6   Brian bought a hat in France. He paid €45.
    The same hat in England costs £39.99.

    The exchange rate is £1 = €1.12

    Is the hat cheaper in France or in England?
    You must show your working.

$$£ \qquad €$$

$$1 \qquad 1.12$$

$$x \qquad 45$$

$$45 = 1.12x$$

$$x = \frac{45}{1.12}$$

$$= £40.18 \quad (\text{The hat's price in France})$$

    It is cheaper in England.

(Total for question 6 is 3 marks)

7   A pair of trainers cost 3400 rupees in India.
    The same pair of trainers cost £68 in the UK.

    The exchange rate is £1 = 92 rupees.

    Work out the difference between the cost of the trainers in India and in the UK.
    Give your answer in pounds (£).

$$£ \qquad INR$$

$$1 \qquad 92$$

$$x \qquad 3400$$

$$3400 = 92x$$

$$x = \frac{3400}{92} = £36.96 \quad (\text{In India})$$

$$68 - 36.96 = £31.04$$

£......31.04......

(Total for question 7 is 3 marks)

8 Carla is on holiday in Italy.
She spends €35 in a restaurant.

The exchange rate is €1 = £0.89

Calculate how much Carla spends in pounds (£).

$$€ \qquad £$$
$$1 \qquad 0.89$$
$$35 \qquad x$$

$$x = 35 \times 0.89$$
$$= £31.15$$

£ ....31.15..................

(Total for question 8 is 2 marks)

---

9 The exchange rate in London is £1 = $1.31

The exchange rate in New York is $1 = £0.79

Bernie wants to change some pounds into dollars.

In which of these cities would Bernie get the most dollars?
You must show your working.

NEW YORK:

$$\$ \qquad £$$
$$1 \qquad 0.79$$
$$x \qquad 1$$

$$1 = 0.79x$$
$$x = \frac{1}{0.79}$$
$$= 1.27$$

In New York £1 = $1.27

Bernie would get the most dollars in London.

(Total for question 9 is 3 marks)

10 George is going on a trip to Vietnam.

He wants to change £750 into Vietnamese dong.
George wants to get as many 200 000 dong notes as possible.

The exchange rate is £1 = 29 000 dong.
Work out the greatest number of 200 000 dong notes that George can get for £750

$$£ \qquad VD$$
$$1 \qquad 29\,000$$
$$750 \times x$$

$$x = 29\,000 \times 750$$
$$= 21\,750\,000$$

$$\frac{21\,750\,000}{200\,000} = 108.75$$

.... 108 ....

(Total for question 10 is 3 marks)

11 In Australia a car costs $26 500
In Ireland the same car costs €17 500

The exchange rates are £1 = $1.96 and £1 = €1.14

Work out the difference in price between the car in Australia and Ireland.
Give your answer in pounds (£).

$$£ \qquad AU\$$$
$$1 \qquad 1.96$$
$$x \times 26500$$
$$1.96x = 26500$$
$$x = \frac{26500}{1.96}$$
$$= £13520.41$$

$$£ \qquad €$$
$$1 \qquad 1.14$$
$$x \times 17500$$
$$1.14x = 17500$$
$$x = \frac{17500}{1.14}$$
$$= £15350.88$$

$$15350.88 - 13520.41$$

£ ..... 1830.47 .....

(Total for question 11 is 4 marks)

12 In London potatoes cost £0.45 per lb.
In Dublin potatoes cost €1.48 per kilogram.

$$1 \text{ kg} = 2.2 \text{ lbs}$$
$$£1 = €1.15$$

In which city are potatoes better value for money, London or Dublin?
You must show your working.

DUBLIN   €1.48 for 2.2 lbs

€	lbs
1.48	2.2
x	1

(crossed)

$$2.2x = 1.48$$
$$x = \frac{1.48}{2.2}$$
$$= 0.67\dot{2}$$
(€ per lb)

£	€
1	1.15
x	0.67$\dot{2}$

(crossed)

$$1.15x = 0.67\dot{2}$$
$$x = \frac{0.67\dot{2}}{1.15}$$
$$= £0.58$$

£0.58 per lb in Dublin

London is better value

(Total for question 12 is 3 marks)

---

13 The exchange rate in London is £1 = €1.15

The exchange rate in Berlin is €1 = £0.88

Angela wants to change some pounds into euros.

In which of these cities would Angela get the most euros?
You must show your working.

BERLIN

€	£
1	0.88
x	1

(crossed)

$$0.88x = 1$$
$$x = \frac{1}{0.88}$$
$$= 1.14$$

In Berlin £1 = €1.14

She would get the most euros in London.

(Total for question 13 is 3 marks)

14 Frank is travelling from the USA to Germany.

Frank wants to book flights which cost $710 and a hotel which costs €45 per night for 12 nights.

The exchange rates are as follows:

$$£1 = €1.14$$
$$\$1 = €0.85$$

Frank can spend no more than £1000
Work out if Frank is able to book the flights and the hotel.

FLIGHTS

$ €

$1   0.85

710 ✕ x

$x = 710 × 0.85$

$= €603.50$

£   €

1   1.14

x ✕ 1143.50

€45 × 12 = €540

(HOTEL)

$1.14x = 1143.50$

$x = \dfrac{1143.50}{1.14}$

603.50 + 540 = 1143.50

$= £1003.07$

No.

2 A block exerts a force of 120 Newtons on the ground.
The block has an area of 2 m².

Work out the pressure on the ground.

$$pressure = \frac{force}{area}$$

$$pressure = \frac{120}{2} = 60 \, N/m^2$$

60 .... N/ m²

(Total for question 2 is 1 mark)

6 A block exerts a force of 84 Newtons on a table.
The pressure on the table is 30 N/m².

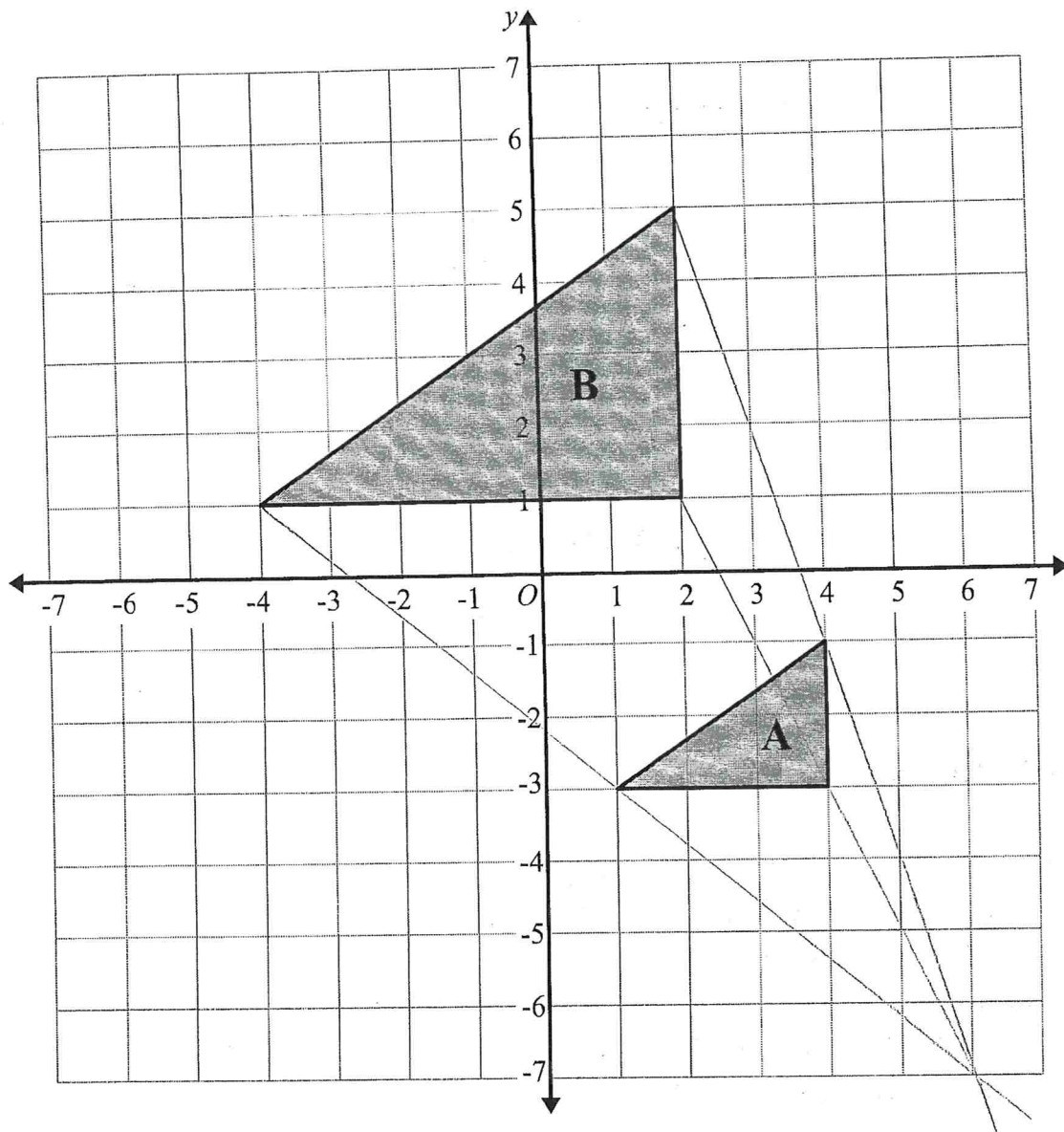Work out the area of the box that is in contact with the table.

$$pressure = \frac{force}{area}$$

$$area = \frac{force}{pressure}$$

$$= \frac{84}{30} = 2.8 \, m^2$$

2.8 .... m²

(Total for question 6 is 2 marks)

1

Describe fully the single transformation that maps triangle **A** on triangle **B**.

Enlargement, Scale Factor 2, Centre (6, -7)

....

