



- 1** The Smith family paid \$5635 for a holiday in India.  
The total cost was divided in the ratio travel : accommodation : entertainment = 10 : 17 : 8.

**(a)** Calculate the percentage of the total cost spent on entertainment.

.....% [2]

**(b)** Show that the amount spent on accommodation was \$2737.

[2]

**(c)** The \$5635 was the total amount Mr Smith received from an investment he made 5 years ago.  
Compound interest at a rate of 2.42% per year was paid on this investment.

Calculate the amount he invested 5 years ago.

\$ ..... [3]

**(d)** Mr Smith, his wife and their three children visit a theme park.  
The tickets cost 2500 Rupees for an adult and 1650 Rupees for a child.

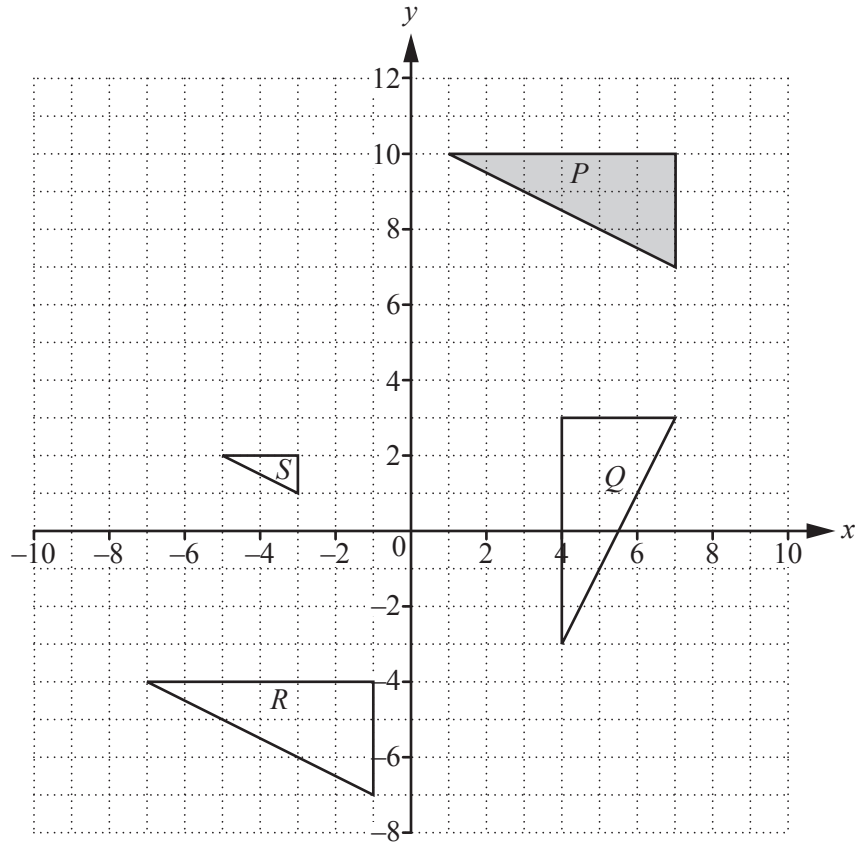
Calculate the total cost of the tickets.

..... Rupees [2]

**(e)** One day the youngest child spent 130 Rupees on sweets.  
On this day the exchange rate was 1 Rupee = \$0.0152 .

Calculate the value of the sweets in dollars, correct to the nearest cent.

\$ ..... [2]



(a) Describe fully the **single** transformation that maps

(i) shape *P* onto shape *Q*,

.....  
 ..... [3]

(ii) shape *P* onto shape *R*,

.....  
 ..... [2]

(iii) shape *P* onto shape *S*.

.....  
 ..... [3]

(b) (i) Draw the reflection of **shape S** in the line  $y = x$ . [2]

(ii) Write down the matrix that represents the transformation in **part (b)(i)**.

