

FORMULAS FOR REFERENCE

SPHERE	Surface area	= $4\pi r^2$
	Volume	= $\frac{4}{3}\pi r^3$
CYLINDER	Area of curved surface	= $2\pi rh$
	Volume	= $\pi r^2 h$
CONE	Area of curved surface	= πrl
	Volume	= $\frac{1}{3}\pi r^2 h$
PRISM	Volume	= base area \times height
PYRAMID	Volume	= $\frac{1}{3} \times$ base area \times height

Please stick the barcode label here

Page total

SECTION A(1) (33 marks)

Answer ALL questions in this section and write your answers in the spaces provided.

1. Simplify $\frac{(a^3)^5}{a^{-6}}$ and express your answer with positive indices. (3 marks)

2. (a) Solve the inequality $x + 1 < \frac{x + 25}{6}$.
- (b) Write down the greatest integer satisfying the inequality $x + 1 < \frac{x + 25}{6}$. (3 marks)

Please do not write in the margin

3. Factorize

(a) $3b - ab$,

(b) $9 - a^2$,

(c) $9 - a^2 + 3b - ab$.

(3 marks)

4. In Figure 1, the radius of the sector OAB is 12 cm . Find the length of \widehat{AB} in terms of π . (3 marks)

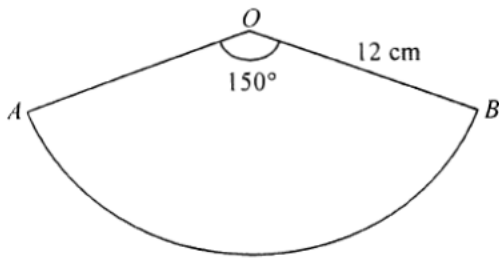


Figure 1

Please do not write in the margin

Please stick the barcode label here

Page total

5. In Figure 2, $ABCD$ is a parallelogram. E is a point lying on AD such that $AE = AB$. It is given that $\angle EBC = 70^\circ$. Find $\angle ABE$ and $\angle BCD$. (3 marks)

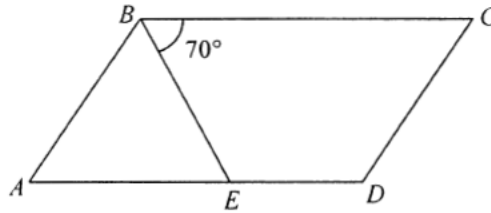


Figure 2

6. The weight of Tom is 20% more than that of John. It is given that Tom weighs 60 kg.
- (a) Find the weight of John.
- (b) The weight of Susan is 20% less than that of Tom. Are Susan and John of the same weight? Explain your answer.
- (4 marks)

Please do not write in the margin

7. In Figure 3, the coordinates of the points A and B are $(-2, 7)$ and $(-5, 5)$ respectively. A is rotated clockwise about the origin O through 90° to A' . B' is the reflection image of B with respect to the y -axis.

- (a) Write down the coordinates of A' and B' .
- (b) Are the lengths of AB and $A'B'$ equal? Explain your answer.

(4 marks)

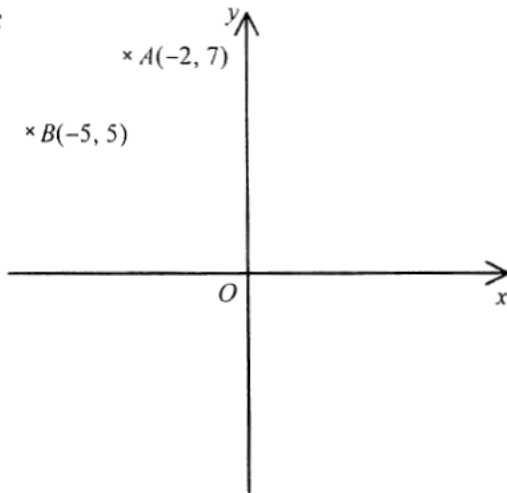


Figure 3

8. There are ten cards numbered 2, 3, 5, 8, 11, 11, 12, 15, 19 and k respectively, where k is a positive integer. It is given that the mean of the ten numbers is 11.

