GCSE – NEW

3310U60-1

MATHEMATICS – NUMERACY

UNIT 2:

CALCULATOR – ALLOWED

HIGHER TIER

THURSDAY,

8 JUNE 2017 – MORNING

1 hour 45 minutes

(plus your additional time allowance)

A CALCULATOR WILL BE REQUIRED FOR THIS PAPER

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1.	3	
2.	2	
3.	4	
4.	4	
5.	8	
6.	6	
7.	8	
8.	6	
9.	3	
10.	5	
11.	8	
12.	7	
13.	7	
14.	9	
Total	80	

Surname:	
Other Names:	
Centre Number:	
Candidate Number:	**0**

ADDITIONAL MATERIALS

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.

A spare Diagram Booklet.

Models for Question 6 and Question 14.

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 continuation pages at the back of the booklet, taking care to number the question(s) correctly.

Take π as $3{\cdot}14$ 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.

In question 6, the assessment will take into account the quality of your linguistic and mathematical organisation, communication and accuracy in writing.

1. Mali's scooter depreciated (decreased) in value by **24%** in the FIRST year. In all further years, her scooter depreciated by **13%** of its previous year's value. She originally paid **£850** for her scooter. Calculate the value of Mali's scooter after **7** years.

After 7 years, the value of Mali's scooter was £ _____

[3 marks]

2. Sanjay stacks three boxes in a pile.

The heights of the boxes are 25 cm, 36 cm and 47 cm.

They are all measured correct to the nearest centimetre.

What is the greatest possible height of the stack of the three boxes?

Greatest possible height of the stack of three boxes is _____ cm

[2 marks]

3. Look at the diagram for Question 3 in the separate Diagram Booklet.
The diagram shows a map of Wales.

ORGANICS4U is planning to have its headquarters in Wales.
The manager has instructed Ffion to look for a site for the headquarters.

Here are the instructions that Ffion has been given by her manager.

'Find the point that is

- **an equal distance between Wrexham and Aberporth, and**
- **an equal distance between Caernarfon and Swansea.**

The new headquarters needs to be within 20 miles of this point.'

On the map, shade the region, IN WALES, that Ffion should identify for her manager.

[4 marks]

4. **Look at the diagram for Question 4 in the separate Diagram Booklet.**
The diagram is NOT drawn to scale.

Ursula is lying on her surfboard 180 metres away from the foot of a vertical cliff.
The height of the cliff is 146 metres.

Ursula was told that if the angle of elevation of the top of the cliff from her lying position is between 42° and 45°, it is safe for her to attempt to stand on her surfboard.

Calculate the angle of elevation of the top of the cliff from Ursula's position lying on her surfboard.

State whether it is

- **safe for Ursula to attempt to stand, or**
- **not safe as she is too near the cliff, or**
- **not safe as she is too far out at sea.**

_____

_____

[4 marks]

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

The diagram is NOT drawn to scale.

The diagram represents a television.

Marta buys a new television.

(a) Marta wants to fit the television in a bookcase on the wall.

In the shop she forgot to write down the length of the television.

She did write down the height and the diagonal of the screen.

The height of the screen is 16 inches.

The diagonal of the screen is 44 inches.

Marta needs to know the length of the screen before she opens the box, in case she wants to return the television.

Calculate the length of the screen.

Give your answer correct to 2 significant figures.

Length is _____ inches,

correct to 2 significant figures.

[4 marks]

Question 5 continued

5. (b) The television was reduced in the sale by 26% of its original price.

It cost Marta £710.40 in the sale.

What was the original price of the television?

_____

_____

_____

_____

_____

_____

_____

_____

Original price £ _____

[2 marks]

Question 5 continued

5. (c) A television uses 1 unit of electricity every 10 hours.

A unit of electricity costs 9.8p

(i) Calculate the cost of having a television turned on for 24 hours.

Circle your answer.

£23.52	£2.35	40.83p	23.52p	2.45p

[1 mark]

continued on the next page . . .

Question 5 (c) continued

5. (c) (ii) On average, Marta watches 4 hours of television each day.
On average, how much A WEEK does it cost her to watch television?
Circle your answer.

27.44p	**£27.44**	**£39.20**	**39.2p**	**10.78p**

[1 mark]

6. IN THIS QUESTION, YOU WILL BE ASSESSED ON THE QUALITY OF YOUR ORGANISATION, COMMUNICATION AND ACCURACY IN WRITING.

Ask for the models for Question 6.
The models are NOT made to scale.

Model 1 represents Elin's old fish tank.

Model 2 represents Elin's new fish tank.

Elin's old fish tank is leaking.

The old fish tank is in the shape of a cuboid. (Model 1)
The base of this tank measures 60 cm by 40 cm.
Before the leak, the height of the water level in Elin's old fish tank was 45 cm.

Elin decides to replace her fish tank with a cylindrical one. (Model 2)

continued on the next page . . .

Question 6 continued

She selects a new cylindrical fish tank that has a radius of 25 cm and a height of 70 cm.

Will all the original contents, including the water, fit into this cylindrical tank?
You must show all your working.

[4 marks + 2 marks OCW]

7. Look at the diagram for Question 7 in the separate Diagram Booklet.
The diagram shows a hand.

Simon plans to make gloves.

(a) One morning, Simon decided to carry out a survey to find the mean hand span of people in Wales.

He decided to sample systematically.
He decided to sample from the first 240 people who pass him in the street during the morning.

He wanted to take 20 people's hand span measurements.
Explain how Simon could use systematic sampling to obtain 20 measurements.

[1 mark]

7. (b) Look at the table for Question 7 (b) in the separate Diagram Booklet.

Yesterday morning, Simon only managed to sample 10 people. He calculated the mean hand span of these 10 people to be 22•8 cm.

Yesterday afternoon, Simon recorded the hand spans of a FURTHER 20 people, shown in the table.

Calculate an estimate of the mean of all 30 HAND SPANS that Simon measured yesterday.

[6 marks]

Question 7 continued

7. (c) What could Simon do to improve his estimate of the mean hand span of people in Wales?

[1 mark]

8. **Look at the diagrams for Question 8 in the separate Diagram Booklet.**
The diagrams are NOT drawn to scale.

Diagram (i) shows where Levi wants to attach a string of lights to his house.
Levi wants to attach a single string of lights from *B* to *A* and then from *A* to *C*.

Diagram (ii) shows the measurements Levi has taken.

He spends £410 at the electrical store buying a string of lights.
After putting up the lights, Levi finds he has 6 metres of the string of lights left over at one end.

How much did the electrical store charge Levi, per metre, for the string of lights?

_____

_____

_____

_____

[6 marks]

9. **Look at the table for Question 9 in the separate Diagram Booklet.**

The table shows the number of Year 11 pupils attending schools in Cwmifan.

In total there are 690 Year 11 pupils attending these three schools.

A new youth theatre has been set up in Cwmifan.
On the opening night, a total of 80 Year 11 pupils from these three schools are going to be invited to attend.

Use a stratified sampling method to calculate the number of Year 11 pupils from each school who should be invited.
You must show all your working.

School	Number that should be invited
Cwrt Haf	
Cwmifan High	
Henclwyd	

[3 marks]

10. Fatima wants to invest some money in a savings account.
She has picked up leaflets from two building societies advertising their high – interest savings accounts.

‘BANNAU’ ACCOUNT	‘ERYRI’ ACCOUNT
Nominal annual rate of **3•85%**	Nominal annual rate of **3•86%**
Interest paid monthly	Interest paid every **6** months

By comparing AERs, which account will offer Fatima the better interest rate on her investment?
You must show all your working.

[5 marks]

11. Look at the diagrams for Question 11 in the separate Diagram Booklet.
The diagrams are NOT drawn to scale.

A company produces metal badges to be worn by its employees.
The badge is made up of two parts.
One part is in the shape of a sector of a circle as shown in Diagram 1.

(a) The perimeter of the sector is decorated with a coloured edging strip.
Calculate the length of edging strip needed to decorate the sector.

[3 marks]

11. (b) The other part is in the shape of a quarter – circle of radius 3 cm as shown in Diagram 2.

To make the badge, the two pieces are joined together with the sector in front of the quarter – circle, as shown in the Diagram 3.
The badge has a vertical line of symmetry.

The visible surface of the front of the badge is painted.
Calculate the area that is painted.

[5 marks]

12. Look at the diagram for Question 12 in the separate Diagram Booklet.
The diagram is NOT drawn to scale.

A plan view of Lowri's garden is shown.
In the diagram,

$AB = 800$ cm

$BC = 400$ cm

$EF = 400$ cm

$AF = 800$ cm

All the measurements are correct to the nearest 10 cm.

(a) Calculate the greatest possible area of Lowri's garden.

[4 marks]

12. (b) Lowri plans to spread grass seed over her garden using a spreading tool.
Over EACH SQUARE METRE, the spreading tool spreads 30 g of grass seed, correct to the nearest 5 g.

Lowri has exactly 1·5 kg of grass seed.
Can she be CERTAIN that she has enough grass seed?
You must show all your calculations.

[3 marks]

13. Look at the diagram for Question 13 (a) and Question 13 (b) in the separate Diagram Booklet.

The diagram is NOT drawn to scale.

The front views of two mathematically similar milk cartons are shown.

(a) Circle either TRUE or FALSE for each statement given below.

STATEMENT		
The ratio of the lengths of the cartons is the same as the ratio of the heights of the cartons.	TRUE	FALSE
The ratio of the volumes of the cartons is the same as the ratio of the heights of the cartons.	TRUE	FALSE

[1 mark]

Question 13 continued

13. (b) It is claimed that the larger carton contains double the amount of milk contained in the smaller carton.
Show that this claim is not true.
Explain your answer.

[3 marks]

Question 13 continued

13. (c) Look at the diagram for Question 13 (c) in the separate Diagram Booklet.
The diagram is NOT drawn to scale.

Another similar milk carton has a label with an area that is one quarter of the area of the label on the carton of height 24 cm.

Calculate the height of this new carton.

[3 marks]

14. Ask for the model for Question 14.

The model is NOT made to scale.

The model represents a 5 m wide section of road that has a uniform gradient.
The shaded area represents level ground.
Two cyclists, Delyth and Ioan, approach this section of road.

Delyth cycles straight up the middle of the road as shown by the arrow.
Ioan thinks this section of road is too steep to cycle straight up, so he decides to cycle from *A* to *B* in a straight line.

(a) How far does Ioan cycle in going from *A* to *B*?

[6 marks]

14. (b) Show that Ioan's route up this section of road is less steep than Delyth's route. You must show all your working.

[3 marks]

END OF PAPER

TOTAL 80 MARKS

Question number	Additional Pages, if required. Write the question number in the left - hand margin.

