



GCSE



C300U20-1

TUESDAY, 7 JUNE 2022 – MORNING

MATHEMATICS – COMPONENT 2

CALCULATOR – ALLOWED MATHEMATICS

FOUNDATION TIER

**2 hours 15 minutes plus your additional
time allowance**

**A CALCULATOR WILL BE REQUIRED
FOR THIS EXAMINATION**

Surname: _____

First name(s): _____

Centre Number: _____

Candidate Number: 0 _____

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1.	5	
2.	6	
3.	2	
4.	4	
5.	7	
6.	4	
7.	3	
8.	6	
9.	6	
10.	10	
11.	6	
12.	5	
13.	4	
14.	4	
15.	4	
16.	4	
17.	5	
18.	4	
19.	3	
20.	5	
21.	5	
22.	7	
23.	6	
24.	5	
Total	120	

(Turn over)

ADDITIONAL MATERIALS

An additional formulae booklet.

A ruler, a protractor and a pair of compasses may be required.

ITEMS INCLUDED WITH QUESTION PAPER

A separate Formula List.

A separate Diagram Booklet.

Model for Question 6.

The Diagram Booklet MUST be handed in to the invigilators and sent for marking.

(Turn over)

INSTRUCTIONS TO CANDIDATES

Use black ink, black ball – point pen, black felt tip or your usual method.

Write your name, centre number and candidate number in the spaces on the front cover.

Answer ALL questions.

Write your answers in the spaces provided.

If you run out of space, use the additional page(s) at the back of the booklet, taking care to number the questions(s) correctly.

Take π as 3.142 or use the π button on your calculator.

(Turn over)

INFORMATION FOR CANDIDATES

You should give details of your method of solution when appropriate.

Unless stated, diagrams are not drawn to scale.

Scale drawing solutions will not be acceptable where you are asked to calculate.

The number of marks is given in brackets at the end of each question or part – question.

You are reminded of the need for good English and orderly, clear presentation in your answers.

(Turn over)

- 1. Look at the table for Question 1 in the separate Diagram Booklet.**

The cost of various items sold at a shop are shown.

- (a) Find the total cost of buying a calculator, a file and a pencil.**

[1 mark]

continued on the next page . . .

(Turn over)

Question 1 continued

- 1. (b) Nisreen bought five notebooks.
She paid for them with a
£20 note.**

**How much change should
she get?**

[2 marks]

continued on the next page . . .

(Turn over)

Question 1 continued

1. (c) George bought two different items.

He paid for them with a £5 note and received £1.90 change.

Which two items did he buy?

You must show all your working.

(Turn over)

Items are

_____ **and** _____

[2 marks]

(Turn over)

2. (a) Look at Diagram 1 and Diagram 2 for Question 2 (a) in the separate Diagram Booklet. The diagrams are NOT drawn to scale.

Find the size of each of the angles marked *e*, *f* and *g* shown in Diagram 1 and Diagram 2.

e = _____ °

f = _____ °

g = _____ °

(Turn over)

[4 marks]

continued on the next page . . .

(Turn over)

Question 2 continued

- 2. (b) The interior angles of a triangle are 65° , 65° and 50°**

Circle the correct mathematical name of this triangle.

Equilateral
Right – angled
Isosceles
Obtuse – angled
Scalene

[1 mark]

continued on the next page . . .

(Turn over)

Question 2 continued

- 2. (c) Look at the diagram for Question 2 (c) in the separate Diagram Booklet.**

Measure the size of the reflex angle ABC shown.

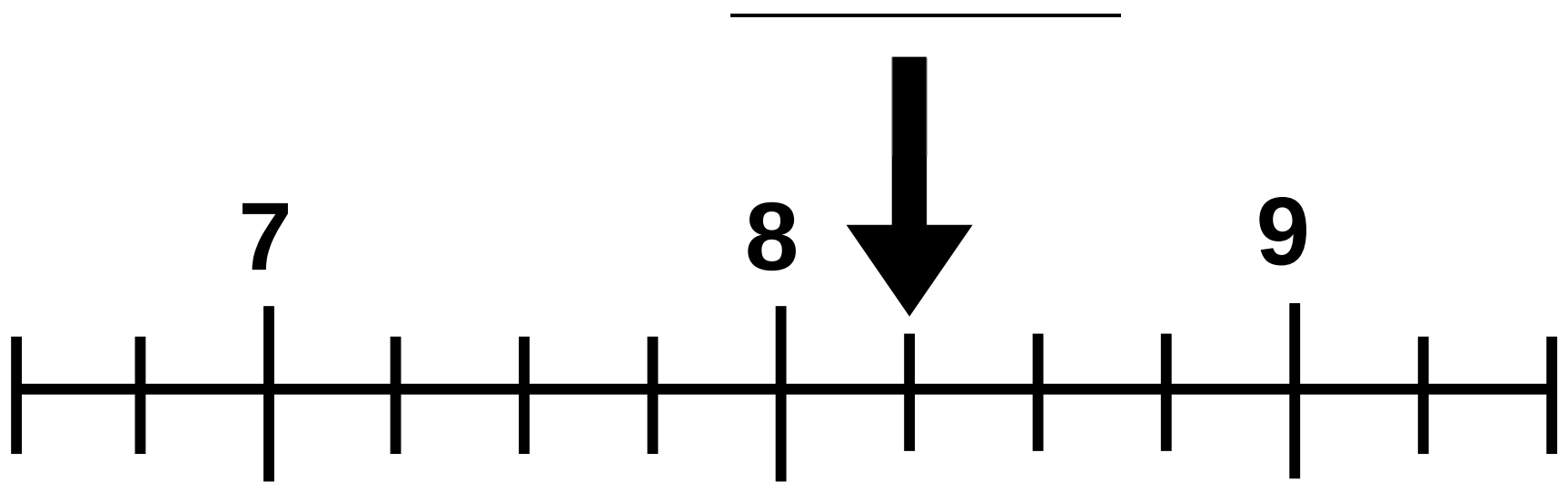
Reflex angle $ABC =$ _____^o

[1 mark]

(Turn over)

3. (a) Part of a number line is shown below.

Which number is the arrow pointing at?



[1 mark]

continued on the next page . . .

(Turn over)

Question 3 continued

- 3. (b) Circle the TWO lengths below that are equal.**

1740 mm
1740 cm
174 cm
174 m
17.4 km

[1 mark]

(Turn over)

4. (a) Write the following statement using the correct mathematical symbol.

0.24 is less than 0.3

[1 mark]

continued on the next page . . .

(Turn over)

Question 4 continued

- 4. (b) Give calculations to show that the following statement is correct.**

18% of 160 is the same as $\frac{2}{3}$ of 43.2

(Turn over)

18

[3 marks]

(Turn over)

5. Look at the diagram for Question 5 in the separate Diagram Booklet.

Roman has the nine cards shown.

**YOU MUST ONLY USE THE
NUMBERS ON THESE CARDS.**

You must show all your working.

**(a) (i) Calculate the sum of the
two prime numbers.**

[2 marks]

continued on the next page . . .

(Turn over)

Question 5 (a) continued

**5. (a) (ii) Calculate the product of
the two square numbers.**

[2 marks]

continued on the next page . . .

(Turn over)

Question 5 (a) continued

**5. (a) (iii) Find the number which
is both a factor of 72 and
a multiple of 8**

[2 marks]

continued on the next page . . .

(Turn over)

Question 5 continued

5. (b) Roman picks one of his nine cards at random.

He says,

“I have a $\frac{2}{9}$ chance of picking a card with a cube number on it.”

Is Roman’s statement correct?

Yes

☐

No

☐

Show how you decide.

(Turn over)

23

[1 mark]

(Turn over)

- 6. Ask for the model for Question 6.
The model is NOT made to scale.**

**Oscar is making a model of
his house.**

He decides to use a scale of

1 cm represents $\frac{1}{4}$ metre to make

his model.

**Look at the diagram for Question 6
in the separate Diagram Booklet.**

The diagram is NOT drawn to scale.

**The diagram is a 2D diagram of the
front of the model.**

continued on the next page . . .

(Turn over)

Question 6 continued

6. (a) Oscar's model is 30 cm tall.

How tall is his actual house?

[2 marks]

continued on the next page . . .

(Turn over)

Question 6 continued

6. (b) The front window of Oscar's house is 2 metres wide.

How wide should the front window be on Oscar's model house?

Give your answer in cm.

(Turn over)

[2 marks]

(Turn over)

- 7. Look at the diagram for Question 7 in the separate Diagram Booklet.**

The diagram shows a sequence of patterns made from using lines and circles.

- (a) How many lines and circles will there be in pattern 5?**

(Turn over)

Lines _____

Circles _____

[2 marks]

continued on the next page . . .

(Turn over)

Question 7 continued

7. (b) Is it possible for a pattern in this sequence to have 36 lines and 24 circles?

Yes

☐

No

☐

Show how you decide.

[1 mark]

(Turn over)

8. (a) A Headteacher wants to put new carpet in one of his classrooms. He uses carpet that costs £12.48 per m²

Look at the diagram for Question 8 (a) in the separate Diagram Booklet. The diagram is NOT drawn to scale.

The diagram shows the dimensions of the classroom.

How much will it cost to buy the exact amount of carpet needed to cover the classroom floor?

[3 marks]

continued on the next page . . .

(Turn over)

Question 8 continued

8. (b) The Headteacher needs to buy vinyl flooring for a different classroom with an area of 67.2 m^2

It is sold in rolls that each cover an area of 10.5 m^2

What is the minimum number of rolls of vinyl flooring he needs to buy?

