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0580/42

February/March 2017

2 hours 30 minutes

Additional Materials: Electronic calculator Geometrical instruments
Tracing paper (optional)

READ THESE INSTRUCTIONS FIRST

DO **NOT** WRITE IN ANY BARCODES.

For π , use either your calculator value or 3.142.

The total of the marks for this paper is 130.

This document consists of **19** printed pages and **1** blank page.

- 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.

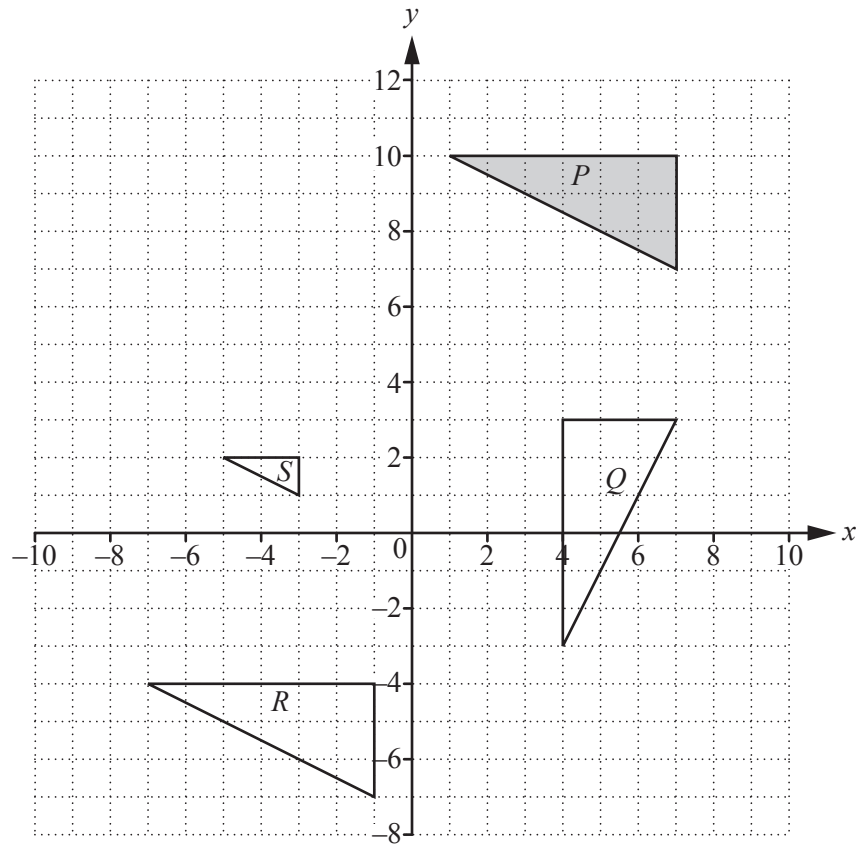
Calculate the total cost of the tickets.

..... 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)**.

$\begin{pmatrix} & \\ & \end{pmatrix}$ [2]

