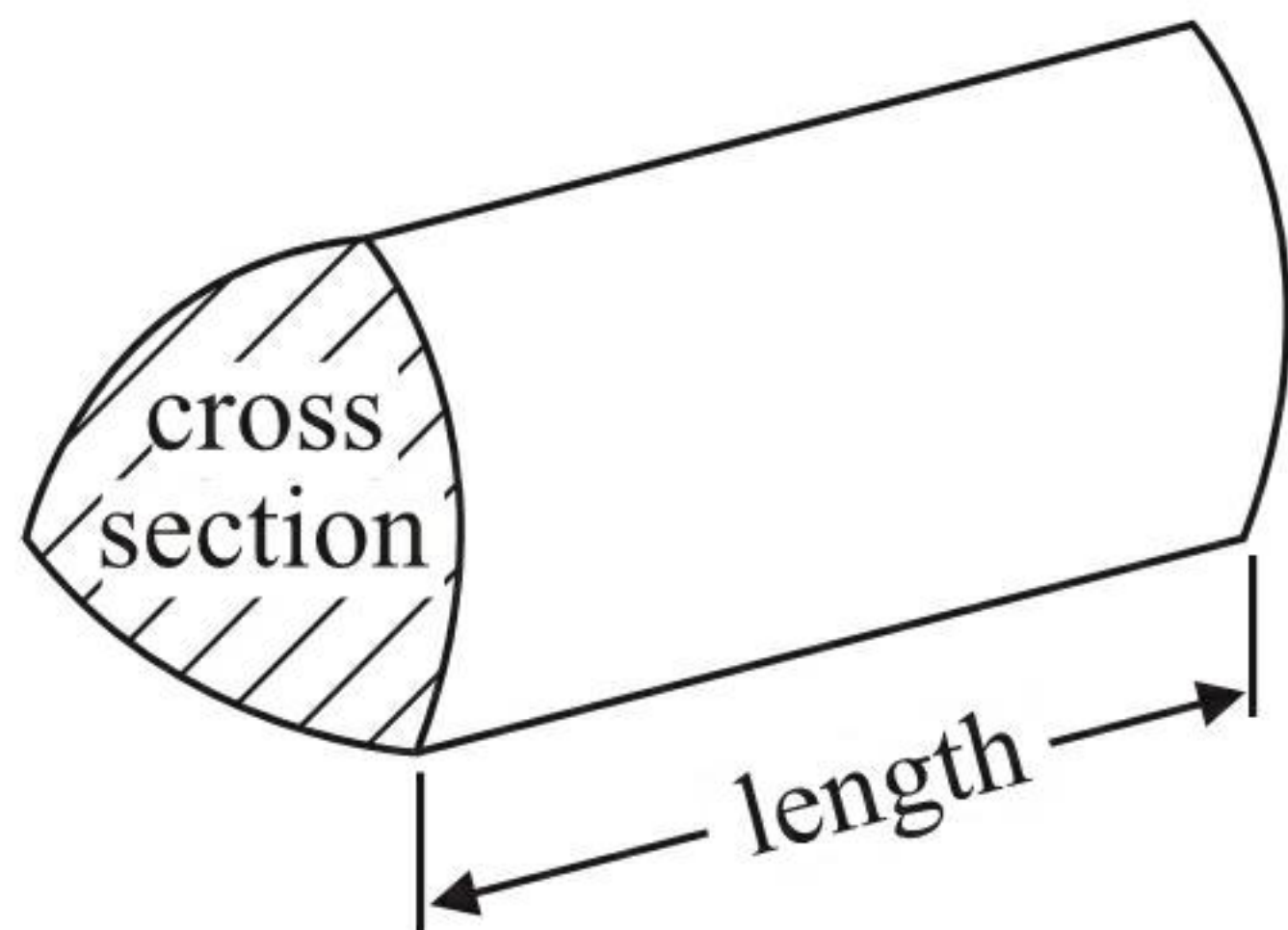


GCSE Mathematics 1MA0

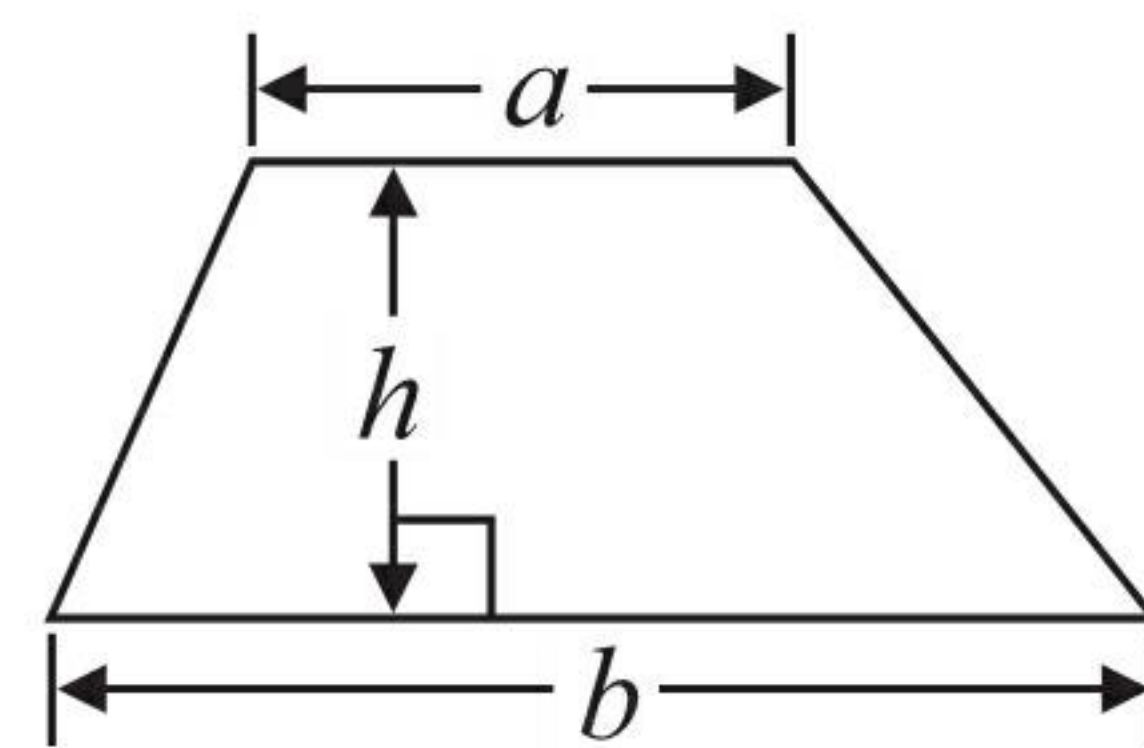
Formulae: Higher Tier

You must not write on this formulae page.
Anything you write on this formulae page will gain NO credit.