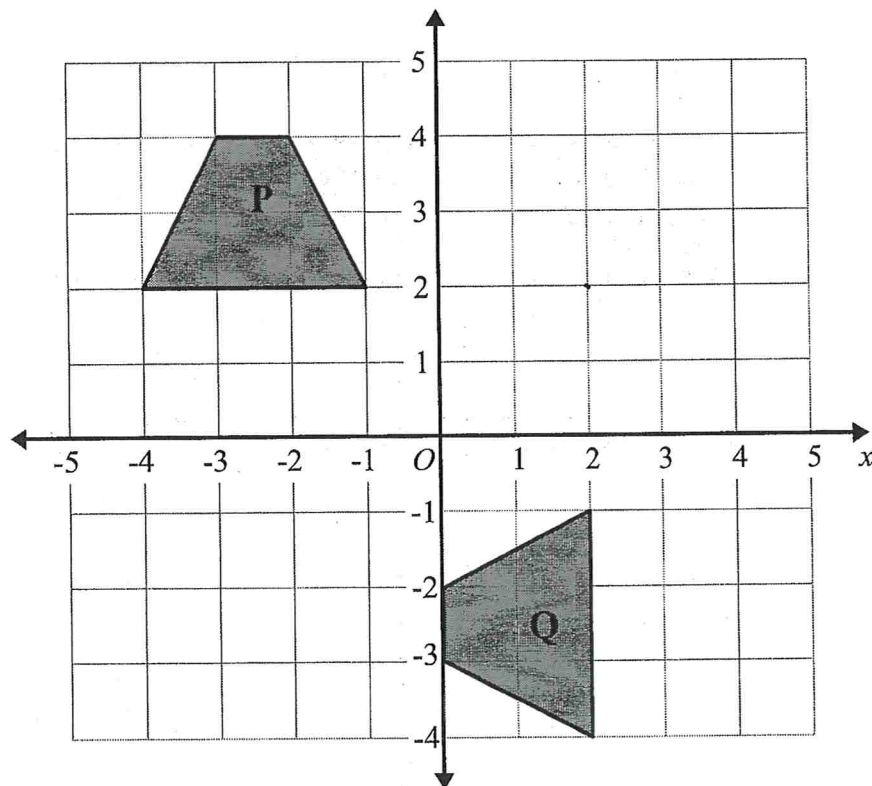**(Total for question 1 is 2 marks)**

2
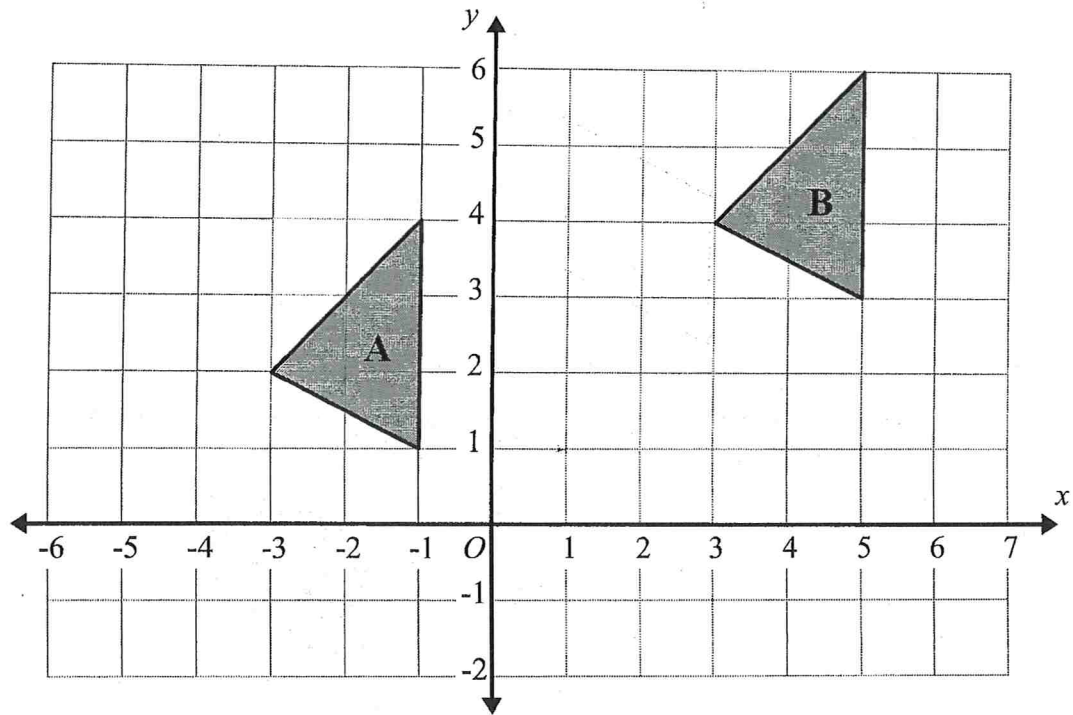
Describe fully the single transformation that maps triangle **A** on triangle **B**.

translation by the vector $\begin{pmatrix} 6 \\ 2 \end{pmatrix}$
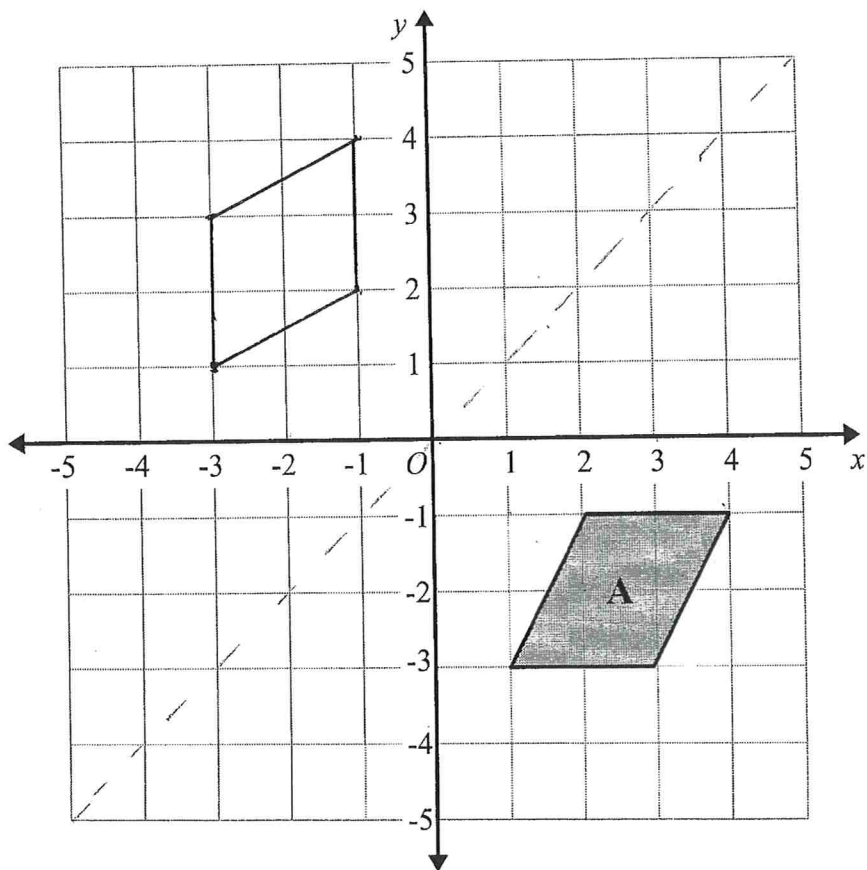
(Total for question 2 is 2 marks)

3

Describe fully the single transformation that maps trapezium **P** on trapezium **Q**.

Rotation, 90° Anti Clockwise, Centre (2, 2)

(Total for question 3 is 2 marks)

4

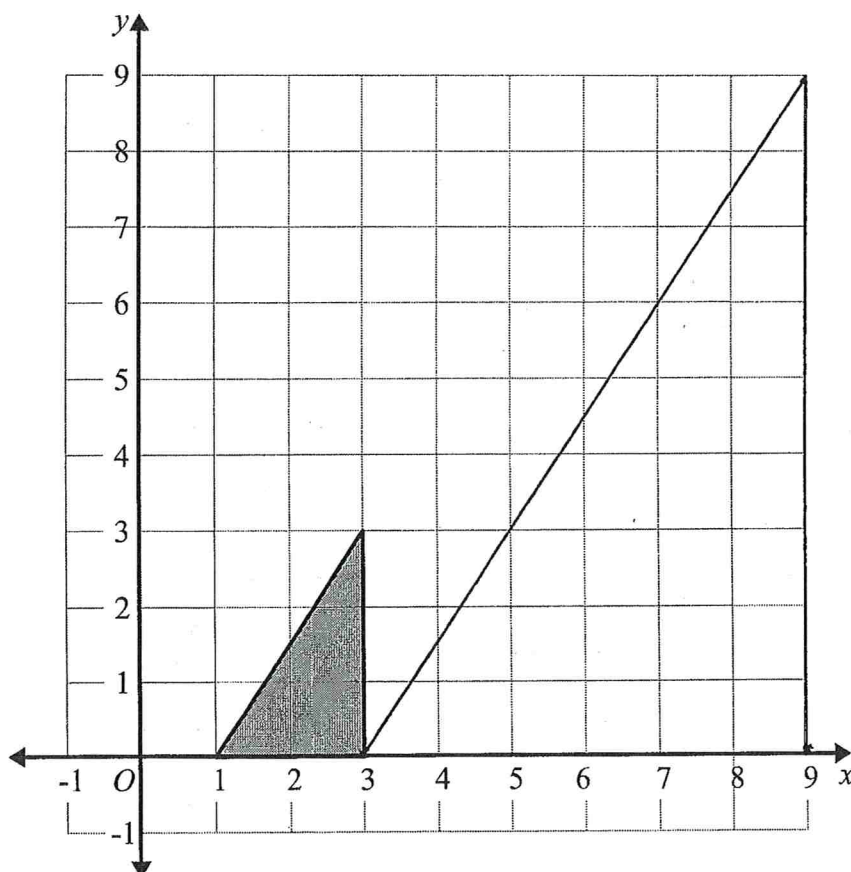Reflect shape **A** in the line with equation $y = x$

(Total for question 4 is 2 marks)

5
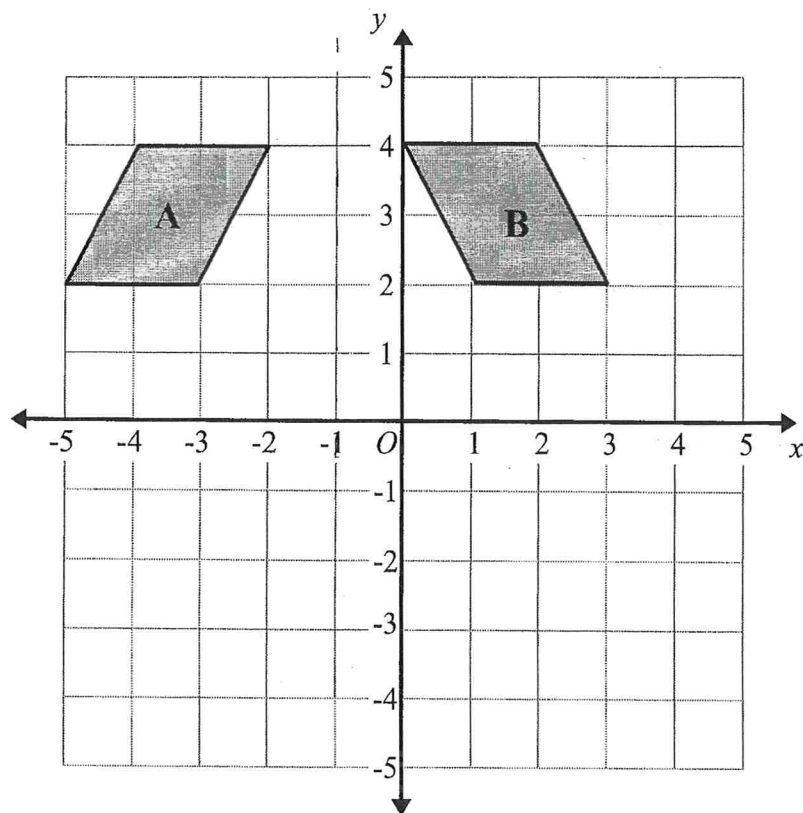
Describe fully the single transformation that maps shape **A** onto shape **B**.

