



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.

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 question(s) correctly.

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

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.

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 . . .

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.

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 = _____ °

[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.

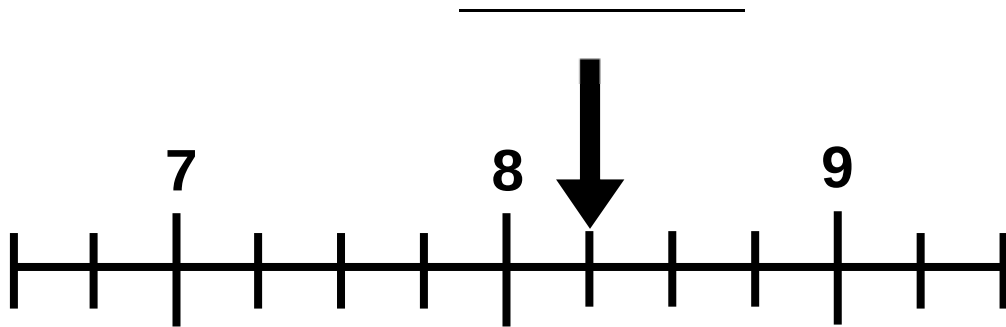
Reflex angle ***ABC*** = _____^o

[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]

- (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)

[3 marks]

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]

- (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.

[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 . . .

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.

[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?**

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]

(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?

[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

- (a) Complete the table below to show how much of each ingredient would be needed to make **72** flapjacks.

MAKES 72 FLAPJACKS

_____ g of porridge oats

_____ g of butter

_____ g of brown sugar

_____ tablespoons of golden syrup

[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?

Anatoly can make _____ batches of **12** flapjacks. [3 marks]

(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.

[1 mark]

(Turn over)

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

[2 marks]

(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]

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

[2 marks]

(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.

Find an expression for the perimeter of this large rectangle (Diagram 2)

IN TERMS OF x .

Simplify your answer.

[3 marks]

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

- (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]

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.

How much profit would you expect Faheema to make?

You must show all your working.

[4 marks]

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.

_____ 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)

[3 marks]

(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?

[illegible]

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]

- (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 ($\mathcal{E}$) 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 . . .

Question 15 continued

- 15. (b) A number is selected at random from the universal set ($\mathcal{U}$).**

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]

- (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]

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.

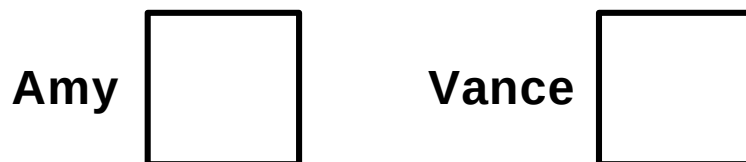
Amy's pizza has a radius of 3 inches.

Vance's pizza has a radius of 5 inches.

Amy eats one half of her pizza.

Vance eats one quarter of his pizza.

Who eats the slice of pizza with the greater area?



You must show all your working.

(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.

[4 marks]

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.

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)

[5 marks]

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

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

[illegible]

[3 marks]

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.

[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

Ali says,

“You have made an error.”

Is Ali correct?

Yes ☐

No ☐

Show clearly how you decide.

[1 mark]

- 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.

- (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.

[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 $y = mx + c$

[illegible]

[3 marks]

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

[1 mark]

(Turn over)

ABC is a right – angled triangle.

Calculate the area of triangle ABC .

[illegible]

65

Area = _____ cm²

[5 marks]

END OF PAPER

TOTAL 120 MARKS

(Turn over)

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

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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

