

Name: ..... SIGNATURE .....

Class: ..... Adm No: ..... Date:.....

121/1  
MATHEMATICS  
PAPER 1

TIME: 2 HOURS 30 MINUTES

## LAIKIPIA EAST TERM 2 2022 FORM 4 EVALUATION EXAM

*Kenya Certificate of Secondary Education – K.C.S.E*

### INSTRUCTIONS TO CANDIDATES:

- Write your **Name**, **Admission number**, **Signature** and write **date** of examination in the spaces provided
- The paper contains **two** sections. Section I and Section II.
- Answer **ALL** the questions in section I and any **five** questions in section II.
- Answers and working **must** be written on the question paper in the spaces provided below each question.
- Show all steps in your calculations below each question.
- Marks may be given for correct working even if the answer is wrong.
- Non programmable silent electronic calculators and KNEC mathematical table may be used, except where stated otherwise.

### FOR EXAMINERS USE ONLY

#### SECTION I

Question	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	TOTAL
Marks																	

#### SECTION II

Question	17	18	19	20	21	22	23	24	TOTAL
Marks									

GRAND TOTAL

--

## SECTION I (50 MARKS)

Answer ***all*** the questions in this section in the spaces provided.

1. Without using mathematical tables or a calculator, evaluate;

(3 marks)

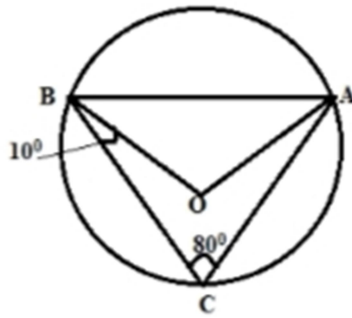
$$\frac{(-8) \times 4 + 156 \div 2 \text{ of } (-43 + 30)}{(-3) - (-8) \times 2 + 6}$$

2. Use squares and square roots and reciprocal tables to evaluate

(3 marks)

$$3.045^2 + \frac{1}{\sqrt{49.24}}$$

3. In the figure below O is the centre of the circle.  $\angle BCA = 80^\circ$  and  $\angle CBO = 10^\circ$ . Determine the size of  $\angle CAB$  (3 marks)



4. A Kenyan tourist left Germany for Kenya through Switzerland. While in Switzerland, he bought a watch worth 52 Deutsche marks. Using the exchange rates below
- 1 Swiss Franc = 1.28 Deutsche marks  
1 Swiss Franc = 45.21 Kenya shillings
- Find the value of the watch to the nearest
- (i) Swiss Franc (2 marks)
- (ii) Kenya shillings (2 marks)

5. Without using mathematical tables or a calculator evaluate

(3 marks)

$$\frac{243^{-\frac{2}{5}} \times 125^{\frac{2}{3}}}{9^{-\frac{3}{2}}}$$

6. Find the acute angle  $y$  if  $\sin 4y = \cos 2y$

( 2marks)

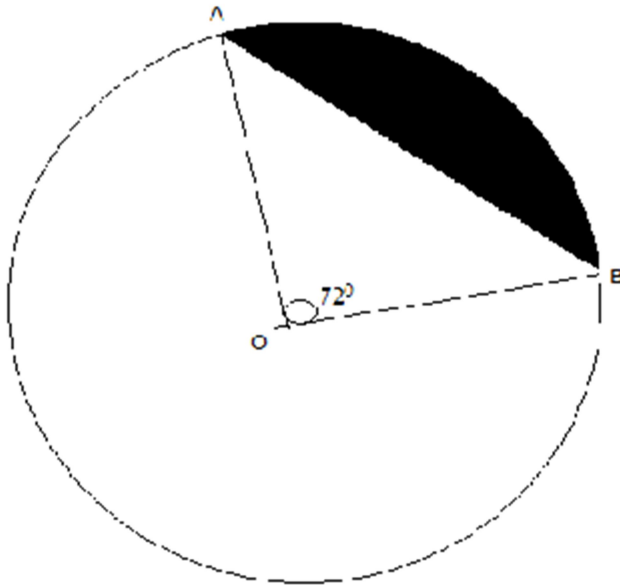
7. Simplify the expression  $\frac{3x^2 - 4x^2 + y}{9x^2 - y^2}$

(3 marks)