Volume of prism = area of cross section \times length

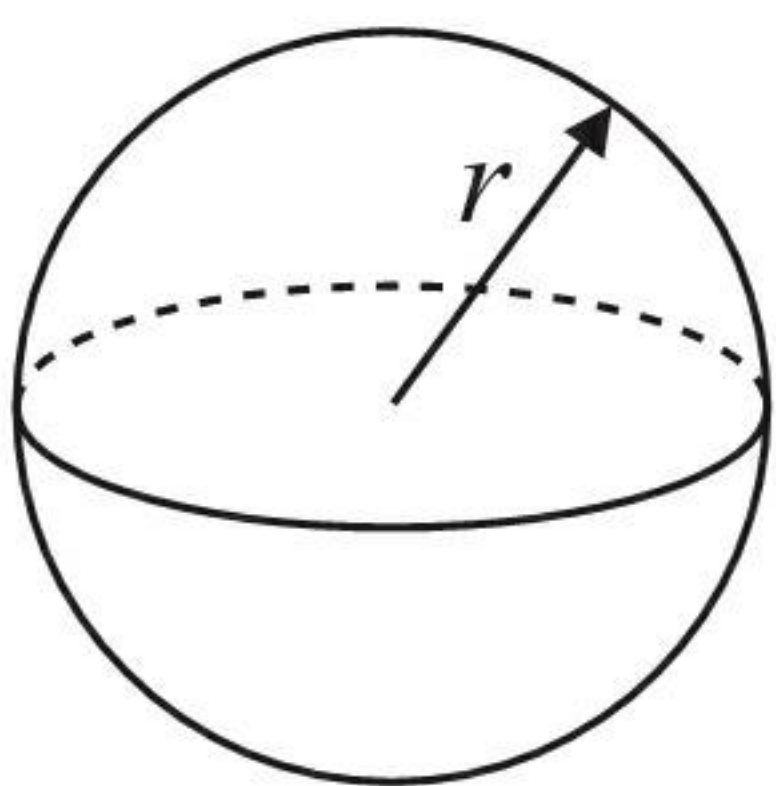


Area of trapezium = $\frac{1}{2} (a + b)h$



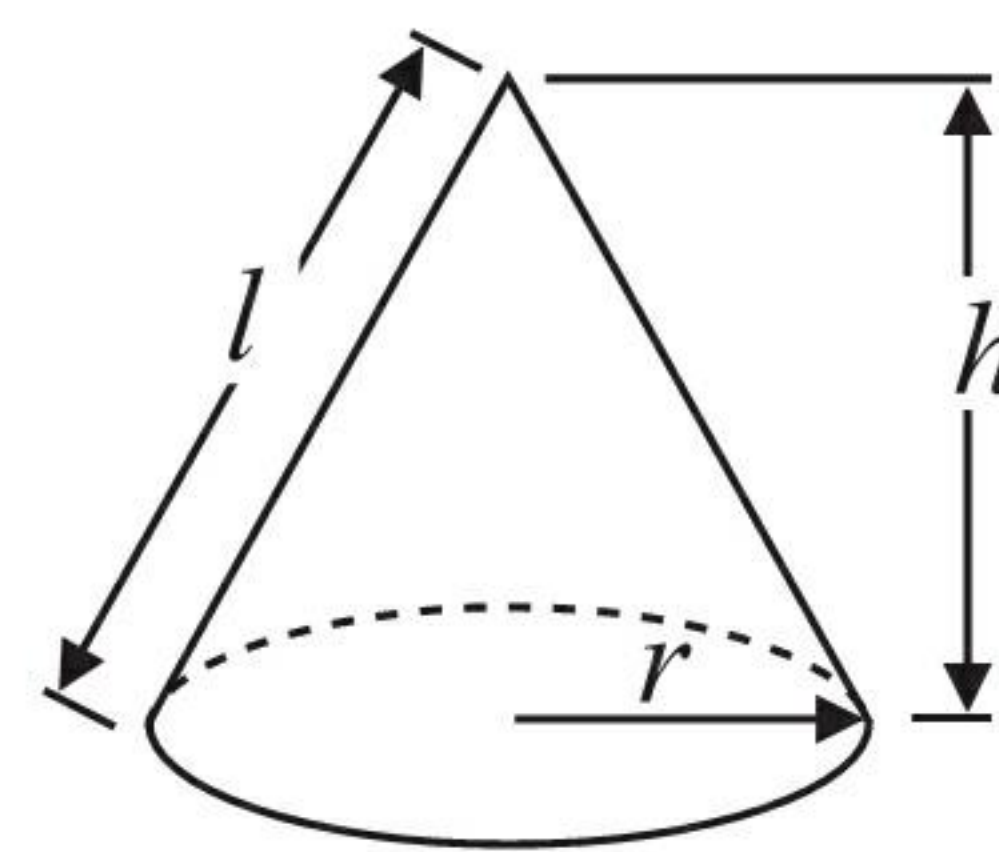
Volume of sphere = $\frac{4}{3} \pi r^3$