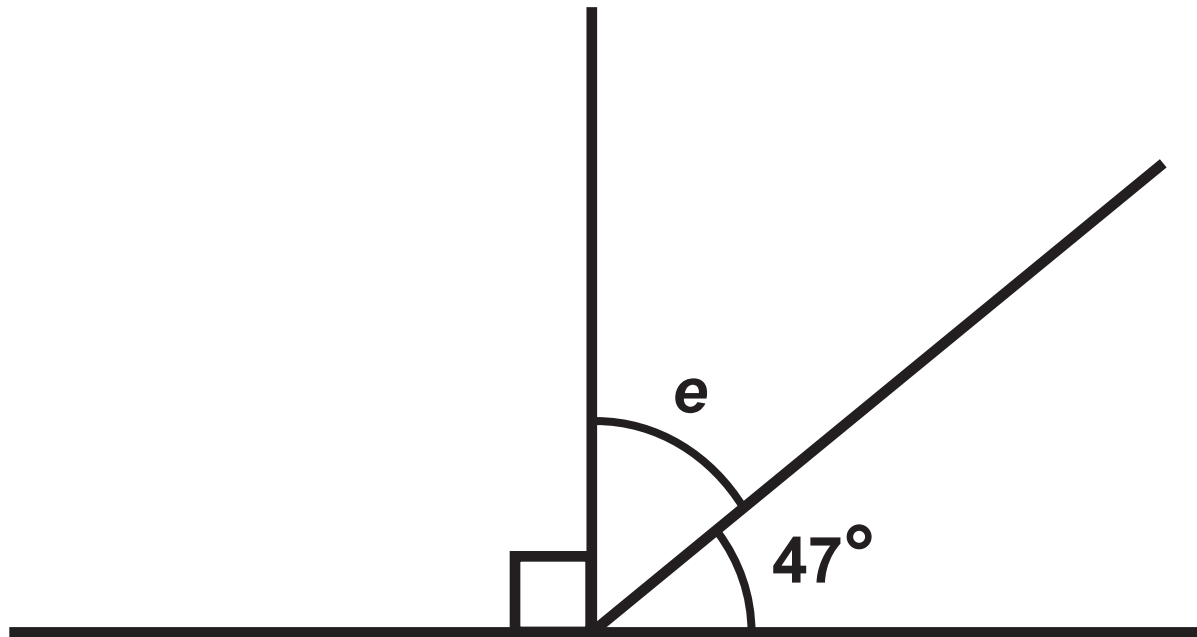
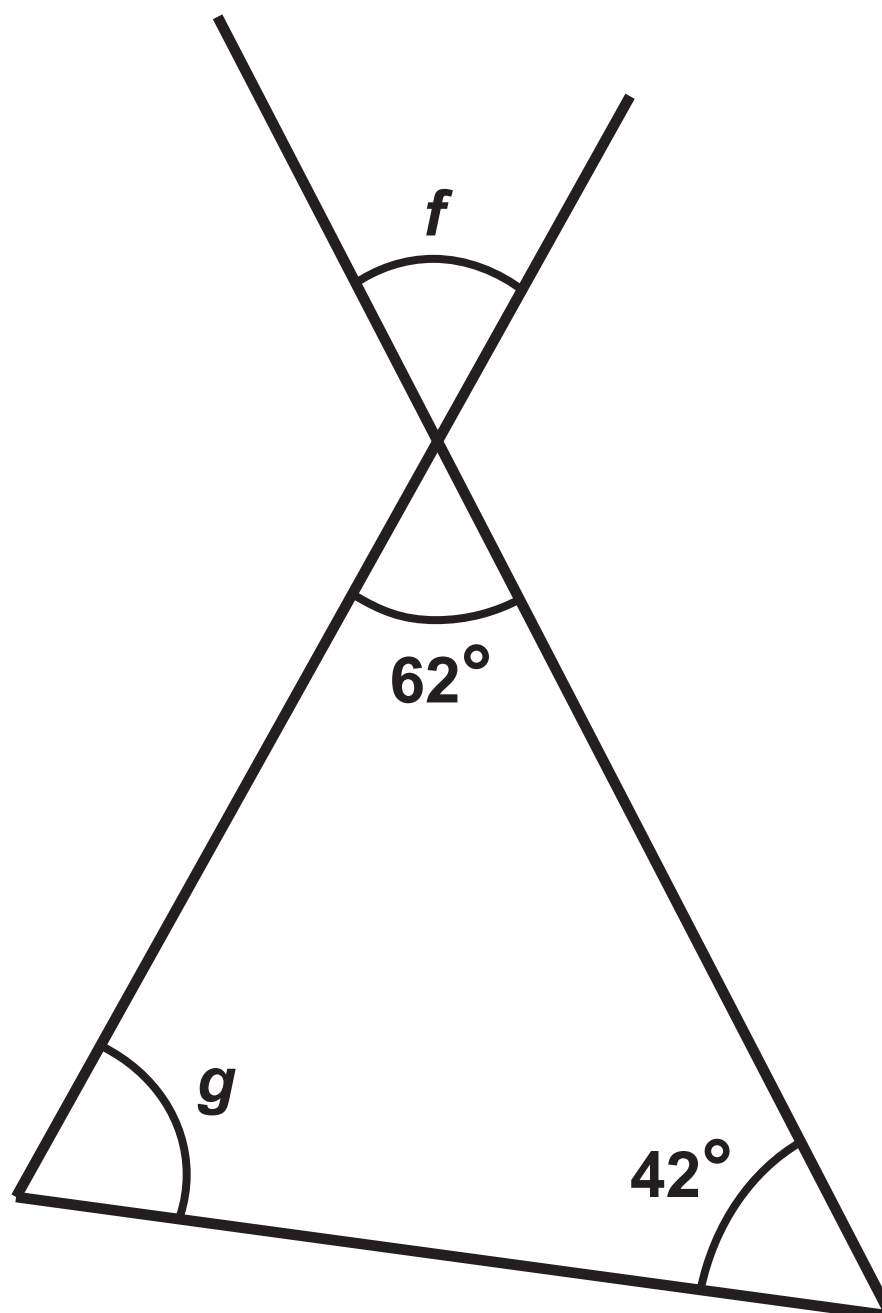
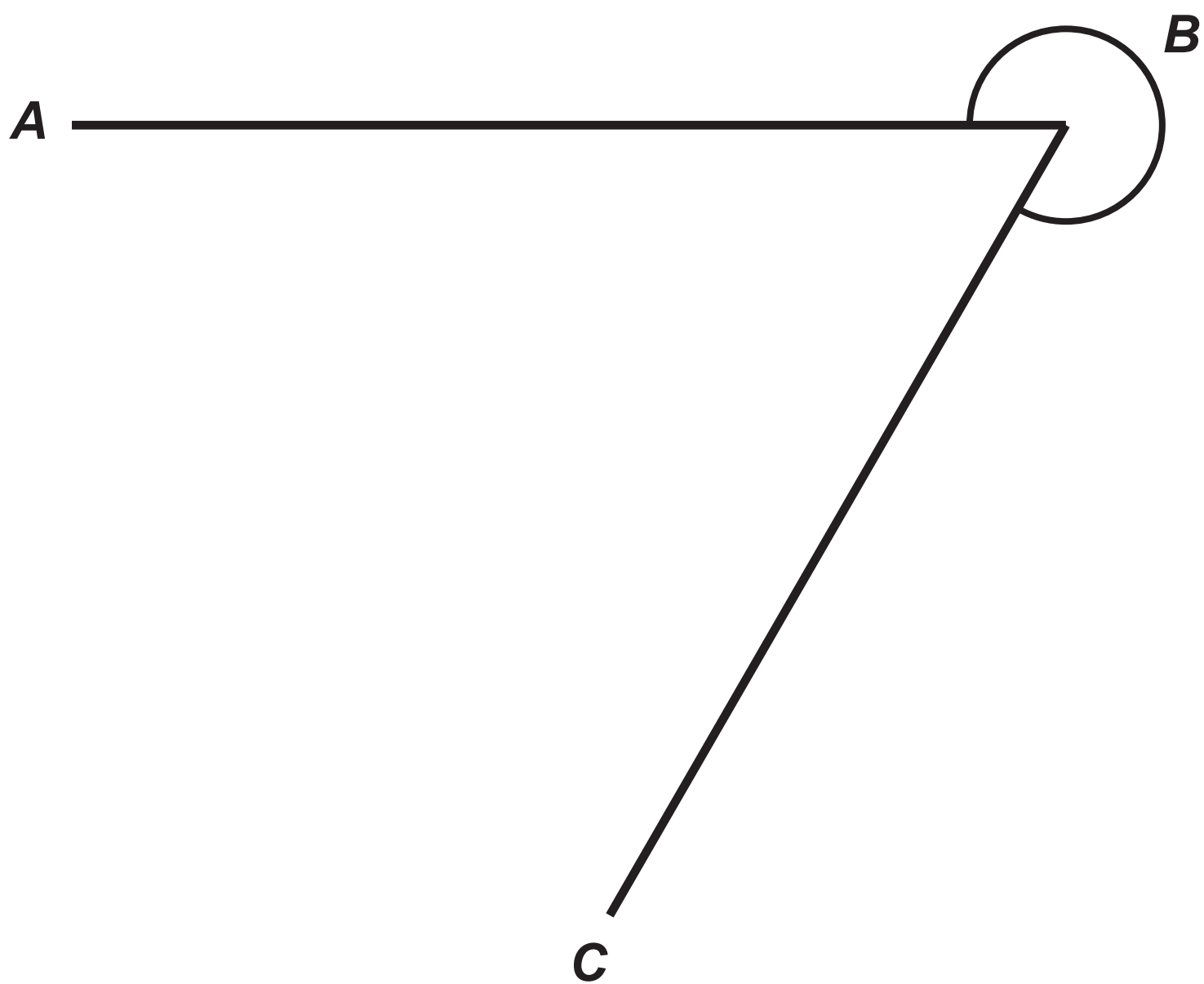


Diagram 2



Question 2 (c)