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GCSE – NEW

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MATHEMATICS – NUMERACY

UNIT 2: CALCULATOR – ALLOWED

HIGHER TIER

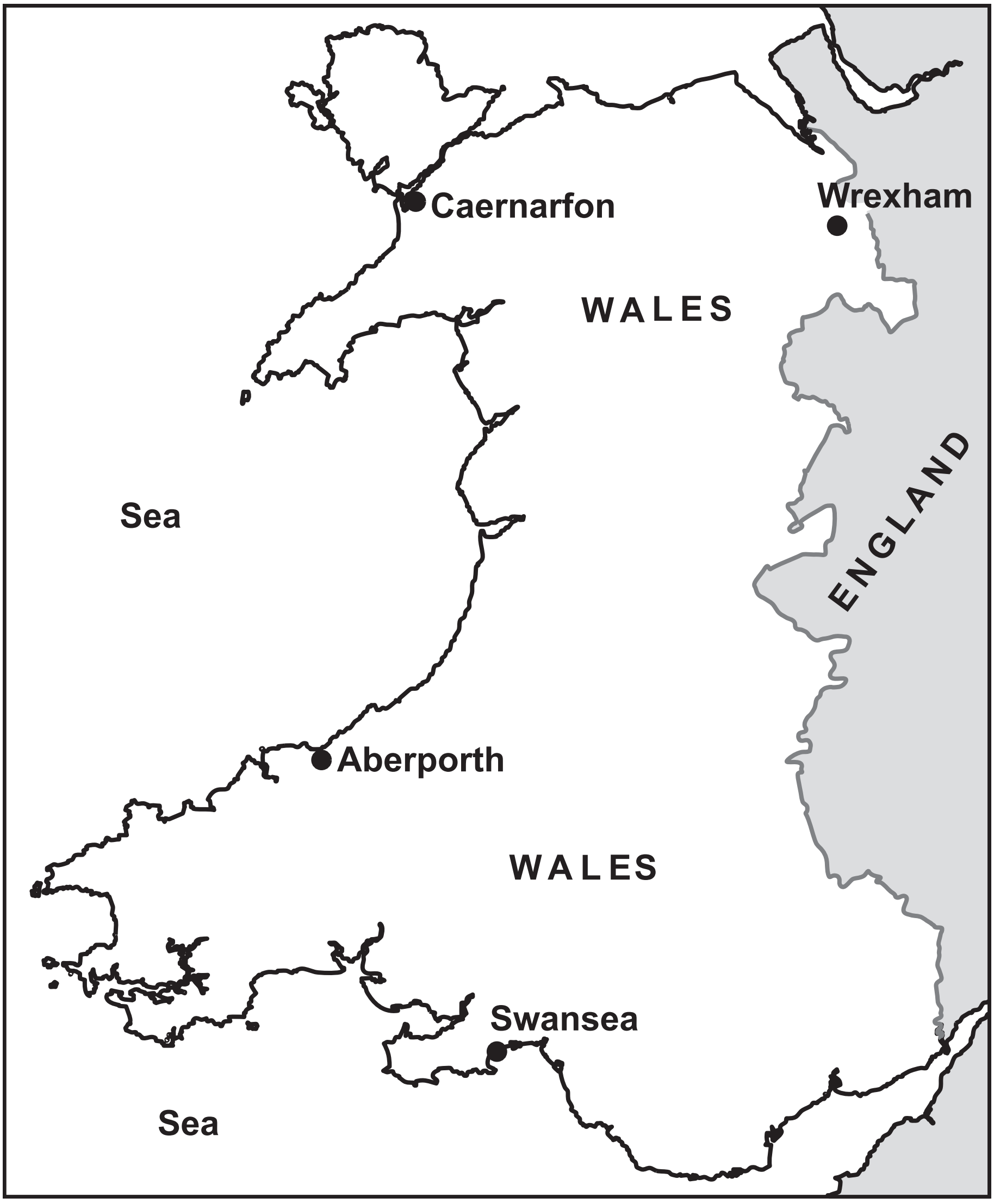
THURSDAY, 8 JUNE 2017 – MORNING

Diagram Booklet

Surname:	
Other Names:	
Centre Number:	
Candidate Number:	**0**

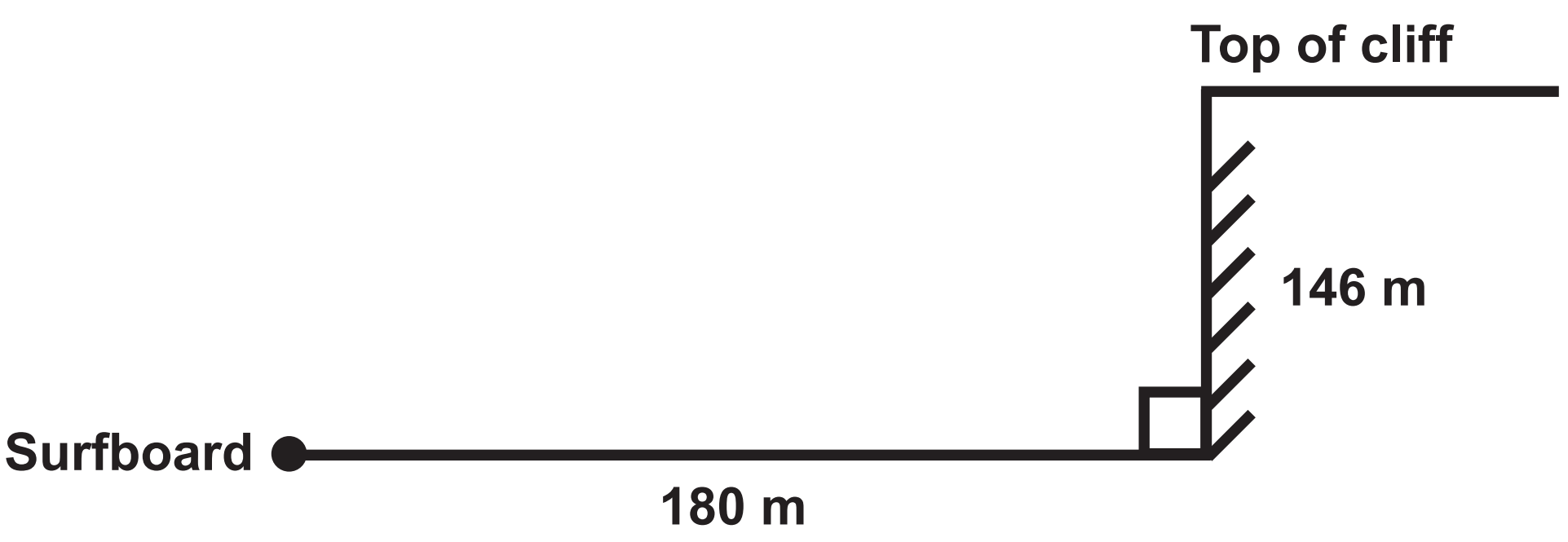
Question 3

Key: 0 20
miles



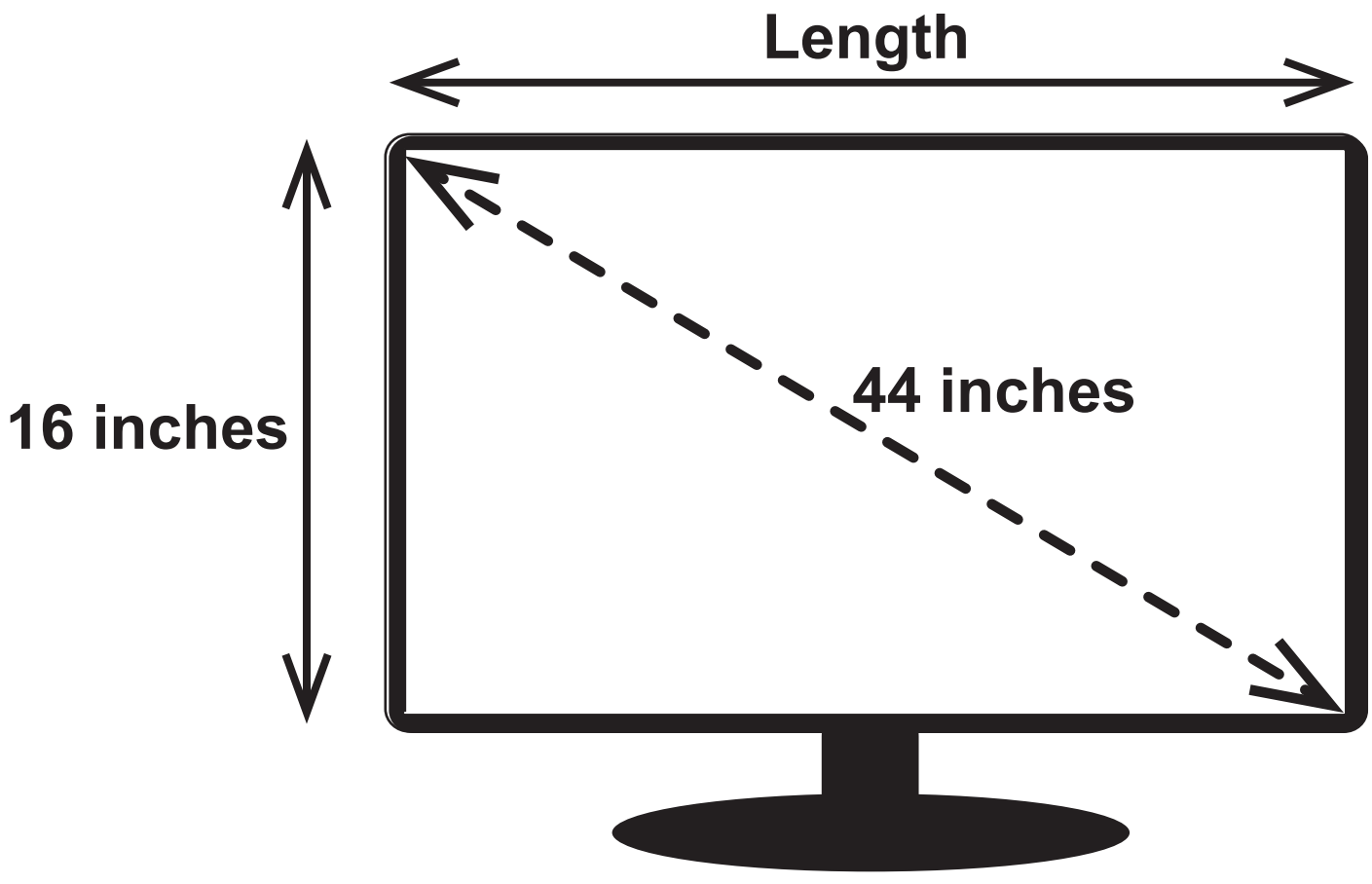
