Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME									
CENTER NUMBER						CANDIDATE NUMBER				

7506469888

MATHEMATICS (US) **0444/33**

Paper 3 (Core) **October/November 2015**

2 hours

Candidates answer on the Question Paper.

Additional Materials: Geometrical instruments
Electronic calculator

READ THESE INSTRUCTIONS FIRST

Write your Center 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 work is needed for any question it must be shown in the space provided.
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 digits.
Give answers in degrees to one decimal place.
For π, use either your calculator value or 3.142.

The number of points is given in parentheses [ ] at the end of each question or part question.
The total of the points for this paper is 104.

Write your calculator model in the box below.

This document consists of **20** printed pages.

Formula List

Area, A, of triangle, base b, height h.	$A = \frac{1}{2}bh$
Area, A, of circle, radius r.	$A = \pi r^2$
Circumference, C, of circle, radius r.	$C = 2\pi r$
Lateral surface area, A, of cylinder of radius r, height h.	$A = 2\pi rh$
Surface area, A, of sphere of radius r.	$A = 4\pi r^2$
Volume, V, of prism, cross-sectional area A, length l.	$V = Al$
Volume, V, of cylinder of radius r, height h.	$V = \pi r^2 h$
Volume, V, of sphere of radius r.	$V = \frac{4}{3}\pi r^3$

1 **(a)** **(i)** Write 6751 correct to the nearest hundred.

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

(ii) Write 0.25 as a fraction.

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

(iii) Write 0.06 as a percentage.

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

(iv) Write 687 000 000 in scientific notation.

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

(b) Find

(i) $\sqrt{81}$,

Answer(b)(i) ..... [1]

(ii) 7^3,

Answer(b)(ii) ..... [1]

(iii) 8^0.

Answer(b)(iii) ..... [1]

(c) Solve.

(i) $29 - x = 18$

Answer(c)(i) $x =$ ..... [1]

(ii) $4(2y + 7) = 164$

Answer(c)(ii) $y =$ ..... [3]

(d) Simplify.

$6x^4 \times 8x$

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

2 **(a)** Chip flies from New York to St Petersburg.
The plane takes off at 02 30 and arrives in St Petersburg at 19 35.
The local time in New York is 8 hours behind the local time in St Petersburg.

How long does the flight take?

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

(b) Chip books a bus tour of St Petersburg.
The cost is $290 for each adult and $163 for each child.
There are 37 adults and 8 children on the bus.

(i) Calculate how much is paid altogether.

Answer(b)(i) $..... [3]

(ii) The bus has 53 seats for passengers.

Calculate the percentage of seats that are occupied.

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

(iii) Chip pays $290 for the bus tour.
The exchange rate is $1 = 33.2 rubles.

Work out the cost of the tour in rubles.

Answer(b)(iii) ..... rubles [1]

(c) Chip went on a cruise ship from St Petersburg. It visited four other ports.
30 guests are asked which port they enjoyed the most.
Each reply is listed below.