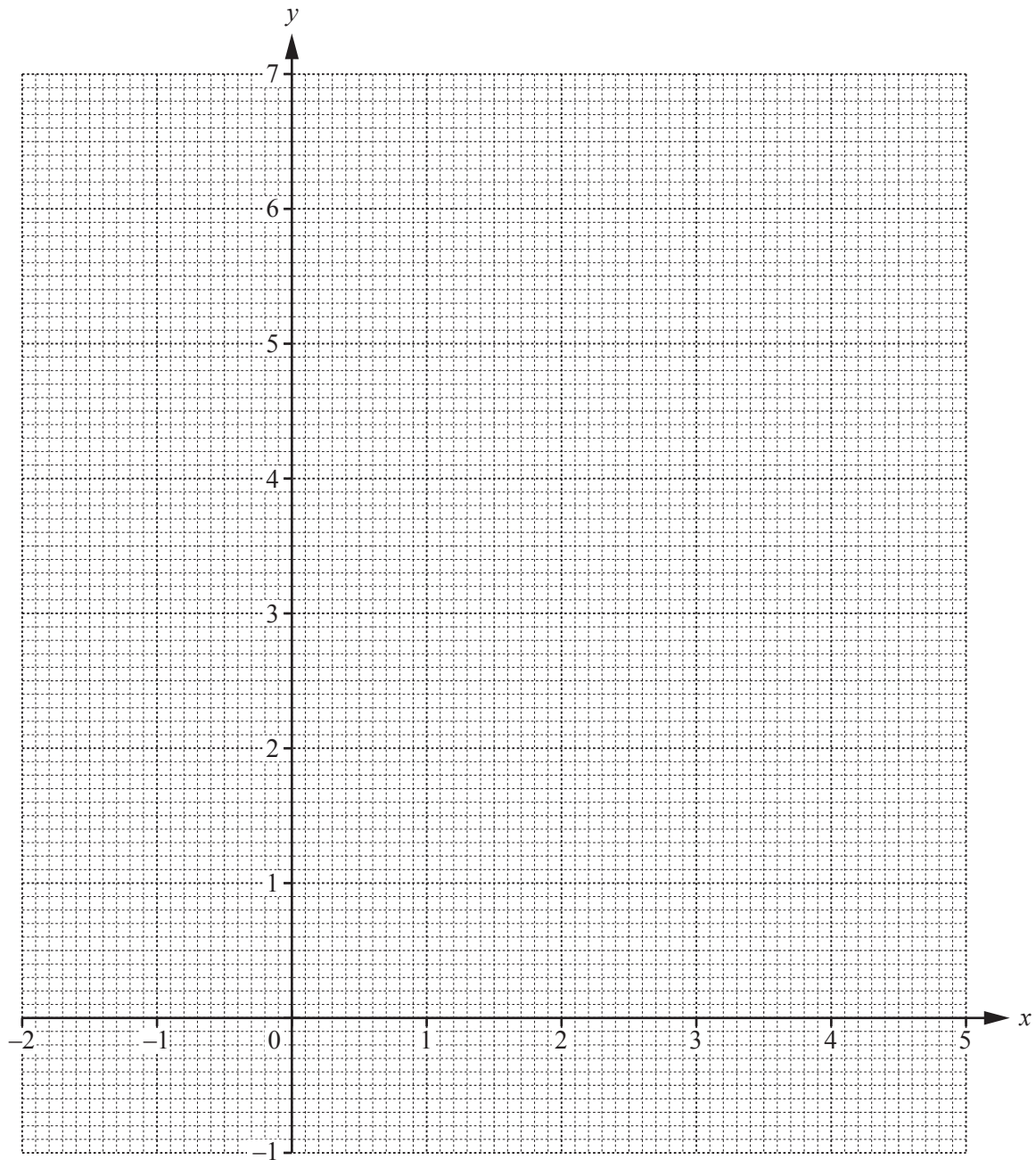
- 3 The table shows some values for $y = 1.5^x - 1$.

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]

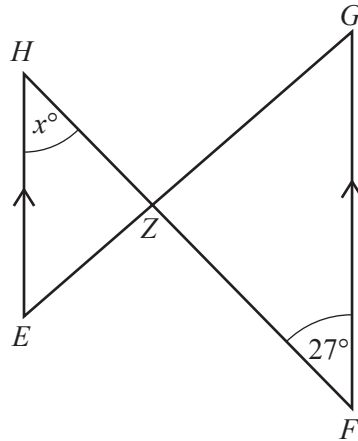
- (b) (i) Show that $\frac{2}{2x+11} - \frac{1}{x-4} = \frac{1}{2}$ simplifies to $2x^2 + 3x - 6 = 0$.

[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)

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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 .

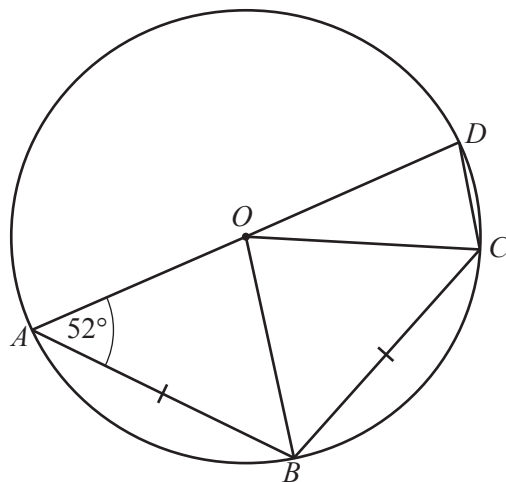
$x = \dots\dots\dots$ [1]

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

Calculate EZ .