Question 4

Diagram NOT drawn to scale



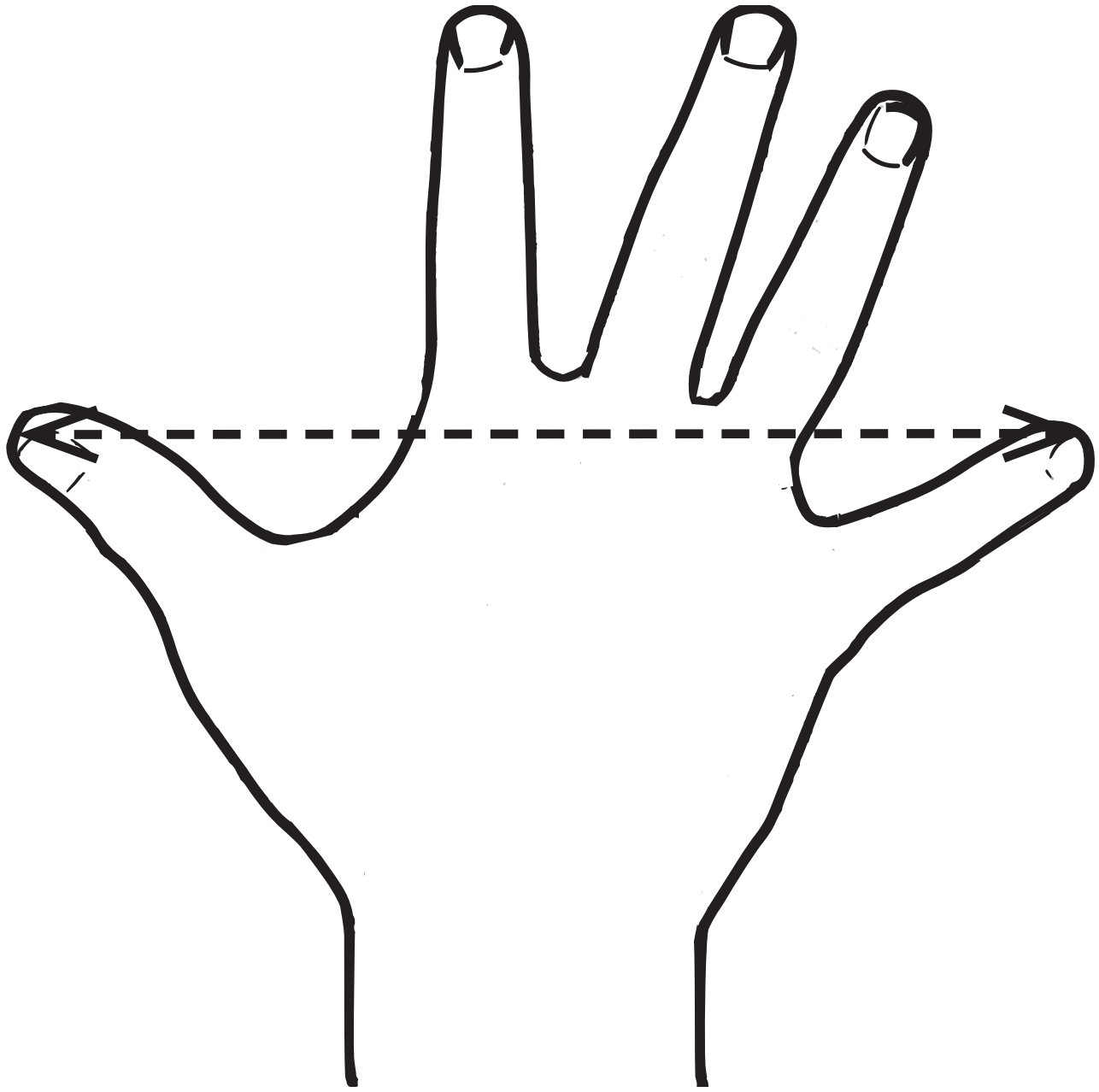
Question 5

Diagram NOT drawn to scale



Question 7

Key : <=------=> **hand span**



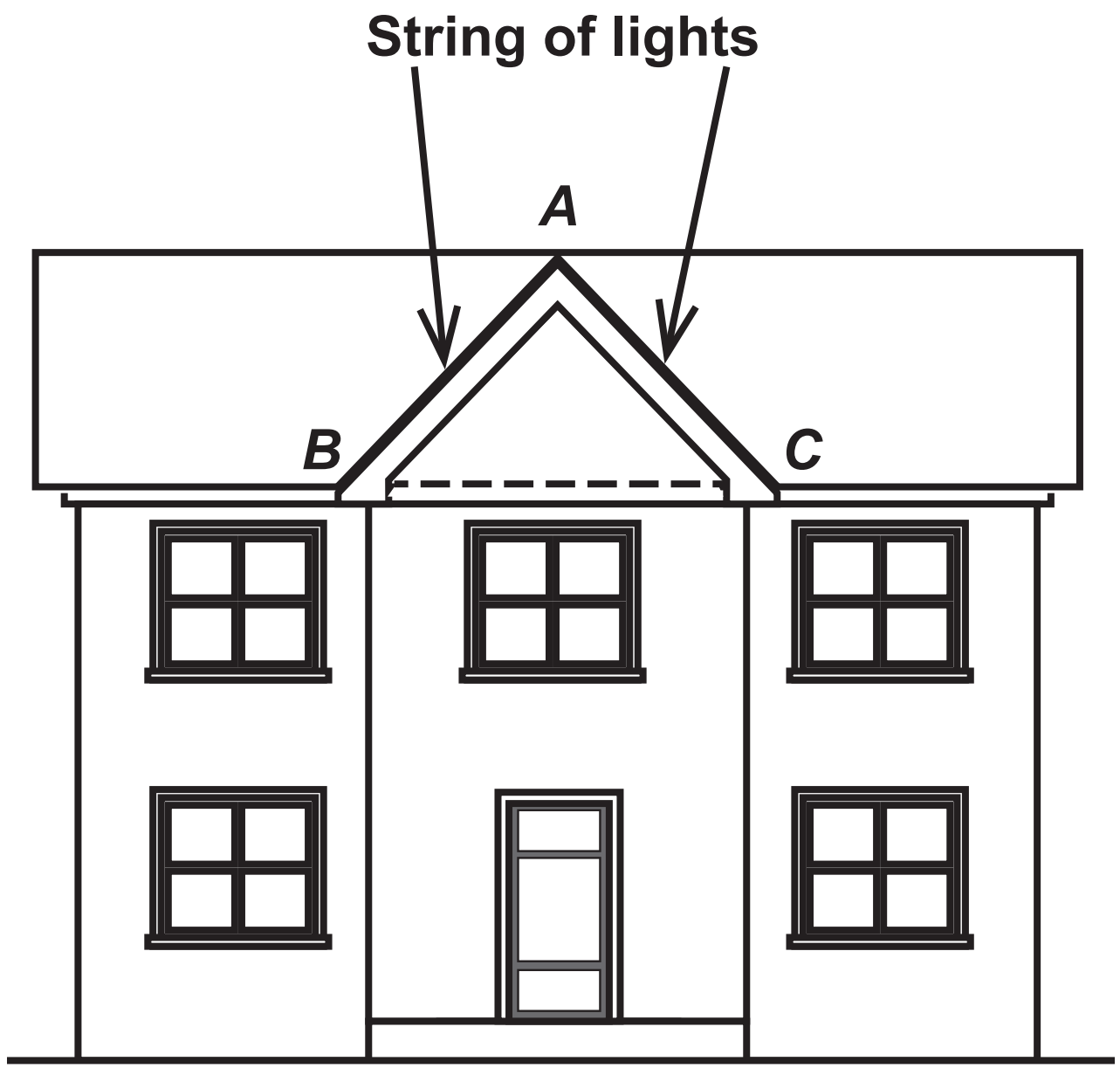
Question 7 (b)

Table

Hand span, to the nearest mm	Frequency
20•0 cm to 20•8 cm	2
20•9 cm to 21•7 cm	3
21•8 cm to 22•6 cm	10
22•7 cm to 23•5 cm	5

Question 8

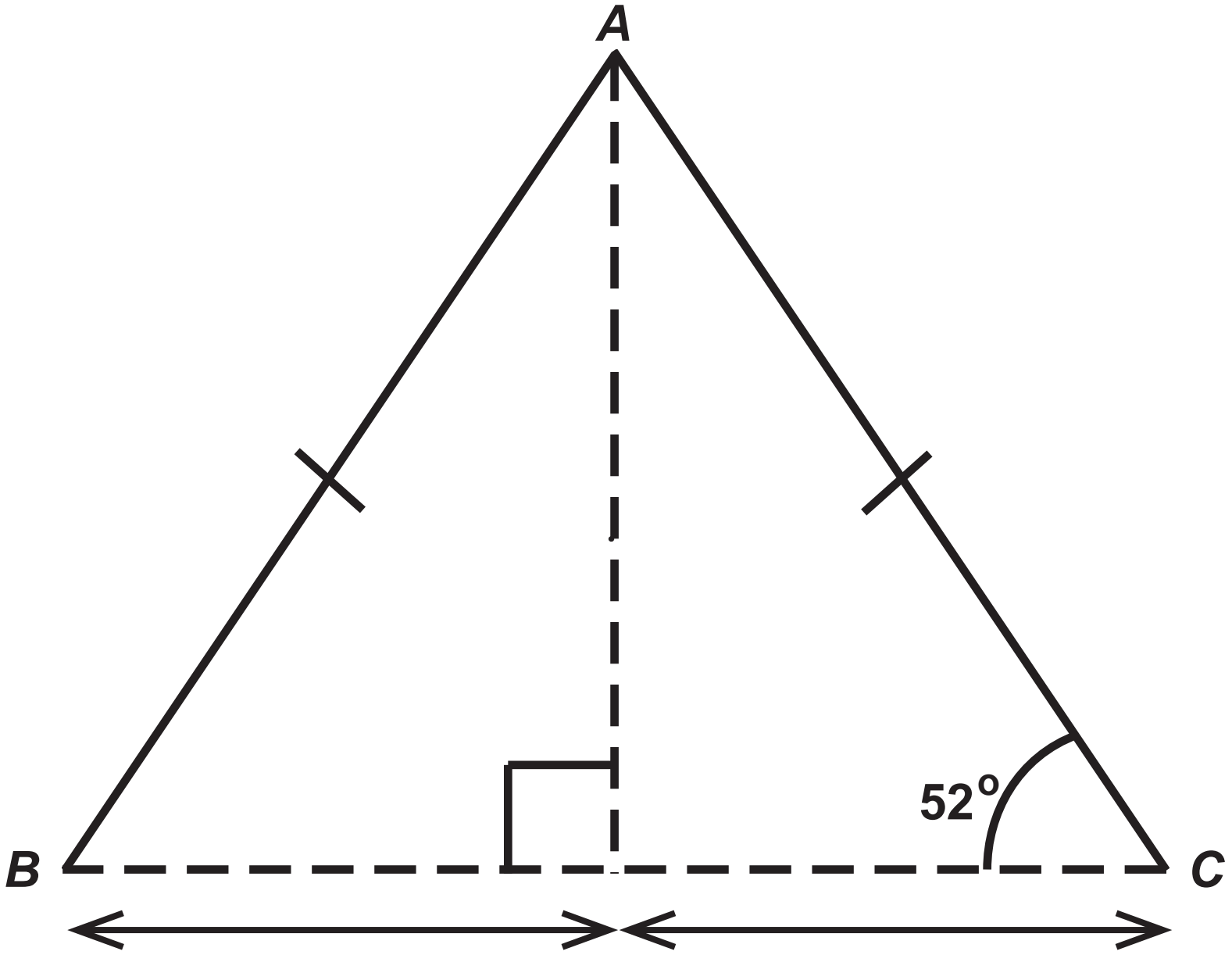
Diagram (i)



Question 8

Diagram (ii)