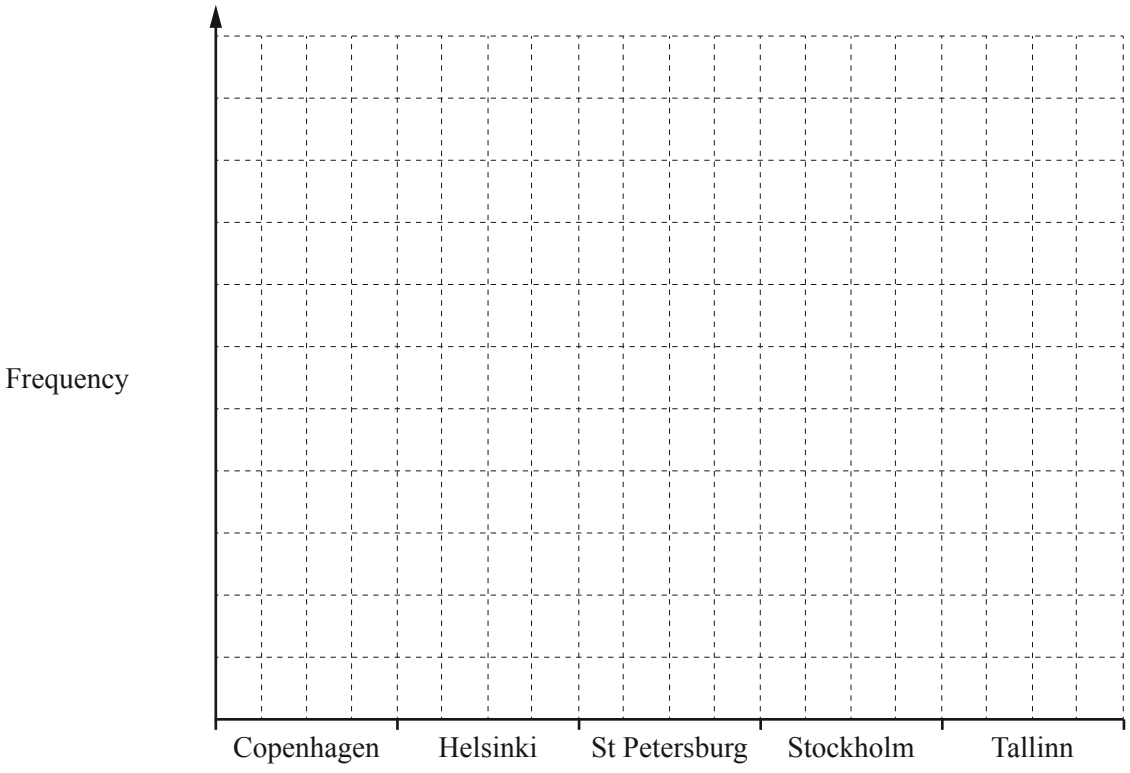
Stockholm	St Petersburg	St Petersburg	Helsinki	Tallinn	St Petersburg
Tallinn	Helsinki	Tallinn	Copenhagen	Tallinn	Copenhagen
St Petersburg	St Petersburg	Stockholm	St Petersburg	Stockholm	Helsinki
Helsinki	St Petersburg	Tallinn	Tallinn	St Petersburg	St Petersburg
Stockholm	Tallinn	St Petersburg	Helsinki	Tallinn	Copenhagen

(i) Complete the frequency table.
You may use the tally column to help you.

Port	Tally	Frequency
Copenhagen		
Helsinki		
St Petersburg		
Stockholm		
Tallinn		
	Total	30

[2]

(ii) Draw a bar chart to show this information.
Complete the scale on the frequency axis.



[3]

3 Kylie, Rio and Choi buy a horse for $21 600.

(a) They pay for the horse in the ratio Kylie : Rio : Choi = 2 : 3 : 4.

Calculate the amount that they each pay.

Answer(a) Kylie $.....

Rio $.....

Choi $..... [3]

(b) It costs $14 000 to keep the horse for one year.

(i) Food costs 30% of the $14 000.

Calculate the cost of the food.

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

(ii) Stable fees are $8000.

Write this as a fraction of the $14 000.
Give your answer in its lowest terms.

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

(iii) It costs $600 for vets' fees and the rest of the $14 000 is spent on equipment.

Work out how much is spent on equipment.

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

(c) They later sell the horse for $17 280.

Calculate the percentage loss on the $21 600 they paid for the horse.

Answer(c) ..... % [3]

(d) Rio invests $5500 for 3 years at a rate of 2.5% per year compound interest.

Calculate how much interest he receives after the 3 years.

Answer(d) $..... [3]

4 Bataar is comparing the engine size of a car with the distance it travels on one gallon of fuel.

(a) Bataar records the results for 12 cars in the table.

Engine size (cm^3)	1650	1700	1750	1840	1900	1930	2000	2050	2160	2200	2300	2390
Distance (km)	91	84	80	78	75	67	58	60	54	83	47	43

David says that Bataar has **incorrectly** recorded the distance 83 km for one of the cars.
Use the data in the table to explain why David might say this.

