



GCSE



C300U20-1

WEDNESDAY, 7 JUNE 2023 – 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.	8	
2.	7	
3.	5	
4.	4	
5.	5	
6.	8	
7.	5	
8.	5	
9.	3	
10.	3	
11.	5	
12.	3	
13.	4	
14.	9	
15.	5	
16.	2	
17.	4	
18.	4	
19.	5	
20.	7	
21.	8	
22.	4	
23.	7	
Total	120	

(Turn over)

ADDITIONAL MATERIALS

An additional formulae booklet.

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

(Turn over)

**ITEMS INCLUDED WITH QUESTION
PAPER**

A separate Formula List.

A separate Diagram Booklet.

Model for Question 2 (c).

**Cut out shapes for Question 2 (a),
Question 17 (a) and Question 17 (b).**

**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.

(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 table shows the menu at a café.

- (a) Lucy buys a cereal bar, a coffee, a salad and a piece of fruit.**

Write down the prices for these items in order of cost.

Start with the cheapest.

Cheapest

[2 marks]

(Turn over)

Question 1 continued

1. (b) The café offers a Meal Deal.

**Buy any main item with a drink
and snack for £5**

Jason buys a sandwich.

**Later he buys a tea and a
packet of crisps.**

**How much LESS would he
have paid if he had bought these
three items using the Meal Deal?**

(Turn over)

[2 marks]

**1. (c) (i) On Monday, Emma buys
8 soft drinks.**

**What is the total cost
for this?**

[2 marks]

continued on the next page . . .

(Turn over)

Question 1 (c) continued

**1. (c) (ii) On Tuesday, Emma only
buys coffees.**

She spends £12.95

**How many coffees does
she buy?**

[2 marks]

(Turn over)

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

The diagram shows an incomplete pattern on a square grid.

Complete the pattern so that AB is a line of symmetry.

Shade the smallest possible number of squares.

Cut out squares are provided for this question.

[2 marks]

continued on the next page . . .

(Turn over)

Question 2 continued

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

The diagram shows five shapes, labelled A, B, C, D and E.

Circle the shape that has rotational symmetry of order 4

[1 mark]

continued on the next page . . .

(Turn over)

Question 2 continued

- 2. (c) Ask for the model for Question 2 (c). The model is NOT made to scale.**

The model represents a triangular prism.

How many edges and vertices does the triangular prism have?

Edges _____

Vertices _____

[2 marks]

continued on the next page . . .

(Turn over)

Question 2 continued

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

Draw one line to connect each of the mathematical names to the correct shape.

You will not need to use every shape.

One has been completed for you.

[2 marks]

(Turn over)

3. (a) Peter uses numbers and a symbol to correctly write,
one seventh is greater than
one eighth.

Circle what Peter writes.

$\frac{1}{7} \leq \frac{1}{8}$	$\frac{1}{7} \geq \frac{1}{8}$	$\frac{1}{7} = \frac{1}{8}$
$\frac{1}{7} > \frac{1}{8}$		$\frac{1}{7} < \frac{1}{8}$

[1 mark]

continued on the next page . . .

(Turn over)

Question 3 continued

- 3. (b) A large jar contains 8571 jellybeans. 2857 of the jellybeans in the jar are blue.**

Use one of the five options shown below to complete the sentence.

One fifth
One quarter
One third
One half
Two thirds

_____ of the jellybeans
in the jar are blue.

(Turn over)

[1 mark]

continued on the next page . . .

(Turn over)

Question 3 continued

- 3. (c) Three of the factors of 18 have
a sum of 17**

**Write these three factors in
the boxes below.**

18

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[3 marks]

(Turn over)

- 4. Look at the diagram for Question 4 in the separate Diagram Booklet. The diagram shows an incomplete pictogram.**

Rhys owns a bakery.

He recorded how many cupcakes he sold each day.

The results for the first four days are displayed in the pictogram.

(a) Rhys sold 42 cupcakes on Friday.

(i) Complete the pictogram for Friday.

[1 mark]

(Turn over)

Question 4 (a) continued

4. (a) (ii) How many cupcakes did Rhys sell in total from Monday to Friday?

_____ cupcakes sold

in total from Monday to Friday.

[2 marks]

continued on the next page . . .

(Turn over)

Question 4 continued

**4. (b) On Saturday, Rhys sold
17 cupcakes.**

**Explain why the key used for
the pictogram is not suitable
to show this.**

[1 mark]

(Turn over)

- 5. (a) Look at the diagram for Question 5 (a) in the separate Diagram Booklet.**

The diagram shows a number machine.

- (i) When the INPUT is 8, what is the OUTPUT?**

[1 mark]

continued on the next page . . .

(Turn over)

Question 5 (a) continued

**5. (a) (ii) When the OUTPUT is 34.7,
what was the INPUT?**

[1 mark]

continued on the next page . . .

(Turn over)

Question 5 continued

- 5. (b) Look at the diagram for Question 5 (b) in the separate Diagram Booklet.**

The diagram shows some boxes and some balls on balance scales.

All the boxes have the same mass. All the balls have the same mass.

Calculate the mass of each box and the mass of each ball.

(Turn over)

25

Mass of each box _____ kg

Mass of each ball _____ kg

[3 marks]

(Turn over)

6. Philip has 250 coins in his money box.

- **22% are £1 coins.**
- **$\frac{2}{5}$ are 20p coins.**
- **The rest are 10p coins.**

(a) How many £1 coins are there in Philip's money box?

(Turn over)

[2 marks]

**6. (b) How many 20p coins are there
in Philip's money box?**

[2 marks]

continued on the next page . . .

(Turn over)

Question 6 continued

**6. (c) What is the total value of the
coins in Philip's money box?**

(Turn over)

[4 marks]

(Turn over)

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

Reem has made a scale model of her car.

The diagram shows the plan view of her model.

- (a) Find the length of Reem's actual car.**

(Turn over)

[3 marks]

- 7. (b) The height of Reem's actual car is 1.7 m.**

Calculate the height of the model car.

Give your answer in cm.

(Turn over)

[2 marks]

(Turn over)

8. Shazad has six numbered cards.

17	31	13	23	15	21
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(a) What is the median of the numbers on Shazad's cards?

[2 marks]

(Turn over)

Question 8 continued

8. (b) Liz says,

**“I can pick five of Shazad’s
cards that have a mean of 21”**

**Which five cards must Liz pick
for her statement to be correct?
You must show all your working.**

(Turn over)

35

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[3 marks]

(Turn over)

9. Look at the diagram for Question 9 in the separate Diagram Booklet. The diagram is NOT drawn to scale.

The diagram shows three IDENTICAL squares.

Calculate the size of angle x .

37

$x =$ _____ ^o

[3 marks]

(Turn over)

10. Look at the diagram for Question 10 in the separate Diagram Booklet.

The diagram is a conversion graph.

The conversion graph may be used to change between distances in miles and distances in kilometres.

Use the graph to answer the following questions.

continued on the next page . . .

(Turn over)

Question 10 continued

10. (a) Aaron and Jenny both went for a run.

Aaron ran 28 km and Jenny ran 15 miles.

Who ran the longer distance?

Aaron ☐ **Jenny** ☐

Show how you decide.

[1 mark]

(Turn over)

Question 10 continued

10. (b) Complete the following statement.

You must show all your working.

37.5 miles is equal to _____ km.

[2 marks]

(Turn over)

11. (a) Simplify $4(x + 6) + 3x$

[2 marks]

(b) Solve $\frac{f}{3} = 5.1$

[1 mark]

(Turn over)

Question 11 continued

11. (c) $x = \frac{w(y + 2)}{8}$

Find the value of x when

$w = 3$ and $y = 24$

(Turn over)

43

[2 marks]

(Turn over)

12. (a) Calculate $\sqrt{5 \times 3.8} + 2.1^2$

Give your answer correct to
2 decimal places.

[2 marks]

continued on the next page . . .

(Turn over)

Question 12 continued

**12. (b) Write 0.05834 correct to
1 significant figure.**

[1 mark]

(Turn over)

13. Look at the diagram for Question 13 in the separate Diagram Booklet.

The diagram is a scatter diagram.

Ken measured the resting heart rate, in beats per minute (bpm), of twelve people.

He asked them how many hours of exercise they usually completed each week.

The results for seven of the people have been plotted on the scatter diagram.

continued on the next page . . .

(Turn over)

Question 13 continued

13. (a) Here are the results for the remaining five people.

Hours of exercise per week	Resting heart rate (bpm)
2	70
4	60
7	55
1	60
5.5	55

Plot these results on the scatter diagram.

[2 marks]

continued on the next page . . .

(Turn over)

Question 13 continued

- 13. (b) Ken recorded one person's resting heart rate incorrectly.**

Circle the point on the scatter diagram that this is most likely to be.

[1 mark]

continued on the next page . . .

(Turn over)

Question 13 continued

13. (c) Describe the relationship between hours of exercise per week and resting heart rate of the people Ken asked. Ignore the result that was recorded incorrectly.

[1 mark]

(Turn over)

**14. (a) Geomet High School has
740 students.**

**Each student was asked which
method of travel listed below
was their main method of travel
to school.**

**Look at the table for
Question 14 (a) in the separate
Diagram Booklet.**

**The table shows the methods
of travel together with some of
their probabilities.**

continued on the next page . . .

(Turn over)

Question 14 (a) continued

14. (a) (i) A student is chosen at random.

**What is the probability
that this student walks to
school or travels
to school by bus?**

[1 mark]

continued on the next page . . .

(Turn over)

Question 14 (a) continued

**14. (a) (ii) How many of the
740 students travel to
school by bus?**

[2 marks]

continued on the next page . . .

(Turn over)

Question 14 (a) continued

14. (a) (iii) The probability that a student travels to school by car is TWICE the probability that a student travels to school by train.

Calculate the probability that a student travels to school by train.

(Turn over)

[3 marks]

continued on the next page . . .

(Turn over)

Question 14 continued

14. (b) Look at the diagram for Question 14 (b) in the separate Diagram Booklet.

The diagram is an incomplete Venn diagram.

The Venn diagram shows information about the number of students who study Music and Drama in Year 11 at Geomet High School.

There are 104 students in Year 11.

continued on the next page . . .

(Turn over)

Question 14 (b) continued

14. (b) (i) Complete the Venn diagram to show the number of students in Year 11 who do NOT study Music or Drama.

[1 mark]

continued on the next page . . .

