

GENERAL CERTIFICATE OF SECONDARY EDUCATION

MATHEMATICS B

J567/03

Paper 3 (Higher Tier)

Candidates answer on the question paper.

OCR Supplied Materials:

None

Other Materials Required:

- Geometrical instruments
- Tracing paper (optional)

ADDITIONAL SPECIMEN

Duration: 1 hour 45 minutes



Candidate Forename		Candidate Surname	
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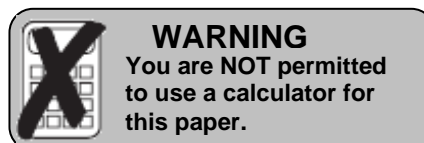
Centre Number						Candidate Number				
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INSTRUCTIONS TO CANDIDATES

- Write your name in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure that you know what you have to do before starting your answer.
- Your answers should be supported with appropriate working. Marks may be given for a correct method even if the answer is incorrect.
- Answer **all** the questions.
- Do **not** write in the bar codes.
- Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your Candidate Number, Centre Number and question number(s).

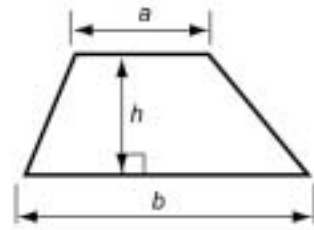
INFORMATION FOR CANDIDATES

- The number of marks is given in brackets [] at the end of each question or part question.
- Your Quality of Written Communication is assessed in questions marked with an asterisk (*).
- The total number of marks for this paper is **100**.
- This document consists of **24** pages.

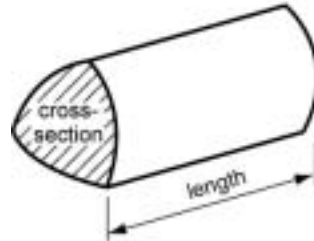


Formulae Sheet: Higher Tier

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



$$\text{Volume of prism} = (\text{area of cross-section}) \times \text{length}$$

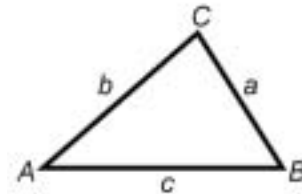


In any triangle *ABC*:

$$\text{Sine rule} \quad \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$\text{Cosine rule} \quad a^2 = b^2 + c^2 - 2bc \cos A$$

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



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

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



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

$$\text{Curved surface area of cone} = \pi r l$$

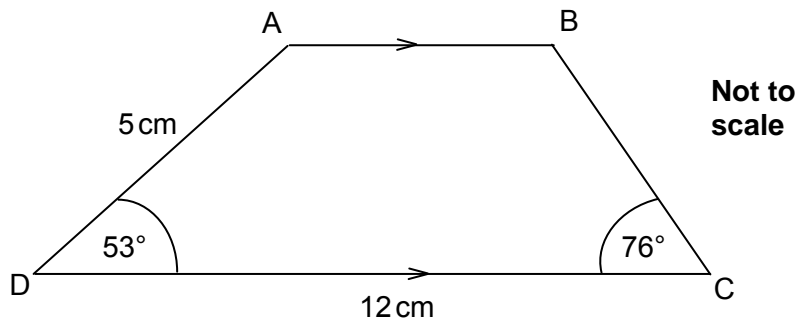


The Quadratic Equation

The solutions of $ax^2 + bx + c = 0$, where $a \neq 0$, are given by $x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$

PLEASE DO NOT WRITE ON THIS PAGE

1 This is a sketch of a trapezium.



DA = 5 cm.
 Angle CDA = 53° and angle BCD = 76° .
 AB is parallel to DC.