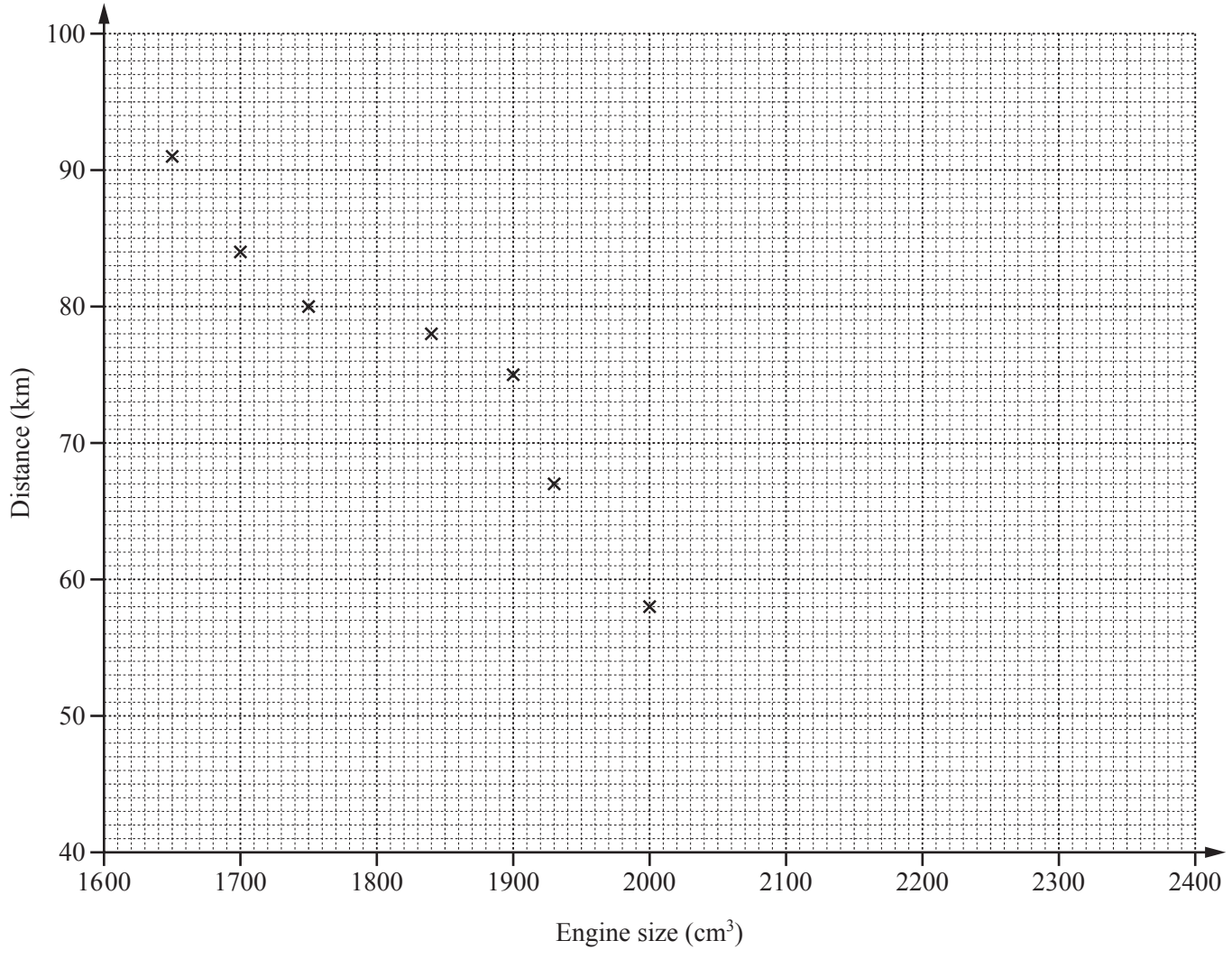
Answer(a) .....

..... [1]

(b) Bataar decides to ignore the incorrect result and uses the data for the remaining 11 cars.

Engine size (cm^3)	1650	1700	1750	1840	1900	1930	2000	2050	2160	2300	2390
Distance (km)	91	84	80	78	75	67	58	60	54	47	43

(i) Complete the scatter diagram.
The first 7 points have been plotted for you.