Reflection in line $x = -1$

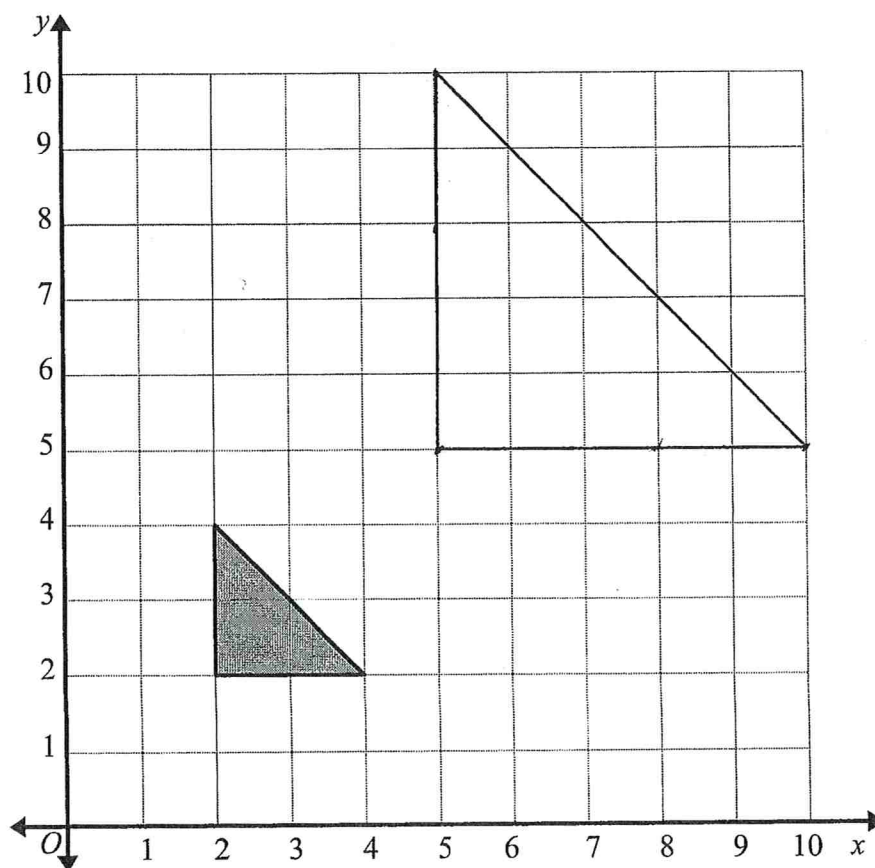**(Total for question 5 is 2 marks)**

6
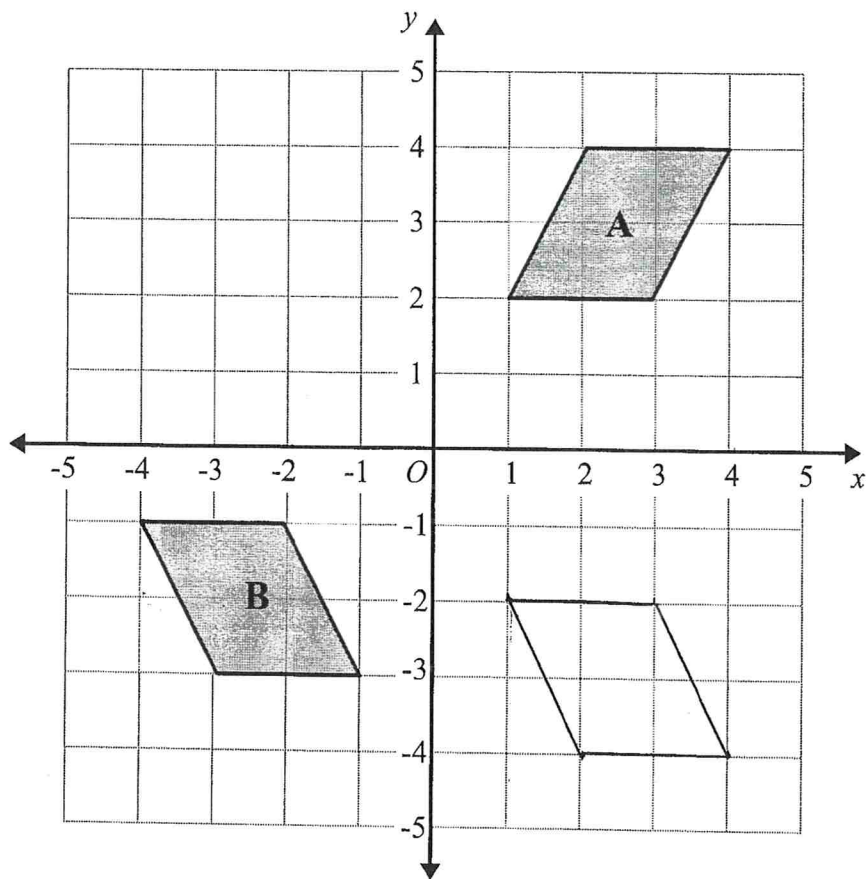

Enlarge the shaded triangle by scale factor 3, centre O

(Total for question 6 is 2 marks)

7

Enlarge the shaded triangle by scale factor 2.5, centre O.

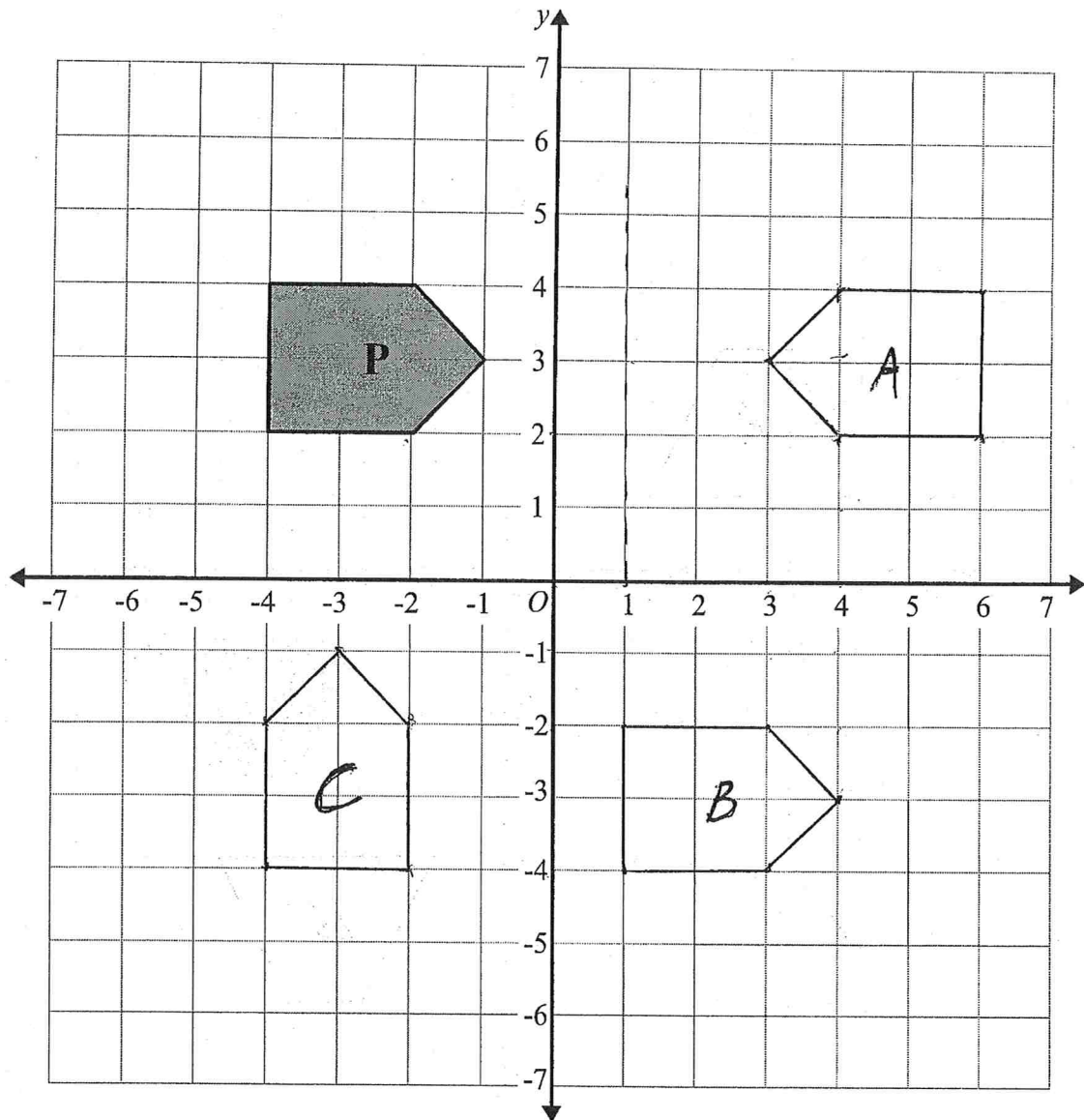**(Total for question 7 is 2 marks)**

8

Shape **A** is transformed to shape **B** by a reflection in the x axis followed by a translation $\begin{pmatrix} p \\ q \end{pmatrix}$

Find the value of p and the value of q.

$p =$ ....-5..........

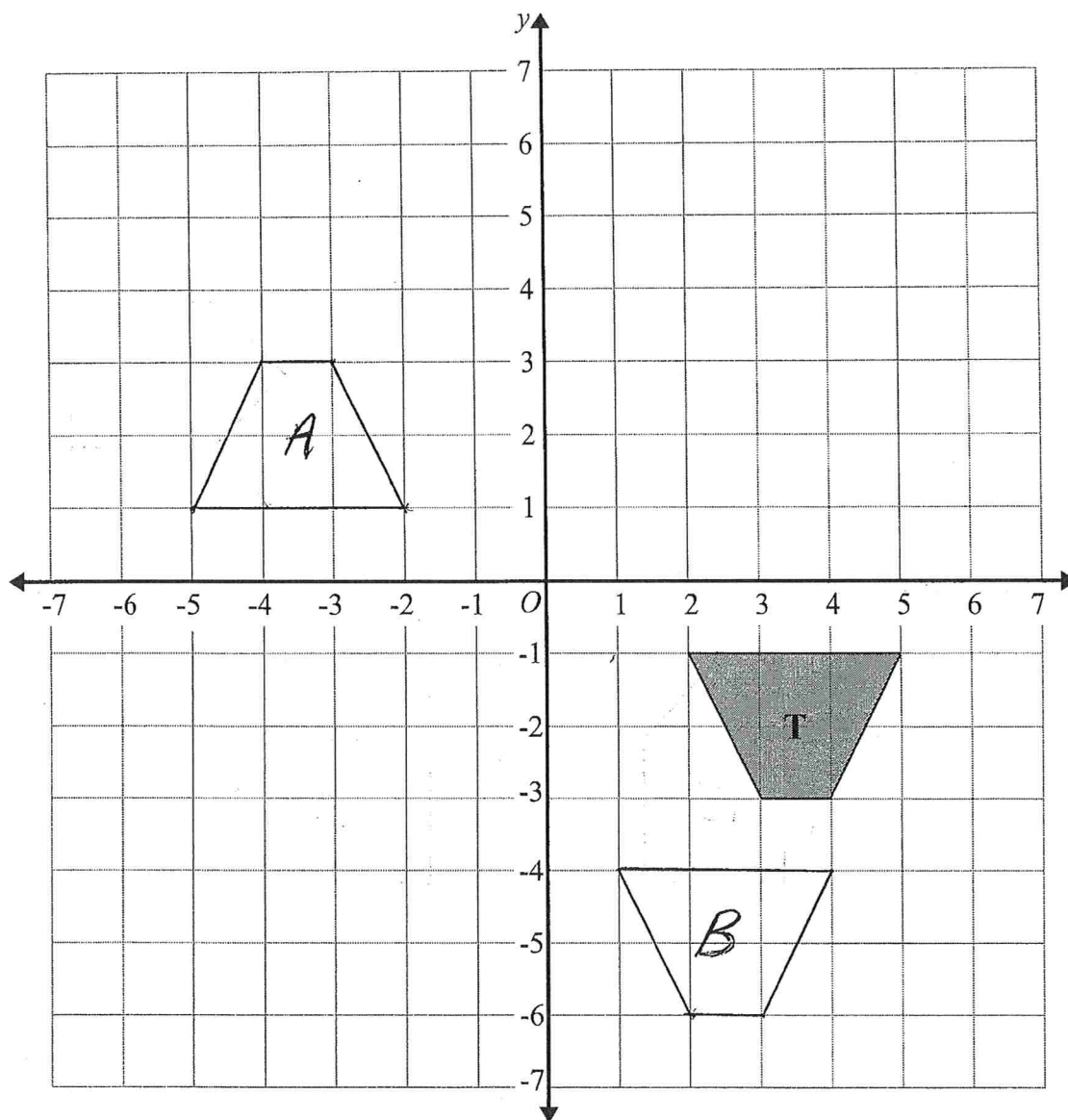$q =$ ....1..........