8. Show that the points P(3,4), Q(4,3) and R(1,6) are collinear (3 marks)

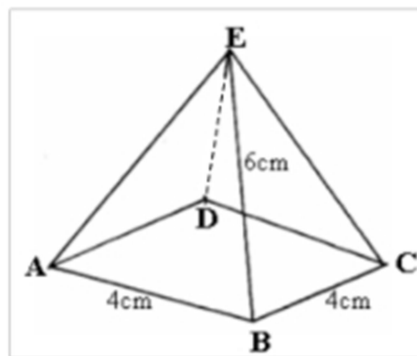
9. Two buses P and Q leave Kisumu at 7.30am and 9.30am respectively. If their speeds are 60km/h and 100km/h respectively, Find the time Q catches up with P (3 Marks)

10. The figure below shows a circle centre O and OAB is a sector of a circle. Angle AOB =  $72^\circ$  as shown. Given that the area of the sector AOB is  $5\pi\text{cm}^2$ , Find the radius of the circle and hence calculate the area of the shaded part (4 marks)



11. The surface area of two similar bottles is  $12\text{cm}^2$  and  $108\text{cm}^2$  respectively. If the larger one has a volume of  $810\text{cm}^3$ , Find the volume of the smaller one (3 marks)

12. Draw the net of the solid below given that it is a right pyramid and  $AB = 4\text{cm} = BC = CD = AD$  and  $BE = 6\text{cm}$ . (3 marks)



13. Three metal rods of lengths 234cm, 270cm and 324cm were cut into short pieces all of the same length to make window grills. Calculate the length of the longest piece that can be cut from each of the rods and hence the total number of pieces that can be obtained from the rods (3 marks)

14. Solve the inequalities and represent the solution on a number line (3 marks)
- $$3x - 9 < 5x + 3 \leq 2x - 6$$

15. A straight line passes through points A (-2,6) and B (4,2). (2 marks)
- (a) M is the midpoint of line AB. Find the coordinates of M

(b) Determine the equation of a straight line passing through point M and is perpendicular to AB (2 marks)

16. (a) Each interior angle of a regular polygon is  $120^\circ$  larger than the exterior angle. How many sides does the polygon have? (2 marks)

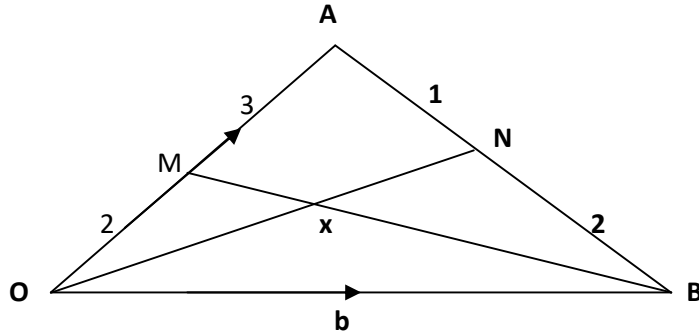
(b) The length of its sides given that the perimeter of the polygon is 120cm (1 marks)



## SECTION II (50 MARKS)

Answer only **five** questions in this section in the spaces provided.

17. OAB is a triangle which  $OA = a$  and  $OB = b$ . M is a point on OA such that  $OM:MA = 2:3$  and N is another point on AB such that  $AN:NB = 1:2$ . Lines ON and MB intersect at x.



- (a) Express the following vectors in terms of  $\underline{a}$  and  $\underline{b}$

i)  $\underline{AB}$

(1 mark)

ii)  $\underline{ON}$

(1 mark)

iii)  $\underline{BM}$

(1 mark)

- (b) If  $\underline{OX} = k\underline{ON}$  and  $\underline{BX} = h\underline{BM}$ . Express  $\underline{OX}$  in two different ways. Hence or otherwise find the value of h and k.

