

Sample Instructions

There are 11 questions on this examination paper. Answer **all** questions:

Questions do not necessarily carry equal marks. To help you manage your time during this examination, a maximum time for each question is suggested. If you remain within these times, you should have about 10 minutes left to review your work.

Write your answers in the spaces provided in this booklet. You may lose marks if you do not do so. There is space for extra work at the back of the booklet. You may also ask the superintendent for more paper. Label any extra work clearly with the question number and part.

The superintendent will give you a copy of the booklet of *Formulae and Tables*. You must return it at the end of the examination.

You will lose marks if all necessary work is not clearly shown.

Answers should include the appropriate units of measurement, where relevant.

Answers should be given in simplest form, where relevant.

Write the make and model of your calculator(s) here:

Question 1

Suggested maximum time: 10 minutes

In some games, you need an eight faced die. The faces are numbered 1, 2, 3, 4, 5, 6, 7 and 8.

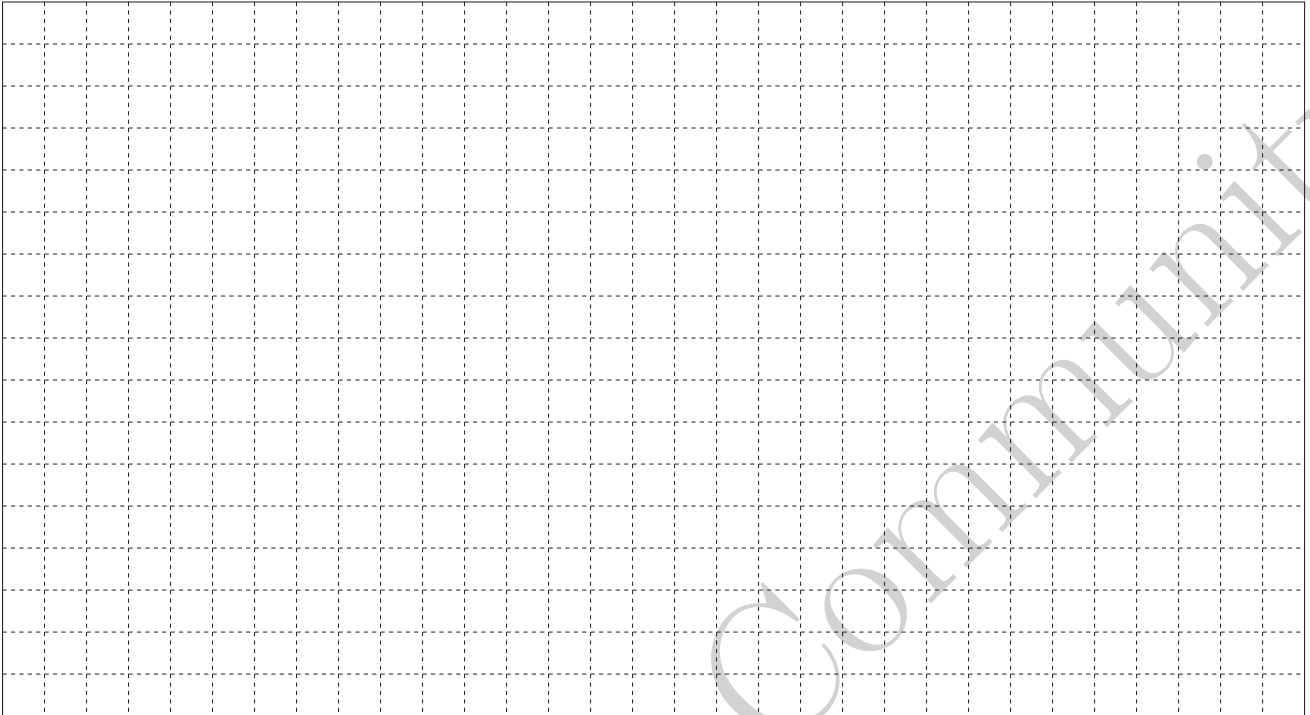
(a) What is the probability of getting a 6?

(b) The die is tossed 1000 times and the following results are found

Number on die	1	2	3	4
Frequency	100	95	110	93
Relative frequency				
Number on die	5	6	7	8
Frequency	91		110	290
Relative frequency				

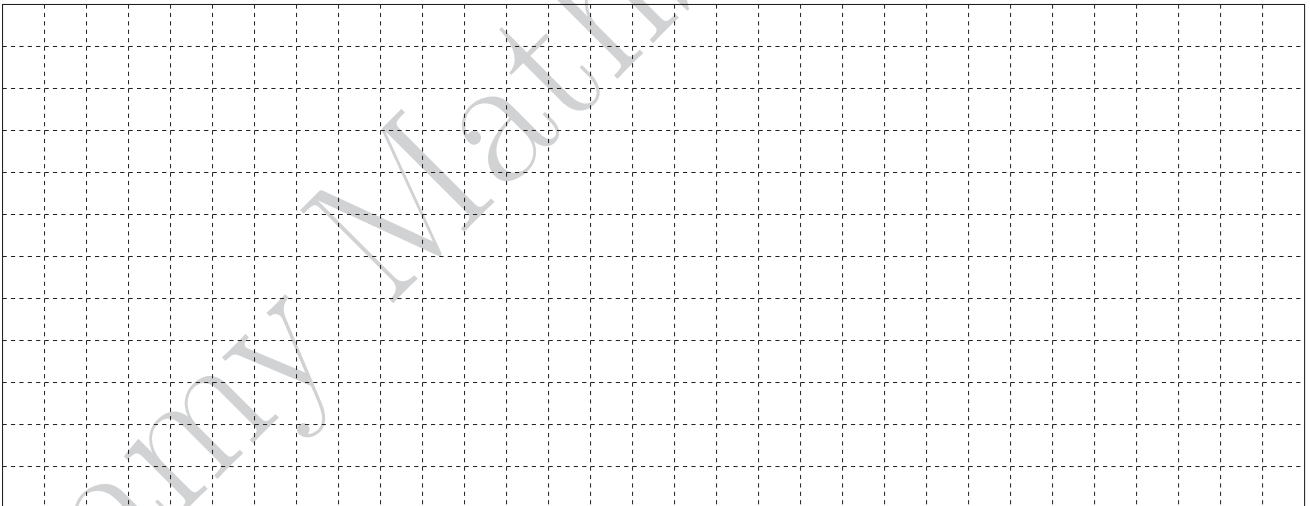
(i) Calculate the missing frequency

(ii) Calculate the relative frequencies



A large grid of 20 columns and 20 rows, intended for calculations. A diagonal watermark reading 'Learnmy Maths Community' is visible across the grid.

(iii) Do you think the die is fair? Justify your answer.



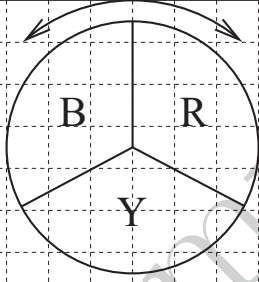
A large grid of 20 columns and 20 rows, intended for justification. A diagonal watermark reading 'Learnmy Maths Community' is visible across the grid.

Question 2

Suggested maximum time: 20 minutes

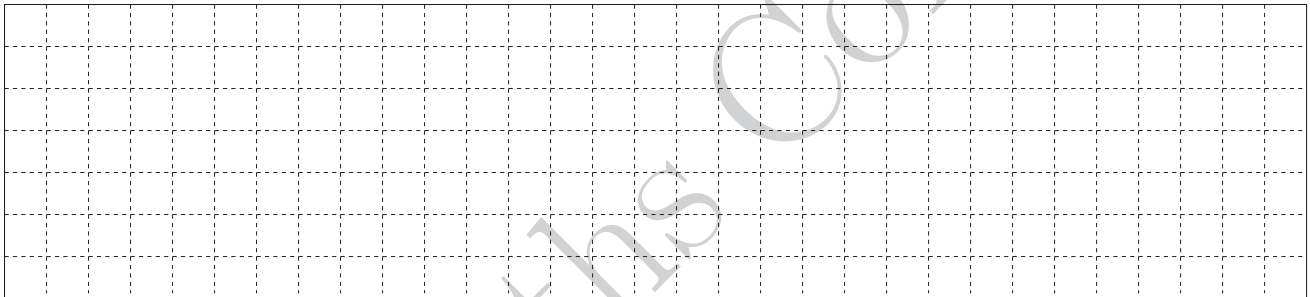
In a fair, there is a new game: you can spin a three colour wheel twice. The three colours on the wheel are blue, red and yellow. If you get the same colour on both spins, you will be a winner.

(a) List the all the possible outcomes using B for blue, R for red and Y for yellow

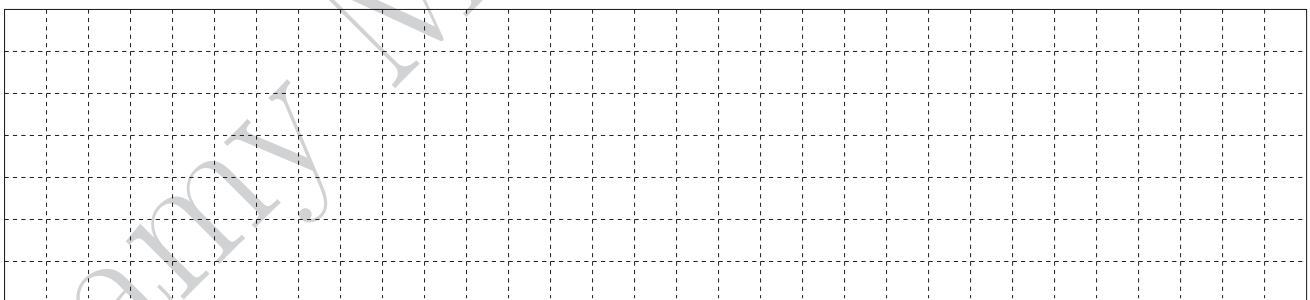


A diagram of a circular wheel divided into three equal sectors. The top-left sector is labeled 'B', the top-right sector is labeled 'R', and the bottom sector is labeled 'Y'. Two curved arrows at the top of the wheel indicate it can spin in either direction.