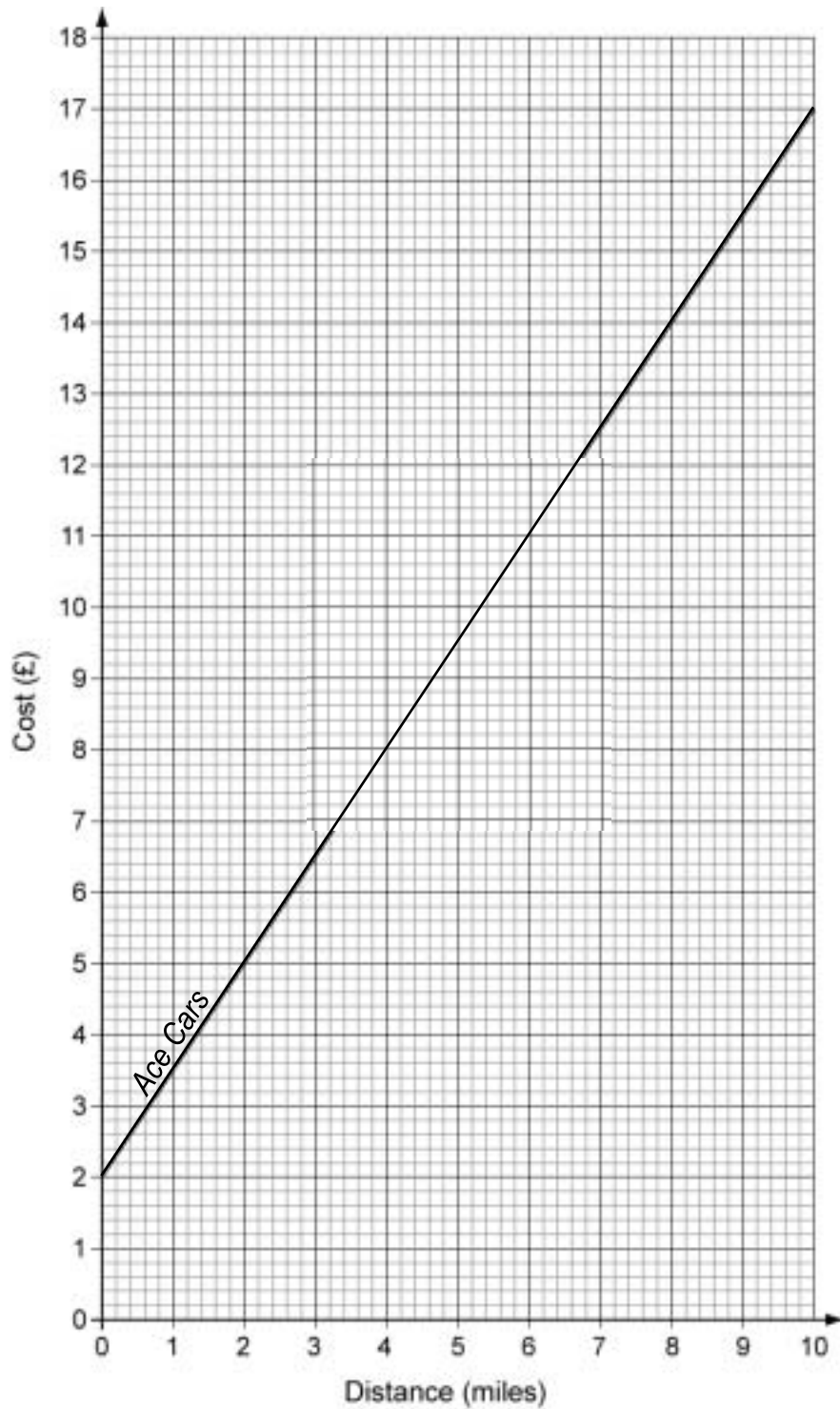
(a) Draw the trapezium full size.
 DC has been drawn for you.



(b) Use measurements from your diagram to calculate the area of the trapezium.

(b) _____ [4]

- 2 *Ace Cars* and *Ready To Go* are two minicab firms.
This graph shows how much *Ace Cars* charges for journeys.



- (a) *Ready To Go* uses this formula to calculate its charges.

$$C = 4 + 1.2m$$

C is the cost in £,
 m is the number of miles.

- (i) Complete this table for the charges for *Ready To Go*.

m	1	4	10
C			

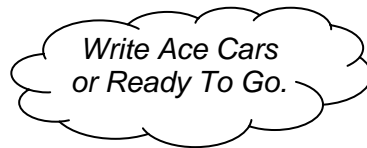
[1]

- (ii) Draw the graph of the charges for *Ready To Go* on the same grid as that for *Ace Cars*.