Question 5

9

13

14

15

17

24

27

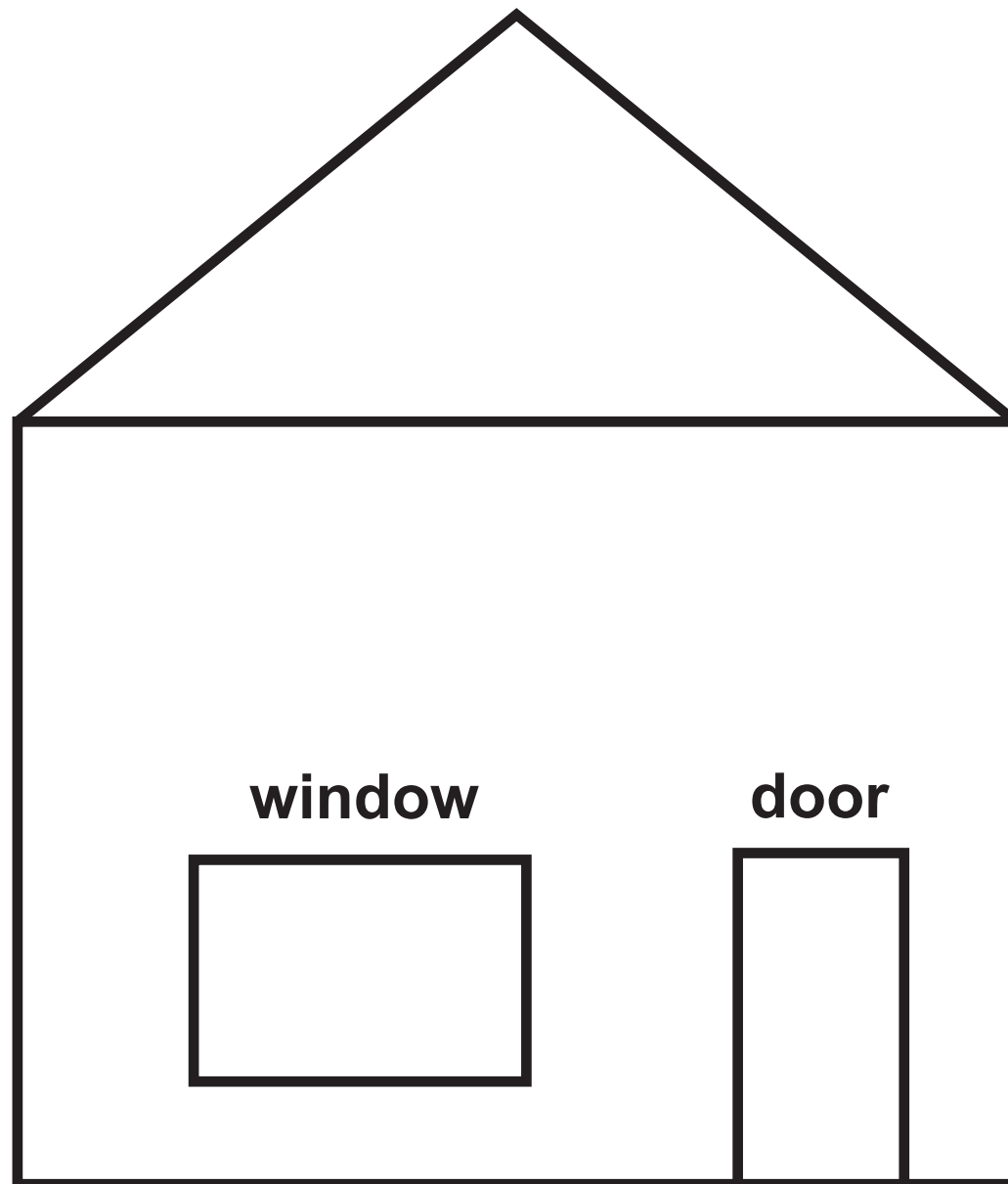
32

36

Question 6

Diagram NOT drawn to scale

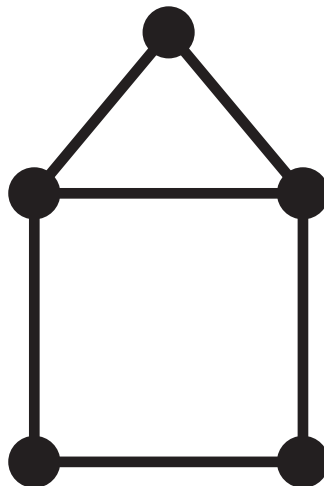
2D diagram of the front of the model



Question 7

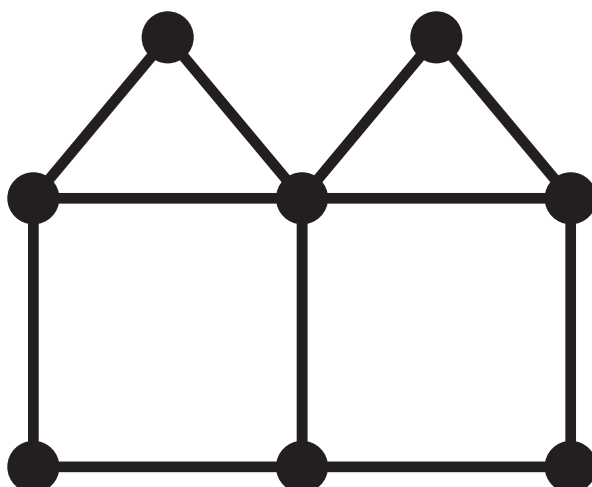
Pattern 1

Lines: 6
Circles: 5



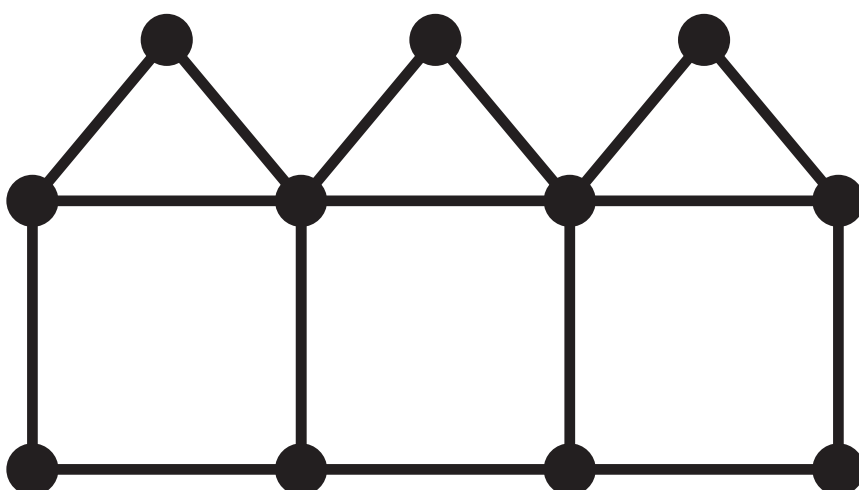
