

IB Maths: AA SL

Past Paper 1

Question Paper

These practice questions can be used by students and teachers and is Suitable for IB Maths AA SL Past Papers

Course	IB Maths
Section	Set A
Topic	Past Paper 1
Difficulty	Medium

Level: IB Maths

Subject: IB Maths AA SL

Board: IB Maths

Topic: Past Paper 1

Question 1

Let A and B be events such that $P(A) = 0.3$, $P(B) = 0.75$ and $P(A \cup B) = 0.9$.
Find $P(B | A)$.

[5 marks]

Question 2

Given that $\frac{dy}{dx} = 3x^2 \cos\left(3x^3 + \frac{\pi}{2}\right)$ and that the graph of y passes through the point $(0, -1)$,
find an expression for y in terms of x .

[5 marks]

Question 3

The functions f and g are defined such that $f(x) = 6x + 7$ and $g(x) = \frac{x - 5}{3}$.

(a) Show that $(f \circ g)(x) = 2x - 3$.

[2 marks]

(b) Given that $(f \circ g)^{-1}(a) = 6$, find the value of a .

[3 marks]

Question 4

(a) (i) Expand $(2k - 1)^3$.

(ii) Hence, or otherwise, show that $(2k - 1)^3 - (2k - 1) = 8k^3 - 12k^2 + 4k$.

[2 marks]

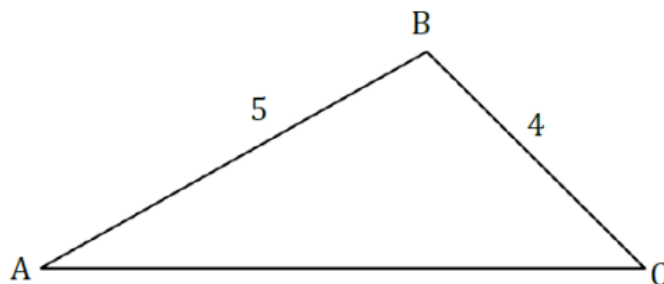
(b) Thus prove, given $k > 1$, $k \in \mathbb{N}$, that the difference between an odd natural number greater than 1 and its cube is always even.

[3 marks]

Question 5

The following diagram shows triangle ABC, with $AB = 5$ and $BC = 4$.

diagram not to scale



(a) (i) Given that $\sin \hat{B} = \frac{3}{5}$, find the possible values of $\cos \hat{B}$.

(ii) Given that \hat{B} is obtuse, find the precise value of $\cos \hat{B}$.

[3 marks]

(b) Find the length of AC.

[2 marks]

Question 6

(a) Show that $\log_4(\cos 2x + 13) = \log_2 \sqrt{\cos 2x + 13}$.

[3 marks]

(b) Hence or otherwise solve $\log_2(3\sqrt{2} \cos x) = \log_4(\cos 2x + 13)$ for $-\frac{\pi}{2} < x < \frac{\pi}{2}$.

[5 marks]

Question 7

Let $f(x) = \frac{1}{3}x^3 - 2x^2 - 21x - 24$.

(a) Find $f'(x)$.

[2 marks]

The graph of f has horizontal tangents at the points where $x = a$ and $x = b$, $a < b$.

(b) Find the value of a and the value of b .

[3 marks]

(c) (i) Find $f''(x)$.

(ii) Hence show that the graph of f has a local maximum point at $x = a$.

[2 marks]

- (d) (i) Sketch the graph of $y = f'(x)$.
- (ii) Hence, use your answer to part (d)(i) to explain why the graph of f has a local minimum point at $x = b$.

[4 marks]

The tangent to the graph of f at $x = a$ and the normal to the graph of f at $x = b$ intersect at the point (p, q) .

- (e) Find the value of p and the value of q .

[5 marks]

Question 8

Let $f(x) = \frac{\ln px}{qx}$ where $x > 0$, $p, q \in \mathbb{R}^+$.

- (a) Show that $f'(x) = \frac{1 - \ln px}{qx^2}$.

[3 marks]

The graph of f has exactly one maximum point A .

- (b) Find the x -coordinate of A .

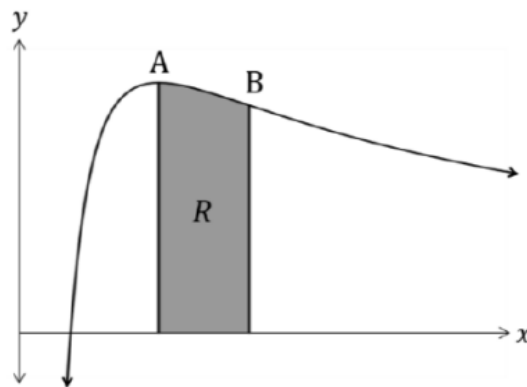
[3 marks]

The second derivative of f is given by $f''(x) = \frac{2 \ln px - 3}{qx^3}$. The graph of f has exactly one point of inflexion B.

(c) Show that the x -coordinate of B is $\frac{3}{p}$.

