MATHEMATICS Compulsory Part

PAPER 1

for HKDSE

Question-Answer Book

2 hours 15 minutes

This paper must be answered in English.

INSTRUCTIONS

1. Write your Candidate Number in the space provided on Page 1.

2. Stick barcode labels in the spaces provided on Pages 1, 3, 5, 7, 9 and 11.

3. This paper consists of THREE sections: A(1), A(2) and B. Each section carries 35 marks.

4. Attempt ALL questions in this paper. Write your answers in the spaces provided in this Question- Answer Book. Do not write in the margins.

5. Graph paper and supplementary answer sheets will be supplied on request. Write your Candidate Number and stick a barcode label on each sheet, and fasten them with string INSIDE this book.

6. Unless otherwise specified, all working must be clearly shown.

7. Unless otherwise specified, numerical answers should be either exact or correct to 3 significant figures.

8. The diagrams in this paper are not necessarily drawn to scale.

Please stick the barcode label here.

Candidate Number

	Marker's Use Only	Examiner's Use Only
	Marker No.	Examiner No.
Question No.	Marks	Marks
1 – 2		
3 – 4		
5 – 6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
Total		

14. It is known that W is the sum of two parts, one part varies as x and the other part varies as the square of x. When $x = 10$, $W = 130$ and when $x = -5$, $W = 10$.

(a) Express W in terms of x. (3 marks)

$p(x)$ is a polynomial. It is given that when $p(x)$ is divided by $x - 3$, the quotient is $(W - 19)$ and the remainder is -9.

(b) Find $p(x)$. (2 marks)

(c) Nathan claims that all the roots of the equation $p(x) = 0$ are positive integers. Do you agree? Explain your answer. (3 marks)

16. Let $a_1, a_2, a_3, \ldots$ be an arithmetic sequence such that $a_{29} - a_{17} = 24$ and $a_5 = 2a_2$.

(a) Express a_n in terms of n. (2 marks)

$b_1, b_2, b_3, \ldots$ is another sequence such that $b_n = a_n + a_{n+1}$.

(b) Is $b_1, b_2, b_3, \ldots$ an arithmetic sequence? Explain your answer. (2 marks)

(c) Let $S_n = b_1 + b_2 + \cdots + b_n$. Express $a_1 + a_2 + \cdots + a_n$ in terms of S_n and n. (2 marks)

18. The equation of a circle C is $x^2 + y^2 - 24x - 12y + 80 = 0$. Let $A(4, 0)$ and $B(20, 0)$ be the two points where C intersects the x-axis.

(a) Write down the coordinates of the centre G of the circle C. (1 mark)

(b) Find the range of values of k such that there is at least one point of intersection of the straight line $L: 4x + 3y - 4k = 0$ and C. (3 marks)

(c) It is given that L intersects with C at the point H only. Find the coordinates of the orthocentre of the triangle ABH. (3 marks)

19. In Figure 4, A, B, C and D are on the same vertical wall. A, B and E are on the same horizontal ground. ACD is a straight line. It is given that $AB = 16\,\text{m}$, $AC = 15\,\text{m}$, $BC = 13\,\text{m}$ and $BD = 22\,\text{m}$.

D

C
          B

A

E
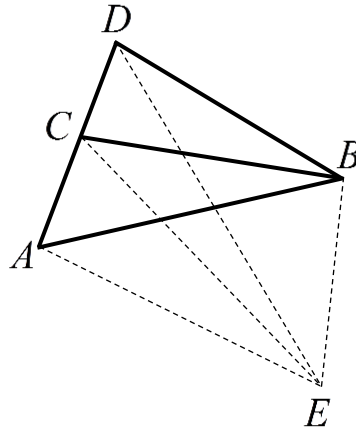
Figure 4

(a) Find $\angle ACB$. (2 marks)

(b) Find the area of the triangle CDB. (3 marks)

(c) Consider the triangular pyramids $EACB$ and $ECDB$.

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