



BOTSWANA EXAMINATIONS COUNCIL  
in collaboration with  
UNIVERSITY OF CAMBRIDGE LOCAL EXAMINATIONS SYNDICATE  
Botswana General Certificate of Secondary Education

CANDIDATE  
NAME

CENTRE  
NUMBER

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CANDIDATE  
NUMBER

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**MATHEMATICS**

**0563/02**

Paper 2

**October/November 2010**

**2 hours**

Candidates answer on the Question Paper.

Additional Materials: Geometrical instruments  
Electronic calculator

**READ THESE INSTRUCTIONS FIRST**

Write your centre number, candidate number and name in the spaces provided at the top of this page.

Answer **all** questions.

Write your answers in the spaces provided on this question paper.

If working is needed for any question it must be shown below that question. Omission of essential working will result in loss of marks.

Do not use staples, paper clips, highlighters, glue or correction fluid.

The number of marks is given in brackets [ ] at the end of each question or part question.

The total of the marks for this paper is 75.

If the degree of accuracy is not specified in the question and if the answer is not exact, the answer should be given to three significant figures. Answers in degrees should be given to one decimal place.

In any question where the value of  $\pi$  is required, use the value from your calculator or take  $\pi$  as 3.142.

**For Examiner's Use**

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This document consists of **14** printed pages and **2** blank pages.

**Mathematical formulae for papers 1 and 2**

**Surface area and volume of solids**

Name of solid	Total surface area	Volume
cone	$\pi r^2 + \pi r l$	$\frac{1}{3} \pi r^2 h$
pyramid		$\frac{1}{3}$ base area $\times$ height
sphere	$4\pi r^2$	$\frac{4}{3} \pi r^3$

**Trigonometry**

Sine Rule  $\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

Area of a triangle  $= \frac{1}{2} ab \sin C$

- 1 The table below shows prices, in Pula, of selected food items from Yarona, Mmabana and Semausu supermarkets.

ITEM	SUPERMARKET		
	YARONA	MMABANA	SEMAUSU
White sugar	P7.75	P6.20	P6.90
Four Flowers tea	P15.50	P16.90	P14.95
Cool Cola	P10.95	P11.15	P12.50

- (a) Kgosi buys the three items from one supermarket.  
What is the highest total amount that he will have to pay?

Answer (a) P..... [2]

- (b) Tshidi buys the three items from different supermarkets such that she pays the least amount.  
How much will she pay?

Answer (b) P..... [2]

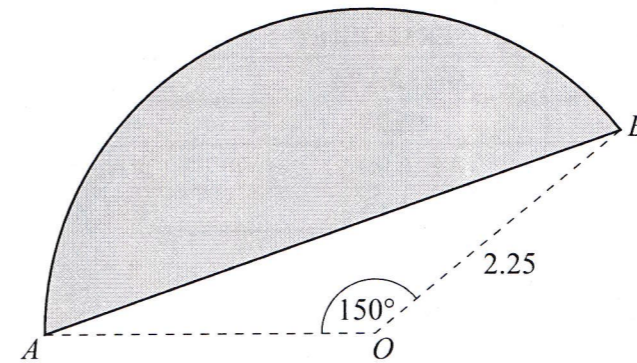
- (c) Mmabana supermarket reduces the price of Four Flowers tea to that of Semausu supermarket.  
Calculate the percentage reduction.

Answer (c).....% [2]

- (d) A wholesale price of Cool Cola is  $\frac{4}{5}$  of the price of Cool Cola at Yarona.  
How much is the wholesale price of Cool Cola?

Answer (d) P..... [2]

- 2 In the diagram below, the shaded segment represents the area of a floor with radius  $OA = OB = 2.25$  m and  $\angle AOB = 150^\circ$ .



- (a) Calculate the area of the sector  $AOB$ .

Answer (a) ..... m<sup>2</sup> [2]

- (b) Show that the area of the floor is  $5.63$  m<sup>2</sup>, correct to 3 significant figures.

Answer (b) ..... m<sup>2</sup> [3]

- (c) The floor is to be tiled. Tiles are sold in boxes, each containing enough to cover an area of  $1.5$  m<sup>2</sup>.