(Total for question 8 is 3 marks)

(a) Reflect shape **P** in the line $x = 1$.
Label the new shape **A**.

(b) Translate shape **P** by the vector $\begin{pmatrix} 5 \\ -6 \end{pmatrix}$
Label the new shape **B**.

(c) Rotate shape **P** by 90° anticlockwise, centre O
Label the new shape **C**
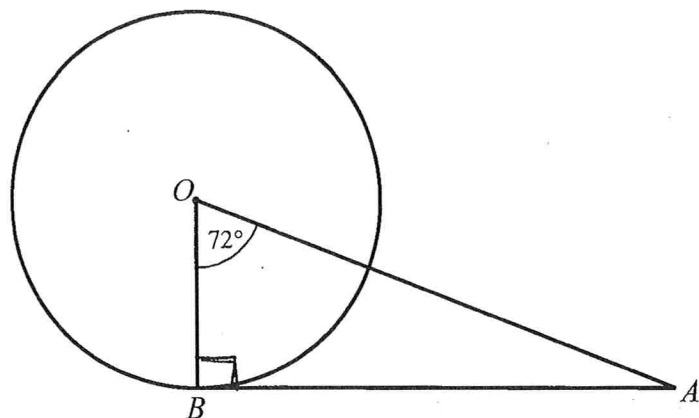
(Total for question 9 is 3 marks)

10

(a) Rotate trapezium **T** 180° about the origin.
Label the new trapezium **A**.

(b) Translate trapezium **T** by the vector $\begin{pmatrix} -1 \\ -3 \end{pmatrix}$
Label the new trapezium **B**.

(Total for question 10 is 2 marks)

1

B is a point on the circumference of a circle, centre O.
AB is a tangent to the circle.

Angle $BOA = 72°$

Work out the size of angle BAO.
You must show all your working.

$OBA = 90°$ Tangent meets radius at $90°$

$BAO = 180 - 90 - 72$ Angles in a triangle
$\qquad\qquad$ add to $180°$
$\quad = 18°$

$\underline{\qquad\qquad 18 \qquad\qquad}°$

(Total for Question 1 is 2 marks)

2
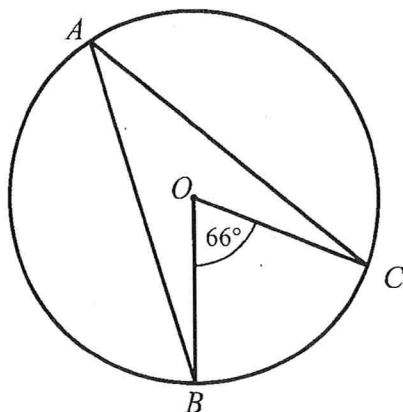
A, B, C and D are points on the circumference of a circle.

Angle $BOC = 66°$

(i) Find the size of angle BAC.

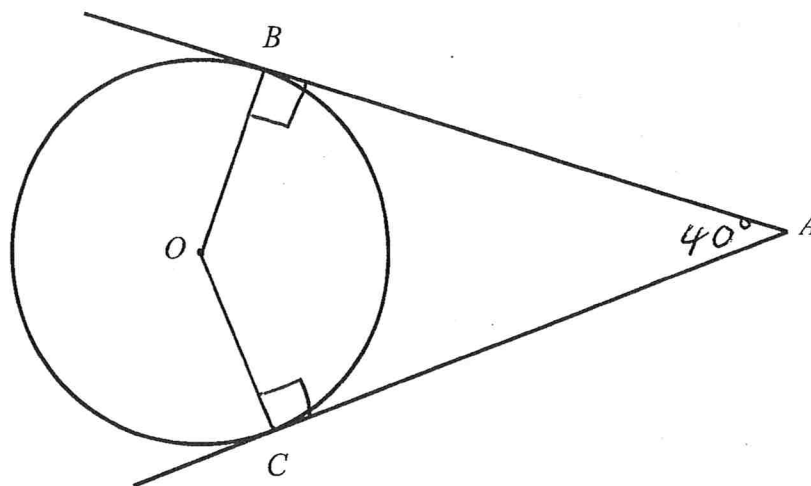$\underline{\qquad\qquad 33 \qquad\qquad}°$

(ii) Give a reason for your answer.

The angle at the circumference is half the angle at the centre

(Total for Question 2 is 2 marks)

3

B and C are points on a circle, centre O.
AB and AC are tangents to the circle.

Angle $BAC = 40°$

Work out the size of angle BOC.
You must show all your working.
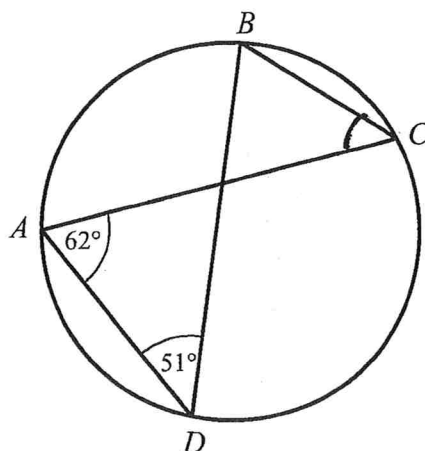
OBA and $OCA = 90°$

Tangent meets radius at $90°$

$360 - 90 - 90 - 40 = 140°$

Angles in a quadrilateral add to $360°$

_____ 140 _____ °

(Total for Question 3 is 3 marks)

4

A, B, C and D are points on the circumference of a circle.

Angle $CAD = 62°$
Angle $ADB = 51°$

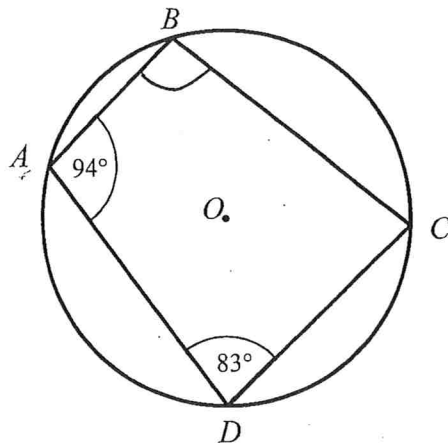(i) Find the size of angle ACB.

_____ 51 _____ °

(ii) Give a reason for your answer.

Angles from the same points (to the circumference) are equal

(Total for Question 4 is 2 marks)

5

A, B, C and D are points on the circumference of a circle.

Angle $BAD = 94°$
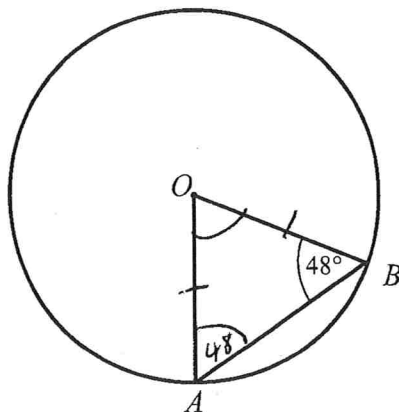Angle $ADC = 83°$

$180 - 83$

(i) Find the size of angle ABC.

_____97_____ °

(ii) Give a reason for your answer.

opposite angles in a cyclic quadrilateral
add to 180°

(Total for Question 5 is 2 marks)

6

A and B are points on the circumference of a circle, centre O.

Angle $ABO = 48°$

$OAB = 48°$
Angles at base
of isosceles are
equal

(i) Find the size of angle AOB.
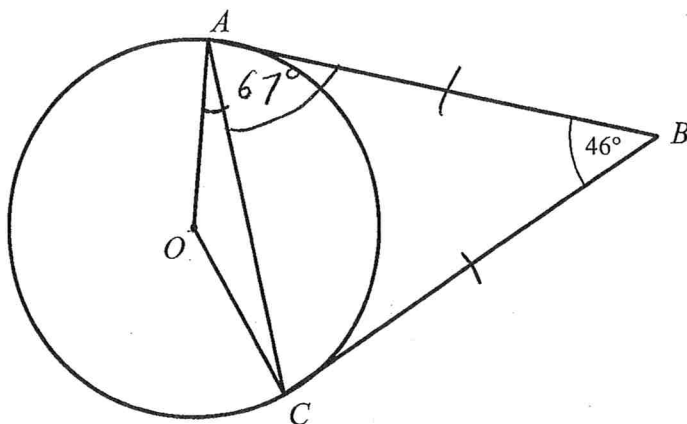
$180 - 48 - 48$

_____84_____ °

(ii) Give a reason for your answer.

Angles at the base of an isosceles triangle are
equal + angles in a triangle add to 180°

(Total for Question 6 is 2 marks)

7

A and C are points on the circumference of a circle, centre O.
AB and BC are tangents to the circle.

Angle ABC = 46°

Find the size of angle OAC.
Give reasons for each stage of your working.

ABC is an isosceles triangle , 2 tangents
from the same point are equal
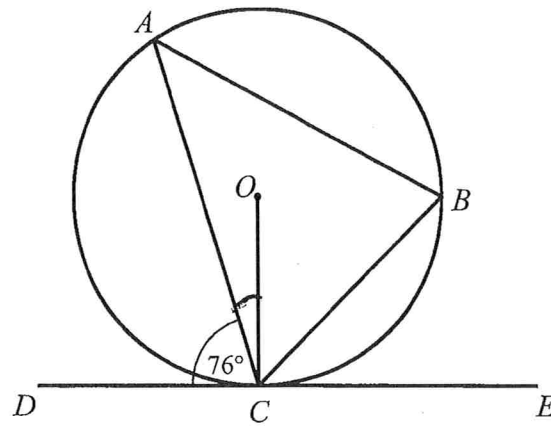
$CAB = \dfrac{180 - 46}{2} = \dfrac{134}{2} = 67°$

Angles at the base of an isosceles
triangle are equal

OAB = 90° Tangent meets radius at 90°

OAC = 90 - 67 = 23°

23 °

(Total for Question 7 is 4 marks)

8

A and B are points on the circumference of a circle, centre O.
DCE is a tangent to the circle.