Pattern 2

Lines: 11
Circles: 8



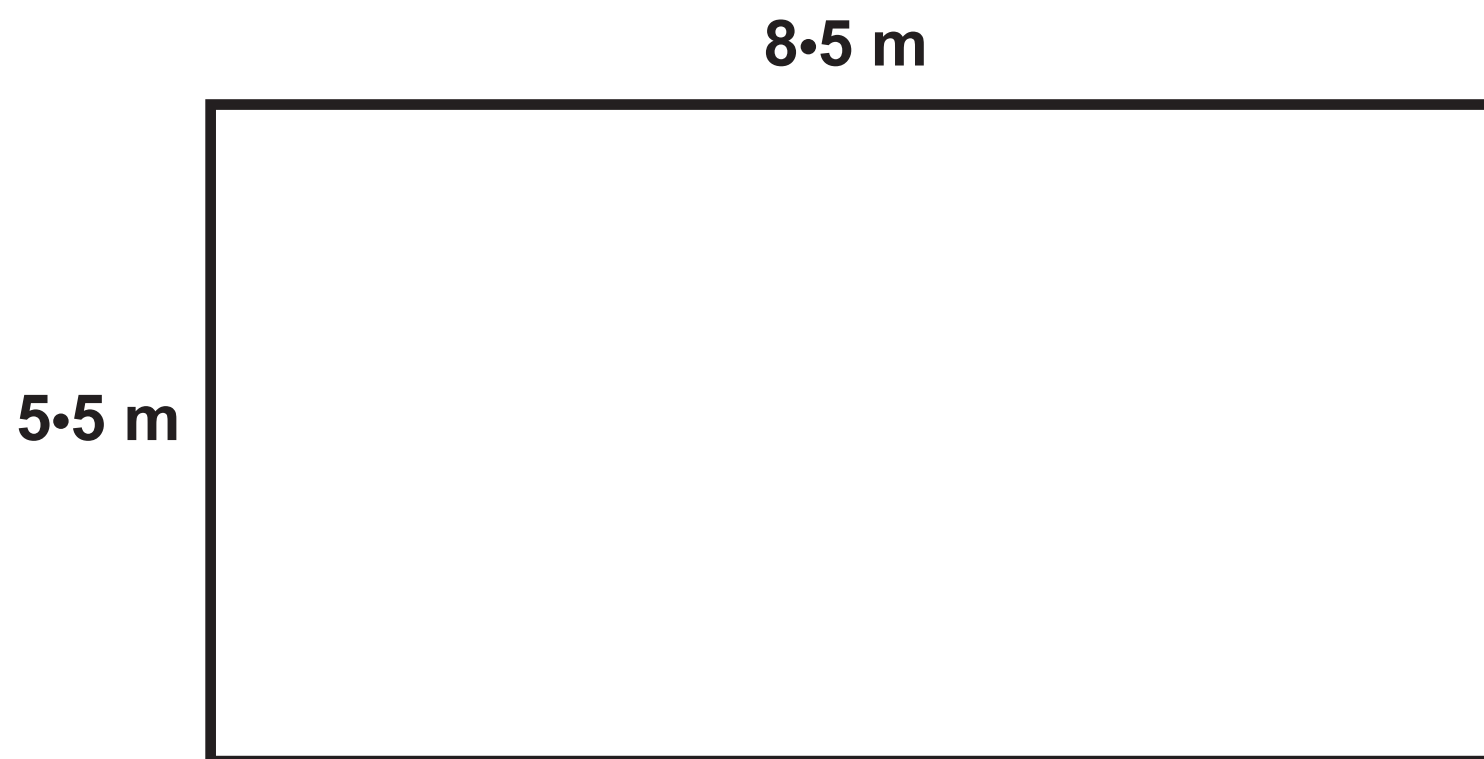
Pattern 3

Lines: 16
Circles: 11



Question 8 (a)

Diagram NOT drawn to scale



Question 10 (e)

Diagrams NOT drawn to scale

Diagram 1

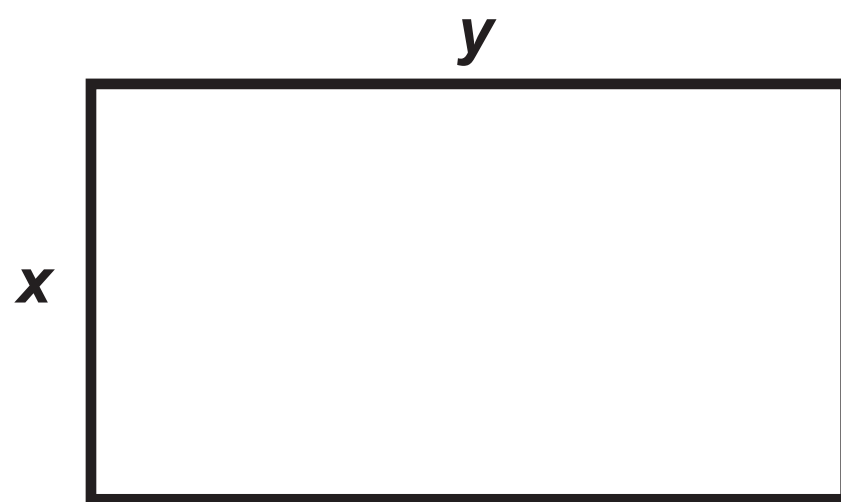
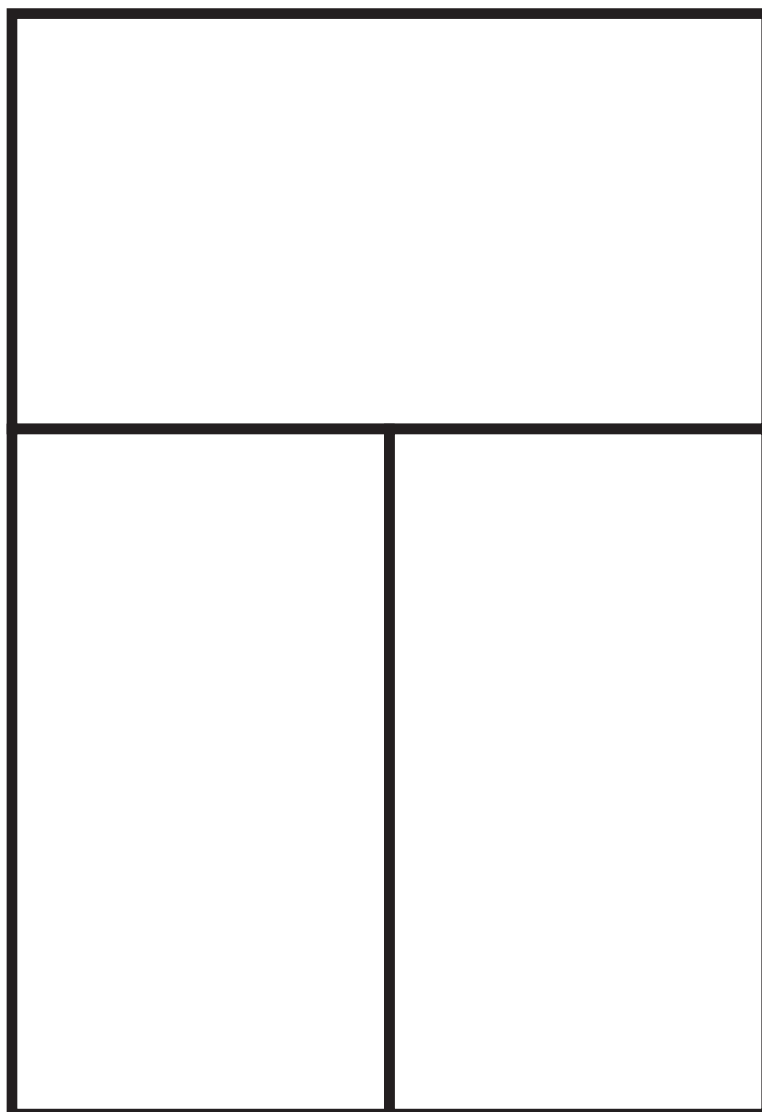
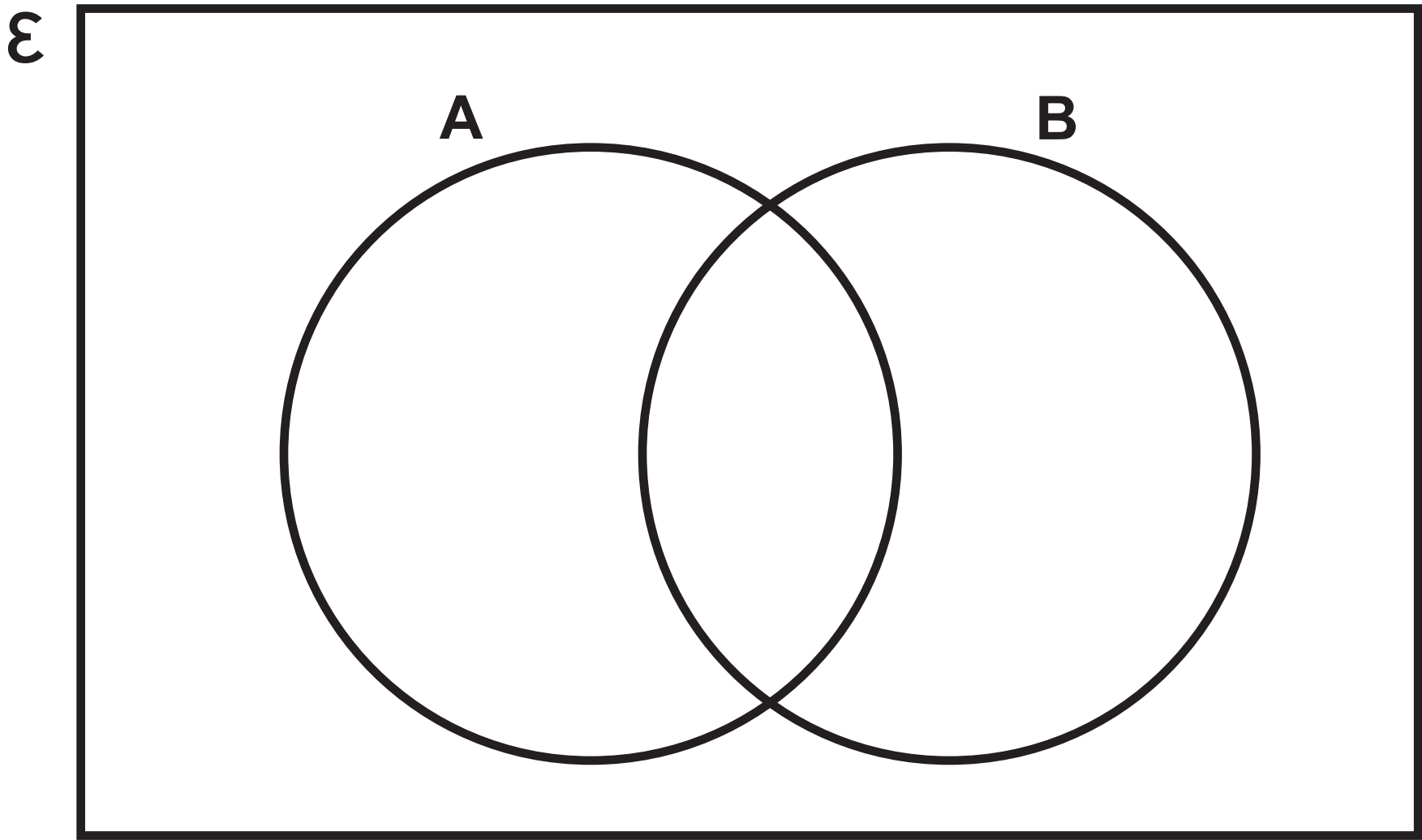


