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CATHOLIC HIGH SCHOOL
Preliminary Examination
Secondary 4 (O-Level Programme)

B

ADDITIONAL MATHEMATICS

4049/01

Paper 1
 BOOKLET B

14 September 2021
2 hours 15 minutes

For examiner's use:

Q7	Q8	Q9	Q10	Q11	Total Marks
/ 6	/ 9	/ 9	/ 6	/ 10	/ 40

This Booklet B consists of **10** printed pages.

- 7 Express $\frac{4x^3 + 7x^2 + 49x + 14}{(2x+1)(x^2+9)}$ in partial fractions. [6]

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- 8 Two points A and B have coordinates $(1, 2)$ and $(-3, 6)$ respectively. A point $P(x, y)$ is such that AP and BP are perpendicular.

(a) Show that P lies on the circumference of a circle. [2]

Find

(b) the coordinates of the centre of the circle and the radius of the circle, [4]

(c) the equation of the circle. [1]

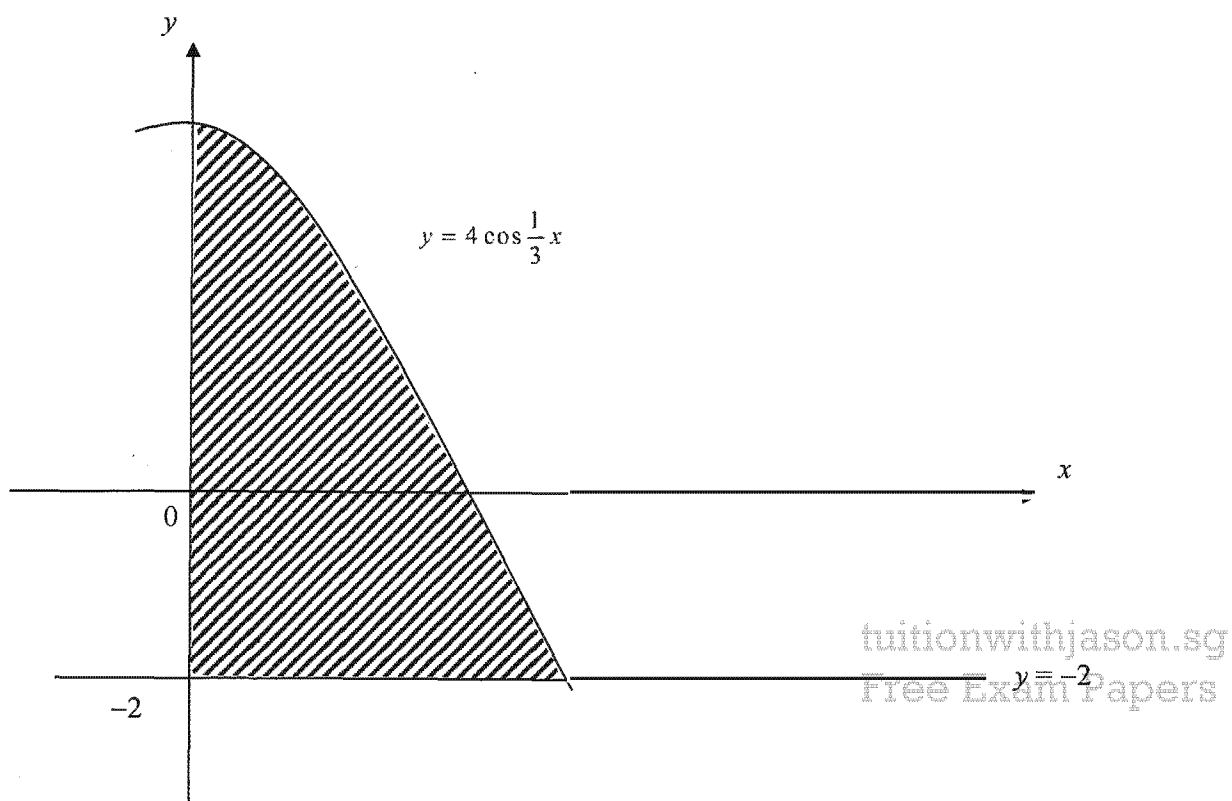
(d) Explain why the tangents to the circle at A and B are parallel. [2]

- 9 (a) A curve has the equation $y = \frac{2x+11}{x+1}$, $x \neq -1$. Show that y is a decreasing function. [3]

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- (b) Find the coordinates of the stationary point(s) of the curve $y = xe^{-2x}$ and determine the nature of the stationary point(s). [6]

- 10 The diagram shows part of the curve $y = 4 \cos \frac{1}{3}x$. Find the area of the shaded region bounded by the curve, the y -axis and the line $y = -2$. [6]



- 11 A particle A moves in a straight line, so that, t seconds after leaving a fixed point P , its velocity, $v_A \text{ ms}^{-1}$, is given by $v_A = 2t - 6$.

(a) Find the distance travelled by the particle A before it comes to instantaneous rest. [3]

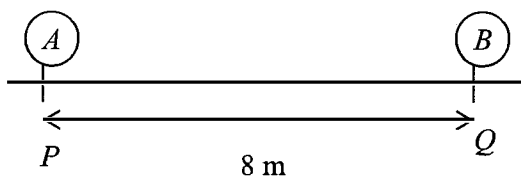
10. (10 marks)

Figure 10 shows the graph of the function $y = f(x)$ for $0 \leq x \leq 10$. The function f is continuous and has a local maximum at $x = 4$ and a local minimum at $x = 6$. The area under the curve $y = f(x)$ from $x = 0$ to $x = 10$ is 100.

(10)

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A second particle B moves along the same horizontal line as A , and starts from Q , a point 8 m away from P , at the same instant that A begins to move. Particle B moves with a velocity of 5 ms^{-1} and decelerates at 1 ms^{-2} .



- (b) Calculate the distance between particle A and particle B when A comes to instantaneous rest. [3]

- (c) Find the time during the interval $0 \leq t \leq 5$ when the distance between particle A and particle B is at its maximum. Calculate this maximum distance. [3]

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- (d) Find the range of values of t for which both particles are moving in the same direction. [1]

END OF PAPER