## **MOCK EXAM 6**

## 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.



ECTION A(1) (35 marks)	
Simplify $\frac{(m^{-2}n)^3}{m^2n^{-4}}$ and express your answer with positive indices.	(3 marks)
,	
	,
Make b the subject of the formula $a(b-5) = 2a - 3b$ .	(3 marks)
	Simplify $\frac{(m^{-2}n)^3}{m^2n^{-4}}$ and express your answer with positive indices.

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3.	Set <i>A</i> has 4 cards numbered 2, 3, 5 and 7 respectively while Set <i>B</i> has 6 cards numbered 2 8 and 9 respectively. One card is randomly drawn from each set of the cards. Find the probability	
	that the sum of the two numbers is larger than 10.	(3 marks)
	X	
4.	Factorize	
	(a) $m^3 - 2m^2n + m^2$ ,	
	(b) $m^3 - 2m^2n + m^2 - 4m + 8n - 4$ .	(4 marks)

https://www.brightmind.com.hk

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7. Figure 1 shows an ice-cream in the shape of a hemisphere of radius *r* cm put on a right circular cone of height 16 cm and base radius *r* cm. It is given that the volume of the right circular cone is twice the volume of the ice-cream.

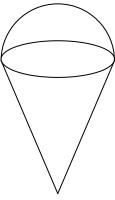
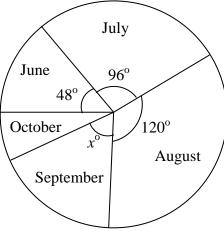


Figure 1

- (a) Find r.
- (b) Find the volume of the ice-cream in terms of  $\pi$ . (4 marks)

(b) Find the perimeter of the sector in terms of π. (5 mar)	(a) Find the angle of the secto	or.	
	(b) Find the perimeter of the s	sector in terms of $\pi$ .	(5 mark
		A	
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9. In Figure 2, the pie chart shows the distribution of the number of typhoons occurred in Hong Kong in a certain year. In that year, the number of typhoons occurred in June is 25% less than that occurred in September.



The distribution of the number of typhoons occurred in Hong Kong in a certain year Figure 2

- (a) Find x.
- (b) Is the total number of typhoons occurred in June and October more than the number of typhoons occurred in September? Explain your answer. (5 marks)

SE	CTI	ON A(2) (35 marks)	
10.	stuc	total cost ( $\$C$ ) of going on picnic is partly a constant and partly varies a lents ( $n$ ) joining the picnic. The cost per student is $\$100$ if $60$ students joint the picnic.	
	(a)	Find the total cost if 90 students join the picnic.	(4 marks)
	(b)	If the total cost of going on picnic is \$6 750, find the cost per student.	(2 marks)
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11.		$f(x) = (x-3)^2(x+h) + k$ , where h and k are constants. It is given that $f(x)$ is divisible by $x-1$
		f(4) = 30.
	(a)	Find $h$ and $k$ . (3 marks)
	(b)	Someone claims that all the roots of the equation $f(x) = 0$ are integers. Do you agree?
		Explain your answer. (3 marks)
		e C
		<del>)</del>
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Number of books	1	2	3	4	5	6
Number of students	6	4	4	12	8	2

(a) Find the mean of the distribution.

(2 marks)

(b) Are the median and the mode of the distribution equal? Explain your answer.

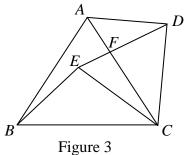
(2 marks)

- (c) If n more students join the group and each of them reads 1 book, write down
  - the value of n such that the mean of the distribution is decreased by 1;
  - (ii) the least value of n such that the median of the distribution is decreased by 2;
  - (iii) the greatest value of n such that the mode of the distribution remains unchanged.

(3 marks)

Answers written in the margins will not be marked.

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(a) Prove that  $\triangle EBC \cong \triangle DAC$ .

(2 marks)

(b) Is  $\triangle$  *EBC* a right-angled triangle? Explain your answer.

(2 marks)

(c) Find the area of *ABCD*.

Answers written in the margins will not be marked.

(3 marks)

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14.	The circle C passes through $A(4, -2)$ and $B(32, -6)$ . P is a moving point in the	rectangular			
	coordinate plane such that $AP = BP$ . Denote the locus of $P$ by $\Gamma$ . $G$ is the centre of the circle $C$ .				
	It is given that the y-coordinate of $G$ is $k$ .				
	(a) (i) Find the equation of $\Gamma$ .				
	(ii) Find the equation of $C$ in terms of $k$ .	(6 marks			
	(b) If C passes through $Q(28, -34)$ , find k and the diameter of C.	(3 marks			
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SE	CTION B (35 ma	arks)	
15.		st, the mean score is 55 marks while my in the test is 1.2.	the standard deviation is 10 marks. The
	(a) Find the test so	core Amy gets.	(2 marks)
	(b) In a science tes	st, the mean score is 61 marks while	the standard deviation is 9 marks. Amy gets
	70 marks in the	e science test. In which test does she	perform better? Explain your answer.
			(2 marks)
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		X 🔾	
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	A		

16.	a bag, there are 11 blue balls and 5 red balls. If 6 balls are randomly drawn	from the bag at the
	me time, find ) the probability that exactly 1 red ball is drawn.	(2 marks)
	) the probability that at most 4 blue balls are drawn.	(2 marks)
		X

17.	The	general term of an arithmetic sequence is denoted by $A(n)$ where $n$ is a positive integer. It is				
	given that $A(3) = 25$ and $A(8) = 55$ .					
	(a)	Let $S(n) = A(1) + A(2) + + A(n)$ . Find $S(n)$ in terms of $n$ . (3 marks)				
	(b)	Let $B(n) = 10^{6n+7}$ , where <i>n</i> is a positive integer. Find the largest possible value of <i>n</i> such that				
		$\log [B(1)B(2)B(n)] \le 8000.$ (3 marks)				

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18.	Let	$f(x) = x^2 - 4kx + 3k^2 - 1.$	
	(a)	Does the graph of $y = f(x)$ intersect with the x-axis? Explain your answer. (2)	marks)
	(b)	Using the method of completing the square, find the coordinates of the vertex of the gra	ph of
		y = f(x) in terms of $k$ . (2)	marks)
	(c)	O is the origin. Let $g(x) = f(-x + 2)$ . Let S and T be the vertices of the graph of $y = f(x)$ and	ind
		$y = g(x)$ respectively. Someone claims that the x-coordinate of the circumcentre of $\Delta$ OS	ST is
		0. Do you agree? Explain you answer. (4	marks)
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19. Figure 4(a) shows a piece of paper card ABCDEF. It is given that AB = AE = AF, AC = AD, BC = ED, CD = EF, AB = 50 cm, BC = 30 cm and  $\angle ABC = 60^{\circ}$ .

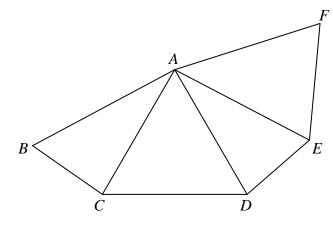


Figure 4(a)

Figure 4(b)

(i) Find *AC*. (a)

Answers written in the margins will not be marked.

- (ii) Find  $\angle ACB$ .
- (iii) Describe how the area of the paper card varies as  $\angle BCD$  changes from  $100^{\circ}$  to  $150^{\circ}$ .

(7 marks)

(b) The paper card is folded into a pyramid with a rectangular base as shown in Figure 4(b). If  $\angle ACD = 50^{\circ}$ , find the volume of the pyramid. (6 marks)

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END OF PAPER