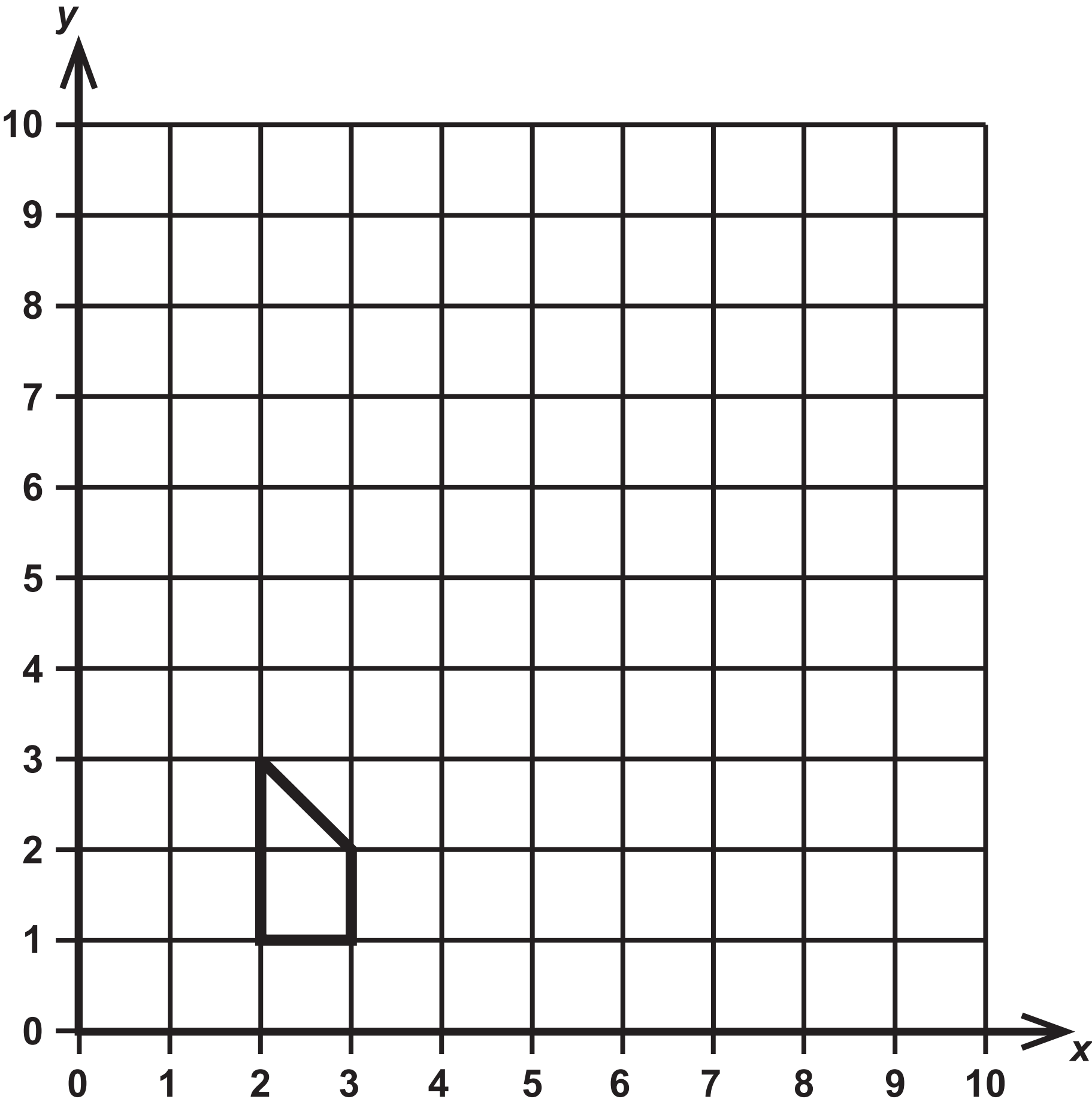
Diagram 2



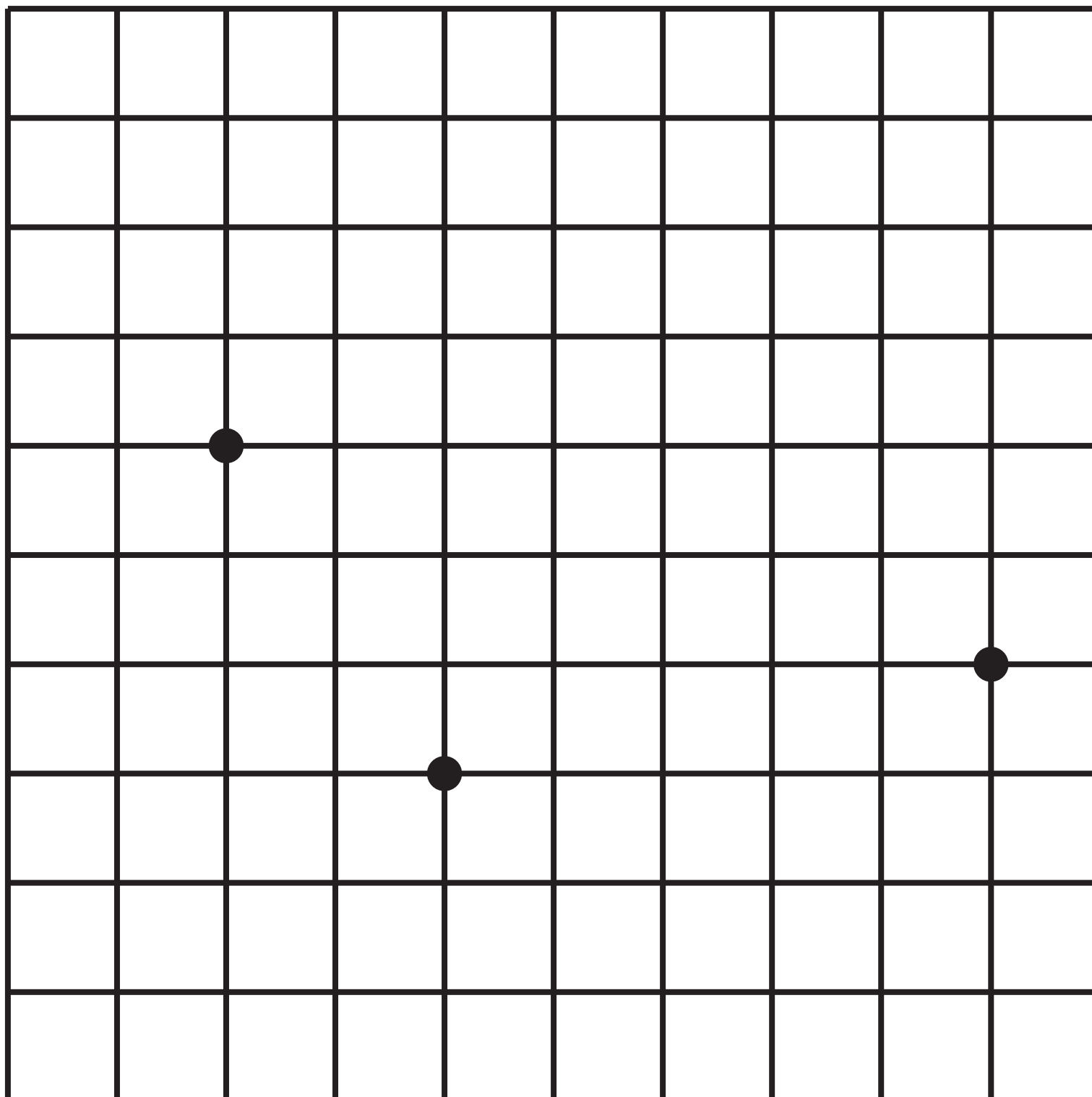
Question 15



