Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME	
CENTRE NUMBER	
CANDIDATE NUMBER	

MATHEMATICS **0580/42**

Paper 4 (Extended) **February/March 2017**

2 hours 30 minutes

Candidates answer on the Question Paper.

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

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
If working is needed for any question it must be shown below that question.
Electronic calculators should be used.
If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place.
For π, use either your calculator value or 3.142.

At the end of the examination, fasten all your work securely together.
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 130.

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.

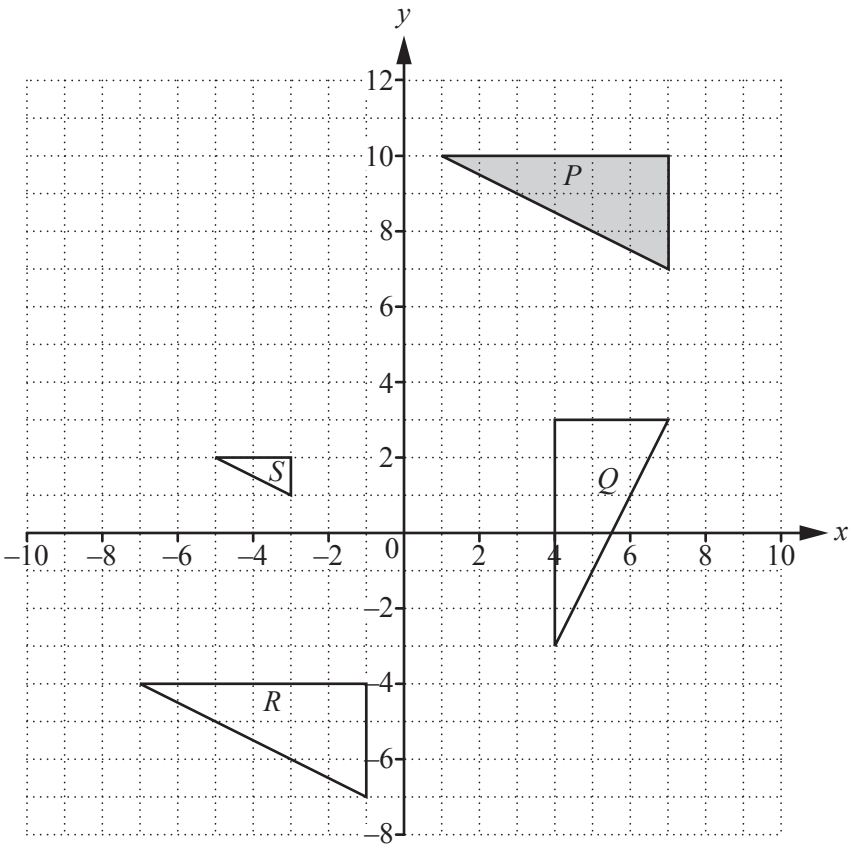
..... Rupees [2]

(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]

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)**.