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

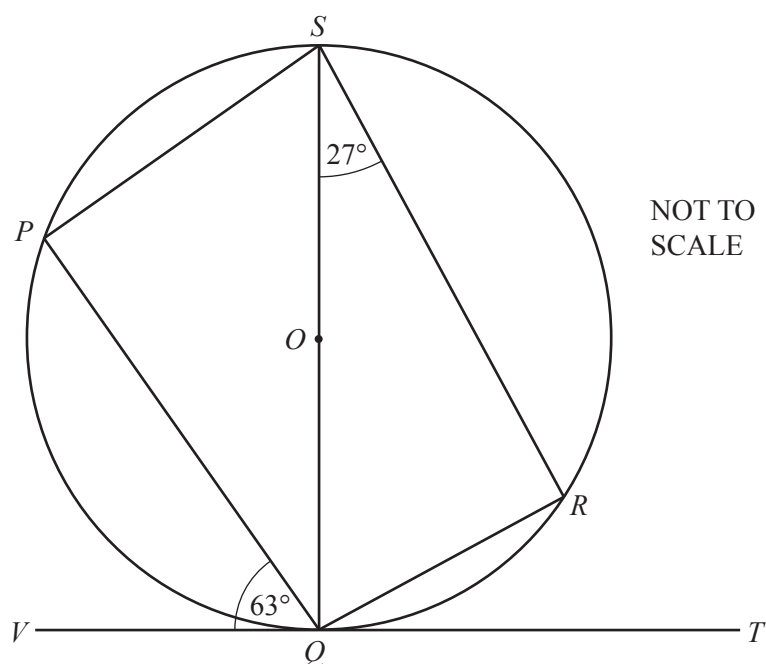
(b) The diagram shows points A , B , C and D on the circumference of a circle, centre O .
 AD is a straight line, $AB = BC$ and angle $OAB = 52^\circ$.

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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 = $^{\circ}$ because [2]
- (ii) Angle SQP = $^{\circ}$ because [2]
- (iii) **Part (c)(i)** and **part (c)(ii)** show that
the cyclic quadrilateral $PQRS$ is a [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.

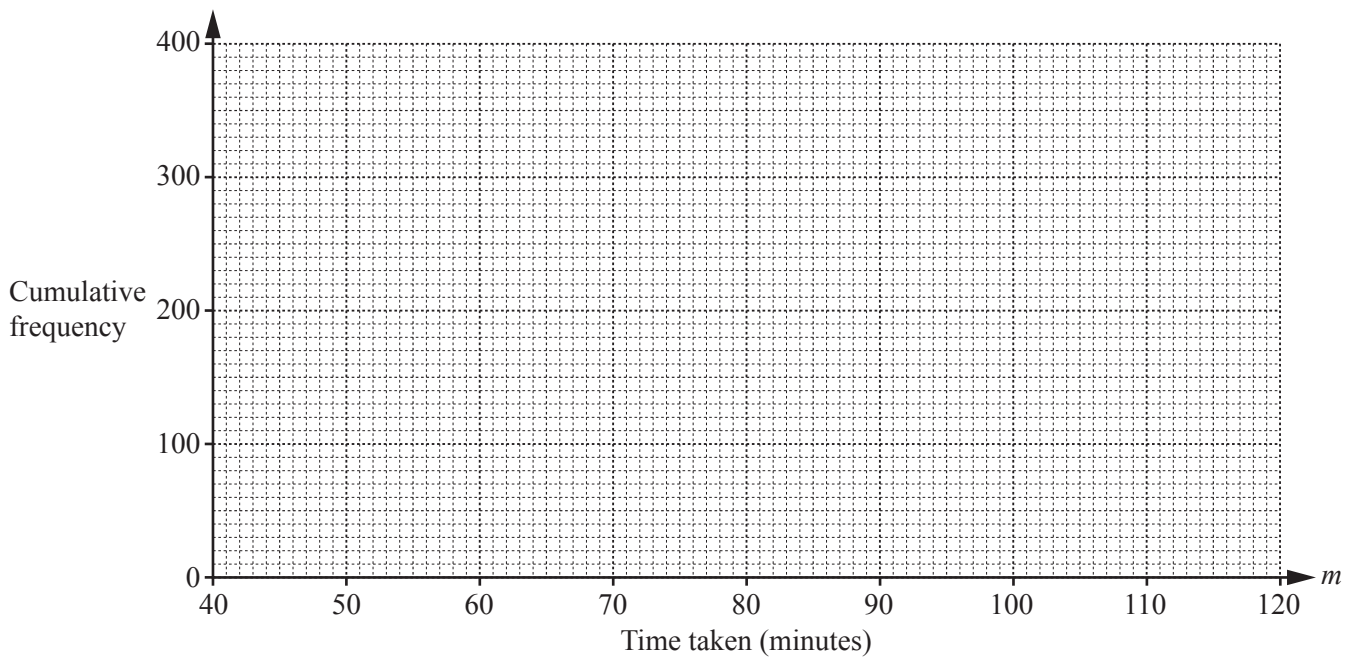
..... min [4]