Angle ACD = 76°

(a) Find the size of angle ACO.
You must ~~show~~ all your working.
Give reasons for

OCD = 90°   Tangent meets radius at 90°

90 - 76 = 14°

                                        14   °
....
                                                    (2)
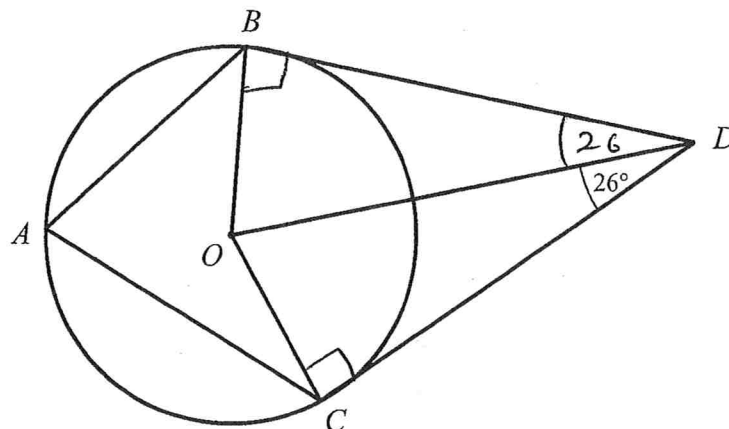
(b) Find the size of angle ABC.
You must ~~show~~ all your working.
give reasons for

ABC = 76°   Alternate segment theorem

                                        76   °
....
                                                    (2)

(Total for Question 8 is 4 marks)

9

A, B and C are points on the circumference of a circle, centre O.
BD and CD are tangents to the circle.

Angle ODC = 26°

Find the size of angle BAC.
Give reasons for each stage of your working.

Triangle BOD = Triangle DOC   all sides are equal

OBD and OCD = 90°   Tangent meets radius
                                        at 90°

BOD and COD = 180 − 90 − 26
                        = 64°

BOC = 2 × 64 = 128°

BAC = $\frac{128}{2}$ = 64°   Angle at circumference
                                        is half the angle
                                        at the centre

_____64_____°

(Total for Question 9 is 4 marks)

10
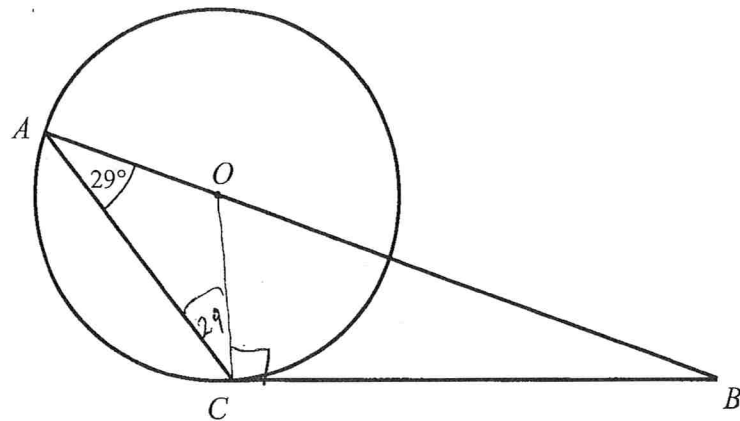
A and *C* are points on the circumference of a circle, centre *O*.
BC is a tangent to the circle.

Angle *CAB* = 29°

Find the size of angle *ABC*.
You must show all your working.

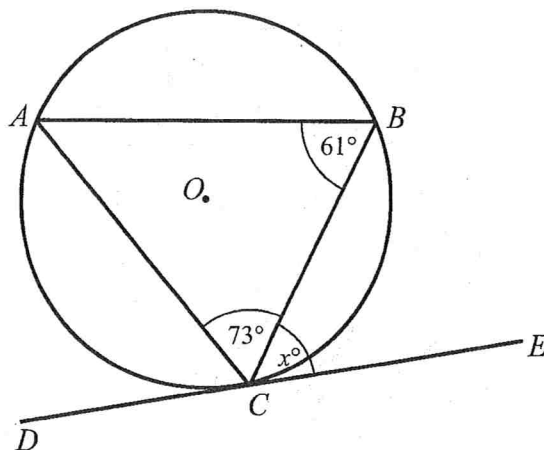$OCA = 29°$ Angles at the base of an isosceles triangle are equal

$OCB = 90°$ Tangent meets radius at 90°

$ABC = 180 - 90 - 29 - 29$
$= 32°$ Angles in a triangle add to 180°

32   °
....

(Total for Question 10 is 4 marks)

11

A, B and C are points on the circumference of a circle, centre O.
DCE is a tangent to the circle.

Angle $ABC = 61°$
Angle $ACB = 73°$
Angle $BCE = x°$

Find the value of x.
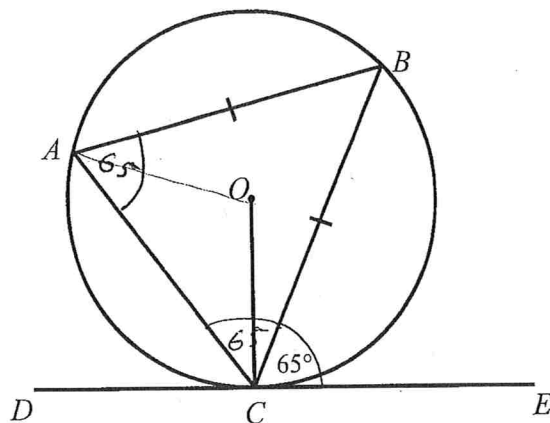You must show all your working.

$BAC = 180 - 73 - 61$

$= 46°$ Angles in a triangle
add to $180°$

$x = 46°$ Alternate segment theorem

$\underline{\quad 46 \quad}°$

(Total for Question 11 is 3 marks)

A, B and C are points on the circumference of a circle, centre O.
DCE is a tangent to the circle.

AB = BC
Angle BCE = 65°

Find the size of angle AOC.
You must show all your working.

BAC = 65°   Alternate segment
                        theorem

ACB = 65°   Angles at the base of
             an isosceles triangle are
             equal

ABC = 180 − 65 − 65
    = 50°   Angles in a triangle
                        add to 180°

AOC = 2 × 50   Angle at centre is
    = 100°   twice angle at circumference

_____100_____ °

(Total for Question 12 is 4 marks)

13
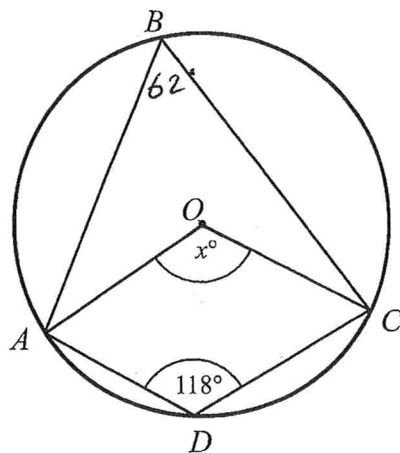
A, B, C and D are points on the circumference of a circle, centre O.

Angle $ADC = 118°$
Angle $AOC = x°$

Work out the value of x.
You must show all your working.

$ABC = 180 - 118$
$\quad = 62°$

opposite angles in a cyclic quadrilateral add to $180°$

$AOC = 2 \times 62$
$\quad = 124°$

Angle at centre is twice angle at circumference

_____124_____°

(Total for Question 13 is 3 marks)
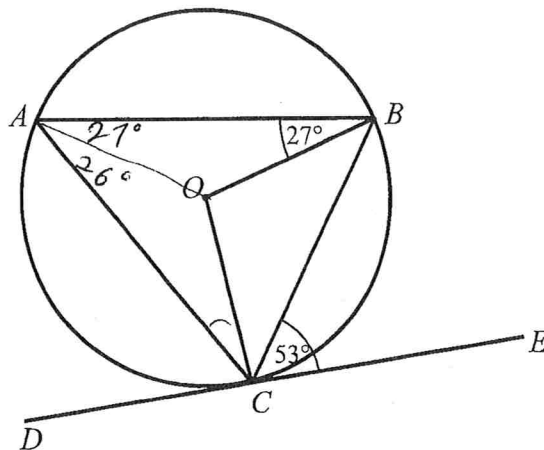
14

A, B and C are points on the circumference of a circle, centre O.
DCE is a tangent to the circle.

Angle $ABO = 27°$
Angle $BCE = 53°$

Find the size of angle ACO.
~~You must show all your working~~.
Give reasons for each stage of your working

$BAO = 27°$ Angles at base of isosceles triangle are equal

$BAC = 53°$ Alternate segment theorem

$OAC = 53 - 27 = 26°$

$ACO = 26°$ Angles at base of isosceles triangle are equal

26 °

(Total for Question 14 is 4 marks)

15
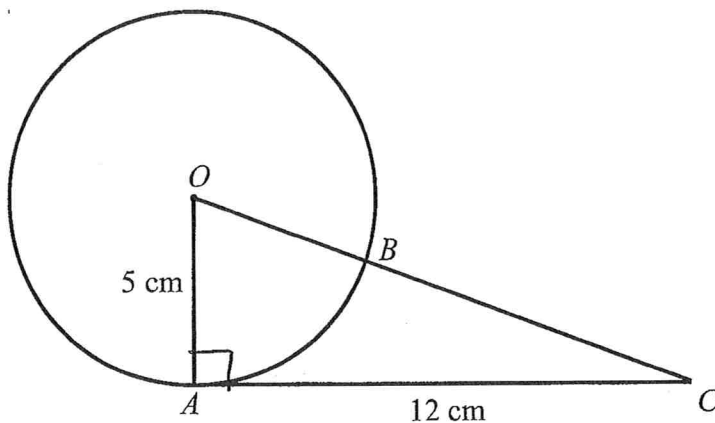
A and B is a point on the circumference of a circle, centre O.
AC is a tangent to the circle.
OBC is a straight line.

$OA = 5$ cm
$AC = 12$ cm

Find the length of BC.
You must show all your working.

$OAC = 90°$ Tangent meets radius at $90°$
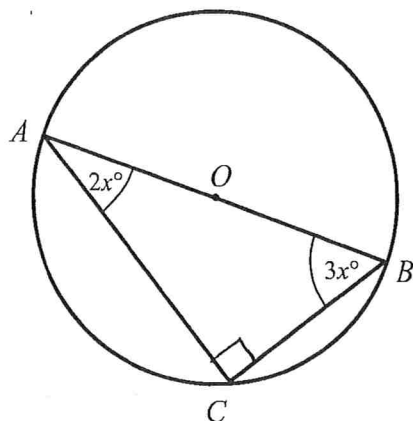
$$5^2 + 12^2 = OC^2$$
$$169 = OC^2$$
$$OC = \sqrt{169}$$
$$= 13 \text{ cm}$$

$BC = 13 - 5 = 8 \text{ cm}$ $(radius = 5 cm)$

.......................8....................... cm

(Total for Question 15 is 4 marks)

16

A, B and C are points on the circumference of a circle, centre O.