[2]

- (b) Johir needs to order a minicab to take him to the station. The distance is 9 miles.

Which of the two minicab firms is cheaper for this journey, and by how much?



(b) _____ by _____ [2]

3 Kelly has a **biased** 6-sided dice.

The table shows the probabilities that the dice lands on each of the faces numbered 1 to 4.

Number	1	2	3	4
Probability	0.2	0.15	0.15	0.2

- (a) The dice is equally likely to land on 5 or 6.
Kelly throws the dice once.

What is the probability that it lands on 5?

(a) _____ [2]

- (b) Kelly throws the dice 60 times.

How many times would you expect it to land on 1?

(b) _____ [2]

- 4 Mr Baldwin is organising a day trip for 150 primary school pupils.
He asked whether they would like to go to Monkey Village or to Splashout.

Of the 150 pupils, 70 said 'No' to Monkey Village, 56 said 'No' to Splashout and 30 said 'No' to both Monkey Village and Splashout.

- (a) Complete the two-way table and find out how many pupils said 'Yes' to **both** Monkey Village and Splashout.

	'Yes' to Monkey village	'No' to Monkey village	Total
'Yes' to Splashout			
'No' to Splashout			
Total		70	

- (a) _____ pupils said 'Yes' to **both** Monkey Village and Splashout. [3]

- (b) What percentage of pupils did not want to go to either place?

- (b) _____ % [2]

5 A newspaper reports that people prefer watching films at home on DVD rather than going to the cinema.

(a) Mike and Panna are asked to find out if this is true in their town.

Mike suggests they do a survey outside the cinema.

Panna says that this is not a good idea because the results will not represent people in their town.

Explain why Panna is likely to be correct.

[1]

(b) Mike and Panna decide to write a questionnaire.

Write a question they could use to find out how many films people watch each year.
You should include response boxes.

[2]

6 (a)

$$C = \frac{5}{9}(F - 32)$$

$$F = 1.8C + 32$$

C is the temperature in degrees Centigrade,
 F is the temperature in degrees Fahrenheit.

Max flew from Manchester to New York in January 2010.

When he left Manchester the temperature was -3°C .

When he arrived in New York the temperature was 23°F .

Which city was colder, and what was the difference in the temperature?

*Write Manchester
or New York.*

(a) _____ by _____ [4]

(b) *

1 litre is approximately 0.26 US gallons.

1 US gallon is approximately 3.8 litres.

In January 2010 the exchange rate between pounds and dollars was approximately $\text{£}1 = \$1.50$.

When Max left Manchester the price of petrol was $\text{£}1.15$ per litre.
In New York the price of petrol was $\$3.00$ per US gallon.

Decide in which city petrol was cheaper.

(b) _____ [3]

7 (a) Factorise.