(b) Find the probability of winning



(c) Jessica says that you are equally likely to get two Blues or two Reds. Is she correct? Justify your answer.

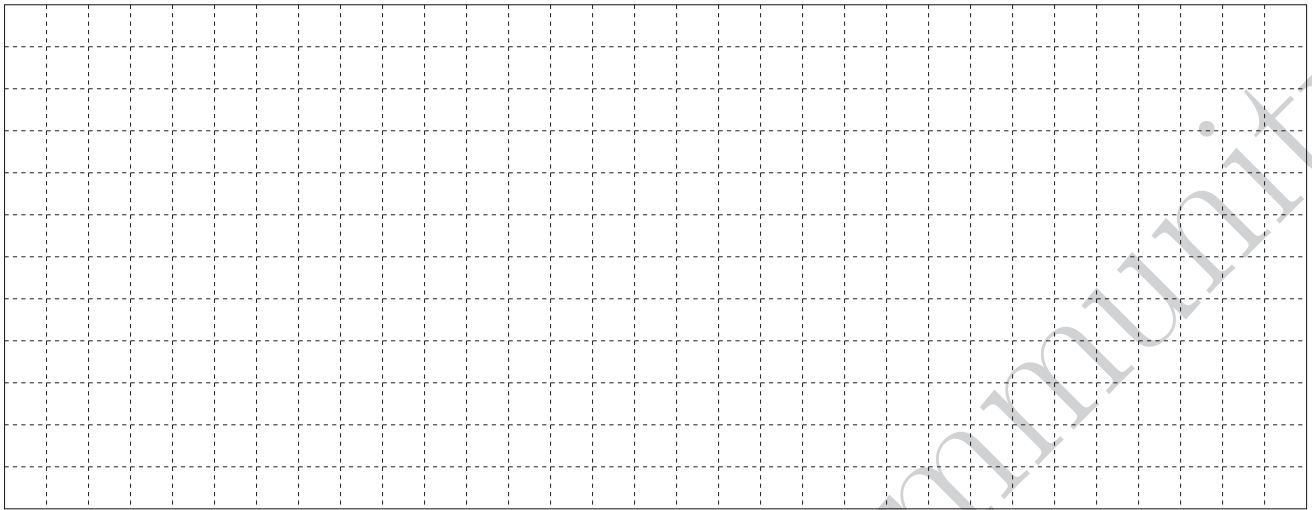


(d) James says that the probability of getting the same colour twice or at least one Blue in your combination is the same. He is correct? Justify your answer?

(e) The owner considers an alternative rule. You will be a winner if your spin combination does not include any Red. What is the new probability of winning?

(f) Which rule is more favorable to the player? Give a reason for your answer.

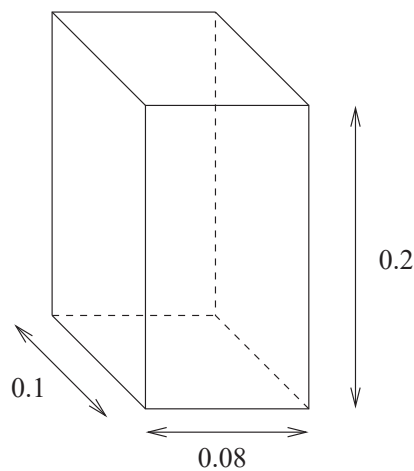
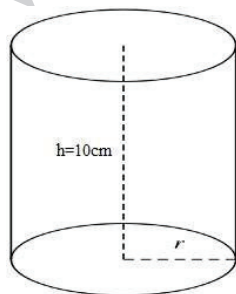
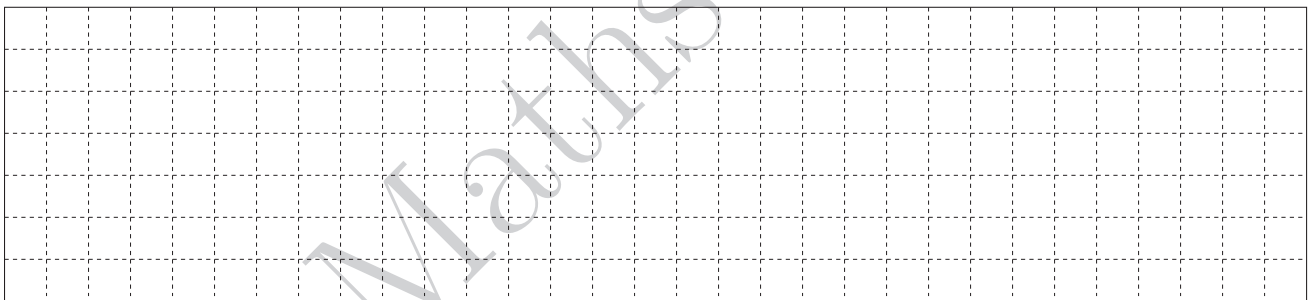
(g) If you were spinning the wheel three times, what would be the probability of getting Yellow three times? Justify your answer.



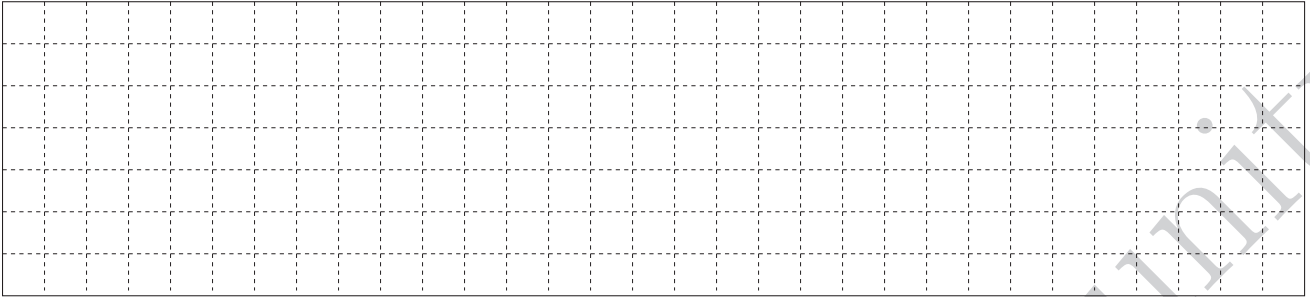
Question 3

Suggested maximum time: 20 minutes

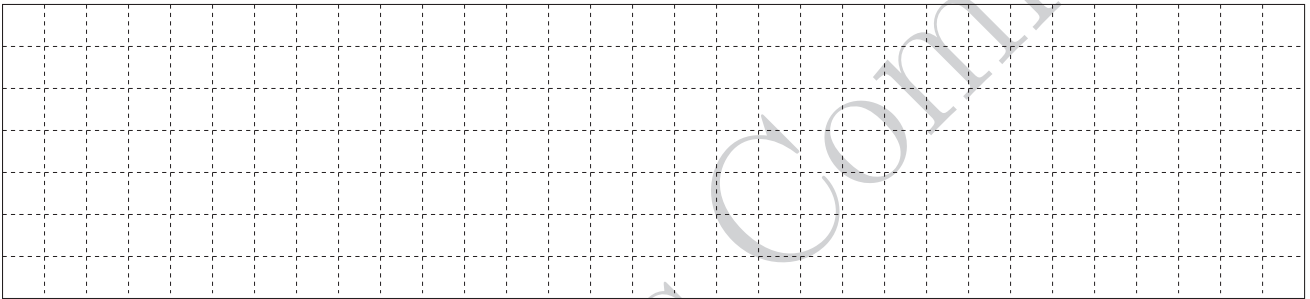
(a) A cylindrical tin contains exactly a litre of soup. The tin is 10cm high. Find the diameter of the tin. Give your answer to the nearest millimetre.



(b) A rectangular container may be used instead. Its length is 0.1m, its width is 0.08m and its height is 0.2m, see figure on the previous page. Find its capacity in litres.