- (a) Find the value of k .
- (b) A card is randomly drawn from the ten cards. Find the probability that the number drawn is a multiple of 3.

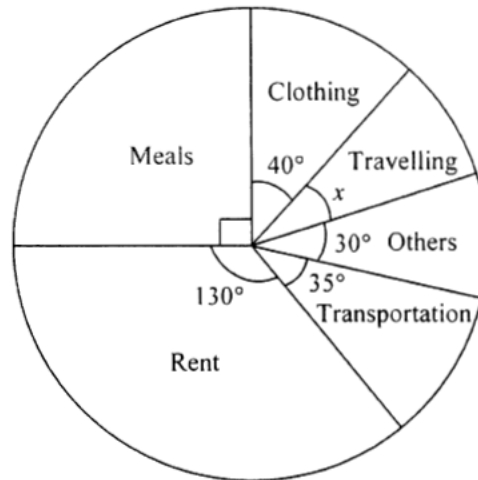
(5 marks)

Please do not write in the margin

Please stick the barcode label here

Page total

9. In Figure 4, the pie chart shows the expenditure of Ada in February 2006. It is given that she spent \$ 1 750 on transportation in that month.



The expenditure of Ada in February 2006

Figure 4

Find

- (a) x ,
(b) her total expenditure in that month,
(c) her expenditure on travelling in that month.

(5 marks)

Please do not write in the margin

Section A(2) (33 marks)

Answer ALL questions in this section and write your answers in the spaces provided.

10. Let $f(x) = (x-a)(x-b)(x+1) - 3$, where a and b are positive integers with $a < b$. It is given that $f(1) = 1$.

- (a) (i) Prove that $(a-1)(b-1) = 2$.
- (ii) Write down the values of a and b .

(3 marks)

(b) Let $g(x) = x^3 - 6x^2 - 2x + 7$. Using the results of (a)(ii), find $f(x) - g(x)$. Hence find the exact values of all the roots of the equation $f(x) = g(x)$. (4 marks)

Please do not write in the margin

Please stick the barcode label here

Page total

11. In Figure 5, $ABCDEF$ is a thin six-sided polygonal metal sheet, where all the measurements are correct to the nearest cm.

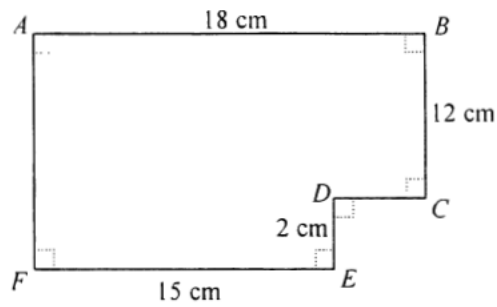


Figure 5

- (a) Write down the maximum absolute error of the measurements. (1 mark)

- (b) Find the least possible area of the metal sheet. (3 marks)

- (c) The actual area of the metal sheet is $x \text{ cm}^2$. Find the range of values of x . (4 marks)

Please do not write in the margin

SECTION B (33 marks)

Answer any **THREE** questions in this section and write your answers in the spaces provided.

Each question carries 11 marks.

14. The stem-and-leaf diagrams below show the distributions of the scores (in marks) of the students of classes *A* and *B* in a test, where *a*, *b*, *c* and *d* are non-negative integers less than 10. It is given that each class consists of 25 students.

