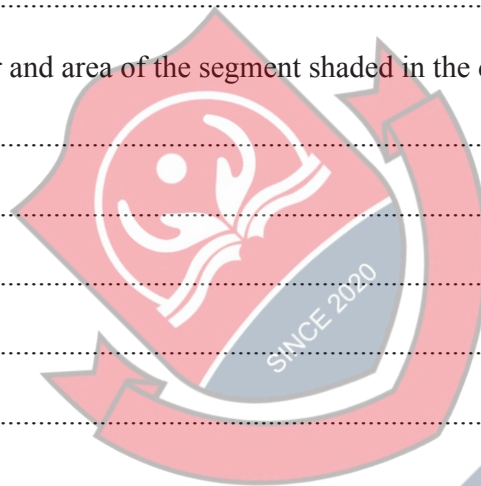
- (c)** Find the value of θ correct to 4 significant figures.

[3]

[illegible]

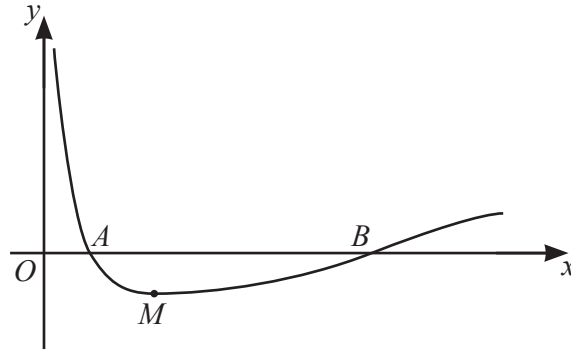
- (d)** Find the perimeter and area of the segment shaded in the diagram.

[4]



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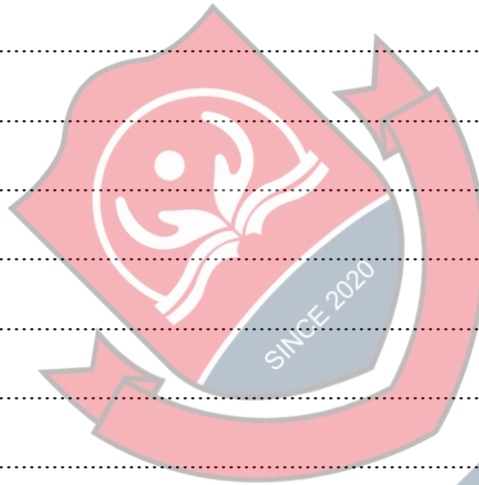
11



The diagram shows the curve with equation $y = 2x^{-\frac{2}{3}} - 3x^{-\frac{1}{3}} + 1$ for $x > 0$. The curve crosses the x -axis at points A and B and has a minimum point M .

(a) Find the exact coordinates of M .

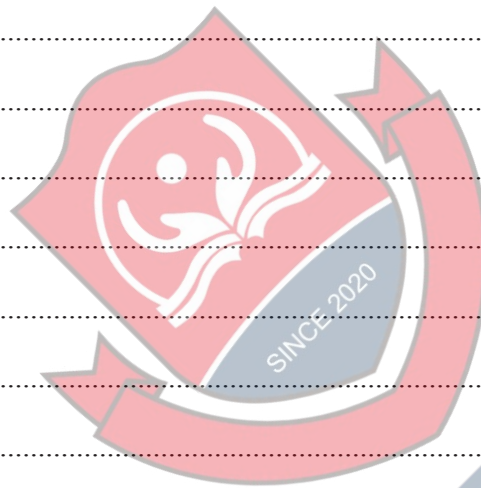
[4]





Additional page

If you use the following page to complete the answer to any question, the question number must be clearly shown.



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