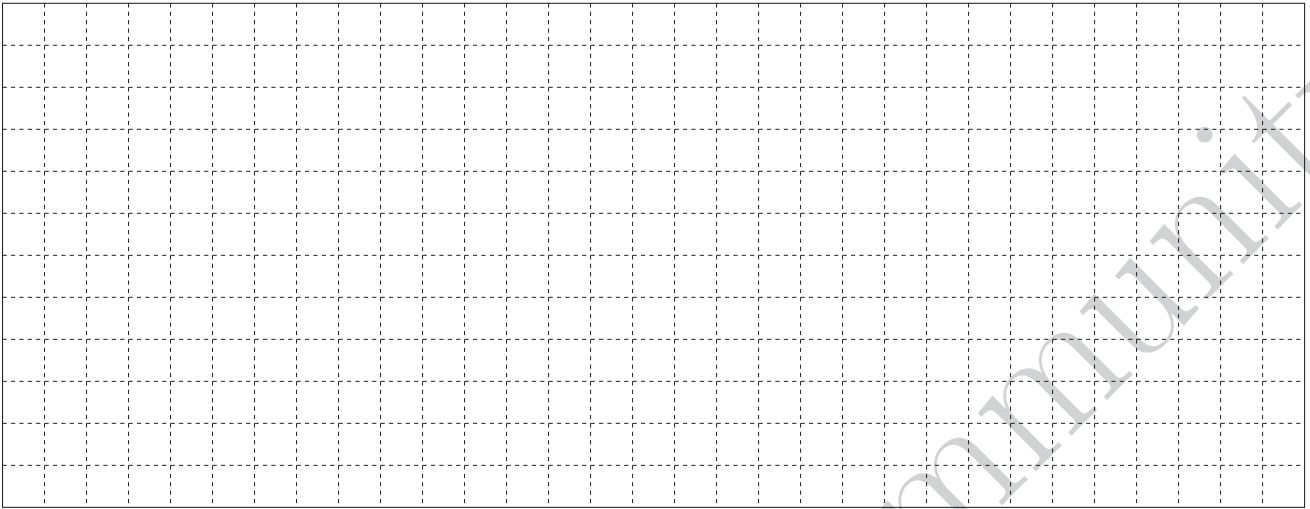
(c) If you pour one litre of soup in the rectangular container, what will be the height of liquid?



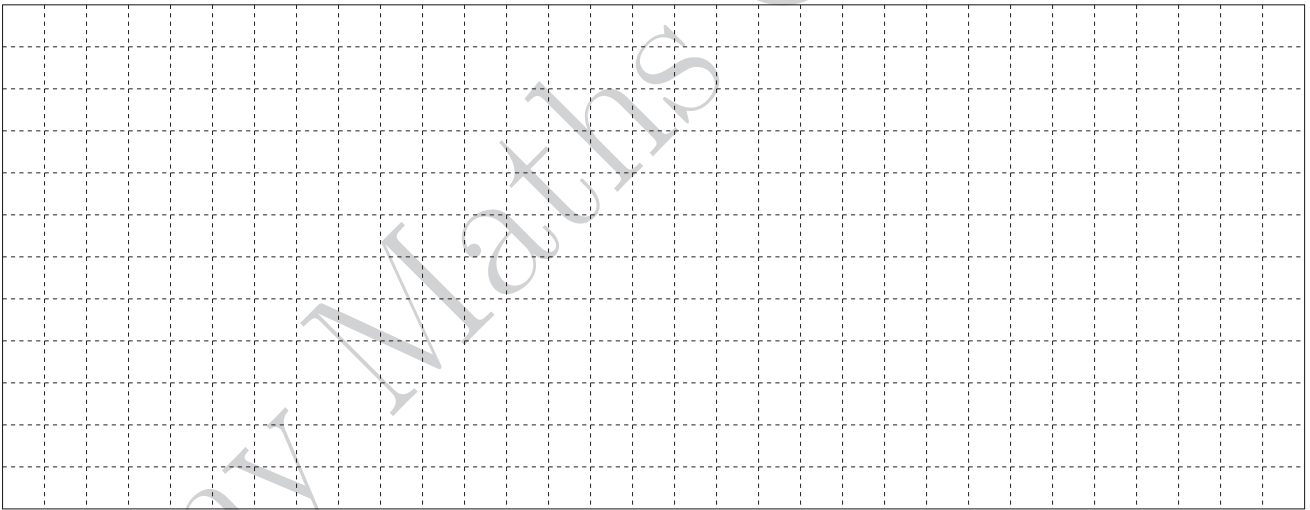
(d) Calculate the surface of metal necessary to manufacture the cylindrical tin in cm^2 . Give your answer correct to the nearest whole number.



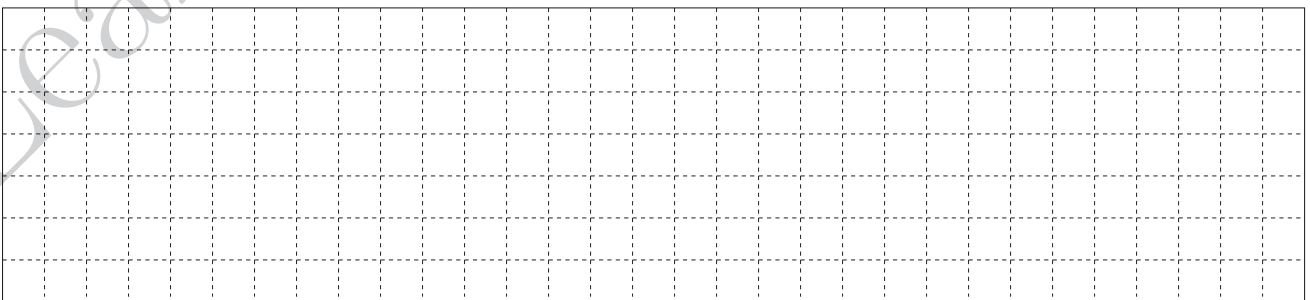
- (e) If the height of the rectangular container is reduced to 12.5 cm, calculate the surface of metal necessary to manufacture the container in cm^2 .



- (f) If the outside area of the cylinder was 610cm^2 and the circle at the bottom and top of the cylinder had the same area as the rectangle at the bottom of the rectangular container, what would be the height of the cylinder?



- (g) Why do you think most tins are cylindrical?



Question 4

Suggested maximum time: 10 minutes

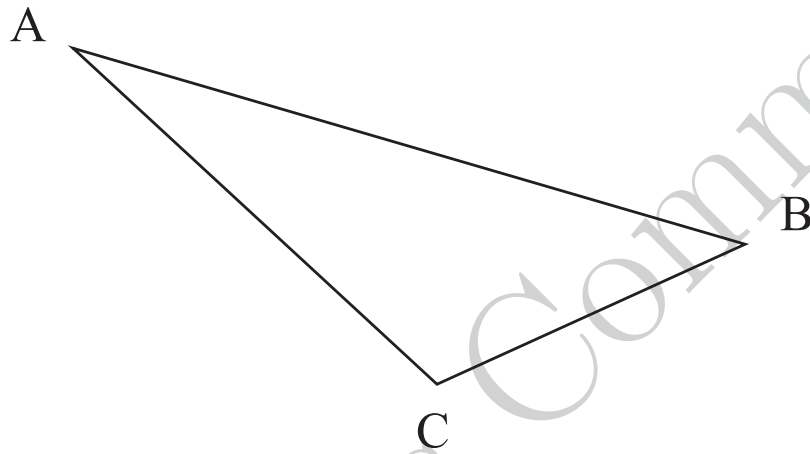
Prove that in a parallelogram, opposite sides are equal and opposite angles are equal.

Diagram
Given
To prove
Construction
Proof

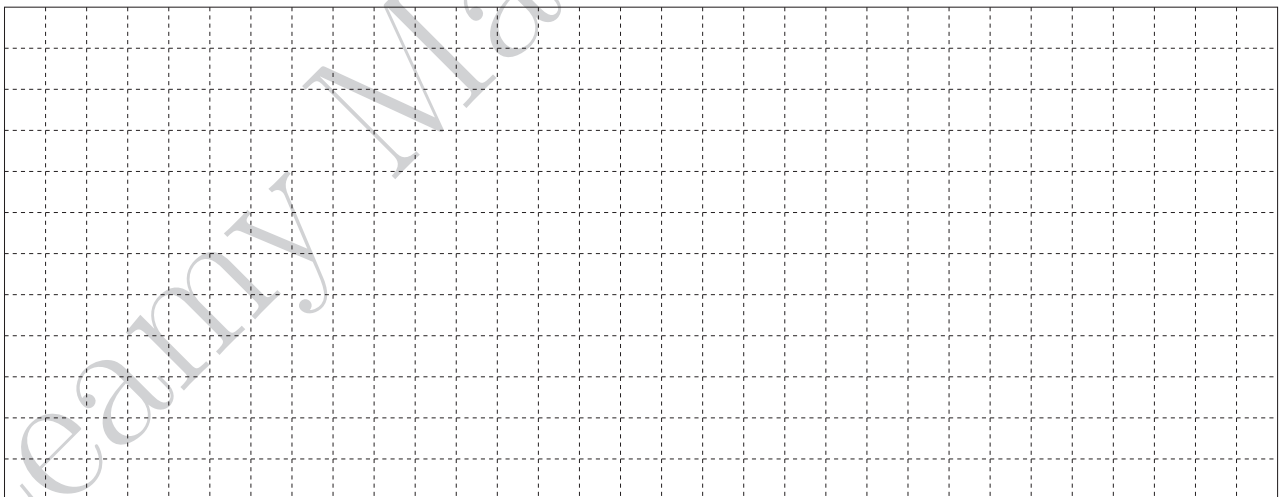
Question 5

Suggested maximum time: 15 minutes

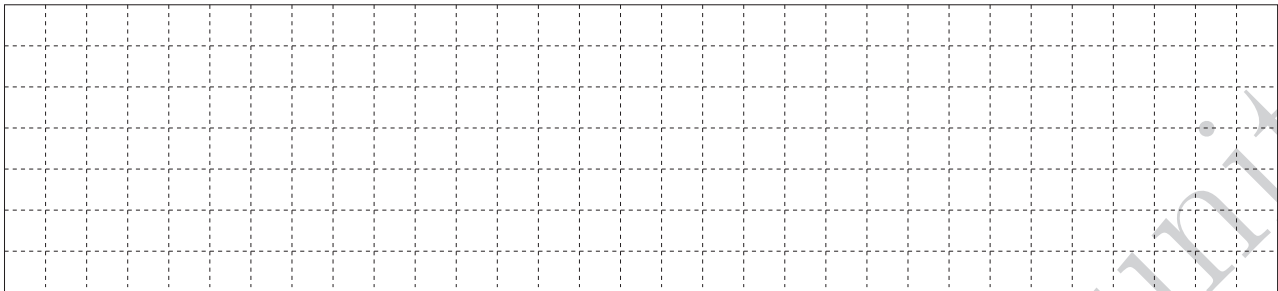
- (a) Construct the perpendicular bisectors of segments $[AB]$ and $[BC]$ below using only a compass and a straight edge. Show all construction work.