[3 marks]

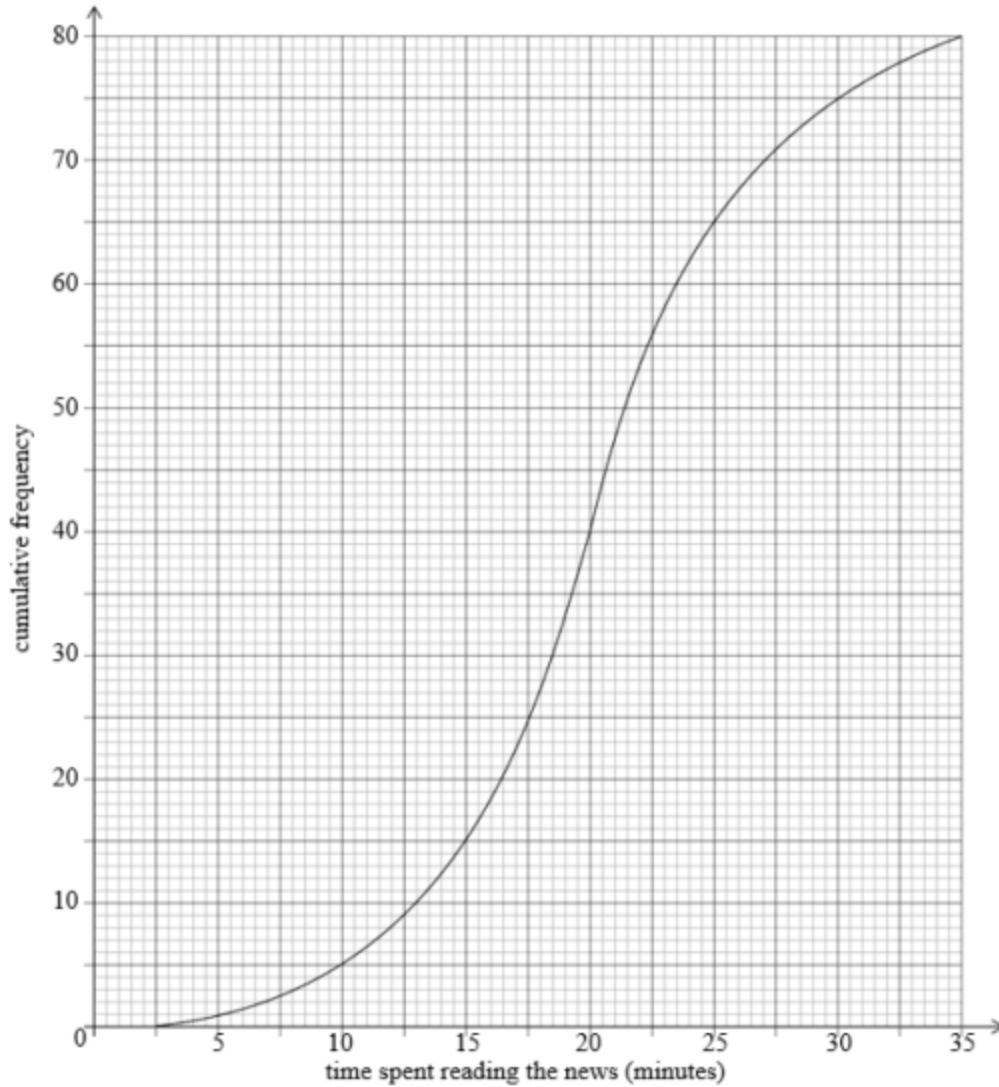
The region R is enclosed by the graph of f , the x -axis, and the vertical lines through the maximum point A and the point of inflexion B.



(d) Calculate the area of R in terms of q and show that the value of the area is independent of p .

[7 marks]

A school surveyed 80 of its final year students to find out how much time they spent reading the news on a given day. The results of the survey are shown in the following cumulative frequency diagram.



(a) Find the median number of minutes spent reading the news.

[2 marks]

(b) Find the number of students whose reading time is within 2.5 minutes of the median.

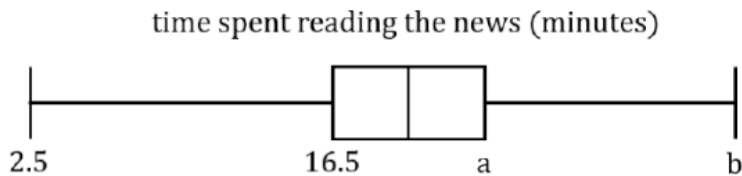
[3 marks]

Only 15% of students spent more than k minutes reading.

(c) Find the value of k .

[3 marks]

The results of the survey can also be displayed on the following box-and-whisker diagram.



(d) Write down the value of b .

[1 mark]

(e) (i) Find the value of a .

(ii) Hence, find the interquartile range.

[4 marks]

(f) Determine whether someone who spends 30 minutes reading the news would be an outlier.

[2 marks]