[2]

(ii) The mean engine size is 1970 cm^3.

Show that the mean distance is 67 km.

Answer(b)(ii)

[1]

(iii) On the scatter diagram, draw a line of best fit. [2]

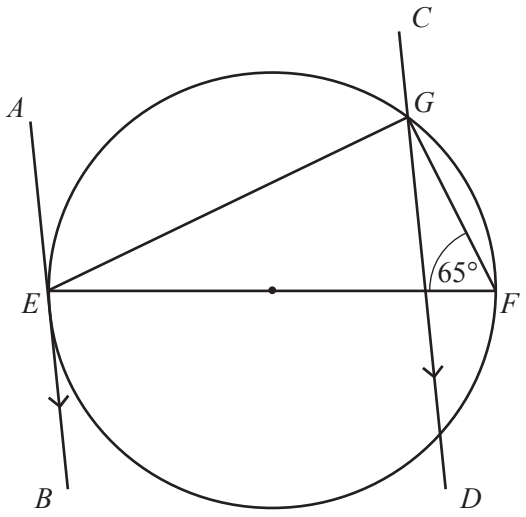
(iv) What type of correlation is shown on the scatter diagram?

Answer(b)(iv) ..... [1]

(c) Use your scatter diagram to estimate the distance traveled by a car with an engine size of 2200 cm^3.

Answer(c) ..... km [1]

5 (a)



NOT TO SCALE

The diagram shows a circle with diameter EF.
AEB is a tangent to the circle at E.
CD is parallel to AB and angle $EFG = 65°$.

Calculate the size of the following angles, giving a reason for each answer.

(i) Angle EGF = ... because .....

..... [2]

(ii) Angle GEF = ... because .....

..... [2]

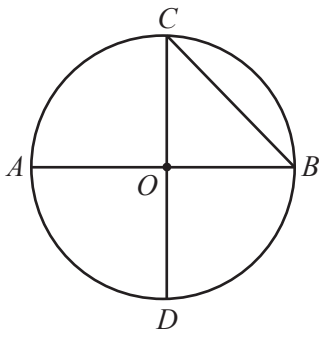
(iii) Angle AEG = ... because .....

..... [2]

(iv) Angle EGD = ... because .....

..... [2]

(b) The diagram shows a circle, center O.



NOT TO SCALE

Write down the mathematical name of the line

(i) OD,

Answer(b)(i) ..... [1]

(ii) BC.

Answer(b)(ii) ..... [1]

6 **(a)** Natalia has 16 reels of cotton.
6 reels are blue, 4 are white, 3 are red, 2 are black and 1 is green.

Natalia picks a reel at random.

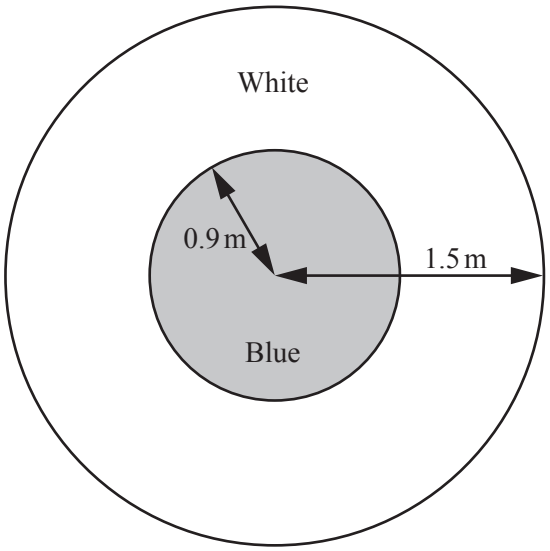
(i) Write down the color she is most likely to pick.

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

(ii) Find the probability that she picks a black reel.

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

(b) Natalia is making a circular tablecloth of radius 1.5 m using blue and white material.
The diagram shows this tablecloth.



NOT TO SCALE

(i) The radius of the blue circle is 0.9 m.

Work out the area of the white material shown in the diagram.

Answer(b)(i) ..... m^2 [3]

(ii) Natalia puts ribbon around the edge of the tablecloth.

Calculate the length of ribbon used.