- (b) Prove that point D common to the two perpendicular bisectors also belongs to the perpendicular bisector of segment $[AC]$.



- (c) Draw the circle centred at point D with radius $R = |DA|$. Explain why points B and C also belong to the circle.



Question 6

Suggested maximum time: 15 minutes

30 people are training for long distance running. At the beginning of the training, they make a test run to see for how long they can run. The results are given in minutes in the table below.

40	45	38	54	55	70	62	67	54	79
46	48	55	41	59	61	64	58	52	72
52	63	65	59	49	62	54	47	58	62

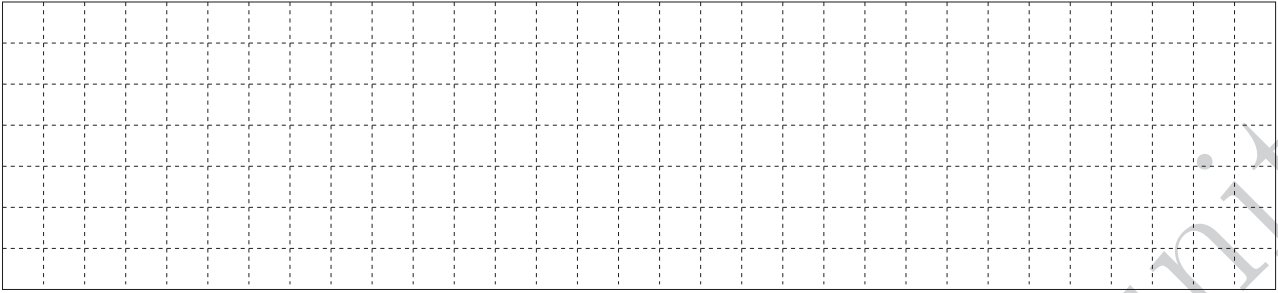
After two months of training, a new test run is organised with the following times (in minutes)

81	72	42	57	64	65	64	51	59	79
75	60	64	57	92	68	65	51	85	74
74	73	53	82	66	77	72	62	75	61

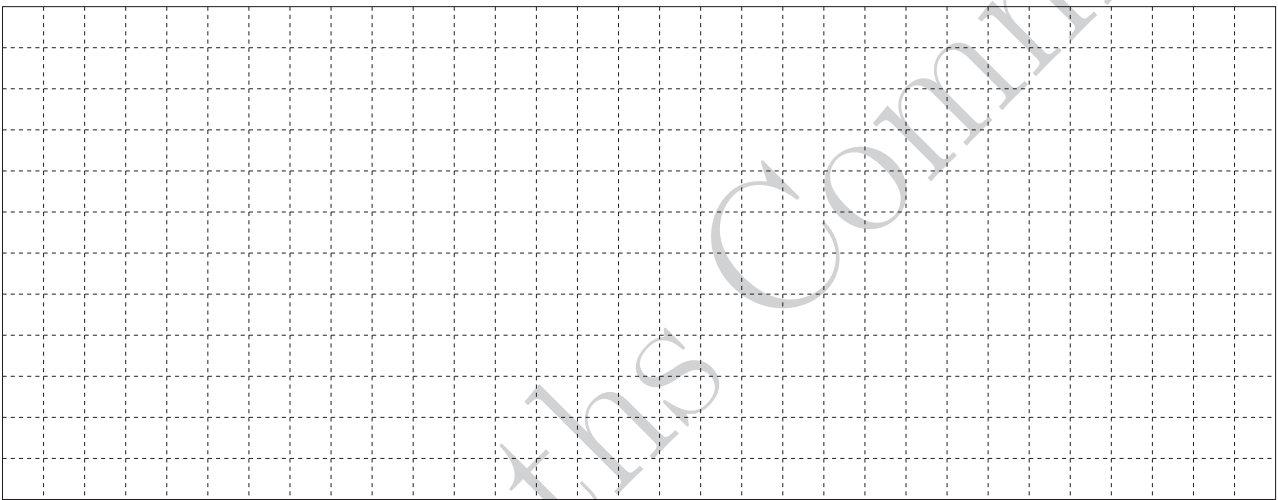
- (a) Represent this data on a back-to-back stem leaf diagram.

First run	Stem	Second run
	3	
	4	
	5	
	6	
	7	
	8	
	9	
		Key:

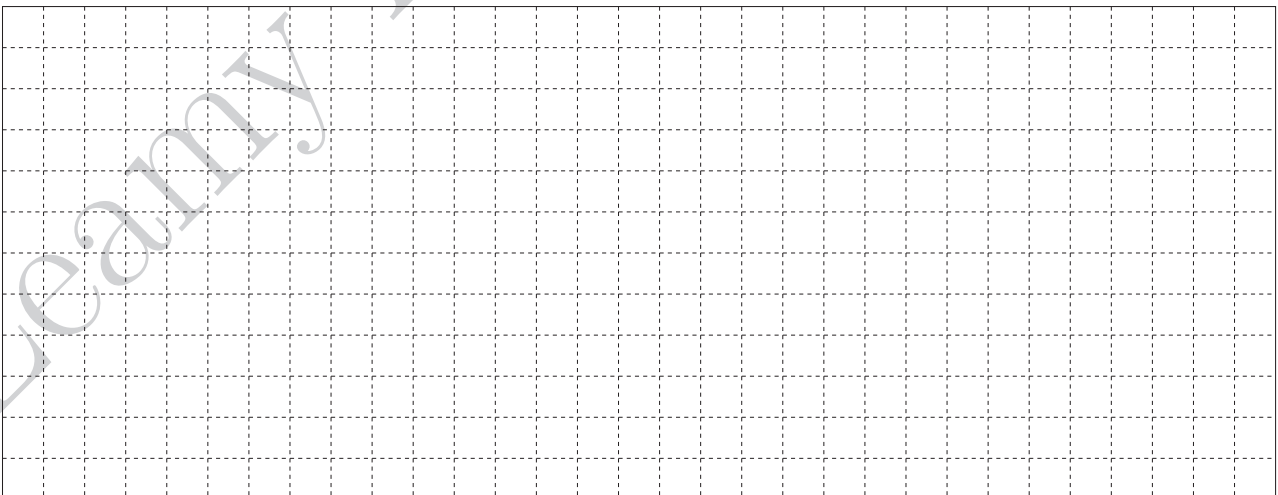
(b) Use the diagram to identify the median in each case.



(c) Find the mean running time for each run.



(d) Compare running times for the two runs. Refer to **at least one** measure of central tendency in your answer. What other parameter should you study to make a more precise description of the data?



(e) Deidre says that everyone has improved between the two runs. Is she correct? Justify your answer.

Question 7

Suggested maximum time: 10 minutes

The students in a class are asked in which supermarket their parents do their shopping. The answers are listed below:

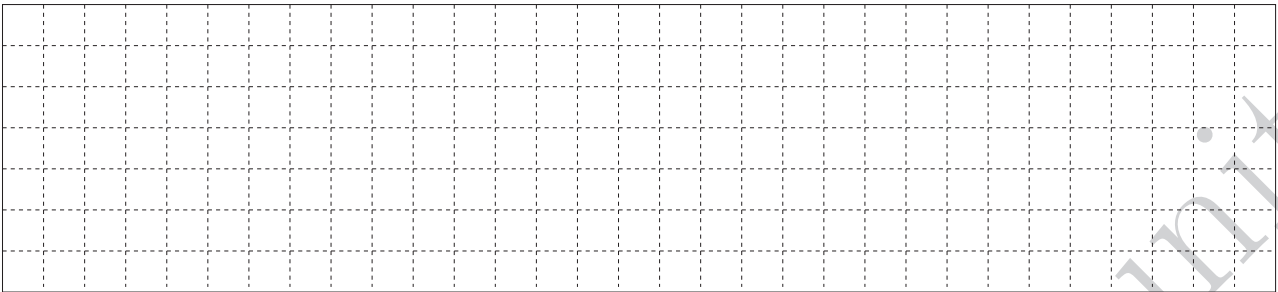
Tesco Dunnes Tesco SuperValu Lidl
 SuperValu Tesco SuperValu Tesco Dunnes
 Tesco Dunnes Lidl Lidl SuperValu
 Tesco Lidl Tesco Dunnes Tesco
 Lidl SuperValu Dunnes Dunnes Tesco

(a) What type of data is this: numerical continuous, numerical discrete, categorical nominal, categorical ordinal?