(Turn over)

34

[3 marks]

(Turn over)

- 9. Below is a recipe to make a batch of 12 flapjacks.**

MAKES 12 FLAPJACKS

240 g of porridge oats

125 g of butter

100 g of brown sugar

2 tablespoons of golden syrup

continued on the next page . . .

(Turn over)

Question 9 continued

- 9. (a) Complete the table provided for Question 9 (a) in the separate Diagram Booklet to show how much of each ingredient would be needed to make 72 flapjacks.**

(Turn over)

[2 marks]

9. (b) Anatoly has 1.75 kg of butter and plenty of the other ingredients.

What is the greatest number of batches of 12 flapjacks Anatoly can make?

(Turn over)

Anatoly can make _____
batches of 12 flapjacks.

[3 marks]

continued on the next page . . .

(Turn over)

Question 9 continued

- 9. (c) This note is written underneath the original recipe.**

**To make 15 flapjacks,
use 25% more of each
ingredient.**

**Show that this statement
is correct.**

(Turn over)

40

[1 mark]

(Turn over)

10. (a) Simplify $5f + 6g + 3f - 9g$

[2 marks]

continued on the next page . . .

(Turn over)

Question 10 continued**10. (b) Expand $5(m - 3)$**

[1 mark]**continued on the next page . . .****(Turn over)**

Question 10 continued

**10. (c) Find the value of $6x + 3y$
when $x = 5.2$ and $y = 0.4$**

[2 marks]

continued on the next page . . .

(Turn over)

Question 10 continued

10. (d) Solve $\frac{e}{2} - 4 = 6$

[2 marks]

continued on the next page . . .

(Turn over)

Question 10 continued

10. (e) Look at Diagram 1 and Diagram 2 for Question 10 (e) in the separate Diagram Booklet. The diagrams are NOT drawn to scale.

Diagram 1 is a rectangle with length y and width x .

Three rectangles congruent to the rectangle shown in Diagram 1 are arranged, without overlapping, to create the large rectangle shown in Diagram 2.

continued on the next page . . .

(Turn over)

Question 10 (e) continued

**Find an expression for the
perimeter of this large rectangle
(Diagram 2) IN TERMS OF x .
Simplify your answer.**

**[3 marks]
(Turn over)**

11. Faheema has a sack that contains a number of identical balls of different colours.

The table below shows the probability of randomly choosing a ball that is red, green, yellow or blue.

Colour	Probability
Red	0.32
Green	0.46
Yellow	0.1
Blue	0.12

continued on the next page . . .

(Turn over)

Question 11 continued

11. (a) Faheema claims:

**“There are other balls that
are not red, green, yellow
or blue in the sack.”**

Explain why she is incorrect.

[1 mark]

(Turn over)

Question 11 continued

11. (b) A ball is chosen at random from the sack.

Calculate the probability that this ball is either green or yellow.

[1 mark]

continued on the next page . . .

(Turn over)

Question 11 continued

11. (c) Faheema uses the sack of balls for a game at her school fair.

In the game, each person pays 50p to choose a ball at random from the sack.

The ball is then returned to the sack.

The player wins a prize worth £2.95 if a blue ball is chosen.

150 people each played the game once.

continued on the next page . . .

(Turn over)

Question 11 (c) continued

**How much profit would you
expect Faheema to make?**

You must show all your working.

[4 marks]

(Turn over)

**12. (a) A car leaves Chester
at 9:27 a.m.**

**It arrives at Taunton
at 1:13 p.m.**

**How long does the journey
take? Give your answer in
hours and minutes.**

54

_____ **hours**

_____ **minutes**

[2 marks]

continued on the next page . . .

(Turn over)

Question 12 continued

12. (b) Bus A and Bus B both leave the station at 8:00 a.m.

Bus A returns to the station every 30 minutes.

Bus B returns to the station every 24 minutes.

At what time will both buses next return to the station at the same time?

(Turn over)

[illegible]

(Turn over)

13. Zahra buys 2.3 kg of parsnips and 3.5 kg of potatoes.

These cost a total of £6.23

1 kg of potatoes costs £1.32

What is the cost of 1 kg of parsnips?

1 kg of parsnips costs _____

[4 marks]

(Turn over)

14. (a) Calculate the value of $\frac{2.6 \times 5.7}{3.4 - 1.8}$

Give your answer correct
to 1 decimal place.

[2 marks]

continued on the next page . . .

(Turn over)

Question 14 continued

**14. (b) Write 68 321 correct to
2 significant figures.**

[1 mark]

continued on the next page . . .

(Turn over)

Question 14 continued

14. (c) Write 6 300 000 in standard form.

[1 mark]

(Turn over)

15. Look at the diagram for Question 15 in the separate Diagram Booklet. The diagram shows an incomplete Venn diagram.

The universal set ($\mathcal{U}$) contains the numbers 31, 32, 33, 34, 35, 36, 37, 38, 39 and 40

A is the set of odd numbers.

B is the set of multiples of 3

(a) Show this information on the Venn diagram.

[2 marks]

continued on the next page . . .

(Turn over)

Question 15 continued

15. (b) A number is selected at random from the universal set (ϵ).

Find the probability that the number selected is an odd number but not a multiple of 3

[2 marks]

(Turn over)

16. (a) Look at the diagram for Question 16 (a) in the separate Diagram Booklet.

The diagram shows a shape on a coordinate grid.

Draw an enlargement of the shape using a scale factor of 2 and $(0, 0)$ as the centre of enlargement.

[3 marks]

continued on the next page . . .

(Turn over)

Question 16 continued

16. (b) Look at the diagram for Question 16 (b) in the separate Diagram Booklet.

The diagram shows a grid.

Three vertices of a parallelogram have been plotted on the grid.

Plot the fourth vertex of the parallelogram.

[1 mark]

(Turn over)

17. Look at the diagram for Question 17 in the separate Diagram Booklet.

The diagram is NOT drawn to scale.

The diagram represents two pizzas.

Amy and Vance each buy a thin pizza.

Amy's pizza has a radius of 3 inches.

Vance's pizza has a radius of 5 inches.

Amy eats one half of her pizza.

Vance eats one quarter of his pizza.

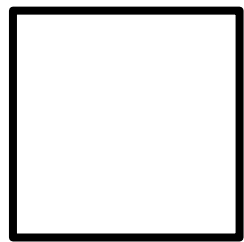
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(Turn over)

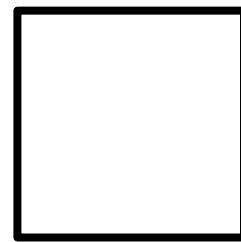
Question 17 continued

Who eats the slice of pizza with the greater area?

Amy



Vance



You must show all your working.

(Turn over)

(Turn over)

[5 marks]

(Turn over)

18. The table below shows the mass of 90 carrots grown by a gardener.

Mass, m (grams)	Number of carrots
$30 < m \leq 60$	9
$60 < m \leq 90$	33
$90 < m \leq 120$	38
$120 < m \leq 150$	8
$150 < m \leq 180$	2

Calculate an estimate for the mean mass of these carrots.

(Turn over)

71

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

[4 marks]
(Turn over)

19. Jan, Freda and Pieter share some money.

Freda gets 3 times as much as Jan.

Pieter gets half as much as Freda.

(a) Write down the ratio of the amounts of money that they each get.

Give your answer in its simplest form.

(Turn over)

Jan : Freda : Pieter =

_____ : _____ : _____

[2 marks]

continued on the next page . . .

(Turn over)

Question 19 continued

**19. (b) What fraction of the money
does Pieter get?**

[1 mark]

(Turn over)

20.

EDUDIG Digger £35 950
--

Samir buys this digger and expects to use it for 1250 hours each year.

The digger will decrease in value at a yearly rate of 18% of its value at the end of the previous year.

Use this information to calculate the decrease in value of Samir's digger when it has been used for 10 000 hours.

(Turn over)

[illegible]

(Turn over)

[5 marks]

(Turn over)

**21. A circular wheel makes
42 complete turns each minute.**

**(a) How many degrees does it turn
through in one second?**

(Turn over)

79

[illegible]

[3 marks]
(Turn over)

Question 21 continued

21. (b) (i) State ONE assumption you have made in your answer to part (a).

[1 mark]

continued on the next page . . .

(Turn over)

Question 21 (b) continued

21. (b) (ii) How would your answer to part (a) change if this assumption was not correct?

[1 mark]

(Turn over)

22. (a) Solve $2x + 5 = 11 + 5x$

[2 marks]

continued on the next page . . .

(Turn over)

Question 22 continued

22. (b) Solve $8x - (3x + 1) = 2$

Give your answer as a fraction.

(Turn over)

[3 marks]

continued on the next page . . .

(Turn over)

Question 22 continued

- 22. (c) Tansy is trying to solve**
 $1 < x + 2 \leq 5$ where x is a
whole number.
Here is her work.

$$1 - 2 < x \text{ and } x \leq 5 - 2$$

$$- 1 < x \text{ and } x \leq 3$$

$$- 1 < x \leq 3$$

x is $- 1, 0, 1, 2$ or 3

continued on the next page . . .

(Turn over)

Question 22 (c) continued

Ali says,

“You have made an error.”

Is Ali correct?

Yes ☐

No ☐

Show clearly how you decide.

(Turn over)

[1 mark]

continued on the next page . . .

(Turn over)

Question 22 continued

22. (d) Look at the diagram for Question 22 (d) in the separate Diagram Booklet. The diagram shows a number line.

**Represent the inequality
 $x > -2$ on the number line.**

[1 mark]

(Turn over)

23. In an experiment, a scientist records the temperature, $y^{\circ}\text{C}$, of an object as it is heated for x seconds.

