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MOCK 18(I)

MATHEMATICS Compulsory Part

PAPER 1

Question-Answer Book

(2¼ hours)

This paper must be answered in English

### INSTRUCTIONS

1. Write your Name, Class and Class Number in the spaces 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 and mark the question number box 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.

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Name	
Class	( )

	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		
<b>Total</b>		

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- (3 marks)

(a)  $2x^3 - 5x^2$ ,  
(b)  $2x^3 - 5x^2 - 8xy^2 + 20y^2$ .

(4 marks)

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- (4 marks)

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7. In a polar coordinate system, the polar coordinates of the points  $P$  and  $Q$  are  $(3, 130^\circ)$  and  $(4, 280^\circ)$  respectively.  $R$  is a point such that  $POR$  is a straight line and  $PR = 8$ , where  $O$  is the pole.

- (a) Write down the polar coordinates of  $R$ .
- (b) Find the area of  $\triangle PQR$ .

(4 marks)

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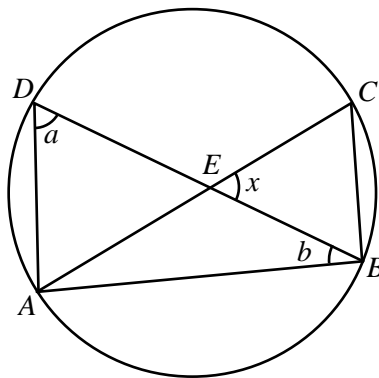


Figure 1

- (a) Express  $x$  in terms of  $a$  and  $b$ .
- (b) If  $x = 2b$ , is  $BD$  a diameter of the circle? Explain your answer.

(5 marks)

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- |                                 |     |        |       |
|---------------------------------|-----|--------|-------|
| <i>Colour of the ball</i>       | Red | Yellow | White |
| <i>Number of tokens awarded</i> | 7   | 23     | $m$   |

- Find the values of  $m$  and  $n$ .
- If the distribution of the colours of the balls in the bag is represented by a pie chart, find the angle of the sector representing yellow balls.

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A bar chart with the following data:

Number of watches	Number of students
0	$m$
1	15
2	27
3	$n$

- (4 marks)

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- A simple line drawing of a cone, showing its circular base and a single vertex at the bottom.

(4 marks)

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12. In Figure 3,  $E$  is a point outside quadrilateral  $ABCD$  such that  $\angle ADE + \angle CBE = 90^\circ$ .  $AFD$  and  $BFE$  are straight lines and  $AB \perp BC$ .

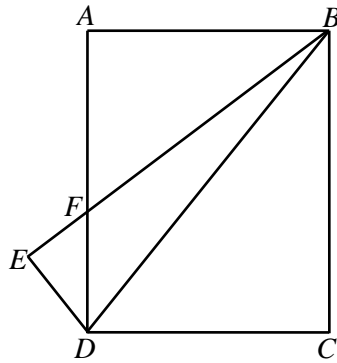


Figure 3

- (a) Prove that  $\triangle DEF \sim \triangle BAF$ . (2 marks)
- (b) Suppose that  $ABCD$  is a rectangle,  $AD = BF = 25$  cm,  $EF = 6$  cm and  $AF > DF$ .
- (i) Is  $\triangle BDE$  a right-angled triangle? Explain your answer.
- (ii) Find the perimeter of  $\triangle BDE$ .

(5 marks)

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- (5 marks)



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- $$\begin{cases} x \geq 1 \\ y \geq 0 \\ 2x + 3y < 16 \\ x - 2y \leq 2 \end{cases}$$

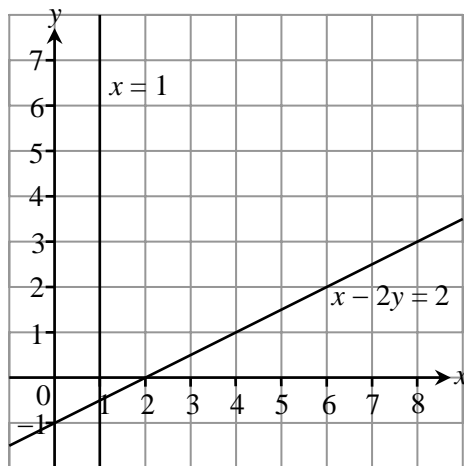


Figure 4

(2 marks)

- (b) Let  $R$  be the region which represents the solution of the system of inequalities in (a). If 5 different points are randomly chosen from all the points  $(a, b)$  in  $R$ , where  $a$  and  $b$  are integers, find the probability that
- (i) the  $x$ -coordinates of exactly 3 chosen points are 2,
  - (ii) the  $x$ -coordinates of at least 3 chosen points are 2.

(3 marks)

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(a) Find the angle between the line  $AD$  and the plane  $ABC$ . (3 marks)

(b)  $M$  is a point on  $AD$ . A geometric model is made by cutting off  $MBCD$  from  $ABCD$  as shown in Figure 5(b). An insect travels from  $B$  to  $M$  in a straight line, and then travels from  $M$  to  $C$  in a straight line. Can the total distance travelled by the insect be less than 27 cm? Explain your answer. (3 marks)

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- (8 marks)

[illegible]

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**END OF PAPER**

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