Angle $CAB = 2x°$
Angle $ABC = 3x°$

Find the value of x.
You must show all your working.

$ACB = 90°$ Angle in a semi circle
is $90°$

$2x + 3x + 90 = 180$

$5x = 90$

$x = 18°$

$x =$ _____ 18 _____

(Total for Question 16 is 3 marks)
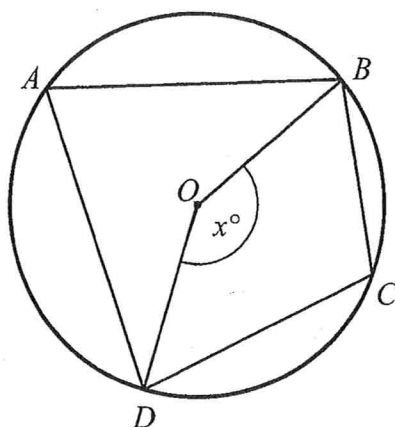
A, *B*, *C* and *D* are points on the circumference of a circle, centre *O*.

Angle $BOD = x°$

Find the size of angle *BCD*, in terms of *x*.
Give reasons for each stage of your working.

$$BAD = \frac{1}{2}x \qquad \text{Angle at circumference is half angle at centre}$$

$$BCD = 180 - \frac{1}{2}x \qquad \text{opposite angles in a cyclic quadrilateral add to } 180°$$

(Total for Question 17 is 3 marks)

18
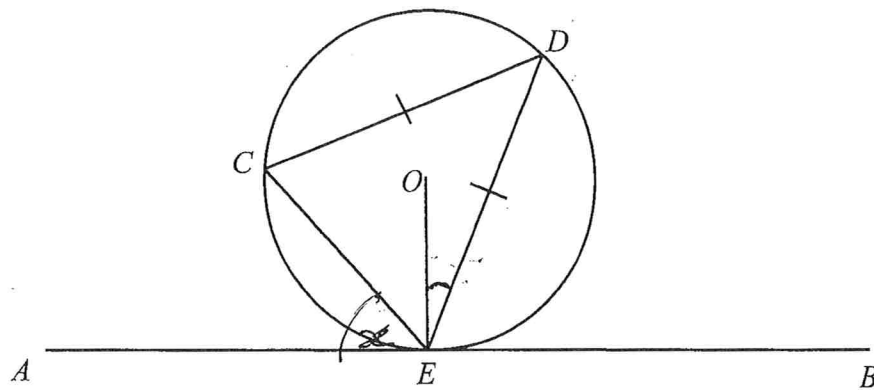
C, D and E are points on a circle, centre O.
AEB is a tangent to the circle at E.

CD = DE
Angle AEC = x°

Find the size of angle OED, in terms of x.
Give reasons for each stage of your working.

$CDE = x$ Alternate segment theorem

$CED = \dfrac{180 - x}{2}$ Angles at the base of an isosceles triangle are equal

$OEC = 90 - x$ $OEA = 90°$ Tangent meets radius at 90°

$OED = \dfrac{180 - x}{2} - (90 - x)$

$= 90 - \tfrac{1}{2}x - 90 + x$

$= \tfrac{1}{2}x$

(Total for Question 18 is 5 marks)

1   The diagram shows two shapes on a centimetre grid.
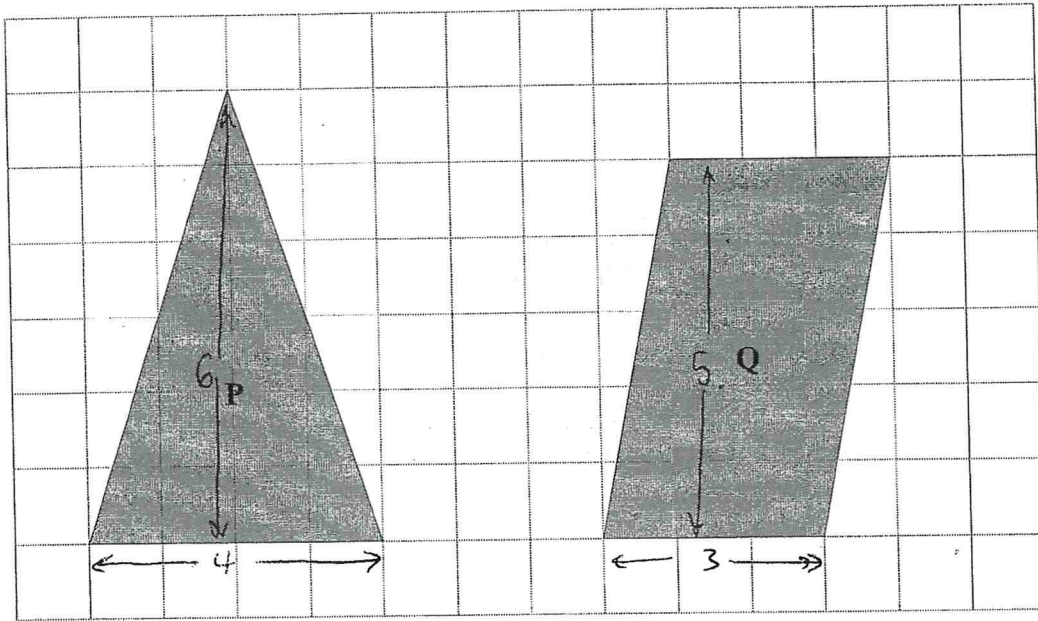
(a) Find the area of shape **P**

$$\frac{base \times height}{2} \qquad \frac{4 \times 6}{2} = 12 \, cm^2$$

_____12_____ cm²

(b) Write down the mathematical name for shape **Q**.

_____parallelogram_____

(c) Find the area of shape **Q**.

$$base \times height$$

$$3 \times 5 = 15 \, cm^2$$

_____15_____ cm²

(Total for question 1 is 3 marks)

2 The length of a rectangle is two times the width of the rectangle.
The perimeter of the rectangle is 24 cm.

Draw the rectangle on the centimetre grid.

4×8

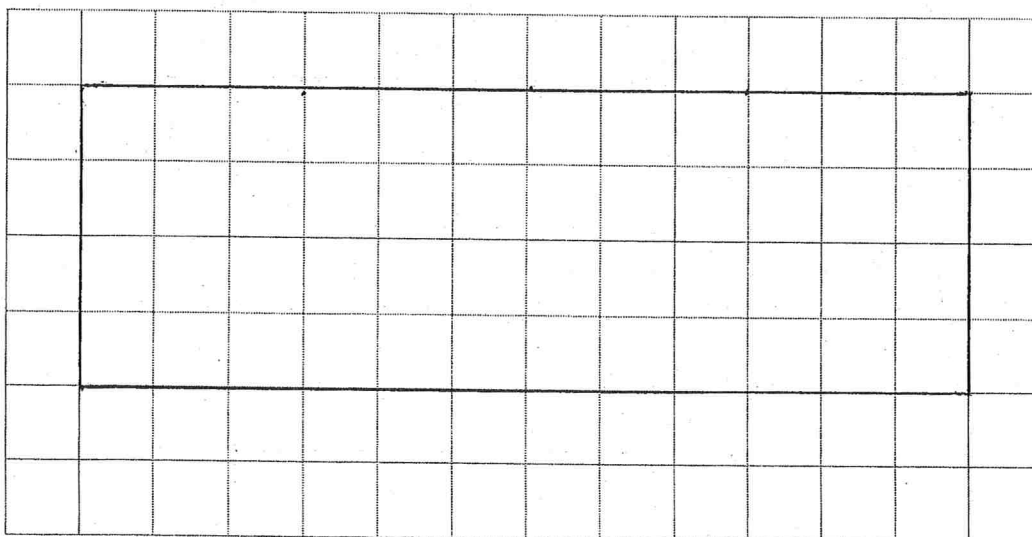| width	length	perimeter
2	4	12
3	6	18
4	8	24 ✓
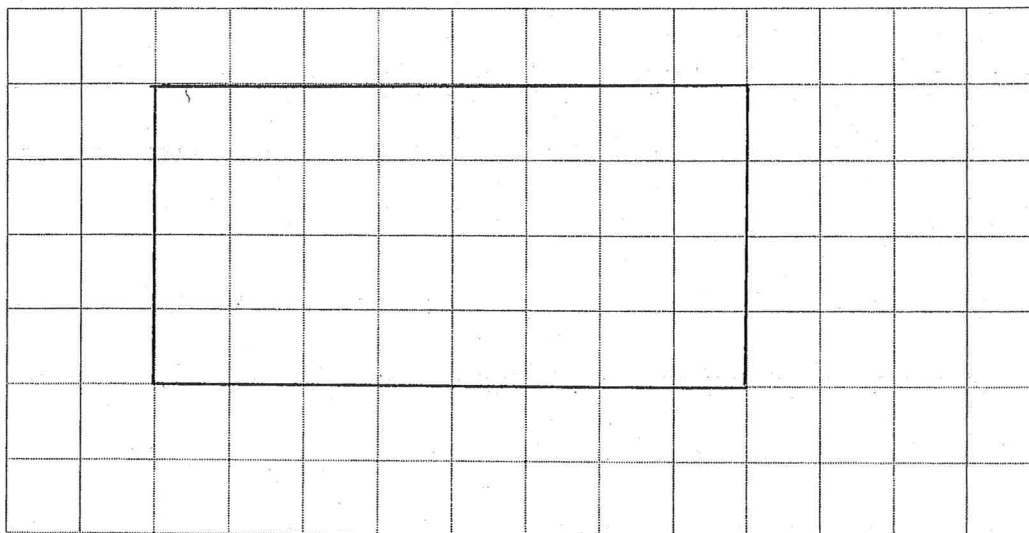
(Total for question 2 is 2 marks)

3 The length of a rectangle is three times the width of the rectangle.
The area of the rectangle is 48 cm².

Draw the rectangle on the centimetre grid.