The scientist thinks that the equation $y = mx + c$ is a good fit for this data.

Look at the diagram for Question 23 in the separate Diagram Booklet.

The diagram shows his results on a scatter graph and his line of best fit.

continued on the next page . . .

(Turn over)

Question 23 continued

**23. (a) Estimate the number of
seconds for which the object
has been heated when its
temperature is 35°C**

[1 mark]

continued on the next page . . .

(Turn over)

Question 23 continued

23. (b) When $x = 70$ seconds, the scientist measures the value of y to be 52°C

Use this information to decide whether the line of best fit is likely or unlikely to give reliable predictions for values of y when x is greater than 50 seconds.

Likely

☐

Unlikely

☐

Explain how you decide.

(Turn over)

[1 mark]

continued on the next page . . .

(Turn over)

Question 23 continued

23. (c) The line of best fit passes through the points (0, 15) and (10, 22)

Find the equation of the line of best fit.

Give your answer in the form

$$***y = mx + c***$$

(Turn over)

[3 marks]
(Turn over)

Question 23 continued

23. (d) Explain what the gradient of the line of best fit represents in this context.

[1 mark]

(Turn over)

24. Look at the diagram for Question 24 in the separate Diagram Booklet.

The diagram is NOT drawn to scale.

ABC is a right – angled triangle.

$AB = 4.8$ cm and angle $BAC = 57^\circ$

Calculate the area of triangle ABC .

(Turn over)

(Turn over)

Area = _____ cm²

[5 marks]

END OF PAPER

TOTAL 120 MARKS

(Turn over)

[illegible]

(Turn over)

[illegible]

(Turn over)

Question number	Additional pages, if required. Write the question number(s) in the left - hand margin.

C300U20-1

TUESDAY, 7 JUNE 2022 – MORNING

MATHEMATICS – COMPONENT 2
CALCULATOR–ALLOWED MATHEMATICS
FOUNDATION TIER

**The Diagram Booklet MUST
be handed in to the invigilators
and sent for marking.**

Diagram Booklet

Surname: _____

First name(s): _____

Centre Number: _____

Candidate Number: 0 _____

Question 1

Table

ITEM	COST
Notebook	£2.49
File	£3.59
Pen	95p
Calculator	£10.50
Pencil	55p
Stapler	£2.15

Question 2 (a)

Diagrams NOT drawn to scale

Diagram 1

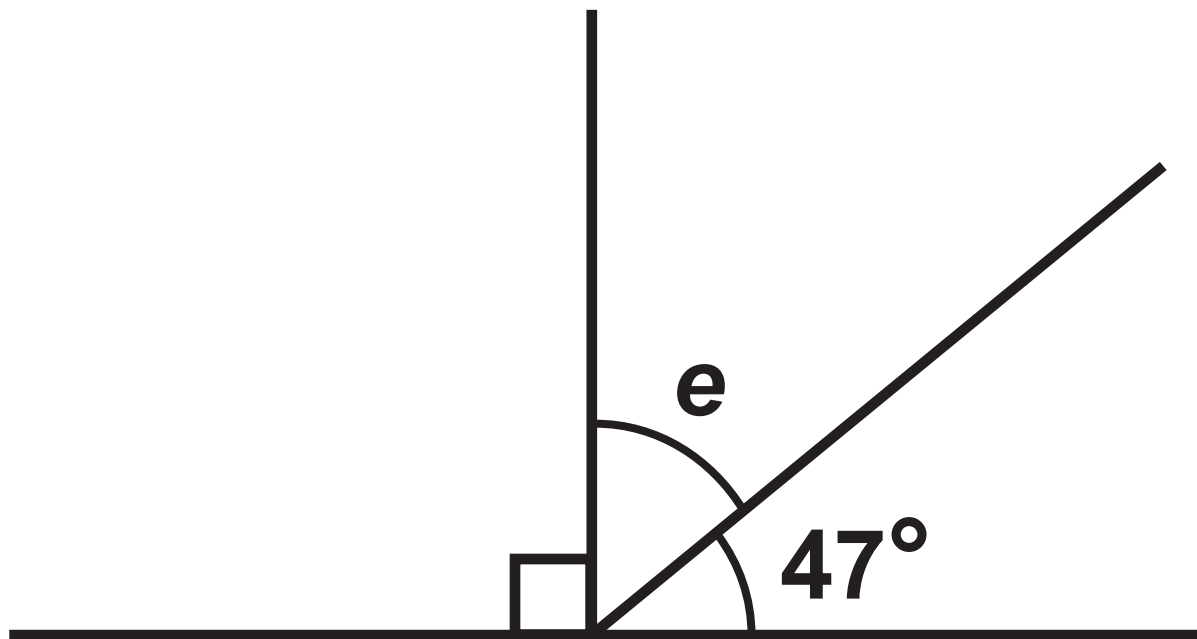
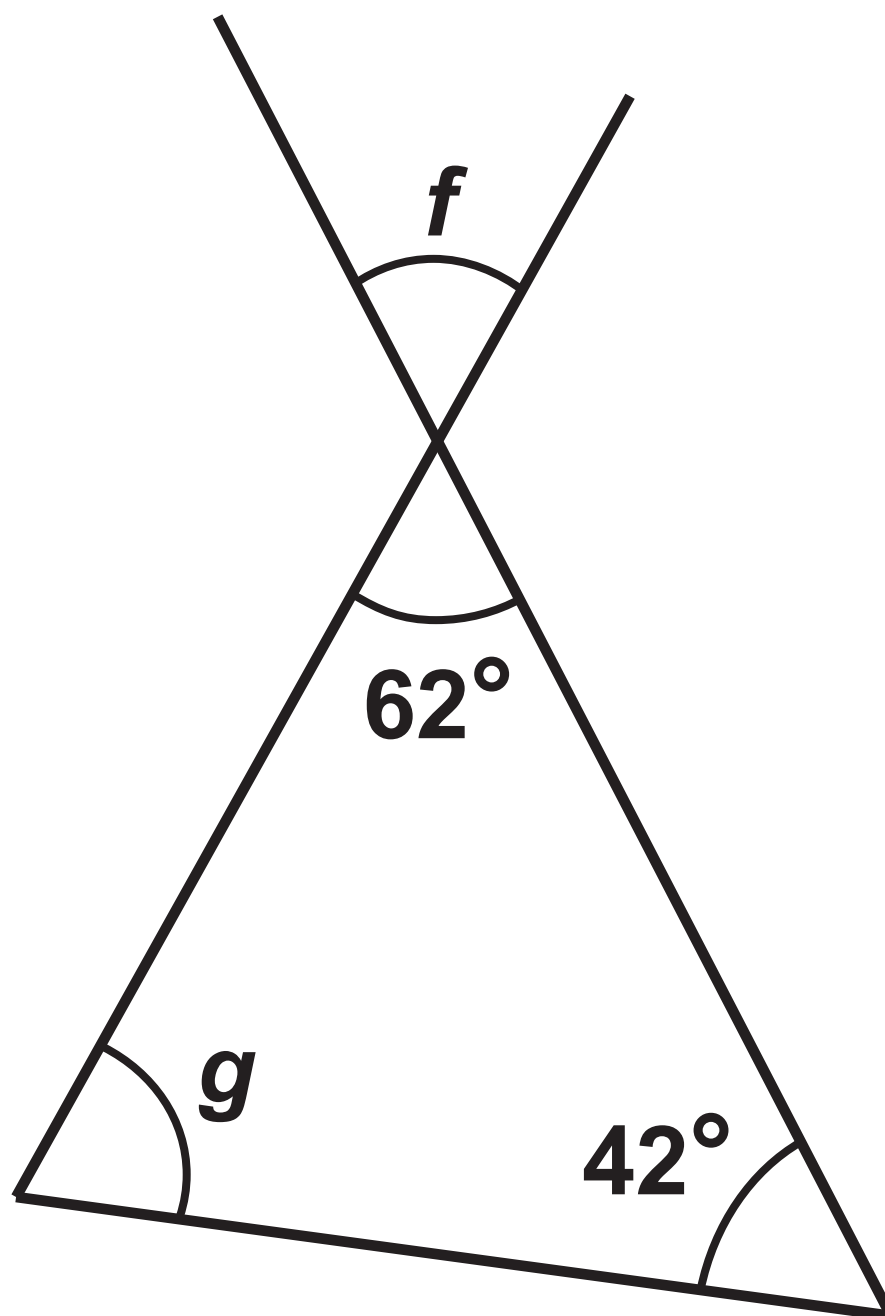
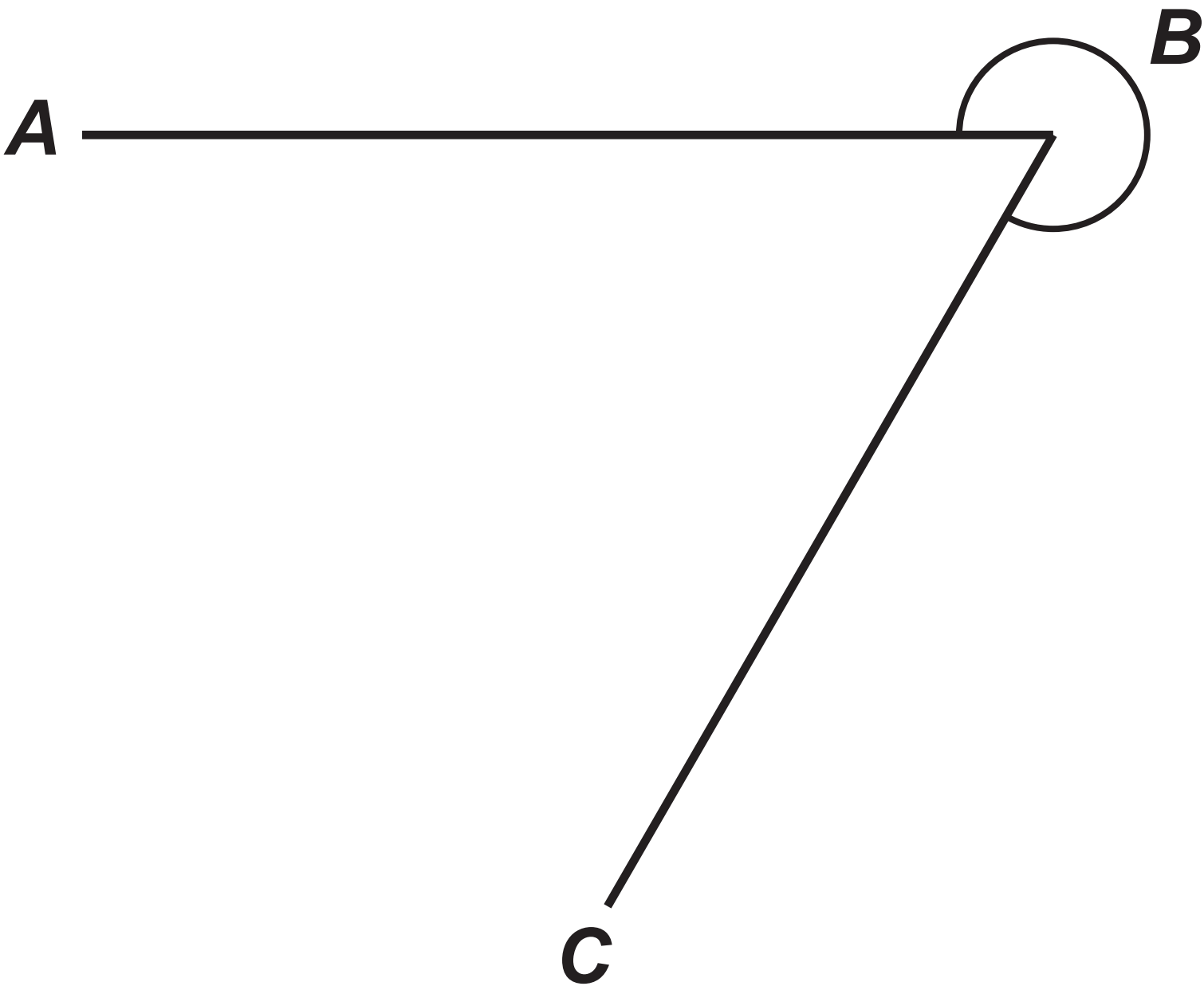