(Turn over)

Question 14 (b) continued

**14. (b) (ii) What is the probability that
a student chosen at random
from Year 11 studies Music?**

[2 marks]

(Turn over)

15. Look at the diagram for Question 15 in the separate Diagram Booklet.

A shop sells storage boxes.

A single box and a stack of four of these boxes are shown in the diagram.

The height of a single box is 35.2 cm.

The height of four of the same boxes when stacked is 52 cm.

A different stack of these boxes has a height of 85.6 cm.

How many boxes are in this stack?

(Turn over)

(Turn over)

60

[5 marks]

(Turn over)

16. Make g the subject of the formula.

$$h = k + 2g$$

[2 marks]

(Turn over)

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

The diagram shows a triangle on a coordinate grid.

Translate the triangle using

the vector $\begin{pmatrix} 3 \\ -4 \end{pmatrix}$

A cut out shape is available for this question.

[2 marks]

continued on the next page . . .

(Turn over)

Question 17 continued

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

The diagram shows a shape on a coordinate grid.

Rotate this shape 90° clockwise about the point $(0, 0)$

A cut out shape is available for this question.

[2 marks]

(Turn over)

18.

Use:

$$\text{Pressure} = \frac{\text{Force (N)}}{\text{Area (cm}^2\text{)}}$$

The base of a filing cabinet is a rectangle.

It measures 45 cm by 60 cm.

The whole of the base is in contact with the horizontal ground.

continued on the next page . . .

(Turn over)

Question 18 continued

**18. (a) The empty filing cabinet exerts
a force of 675 N on the ground.**

**What is the pressure exerted
on the ground by the empty
filing cabinet?**

Give your answer in N/cm^2

(Turn over)

[2 marks]

continued on the next page . . .

(Turn over)

Question 18 continued

18. (b) When the filing cabinet is full, the pressure it exerts on the ground is 0.75 N/cm^2

What is the force that the full filing cabinet exerts on the ground?

Give your answer in newtons (N).

(Turn over)

[2 marks]

(Turn over)

19. Look at the diagram for Question 19 in the separate Diagram Booklet.

The diagram shows information about the percentage of households in Eduvale that owned a DESKTOP computer for the even – numbered years from 2006 to 2018.

continued on the next page . . .

(Turn over)

Question 19 continued

19. (a) (i) Complete this statement.

**The percentage of households
that owned a desktop computer
decreased the most between the
even – numbered years _____
and _____ .**

[1 mark]

continued on the next page . . .

(Turn over)

Question 19 (a) continued

19. (a) (ii) Jane says,

“The graph shows that 70% of people owned a desktop computer in 2009 because it passes through that point.”

Is Jane correct?

Yes

☐

No

☐

Explain how you decide.

(Turn over)

[1 mark]

continued on the next page . . .

(Turn over)

Question 19 continued

19. (b) Look at the table for Question 19 (b) in the separate Diagram Booklet.

The table shows information about the percentage of households in Eduvale that had an internet connection for the even – numbered years from 2006 to 2018.

(i) On the diagram for Question 19, plot the information for internet connection.

[1 mark]

(Turn over)

Question 19 (b) continued

19. (b) (ii) In which even – numbered year was the difference in the percentage of households in Eduvale owning a desktop computer and the percentage of households having an internet connection the greatest?

[1 mark]

continued on the next page . . .

(Turn over)

Question 19 (b) continued

19. (b) (iii) Eduvale is a large town in a COUNTY.

Comment on how, in this county, the percentage of households owning a desktop computer and the percentage of households having an internet connection are LIKELY to have changed in this time period.

(Turn over)

76

[1 mark]

(Turn over)

20. (a) Look at the diagram for Question 20 (a) in the separate Diagram Booklet.

The diagram is NOT drawn to scale.

The diagram shows a circle inside a square of side 8.2 cm.

The sides of the square are tangents to the circle.

Find the area of the shaded region.

You must show all your working.

(Turn over)

78

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)

Question 20 continued

20. (b) Look at the diagram for Question 20 (b) in the separate Diagram Booklet.

The diagram is NOT drawn to scale.

The diagram shows a parallelogram, labelled *ABCD*. It is a cross – section of a prism.

In the diagram,

$$\mathbf{BC = 8\text{ cm}}$$

$$\mathbf{DC = 9.8\text{ cm}}$$

The perpendicular height of the parallelogram is 7 cm.

continued on the next page . . .

(Turn over)

Question 20 (b) continued

**The length of the prism
is 16 cm.**

Find the volume of the prism.

81

[3 marks]

(Turn over)

21. (a) Solve $7x - 5 = 2x + 3$

[illegible]

[2 marks]

(Turn over)

Question 21 continued

21. (b) Roza is buying bananas and apples.

She buys x bananas which cost 30 pence each.

She buys 2 more apples than the number of bananas she buys.

Her apples cost 25 pence each.

She pays a total of £5.45

continued on the next page . . .

(Turn over)

Question 21 (b) continued

**Use an algebraic method to
find the number of bananas
Roza buys.**

[4 marks]

continued on the next page . . .

(Turn over)

Question 21 continued**21. (c) Factorise $x^2 + 5x + 4$**

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

22. Look at the diagram for Question 22 in the separate Diagram Booklet.

The diagram is NOT drawn to scale.

An aircraft is making its final approach ready to land.

The aircraft is:

- **flying at 3° to the horizontal,**
 - **2.5 km horizontally from the start of the runway,**
- as shown on the diagram.**

continued on the next page . . .

(Turn over)

Question 22 continued

Calculate the vertical height of the aircraft above the horizontal ground. You must show all your working.

(Turn over)

(Turn over)

90

[4 marks]

(Turn over)

23. Look at the information provided for Question 23 in the separate Diagram Booklet.

The information is about two saving accounts.

Heath has £3000 to invest for five years.

No extra money will be paid in or withdrawn during these five years.

He is going to choose one of these accounts.

continued on the next page . . .

(Turn over)

Question 23 continued

23. (a) Which account gives Heath the greater PERCENTAGE INCREASE in his money at the end of 5 years and by how much is it greater?

Show how you decide.

State any assumption that you make.

(Turn over)

[illegible]

(Turn over)

Account _____ gives the
greater percentage increase by
_____ %

Assumption _____

(Turn over)

[6 marks]

continued on the next page . . .

(Turn over)

Question 23 continued

23. (b) Comment on the effect that your assumption in part (a) has had on your decision.

[1 mark]

END OF PAPER

TOTAL 120 MARKS

(Turn over)

[illegible]

(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

WEDNESDAY, 7 JUNE 2023 – 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: _____

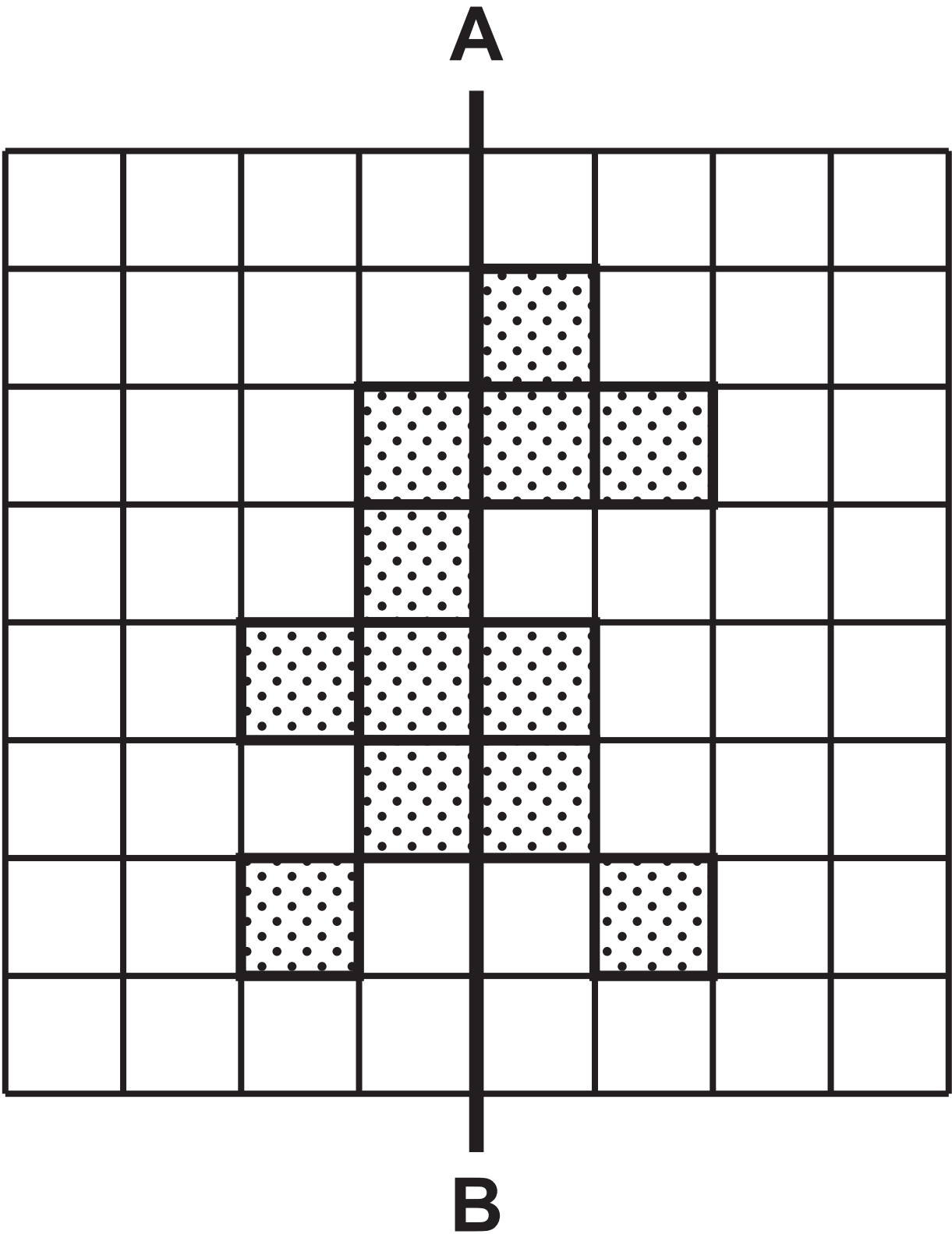
Candidate Number: 0 _____

Question 1

Table

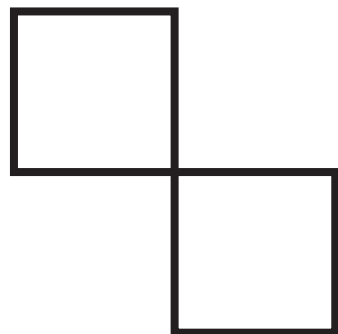
MENU					
MAIN ITEMS		DRINKS		SNACKS	
Roll	£3.60	Tea	£1.20	Packet of crisps	£1
Sandwich	£3.49	Coffee	£1.85	Piece of fruit	60 p
Salad	£4.23	Soft drink	95 p	Cereal bar	86 p