Diagram NOT drawn to scale



Question 9

Table

School	Number of Year 11 pupils
Cwrt Haf	307
Cwmifan High	239
Henclwyd	144

Question 11

Diagrams NOT drawn to scale

Diagram 1

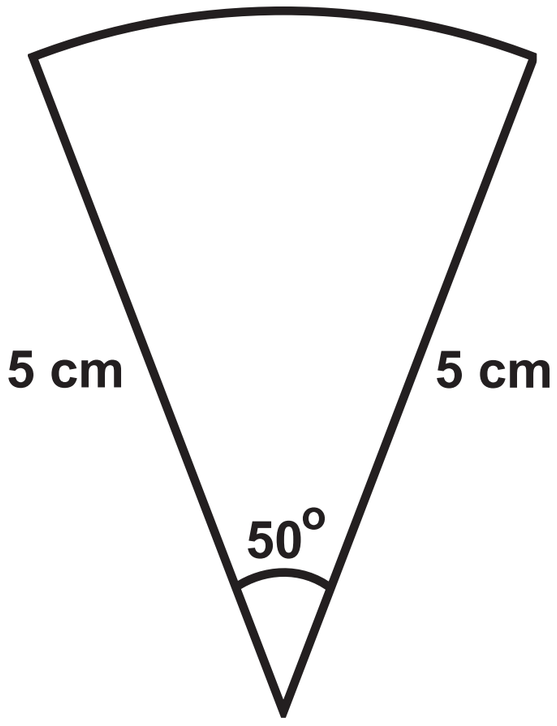


Diagram 2

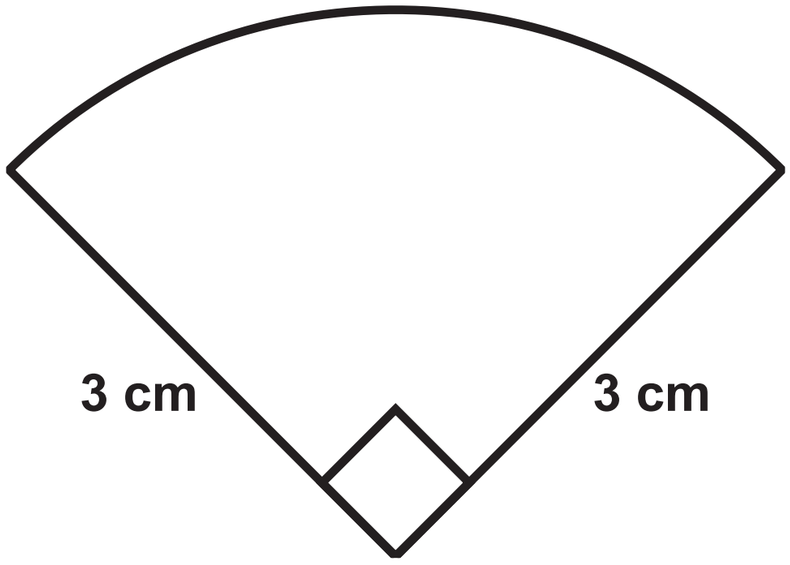
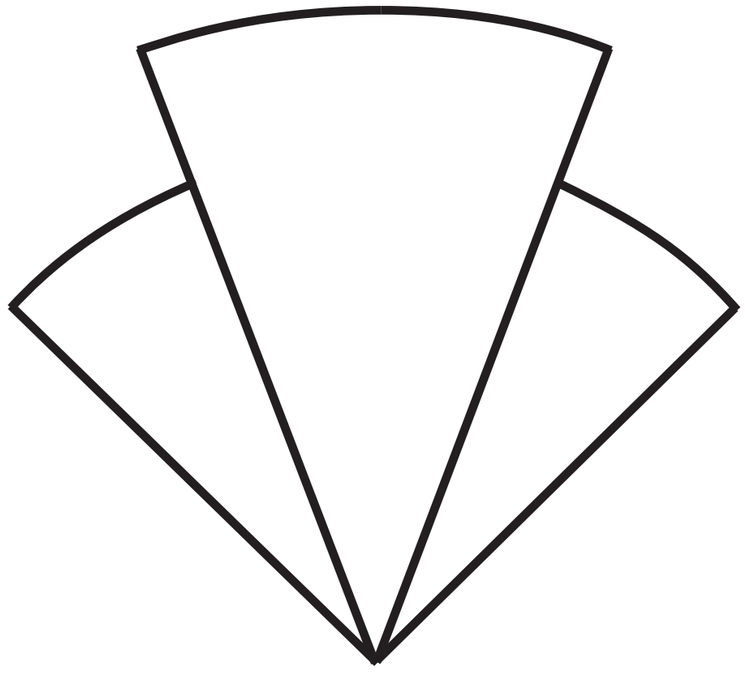
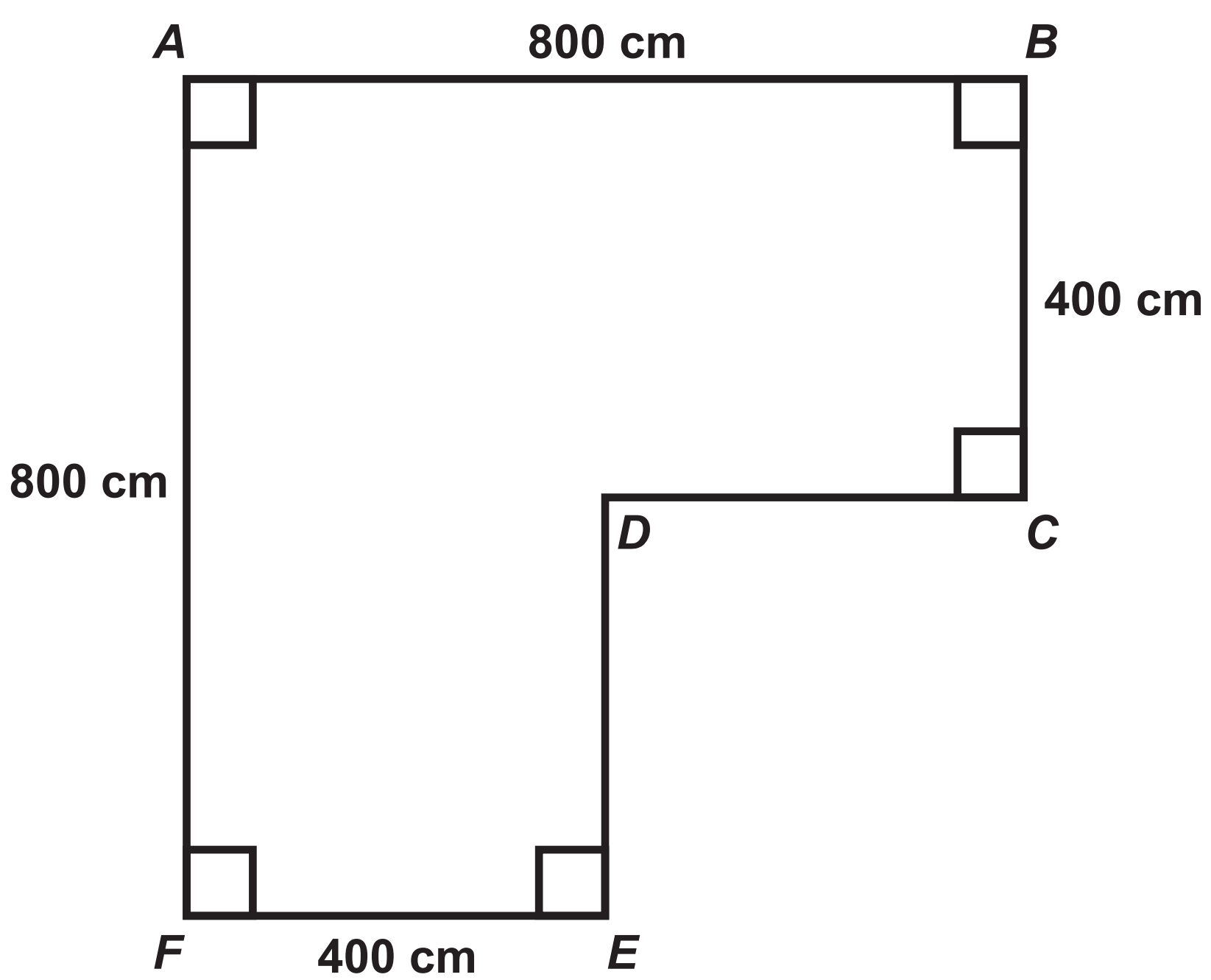


Diagram 3



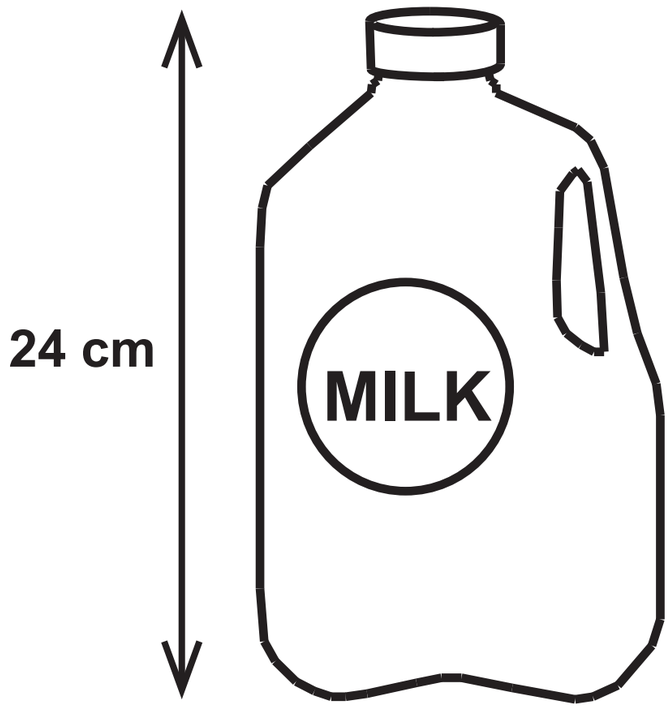
Question 12

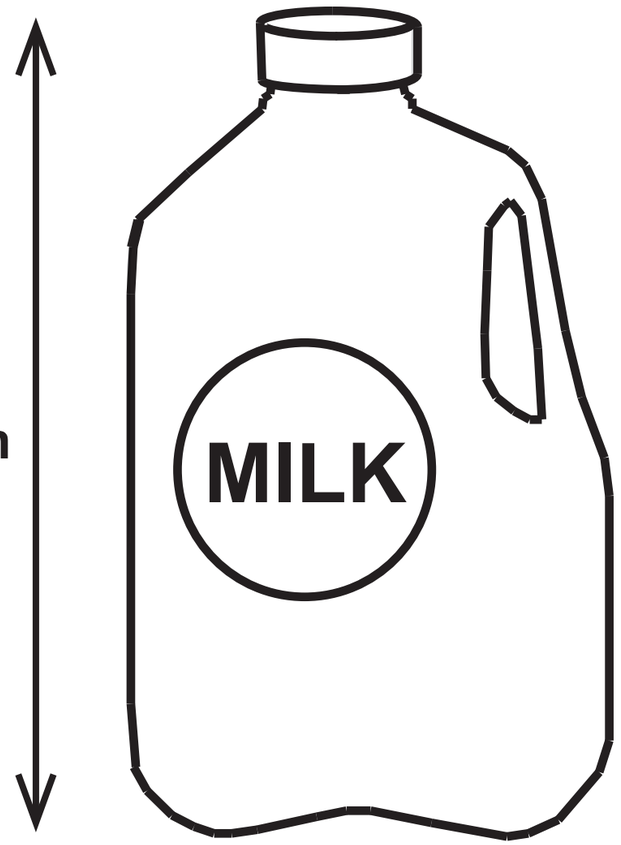
Diagram NOT drawn to scale



For use with Question 13 (a) and Question 13 (b)

Diagram NOT drawn to scale





Question 13 (c)