$$3x^2 + 12xy$$

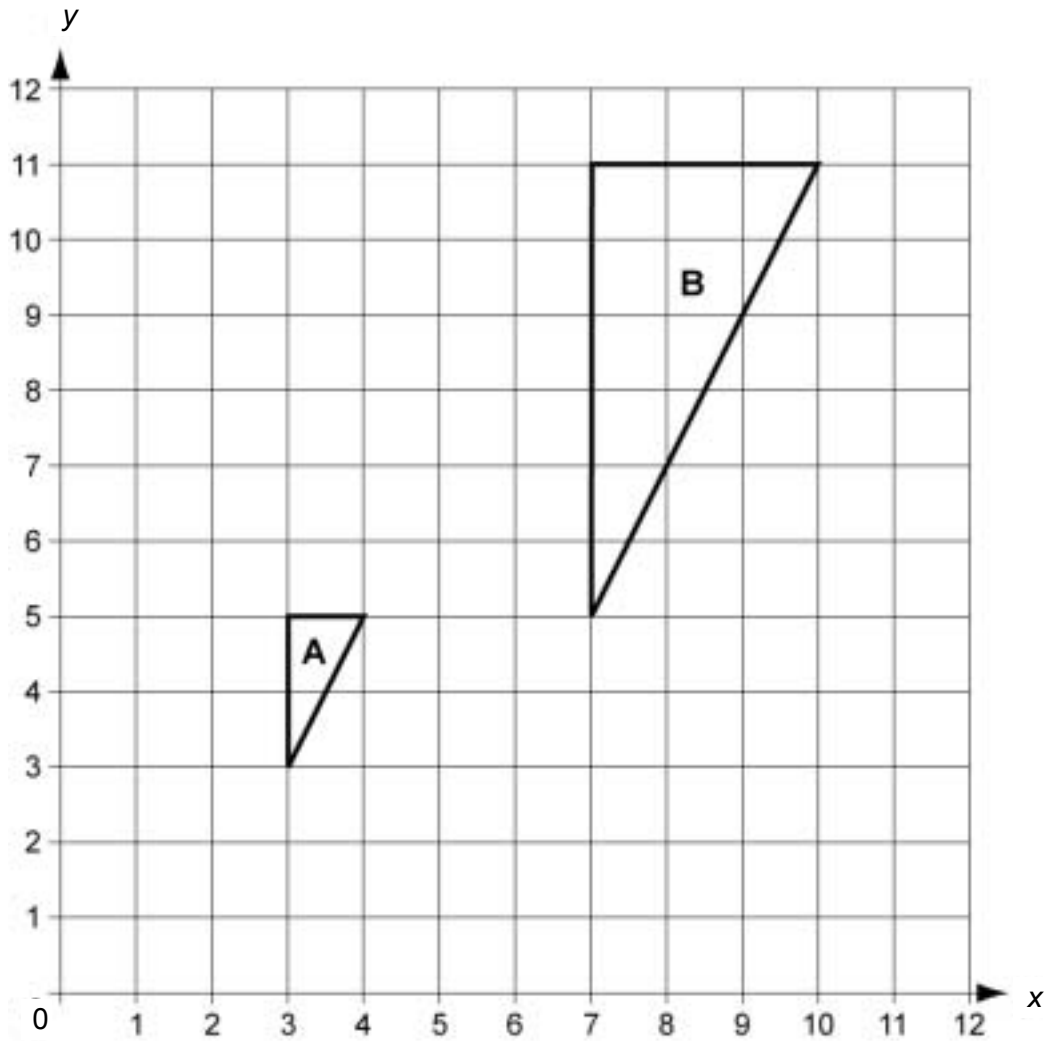
(a) _____ [2]

(b) Solve.

$$\frac{4x + 3}{5} = 9$$

(b) $x =$ _____ [3]

8 An enlargement maps triangle **A** onto triangle **B**.



Find the scale factor and centre of this enlargement.

Scale factor _____

Centre (_____ , _____) [3]

9 Solve algebraically.

$$3x - 4y = 18$$

$$5x + 3y = 1$$

$$x = \underline{\hspace{4cm}}$$

$$y = \underline{\hspace{4cm}} \quad [4]$$

10 A shoe shop is closing down and is having a sale.

- (a) The prices of all trainers are reduced by 35%.
A pair of trainers originally cost £64.

Work out the sale price of these trainers.

(a) £ _____ [3]

- (b) The prices of all boots are reduced by 60%.
The sale price of a pair of boots is £36.

Work out the original price of the boots.

(b) £ _____ [3]

11* Three consecutive even numbers are written as n , $n + 2$ and $n + 4$.

Prove that, for any three consecutive even numbers, the square of the middle number is always 4 more than the product of the other two numbers. [4]

12 (a) Calculate the following.
Write each answer as a mixed number.

(i) $4\frac{1}{2} - 1\frac{3}{5}$

(a)(i) _____ [3]

(ii) $3\frac{1}{4} \times 1\frac{2}{3}$

(ii) _____ [3]

- (b) (i) Write $\frac{3}{20}$ as a decimal.