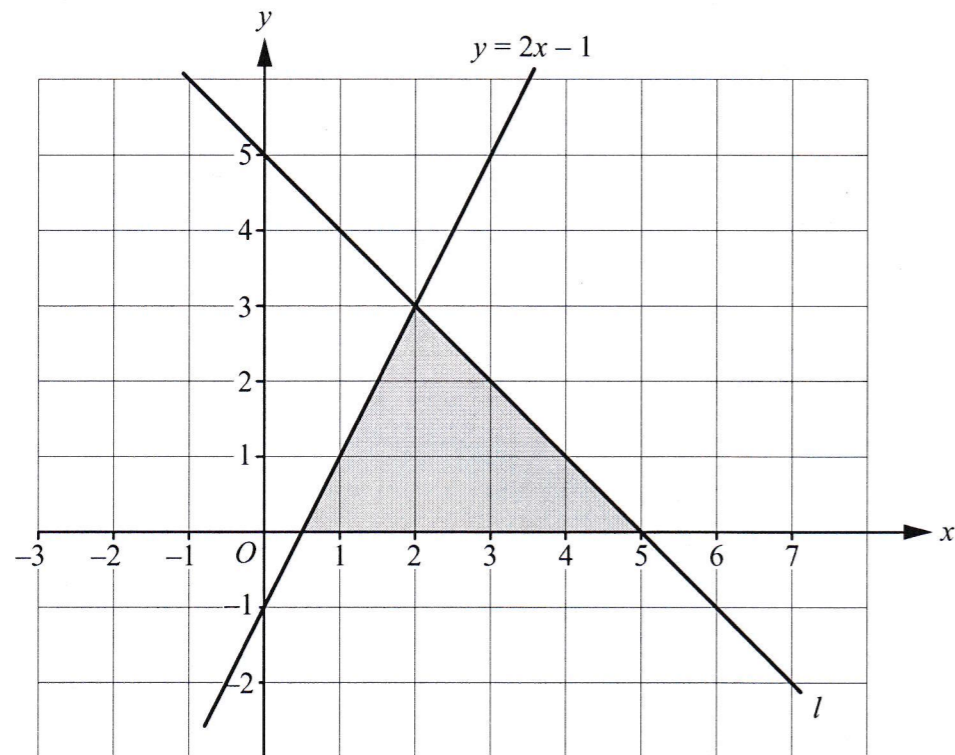
- (i) Calculate the least number of boxes required to cover the whole floor.

Answer (c)(i) .....boxes [2]

- (ii) One box of tiles costs P169.95. How much money is required to buy the least number of boxes to cover the whole floor?

Answer (c)(ii) P..... [2]

3 The diagram below shows a shaded region bounded by  $y = 2x - 1$ , the line  $l$  and the  $x$ -axis.



(a) Write down the coordinates of the point of intersection of  $y = 2x - 1$  and  $l$ .

Answer (a) ..... [1]

(b) Find the equation of line  $l$ .

Answer (b) ..... [2]

(c) The shaded region is described by  $y \geq 0$  and two other inequalities. Write down the other two inequalities.

Answer (c) ..... , ..... [2]