$\left( \begin{array}{cc} & \\ & \end{array} \right)$  [2]

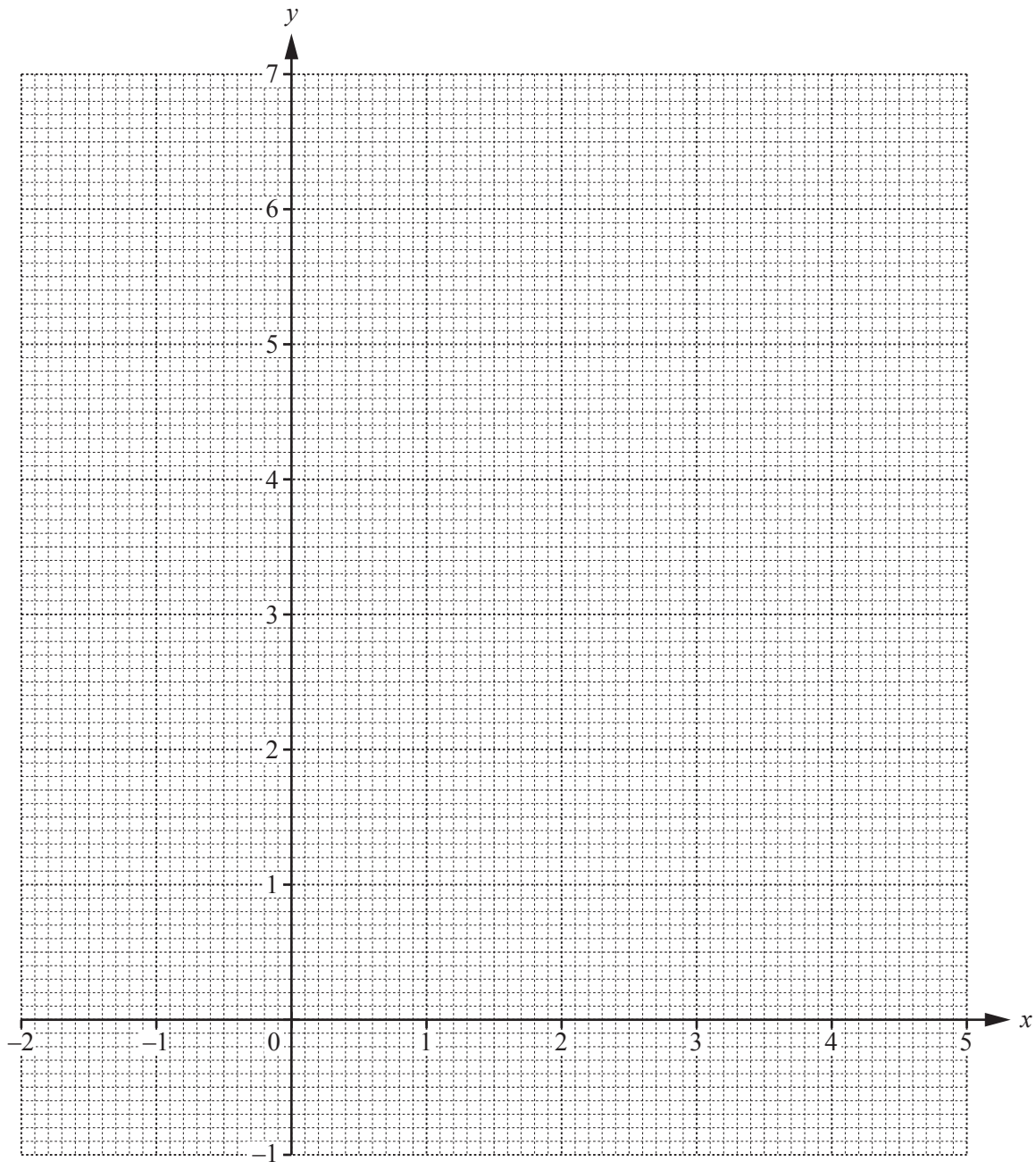
3 The table shows some values for  $y = 1.5^x - 1$ .

$x$	-2	-1	0	1	2	3	4	5
$y$	-0.56	-0.33				2.38	4.06	6.59

(a) Complete the table.

[3]

(b) Draw the graph of  $y = 1.5^x - 1$  for  $-2 \leq x \leq 5$ .



[4]

(c) Use your graph to solve the equation  $1.5^x - 1 = 3.5$ .

