

PAPER 1

HONG KONG EXAMINATIONS AND ASSESSMENT AUTHORITY
HONG KONG DIPLOMA OF SECONDARY EDUCATION EXAMINATION 2023

MATHEMATICS Compulsory Part PAPER 1

Question-Answer Book

8:30 am – 10:45 am (2½ 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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Candidate Number					



3.	A packet of cheese is termed <i>regular</i> if its weight is measured as 220 g correct to the nearest 10 g. Someone claims that the total weight of 250 <i>regular</i> packets of cheese can be measured as 53.6 kg correct to the nearest 0.1 kg. Is the claim correct? Explain your answer. (3 marks)									
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4.	Cons	ider the compound inequality $3x+2>\frac{4x-5}{2} \text{ and } 3x-2<7 \qquad (*).$								
	(a)	Solve (*).								
	(b)	How many negative integers satisfy (*)? (4 marks)								
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Let a, b and c be non-zero numbers such that $7a = 6b$ and $\frac{4a - 3c}{2b - c} = 9$. Find	(4 marks)
(a) $a:b:c$,	
$(b) \qquad \frac{5a+8b}{7b+3c} \ .$	(4 marks)

On a ferry, the number of female passengers is 40% more than the number of male passengers.

If 24 female passengers leave the ferry, then the number of male passengers is 40% more than the

(4 marks)

number of female passengers. Find the number of male passengers on the ferry.

Answers written in the margins will not be marked.

5.

7. In Figure 1, PR is a diameter of the circle PQRS. Denote the point of intersection of PR and QS by T.

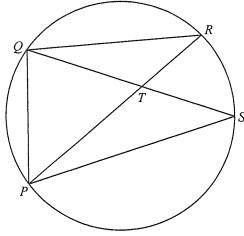


Figure 1

If $\angle PSQ = 41^{\circ}$ and $\angle PTQ = 68^{\circ}$, find $\angle RQS$ and $\angle PQS$.

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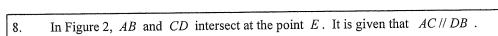
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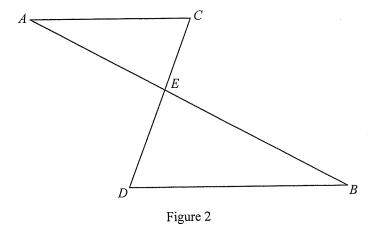
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(4 marks)

(b)





(a) Prove that $\triangle ACE \sim \triangle BDE$.

right-angled triangle? Explain your answer.

(5 marks)

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Suppose that AB = 20 cm, AC = 10 cm, BD = 15 cm and CE = 7 cm. Is $\triangle BDE$ a

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(a)	Find tl	he mean	and the	mode o	f the dist	tribution	1.				
(b)											number of
	hours	of the se	lected w	orker in	the wee	ek excee	ds the n	node of	the dist	ribution	
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It is given that A and B are two distinct points in a rectangular coordinate plane. Let P be a moving

point in the rectangular coordinate plane such that P is equidistant from A and B. Denote the locus

the equation of the straight line which passes through $\,A\,$ and $\,B\,$,

Suppose that the coordinates of A are (2, -4) and the equation of Γ is 3x + y - 12 = 0. Find

Describe the geometric relationship between Γ and AB.

the equation of the circle with AB as a diameter.

Answers written in the margins will not be marked.

(1 mark)

(5 marks)

SECTION A(2) (35 marks)

of P by Γ .

(i)

(ii)

(a)

(b)

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	Number of students	8	5	n	1		
The	mean of the distribution is 2.						
(a)	Find the median, the inter-qu	ıartile range a	nd the var	iance of	the distrib	oution.	(5 m
(b)	Two students now withdraw unchanged. Is there any cha students? Explain your answ	inge in the rai	ss. It is fonge of the	ound that distribu	t the mean tion due to	of the distri	bution ren awal of the (2 m

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(*)	Find $f(5)$. (3 mar.
(a)	Find $f(5)$. (3 mar
(b)	Suppose that $U(0, u)$ and $V(5, v)$ are points lying on the graph of $y = f(x)$. The horizon line passing through V cuts the y -axis at the point W . Denote the circle which passes through V , V and V by V . Express the circumference of V in terms of V . (4 matrix)
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(a)	Find the quotient when $h(x)$ is divided by $g(x)$.	(3 marks
(b)	How many rational roots does the equation $h(x) = 0$ have? Explain your answer.	(4 marks
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4.	The	base radius and the curved surface area of a solid metal right circular cone ar	e 14 cm
	and	$700\pi \text{ cm}^2$ respectively.	
	(a)	Find the height of the circular cone.	(3 marks)
	(b)	The circular cone is divided into a right circular cone X and a frustum Y by a plan parallel to its base. The curved surface area of Y is 15 times the curved surface area of	e which is of X .
		(i) Express the volume of Y in terms of π .	
		(ii) If Y is melted and recast into 2 identical solid spheres, find the diameter of each	h sphere. (5 marks)
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In a b	box, there are 5 red balls and 4 black balls. From the box, 2 balls are randomly chosen at time.
(a)	Find the probability that the 2 balls chosen are red. (2 mark
(b)	In a bag, there are 8 red balls. The 2 balls chosen from the box are put into the bag a then 3 balls are randomly chosen at the same time from the bag. Find the probability the 3 balls chosen are of the same colour.
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16.	(a)	Let a and b be real constants. If the roots of the equation $x^2 + ax + b = 0$ are p and $5p$, prove that $5a^2 = 36b$. (2 marks)
	(b)	Denote the circle $x^2 + y^2 - 6x - 12y + 20 = 0$ by C . Find the constant m such that the straight line $y = mx$ cuts C at the points Q and R with $OQ: QR = 1:4$, where O is the origin. (3 marks)

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- It is given that WXY is a triangle, where WX = 6 cm, XY = 5 cm and $\angle WYX = 70^{\circ}$. 17. (a) (2 marks) Find $\angle XWY$.
 - Figure 3 shows the pyramid WXYZ, where WZ = XZ = YZ. The base of this pyramid is the (b) triangle WXY described in (a).

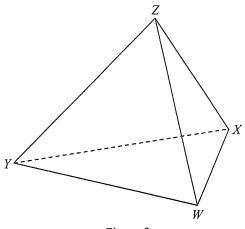


Figure 3

It is given that the angle between WZ and the triangle WXY is 30° . Does the angle between (4 marks) the triangles WXY and XYZ exceed 45°? Explain your answer.

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(a)	Express $\log_7 \alpha$ in terms of $\log_7 \beta$. (3 mark
(b)	If $\log_{\beta} \alpha, \log_{7} \beta, \log_{\alpha} \beta$ is an arithmetic sequence, find the common difference of arithmetic sequence. (5 mar
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(a)	Expr	ress the coordinates of G and H in terms of t . (5 mass	rks)
(b)		S be a point lying on OP such that QS is perpendicular to OP . It is gi $\angle PQS = \angle POQ$.	ven
	(i)	By considering $\tan \angle PQS$, prove that $t = 24$.	
	(ii)	Are O , G and Q collinear? Explain your answer.	
	(iii)	Denote the in-centre of $\triangle OPR$ by I . Find the ratio of the area of $\triangle GHR$ to the a of $\triangle IPQ$.	
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