

External assessment 2022

Multiple choice question book

# Mathematical Methods

Paper 2 — Technology-active

## General instruction

- Work in this book will not be marked.



Queensland  
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## Section 1

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### QUESTION 1

The position (in cm) of a particle is given by  $x = \cos(4t)$ , where  $t$  is time (in seconds).

The velocity of the particle when  $t = 5$  is

- (A)  $1.6323 \text{ cm s}^{-1}$
- (B)  $0.4081 \text{ cm s}^{-1}$
- (C)  $-0.9129 \text{ cm s}^{-1}$
- (D)  $-3.6518 \text{ cm s}^{-1}$

### QUESTION 2

Identify the correct features of the function  $f(x) = xe^x$

- (A)  $f'(-1) = 0, f''(-1) < 0$
- (B)  $f'(-1) = 0, f''(-1) > 0$
- (C)  $f'(-1) < 0, f''(-1) < 0$
- (D)  $f'(-1) < 0, f''(-1) > 0$

### QUESTION 3

The derivative of the function  $f(x)$  is given by  $f'(x) = \sin(x^3)$  for the domain  $-1.8 < x < 1.8$ .

The number of points of inflection that the graph of  $f(x)$  has on this interval is

- (A) 1
- (B) 3
- (C) 4
- (D) 5

#### QUESTION 4

The distribution for a sample proportion  $\hat{p}$  has a mean of 0.15 and a standard deviation of 0.0345.

The sample size is

- (A) 10
- (B) 14
- (C) 107
- (D) 116

#### QUESTION 5

The continuous random variable  $X$  has the probability density function

$$f(x) = \begin{cases} \frac{\cos(x)}{2}, & -\frac{\pi}{2} \leq x \leq \frac{\pi}{2} \\ 0, & \text{otherwise} \end{cases}$$

The standard deviation of  $X$  is

- (A) 0.467
- (B) 0.684
- (C) 1.211
- (D) 1.467

#### QUESTION 6

A stall at the school fete sells cups of lemonade. Assuming the amount of lemonade in a cup is normally distributed with a mean of 60 mL and a standard deviation of 3 mL, 80% of the cups contain more than

- (A) 52.4 mL
- (B) 57.5 mL
- (C) 61.6 mL
- (D) 62.5 mL

### QUESTION 7

A marble moves in one direction in a straight line with velocity  $v = 2\ln(t + 1)$  (in metres per second) where  $t$  is time (in seconds) since the marble passed through the origin.

Determine the distance from the origin the marble has rolled after 4 seconds.

- (A) 0.40 m
- (B) 1.60 m
- (C) 3.22 m
- (D) 8.09 m

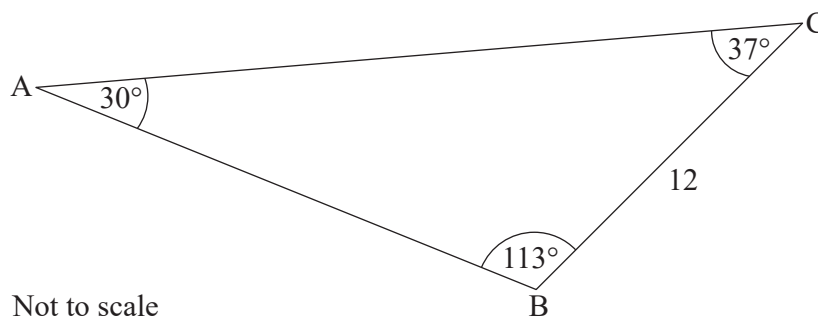
### QUESTION 8

Determine the equation of the asymptote of the function  $f(x) = \log_9(x - 3) - 4$ .

- (A)  $x = -4$
- (B)  $x = -3$
- (C)  $x = 3$
- (D)  $x = 4$

### QUESTION 9

Determine the length of side AB in triangle ABC.



- (A) 22.13
- (B) 14.44
- (C) 9.97
- (D) 7.82

**QUESTION 10**

The solution of  $e^{2x-3} = 42$  is

- (A) 1.48
- (B) 2.31
- (C) 3.37
- (D) 4.54

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