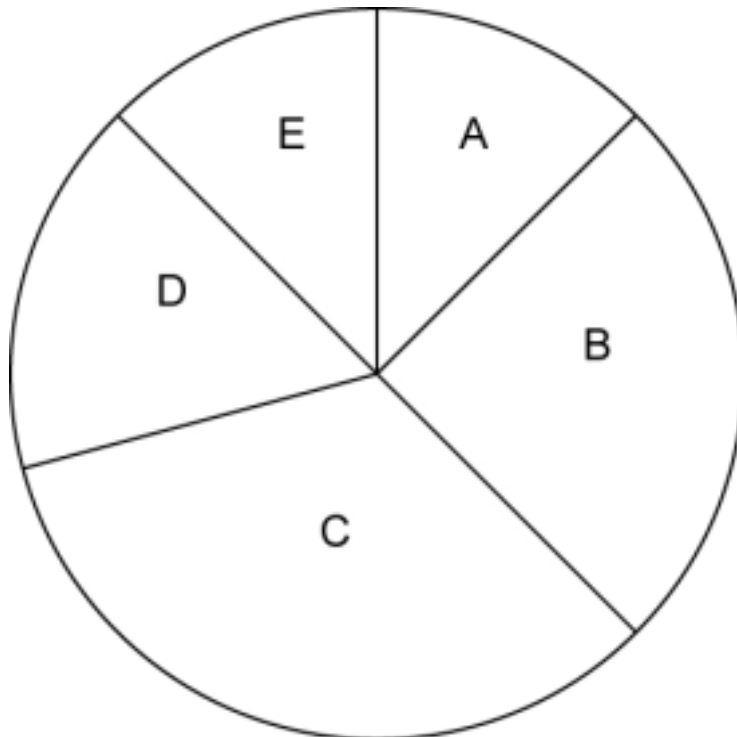
(b)(i) _____ [1]

- (ii) Write $0.\dot{3}9$ as a fraction in its simplest form.

(ii) _____ [3]

13 Brill Hires is a car hire company.

- (a) There are five categories of car: A, B, C, D and E.
This pie chart shows the distribution of the number of cars in each category.



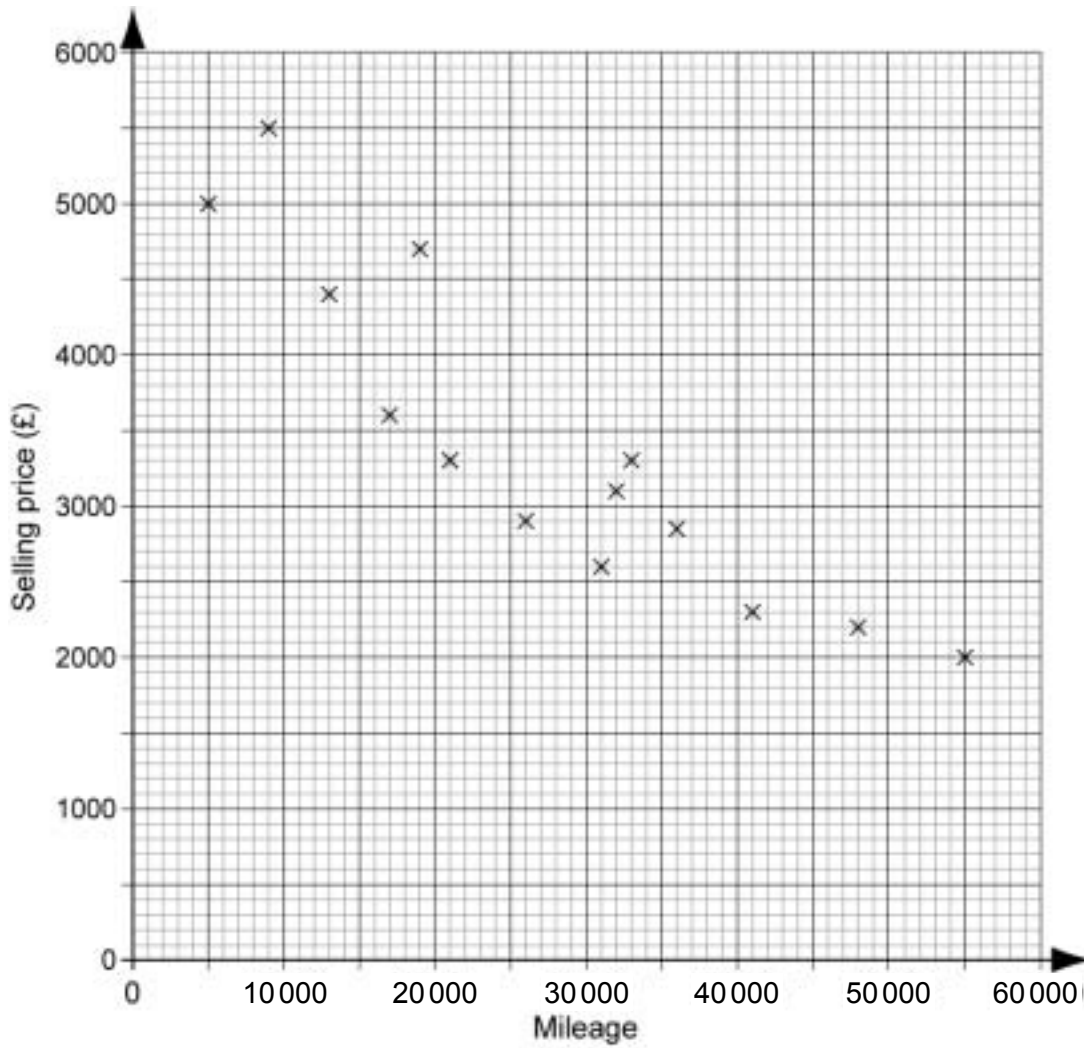
There are 60 category B cars.