Diagram 2



Question 2 (c)



Question 5

9

13

14

15

17

24

27

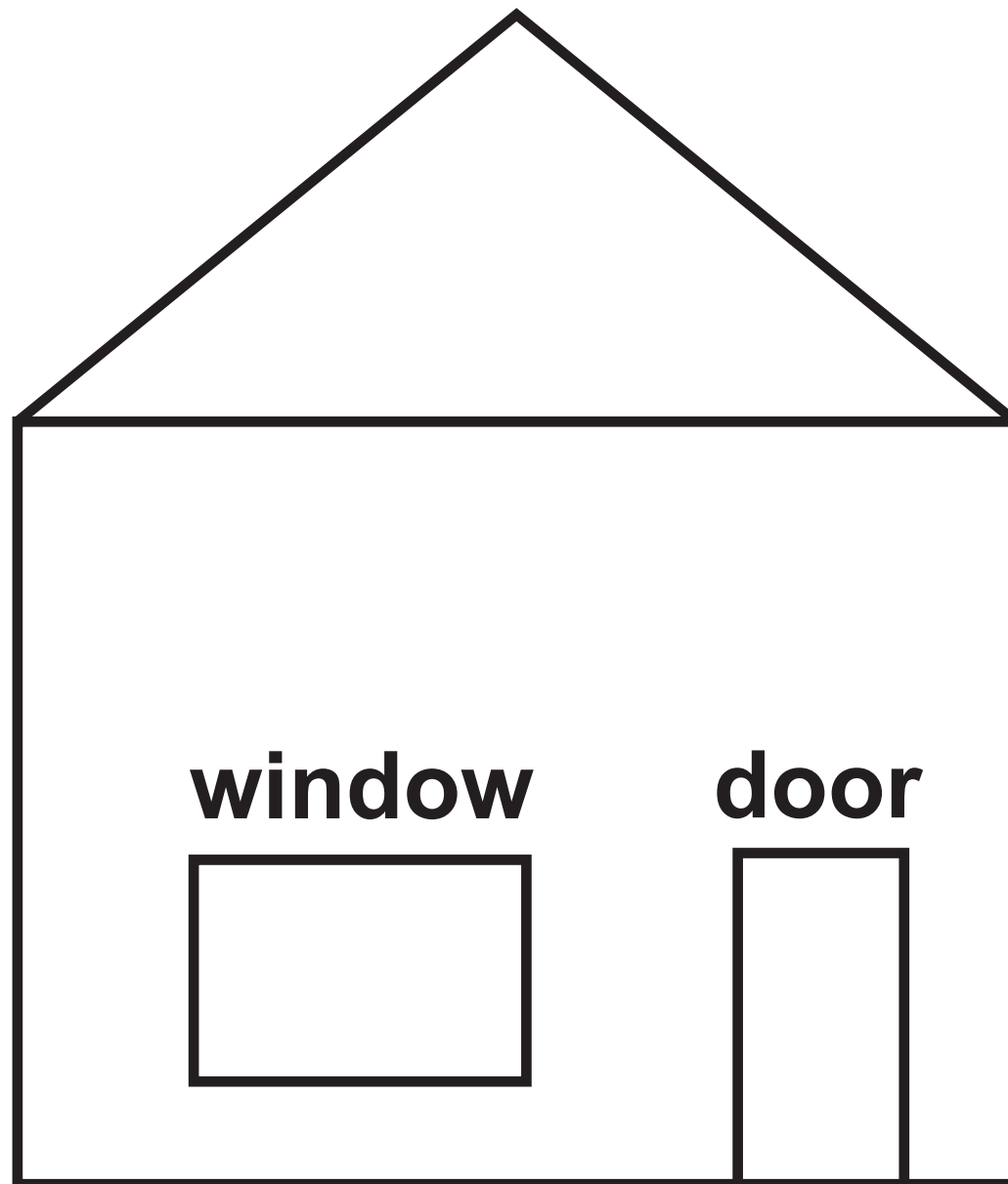
32

36

Question 6

Diagram NOT drawn to scale

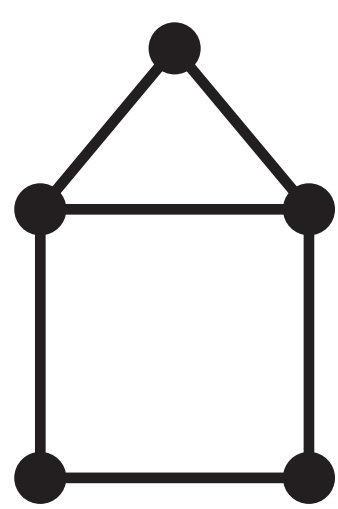
2D diagram of the front of the model



Question 7

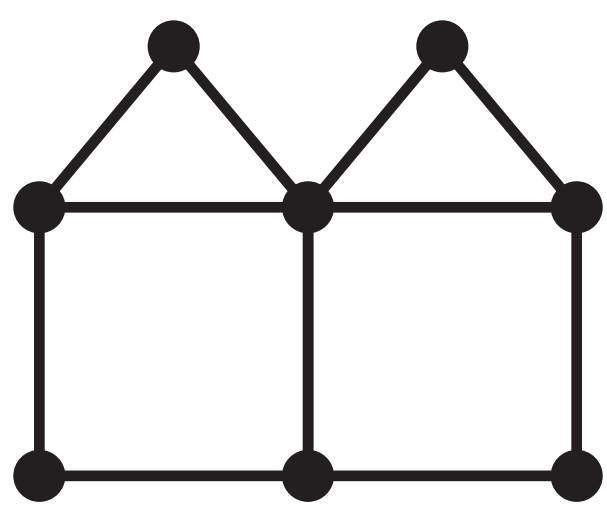
Pattern 1

Lines: 6
Circles: 5



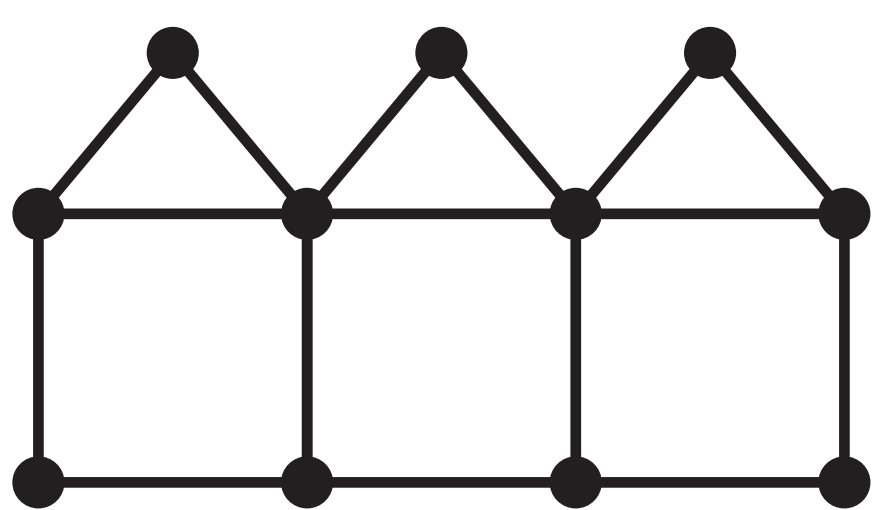
Pattern 2

Lines: 11
Circles: 8



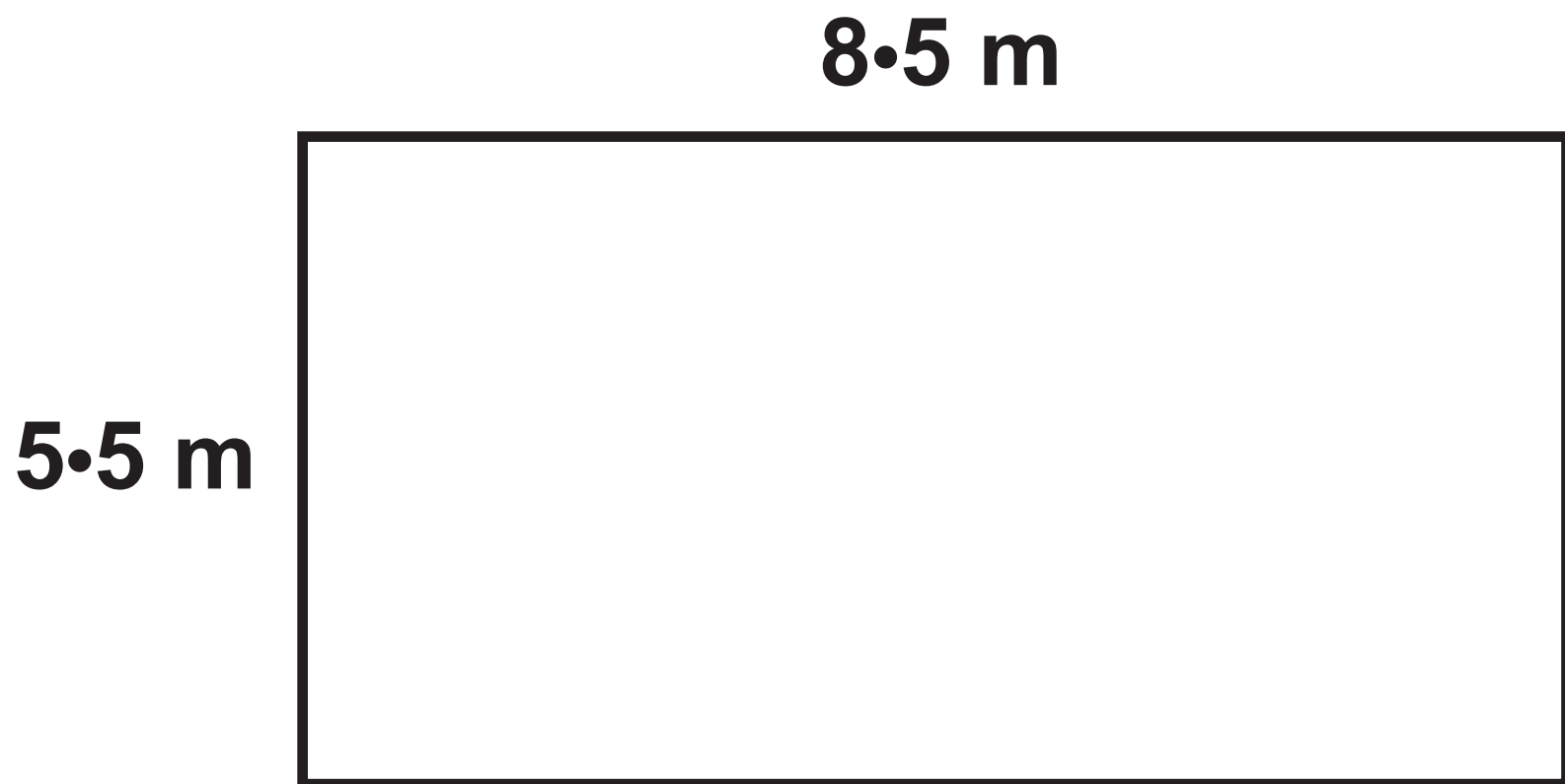