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

(iii) Natalia buys 12 m of ribbon costing \$1.45 per meter.

Calculate the amount of change she receives from \$20.

Answer(b)(iii) \$..... [2]

7 **(a)** Goat food is sold in 20 kg bags.
One goat eats $\frac{2}{5}$ of a bag of food each week.

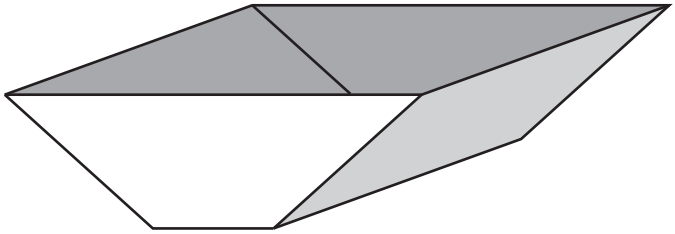
(i) Work out how many kilograms of food this goat eats in one week.

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

(ii) How many bags of food will the goat eat in 15 weeks?

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

(b) The diagram shows the trough used to feed the goat.

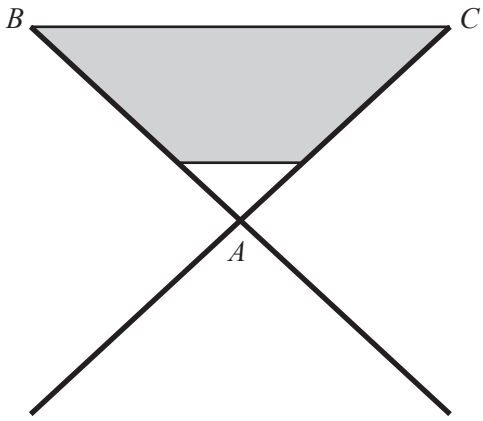


(i) The cross section of the trough is a trapezoid.

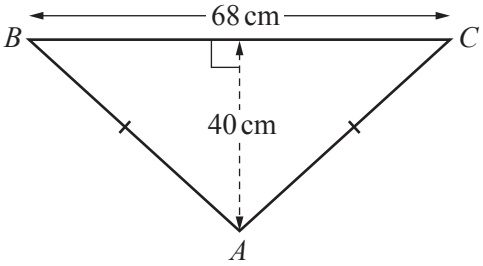
What geometric 3-dimensional shape is the best model for this trough?

Answer(b)(i) ..... [1]

(ii) The diagram shows the cross section of the trough on its stand.



The top section, ABC, can be modeled as an isosceles triangle with $AB = AC$.