$x = \dots\dots\dots$  [2]

(d) By drawing a suitable straight line, solve the equation  $1.5^x - x - 2 = 0$ .

$x = \dots\dots\dots$  or  $x = \dots\dots\dots$  [3]

(e) (i) On the grid, plot the point  $A$  at  $(5, 5)$ . [1]

(ii) Draw the tangent to the graph of  $y = 1.5^x - 1$  that passes through the point  $A$ . [1]

(iii) Work out the gradient of this tangent.

$\dots\dots\dots$  [2]

- 4 Ravi spins a biased 5-sided spinner, numbered 1 to 5. The probability of each number is shown in the table.

Number	1	2	3	4	5
Probability	$\frac{1}{6}$	$\frac{1}{4}$	$\frac{1}{3}$	$x$	$x$

- (a) Find the value of  $x$ .

$$x = \dots\dots\dots [3]$$

- (b) Ravi spins the spinner once.

Find the probability that the number is 2 or 3.

$$\dots\dots\dots [2]$$

- (c) Ravi spins the spinner twice.

Find the probability that

- (i) the number is 2 both times,

$$\dots\dots\dots [2]$$

- (ii) the sum of the numbers is 3.

$$\dots\dots\dots [3]$$

- (d) Ravi spins the spinner 72 times.

Calculate how many times he expects the number 1.

$$\dots\dots\dots [1]$$

5 (a) (i) Factorise  $3x^2 + 11x - 4$ .

..... [2]

(ii) Solve the equation  $3x^2 + 11x - 4 = 0$ .

$x = \dots\dots\dots$  or  $x = \dots\dots\dots$  [1]

(b) (i) Show that  $\frac{2}{2x+11} - \frac{1}{x-4} = \frac{1}{2}$  simplifies to  $2x^2 + 3x - 6 = 0$ .

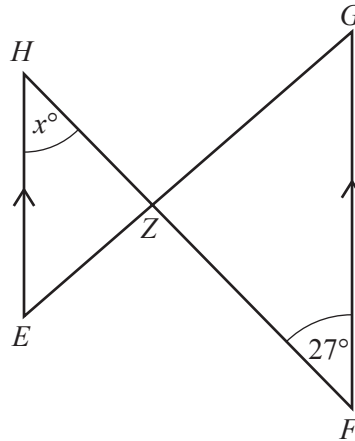
[4]

(ii) Solve the equation  $2x^2 + 3x - 6 = 0$ .

You must show all your working and give your answers correct to 2 decimal places.

$x = \dots\dots\dots$  or  $x = \dots\dots\dots$  [4]

6 (a)



NOT TO SCALE

In the diagram,  $EH$  is parallel to  $FG$ .  
The straight lines  $EG$  and  $FH$  intersect at  $Z$ .  
Angle  $ZFG = 27^\circ$ .

(i) Find the value of  $x$ .

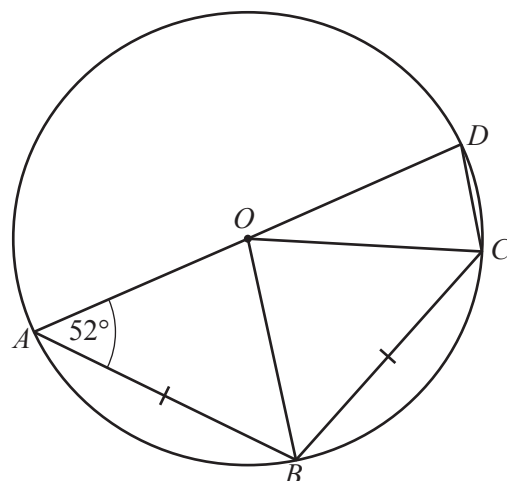
$x = \dots\dots\dots$  [1]

(ii)  $EH = 5$  cm,  $FG = 9$  cm and  $ZG = 7$  cm.

Calculate  $EZ$ .

$EZ = \dots\dots\dots$  cm [2]

(b) The diagram shows points  $A, B, C$  and  $D$  on the circumference of a circle, centre  $O$ .  
 $AD$  is a straight line,  $AB = BC$  and angle  $OAB = 52^\circ$ .