4×12

width	length	area
2	6	12
3	9	27
4	12	48 ✓

(Total for question 3 is 2 marks)

4 The base of a triangle twice the height of the triangle.
The area of a triangle is 16 cm².

Draw the triangle on the centimetre grid.

$$\frac{base \times height}{2} = 16$$

$base \times height = 32$

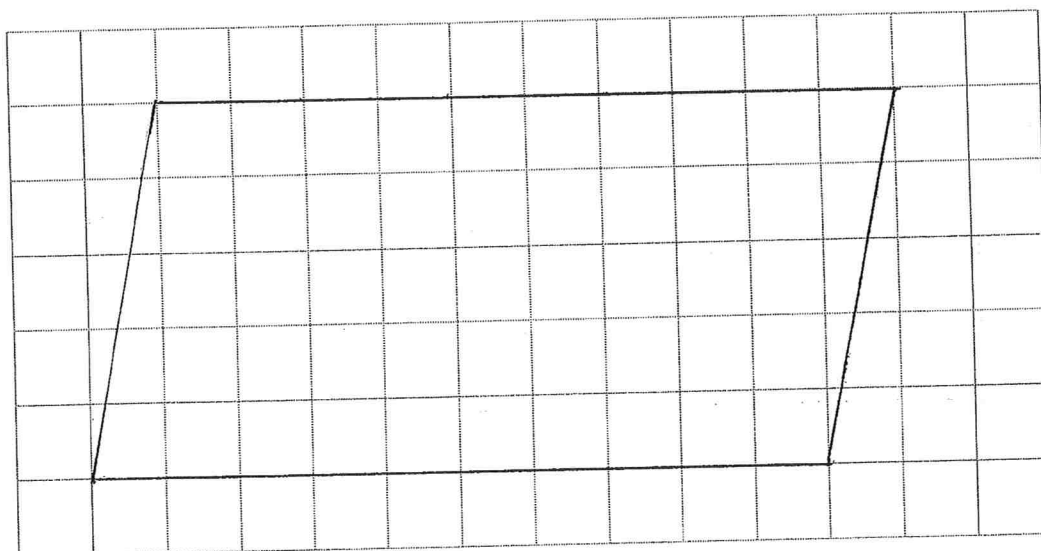| height	base	base × height area
2	4	8
3	6	18
4	8	32 ✓
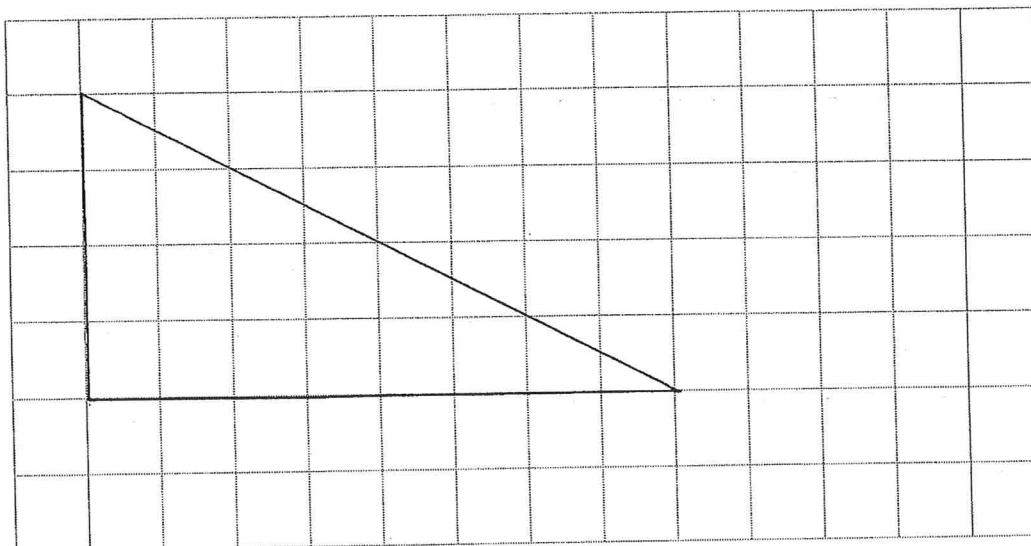
(Total for question 4 is 2 marks)

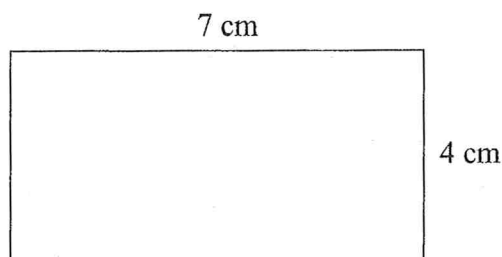**5** The base of a parallelogram twice the perpendicular height of the parallelogram.
The area of the parallelogram is 50 cm².

Draw the parallelogram on the centimetre grid.

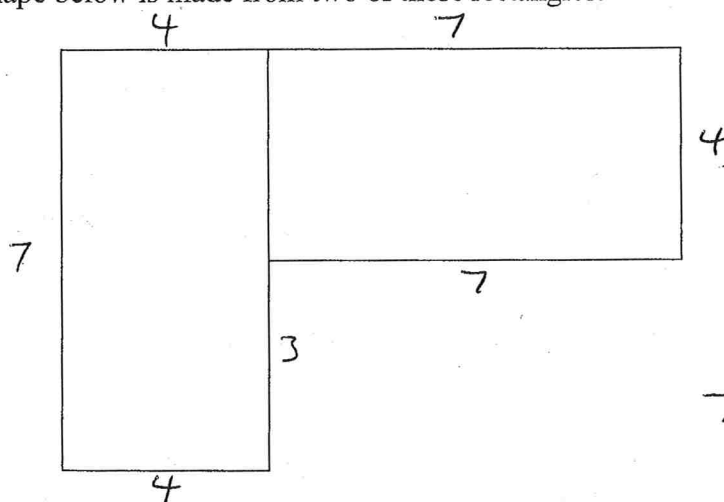| base	height	area
6	3	18
8	4	32
10	5	50 ✓

(Total for question 5 is 2 marks)

6 Here is a rectangle.

7 cm

4 cm

The six-sided shape below is made from two of these rectangles.
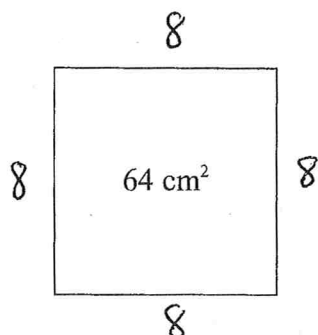
4

7

4

7

7

3

$7 - 4 = 3$

4

Work out the perimeter of this six-sided shape.

$7 + 4 + 7 + 4 + 7 + 3 + 4$

_____36_____ cm

(Total for question 6 is 3 marks)

7 A square has an area of 64 cm².

8

8   64 cm²   8

8

$8 \times 8 = 64$

Find the perimeter of the square.

$4 \times 8 = 32$

_____32_____ cm

(Total for question 7 is 2 marks)

1
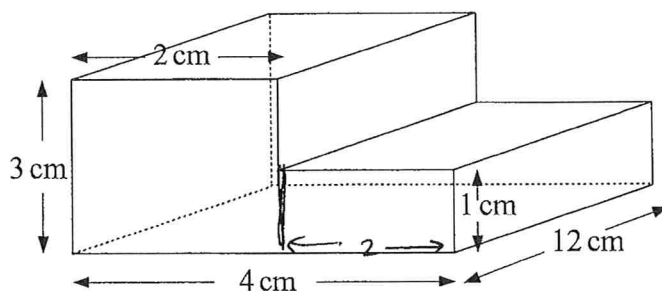
The diagram shows a prism.
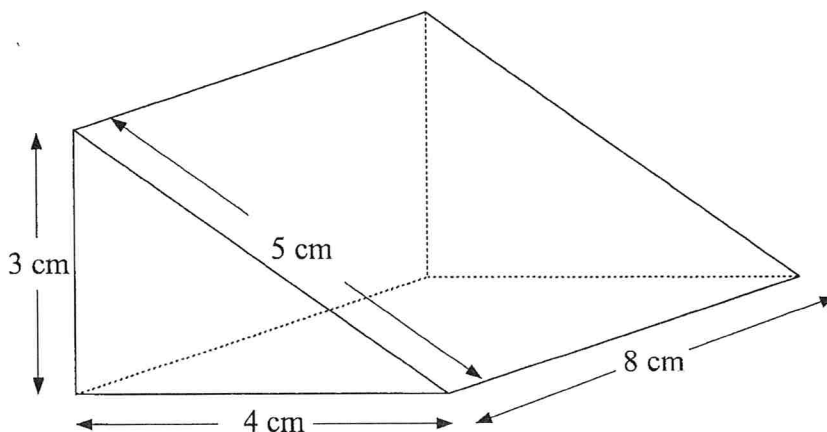
Work out the volume of the prism.

Area of cross section = 3 × 2 + 2 × 1

= 6 + 2

= 8 cm²

Volume = 8 × 12

= 96 cm³

...................96...............cm³

(Total for question 1 is 3 marks)

2

The diagram shows a triangular prism.
The cross-section of the prism is a right angled triangle.
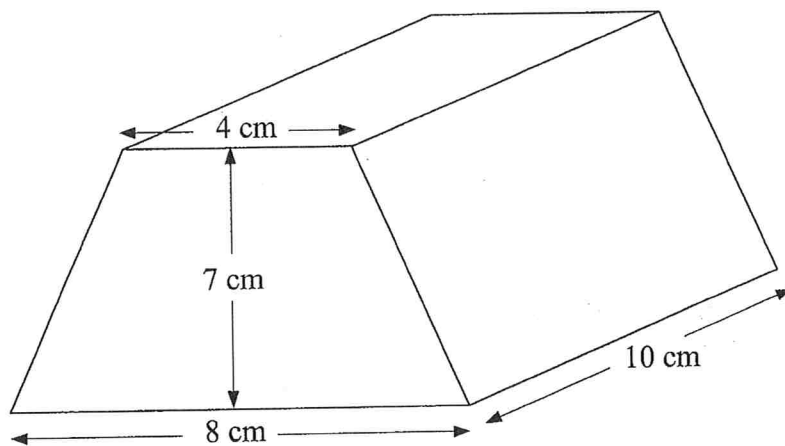
Calculate the volume of the prism.

Area of cross section = $\frac{3 \times 4}{2}$ = 6 cm²

Volume = 6 × 8

= 48 cm³

...................48...............cm³

(Total for question 2 is 3 marks)

3

The diagram shows a prism.
The cross-section of the prism is a trapezium.
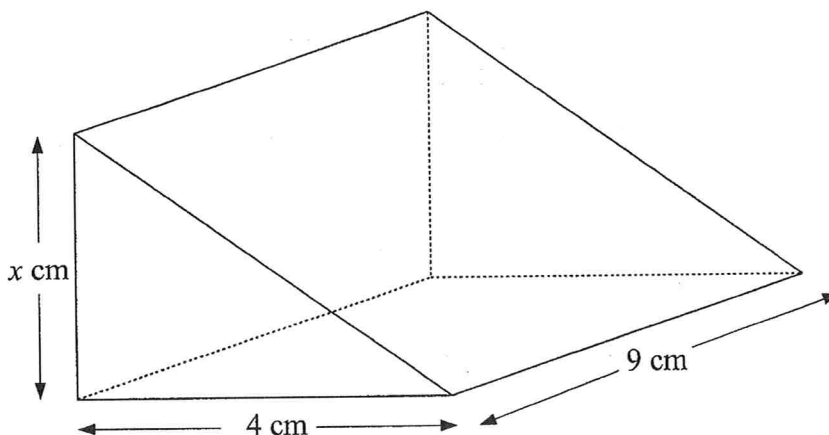
Work out the volume of the prism.

$$\text{Area of cross section} = \frac{1}{2}(4+8) \times 7$$
$$= 6 \times 7$$
$$= 42 \text{ cm}^2$$

$$\text{Volume} = 42 \times 10$$
$$= 420 \text{ cm}^3$$

..................**420**..................cm³

(Total for question 3 is 3 marks)

4

The diagram shows a triangular prism.
The cross-section of the prism is a right angled triangle.

The volume of the prism is 198 cm³

Calculate the value of x
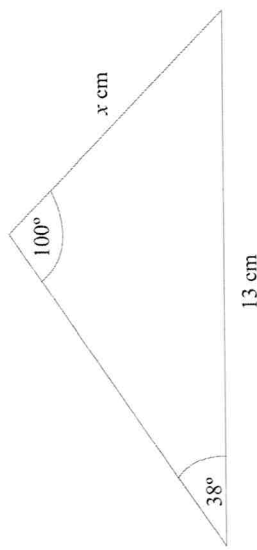
$$\text{Area of cross section} = \frac{4x}{2} = 2x$$

$$\text{Volume} = 2x \times 9 = 18x$$

$$18x = 198$$
$$x = \frac{198}{18} = \frac{99}{9} = 11 \text{ cm}$$

..................**11**..................