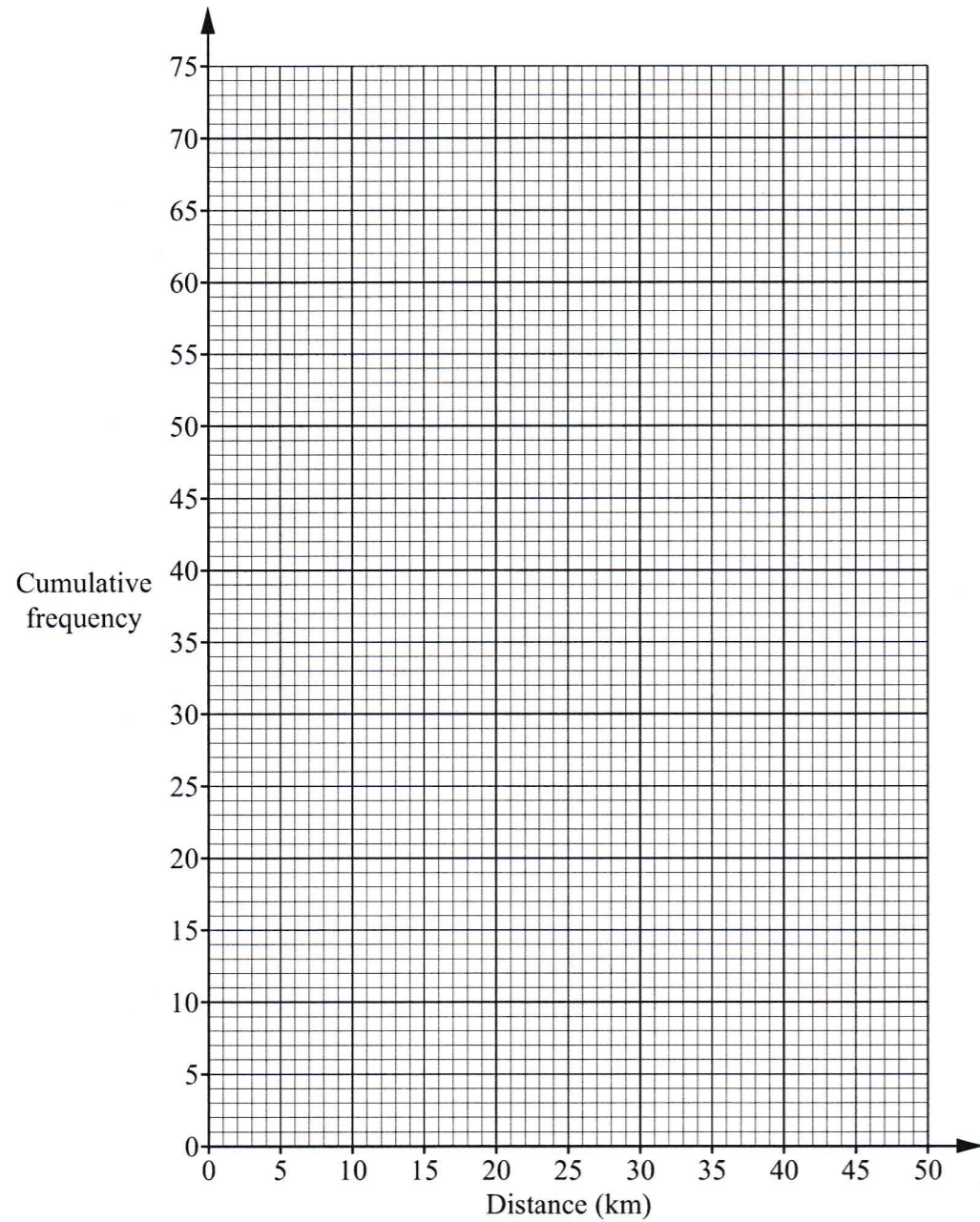
4 The table below shows distances, in km, from home to school for a group of 75 students.

Distance (km)	Number of students	Cumulative frequency
$0 < d \leq 5$	1	1
$5 < d \leq 10$	3	4
$10 < d \leq 15$	4	8
$15 < d \leq 20$	5	
$20 < d \leq 25$	11	
$25 < d \leq 30$	20	
$30 < d \leq 35$	18	
$35 < d \leq 40$	8	
$40 < d \leq 45$	4	
$45 < d \leq 50$	1	

(a) Complete the cumulative frequency column.

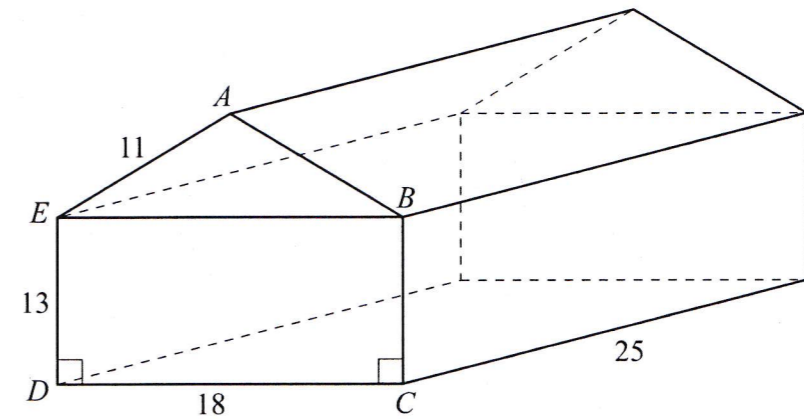
[11]