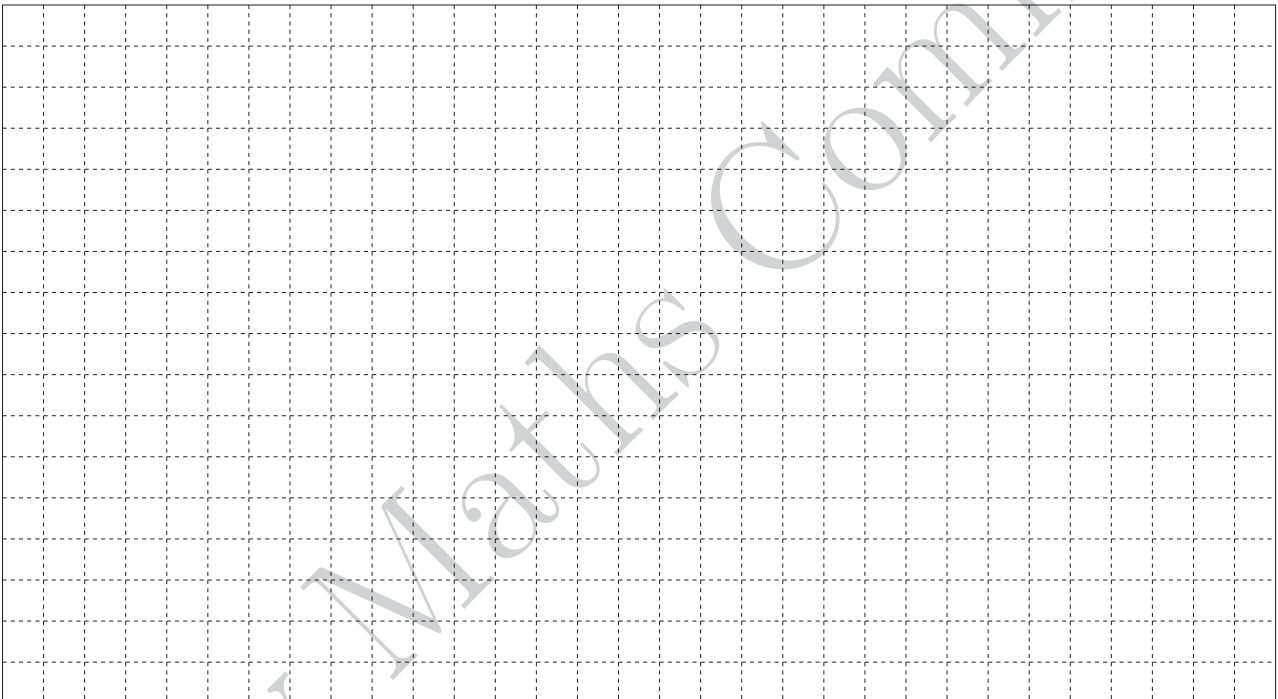
(b) Fill in the frequency table

Supermarket	Dunnes	Lidl	SuperValu	Tesco
Frequency				

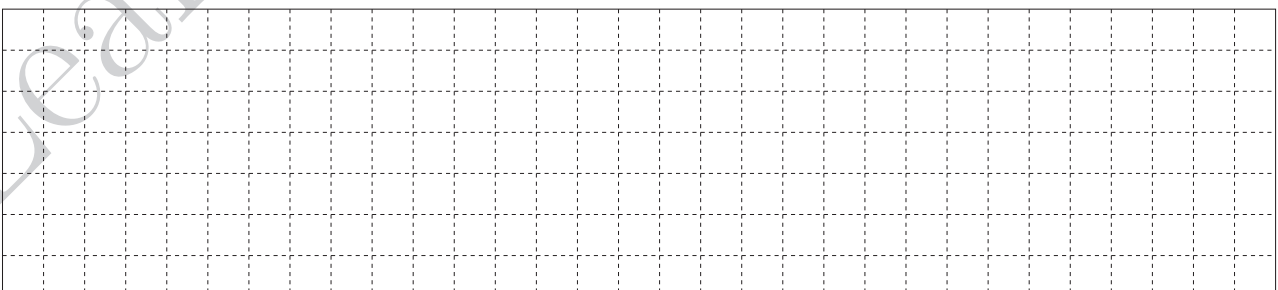
(c) Calculate the mode and the average of the data if they exist. If they do not exist, explain why.



(d) Display the data in a pie chart. Show all of your calculations clearly.



(e) Mark wants to get another set of data. He stands outside his local SuperValu store and ask people where they go shopping. Do you think his method is correct?

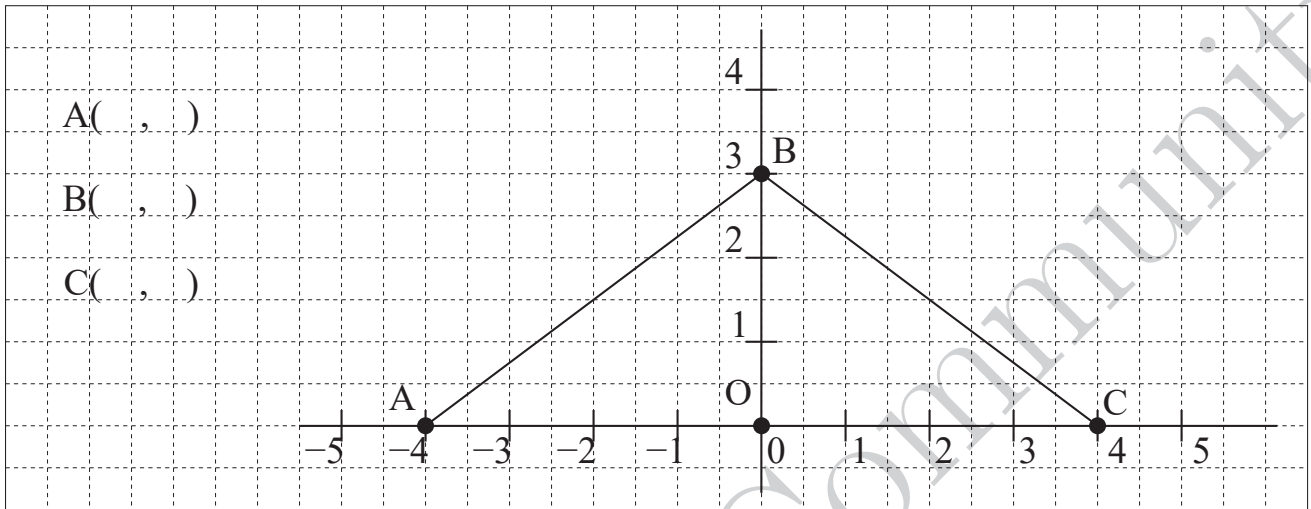


Question 8

Suggested maximum time: 10 minutes

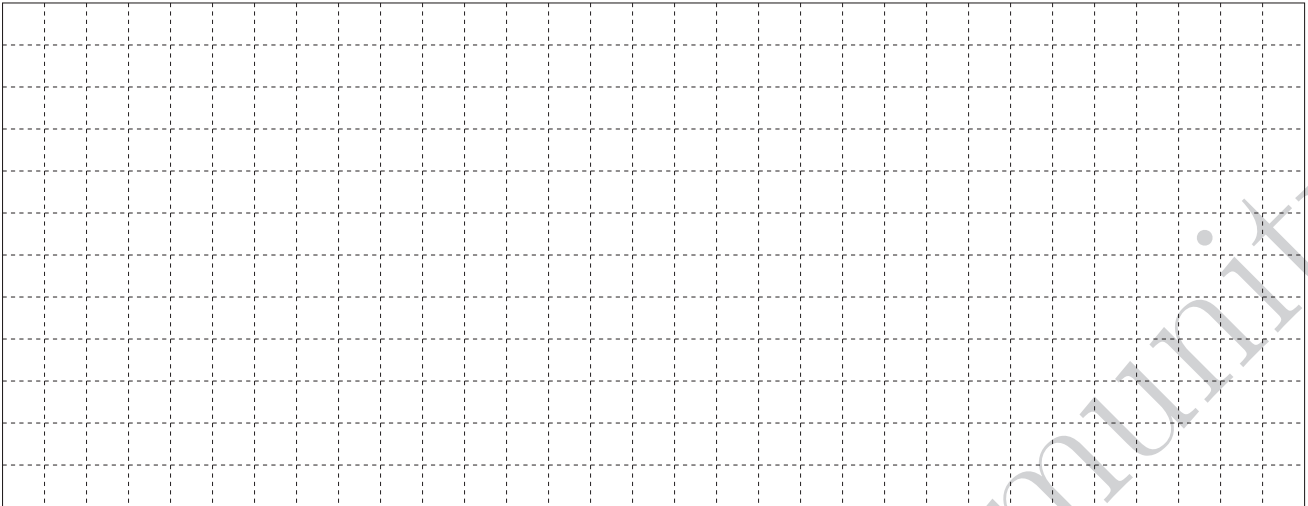
The roof of a house is described by the the following diagram

(a) What are the coordinates of points A, B and C?

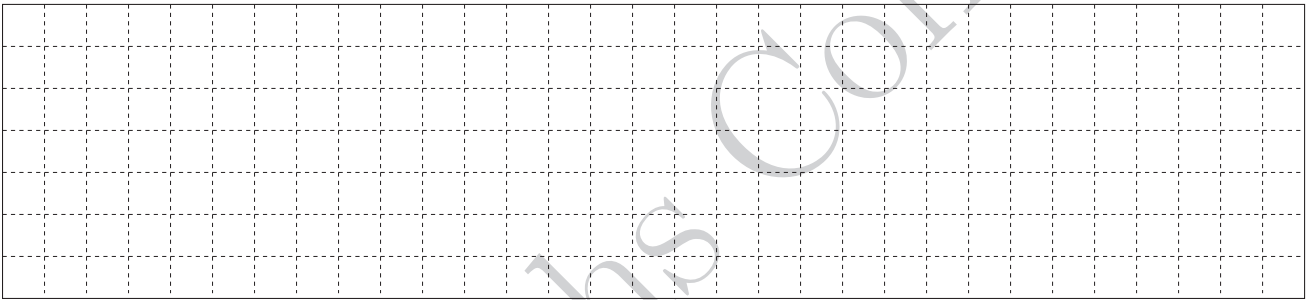


(b) Calculate the slope of line (AB).