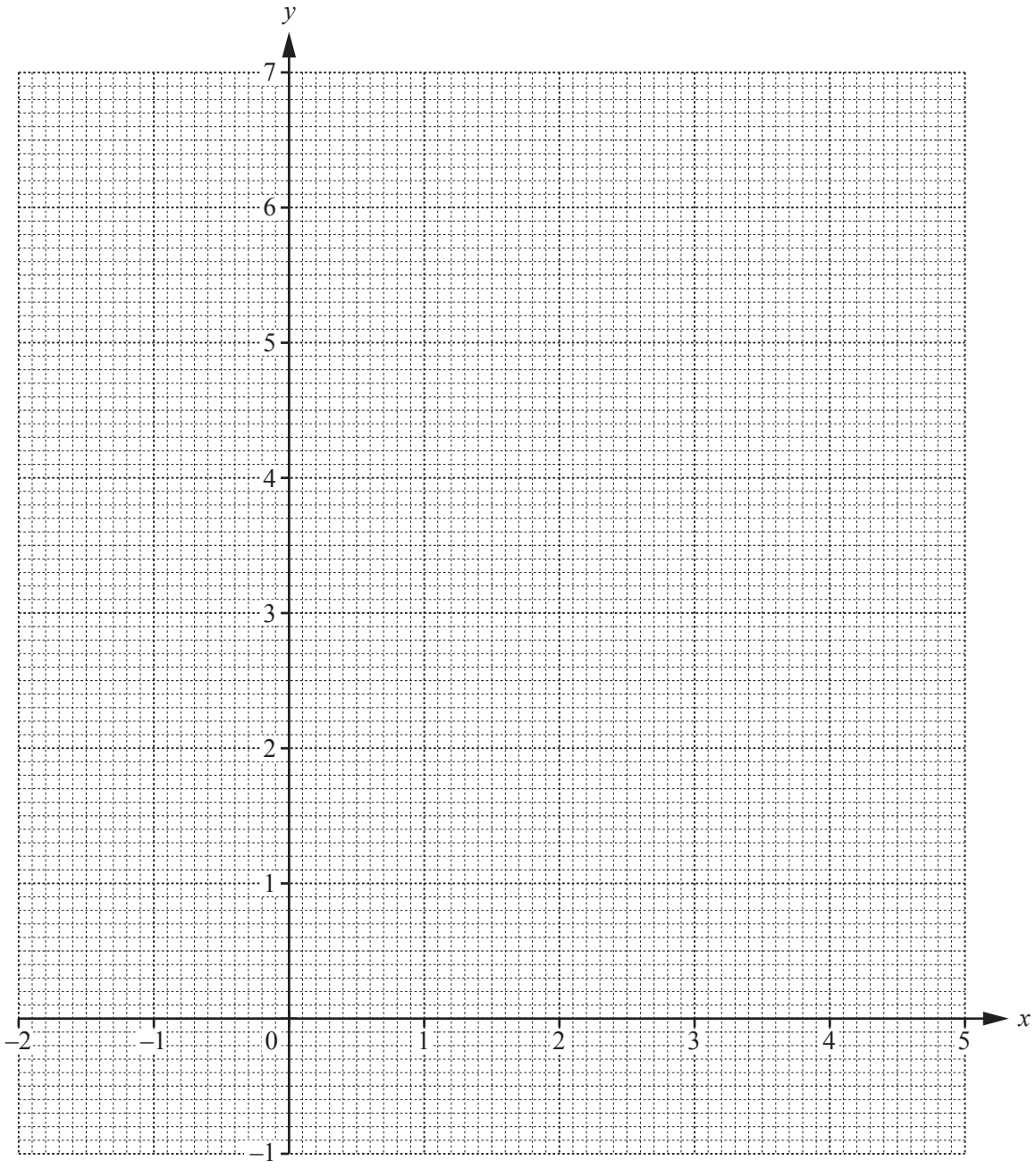
$\begin{pmatrix} & \\ & \end{pmatrix}$ [2]

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 $-2 \leqslant x \leqslant 5$.



[4]

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

$x =$ ..... [2]

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

$x =$ ..... or $x =$ .....[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.

..... [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.

$x =$ ..... [3]

(b) Ravi spins the spinner once.

Find the probability that the number is 2 or 3.

..... [2]

(c) Ravi spins the spinner twice.

Find the probability that

(i) the number is 2 both times,

..... [2]

(ii) the sum of the numbers is 3.

..... [3]

(d) Ravi spins the spinner 72 times.

Calculate how many times he expects the number 1.

..... [1]

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

..... [2]

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

$x =$ ..... or $x =$ .....[1]

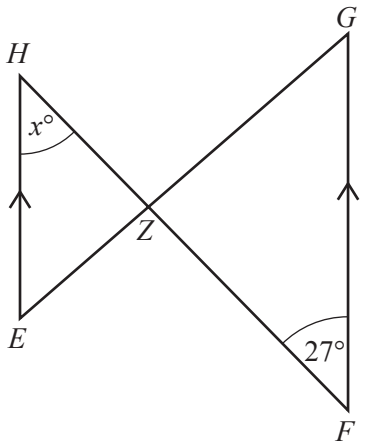
(b) **(i)** Show that $\frac{2}{2x+11} - \frac{1}{x-4} = \frac{1}{2}$ simplifies to $2x^2 + 3x - 6 = 0$.

[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.

$x =$ ..... or $x =$ .....[4]

6 (a)



NOT TO SCALE

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

(i) Find the value of x.