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

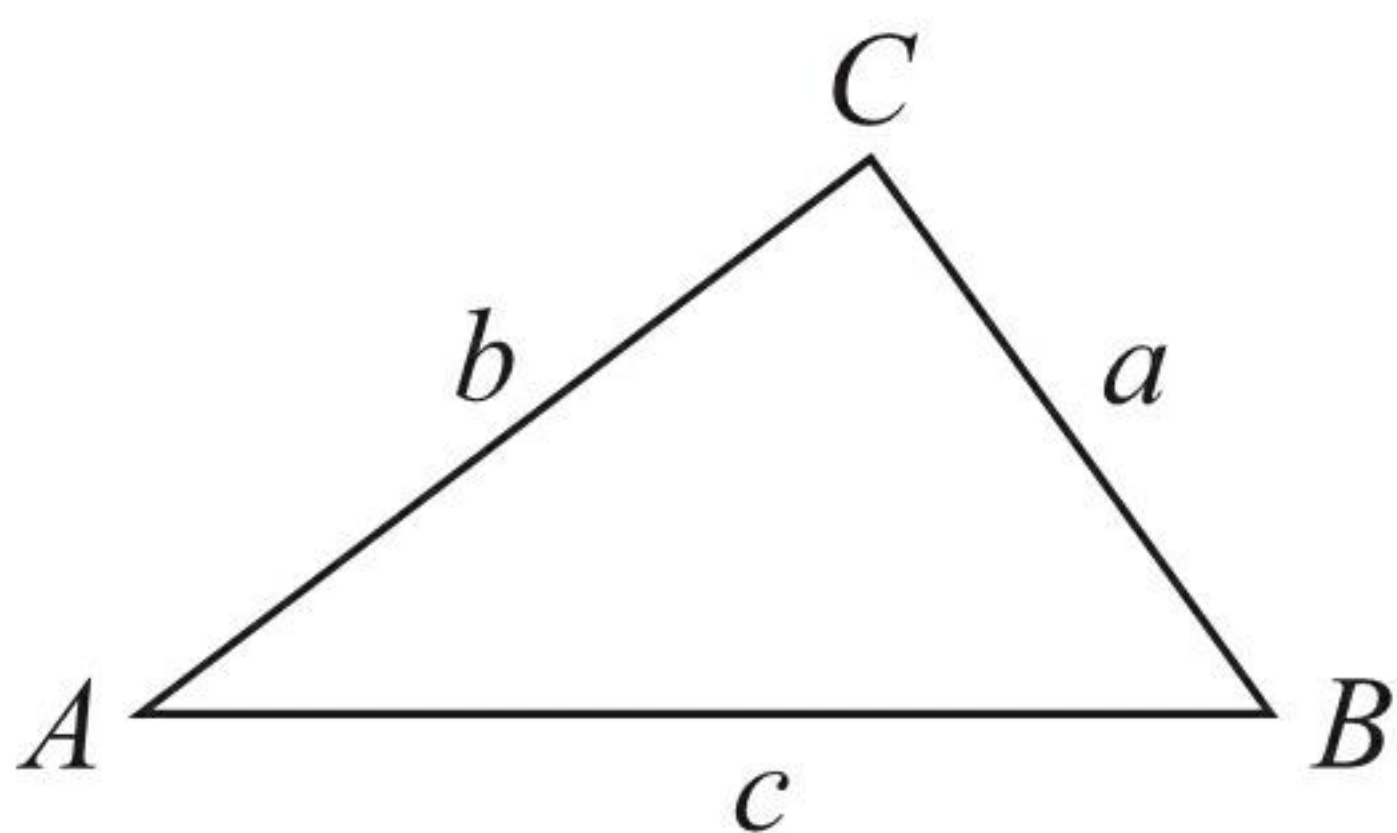


Volume of cone = $\frac{1}{3} \pi r^2 h$

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



In any triangle ABC



The Quadratic Equation

The solutions of $ax^2 + bx + c = 0$
where $a \neq 0$, are given by

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

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

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

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



Answer ALL questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

- 1 The point A has coordinates $(2, 3)$.
The point B has coordinates $(6, 8)$.

M is the midpoint of the line AB .

Find the coordinates of M .

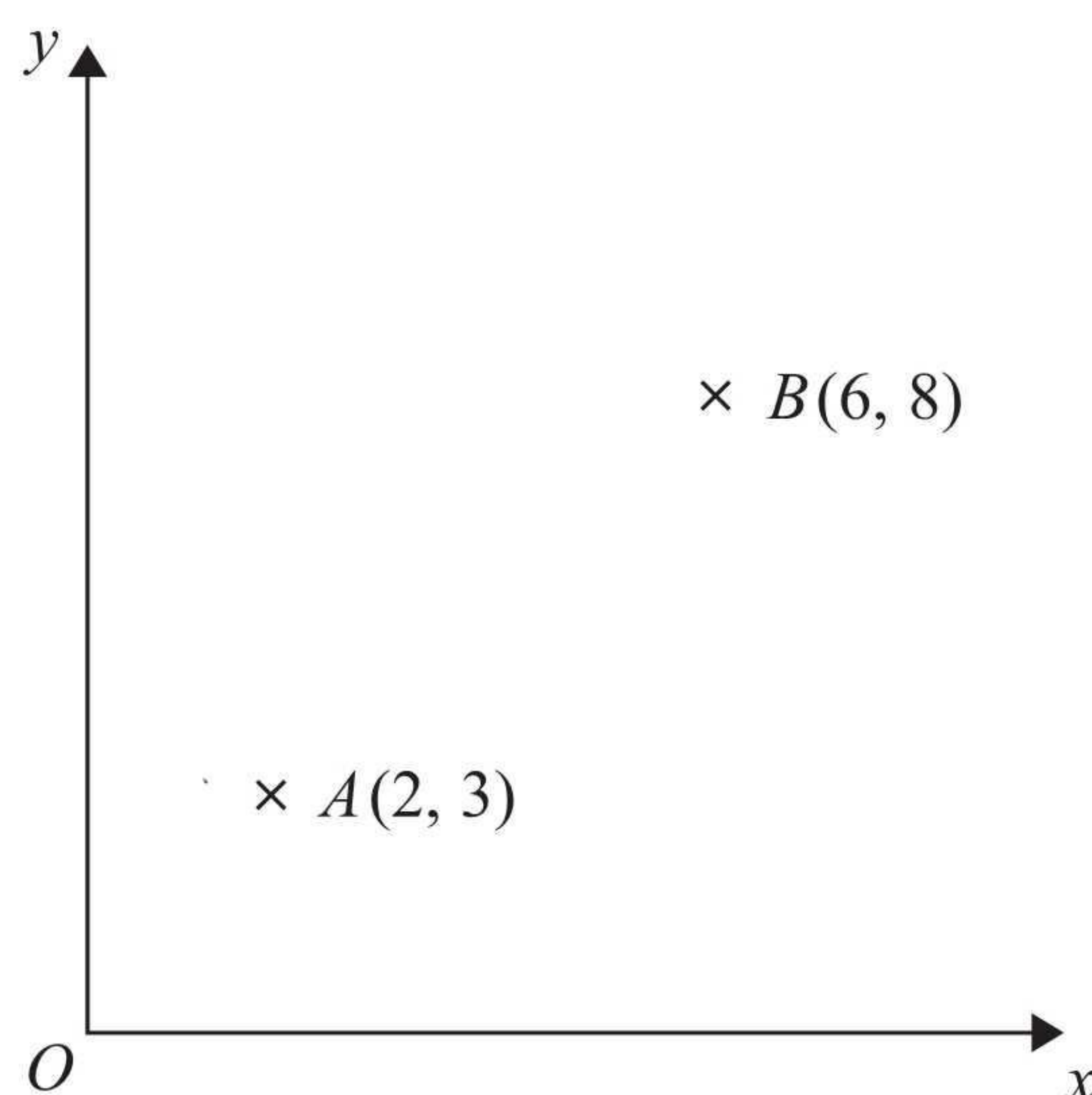


Diagram **NOT**
accurately drawn

$$\left(\frac{2+6}{2}, \frac{3+8}{2} \right)$$

$$(4, 5.5)$$

$$(4, 5.5)$$

(Total for Question 1 is 2 marks)