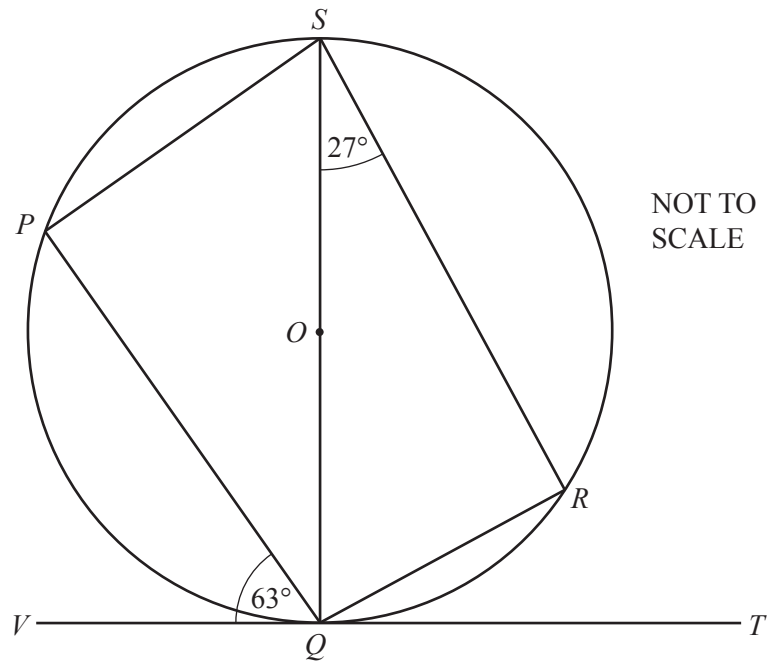
NOT TO SCALE

Find angle  $ADC$ .

Angle  $ADC = \dots\dots\dots$  [3]



- (c) The diagram shows points  $P, Q, R$  and  $S$  on the circumference of a circle, centre  $O$ .  $VT$  is the tangent to the circle at  $Q$ .



Complete the statements.

- (i) Angle  $QPS =$  angle  $QRS = \dots\dots\dots^\circ$  because  $\dots\dots\dots$   
 $\dots\dots\dots$  [2]
- (ii) Angle  $SQP = \dots\dots\dots^\circ$  because  $\dots\dots\dots$   
 $\dots\dots\dots$  [2]
- (iii) **Part (c)(i)** and **part (c)(ii)** show that  
 the cyclic quadrilateral  $PQRS$  is a  $\dots\dots\dots$  [1]

7 The table shows information about the time taken by 400 people to complete a race.

Time taken ( $m$ minutes)	$45 < m \leq 50$	$50 < m \leq 60$	$60 < m \leq 70$	$70 < m \leq 90$	$90 < m \leq 100$	$100 < m \leq 120$
Frequency	23	64	122	136	26	29

(a) Calculate an estimate of the mean time taken.

