

HONG KONG EXAMINATIONS AND ASSESSMENT AUTHORITY
HONG KONG DIPLOMA OF SECONDARY EDUCATION EXAMINATION 2024

## MATHEMATICS Compulsory Part PAPER 1

**Question-Answer Book** 

8:30 am – 10:45 am (2¼ hours)
This paper must be answered in English

## **INSTRUCTIONS**

- (1) After the announcement of the start of the examination, you should first write your Candidate Number in the space provided on Page 1 and stick barcode labels in the spaces provided on Pages 1, 3, 5, 7, 9 and 11.
- (2) This paper consists of THREE sections, A(1), A(2) and B.
- (3) Attempt ALL questions in this paper. Write your answers in the spaces provided in this Question-Answer Book. Do not write in the margins. Answers written in the margins will not be marked.
- (4) Graph paper and supplementary answer sheets will be supplied on request. Write your Candidate Number, mark the question number box and stick a barcode label on each sheet, and fasten them with string INSIDE this book.
- (5) Unless otherwise specified, all working must be clearly shown.
- (6) Unless otherwise specified, numerical answers should be either exact or correct to 3 significant figures.
- (7) The diagrams in this paper are not necessarily drawn to scale.
- (8) No extra time will be given to candidates for sticking on the barcode labels or filling in the question number boxes after the 'Time is up' announcement.

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SEC'	TION A(1) (35 marks)	
1.	Simplify $\frac{2}{4h-7} - \frac{3}{6h-5}$ .	(3 marks)
2.	Make x the subject of the formula $\frac{Ax+C}{B} = 3x$ ,	(3 marks)
2.	Make x the subject of the formula $\frac{Ax+C}{B} = 3x$	(3 marks)
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3.	Facto	prize	
	(a)	$6r^2 - 13rs - 28s^2$ ,	
	(b)	$4r - 14s + 6r^2 - 13rs - 28s^2 .$	(3 marks)
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4.	(a)	Find the range of values of x which satisfy both $\frac{5x+7}{4}-1<2x$ and $3x+9\geq 0$ .	
	(b)	Write down the least integer satisfying both inequalities in (a).	(4 marks)
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are (	polar coordinate system, $O$ is the pole. The polar coordinates of the points $P$ , $(11,59^{\circ})$ , $(60,149^{\circ})$ and $(144,239^{\circ})$ respectively.	~	
(a)	Find $\angle POQ$ .		
(b)	Are $P$ , $O$ and $R$ collinear? Explain your answer.		
(c)	Find the perimeter of $\Delta PQR$ .	(1	
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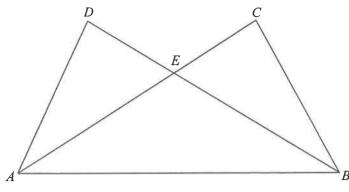


Figure 1

- (a) Prove that  $\triangle ABC \cong \triangle BAD$ .
- (b) If AD = 12 cm and DE = 9 cm, find the area of the pentagon ABCED.

(5 marks)

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9. The table below shows the distribution of the numbers of keys owned by a group of housewives.

Number of keys	3	4	5	6	7	8
Number of housewives	10	9	4	3	4	k

If a housewife is randomly selected from the group, then the probability that she owns more than 6 keys is  $\frac{5}{18}$ .

- (a) Find k.
- (b) Write down the mean, the mode and the median of the distribution.

(5 marks)

Answers written in the margins will not be marked.

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	given that $g(x)$ is partly constant and partly varies as $x$ . Suppose that $g(7) = 9$ .	g(-3) = -21
(a)	Find $g(x)$ .	(3 marks)
(b)	Let $h(x) = x g(x) + k$ , where $k$ is a real constant. If all the roots of the equation real numbers, find the range of values of $k$ .	h(x) = 0  are (3 marks)
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11. The stem-and-leaf diagram below shows the distribution of the numbers of hours spent on reading journals in a month by a group of researchers.

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 Leaf (units)

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The mean of the distribution is 30.

(a) Find a and b.

Answers written in the margins will not be marked.

(3 marks)

(b) Write down the least possible range of the distribution.

(1 mark)

(c) Find the greatest possible inter-quartile range of the distribution.

(3 marks)

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It is given that The slope of $L$	$\log_9 y$ is a linear function of $\log_3 x$ . Denote the graph of the linear f is 4 and L passes through the point $(5,22)$ . Express y in terms of x	Function by $L$ . (3 marks
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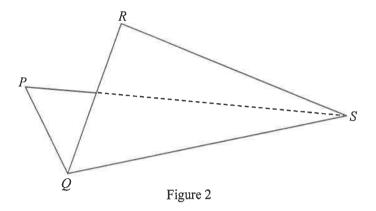
6. In a l same	pag, there are 16 red cups and 4 white cups. If 5 cups are randomly drawn from the time, find	bag at the
(a)	the probability that exactly 1 white cup is drawn;	(2 marks)
(b)	the probability that at most 3 red cups are drawn.	(2 marks)
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- (i) the length of QS,
- (ii)  $\angle RQS$

(4 marks)

(b) The metal sheet PQRS described in (a) is now folded along QS (see Figure 2). It is given that the angle between the plane PQS and the plane QRS is  $80^{\circ}$ .



- (i) Find the shortest distance from R to the plane PQS.
- (ii) Let X be any point lying on the plane QRS. Someone claims that the distance between P and X exceeds  $8 \, \mathrm{cm}$ . Is the claim correct? Explain your answer.

(4 marks)

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).			$x^2 + 4mx + 8x + 2m^2 + 8m + n$ , where $m$ and $n$ are real constants such that $mn < 0$ extex of the graph of $y = f(x)$ by $P$ .	•
	(a)	Using	the method of completing the square, express the coordinates of $P$ in terms of $m$ and $n$ . (2 marks	
	(b)	Descri	be the geometric meaning represented by transforming $f(x)$ to $f\left(\frac{x}{5}\right) + 7$ . (2 marks	;)
	(c)		the the vertex of the graph of $y = f\left(\frac{x}{5}\right) + 7$ by $Q$ . Let $(a_1, b_1)$ and $(a_2, b_2)$ be the nates of $P$ and $Q$ respectively. It is given that $a_1, 1+n, a_2$ is an arithmetic sequence	
			hates of $F$ and $Q$ respectively. It is given that $a_1, 1+n, a_2$ is an arithmetic sequence $a_1, 4-m, b_2$ is a geometric sequence.	C
		(i)	Find the coordinates of $P$ and $Q$ .	
			The coordinates of the points $R$ and $S$ are $(3t+27,t)$ and $(3t+3,2t-3)$ respectively, where $t$ is a real number. Is it possible that $PQRS$ is a rhombus? Explain your answer.	
			(8 marks	;)
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