NOT TO SCALE

Calculate

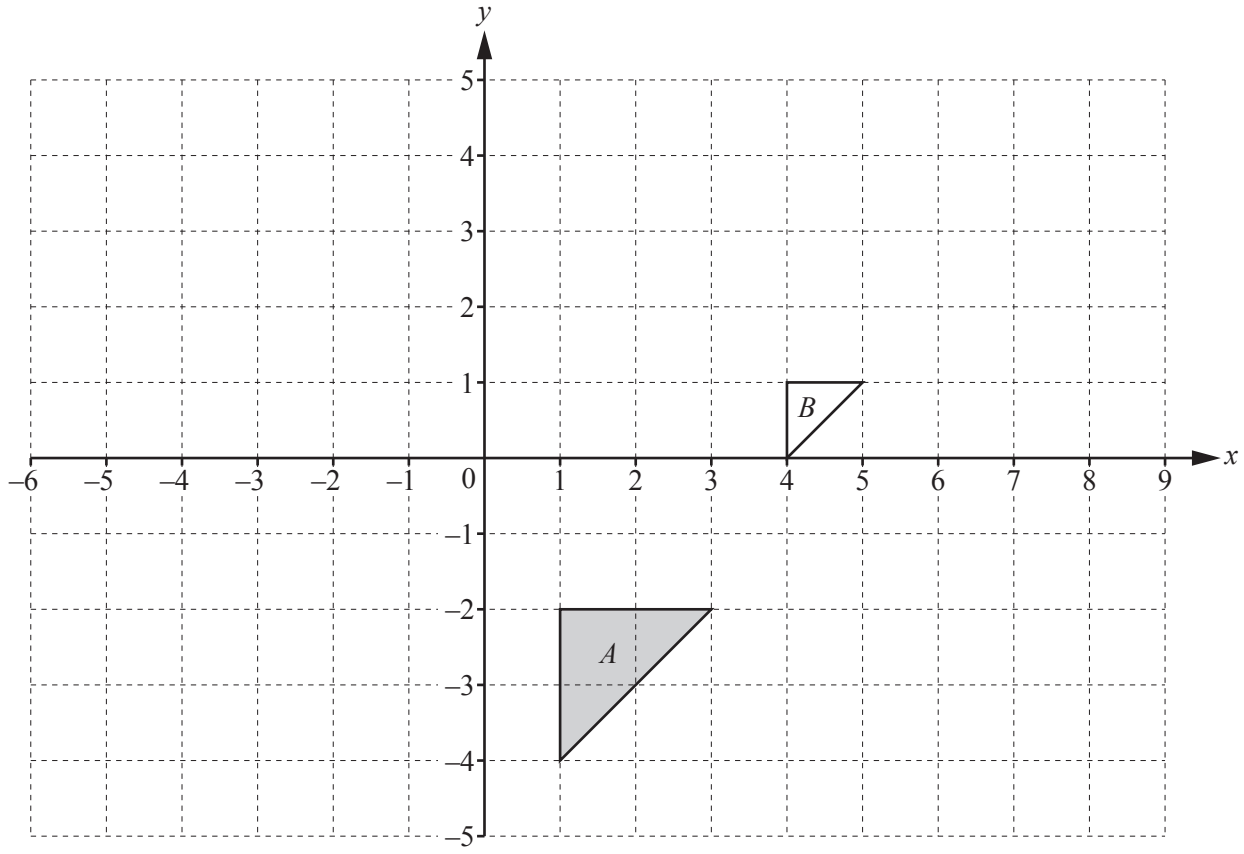
(a) angle ABC,

Answer(b)(ii)(a) Angle ABC = ... [2]

(b) the length of AB.

Answer(b)(ii)(b) AB = ... cm [2]

8 (a)



(i) Rotate triangle A through 180° about (0, 0). [2]

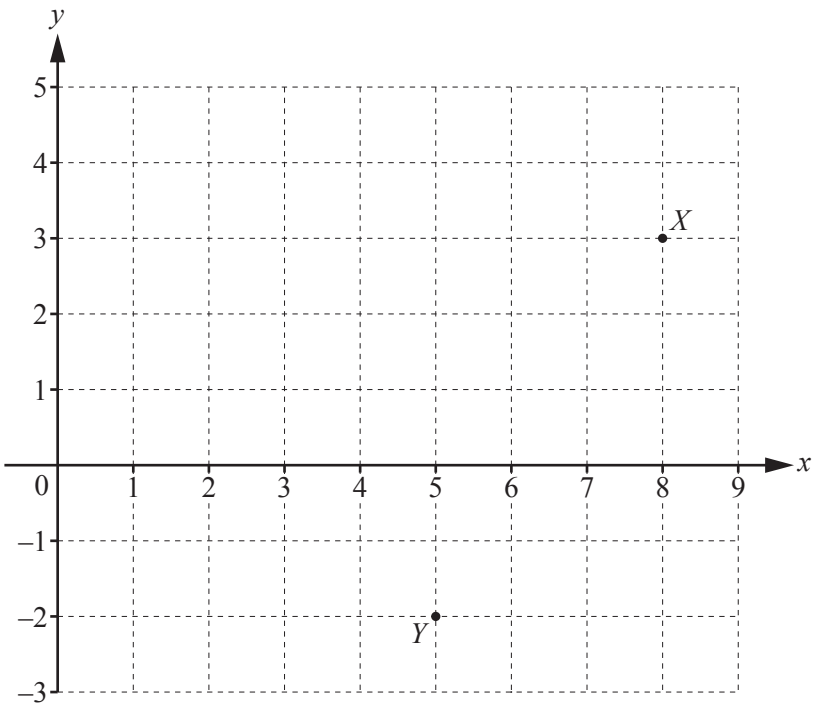
(ii) Reflect triangle A in the line $x = -1$. [2]

(iii) Describe fully the **single** transformation that maps triangle A onto triangle B.

