

**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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Candidate Number



SECTION A(1) (35 marks)

1. Simplify  $\frac{(mn^{-2})^5}{m^{-4}}$  and express your answer with positive indices. (3 marks)

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2. Factorize
- (a)  $\alpha^2 + \alpha - 6$  ,
- (b)  $\alpha^4 + \alpha^3 - 6\alpha^2$  .
- (3 marks)

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3. (a) Round up 534.7698 to the nearest hundred.  
(b) Round down 534.7698 to 2 decimal places.  
(c) Round off 534.7698 to 2 significant figures.

(3 marks)

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4. Let  $a$ ,  $b$  and  $c$  be non-zero numbers such that  $\frac{a}{b} = \frac{6}{7}$  and  $3a = 4c$ . Find  $\frac{b+2c}{a+2b}$ . (3 marks)

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5. In a recruitment exercise, the number of male applicants is 28% more than the number of female applicants. The difference of the number of male applicants and the number of female applicants is 91. Find the number of male applicants in the recruitment exercise. (4 marks)

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6. Consider the compound inequality

$$3 - x > \frac{7 - x}{2} \text{ or } 5 + x > 4 \quad \dots\dots\dots (*)$$

- (a) Solve (\*).
- (b) Write down the greatest negative integer satisfying (\*). (4 marks)

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7. Let  $p(x) = 4x^2 + 12x + c$ , where  $c$  is a constant. The equation  $p(x) = 0$  has equal roots. Find

(a)  $c$ ,

(b) the  $x$ -intercept(s) of the graph of  $y = p(x) - 169$ .

(5 marks)

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8. In Figure 1,  $B$  and  $D$  are points lying on  $AC$  and  $AE$  respectively.  $BE$  and  $CD$  intersect at the point  $F$ . It is given that  $AB = BE$ ,  $BD \parallel CE$ ,  $\angle CAE = 30^\circ$  and  $\angle ADB = 42^\circ$ .

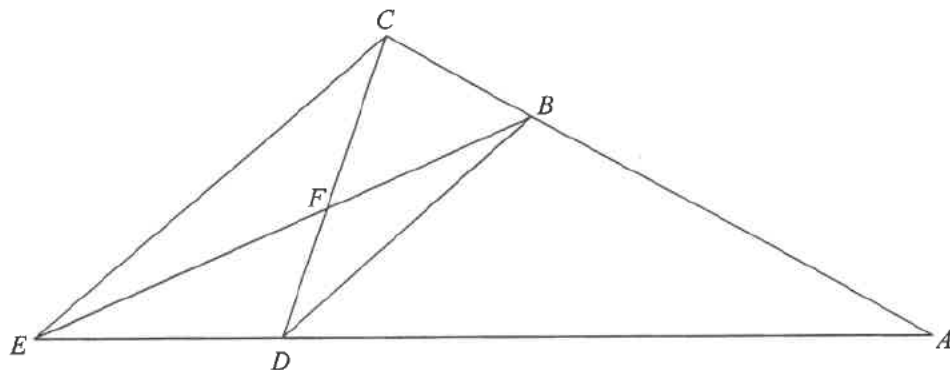


Figure 1

- (a) Find  $\angle BEC$ .
- (b) Let  $\angle BDC = \theta$ . Express  $\angle CFE$  in terms of  $\theta$ .

(5 marks)

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9. The table below shows the distribution of the numbers of subjects taken by a class of students.

Number of subjects taken	4	5	6	7
Number of students	8	12	16	4

- (a) Write down the mean, the median and the standard deviation of the above distribution.
- (b) A new student now joins the class. The number of subjects taken by the new student is 5. Find the change in the median of the distribution due to the joining of this student.

(5 marks)

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**SECTION A(2) (35 marks)**

10. The price of a brand  $X$  souvenir of height  $h$  cm is  $\$P$ .  $P$  is partly constant and partly varies as  $h^3$ . When  $h = 3$ ,  $P = 59$  and when  $h = 7$ ,  $P = 691$ .

- (a) Find the price of a brand  $X$  souvenir of height 4 cm . (4 marks)
- (b) Someone claims that the price of a brand  $X$  souvenir of height 5 cm is higher than the total price of two brand  $X$  souvenirs of height 4 cm . Is the claim correct? Explain your answer. (2 marks)

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11. The stem-and-leaf diagram below shows the distribution of the weights (in grams) of the letters in a bag.