(6 marks)

- (c) Determine the ratio OX: XN

(1 mark)

18. The data below shows the sample of age distribution of some of the people who reside in a certain village in years.

Age group	Number of people in age group	
1 – 5	4	
6 – 10	12	
11 – 20	9	
21 -30	6	
31 – 50	18	
51 – 55	4	
56 - 65	2	

- (a) Complete the frequency distribution table above and hence:

(i) Calculate the mean

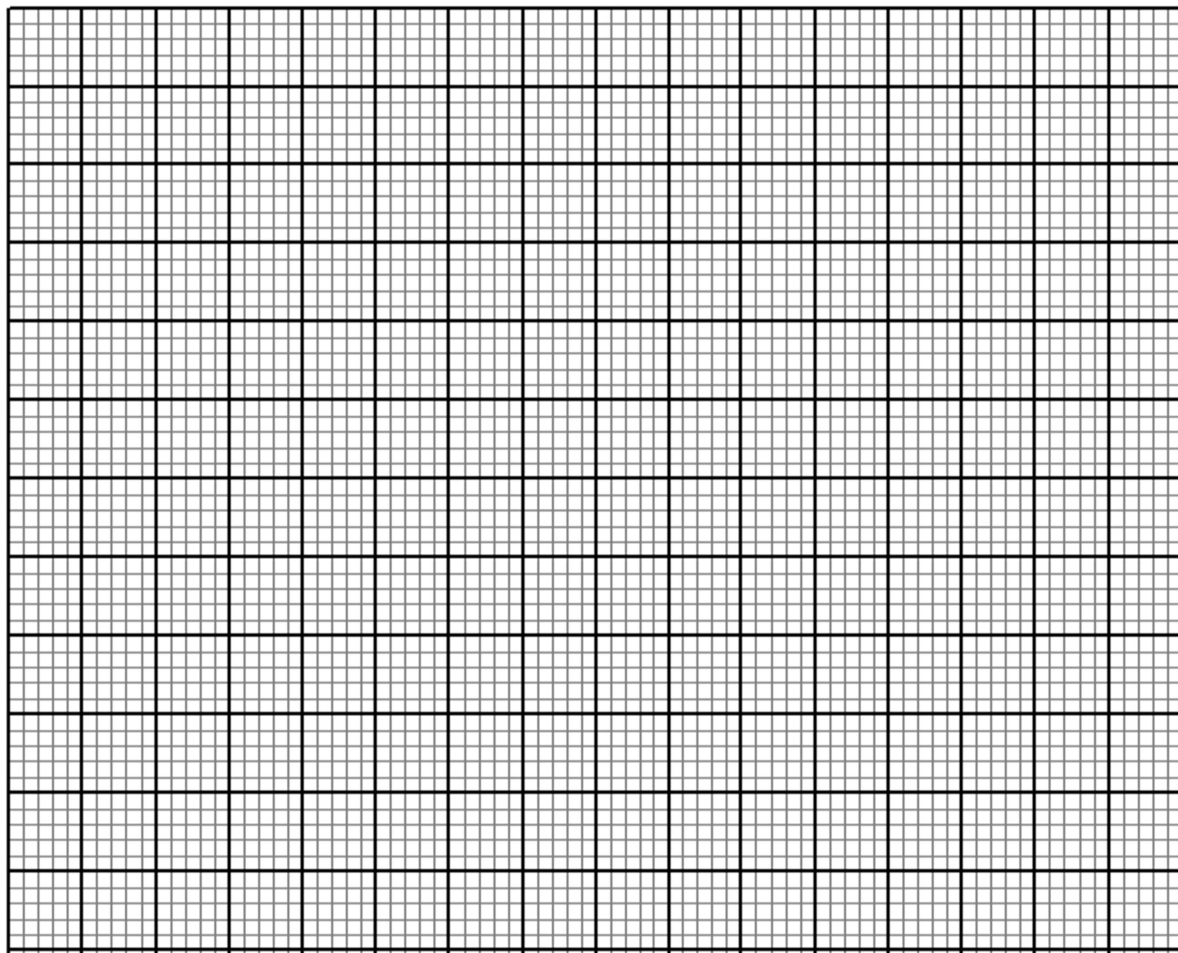
(3 marks)

(ii) Calculate the median

(3 marks)

- (b) Draw the frequency polygon from the given data on the grid below

(4 marks)



19. A kite ABCD has vertices at A(1,1), B(6,2), C(6,6) and D (2,6)

(a) Draw kite ABCD on the Cartesian plane

(1 mark)