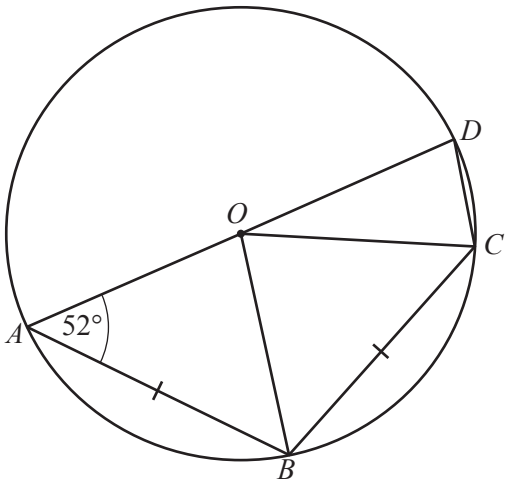
$x =$ ..... [1]

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

Calculate EZ.

$EZ =$ ..... 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 $OAB = 52°$.

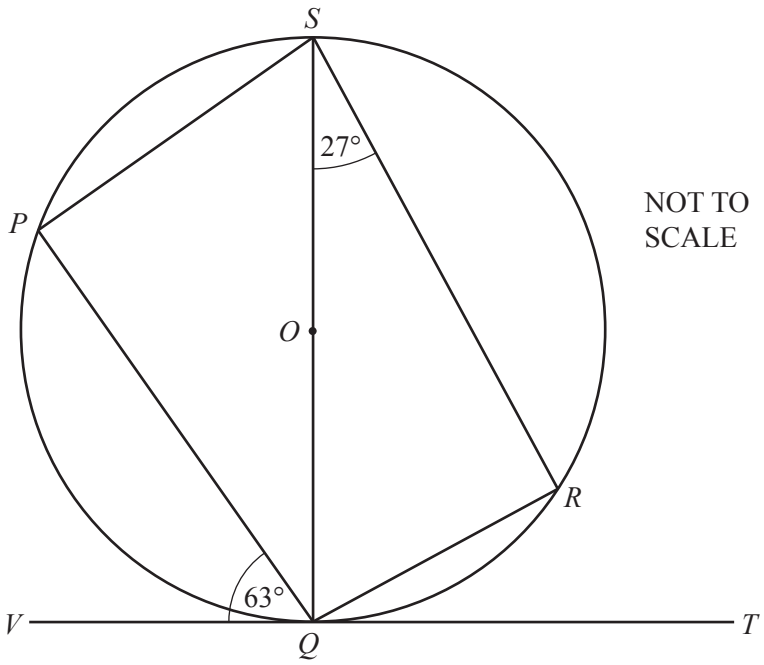


NOT TO SCALE

Find angle ADC.

Angle $ADC =$ ..... [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 = ... ° because .....

..... [2]

(ii) Angle SQP = ... ° 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)	$45 < m \leqslant 50$	$50 < m \leqslant 60$	$60 < m \leqslant 70$	$70 < m \leqslant 90$	$90 < m \leqslant 100$	$100 < m \leqslant 120$
Frequency	23	64	122	136	26	29