- (b) On the pair of axes provided, draw a cumulative frequency curve for the distances from home to school. [3]



- (c) Use the curve to find
- (i) the number of students whose homes are at the most 28 km from the school,  
 Answer (c)(i) ..... [2]
- (ii) the probability that a student picked at random stays at least 42 km from the school.  
 Answer (c)(ii) ..... [2]

- 5 The diagram below shows a wooden block of length 25 cm. The wooden block has a pentagonal cross section  $ABCDE$  such that  $DC = 18$  cm,  $AB = AE = 11$  cm and  $ED = BC = 13$  cm.  $\hat{BCD} = \hat{CDE} = 90^\circ$ .



- (a) Calculate the shortest distance from  $A$  to  $BE$ .

Answer (a) ..... cm [2]

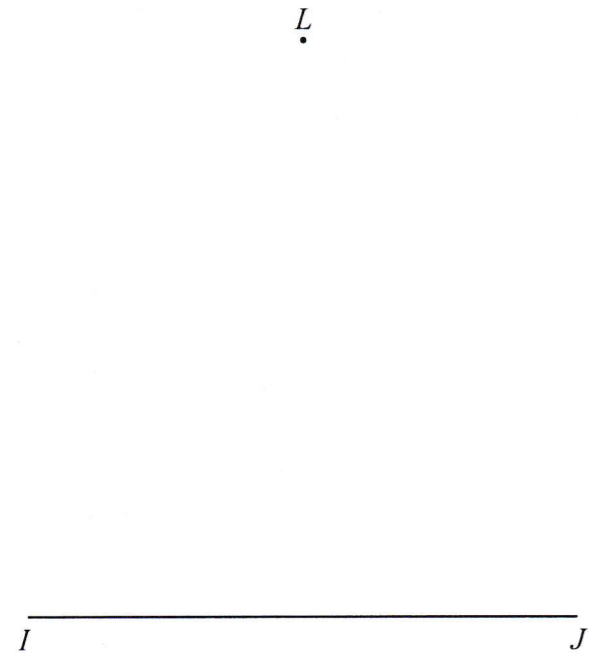
- (b) Show that the area of the cross section  $ABCDE$  is  $291 \text{ cm}^2$ , correct to 3 significant figures.

Answer (b) .....  $\text{cm}^2$  [3]

- (c) The whole wooden block is to be painted. Calculate the total surface area to be painted.

Answer (c) .....  $\text{cm}^2$  [3]

6 In the diagram below, the line segment  $IJ$  and point  $L$  are part of a quadrilateral  $IJKL$ .



- (a) The point  $K$  is such that  $LK$  is parallel and equal to  $IJ$ . Construct the line segment  $LK$ . [1]
- (b) Draw the lines  $IL$  and  $JK$  to complete the quadrilateral  $IJKL$ . [2]
- (c) What is the name of quadrilateral  $IJKL$ ?  

*Answer (c)*..... [1]
- (d) Construct the locus of points which are the same distances from  $IL$  as they are from  $IJ$ . [2]

7 The table below shows a physical activity and the corresponding energy, in kJ, burnt per hour.

<i>Physical Activity</i>	<i>Energy (kJ) burnt per hour</i>
Housework	1050
Gardening	1500
Jogging	2500
Watching TV	420

- (a) Which activity burns the least energy?  

*Answer (a)*..... [1]
- (b) Write down the energy burnt per hour during housework in standard form, correct to 2 significant figures.  

*Answer (b)*..... kJ [2]
- (c) (i) Brian jogs for  $1\frac{1}{2}$  hours.  
How much energy will he burn?  

*Answer (c)(i)*..... kJ [2]
- (ii) Matshediso is doing gardening but she needs to burn the same amount of energy as Brian burns in  $1\frac{1}{2}$  hours of jogging.  
How many hours of gardening does she need to do?  