4 Here is a circle.

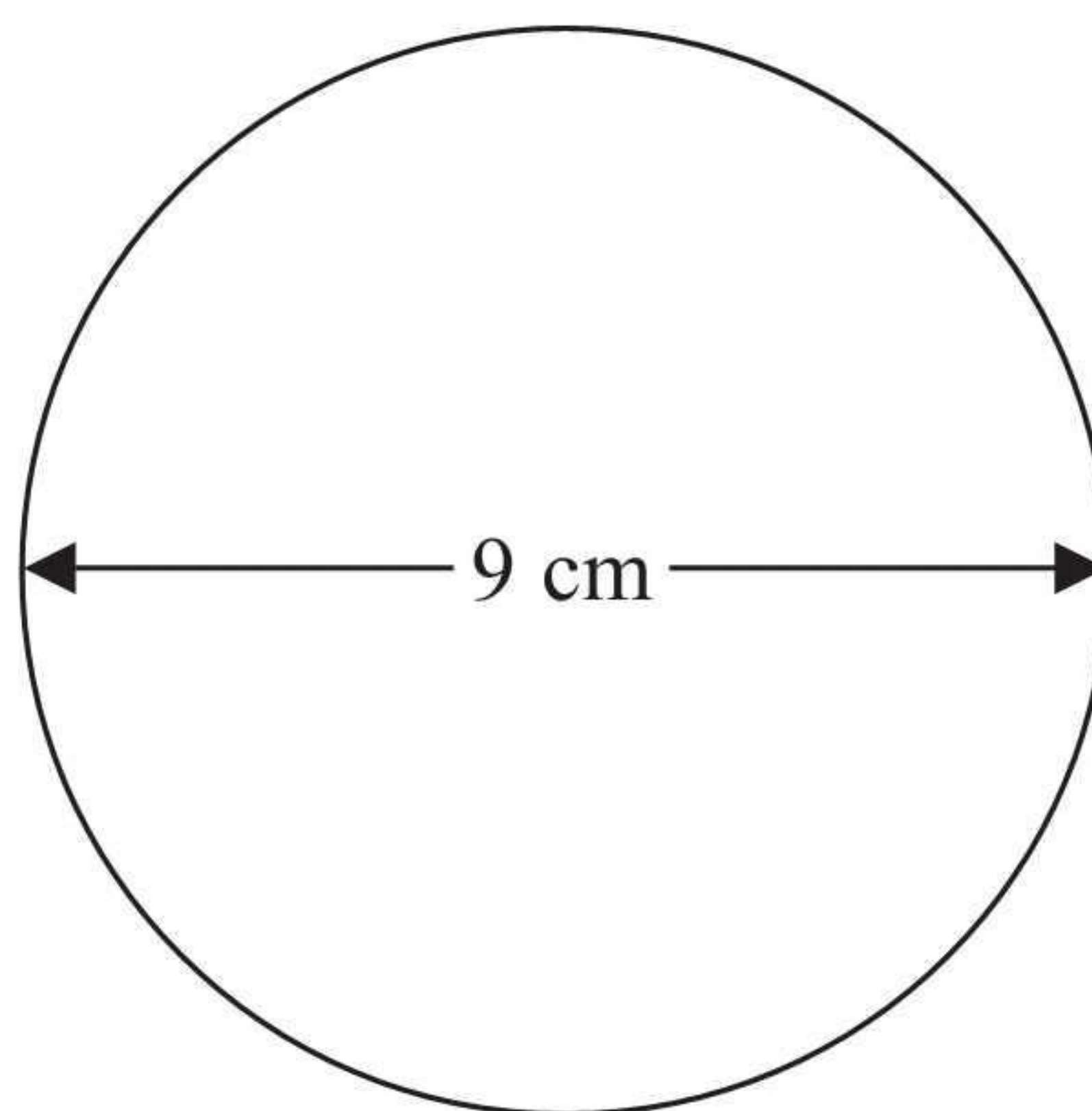


Diagram **NOT**
accurately drawn

The diameter of the circle is 9 cm.

Work out the circumference of this circle.

Give your answer correct to 3 significant figures.

$$\pi \times 9$$

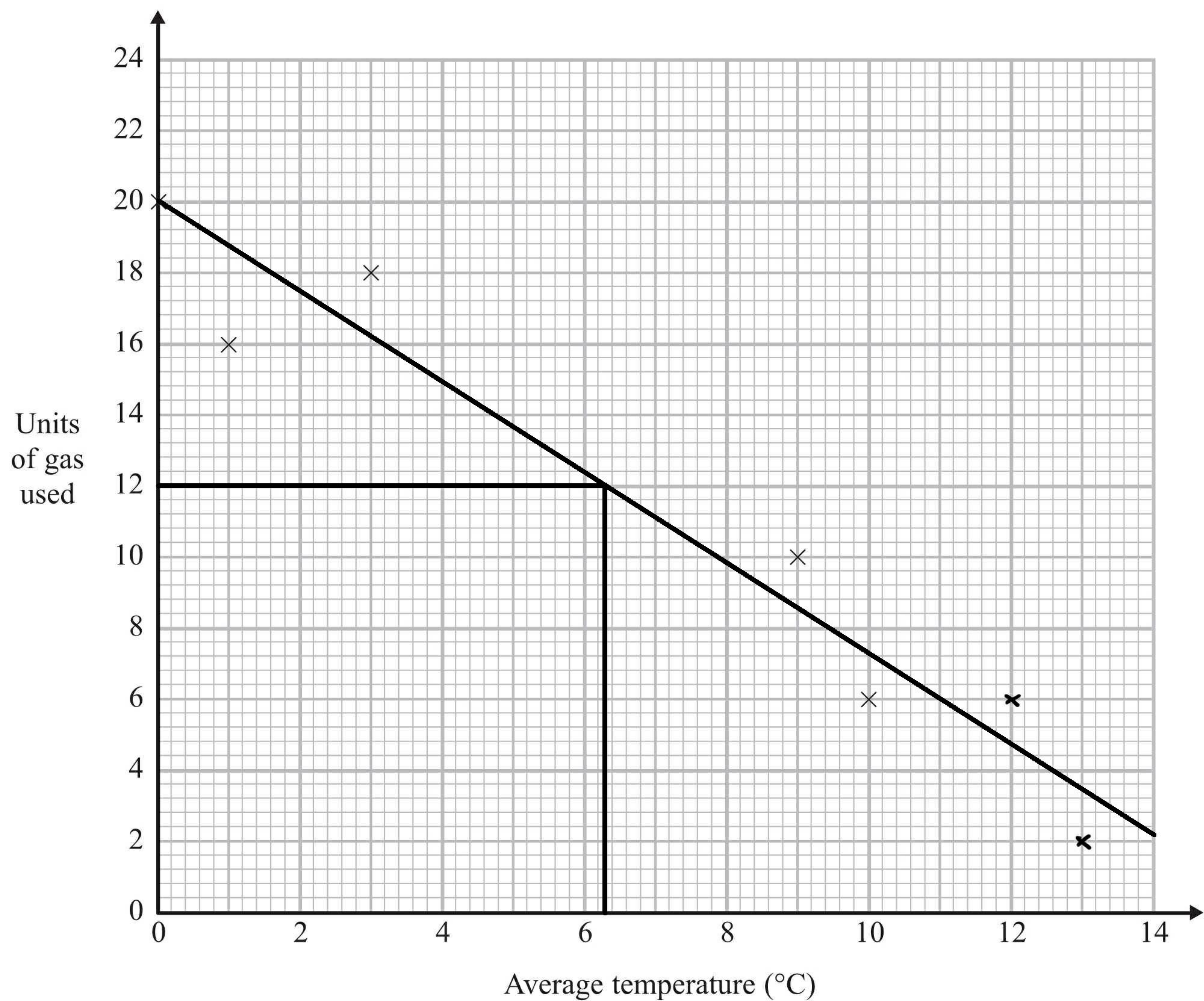
28.3 cm

(Total for Question 4 is 2 marks)



2 The table shows the average temperature on each of seven days and the number of units of gas used to heat a house on these days.

Average temperature (°C)	0	1	3	9	10	12	13
Units of gas used	20	16	18	10	6	6	2



(a) Complete the scatter graph to show the information in the table.
The first 5 points have been plotted for you.

(1)

(b) Describe the relationship between the average temperature and the number of units of gas used.

negative correlation: as the temperature increases, the number of units of gas used decreases

(1)



(c) Estimate the average temperature on a day when 12 units of gas are used.