Answer(a)(iii) .....

..... [3]

(b)



(i) Write down the co-ordinates of point Y.

Answer(b)(i) (..... , ...) [1]

(ii) Write $\overrightarrow{XY}$ as a column vector.

Answer(b)(ii) $\begin{pmatrix} \quad \\ \quad \end{pmatrix}$ [1]

(iii) $\overrightarrow{XZ} = \begin{pmatrix} -5 \\ 1 \end{pmatrix}$

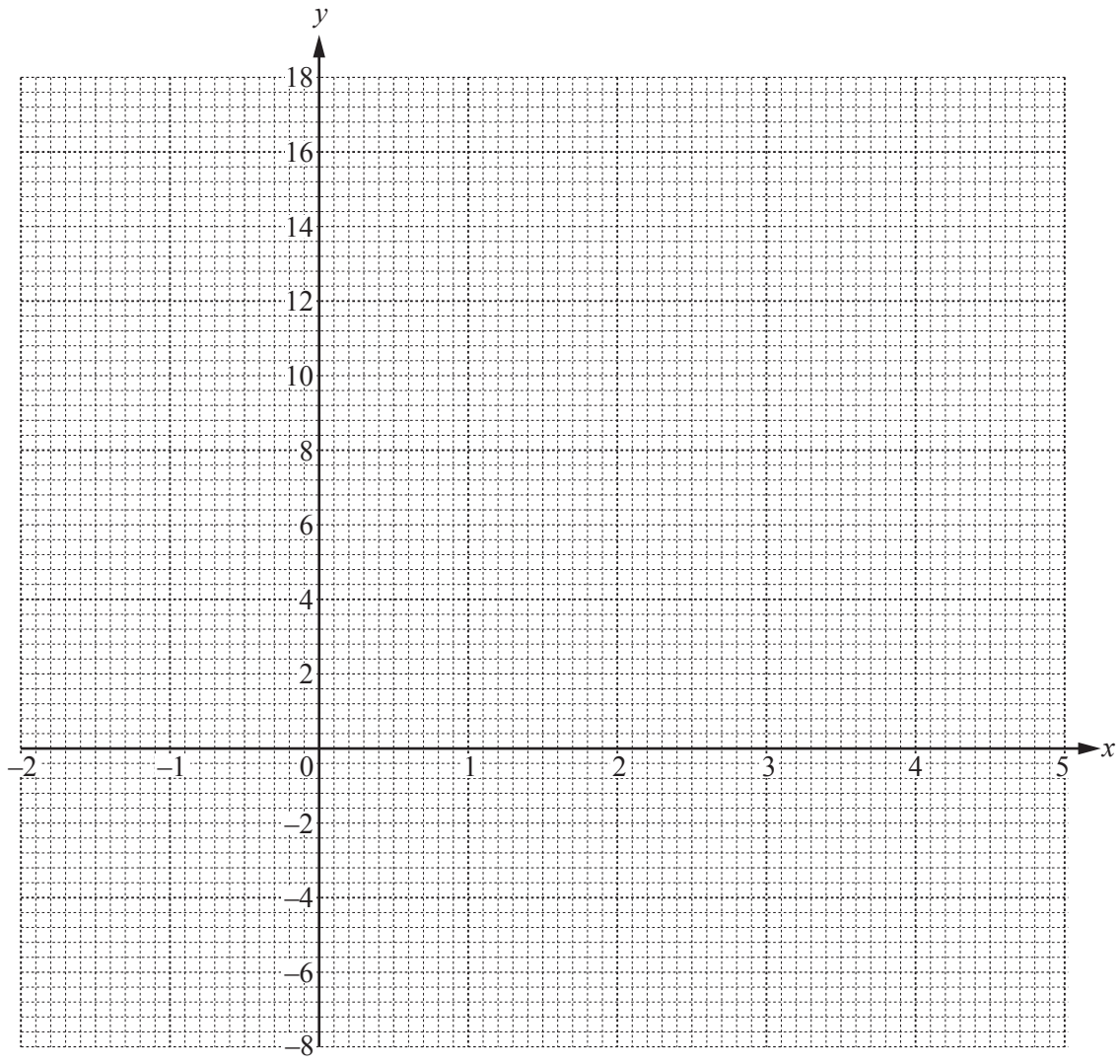
On the grid, plot the point Z. [1]