Question 2 (a)

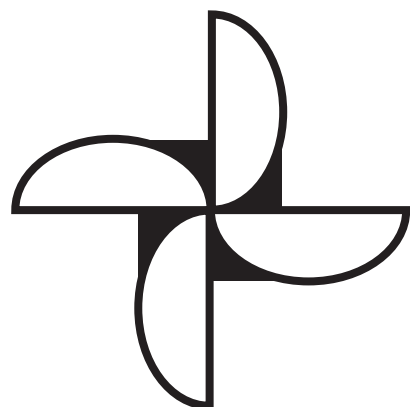


Question 2 (b)

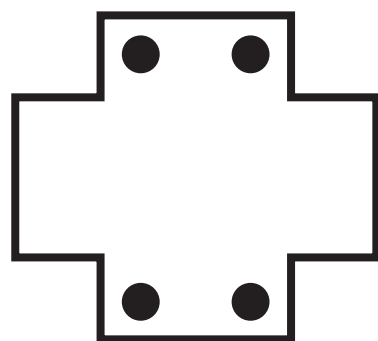
Shape A



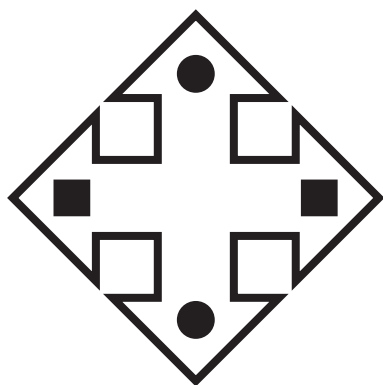
Shape B



Shape C



Shape D



Shape E



Question 2 (d)

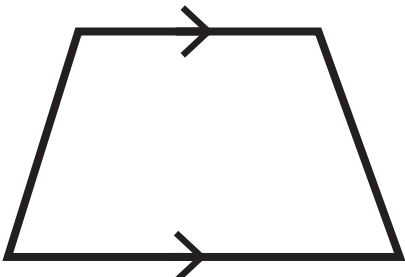
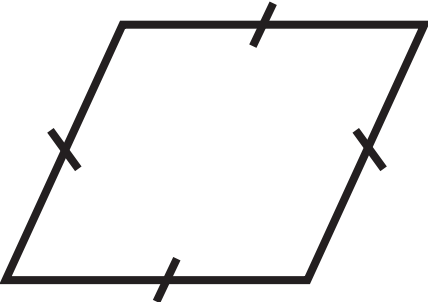
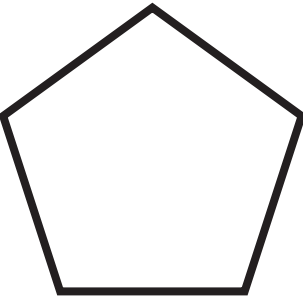
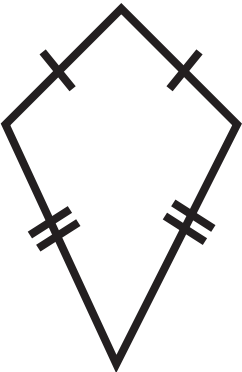
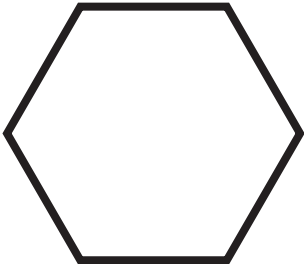
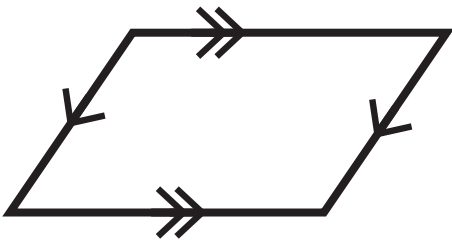
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Rhombus

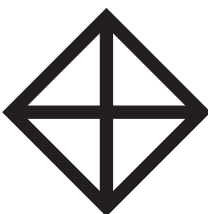
Trapezium

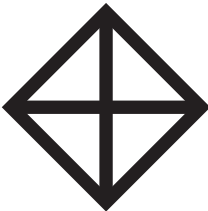
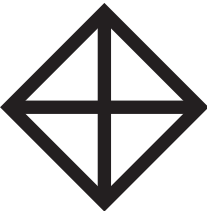
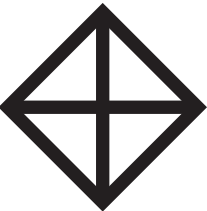
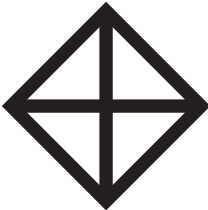
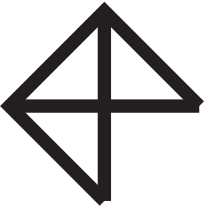
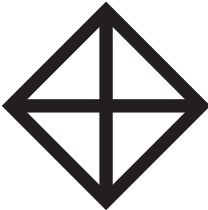
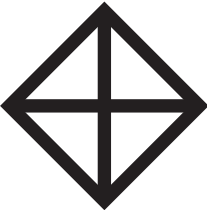
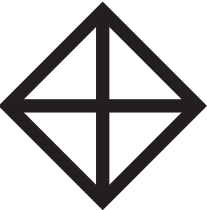
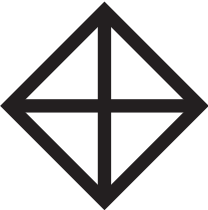
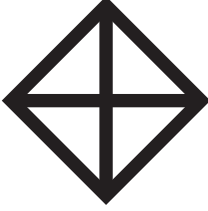
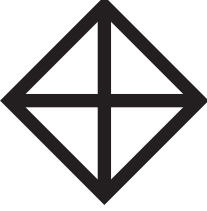
Kite

Hexagon

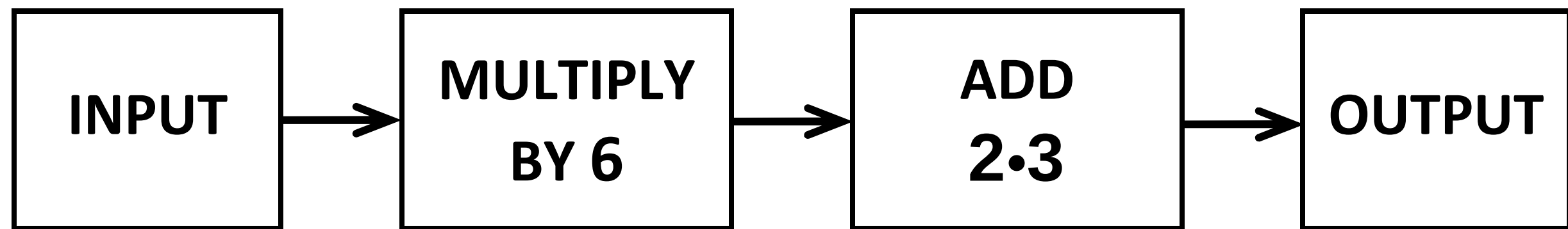


Question 4

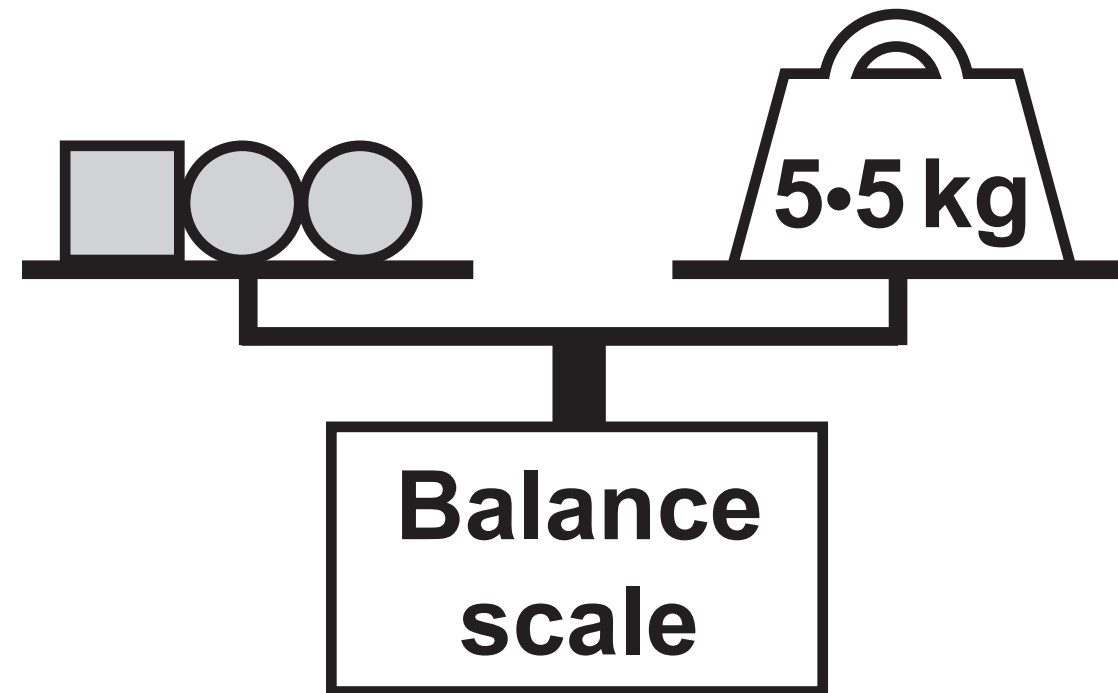
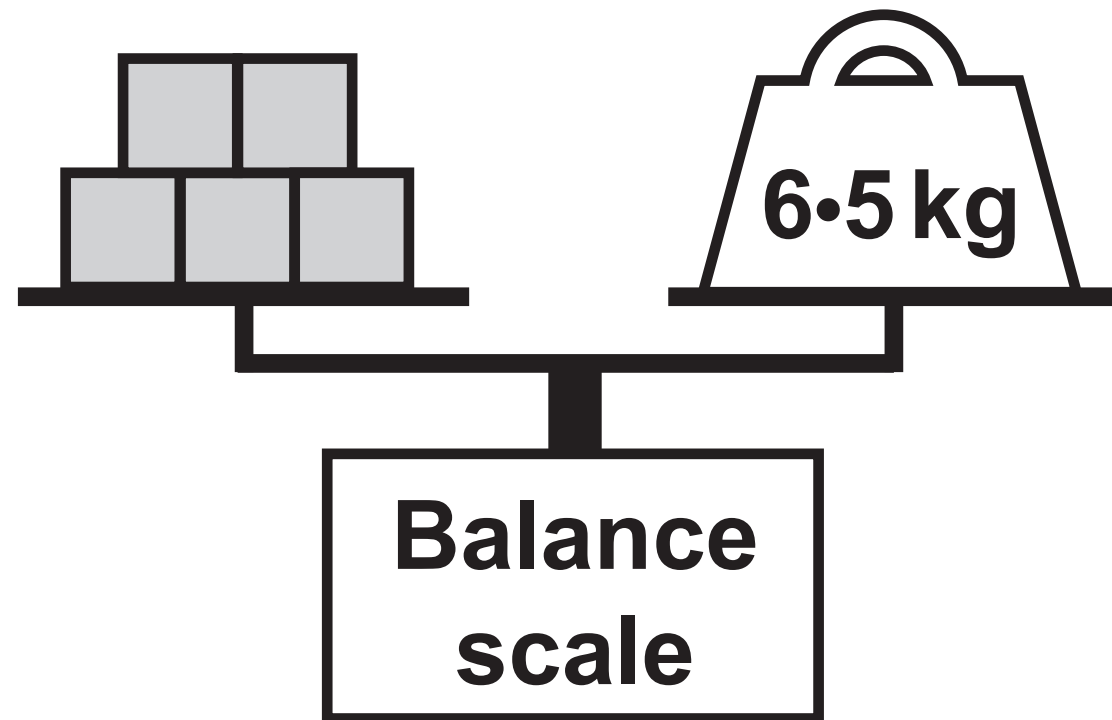
Key:  represents 12 cupcakes