(c) Calculate the distances AO, BO and AB. *There is room for working out on the next page.*



(d) Calculate the $\tan\theta$ where $\theta = \angle OAB$. What do you notice?

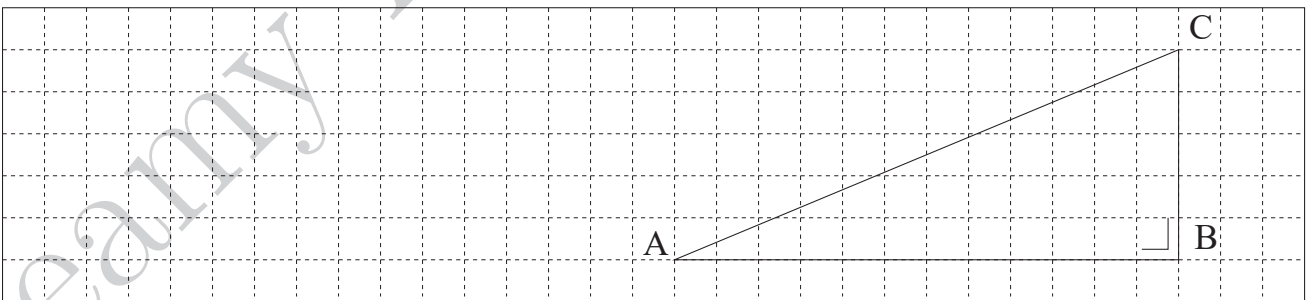


Question 9

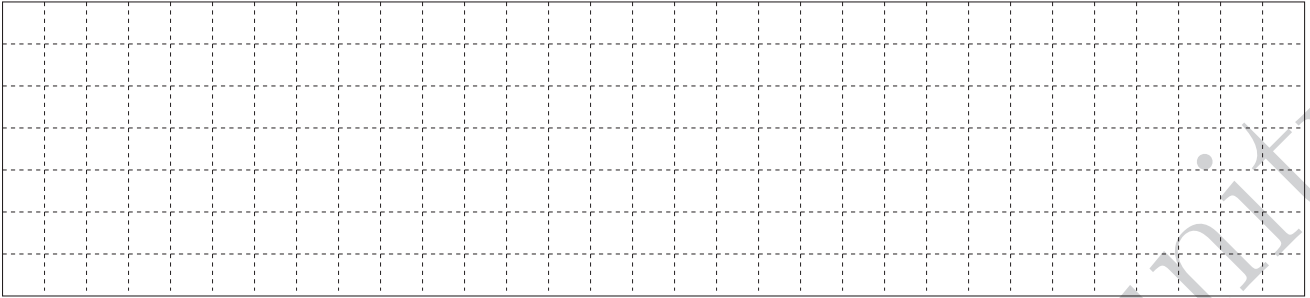
Suggested maximum time: 5 minutes

In the triangle ABC, $|AB| = 5$ and $|AC| = 7$.

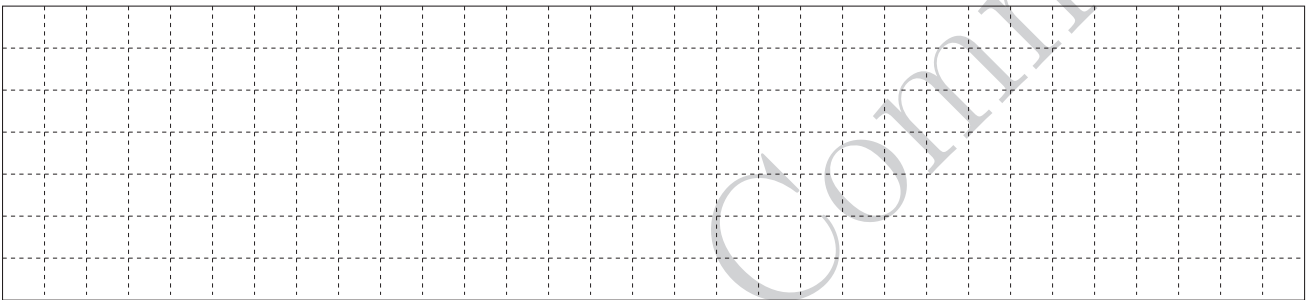
(a) Calculate $|BC|$ leaving your answer in surd form



(b) Calculate $\cos \angle BAC$ and $\sin \angle BAC$, leaving your answers in surd form.



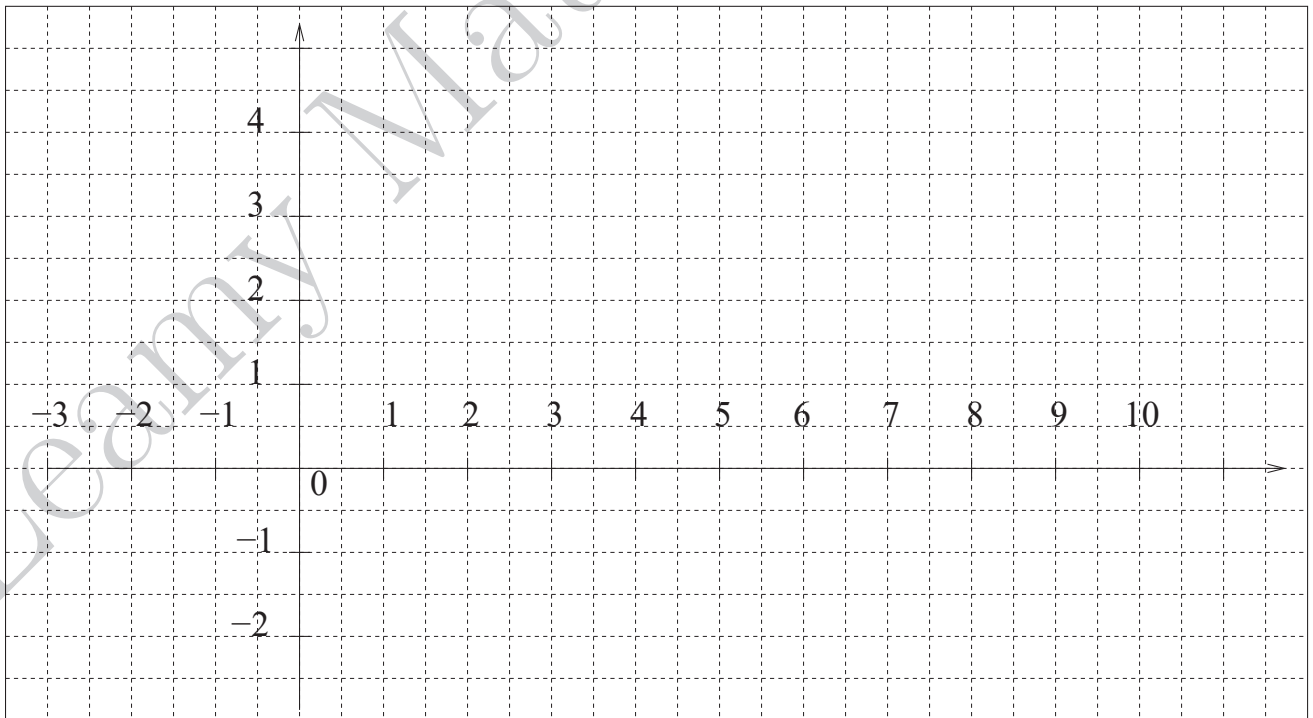
(c) Verify that $\cos^2 \theta + \sin^2 \theta = 1$ where $\theta = \angle BAC$.