.....6.3..... °C
(2)

(Total for Question 2 is 4 marks)

3 $x = 0.7$

Work out the value of $\frac{(x+1)^2}{2x}$

Write down all the figures on your calculator display.

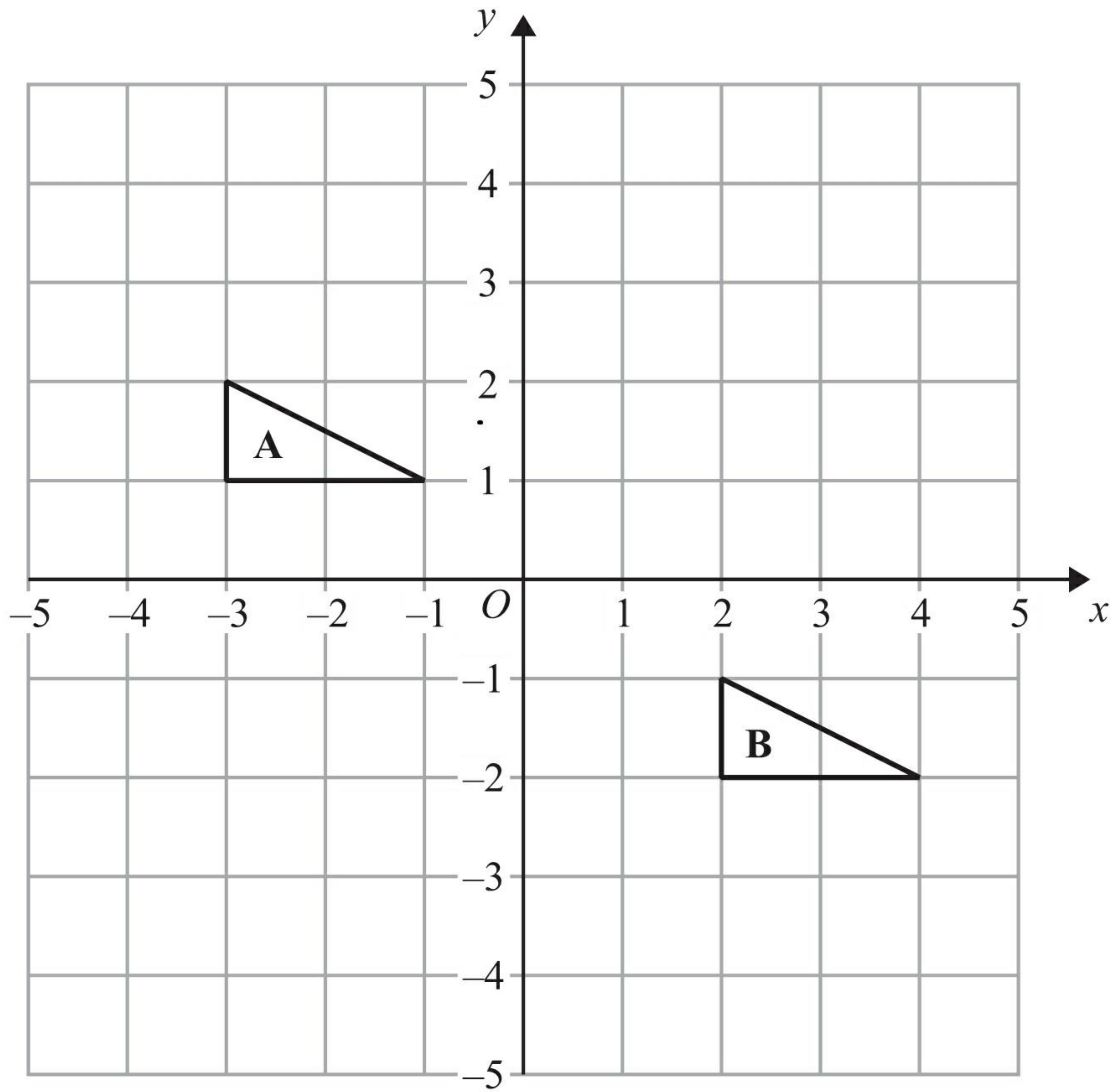
$$\frac{(0.7 + 1)^2}{2(0.7)}$$

.....2.064285714.....

(Total for Question 3 is 2 marks)



5



Describe the single transformation that maps triangle A onto triangle B.

translation by vector $\begin{pmatrix} 5 \\ -3 \end{pmatrix}$

(Total for Question 5 is 2 marks)



6 Sue is driving home from her friend's house.

Sue drives

10 miles from her friend's house to the motorway
240 miles on the motorway
5 miles from the motorway to her home

Sue

takes 20 minutes to drive from her friend's house to the motorway
drives at an average speed of 60 mph on the motorway
takes 25 minutes to drive from the motorway to her home

Sue stops for a 30 minute rest on her drive home.

Sue leaves her friend's house at 9.00 am.

What time does Sue get home?
You must show all your working.

$$240 \text{ miles at } 60 \text{ mph: } \frac{240}{60} = 4 \text{ hours}$$

$$4 \text{ hours} + 20 \text{ mins} + 25 \text{ mins} + 30 \text{ mins} \\ = 5 \text{ hours } 15 \text{ mins}$$

$$9 \text{ am} + 5 \text{ hrs } 15 \text{ mins} = 2.15 \text{ pm}$$

2:15pm

(Total for Question 6 is 3 marks)