- (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]

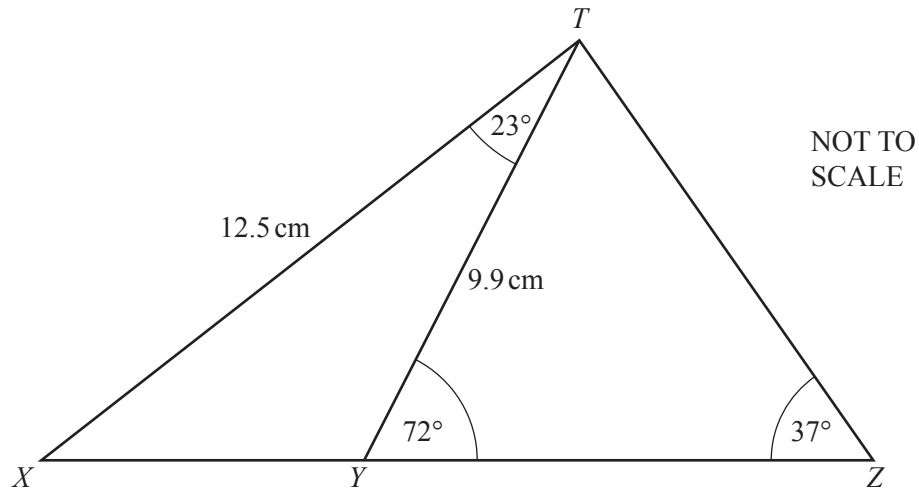
(b) the inter-quartile range,

..... min [2]

(c) the 60th percentile.

..... min [2]

- 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 $TYZ = 72^\circ$.



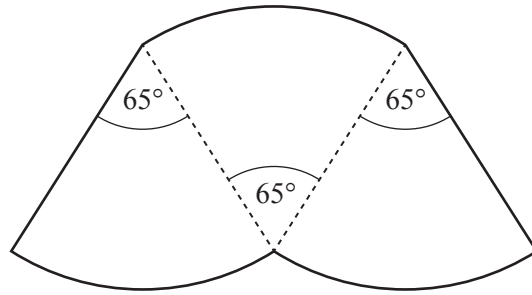
- (i) Calculate XY .

$XY = \dots\dots\dots$ cm [4]

- (ii) Calculate TZ .

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

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



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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.

.....