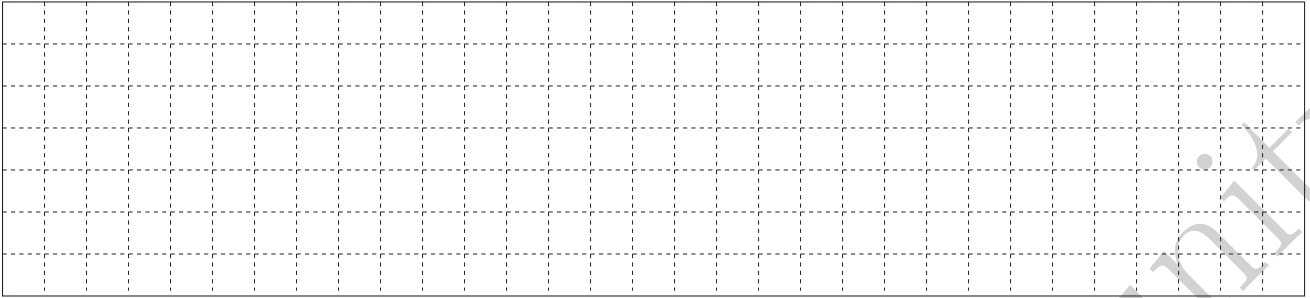
Question 10

Suggested maximum time: 5 minutes

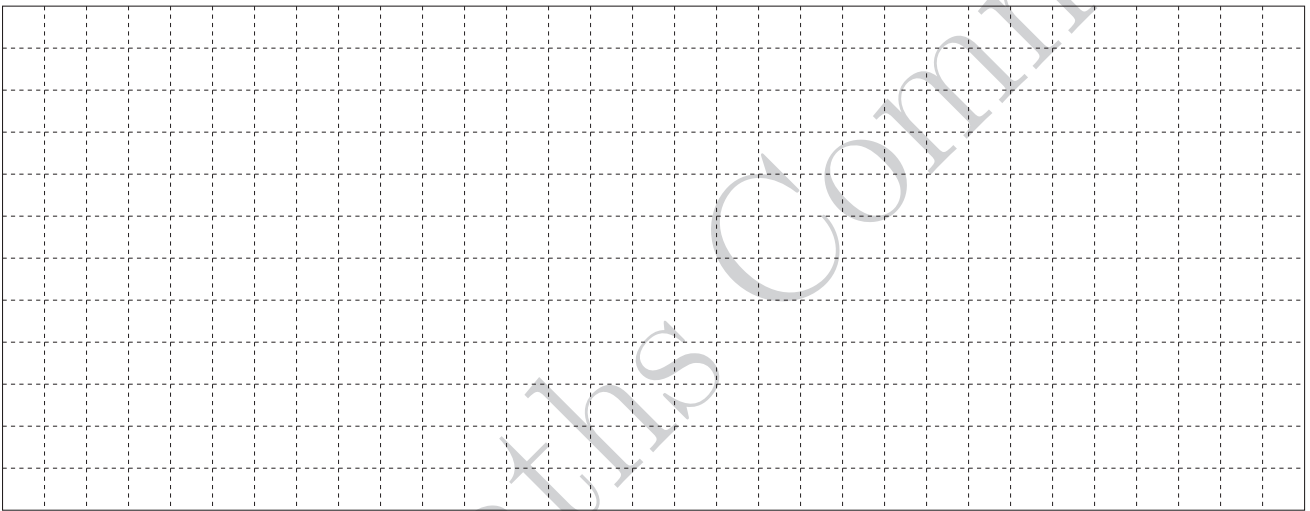
(a) Place the points $A(-2, -2)$, $B(2, 2)$, $C(8, 4)$, $D(4, 0)$ on the graph below.



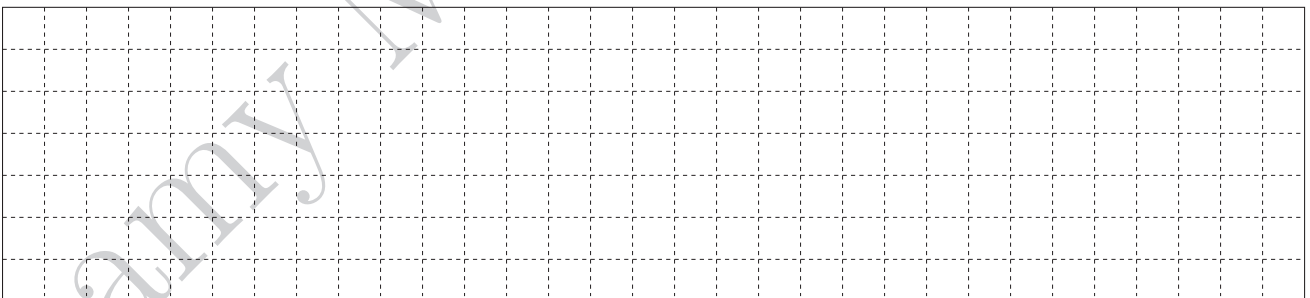
(b) Read on the graph the coordinates of point E where the two lines (AC) and (BD) intersect.



(c) Show that the point E is the midpoint of $[AC]$ and is also the midpoint of $[BD]$.



(d) What can you say about the quadrilateral $ABCD$?



Question 11

Suggested maximum time: 20 minutes

The equation of **line l** is $x-2y=8$.

(a) What are the slope and the y intercept of the line?

A grid for writing the answer to part (a). The grid is 20 units wide and 10 units high.

(b) Is the point A(2,2) on **line l**? Justify your answer.

A grid for writing the answer to part (b). The grid is 20 units wide and 10 units high.

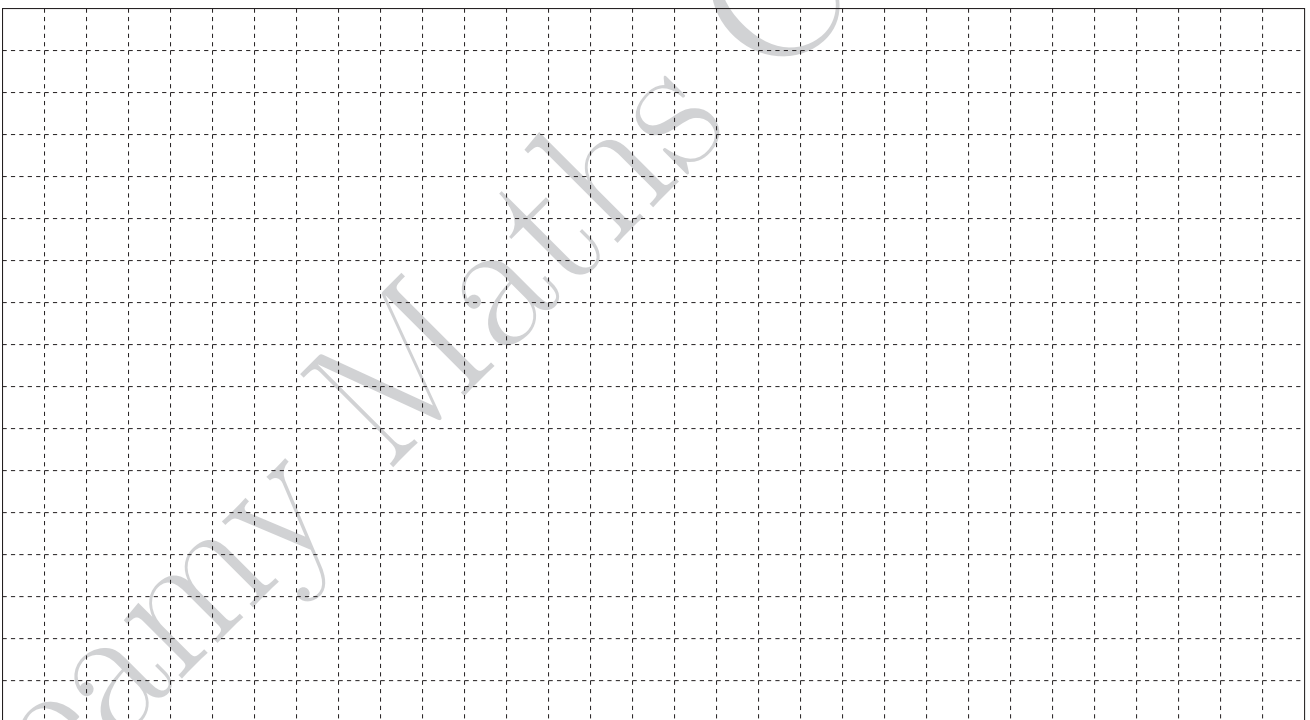
(c) **Line k** is parallel to **line l** and passes through point A. Calculate the equation of this line

A grid for writing the answer to part (c). The grid is 20 units wide and 10 units high.

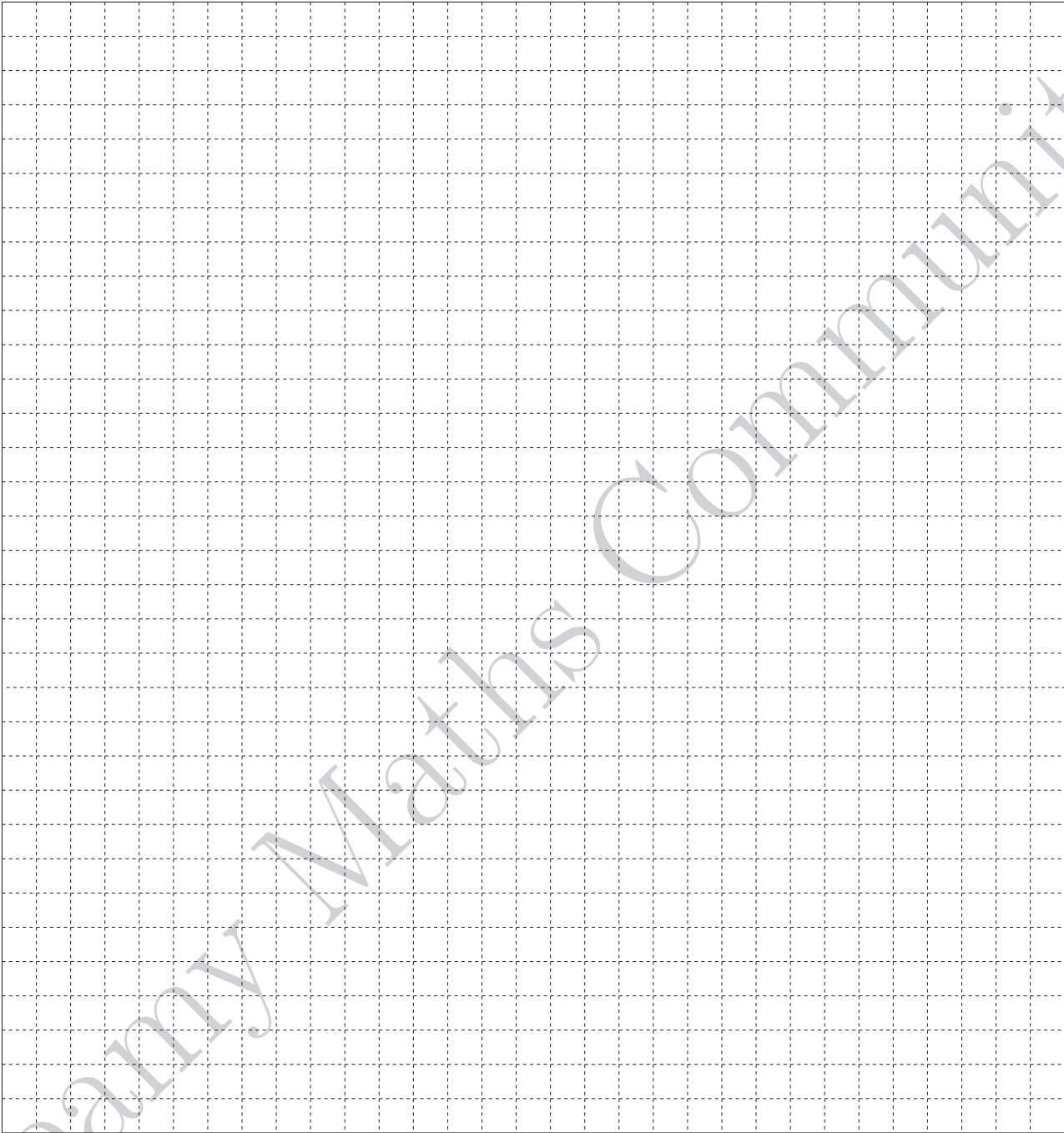
(d) **Line m** is perpendicular to **line l** and passes through point A. Calculate the equation of this line