Pattern 3

Lines: 16
Circles: 11



Question 8 (a)

Diagram NOT drawn to scale



Question 9 (a)

Table

MAKES 72 FLAPJACKS

_____ g of porridge oats

_____ g of butter

_____ g of brown sugar

_____ tablespoons of golden syrup

Question 10 (e)

Diagrams NOT drawn to scale

Diagram 1

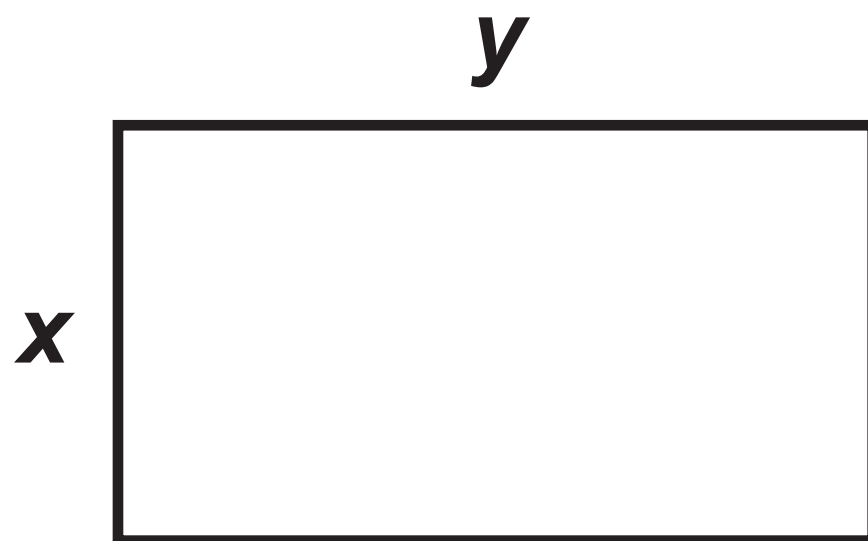
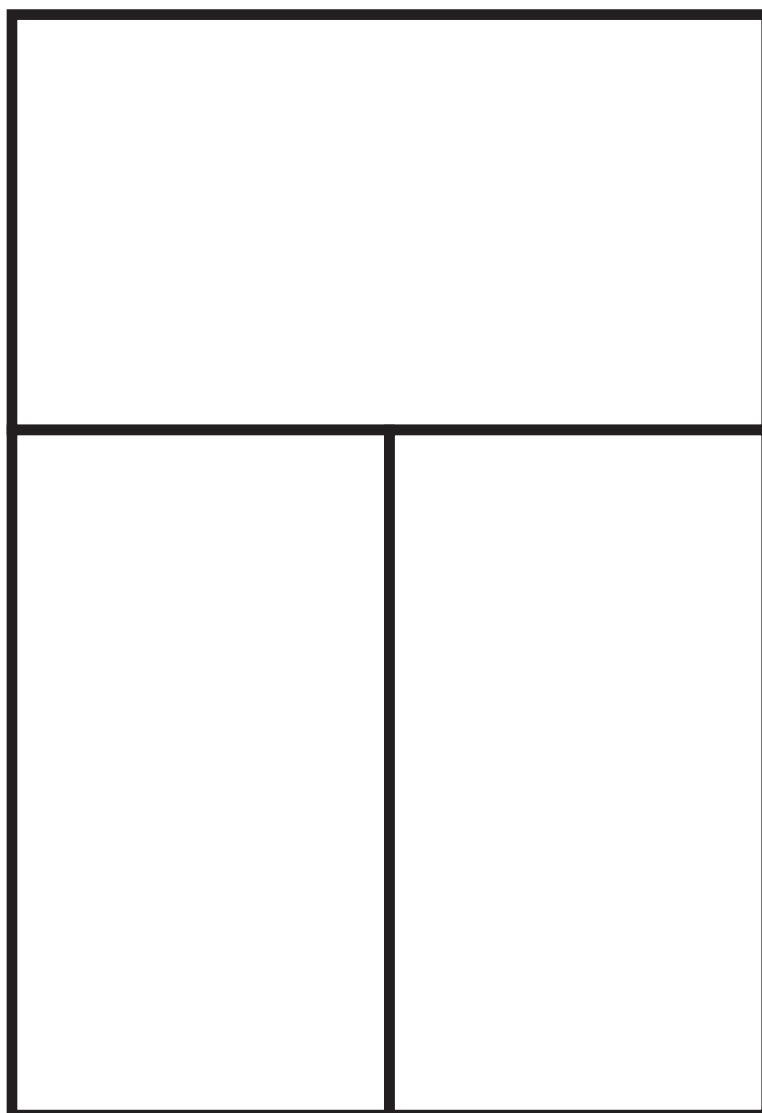
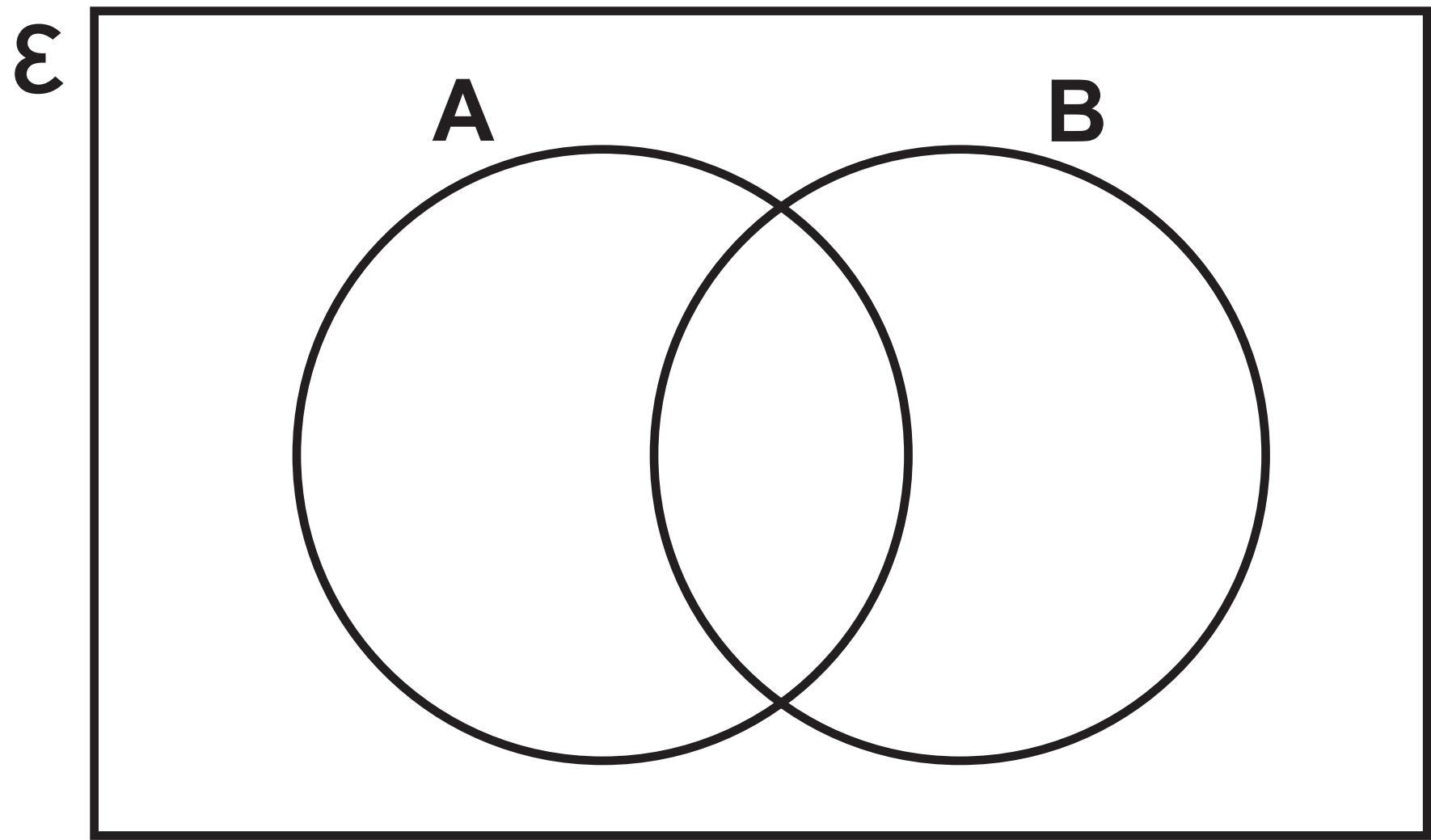