Diagram NOT drawn to scale

GCSE – NEW

3310U60-1

MATHEMATICS – NUMERACY

UNIT 2: CALCULATOR – ALLOWED

HIGHER TIER

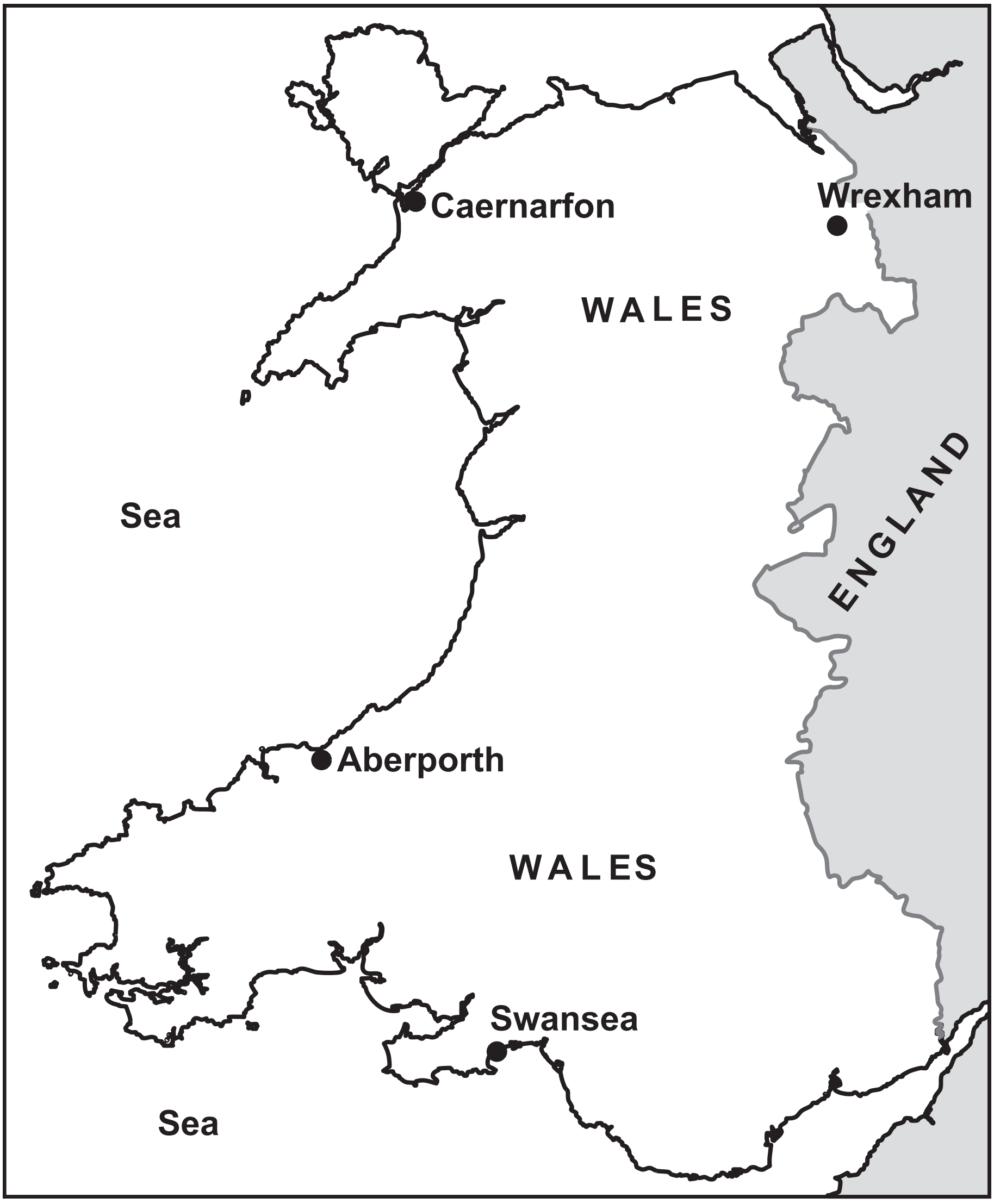
THURSDAY, 8 JUNE 2017 – MORNING

Spare Diagram Booklet

Surname:	
Other Names:	
Centre Number:	
Candidate Number:	**0**

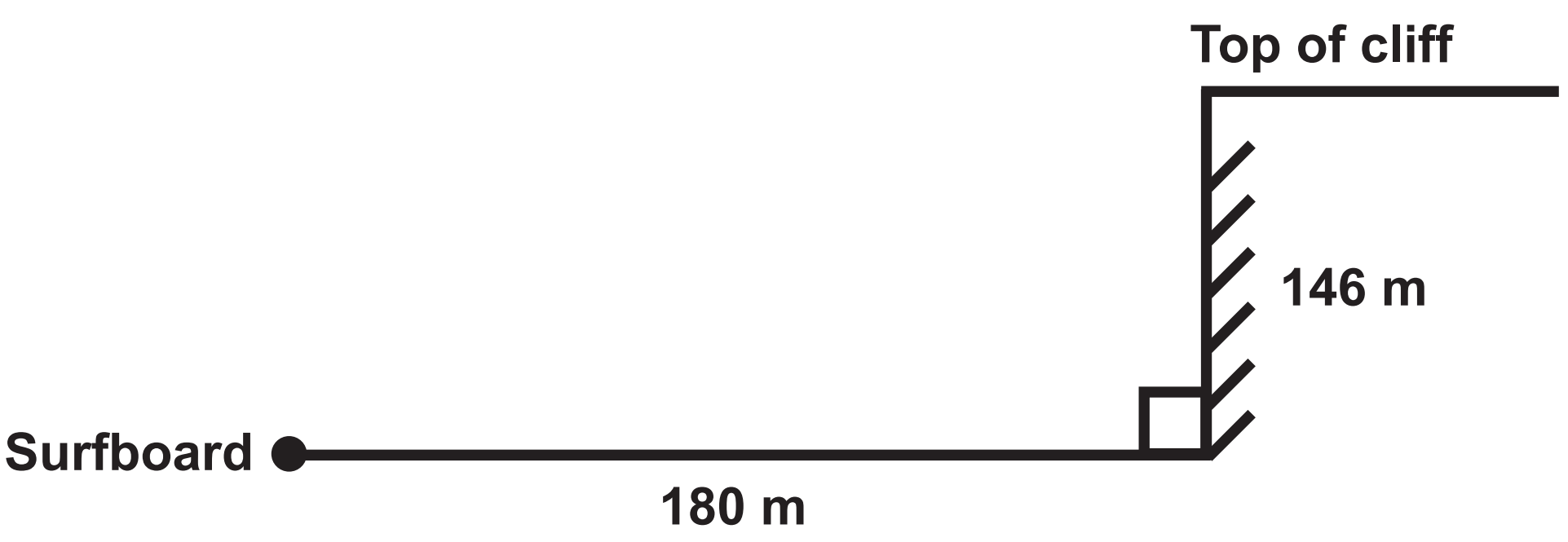
Question 3

Key: 0 20
miles



Question 4

Diagram NOT drawn to scale



Question 5

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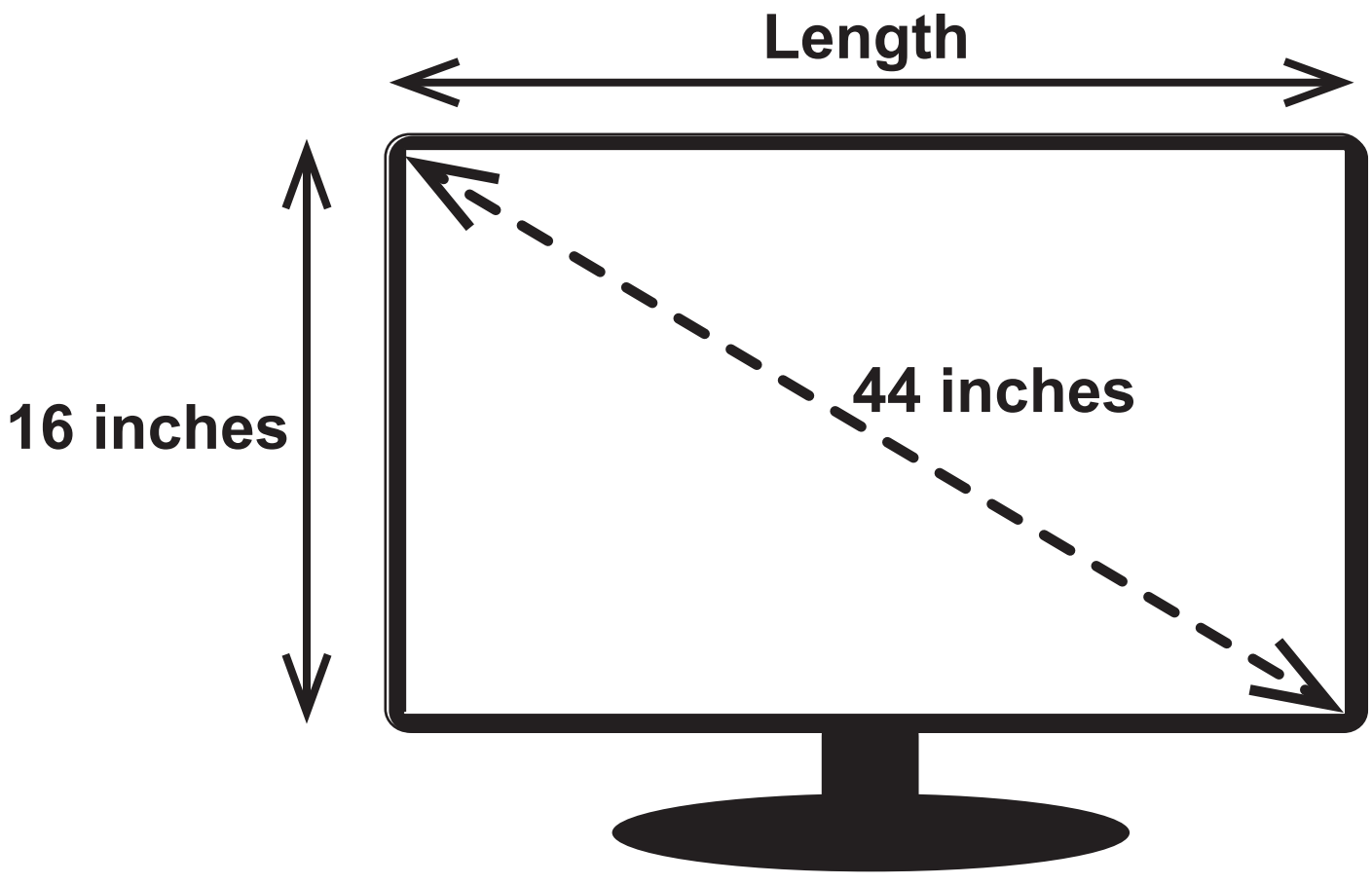
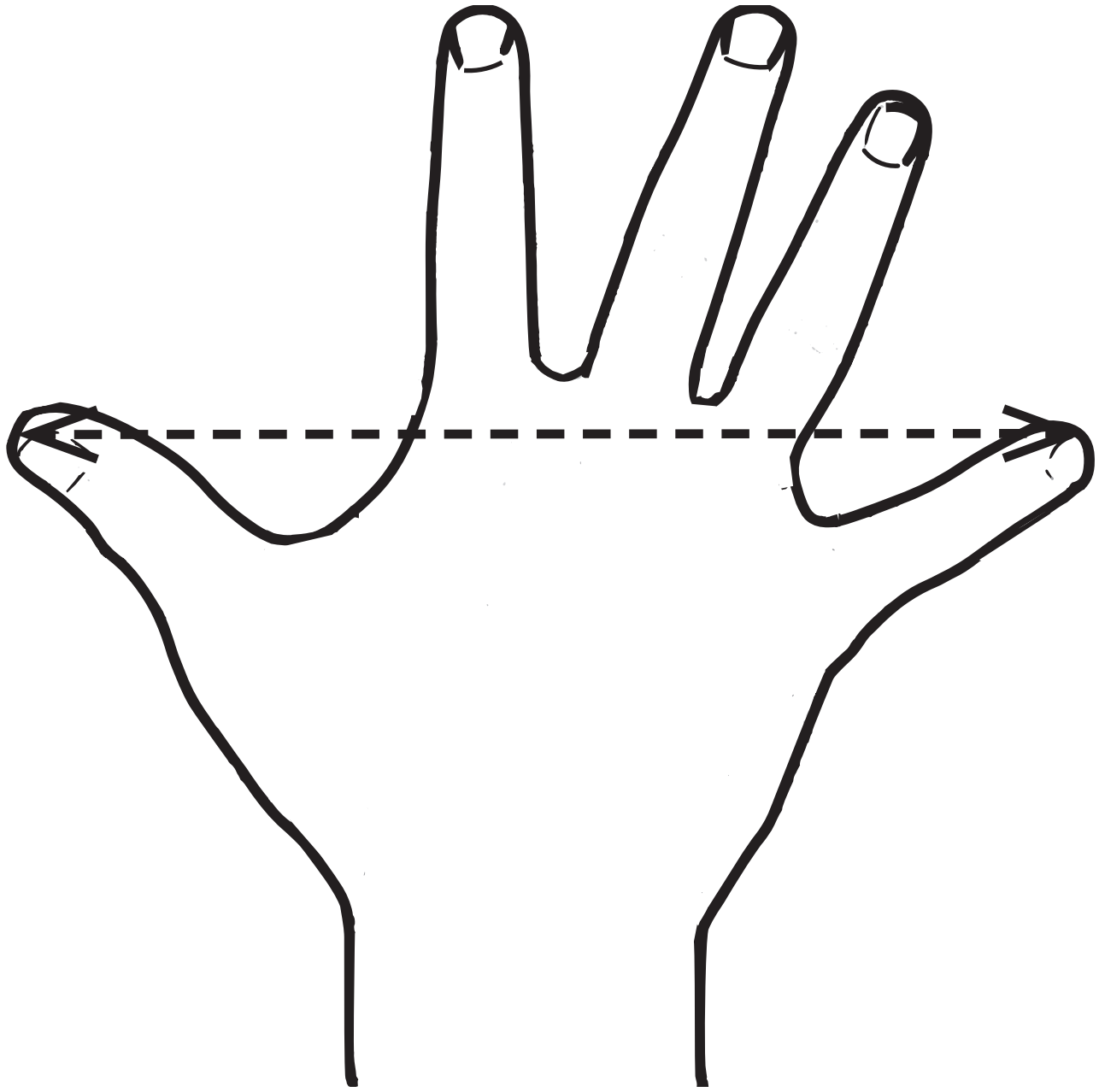