How many category C cars are there?

(a) _____ [2]

(b) Brill Hires is selling its 3-year-old category B cars.

This scatter diagram shows the selling price and mileage of 14 cars.



(i) Describe the correlation.

(b)(i) _____ [1]

(ii) Another 3-year-old category B car had covered 27 000 miles.

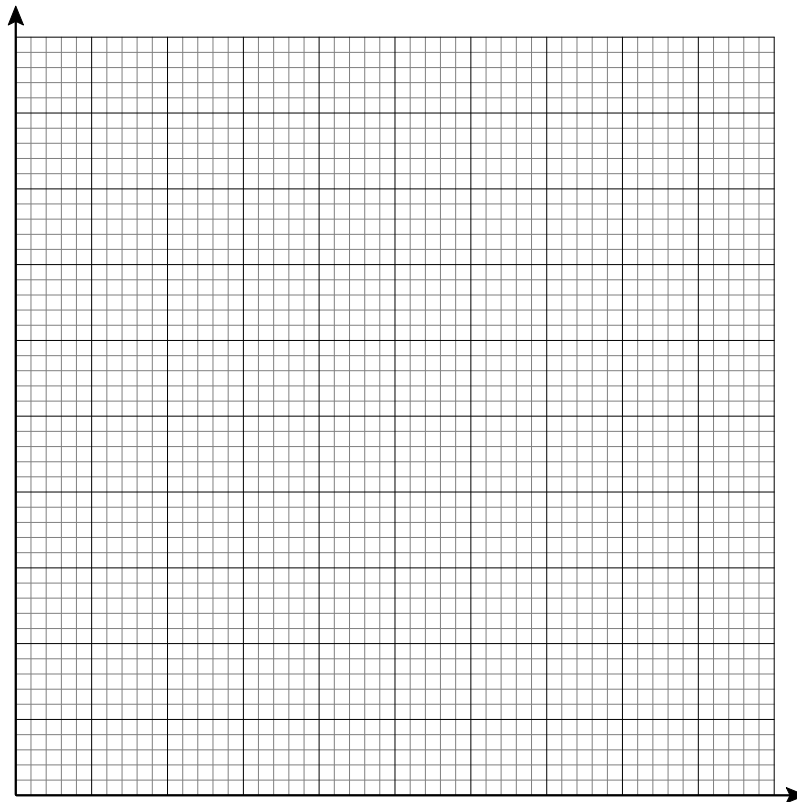
Draw a line of best fit and use it to estimate the selling price of this car.

(ii) £ _____ [2]

(c) This table shows the distribution of the mileages of 30 of the 2-year-old category B cars.