Monday	  
Tuesday	 
Wednesday	   
Thursday	  
Friday	

Question 5 (a)

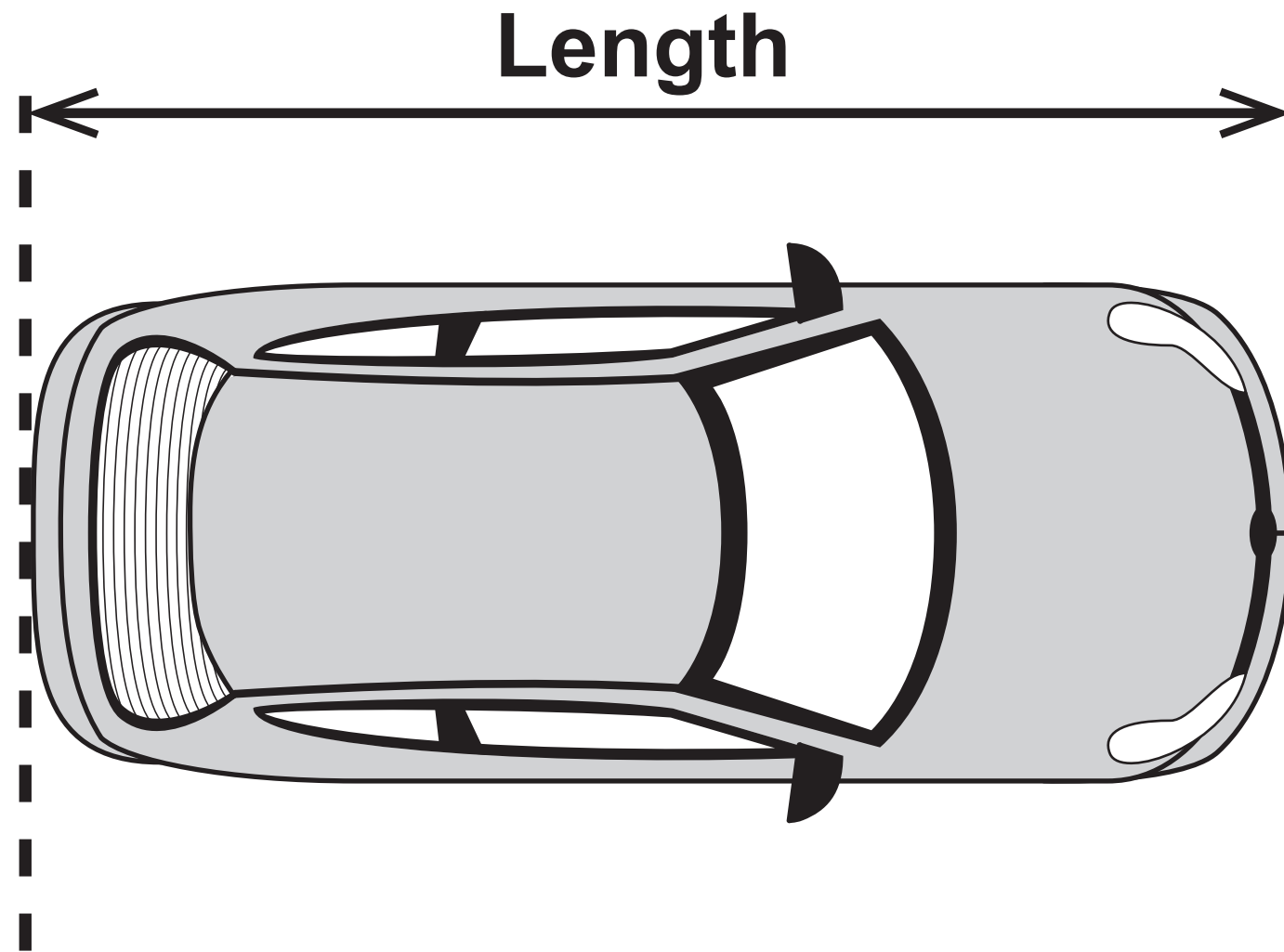


Question 5 (b)