Question 7

Key : <=------=> **hand span**



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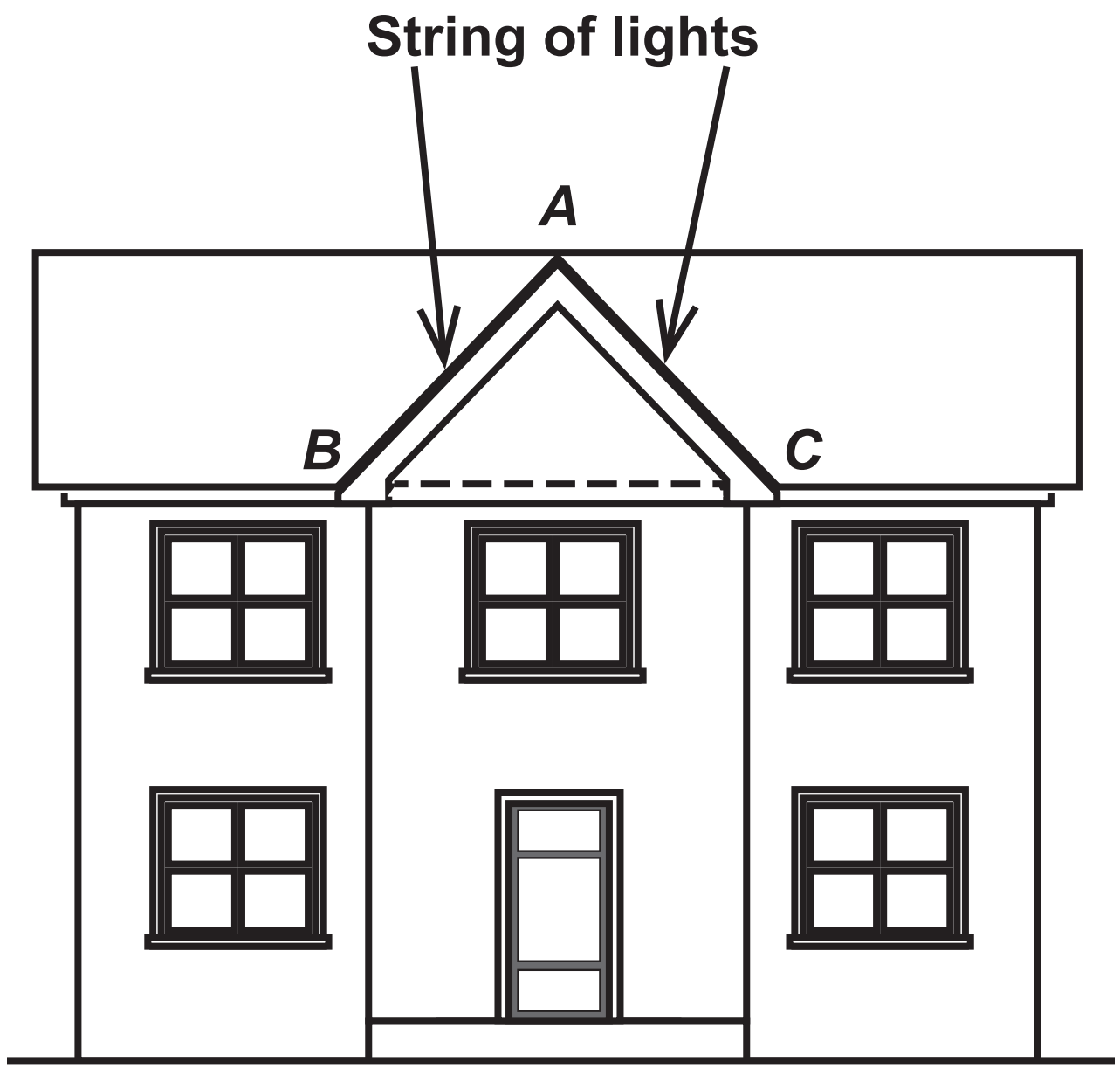
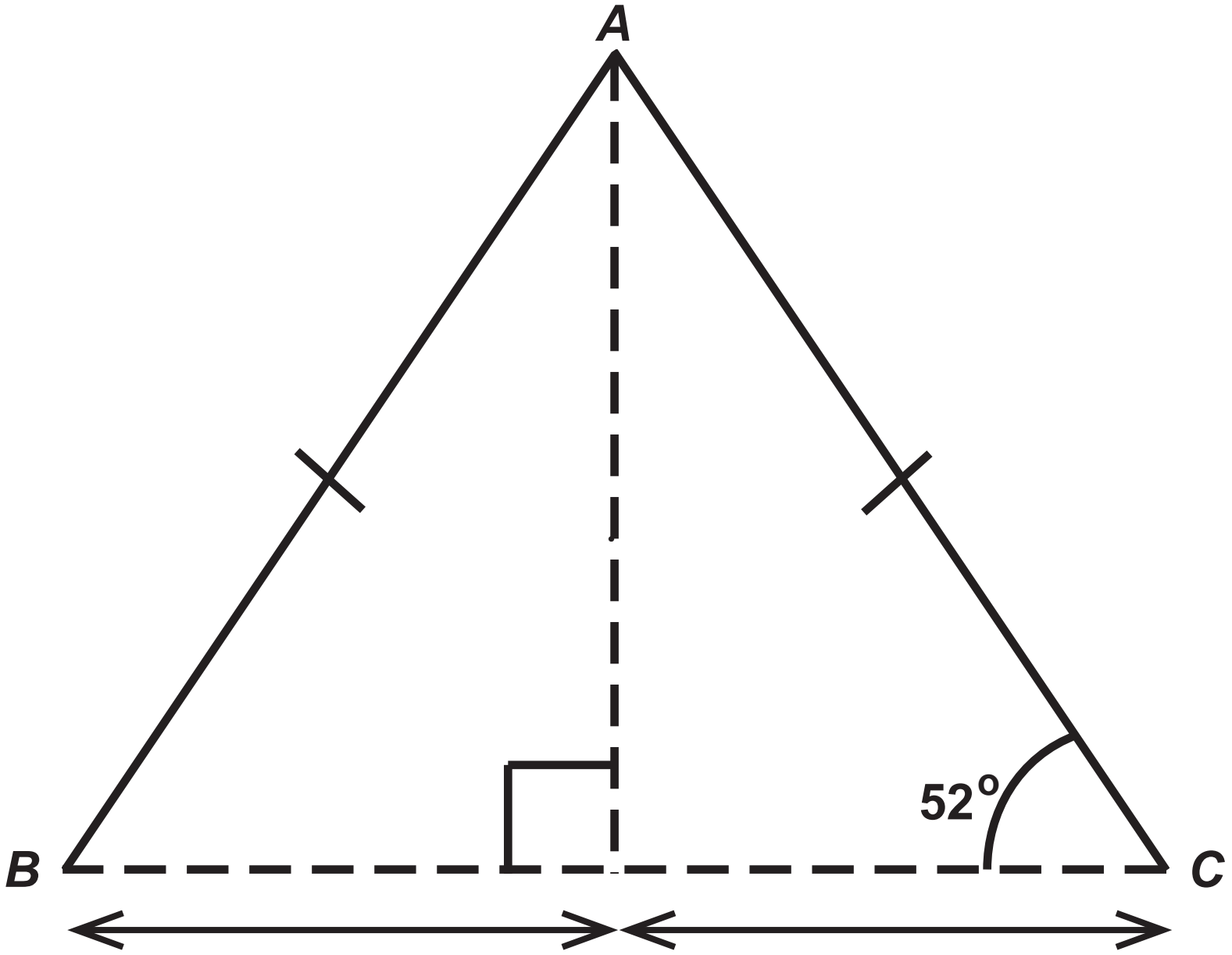


Question 8

Diagram (ii)