Question 16 (a)

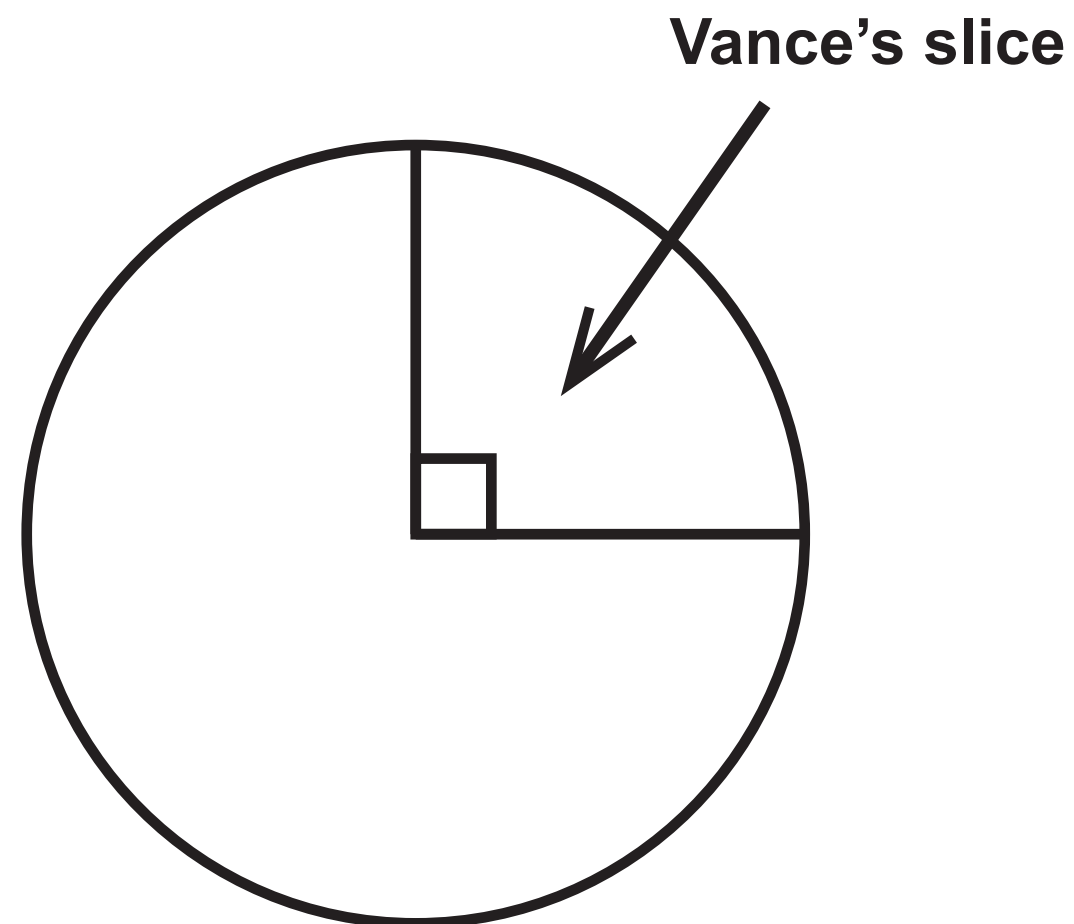
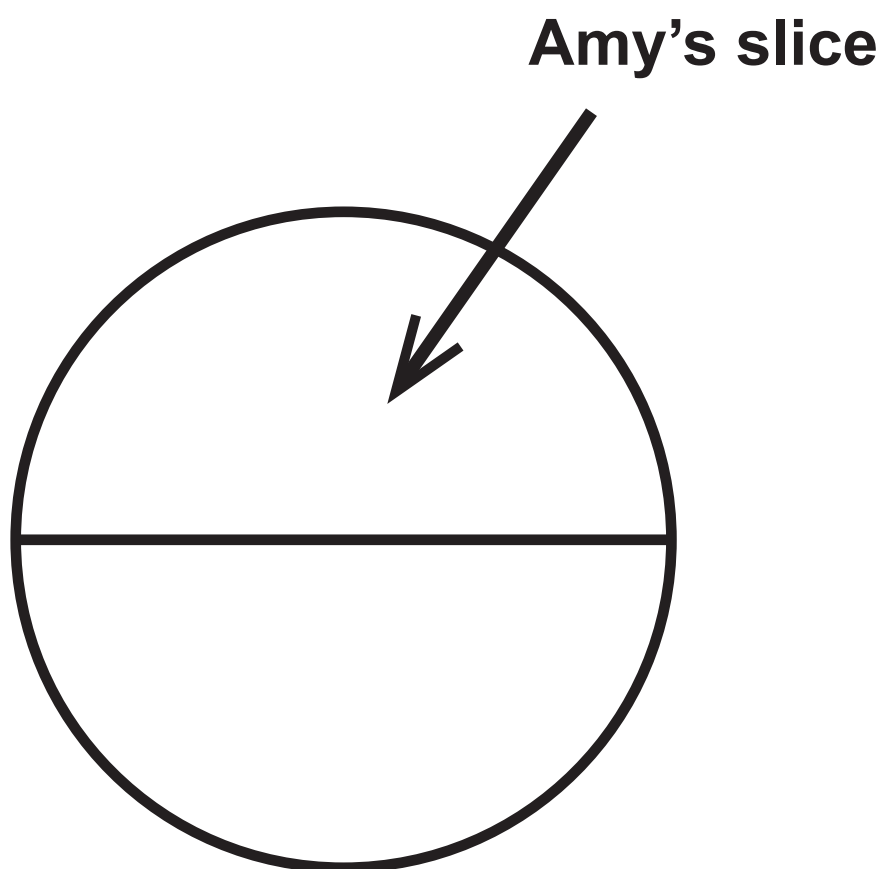