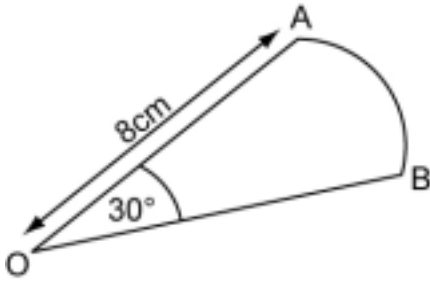
Mileage (m thousands)	Frequency
$0 < m \leq 10$	10
$10 < m \leq 15$	7
$15 < m \leq 20$	4
$20 < m \leq 30$	6
$30 < m \leq 50$	3

Draw a histogram to show this information.



[4]

- 14 OAB is the sector of a circle, radius 8 cm.
Angle BOA = 30° .

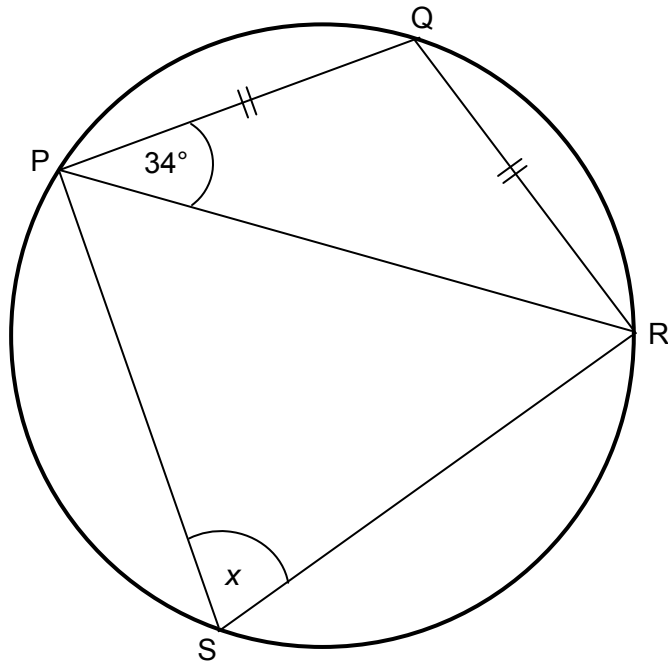


Not to scale

Work out the perimeter of the sector, leaving your answer in terms of π .