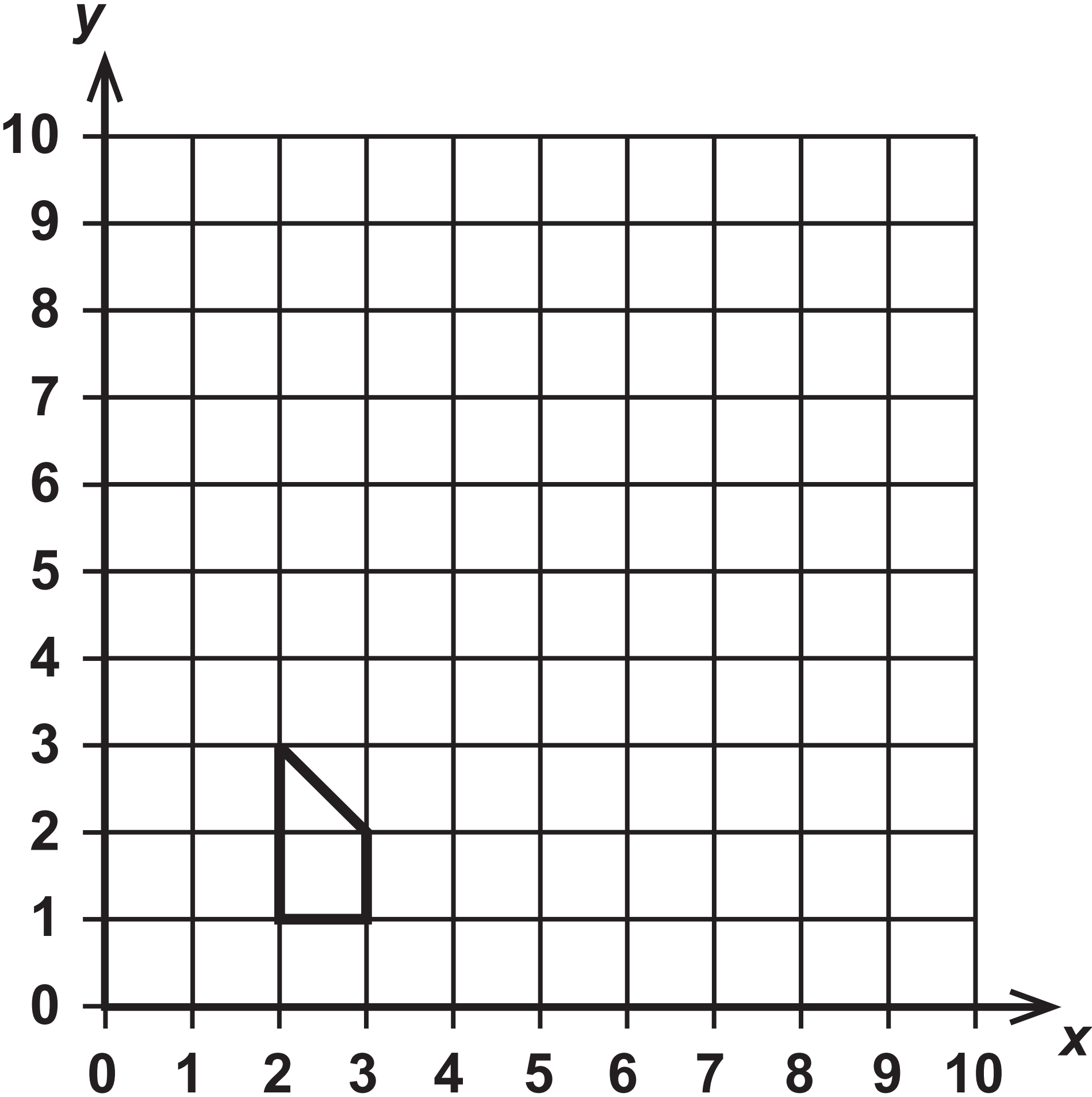
Diagram 2



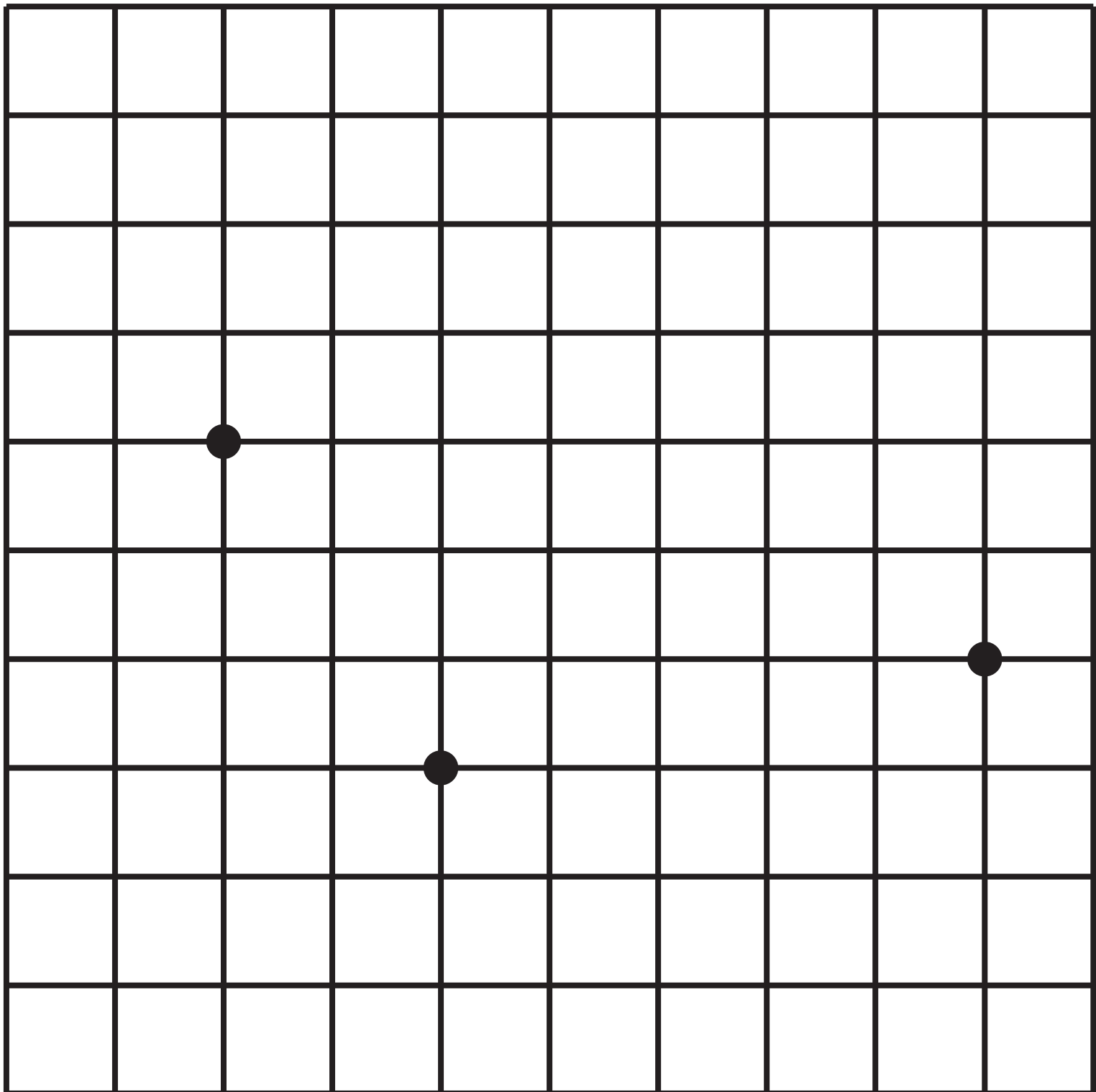
Question 15



Question 16 (a)



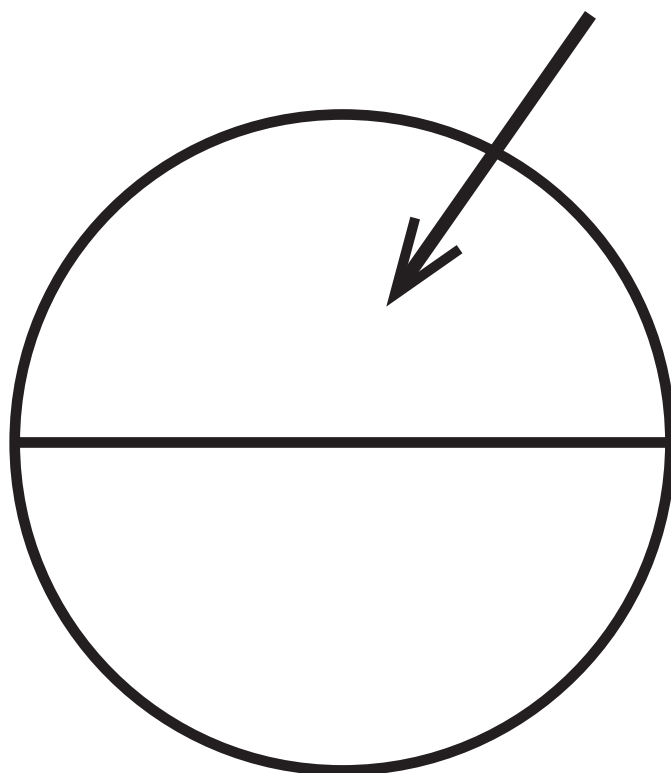
Question 16 (b)