*Answer (c)(ii)*..... hrs [2]

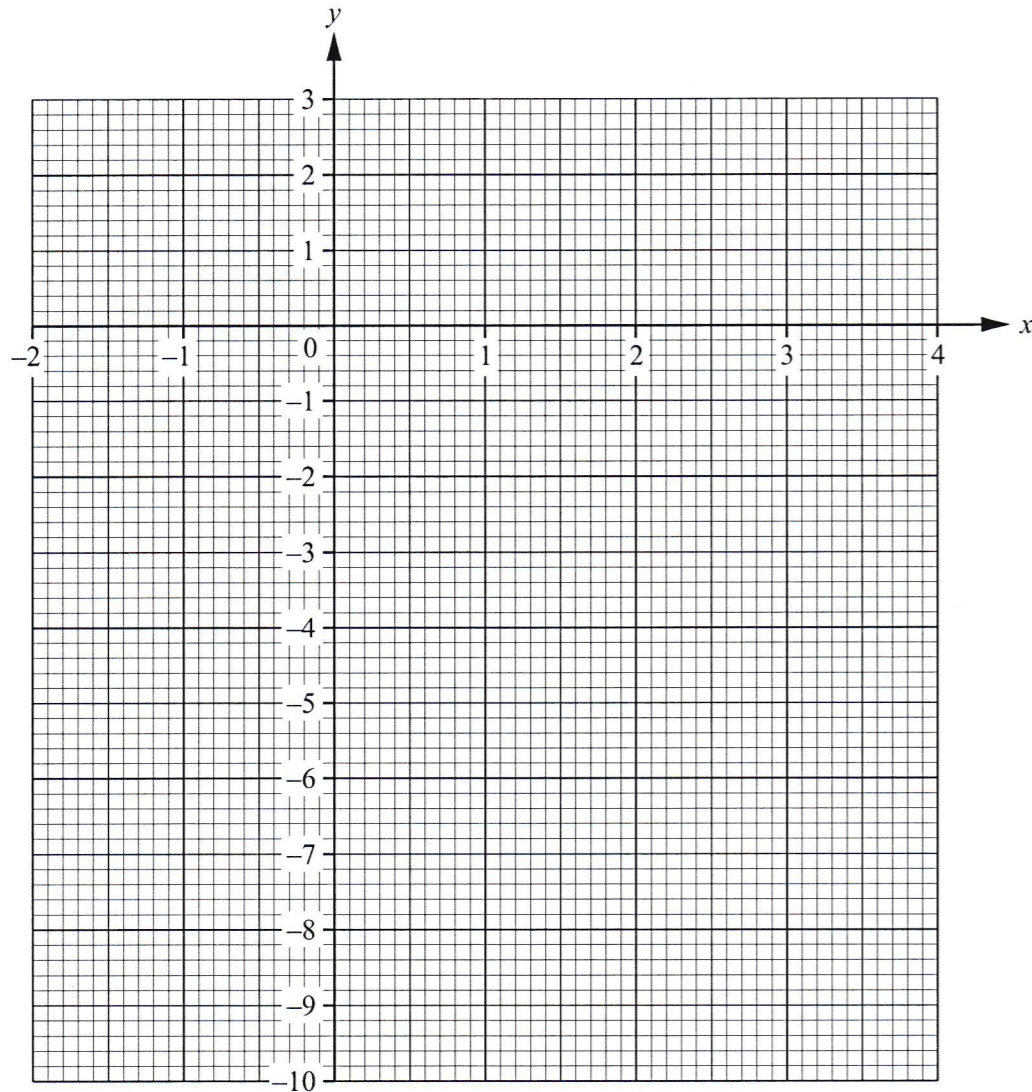
8 The table below shows the values of  $x$  and the corresponding values of  $y$  for  $y = 2 + x - x^2$ .

$x$	-2	-1	0	$\frac{1}{2}$	1	2	3	4
$y$	-4	0	2	$2\frac{1}{4}$	2	0	-4	$d$

(a) Calculate the value of  $d$ .

Answer (a)..... [1]

(b) On the pair of axes provided, draw the graph of  $y = 2 + x - x^2$  for values of  $x$  from -2 to 4.