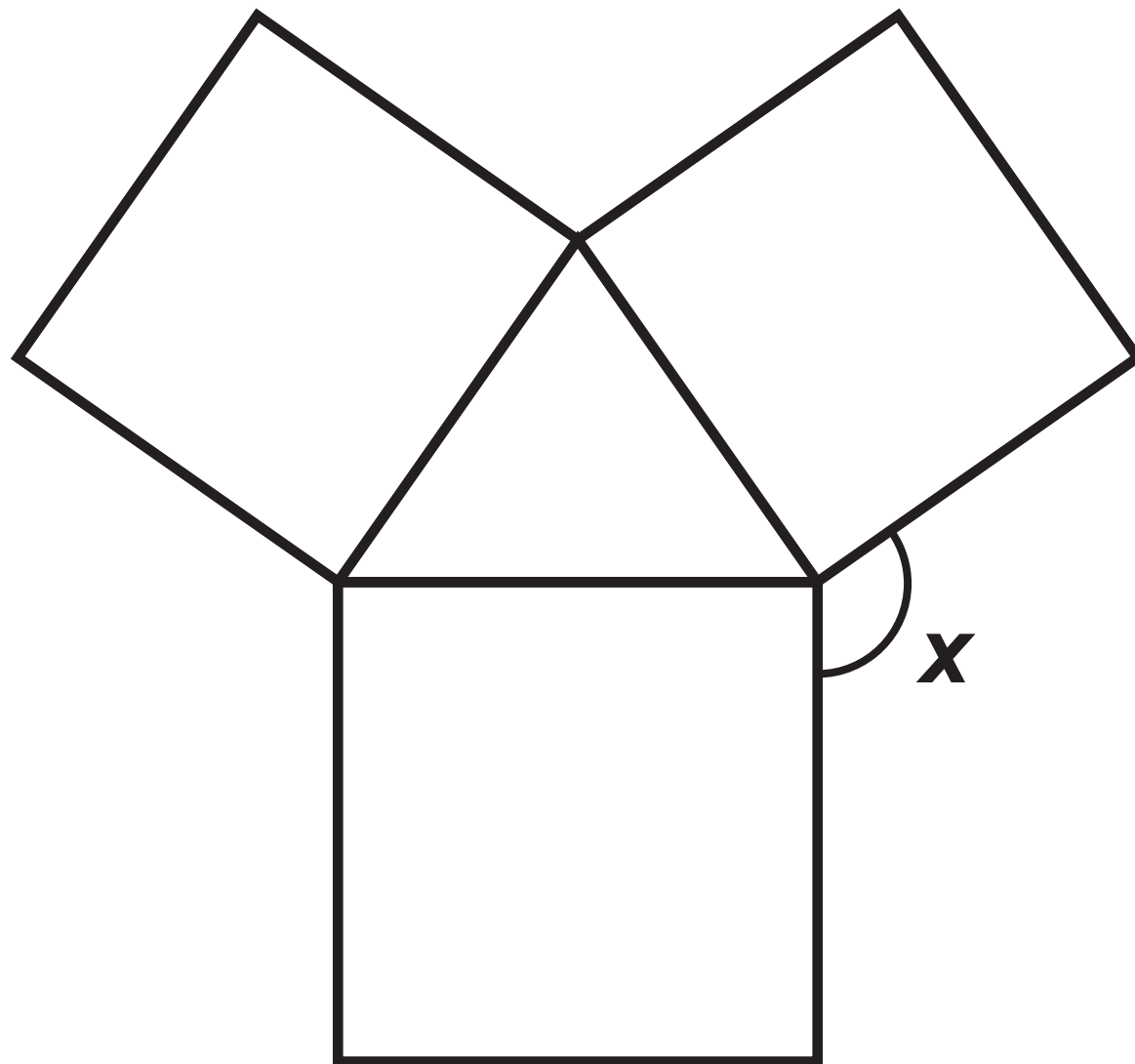
Question 7

Scale: 1 cm represents $\frac{1}{4}$ metre



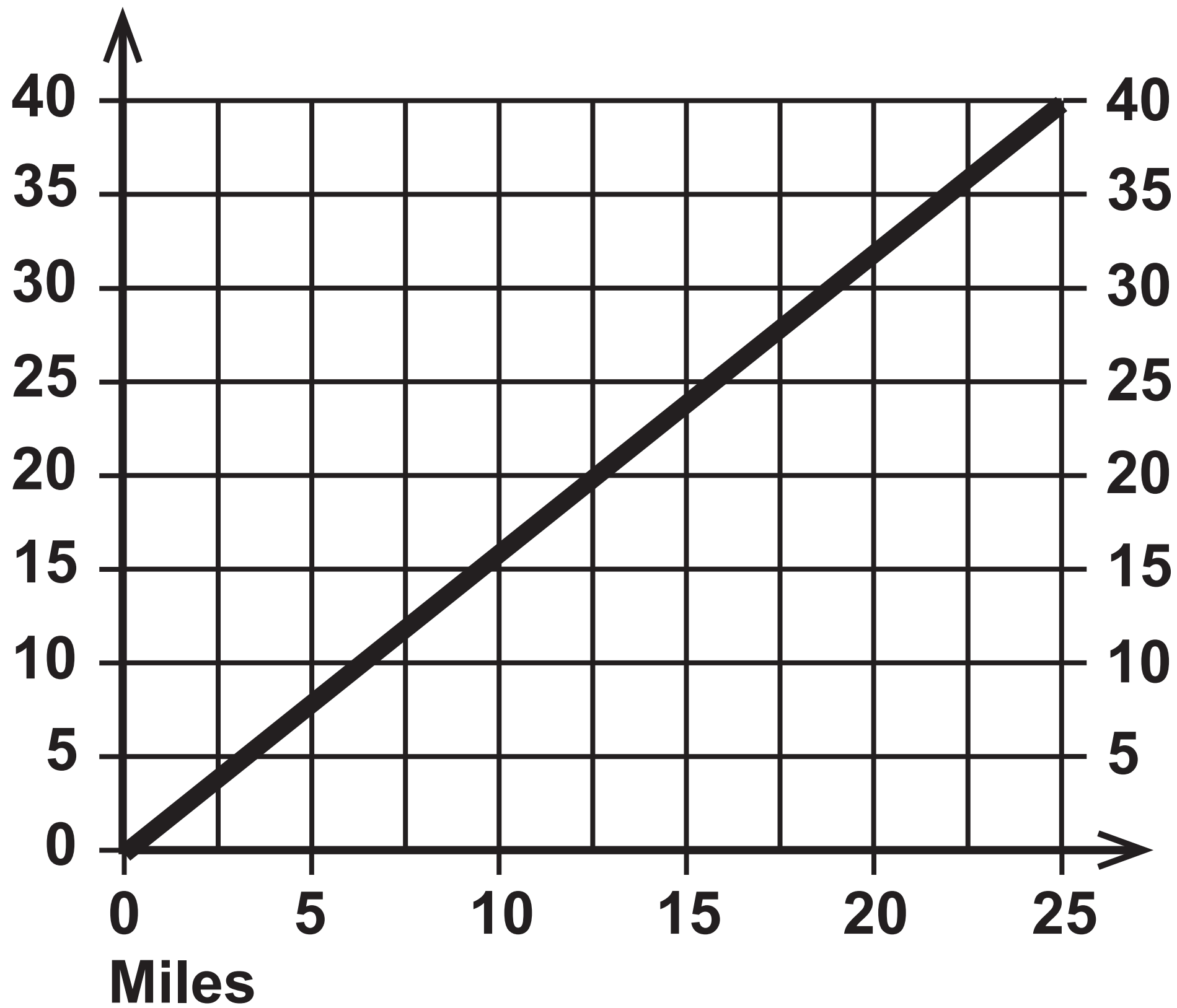
Question 9

Diagram NOT drawn to scale



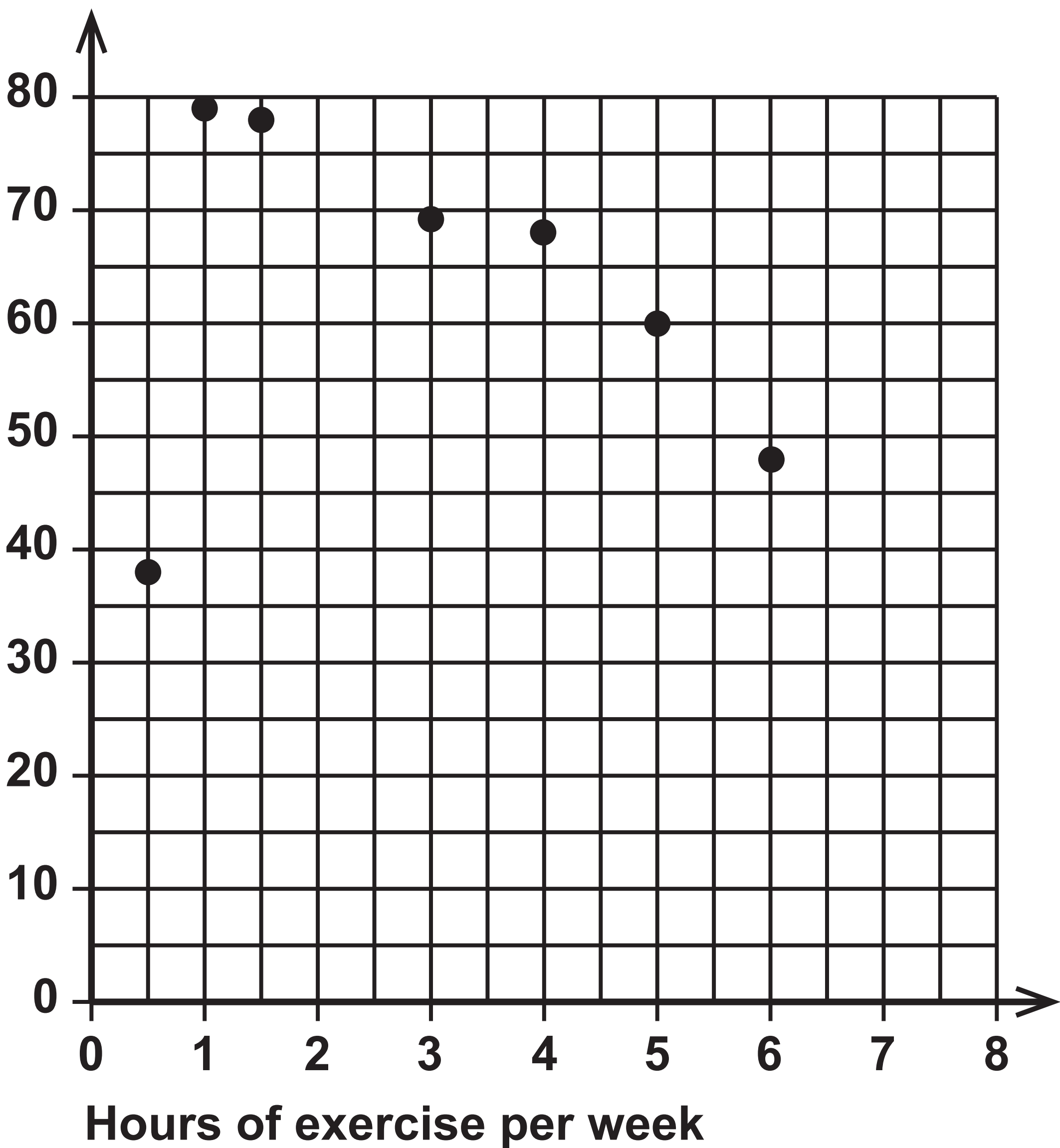
Question 10

Kilometres (km)



Question 13

Resting heart
rate (bpm)

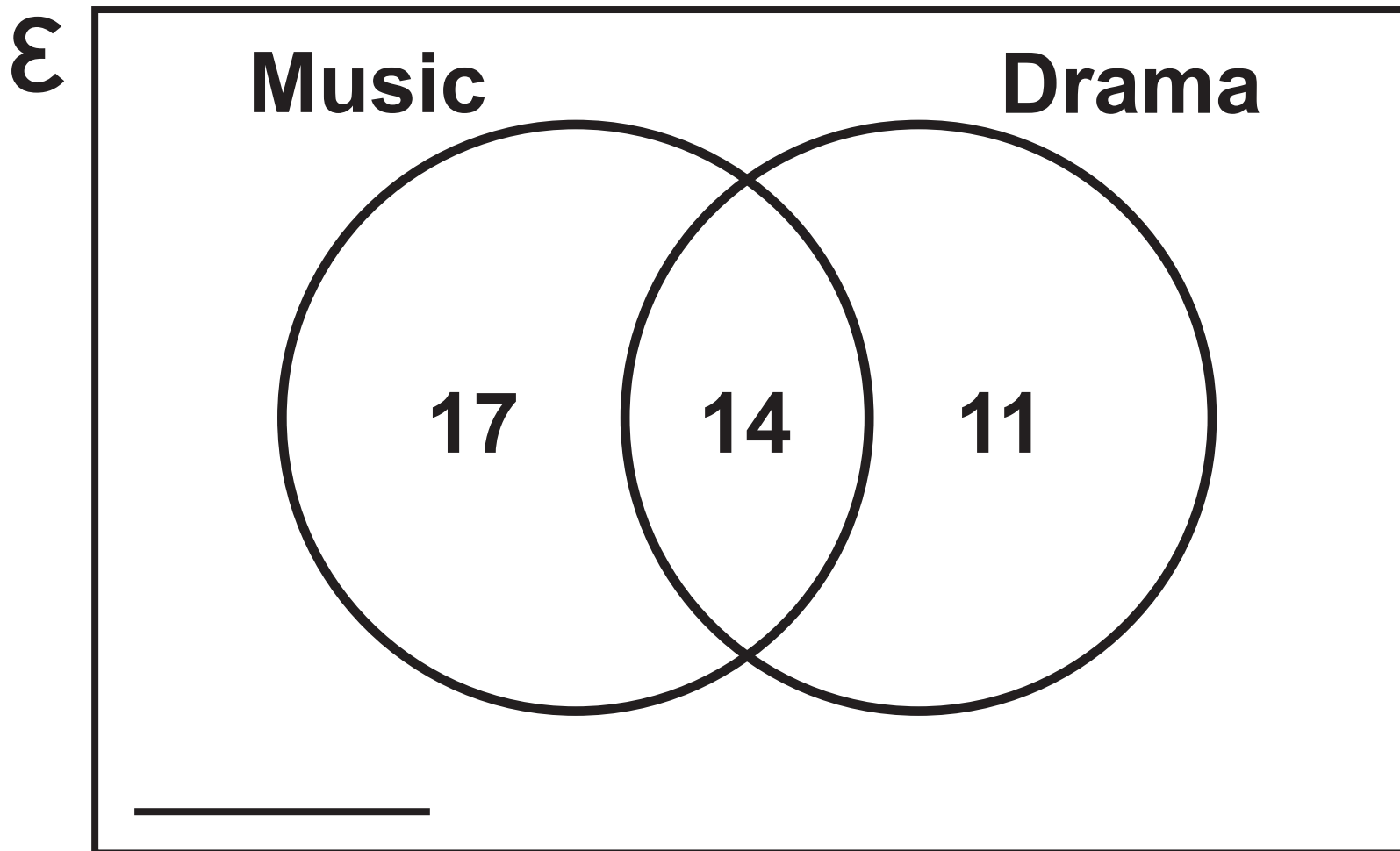


Question 14 (a)