Stem (tens)	Leaf (units)						
1	1	2	3	3			
2	3	3	4	5	6	9	9
3	1	6	7	8	8	8	
4	2						
5	0	$w$					

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

- (a) Find  $w$ . (4 marks)
- (b) If a letter is randomly chosen from the bag, find the probability that the weight of the chosen letter is not less than the mode of the distribution. (2 marks)

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18. In Figure 2,  $U$ ,  $V$  and  $W$  are points lying on a circle. Denote the circle by  $C$ .  $TU$  is the tangent to  $C$  at  $U$  such that  $TVW$  is a straight line.

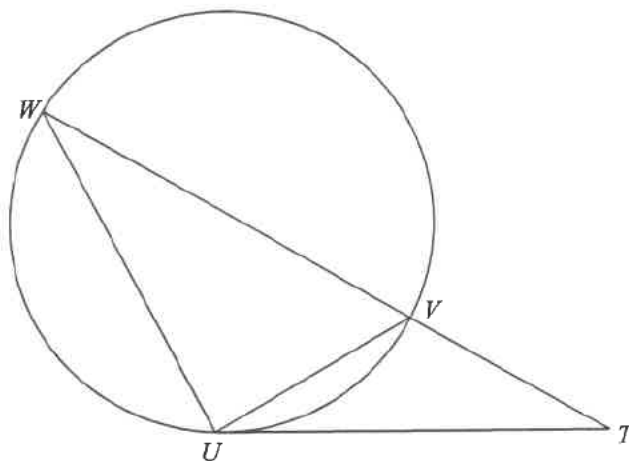


Figure 2

- (a) Prove that  $\triangle UTV \sim \triangle WTV$ . (2 marks)
- (b) It is given that  $VW$  is a diameter of  $C$ . Suppose that  $TU = 780$  cm and  $TV = 325$  cm.
- (i) Express the circumference of  $C$  in terms of  $\pi$ .
- (ii) Someone claims that the perimeter of  $\triangle UVW$  exceeds 35 m. Do you agree? Explain your answer. (5 marks)

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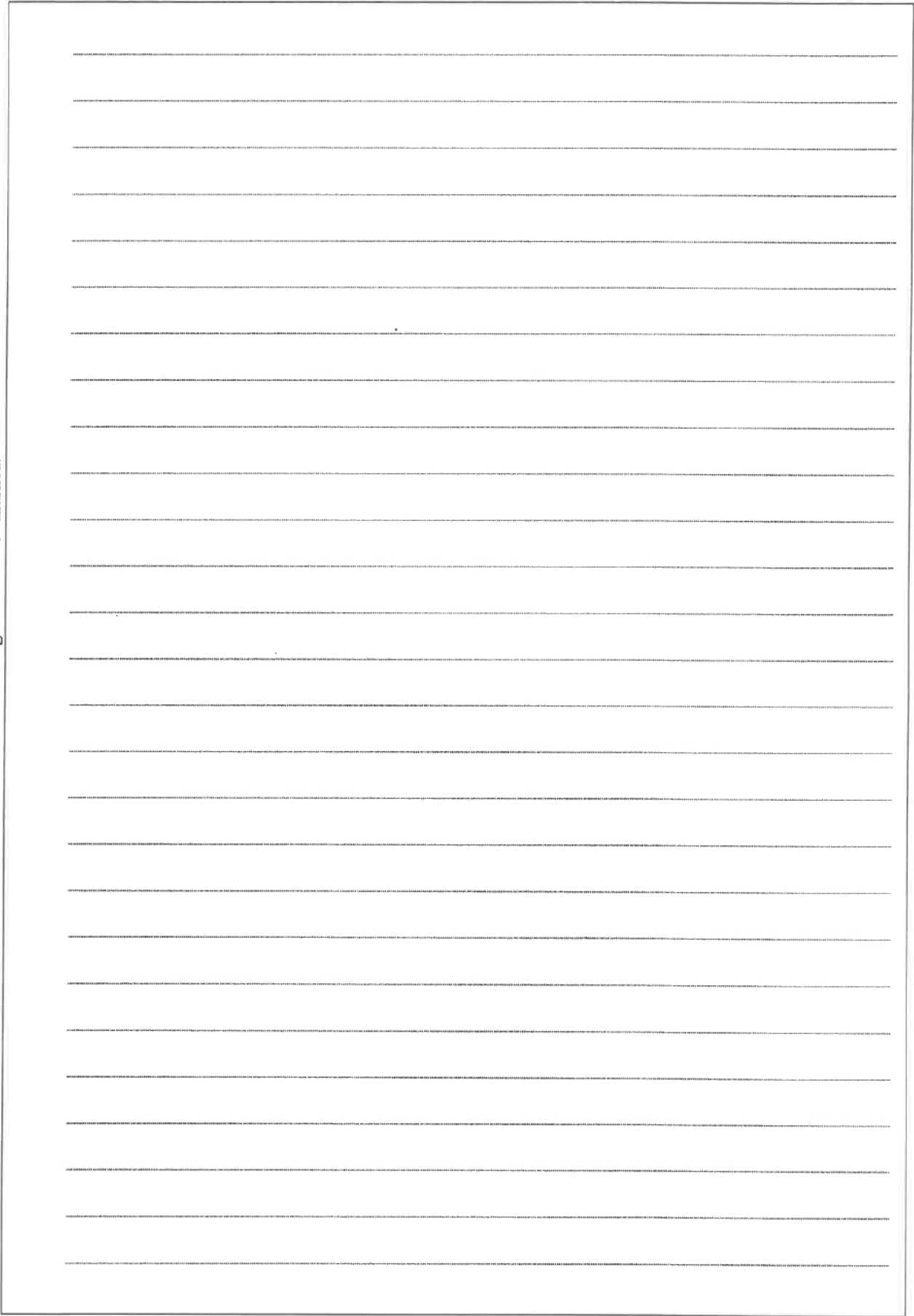
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19.  $PQRS$  is a quadrilateral paper card, where  $PQ = 60$  cm ,  $PS = 40$  cm ,  $\angle PQR = 30^\circ$  ,  $\angle PRQ = 55^\circ$  and  $\angle QPS = 120^\circ$  . The paper card is held with  $QR$  lying on the horizontal ground as shown in Figure 3.