Class A

<u>Stem (tens)</u>	<u>Leaf (units)</u>
0	<i>a</i> 9
1	2 5 7 8 8
2	3 3 5 6 7 9
3	2 3 5 6 9 9 9
4	1 2 2 4 <i>b</i>

Class B

<u>Stem (tens)</u>	<u>Leaf (units)</u>
0	<i>c</i> 3 3 4 5
1	1 1 2 2 3 3 5 6 7 8
2	1 1 5 5 5 7 8
3	5 9
4	<i>d</i>

- (a) (i) Find the inter-quartile range of the score distribution of the students of class *A* and the inter-quartile range of the score distribution of the students of class *B*.
- (ii) Using the results of (a)(i), state which one of the above score distributions is less dispersed. Explain your answer.
- (4 marks)
- (b) The passing score of the test is 20 marks. From the 50 students, 3 students are randomly selected.
- (i) Find the probability that exactly 2 of the selected students pass the test.
- (ii) Find the probability that exactly 2 of the selected students pass the test and both of them are in the same class.
- (iii) Given that exactly 2 of the selected students pass the test, find the probability that both of them are in the same class.
- (7 marks)

Please do not write in the margin

17. In Figure 9(a), ABC is a triangular paper card. D is a point lying on AC such that BD is perpendicular to AC . It is known that $AB = 40$ cm, $BC = 60$ cm and $AC = 90$ cm.

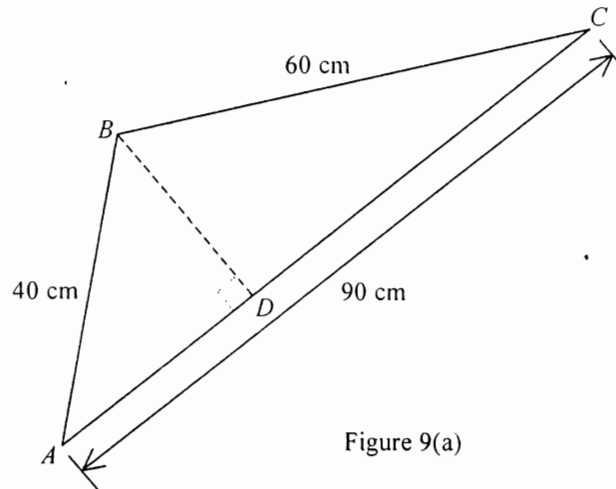


Figure 9(a)

- (a) Find AD . (2 marks)
- (b) The triangular paper card in Figure 9(a) is folded along BD such that AB and BC lie on a horizontal plane as shown in Figure 9(b).

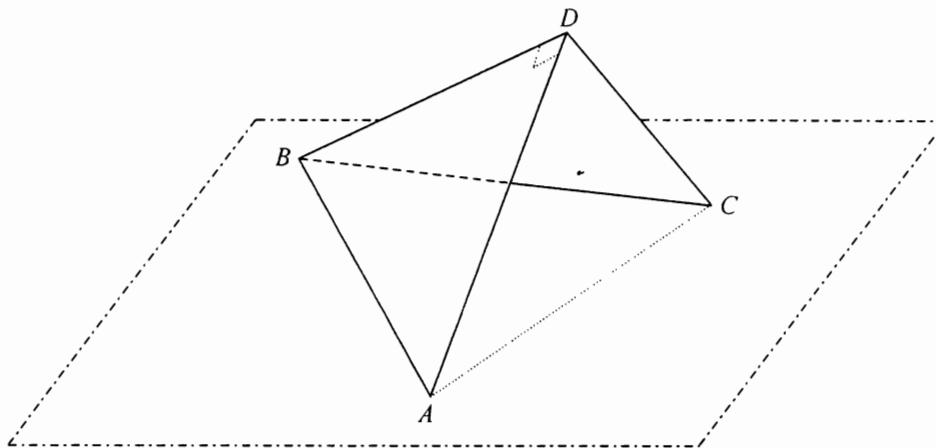


Figure 9(b)

- (i) Suppose $\angle DAC = 62^\circ$.
- (1) Find the distance between A and C on the horizontal plane.
 - (2) Using Heron's formula, or otherwise, find the area of $\triangle ABC$ on the horizontal plane.
 - (3) Find the height of the tetrahedron $ABCD$ from the vertex D to the base $\triangle ABC$.
- (ii) Describe how the volume of the tetrahedron $ABCD$ varies when $\angle ADC$ increases from 30° to 150° . Explain your answer.

(9 marks)

Please do not write in the margin