Table

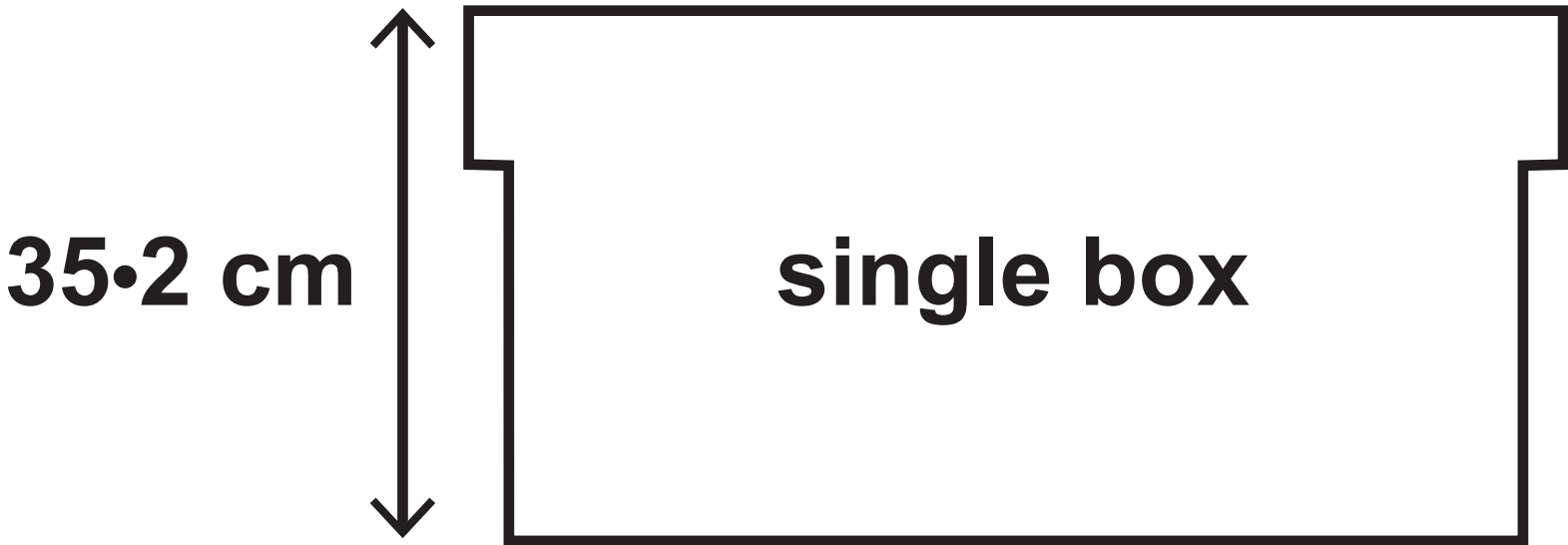
Method of travel	Probability
Walk	0.2
Bus	0.35
Bike	0.3
Car	
Train	
Other	0

Question 14 (b)