Diagram NOT drawn to scale



Question 9

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Question 11

Diagrams NOT drawn to scale

Diagram 1

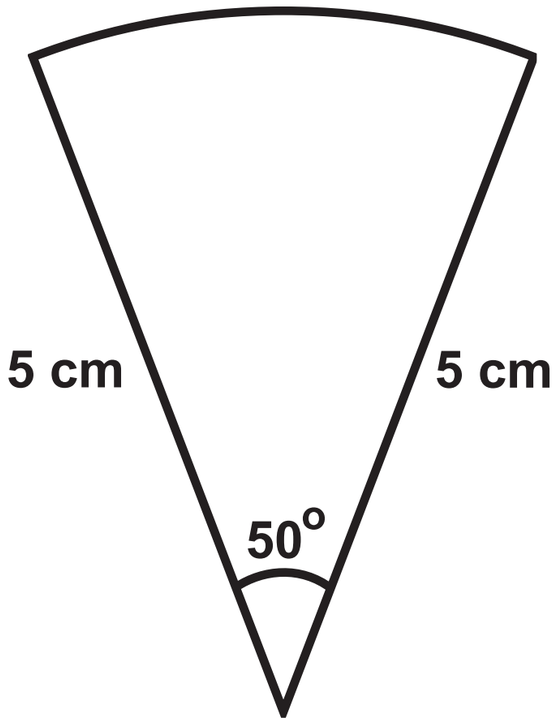


Diagram 2

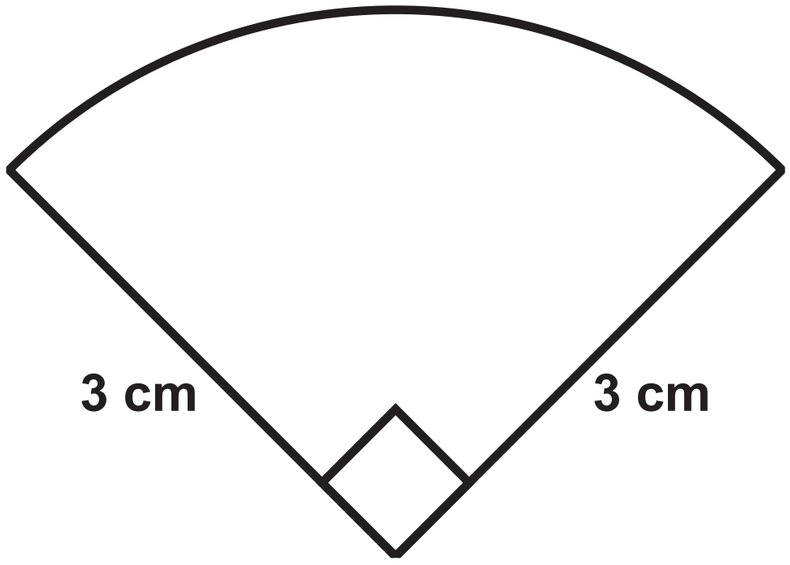
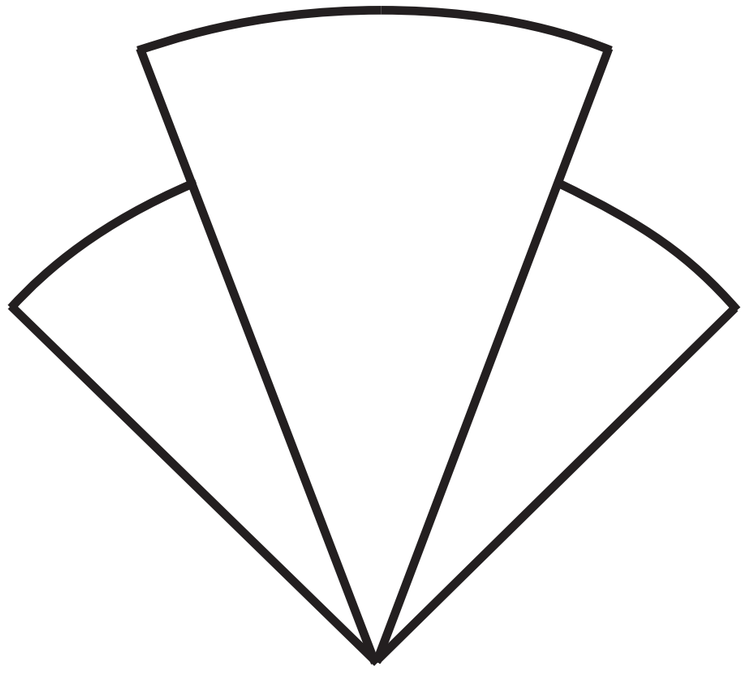
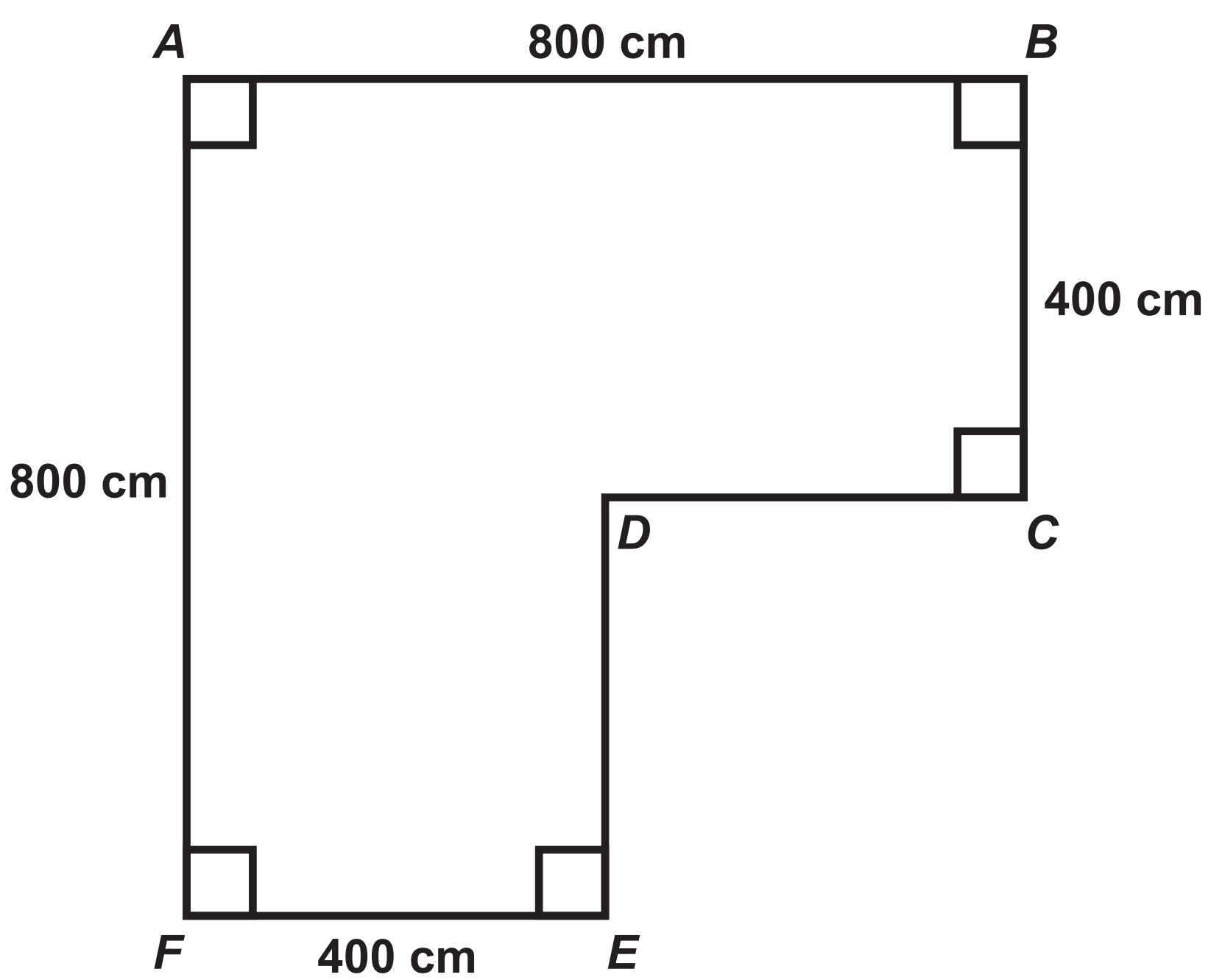


Diagram 3



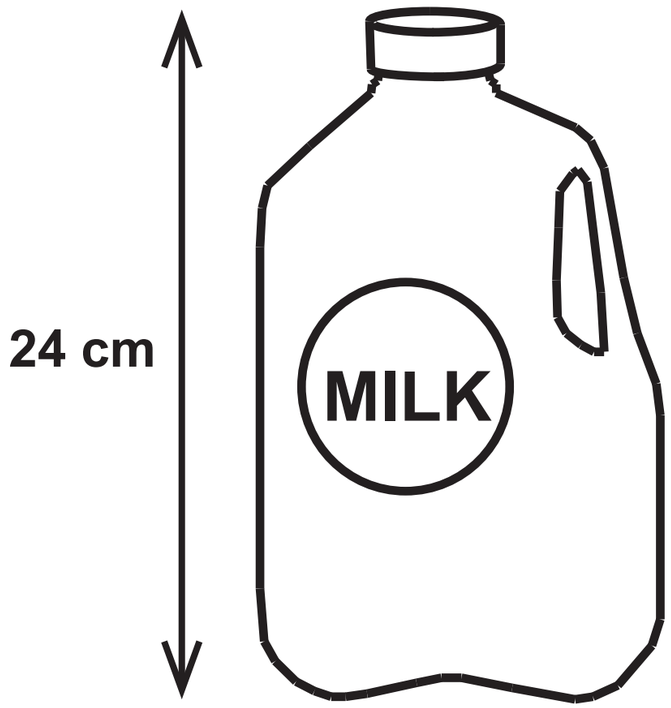
Question 12

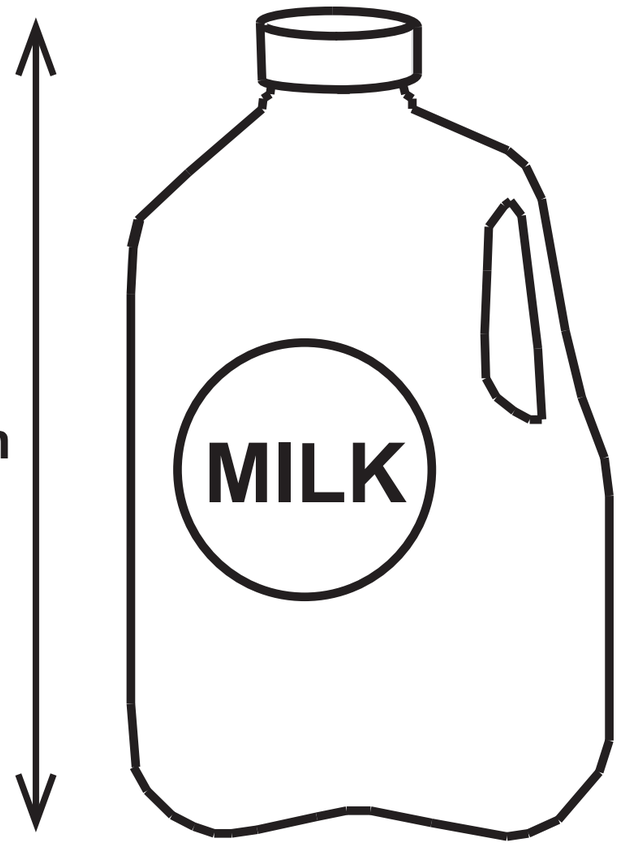
Diagram NOT drawn to scale



For use with Question 13 (a) and Question 13 (b)

Diagram NOT drawn to scale





Question 13 (c)

Diagram NOT drawn to scale

GCSE – NEW

MATHEMATICS

and

NUMERACY

FORMULA LIST

HIGHER TIER

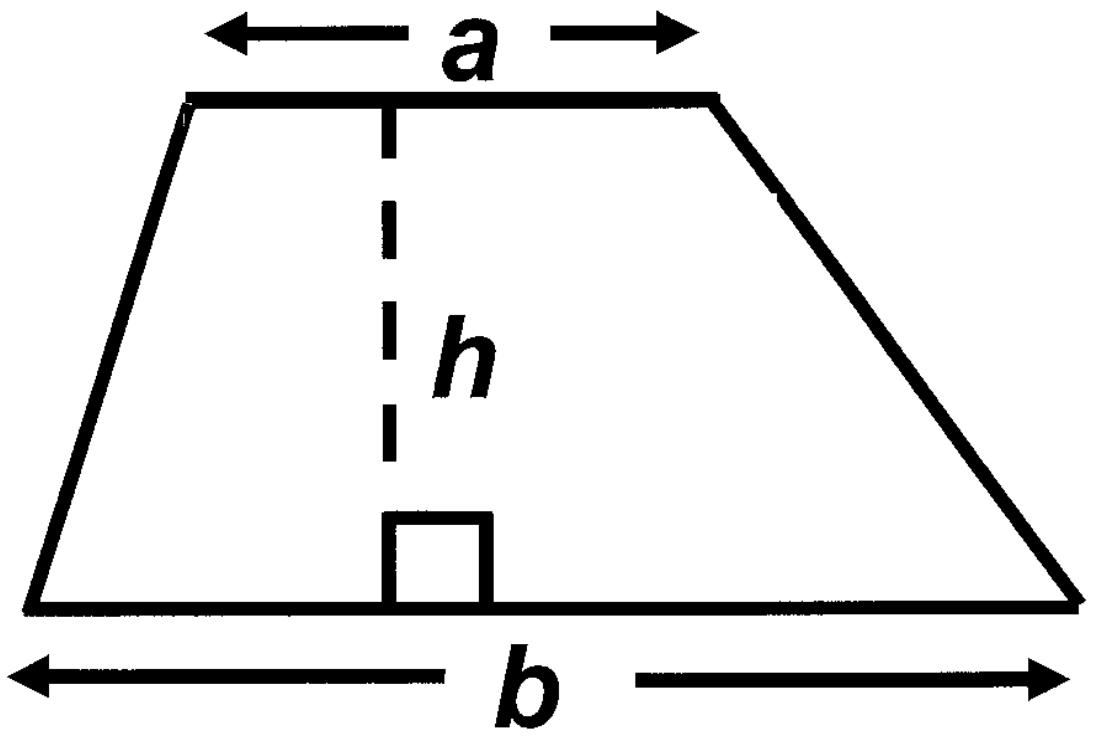
GCSE

You must not write on these formula pages.