*7

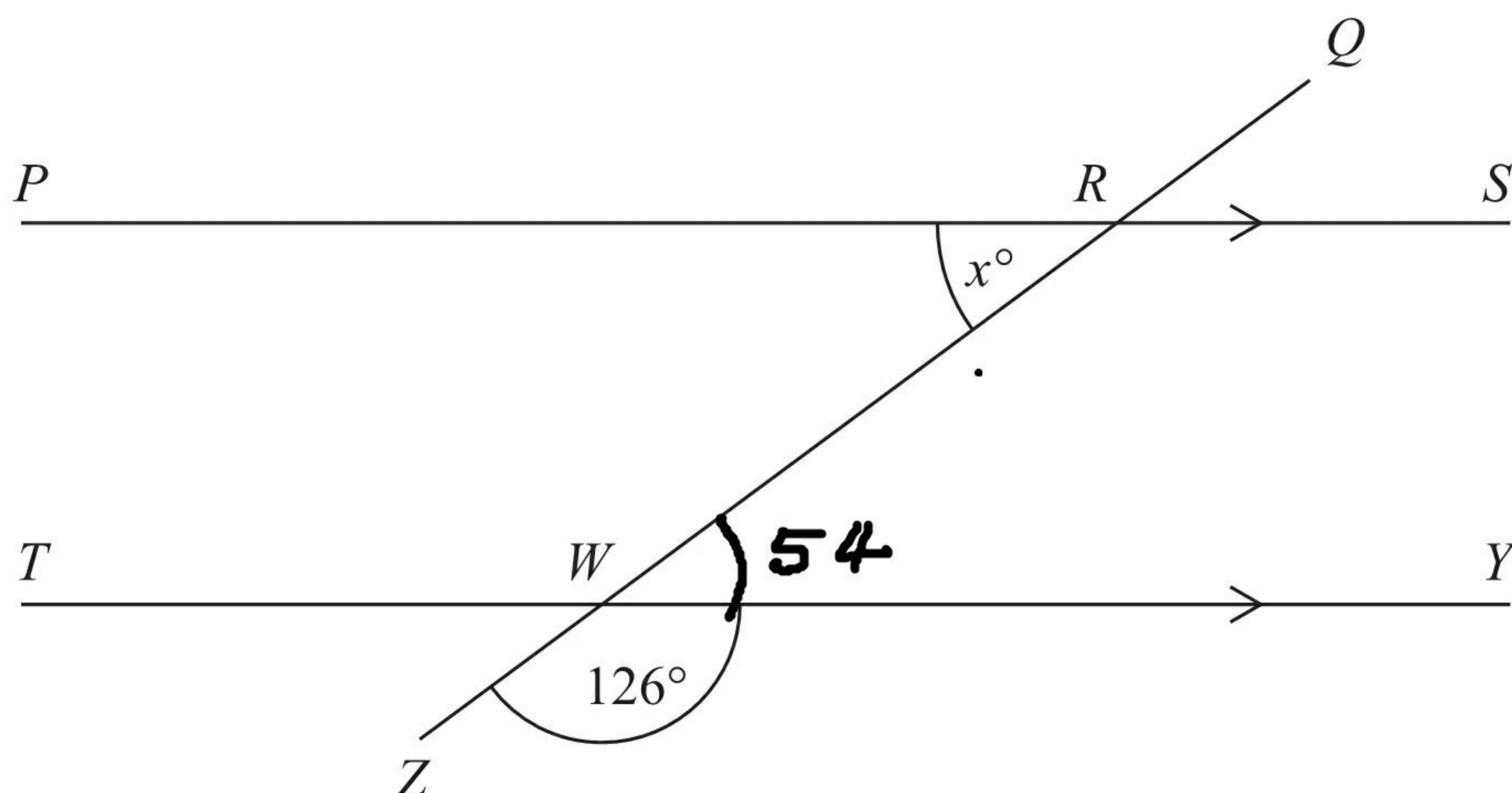


Diagram **NOT**
accurately drawn

PRS and *TWY* are parallel straight lines.
QRWZ is a straight line.

Work out the value of x .
Give reasons for your answer.

$$x = 54^\circ$$

Angles on a straight line add
up to 180°

Alternate angles are equal

(Total for Question 7 is 3 marks)



8 Lorna carries out a survey about the number of times customers go to a shop.

She asks at random 100 customers how many times they went to the shop last month.

The table shows Lorna's results.

Number of times	0	1	2	3	4	5	6	more than 6
Frequency	4	12	13	17	25	13	11	5

One of the 100 customers is chosen at random.

(a) What is the probability that this customer went to the shop 5 or more times?

$$\frac{13 + 11 + 5}{100}$$

$$\frac{29}{100}$$

(2)

Last month the shop had a total of 1500 customers.

(b) Work out an estimate for the number of customers who went to the shop exactly 2 times last month.

$$\frac{13}{100} \times 1500$$

$$195$$

(2)

The owner of a different shop is carrying out a survey on the ages of his customers.

He records the ages of the first 10 customers in his shop after 9 am one morning.

(c) This may **not** be a suitable sample.

Give **two** reasons why.

- 1
not enough people (sample size is too small)
- 2
The time may limit who can come in (people at school/work)
- (2)

(Total for Question 8 is 6 marks)

9 The diagram shows a trapezium.

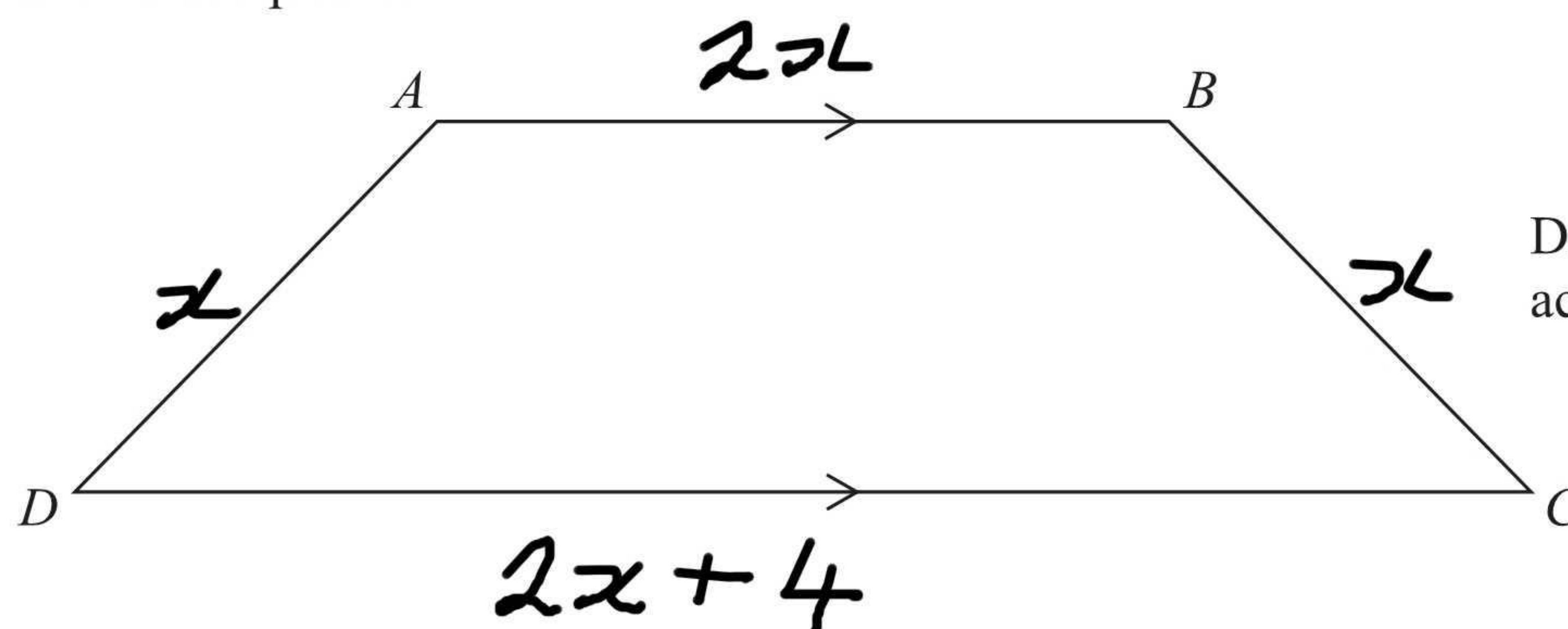


Diagram **NOT**
accurately drawn

$AD = x$ cm.

BC is the same length as AD .

AB is twice the length of AD .

DC is 4 cm longer than AB .

The perimeter of the trapezium is 38 cm.