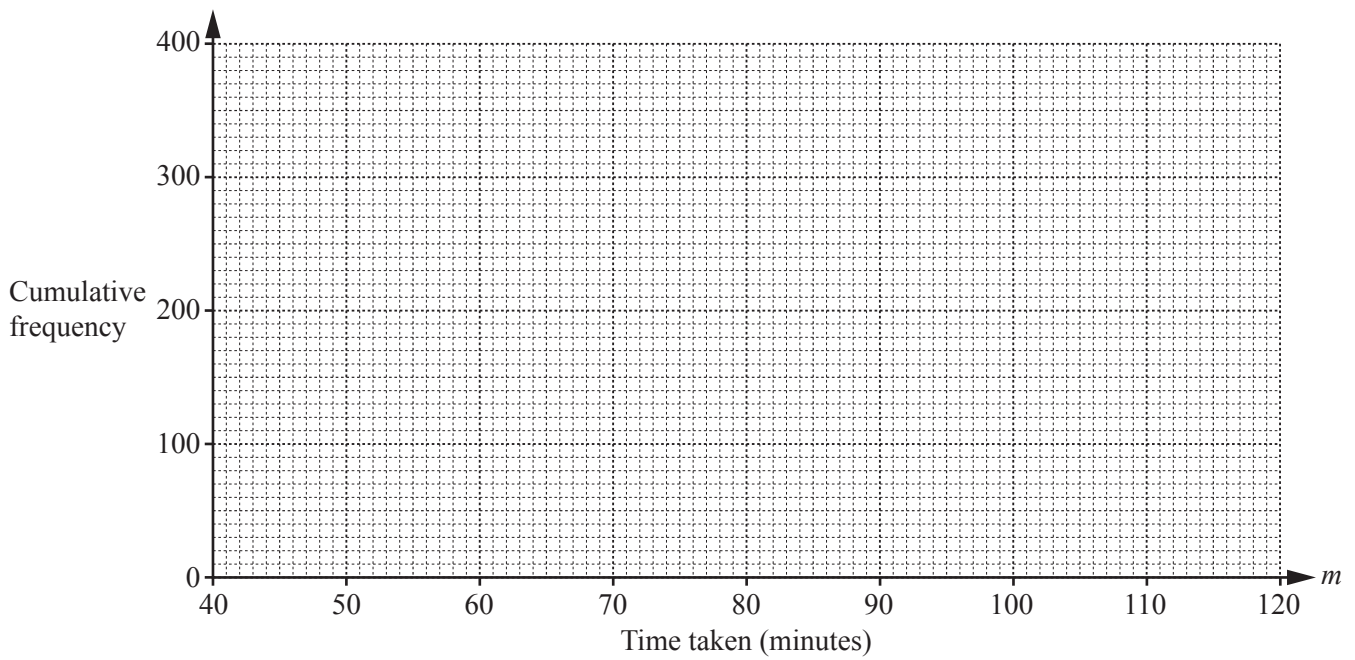
..... min [4]

(b) (i) Complete the cumulative frequency table.

Time taken ( $m$ minutes)	$m \leq 50$	$m \leq 60$	$m \leq 70$	$m \leq 90$	$m \leq 100$	$m \leq 120$
Cumulative frequency	23					400

[2]

(ii) On the grid, draw a cumulative frequency diagram to show this information.



[3]

(iii) Use your diagram to estimate

(a) the median,

..... min [1]

(b) the inter-quartile range,

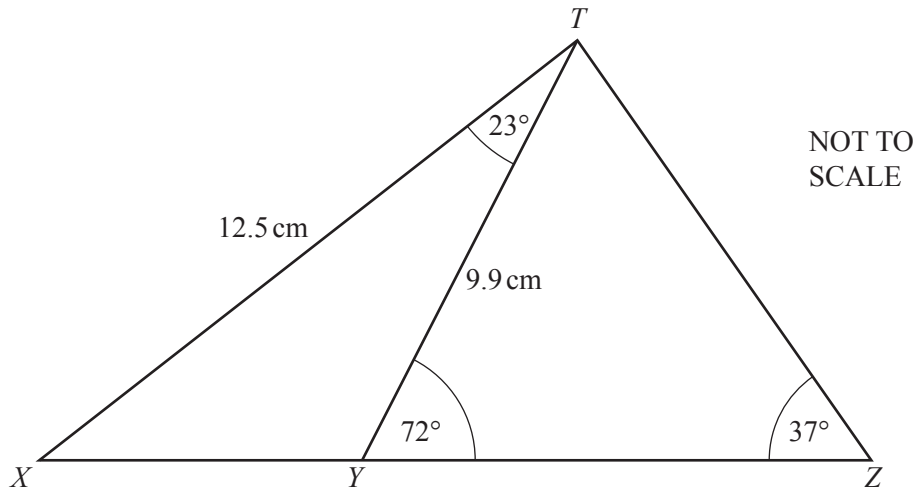
..... min [2]

(c) the 60th percentile.

..... min [2]

12

- 8 (a) In triangle  $TXZ$ ,  $TX = 12.5$  cm and angle  $TZX = 37^\circ$ .  
 $Y$  is a point on the line  $XZ$  such that  $TY = 9.9$  cm, angle  $XTY = 23^\circ$  and angle  $TYZ = 72^\circ$ .