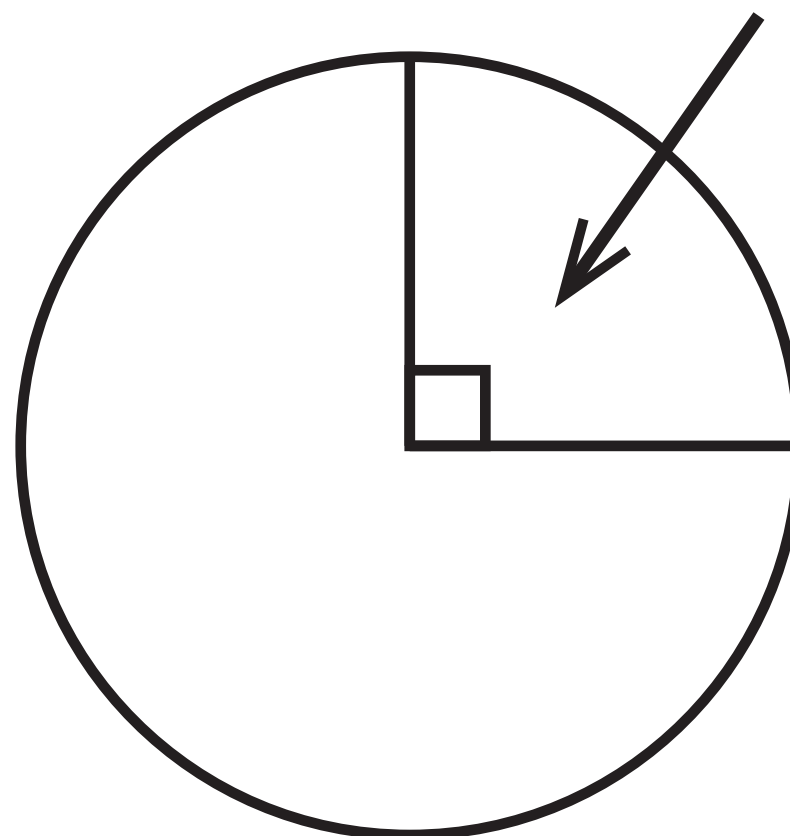
Question 17

Diagram NOT drawn to scale

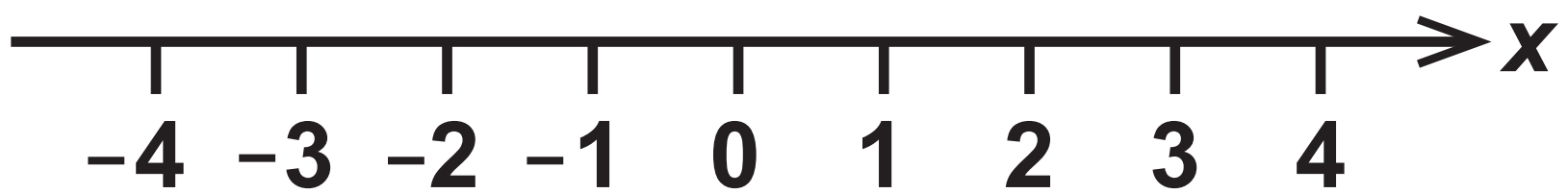
Amy's slice



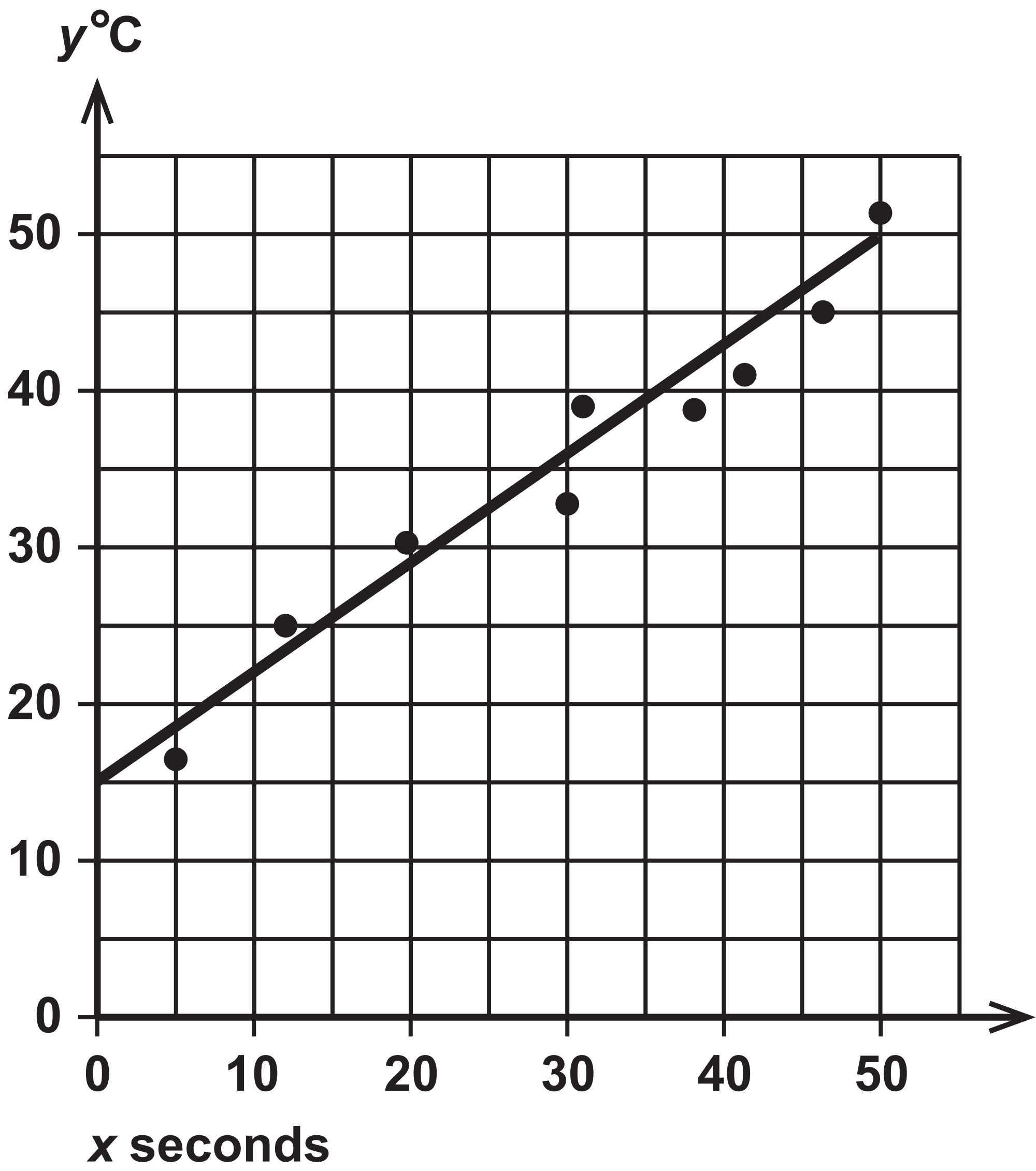
Vance's slice



Question 22 (d)