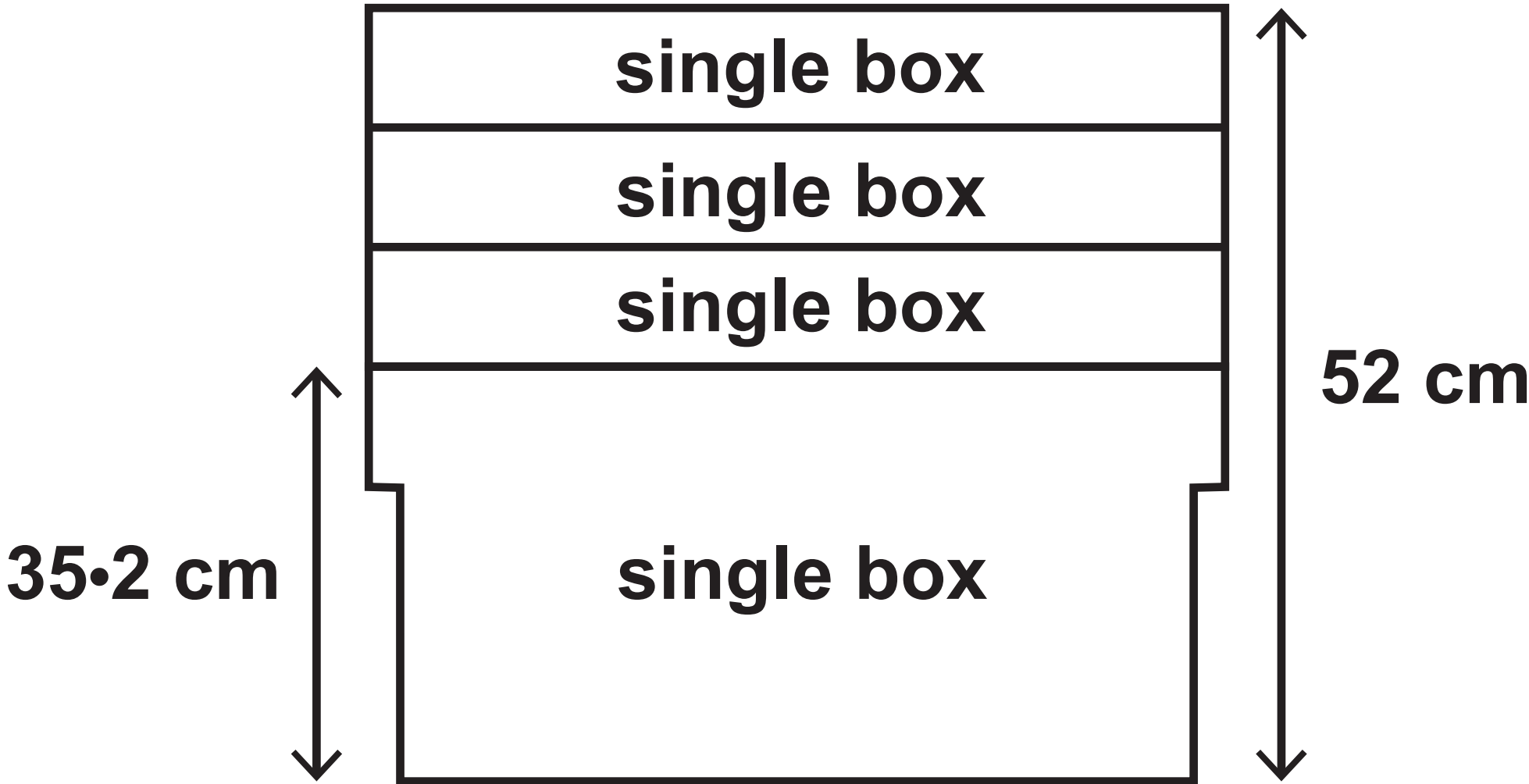


Question 15

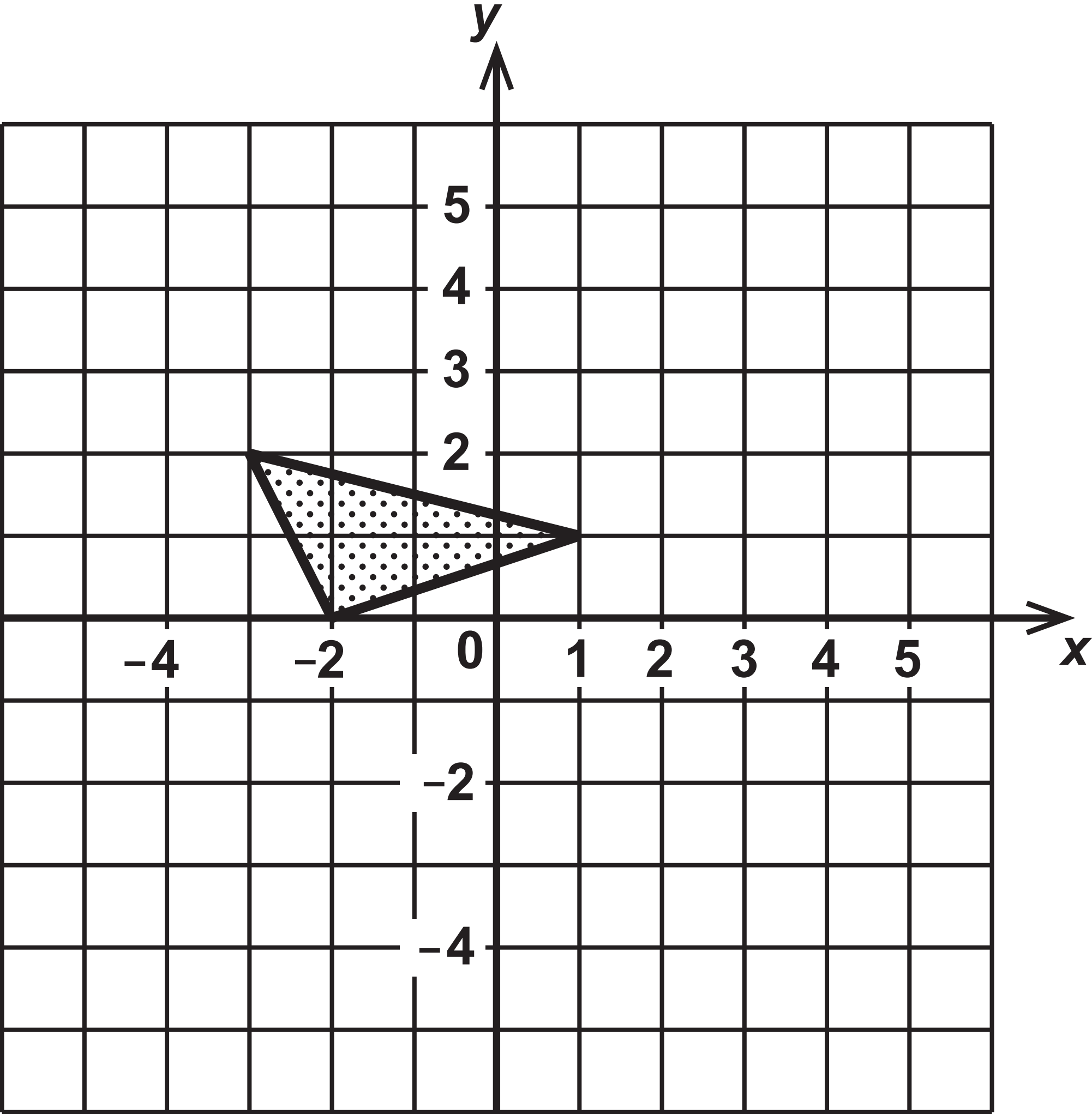
Diagram NOT drawn to scale



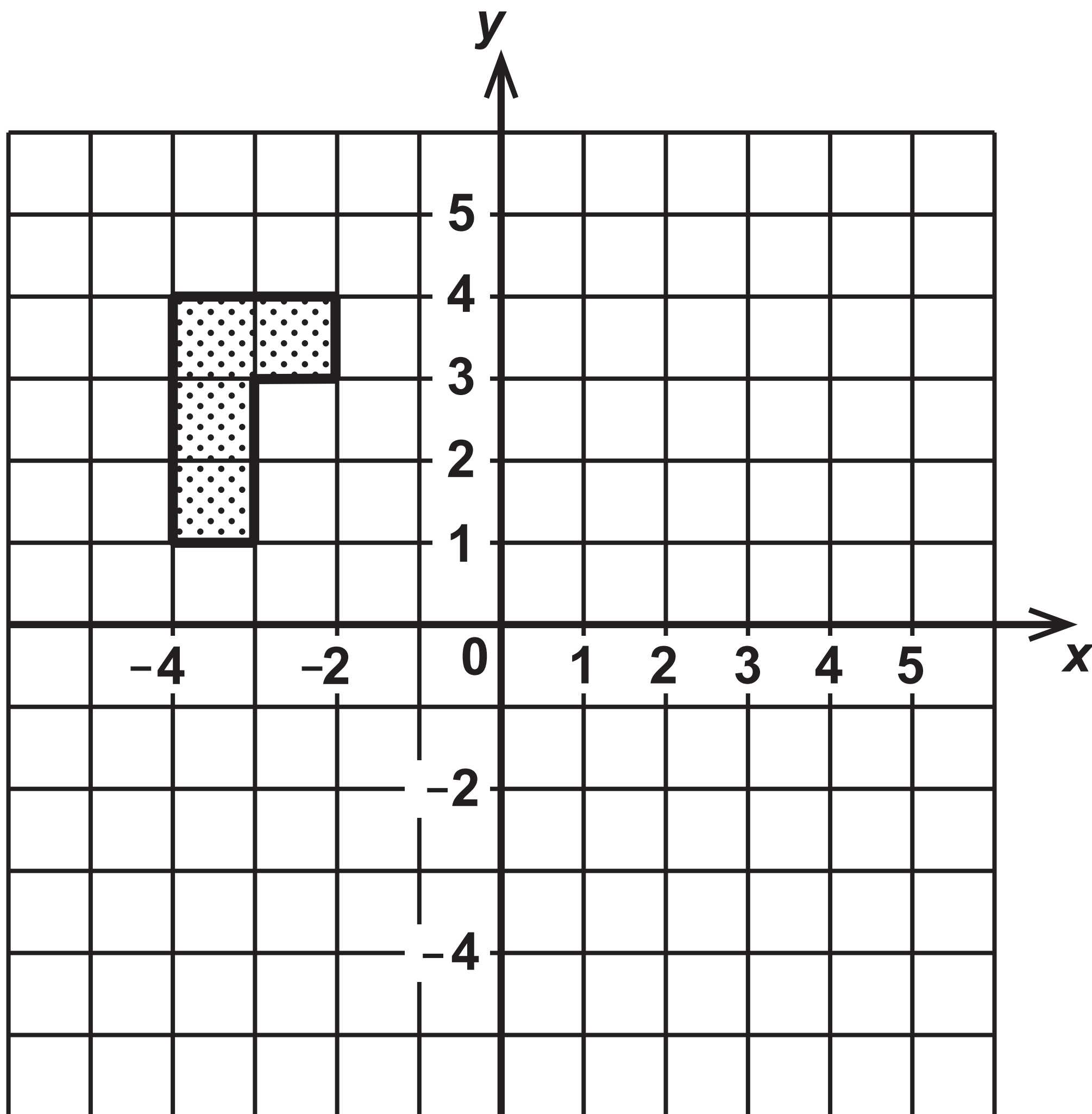
Stack of four boxes



Question 17 (a)

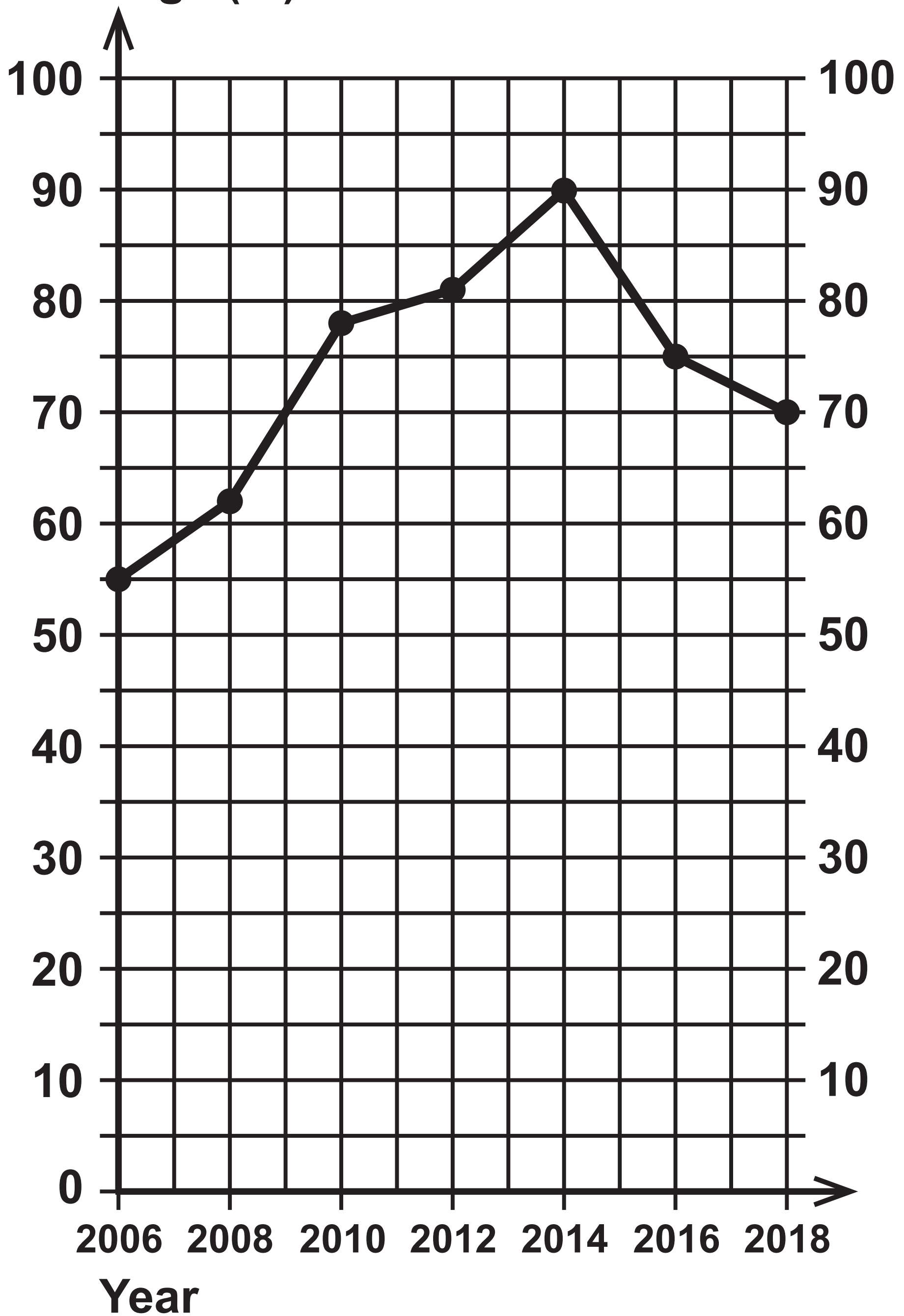


Question 17 (b)



Question 19

Percentage (%)



Question 19 (b)

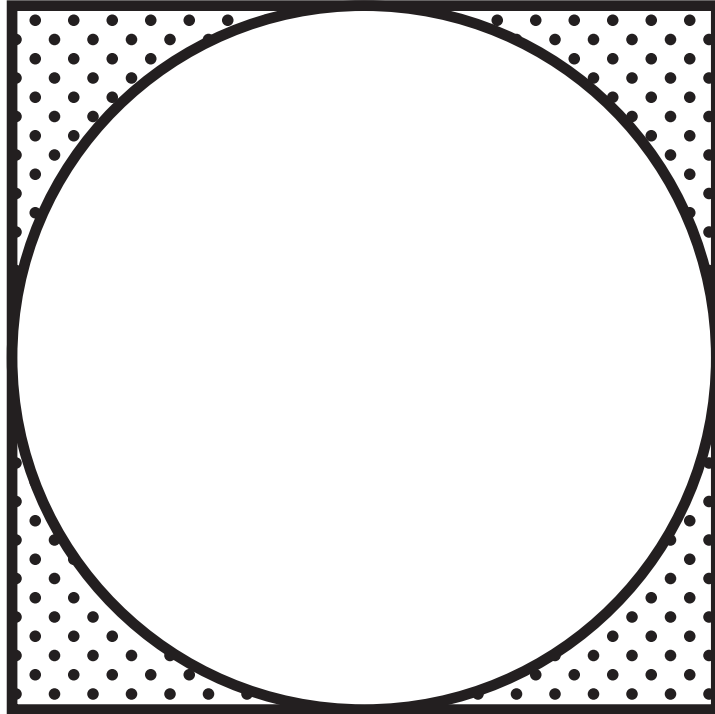
Table

Year	Internet connection (%)
2006	45
2008	55
2010	65
2012	75
2014	85
2016	90
2018	95

Question 20 (a)