Work out the length of AD .

$$6x + 4 = 38$$

$$6x = 34$$

$$x = 5.6$$

$$5\frac{2}{3}$$

..... cm

(Total for Question 9 is 4 marks)



10 (a) Simplify $(p^3)^2$

$$p^6$$

(1)

(b) Simplify $\frac{t^8}{t^3}$

$$t^5$$

(1)

$$2^3 \times 2^n = 2^9$$

(c) Work out the value of n .

$$6$$

(1)

$$2x^3 = 128$$

(d) Work out the value of x .

$$x^3 = 64$$

$$x = 4$$

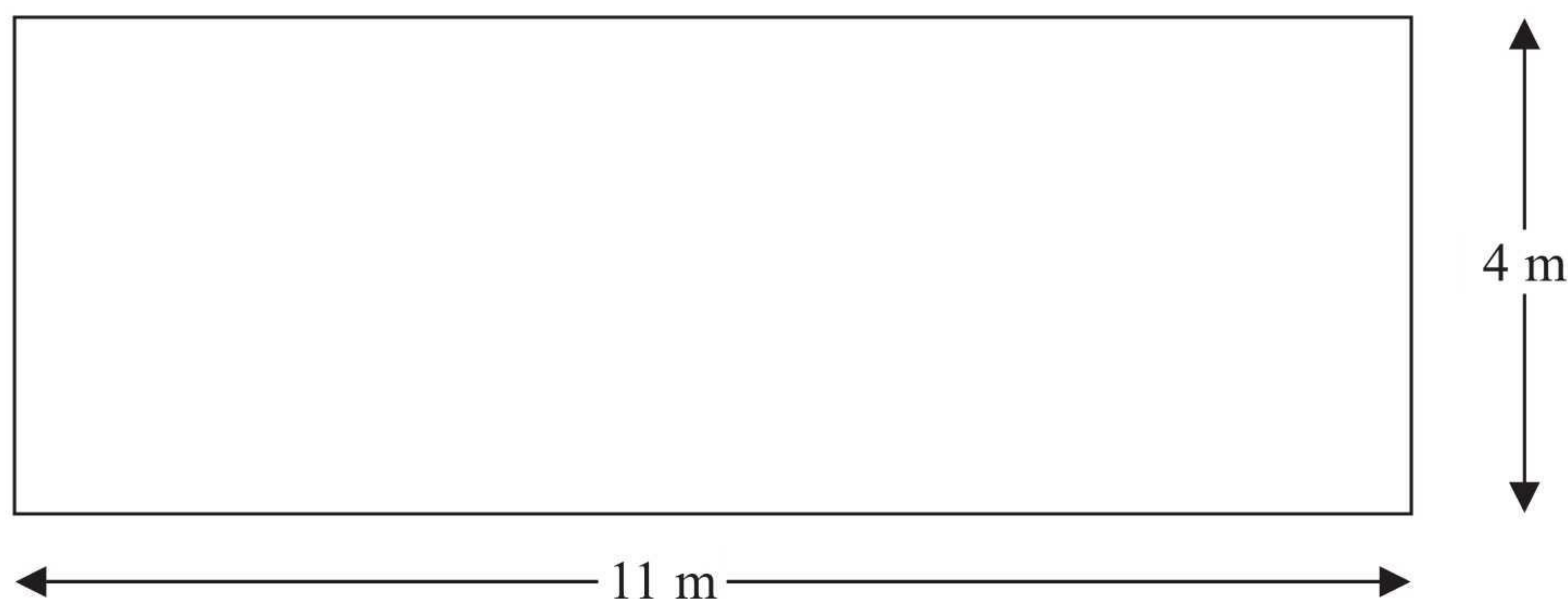
$$4$$

(1)

(Total for Question 10 is 4 marks)



11 Here is a plan of Martin's driveway.



Martin is going to cover his driveway with gravel.
The gravel will be 6 cm deep.

Gravel is sold in bags.

There are 0.4 m^3 of gravel in each bag.

Each bag of gravel costs £38

Martin gets a discount of 30% off the cost of the gravel.

Work out the total amount of money Martin pays for the gravel.

$$\text{Volume} = 4 \times 11 \times 0.06 = 2.64 \text{ m}^3$$

$$\frac{2.64}{0.4} = 6.6 \therefore \text{Martin needs 7 bags}$$

$$7 \times 38 = 266$$

The bags cost £266

$$70\% \text{ of } 266 = 186.2$$

With the discount Martin pays £186.20

£186.20

(Total for Question 11 is 5 marks)



12 Here are the first five terms of an arithmetic sequence.

4 9 14 19 24

(a) Find, in terms of n , an expression for the n th term of this sequence.

$$\underline{5n - 1}$$

(2)

Here are the first five terms of a different sequence.

2 2 0 -4 -10

An expression for the n th term of this sequence is $3n - n^2$

(b) Write down, in terms of n , an expression for the n th term of a sequence whose first five terms are

4 4 0 -8 -20

$$2(3n - n^2)$$

$$\underline{6n - 2n^2}$$

(1)

(Total for Question 12 is 3 marks)



13 $-5 < y \leq 0$

y is an integer.

(a) Write down all the possible values of y .

$-4, -3, -2, -1, 0$
(2)

(b) Solve $6(x - 2) > 15$

$$6x - 12 > 15$$

$$6x > 27$$

$$x > \frac{27}{6}$$

$$x > \frac{9}{2}$$

$x > 4.5$
(2)

(Total for Question 13 is 4 marks)



14 Ali is planning a party.

He wants to buy some cakes and some sausage rolls.

The cakes are sold in boxes.

There are 12 cakes in each box.

Each box of cakes costs £2.50

The sausage rolls are sold in packs.

There are 8 sausage rolls in each pack.

Each pack of sausage rolls costs £1.20

Ali wants to buy more than 60 cakes and more than 60 sausage rolls.

He wants to buy exactly the same number of cakes as sausage rolls.

What is the least amount of money Ali will have to pay?

$$12 \times 6 = 72$$

6 boxes of cakes

$$8 \times 9 = 72$$

9 packs of sausage rolls

$$6 \times £2.50 = £15$$

$$9 \times £1.20 = £10.80$$

£25.80

(Total for Question 14 is 5 marks)



