MOCK EXAM 3

MATHEMATICS Compulsory Part PAPER 1

Question-Answer Book

 $(2\frac{1}{4} \text{ hours})$

This paper must be answered in English

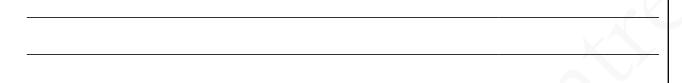
INSTRUCTIONS

- 1. Write your name in the space provided on Page 1.
- 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 name on the graph paper and supplementary answer sheets.
- 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.



SECTION A(1) (35 marks)

Simplify $\frac{x^2y^5}{(x^{-3}y^2)^3}$ and express your answer with positive indices. (3 marks)



Factorize

Answers written in the margins will not be marked.

- (a) $x^2 + 5x 6$,
- (b) $x^4 + 5x^3 6x^2$ (3 marks)

2

Number of children	0	1	2	3	4
Number of families	5	20	17	6	2

Find the median, the mode and the standard deviation of the above distribution.

(3 marks)

Consider the formula 3(x - 2y) = 6x - 4.

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- (a) Make y the subject of the above formula.
- (b) If the value of x is increased by 4, write down the change in the value of y. (4 marks)

5.	The price of 5 rulers and 6 pens is \$73 while the price of 7 rulers and 9 pens is \$107. Find the price
	of a pen. (4 mark
6.	In a polar coordinate system, O is the pole. The polar coordinates of A , B and C are (16, 59°), (12, 239°) and (11, 329°) respectively.
	(a) Describe the geometric relationship between OC and AB .
	(b) Find the area of $\triangle ABC$. (4 mark

In Figure 1, D is a point lying on BC such that $\angle DAC = \angle ABD$.

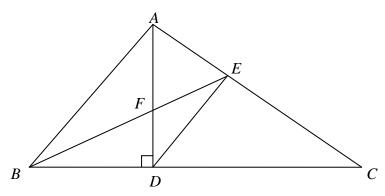


Figure 1

- (a) Prove that \triangle *ABC* ~ \triangle *DAC*.
- (b) If $\angle DEC = 90^{\circ}$,

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- Write down all the triangle(s) which is/are similar to \triangle *ABC* other than \triangle *DAC*.
- (ii) Write down another pair of similar triangles other than those in (i). (4 marks)

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8.	There are 8 cards numbered 6, 7, 8, 8, 10, 12, 13 and <i>k</i> respectively where <i>k</i> is a positive integer. It is given that the median is 8.5.					
	(a) Find the value of k.					
	(b) Two cards are drawn randomly from the cards one by one without replacement. Fin probability that their product is a multiple of 3.					

In Figure 2, the volume of the solid right prism *ABCDEFGH* is 1 440 cm³. The base *ABCD* of the 9. prism is a rhombus. It is given that AC = 16 cm and DE = 15 cm.

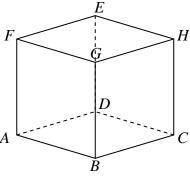


Figure 2

Find

- the length of BD, (a)
- the total surface area of the prism ABCDEFGH.

(5 marks)

10. The stem-and-leaf diagram below shows the distribution of the numbers of weekly hours spent by a group of students in doing homework:

It is given that the range of the above distribution is the triple of its inter-quartile range.

- (a) Find a. (4 marks)
- (b) If a student is randomly selected from the group, find the probability that the number of hours spent by the student in doing homework is not more than the mode of the distribution.

(2 marks)

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12.	The	radius of the base of a right circular cone is 40 cm. The height of the cone is 30 cm. The cone
	is d	livided into a frustum A and a cone B by a plane which is parallel to its base. It is given that
	heig	ght of B is 18 cm.
	(a)	Find the volume of A in terms of π . (3 marks)
	(b)	Another cone is divided into a frustum C and a cone by a plane which is parallel to its base.
		The height and the total surface area of C are 15 cm and 5400π cm ² respectively. Are A and C
		similar? Explain your answer. (4 marks)
		

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SE	CTI	ON B (35 marks)
15.		mean of the test scores obtained by a class of students in a Chinese test is 55 marks. John gets narks and his standard score is 0.5.
	(a)	Find the standard deviation of the test scores. (1 mark)
	(b)	Many students fail the test. The teacher decides to adjust the test scores. Extra 10 marks are added to each test score. Is there any change in the standard score of each student due to the score adjustment? Explain your answer. (2 marks)
)

16

16	. The	ere are 8 white socks and 10 black socks in a drawer.	
	(a)	If 2 socks are randomly drawn from the drawer at the same time, find the probability socks of the same colour are drawn.	
		socks of the same colour are drawn.	(2 marks)
	(b)	If 6 socks are randomly drawn from the drawer at the same time, find the probability	y that at
		least 4 black socks are drawn.	(2 marks)
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17. Figure 3(a) shows a solid pyramid VABCD with a rectangular base, where AB = 20 cm, BC = 16 cm, VA = 24 cm and VB = VC = 32 cm.

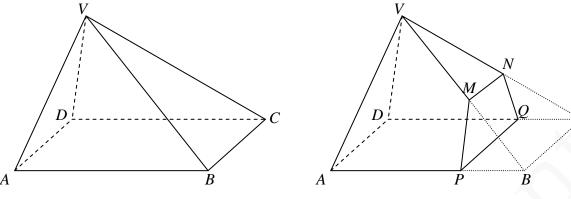


Figure 3(a)

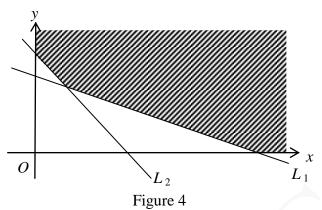
Figure 3(b)

- Find $\angle VBA$. (2 marks)
- (b) M and N are the mid-points of VB and VC respectively. The plane MNPQ is perpendicular to the plane ABCD. A geometric model is made by cutting off PBCQNM from VABCD as shown in Figure 4(b). Someone claims that the area of the trapezium *PQNM* is less than 140 cm². Do (5 marks) you agree? Explain your answer.

Answers written in the margins will not be marked.

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18. (a) In Figure 4, the equation of the straight ling L_1 is 4x + 11y = 1080 and the y-intercept of the straight line L_2 is 140. L_1 and L_2 intersect at the point (50, 80). The shaded region (including the boundary) represents the solution of a system of inequalities. Find the system of inequalities. (4 marks)



(b) A factory produces two types of T-shirts, X and Y. Each T-shirt X requires 4 units of polyester and 6 units of cotton for production while each T-shirt Y requires 11 units of polyester and 5 units of cotton for production. The supplier requires the factory to order at least 1080 units of polyester and 700 units of cotton. The costs for producing a T-shirt X and a T-shirt Y are \$30 and \$48 respectively. The manager claims that the total cost of producing the T-shirts always exceed \$5 000. Do you agree? Explain your answer. (4 marks)

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