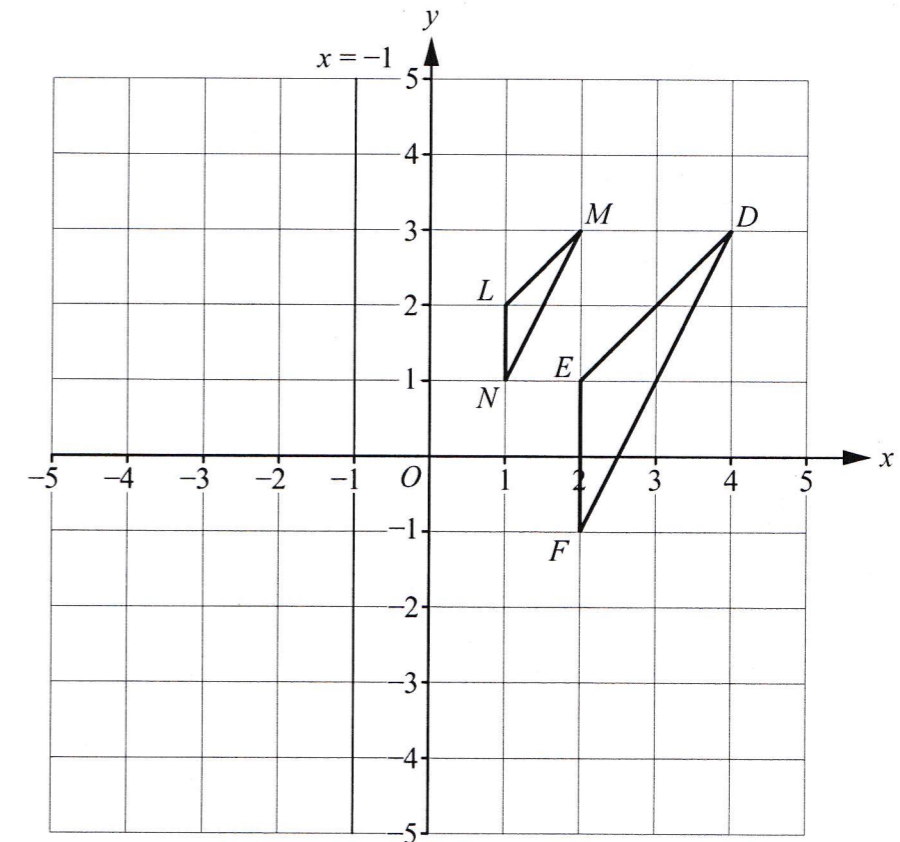


[3]

(c) Use the graph to find the values of  $x$  when  $y = 1\frac{1}{2}$ .

Answer (c)..... [2]

9 The diagram below shows triangles  $LMN$ ,  $EDF$  and line  $x = -1$ .



(a) Describe fully the transformation that maps triangle  $LMN$  onto triangle  $EDF$ . [3]

(b) Reflect triangle  $LMN$  in the line  $x = -1$ .  
Label the image  $PQR$ . [2]

(c) Translate triangle  $LMN$  using column vector  $\begin{pmatrix} 3 \\ -5 \end{pmatrix}$ .  
Label the image  $STU$ . [2]

10 (a) Factorise completely  $3ax + 4ay - 9x - 12y$ .

Answer (a)..... [2]

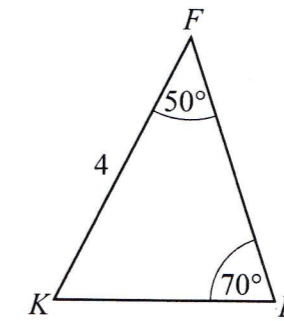
(b) Express as a single fraction  $\frac{2}{x+1} - \frac{3}{4}$ .

Answer (b)..... [2]

(c) Solve the equation  $\frac{1}{2} + \frac{x+2}{3} = 1$ .

Answer (c)..... [2]

11 The diagram below shows a farm house,  $F$ , a kraal,  $K$ , and a borehole,  $B$ . The kraal is 4 km away from the farm house.  $\hat{BFK} = 50^\circ$  and  $\hat{KBF} = 70^\circ$ .



(a) Calculate the distance between the kraal,  $K$ , and the borehole,  $B$ .

Answer (a).....km [3]

(b) A fence supported by poles is constructed from the kraal,  $K$ , to the farm house,  $F$ . The support poles are in a single file such that they are 6.4 m apart. There is a support pole at the kraal and at the farm house.

How many poles are needed for the fence?

Answer (b)..... poles [2]