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

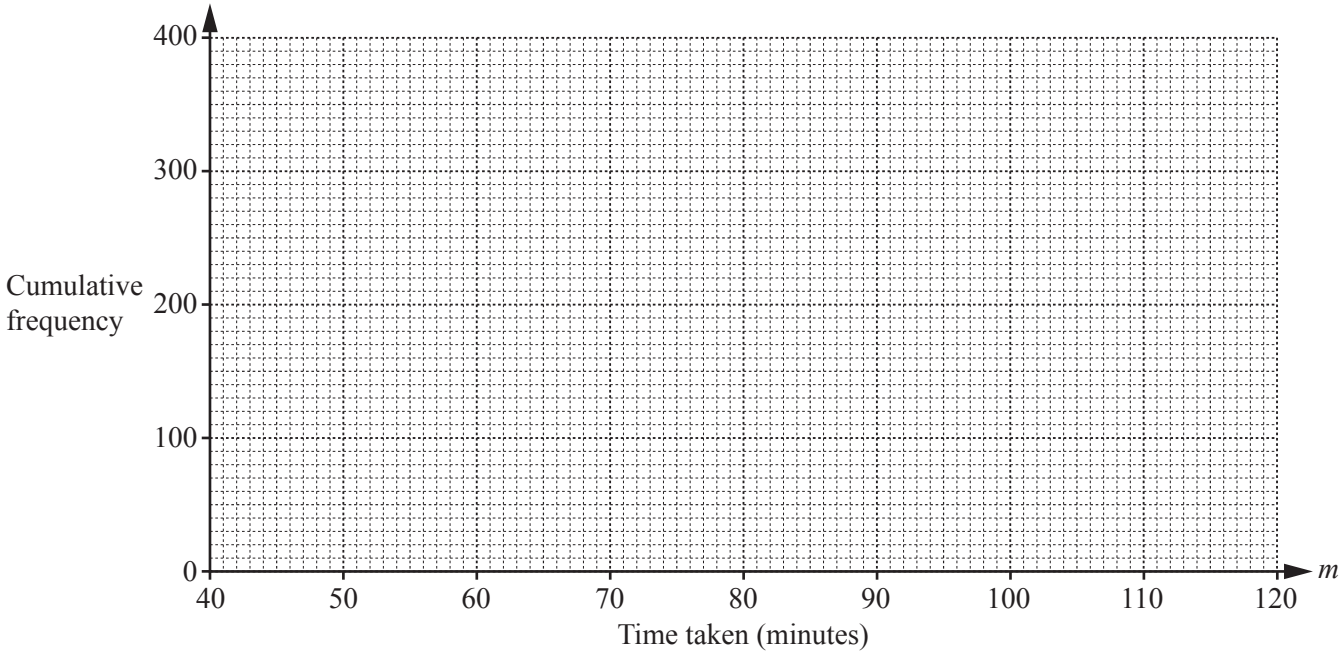
..... min [4]

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

Time taken (m minutes)	$m \leqslant 50$	$m \leqslant 60$	$m \leqslant 70$	$m \leqslant 90$	$m \leqslant 100$	$m \leqslant 120$
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]

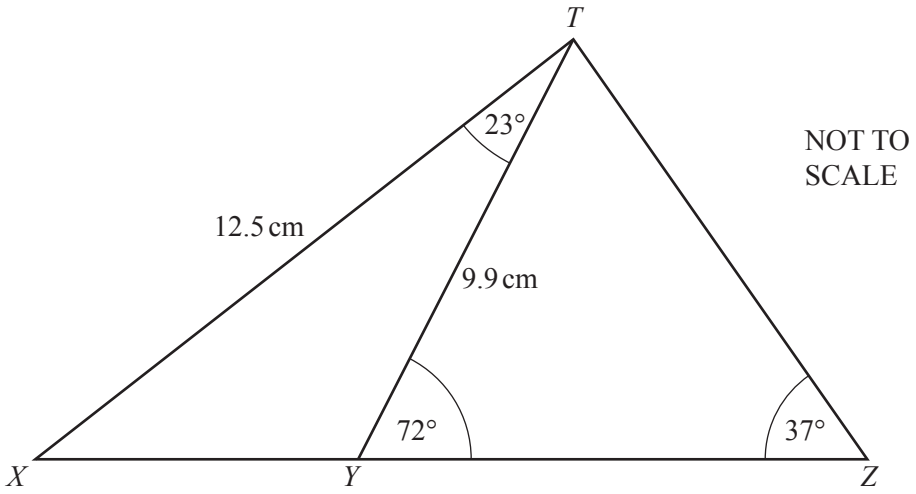
(b) the inter-quartile range,

..... min [2]

(c) the 60th percentile.

..... min [2]

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



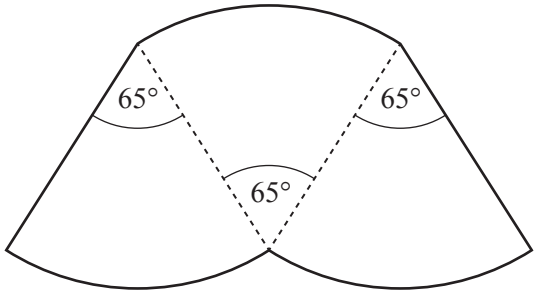
(i) Calculate XY.

$XY =$ ..... cm [4]

(ii) Calculate TZ.

$TZ =$ ..... 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.



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.

.....