_____ cm [4]

15



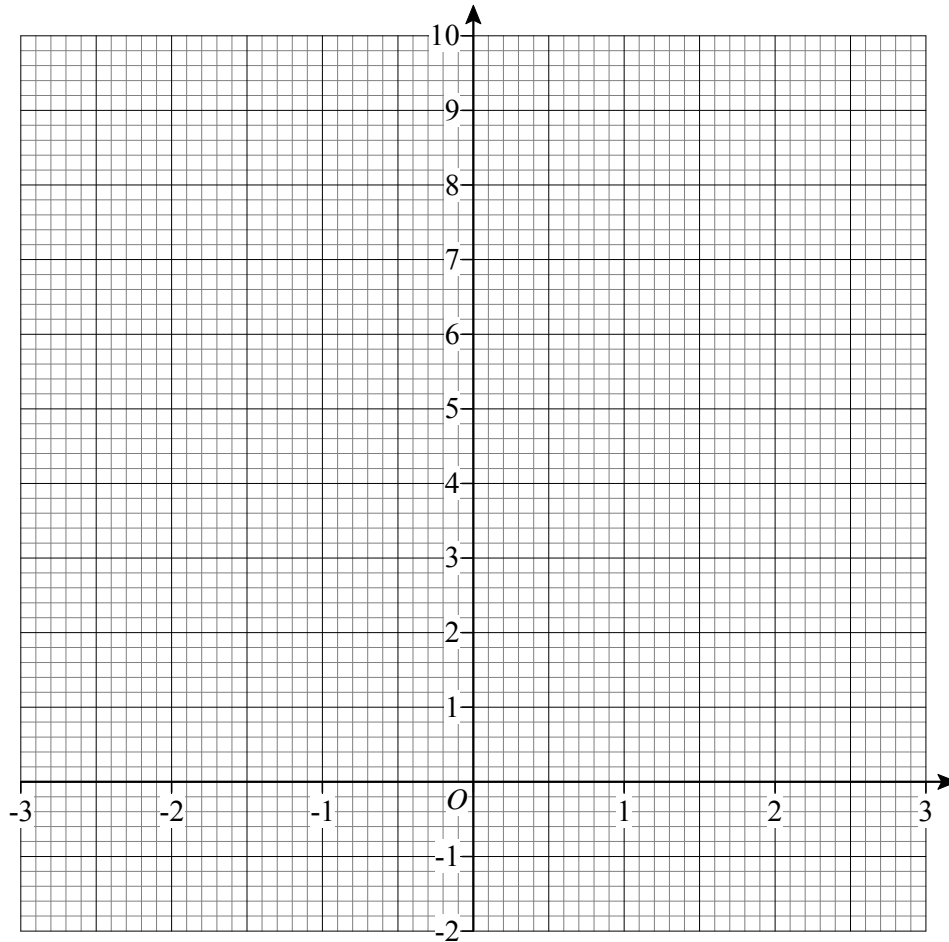
Not to scale

P, Q, R and S are points on a circle.
 Angle $RPQ = 34^\circ$ and $QP = QR$.

Calculate angle x .
 Give a reason for each step of your calculation.

[4]

16 (a) Draw the graph of $y = 2^x$ for $-3 \leq x \leq 3$.

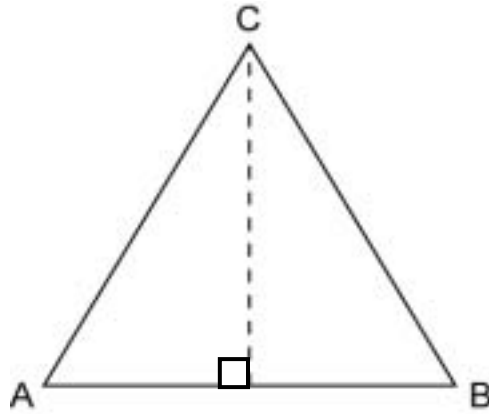


[3]

(b) Use your graph to solve the equation $2^x = 6$.

(b) $x =$ _____ [1]

17 (a) ABC is an equilateral triangle with sides of length 10 cm.



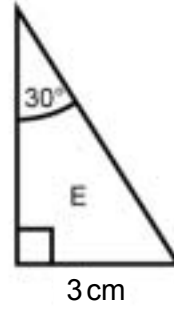
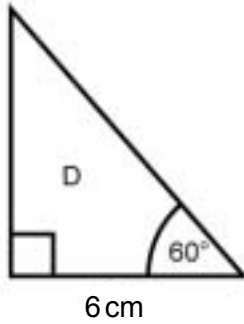
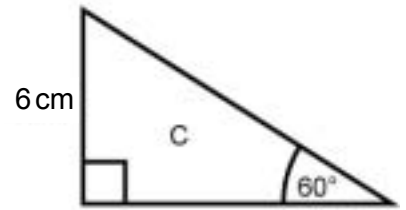
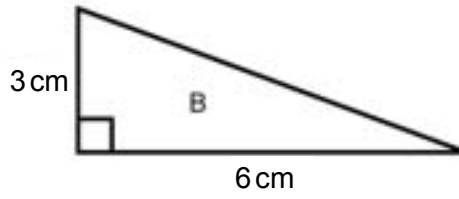
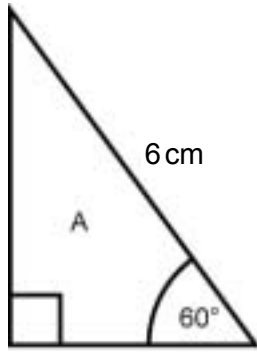
(i) Show that $\cos 60^\circ = \frac{1}{2}$.

[2]

(ii) Show that $\cos 30^\circ = \frac{\sqrt{3}}{2}$.

[4]

(b)



Not to scale

Work out which **two** of the triangles are congruent, justifying your answer fully.

[3]

TURN OVER FOR QUESTION 18

18 Solve algebraically these simultaneous equations.

$$y = 5x^2 - 21x - 1$$

$$y = 7 - 3x$$

$$x = \underline{\hspace{2cm}} \quad y = \underline{\hspace{2cm}}$$

$$x = \underline{\hspace{2cm}} \quad y = \underline{\hspace{2cm}} \quad [6]$$



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