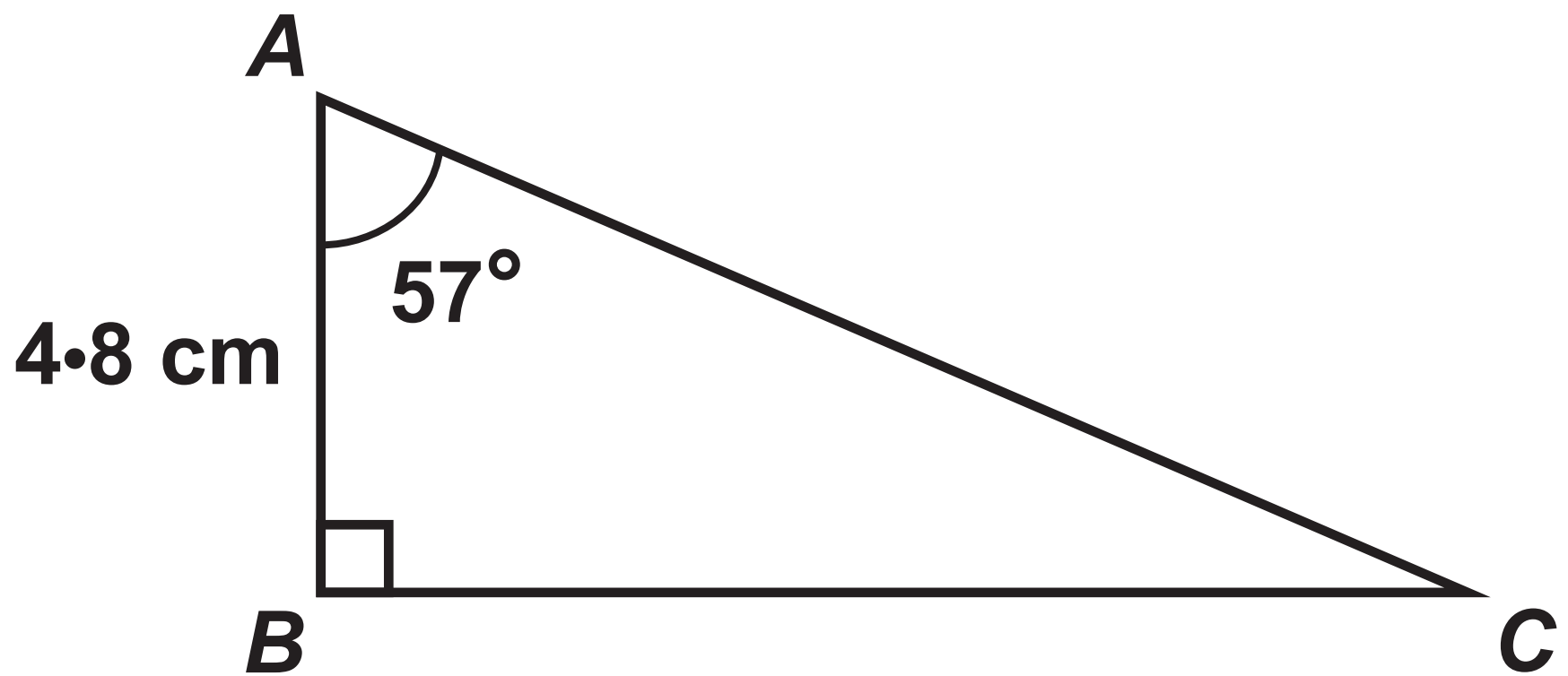


Question 23



Question 24

Diagram NOT drawn to scale



**FORMULA LIST
FOUNDATION TIER
AND HIGHER TIER
GCSE**

You must not write on these formulae pages.

Anything you write on these formulae pages will gain NO credit.

AREA AND VOLUME FORMULAE

Where r is the radius of the sphere or cone,
 l is the slant height of a cone and
 h is the perpendicular height of a cone:

Curved surface area of a cone = $\pi r l$

Surface area of a sphere = $4\pi r^2$

Volume of a sphere = $\frac{4}{3}\pi r^3$

Volume of a cone = $\frac{1}{3}\pi r^2 h$

KINEMATICS FORMULAE

Where a is constant acceleration,
 u is initial velocity, v is final velocity,
 s is displacement from the position
when $t = 0$ and t is time taken:

$$v = u + at$$

$$s = ut + \frac{1}{2}at^2$$

$$v^2 = u^2 + 2as$$

C300U20-1A

TUESDAY, 7 JUNE 2022 – MORNING

MATHEMATICS

FOUNDATION TIER

Additional Formulae

PERIMETER, AREA AND VOLUME

Where a and b are the lengths of the parallel sides and h is their perpendicular separation:

$$\text{Area of a trapezium} = \frac{1}{2}(a + b)h$$

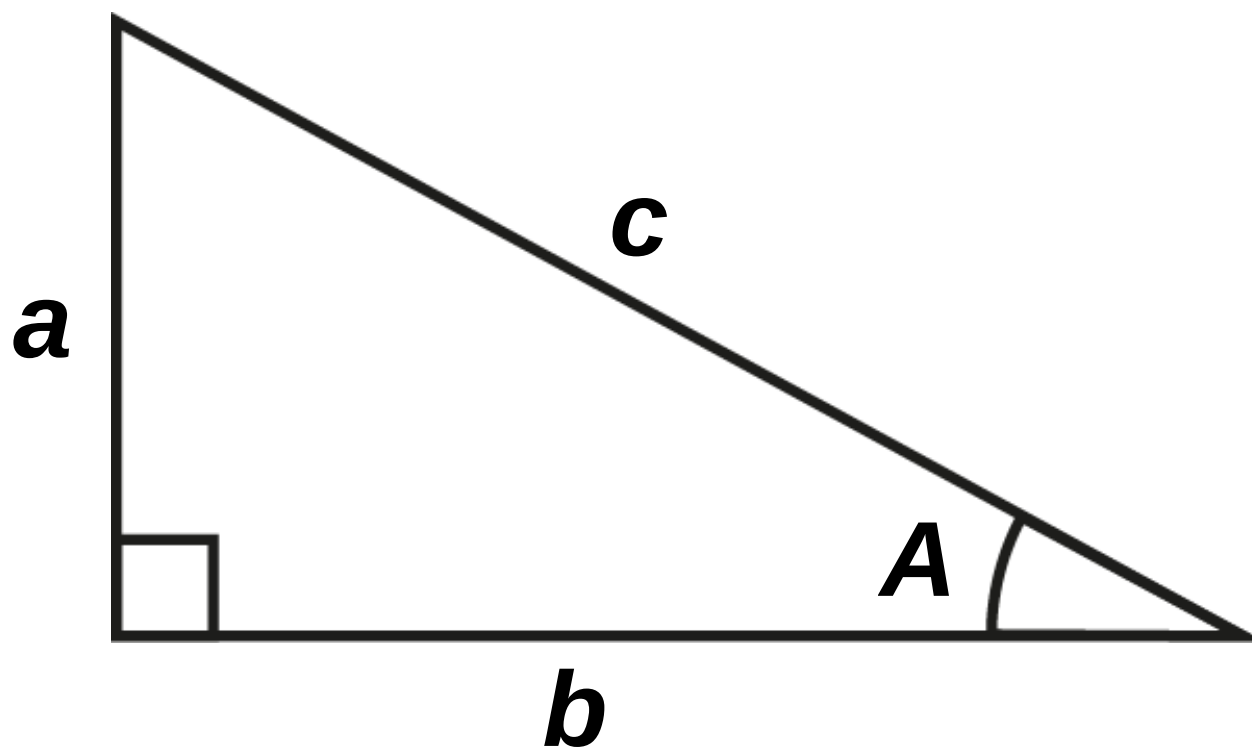
**Volume of a prism =
area of cross section $\times$ length**

**Where r is the radius and
 d is the diameter:**

$$\text{Circumference of a circle} = 2\pi r = \pi d$$

$$\text{Area of a circle} = \pi r^2$$

PYTHAGORAS' THEOREM AND TRIGONOMETRY



In any right – angled triangle where a , b and c are the length of the sides and c is the hypotenuse:

$$a^2 + b^2 = c^2$$

In any right – angled triangle ABC where a , b and c are the length of the sides and c is the hypotenuse:

$$\sin A = \frac{a}{c} \quad \cos A = \frac{b}{c} \quad \tan A = \frac{a}{b}$$

COMPOUND INTEREST

Where P is the principal amount,
 r is the interest rate over a given period
and n is number of times that the
interest is compounded:

$$\text{Total accrued} = P \left(1 + \frac{r}{100} \right)^n$$

PROBABILITY

Where $P(A)$ is the probability of
outcome A and $P(B)$ is the probability
of outcome B :

$$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$$