9 **(a)** **(i)** Complete the table of values for $y = x^2 - 4x - 2$.

x	–2	–1	0	1	2	3	4	5
y			–2		–6	–5	–2	3

[3]

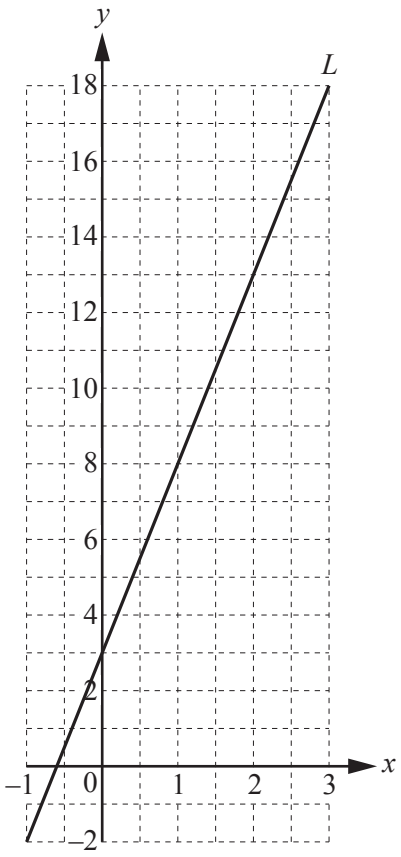
(ii) On the grid, draw the graph of $y = x^2 - 4x - 2$ for $-2 \leqslant x \leqslant 5$. [4]



(iii) Use your graph to solve the equation $x^2 - 4x - 2 = 0$.

Answer(a)(iii) $x =$ ..... or $x =$ ..... [2]

(b)



The line L is drawn on the grid.

Find the equation of the line in the form $y = mx + b$.

Answer(b) $y =$ ..... [3]

Question 10 is printed on the next page.

10 The first three diagrams in a sequence are shown below.

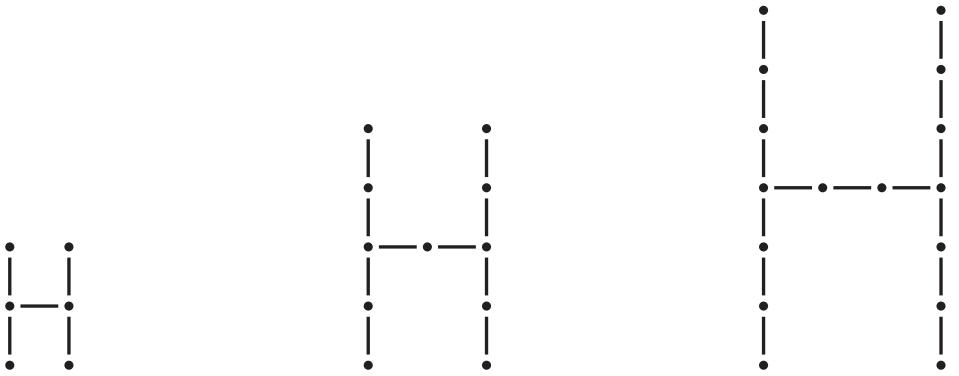


Diagram 1 Diagram 2 Diagram 3

(a) Complete the table for the number of lines and the number of dots in Diagram 3 and Diagram 4.

Diagram	1	2	3	4
Lines	5	10		
Dots	6	11		

[2]

(b) For Diagram n, write down an expression, in terms of n, for the number of

(i) lines,

Answer(b)(i) ..... [1]

(ii) dots.

Answer(b)(ii) ..... [1]

(c) Work out the number of lines and the number of dots in Diagram 20.

Answer(c) Number of lines = ...

Number of dots = ... [2]