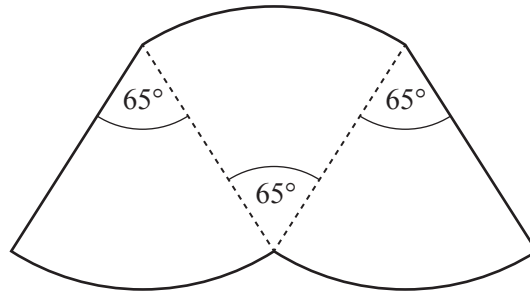
- (i) Calculate  $XY$ .

$$XY = \dots\dots\dots \text{ cm [4]}$$

- (ii) Calculate  $TZ$ .

$$TZ = \dots\dots\dots \text{ cm [3]}$$

- (b) The diagram shows a shape made up of three identical sectors of a circle, each with sector angle  $65^\circ$ . The perimeter of the shape is 20.5 cm.



NOT TO  
SCALE

Calculate the radius of the circle.

..... cm [4]

- 9 Bernie buys  $x$  packets of seeds and  $y$  plants for his garden.  
He wants to buy more packets of seeds than plants.  
The inequality  $x > y$  shows this information.

He also wants to buy

- less than 10 packets of seeds
- at least 2 plants.

- (a) Write down two more inequalities in  $x$  or  $y$  to show this information.

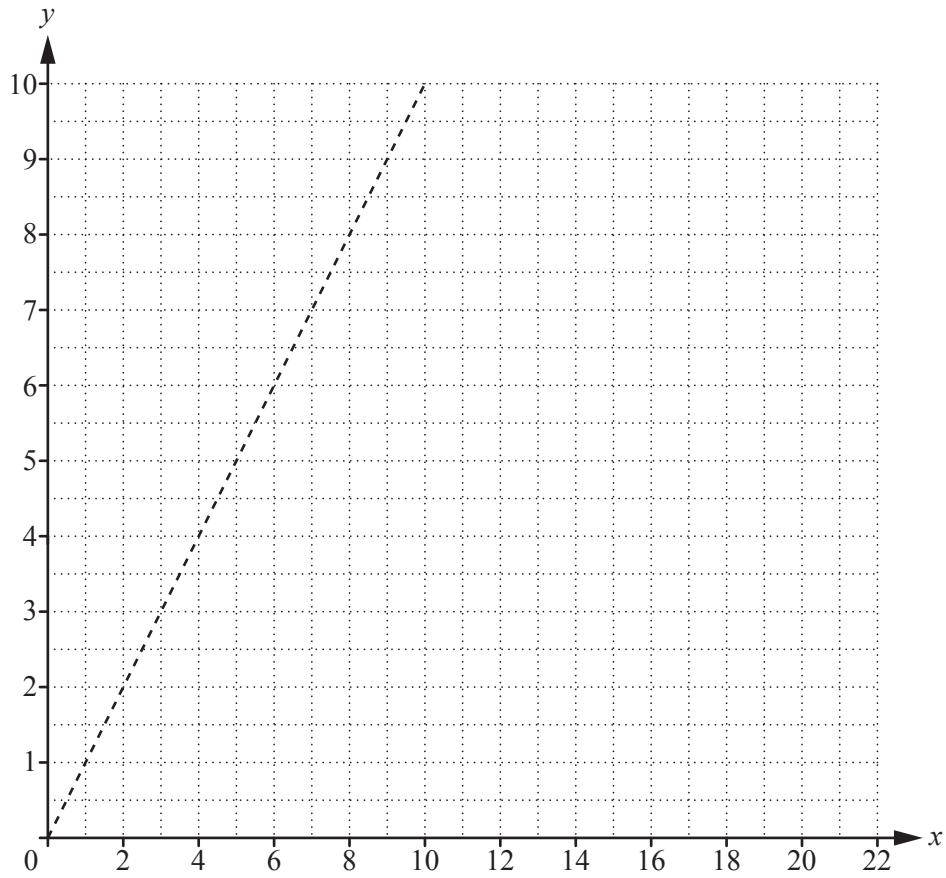
.....  
..... [2]

- (b) Each packet of seeds costs \$1 and each plant costs \$3.  
The maximum amount Bernie can spend is \$21.