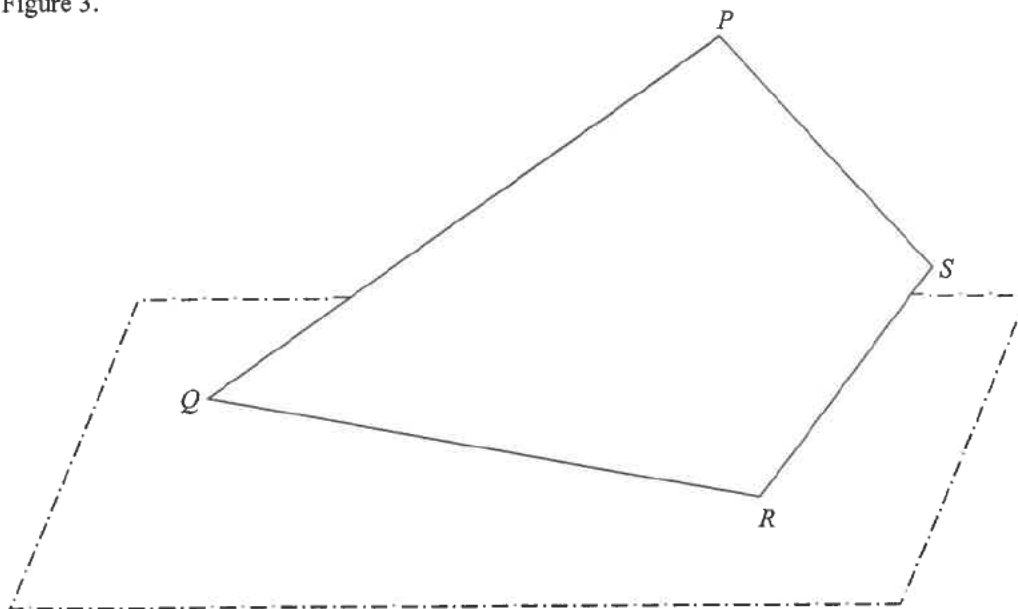


Figure 3

- (a) Find the length of  $RS$  . (3 marks)
- (b) Find the area of the paper card. (2 marks)
- (c) It is given that the angle between the paper card and the horizontal ground is  $32^\circ$  .
- (i) Find the shortest distance from  $P$  to the horizontal ground.
- (ii) A student claims that the angle between  $RS$  and the horizontal ground is at most  $20^\circ$  . Is the claim correct? Explain your answer. (7 marks)

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**END OF PAPER**

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