15 The diagram shows the positions of three turbines A, B and C.

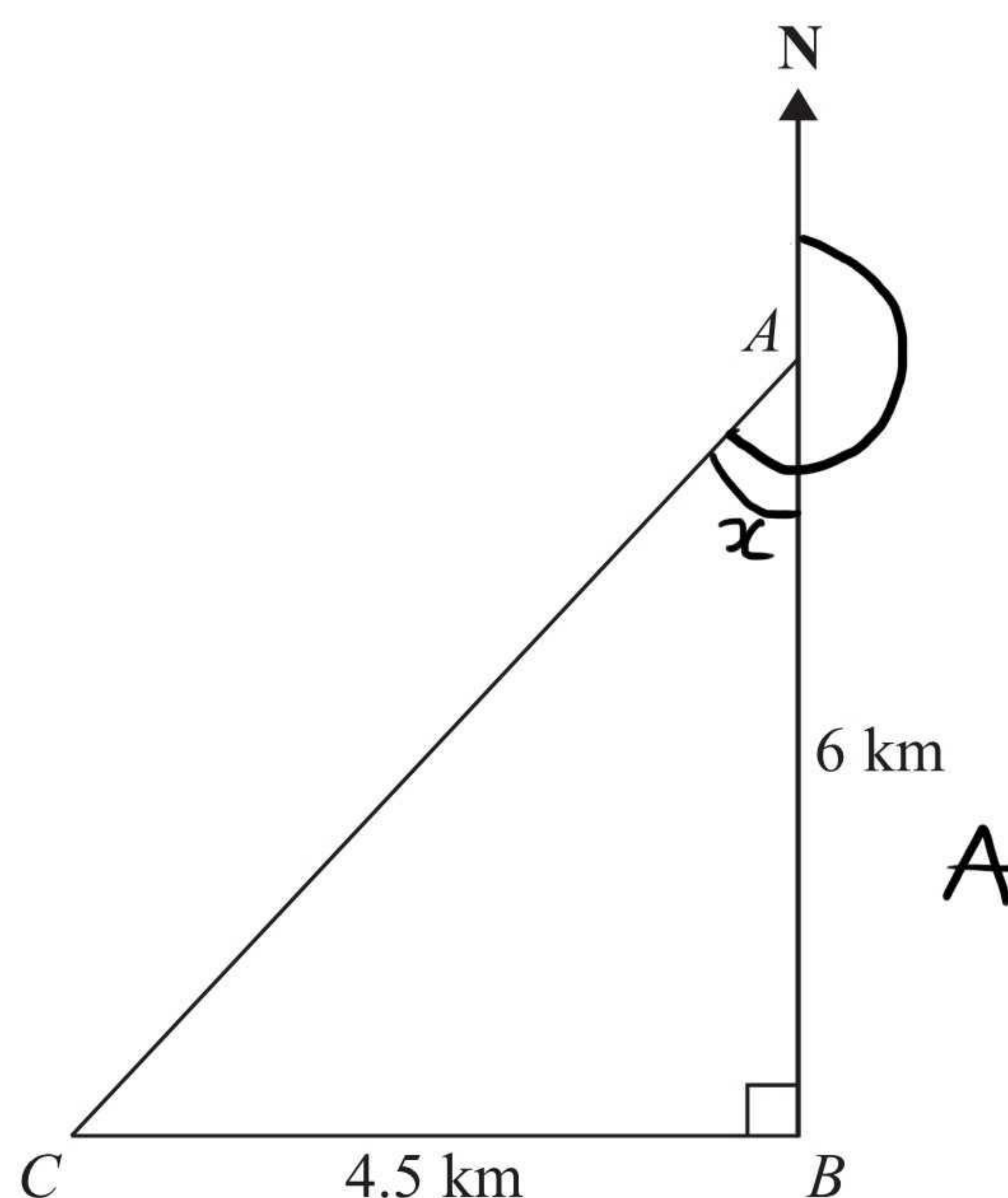


Diagram **NOT**
accurately drawn

A is 6 km due north of turbine B.
C is 4.5 km due west of turbine B.

(a) Calculate the distance AC.

$$\begin{aligned} a^2 + b^2 &= c^2 \\ 4.5^2 + 6^2 &= c^2 \\ 56.25 &= c^2 \\ c &= \sqrt{56.25} \end{aligned}$$

7.5 km
(3)

(b) Calculate the bearing of C from A.
Give your answer correct to the nearest degree.

$$\tan(x) = \frac{O}{A}$$

$$\tan(x) = \frac{4.5}{6}$$

$$= 37^\circ \text{ (to the nearest degree)}$$

$$180 + 37$$

217 °
(4)

(Total for Question 15 is 7 marks)



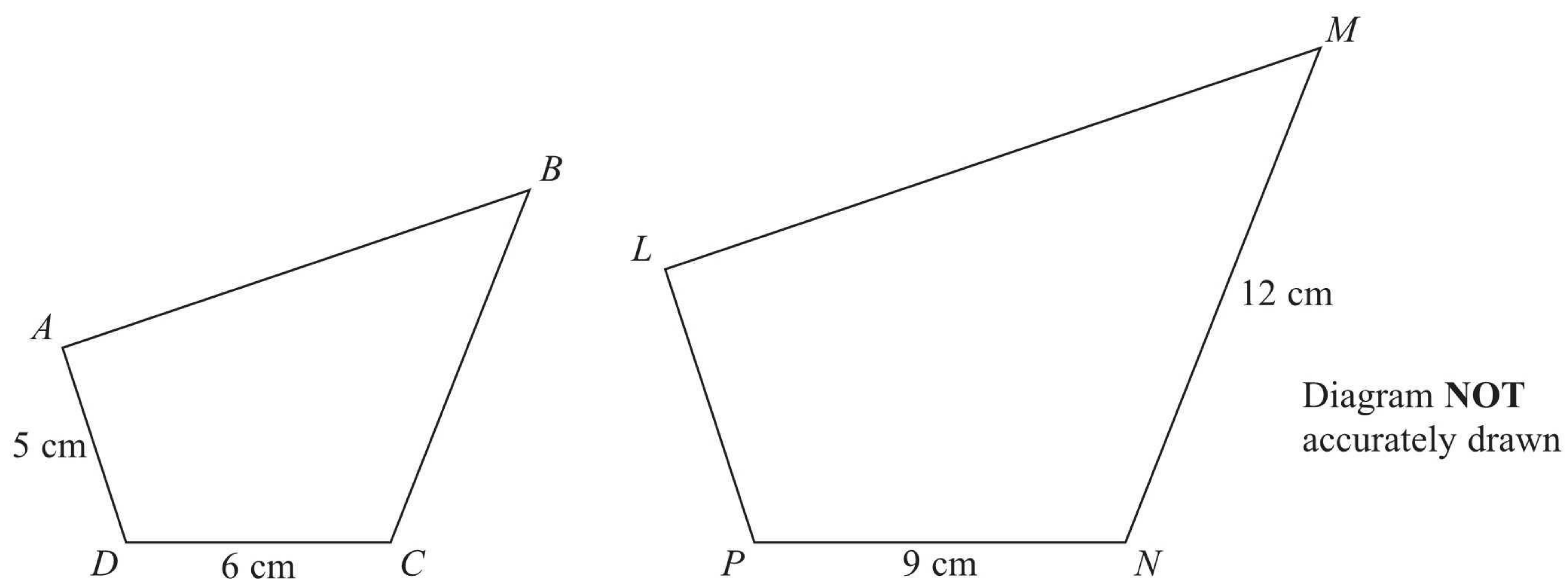
- 16 Work out the value of $(7.5 \times 10^4) \times (2.5 \times 10^3)$
Give your answer in standard form.

/ 8 7 5 0 0 0 0 0

1.875×10^8

(Total for Question 16 is 2 marks)





Quadrilaterals $ABCD$ and $LMNP$ are mathematically similar.

Angle A = angle L

Angle B = angle M

Angle C = angle N

Angle D = angle P

(a) Work out the length of LP .

$$S.A \times 1.5$$

$$5 \times 1.5$$

..... **7.5** cm
(2)

(b) Work out the length of BC .

$$12 \div 1.5$$

..... **8** cm
(2)

(Total for Question 17 is 4 marks)