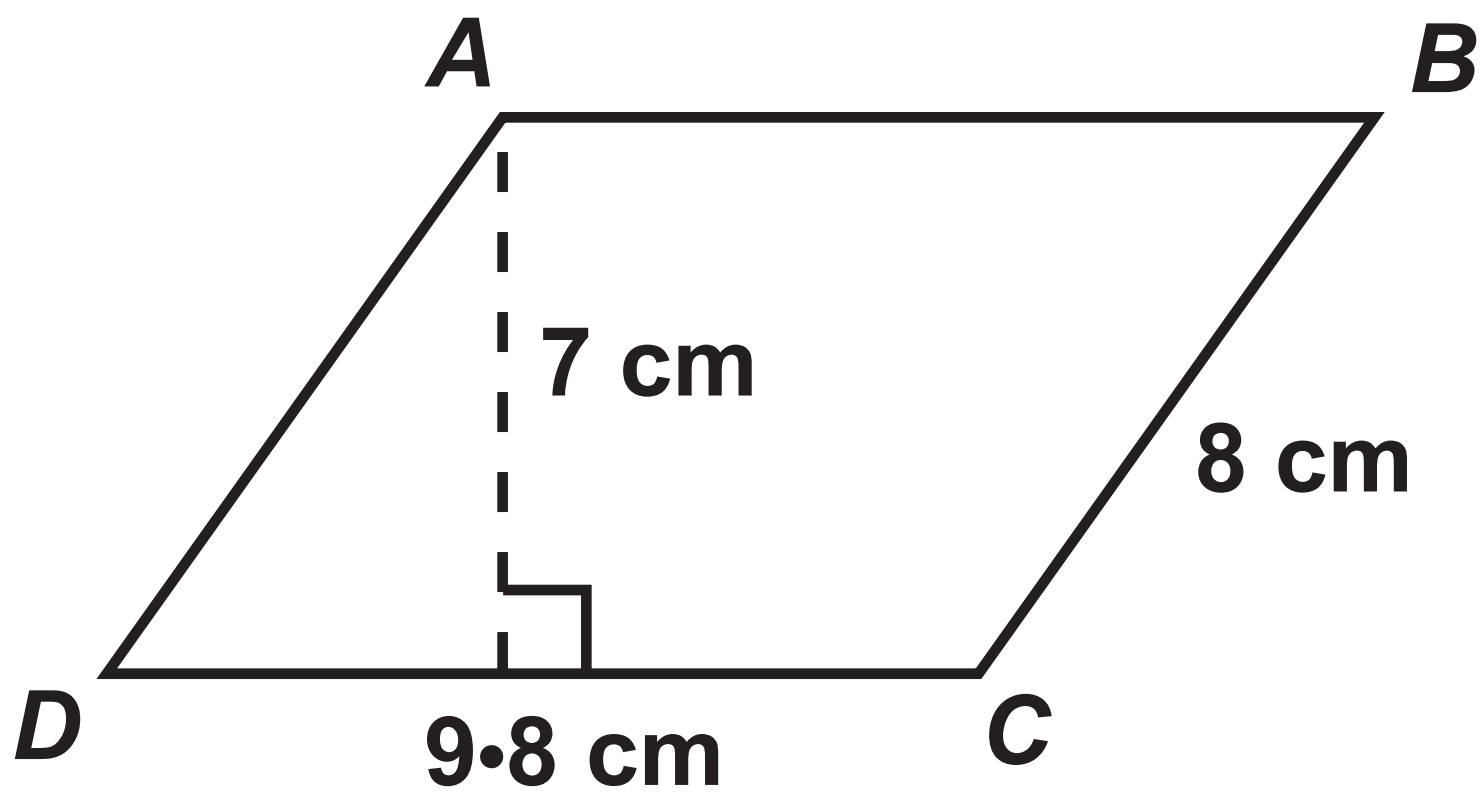
Diagram NOT drawn to scale

8.2 cm



Question 20 (b)

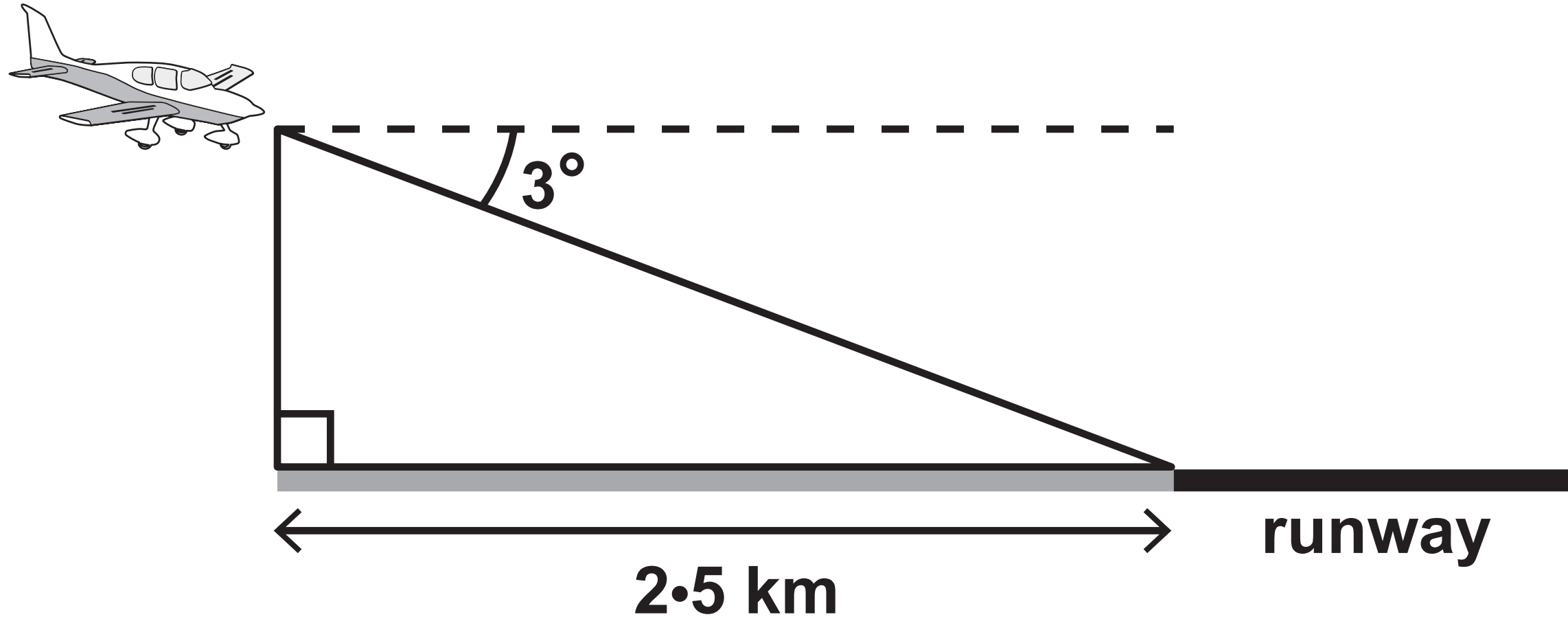
Diagram NOT drawn to scale



Question 22

Diagram NOT drawn to scale

Aircraft



Question 23

Information

ACCOUNT A

**4% compound interest
per year**

Interest rates can vary

ACCOUNT B

**Guaranteed interest
at the end of 5 years
of £190 for each
£1000 invested**

**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

WEDNESDAY, 7 JUNE 2023 – 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:

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

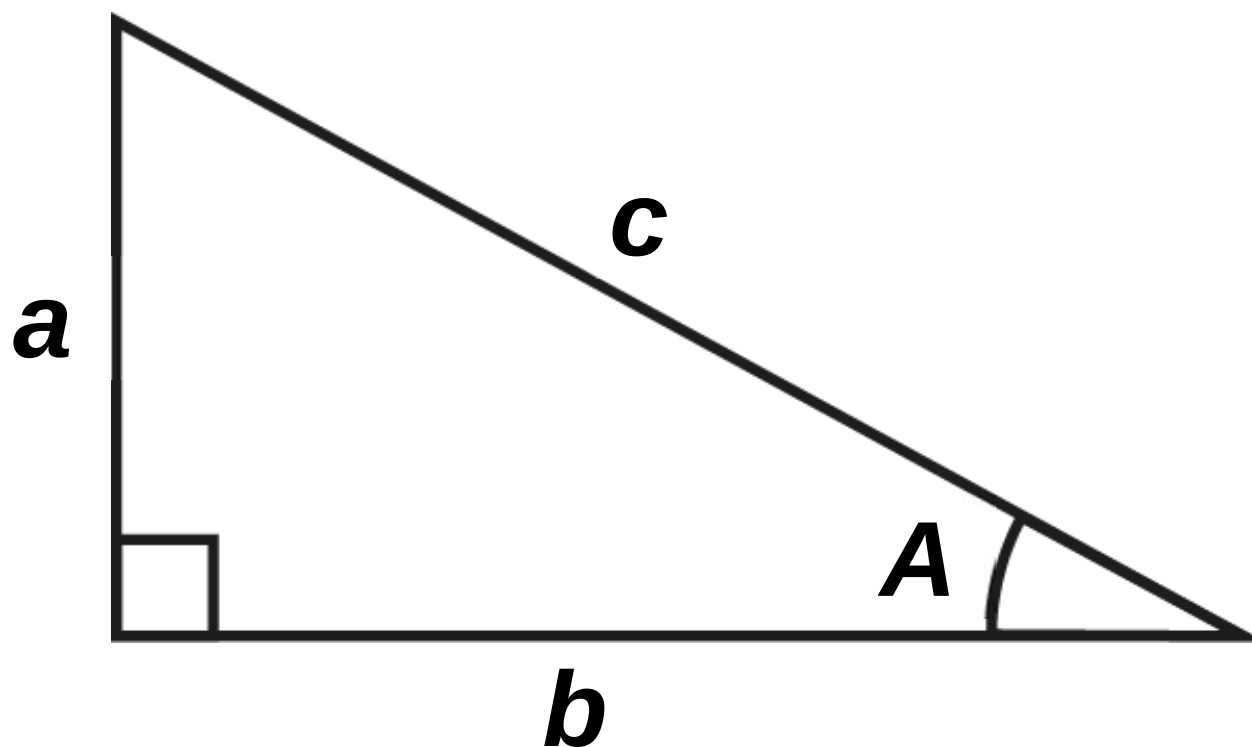
Volume of a prism =
area of cross section $\times$ length

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 :

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