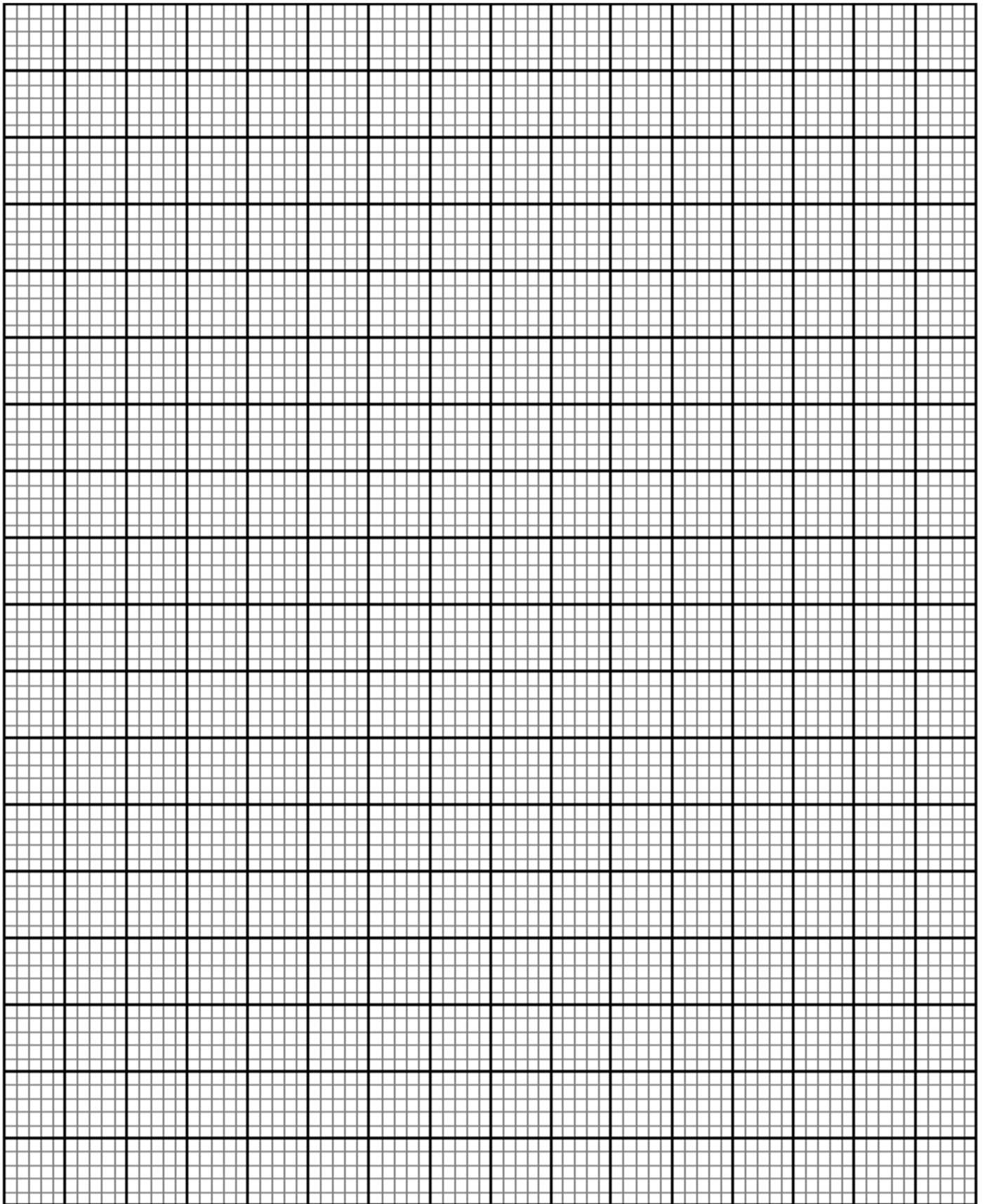
(b) On the same axes:

(i) Draw the image  $A^I B^I C^I D^I$  of ABCD under a rotation of  $90^\circ$  clockwise about the origin and state its coordinates (2 marks)

(ii) Draw  $A^{II} B^{II} C^{II} D^{II}$  the image of  $\Delta A^I B^I C^I D^I$  under reflection in the line  $y = x$ . State the coordinates of  $A^{II}$ ,  $B^{II}$ ,  $C^{II}$  and  $D^{II}$  (3 marks)

(iii)  $A^{III} B^{III} C^{III} D^{III}$  is the image of  $A^{II} B^{II} C^{II} D^{II}$  under a rotation of  $90^\circ$  anticlockwise about the origin. Draw  $A^{III} B^{III} C^{III} D^{III}$  and state the coordinates of its vertices (2 marks)

(iv) Describe a single transformation that map  $A^{III} B^{III} C^{III} D^{III}$  onto ABCD (2 marks)



20. A trader bought 2 cows and 9 goats for shs. 98200. If she had bought 3 cows and 4 goats she would have spent shs.2200 less.