Question 16 (b)

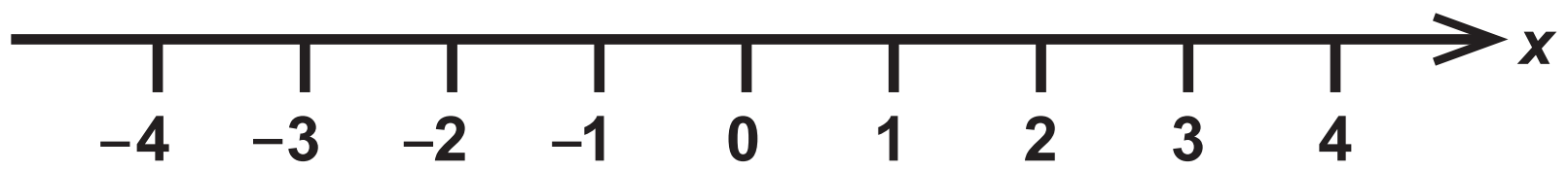


Question 17

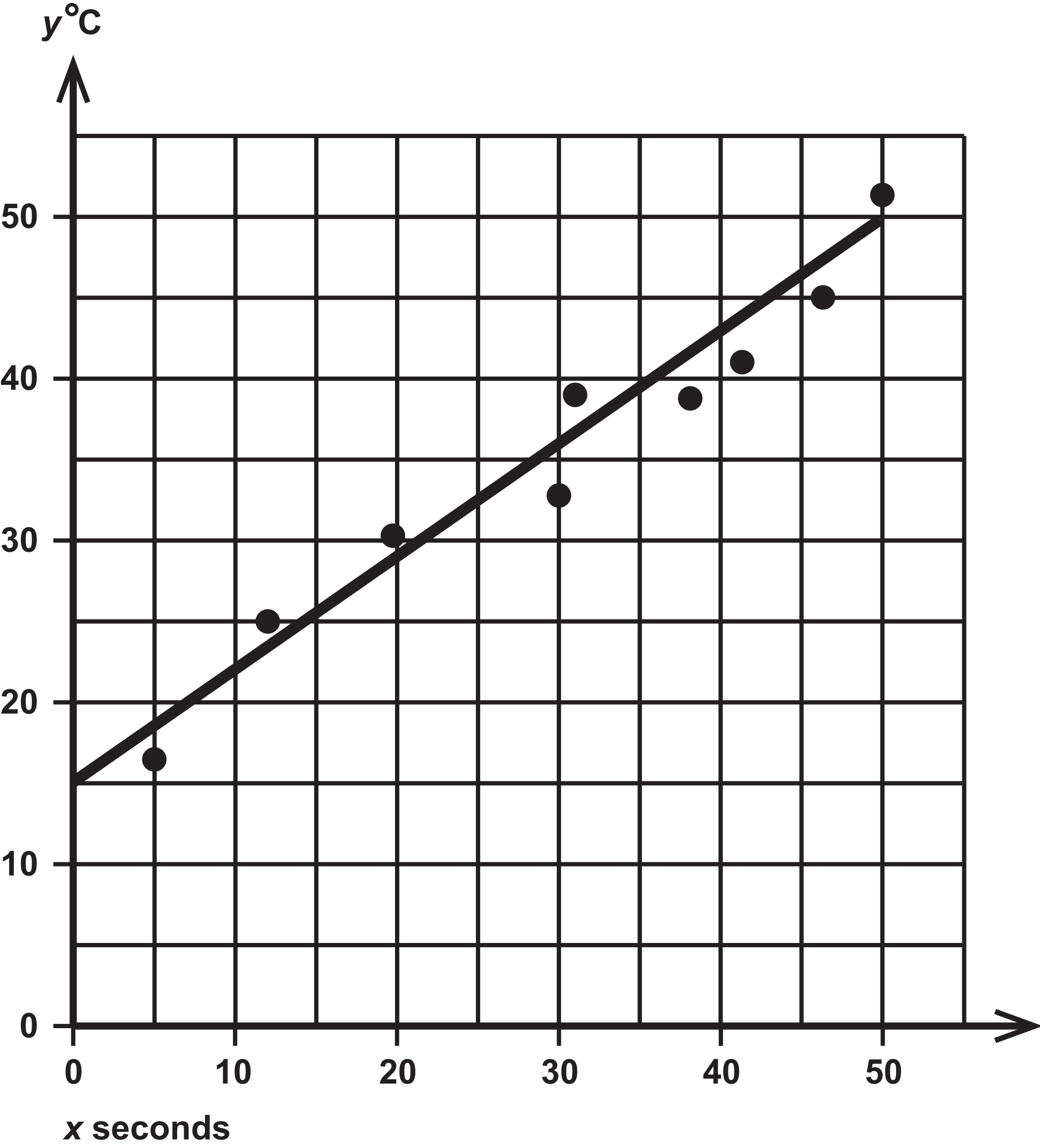
Diagram NOT drawn to scale



Question 22 (d)

