

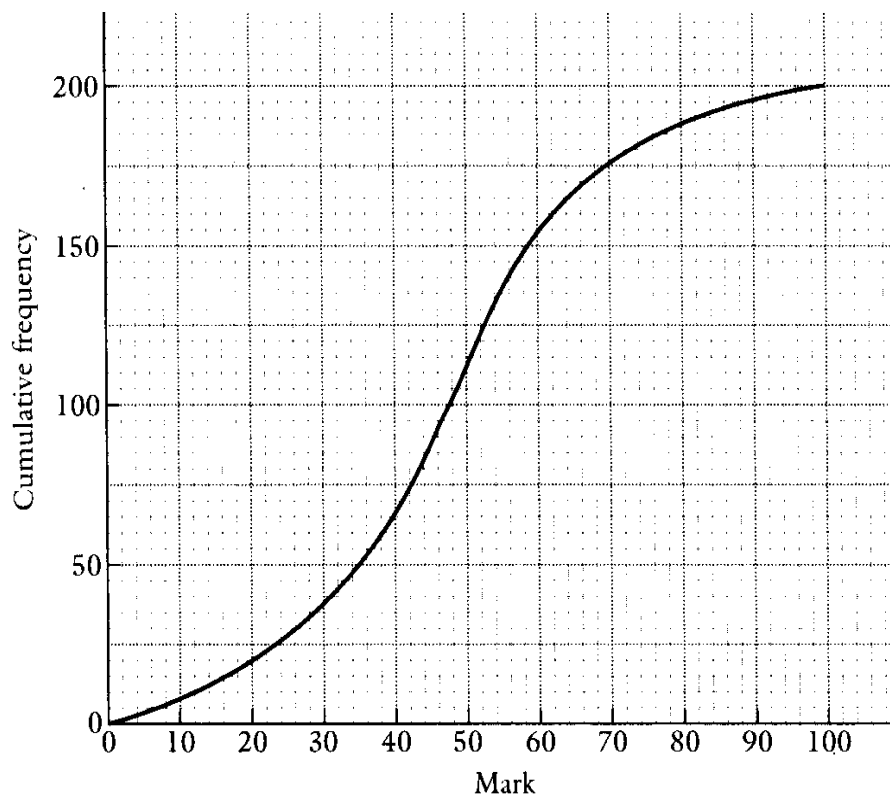
As a guideline this paper should be completed in 1 hour.

You will need a Graphics Display Calculator (GDC) for this examination.

**Section A [37 marks]**

1. [Maximum mark 6]

The diagram below shows the marks of 200 students who sat an IB maths examination.



Use your diagram to find,

- find the median,
- find an estimate of the mean mark.

2. [Maximum mark 6]

The number of accidents per week on a certain road is be modelled by a Poisson distribution with a mean of 1.5

Calculate:

- a) the probability that at least two accidents occur in a week,
- b) the probability that no more than 4 accidents occur in a week, given that at least 2 accidents have occurred.

3. [Maximum mark 5]

Students sitting a Maths HL paper have marks that are normally distributed with a mean of 58 marks and a standard deviation of 16. The highest mark is a grade 7, which is set so that only 5% of the students can achieve a 7.

Calculate, to the nearest integer, the mark required to achieve a 7.

4. [Maximum mark 4]

A geometric series has first term 400, ten terms and a sum of 1295.67.

Find the common ratio,  $r$ , of the series.

5. [Maximum mark 6]

- a) Find the unique set of solutions for the following set of simultaneous equations.

$$3x + 5y + z = 0$$

$$2x - y + 8z = 3$$

$$x + 10y - z = 7$$

- b) Find the angle created when the planes  $3x - y + 4z = 2$  and  $x - 7y + 10z = 1$  intersect.

6. [Maximum mark 5]

\$3000 is invested at an annual interest rate of 6%, compounded yearly.

- a) Write down an expression for the value of the investment at the end of  $n$  years.
- b) Evaluate the value of the investment at the end of 5 years.
- c) In what year will the value exceed \$10000?

7. [Maximum mark 5]

A triangle has vertices  $A(0,1,4)$   $B(1,-3,4)$  and  $C(-3,4,2)$ .

Find the angle  $ABC$  in degrees to the nearest degree.

## Section B [23 marks]

8. [Maximum mark 23]

i) The function  $f(x)$ , where  $x > 0$ , passes through  $(1,1)$  and has the differential that is defined as  $f'(x) = \frac{(\ln x)^2}{x}$ .

a) Find the function  $f(x)$ . [4 marks]

b) The function  $f(x)$  has two points of inflection. Give the coordinates of these points. [5 marks]

ii) The function  $g(x) = x \sin 5x$ .

a) Use integration to show that

$$\int g(x) dx = \frac{1}{25} \sin x - \frac{1}{5} x \cos x + c.$$

[4 marks]

b) Sketch  $g(x)$  for  $0 \leq x \leq \pi$ . [2 marks]

c) Give the exact answers for  $g(x) = 0$ , for  $0 \leq x \leq \pi$ . [2 marks]

d) Find the area enclosed above the  $x$ -axis and the curve  $g(x)$  between  $0 \leq x \leq \pi$ , giving your answer as a multiple of  $\pi$ . [6 marks]

Paper D

IB HL Paper 2 Practice Papers

Answers