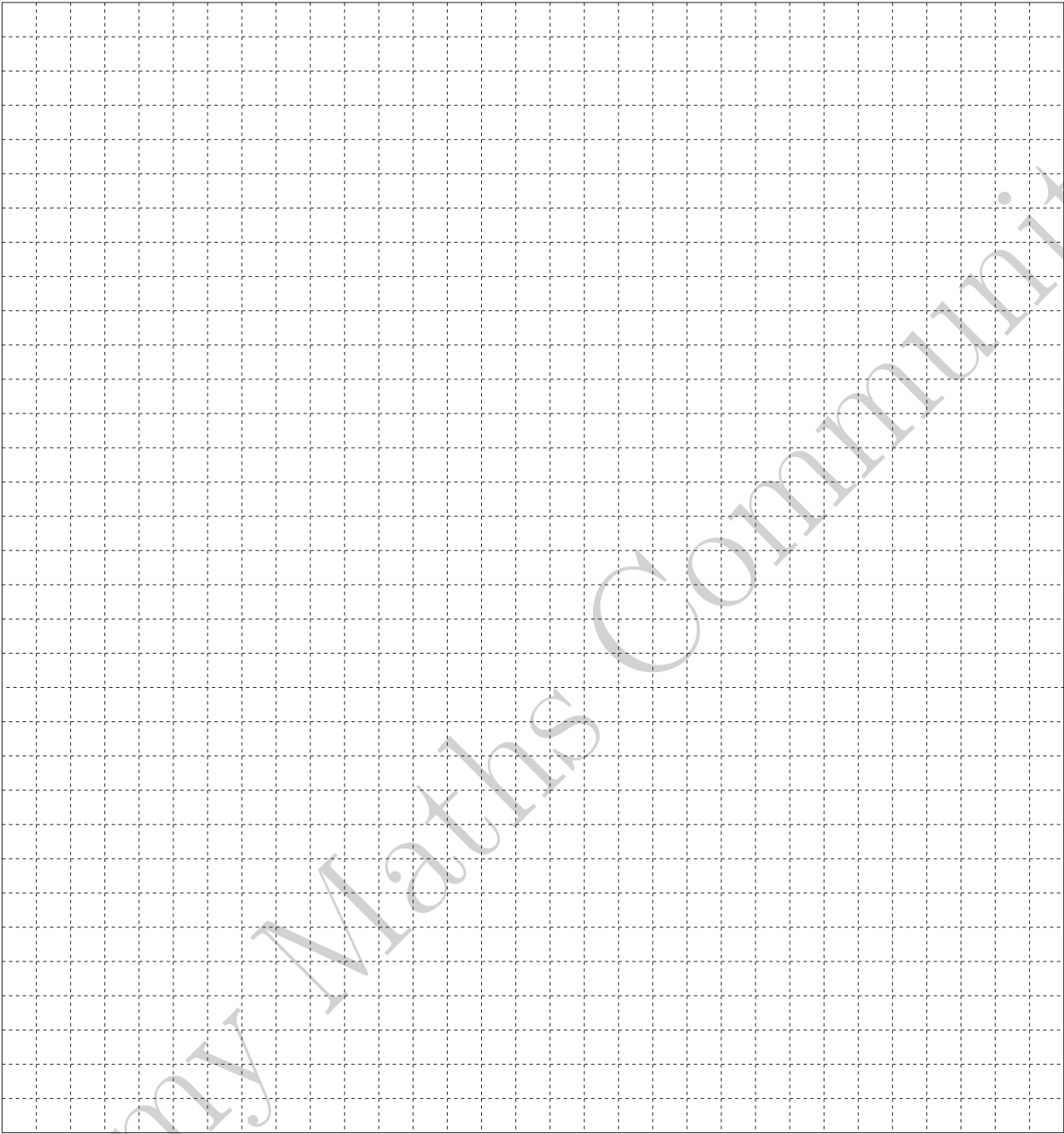


(e) Calculate the coordinates of the point common to **line l** and **line m**.

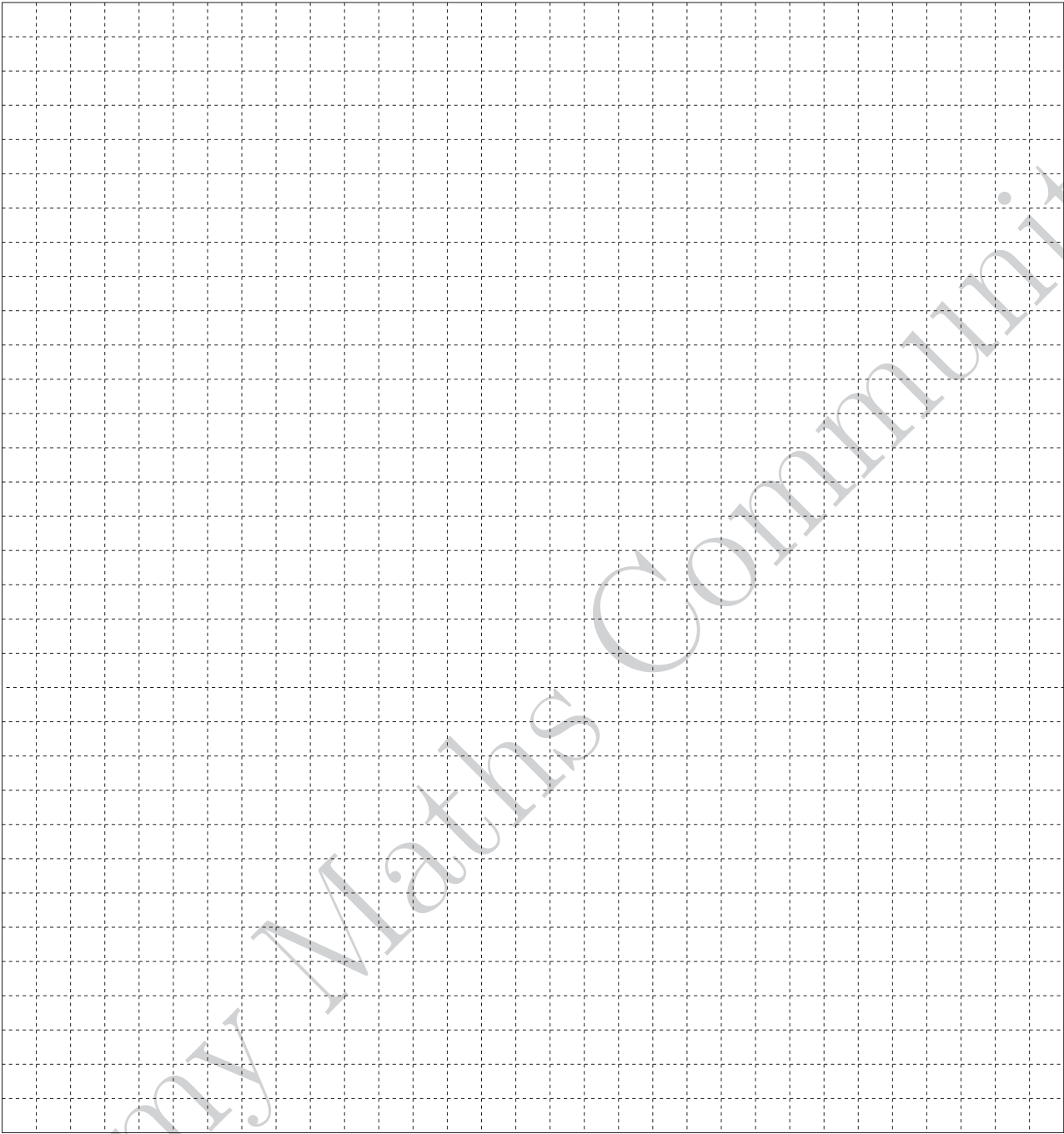


Rough Work





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