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

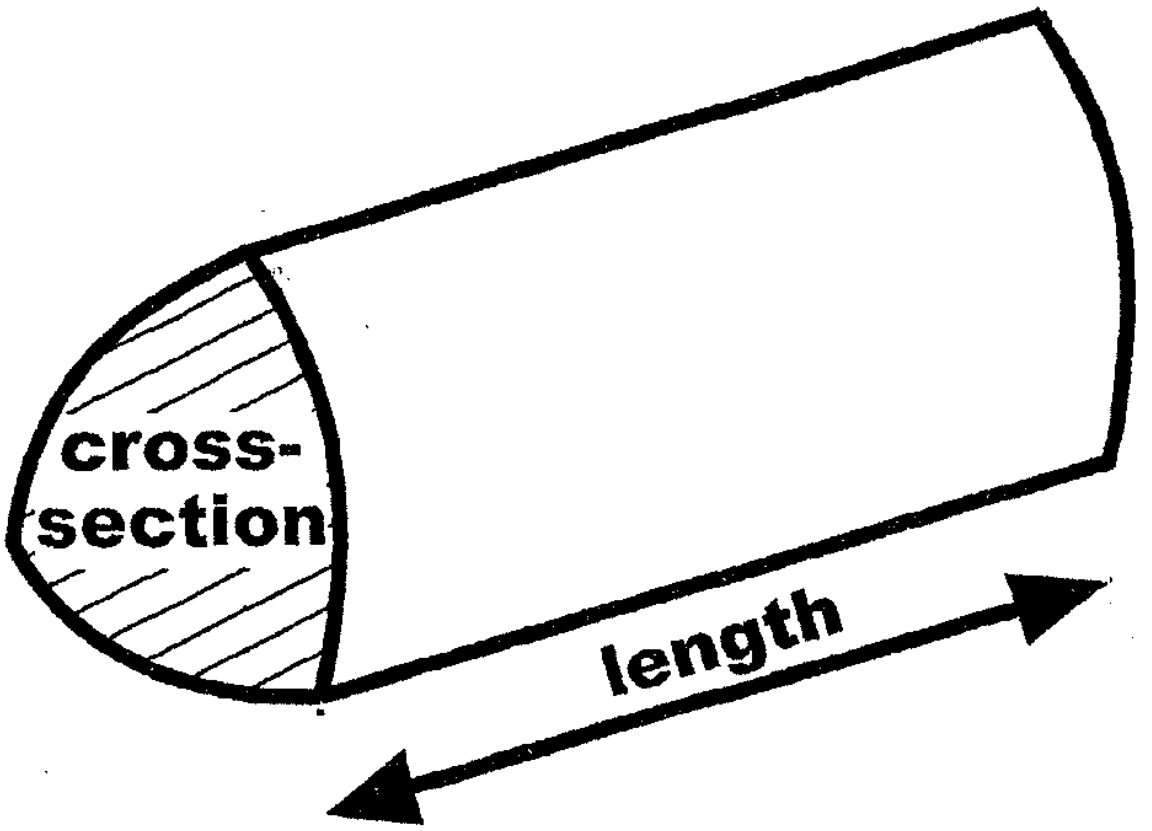
Formula List – Higher Tier

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



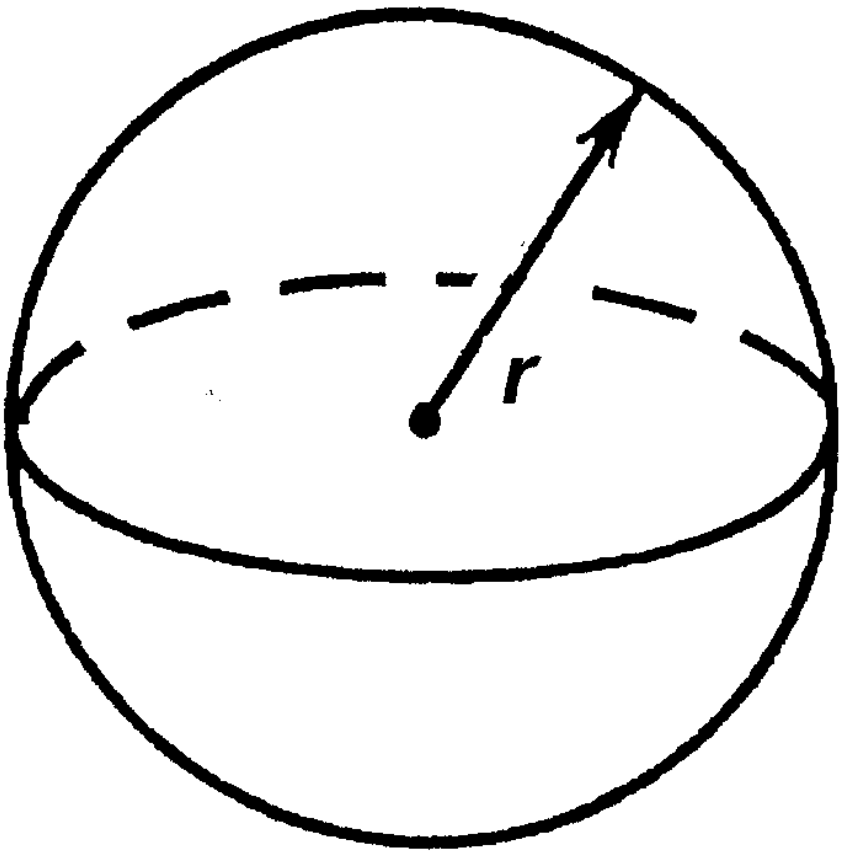
Volume of prism =

area of cross – section × length



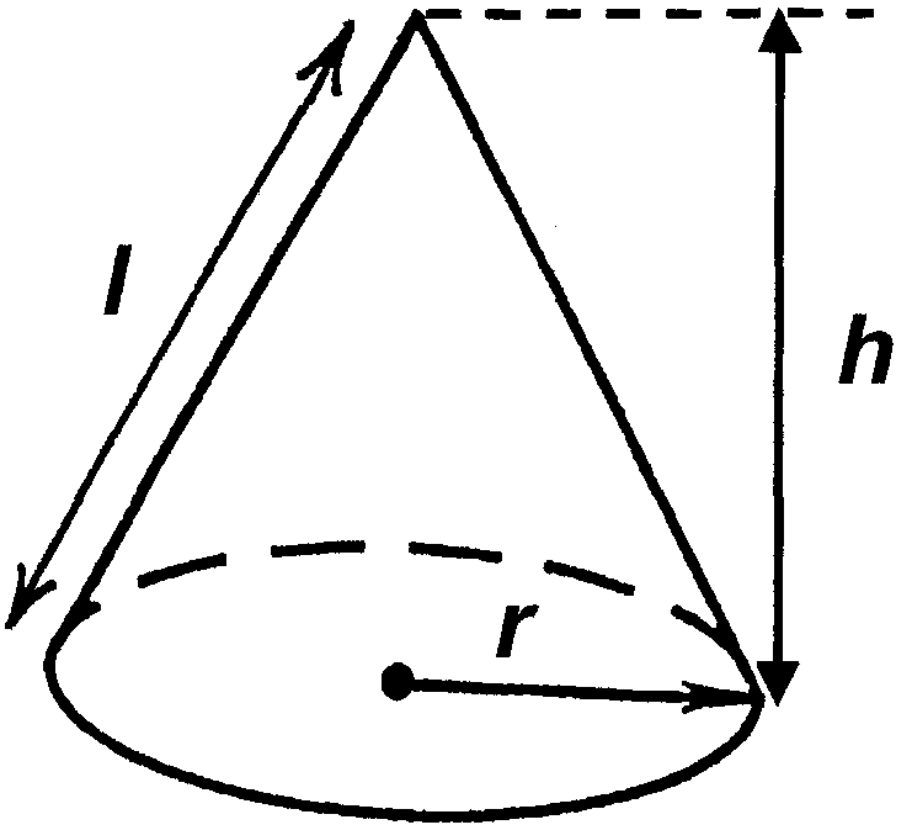
Volume of sphere $= \frac{4}{3}\pi r^3$

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

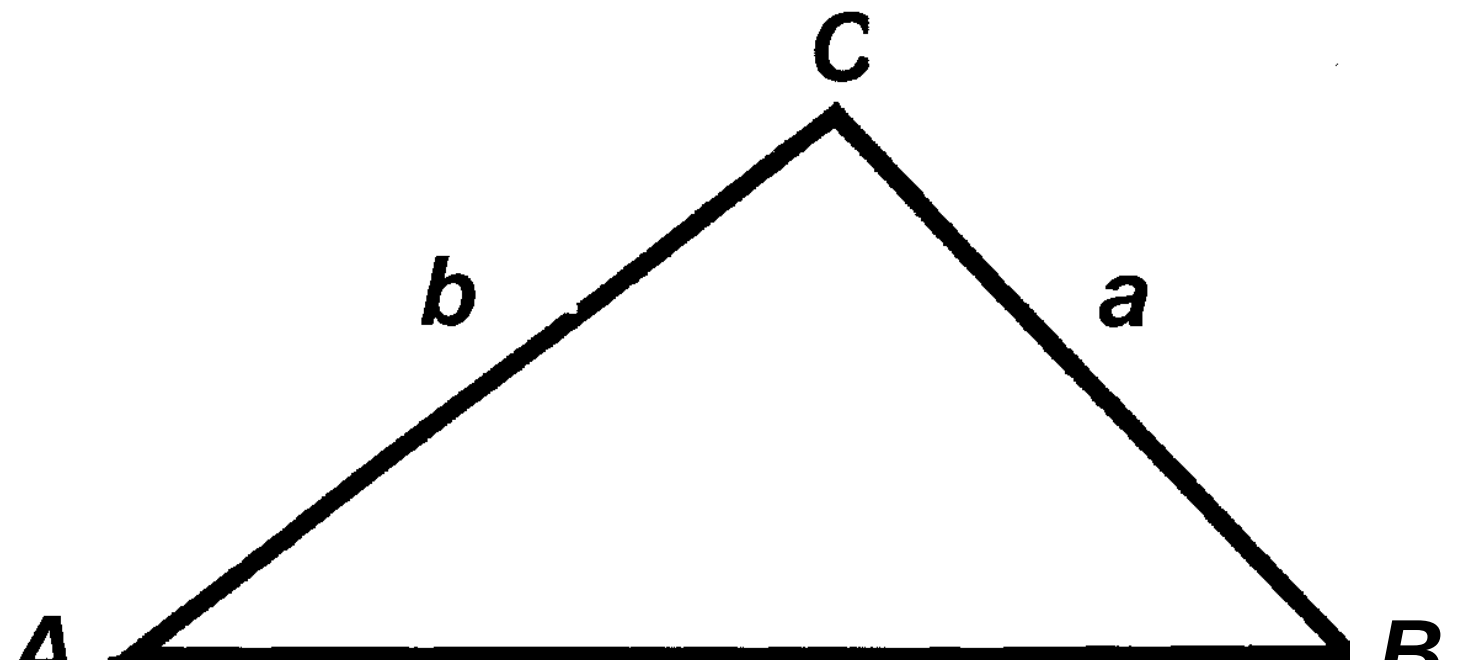


Volume of cone $= \frac{1}{3}\pi r^2 h$

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



In any triangle ABC



Sine Rule $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

Cosine Rule $a^2 = b^2 + c^2 - 2bc\cos A$

Area of triangle $= \dfrac{1}{2}ab\sin C$

The Quadratic Equation

The solutions of $ax^2 + bx + c = 0$

where $a \neq 0$, are given by

$$x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$$

Annual Equivalent Rate (AER)

AER, as a decimal, is calculated using the formula $\left(1+\frac{i}{n}\right)^n - 1$, where i is the nominal interest rate per annum as a decimal and n is the number of compounding periods per annum.