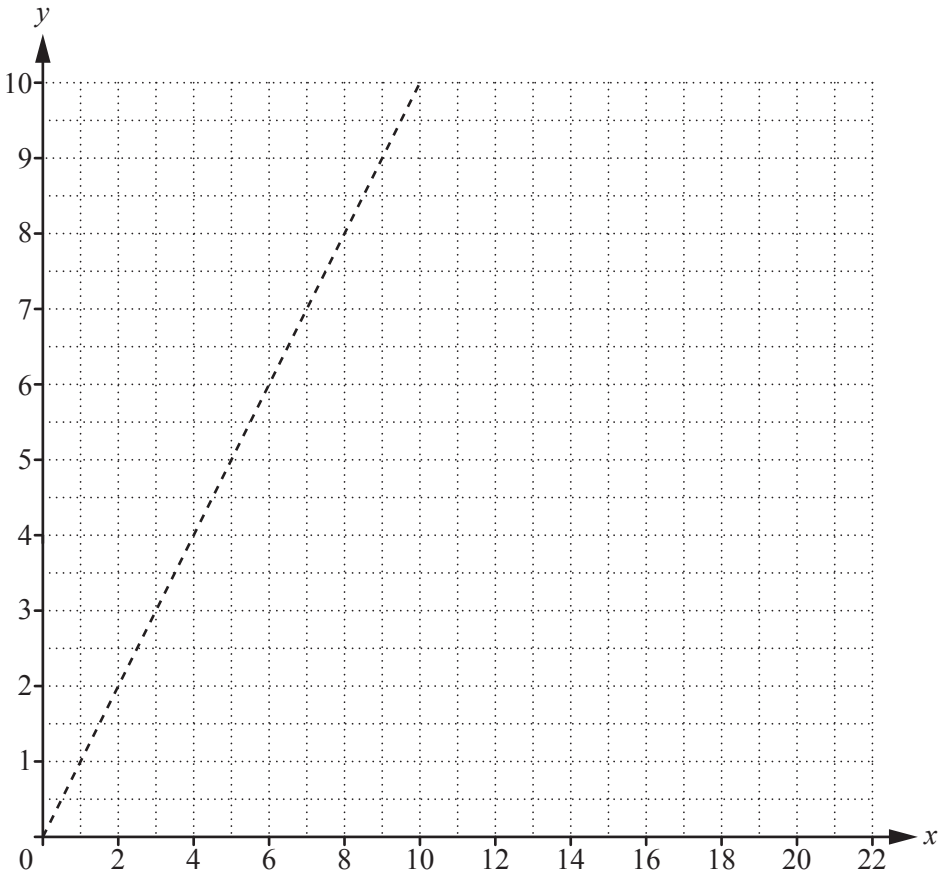
..... [2]

(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.

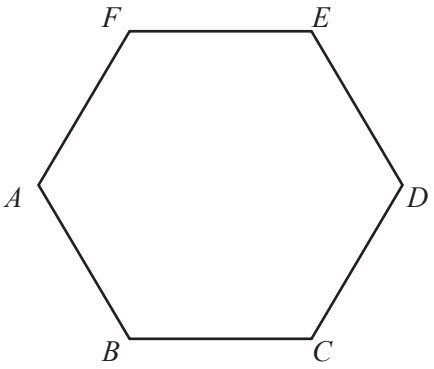
(i) Find the maximum number of plants he can buy.

..... [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.



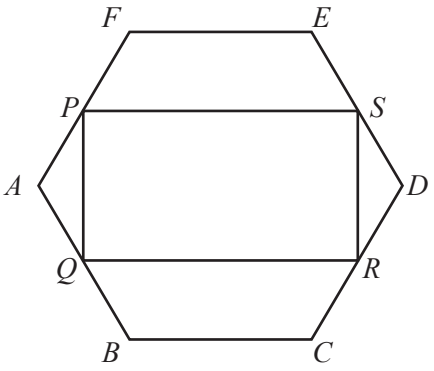
NOT TO SCALE

(i) Show that angle $BAF = 120°$.

[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.

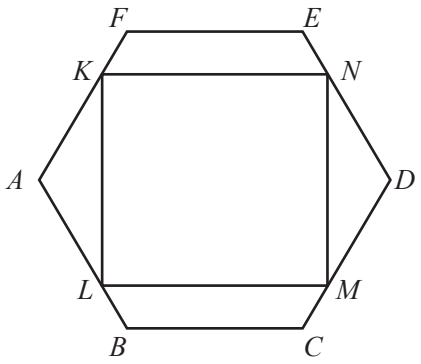
$PQ =$ ..... cm [3]

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

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

[3]

(b)



NOT TO SCALE

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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