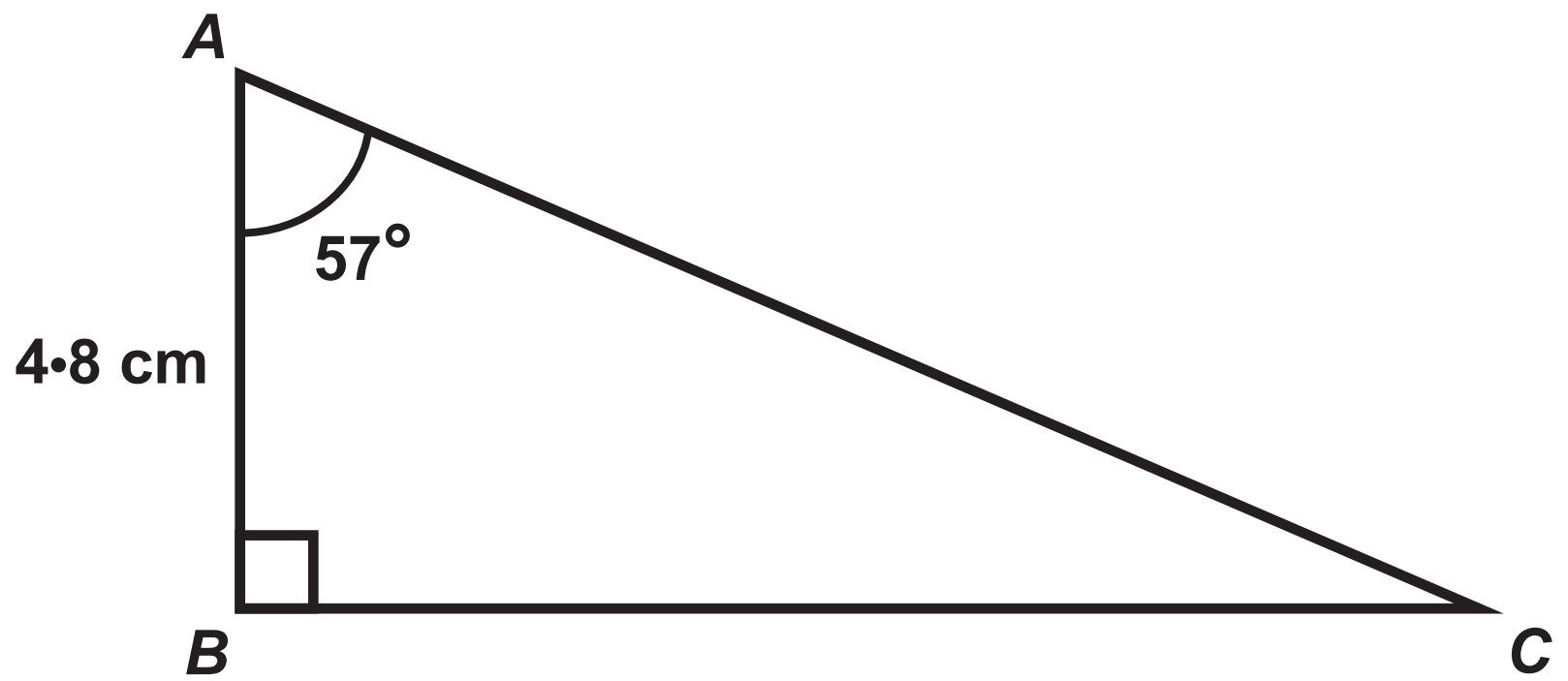


Question 23



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:

$$v = u + at$$

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

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

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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:

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

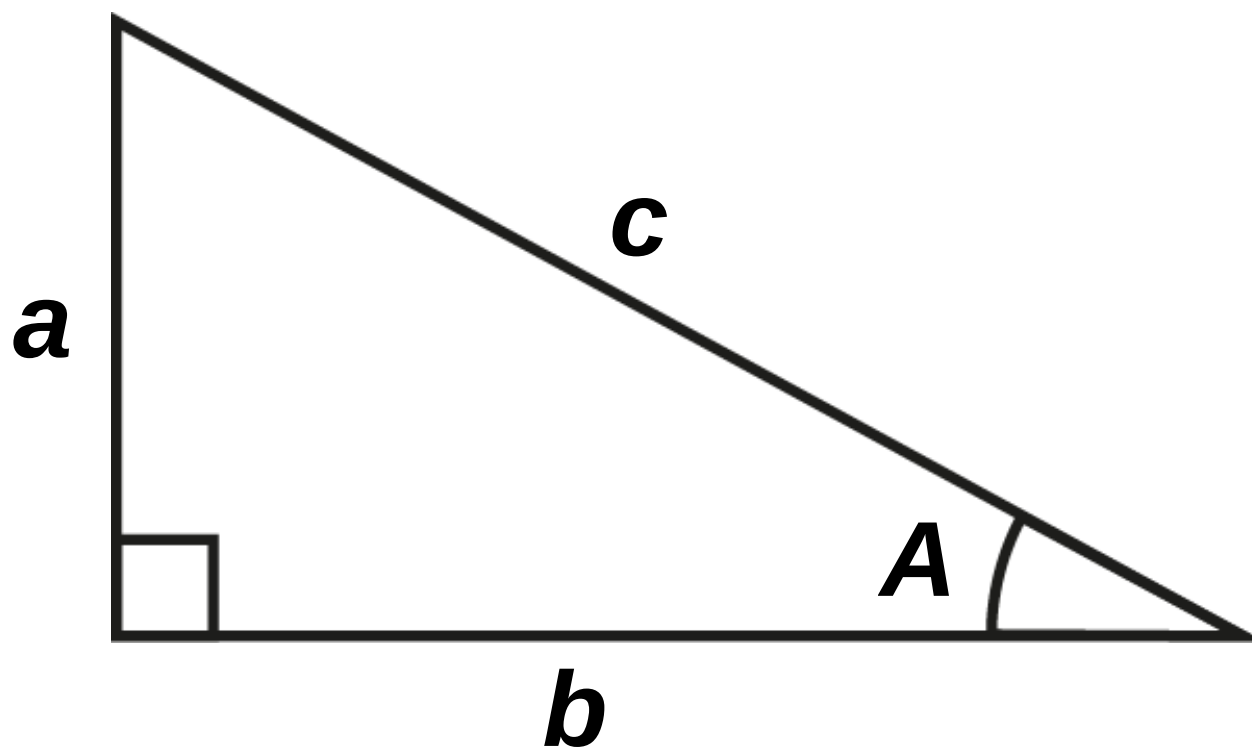
**Volume of a prism =
area of cross section $\times$ length**

**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 :

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