(a) Form two equations to represent the above information (2 marks)

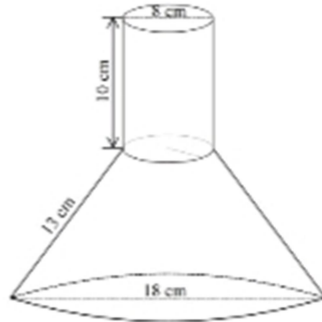
(b) Use the matrix method to determine the cost of a cow and that of a goat (4 marks)

(c) The trader sold the animals she had bought making a profit of 30% per cow and 40% per goat.

(i) Calculate the total amount of money she received (2 marks)

(ii) Determine, correct to 4 significant figures, the percentage profit the trader made from the sale of the animals (2 marks)

21. The figure below represents a container consisting of a cylindrical part of internal diameter 8cm and a conical part of internal diameter 18cm. The slant length of the conical part is 13cm and the height of the cylindrical part is 10cm.



Calculate in terms of  $\pi$ ;

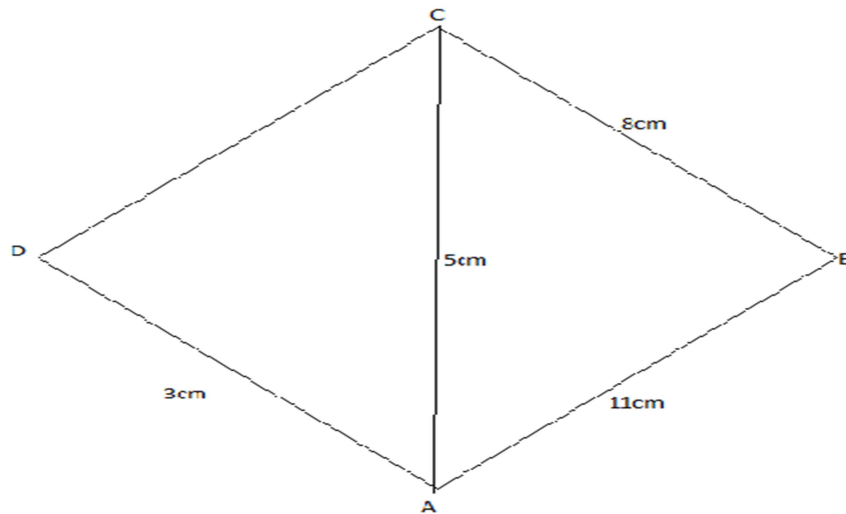
- (a) The internal surface area of the container

(5 marks)

- (b) The volume of the solid

(5 marks)

22. In the figure below  $AB=11\text{cm}$ ,  $BC=8\text{cm}$ ,  $AD=3\text{cm}$ ,  $AC=5\text{cm}$  and  $\angle DAC$  is a right angle.



Calculate, correct to one decimal place:

(a) The length of DC (2 marks)

(b) The size of  $\angle ADC$  (2 marks)

(c) The size of  $\angle ACB$  (3 marks)

(d) The area of the quadrilateral ABCD (3 marks)



23. A particle moving along a straight line passes through a fixed point P. Its displacement  $S$  metres from P after a period of  $t$  seconds is given  $S = t^3 - 5t^2 + 3$ .

Find;

(a) The particle's displacement from P at  $t=4$  (2 marks)

(b) The particle's velocity at  $t=4$  (3 marks)

(c) The possible value(s) of  $t$  when the particle is momentarily at rest (3 marks)

(d) The acceleration of the particle at  $t=3$  (2 marks)

24. Town B is 102km on a bearing of  $122^{\circ}$  from town A. Town C is 94km on a bearing of  $062^{\circ}$  from B. Town D is on a bearing of  $062^{\circ}$  from B. Town D is on a bearing of  $073^{\circ}$  from A and  $336^{\circ}$  from C.
- (a) Using a scale of 1cm represent 20km, draw a scale diagram to show the relative positions of town A, B, C and D (4 marks)

- (b) Using your diagram, determine;
- (i) The bearing of B From D (2 marks)
- (ii) The distance from town A to D (2 mark)
- (iii) The bearing of town A from C (1 mark)
- (iv) The distance from town B to D (1 mark)