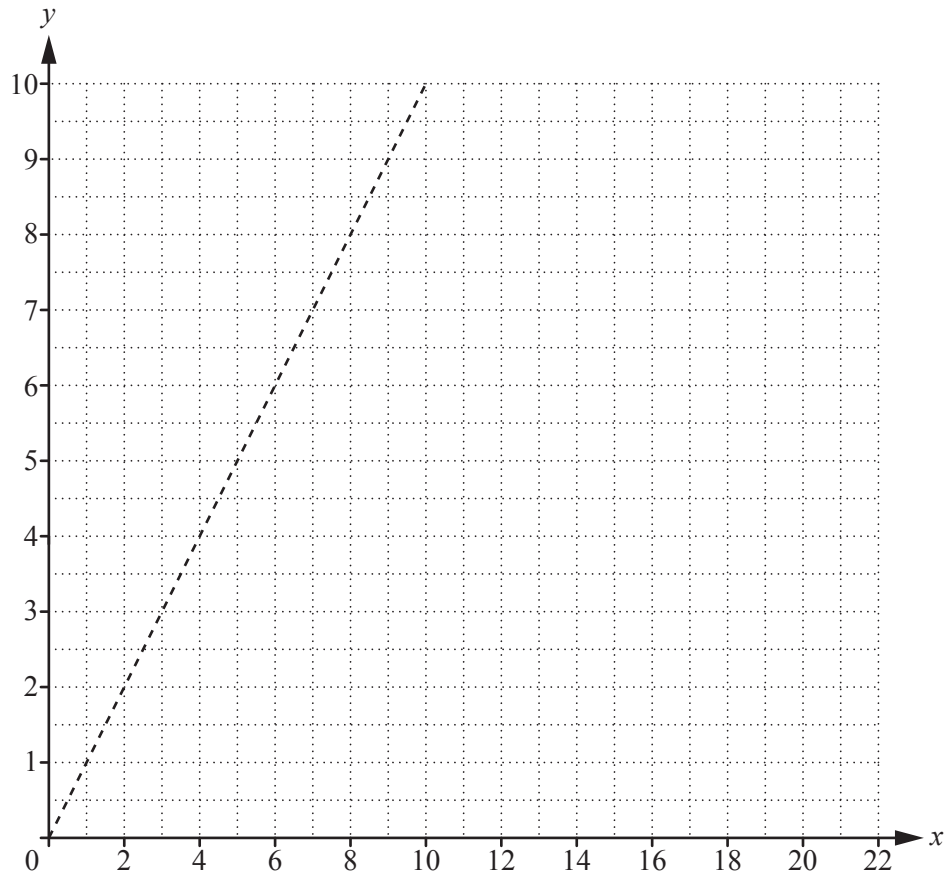
..... [2]

- (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.

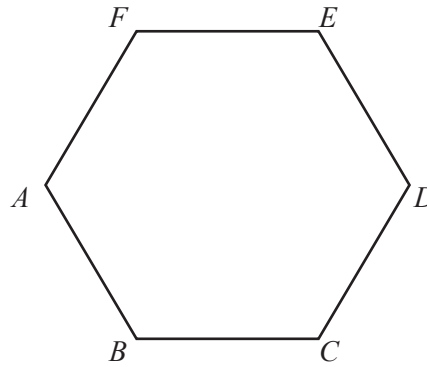
(i) Find the maximum number of plants he can buy.

..... [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.



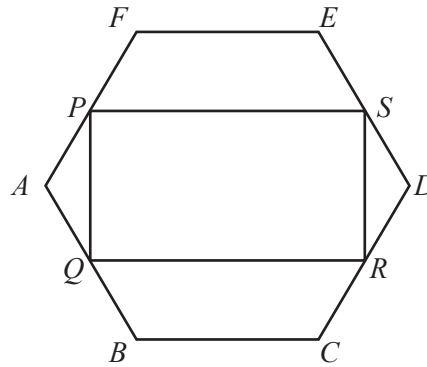
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- (i) Show that angle $BAF = 120^\circ$.

[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.



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

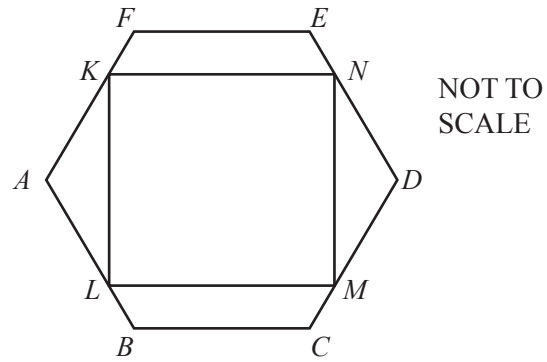
$PQ = \dots\dots\dots$ cm [3]

- (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 $k = \dots\dots\dots$. [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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