Write down another inequality in  $x$  and  $y$  to show this information.

..... [1]

- (c) The line  $x = y$  is drawn on the grid.  
 Draw three more lines to show your inequalities and shade the **unwanted** regions.



[5]

- (d) Bernie buys 8 packets of seeds.

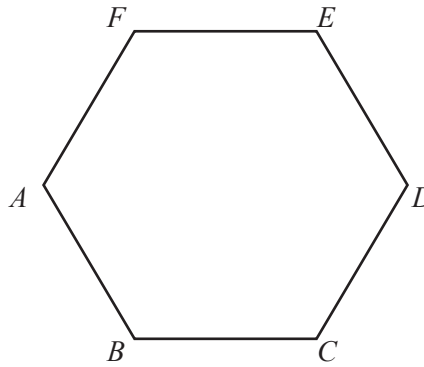
(i) Find the maximum number of plants he can buy.

..... [1]

(ii) Find the total cost of these packets of seeds and plants.

\$..... [1]

- 10 (a) The diagram shows a regular hexagon  $ABCDEF$  of side 10 cm.



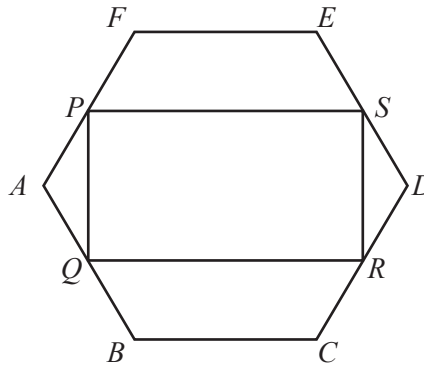
NOT TO SCALE

- (i) Show that angle  $BAF = 120^\circ$ .

[2]

- (ii) The vertices of a rectangle  $PQRS$  touch the sides  $FA$ ,  $AB$ ,  $CD$  and  $DE$ .

$PS$  is parallel to  $FE$  and  $AP = x$  cm.



NOT TO SCALE

Use trigonometry to find the length of  $PQ$  in terms of  $x$ .

$PQ = \dots\dots\dots$  cm [3]

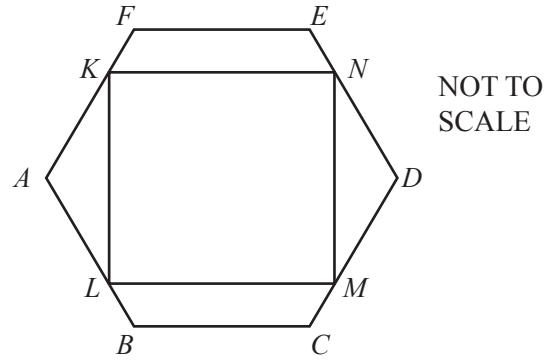
- (iii)  $PF = (10 - x)$  cm.

Show that  $PS = (20 - x)$  cm.

[3]



(b)



The diagram shows the vertices of a square  $KLMN$  touching the sides of the same hexagon  $ABCDEF$ , with  $KN$  parallel to  $FE$ .

Use your results from **part (a)(ii)** and **part (a)(iii)** to find the length of a side of the square.

..... cm [4]

- 11 On Monday, Ankuri sent this text message to two friends.

Today is Day Number 1.

Tomorrow, please add 1 to the Day Number and send this text message to two friends.

All the friends who receive a text message follow the instructions.

- (a) Complete the table.

Day	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Day Number	1	2	3				
Number of text messages sent today	2	4					

[4]

- (b) Write down an expression for the number of text messages sent on Day Number  $n$ .

..... [1]

- (c) Ankuri thinks that, by the end of Day Number 3, the **total** number of text messages that have been sent is  $2^4 - 2$ .

- (i) Show that she is correct.

[2]

- (ii) Complete the statement.

The **total** number of text messages sent by the end of Day Number 5 is ..... which is equal to  $2^k - 2$  where  $k =$  .....

[2]

- (iii) Write down an expression for the **total** number of text messages sent by the end of Day Number  $n$ .

..... [1]

- (iv) Find the Day Number when the **total** number of text messages sent by the end of the day is 1022.

..... [1]

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