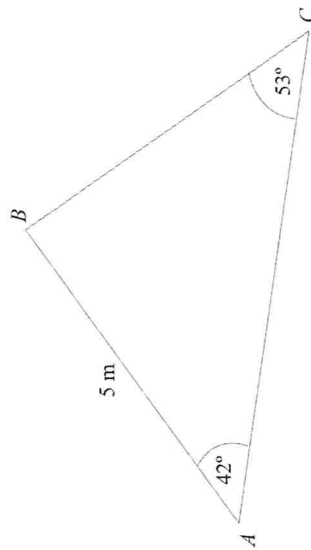**(Total for question 4 is 3 marks)**

Mathsgenie.co.uk

Please do not write on this sheet

1.

100º

x cm

38º

13 cm

Work out the value of x.
Give your answer to 1 decimal place.

(3 marks)

2.

B

5 m

C

53º

A

42º

Work out the length of BC.
Give your answer to 3 significant figures.
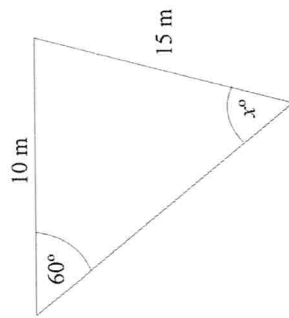
(3 marks)

3.

6.7 cm

5.4 cm

xº

95º
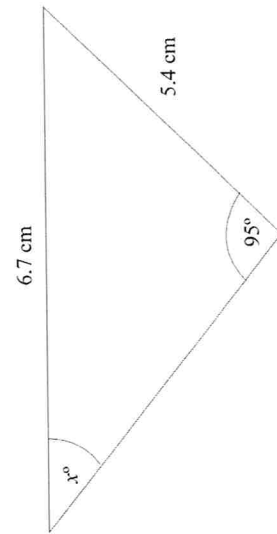
Work out the value of x.
Give your answer to 3 significant figures.

(3 marks)

4.

10 m

15 m

60º

xº

Work out the size of angle
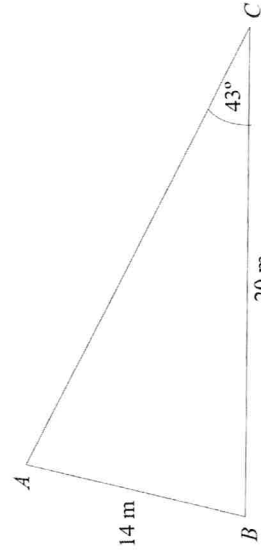Give your answer to 3 significant figures.

(3 marks)

5.

C

20º

12 cm

A

55º

B

Work out the length of AC.
Give your answer to 1 decimal place.

(3 marks)

6.

C

43º

20 m

A

14 m

B

Work out the size of angle *BAC*.
Give your answer to 3 significant figures.

(3 marks)

Sine Rule

Grade 7

1 $\dfrac{a}{\sin A} = \dfrac{b}{\sin B}$

100°

x cm

38°

13 cm

Work out the value of *x*.
Give your answer to 1 decimal place.

$$\dfrac{x}{\sin(38)} = \dfrac{13}{\sin(100)}$$

$$x = \dfrac{13}{\sin(100)} \times \sin(38)$$

$$= 8.1 \ (1dp)$$

8.1

(Total for question 1 is 3 marks)

2

B

5 m

x

42°

A

53°

C
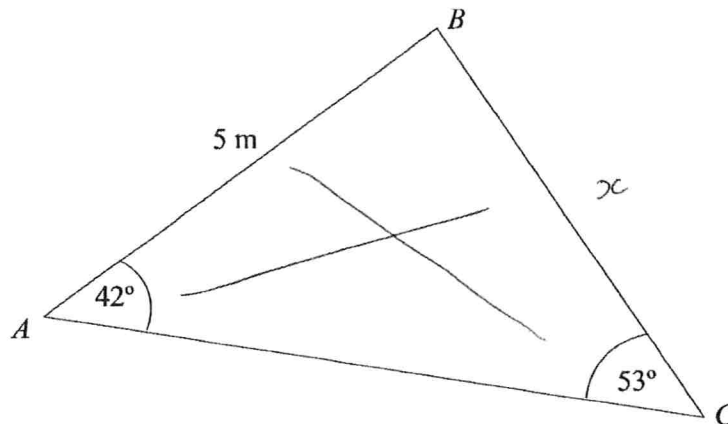
Work out the length of BC.
Give your answer to 3 significant figures.

$$\dfrac{x}{\sin(42)} = \dfrac{5}{\sin(53)}$$
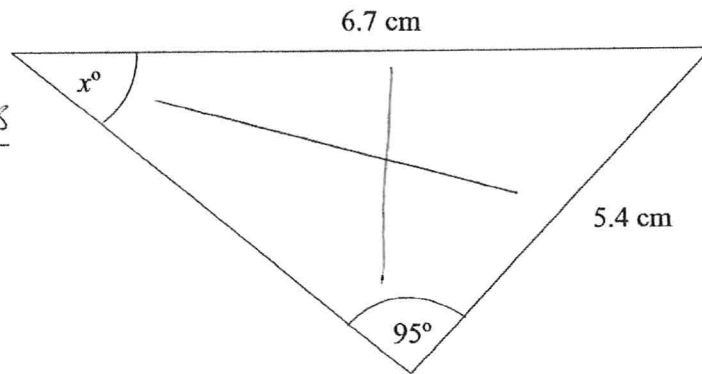
$$x = \dfrac{5}{\sin(53)} \times \sin(42)$$

$$= 4.19 \ (3sf)$$

4.19 m

(Total for question 2 is 3 marks)

3

6.7 cm

$x°$

5.4 cm

95°

$$\frac{\sin A}{a} = \frac{\sin B}{b}$$

Work out the value of x.
Give your answer to 3 significant figures.

$$\frac{\sin x}{5.4} = \frac{\sin(95)}{6.7}$$

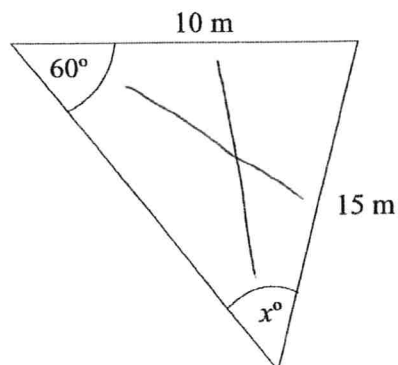$$\sin x = \frac{\sin(95)}{6.7} \times 5.4$$

$$= 0.8029 \cdots$$

$$x = \sin^{-1}(Ans)$$

$$= 53.4 \quad (3sf)$$

53.4

(Total for question 3 is 3 marks)

4

10 m

60°

15 m

$x°$

Work out the size of angle x.
Give your answer to 3 significant figures.

$$\frac{\sin x}{10} = \frac{\sin 60}{15}$$

$$\sin x = \frac{\sin(60)}{15} \times 10$$
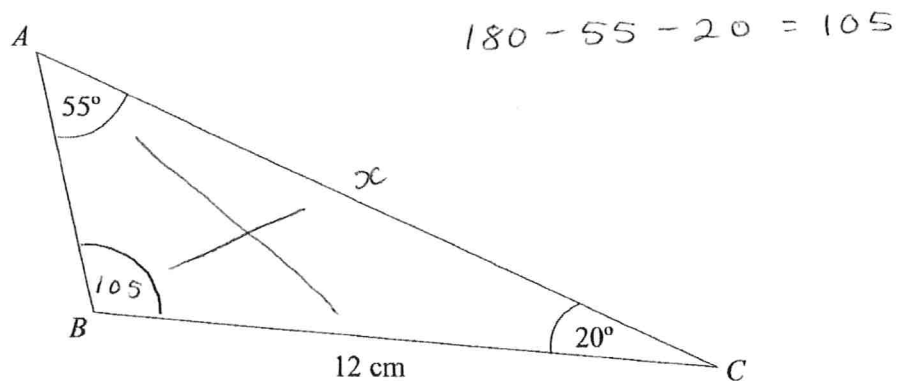
$$\sin x = \frac{\sqrt{3}}{3}$$

$$x = \sin^{-1}(Ans)$$

$$= 35.3 \quad (3sf)$$

35.3

(Total for question 4 is 3 marks)

5

$180 - 55 - 20 = 105$

Work out the length of AC.
Give your answer to 1 decimal place.

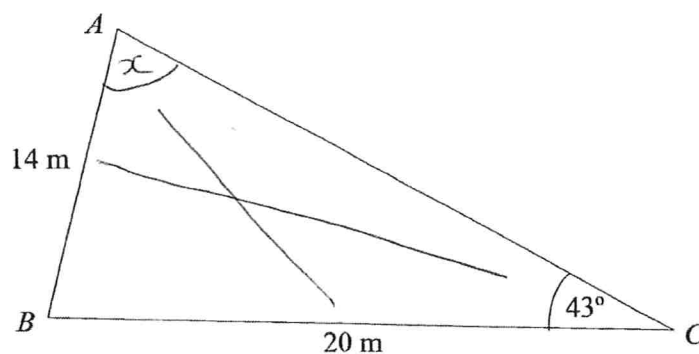$$\frac{x}{\sin(105)} = \frac{12}{\sin(55)}$$

$$x = \frac{12}{\sin(55)} \times \sin(105)$$

$$= 14.2 \quad (1dp)$$

....14.2....cm

(Total for question 5 is 3 marks)

6

Work out the size of angle *BAC*.
Give your answer to 3 significant figures.

$$\frac{\sin x}{20} = \frac{\sin(43)}{14}$$

$$\sin x = \frac{\sin(43)}{14} \times 20$$
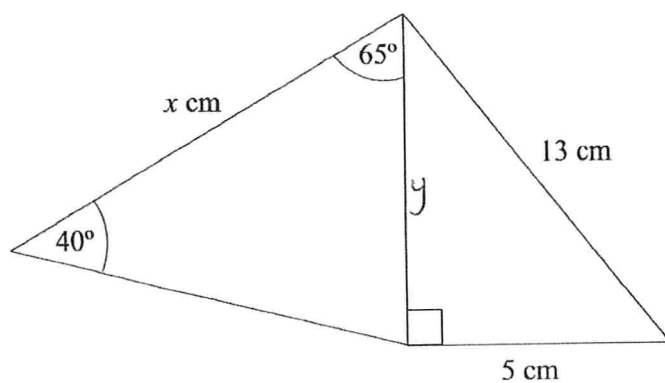
$$\sin x = 0.97428\ldots$$
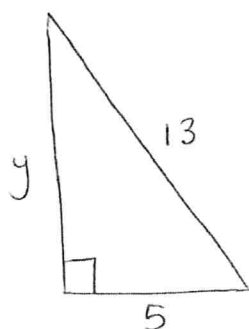
$$x = \sin^{-1}(Ans)$$

$$= 77.0 \quad (3sf)$$

....77.0....°

(Total for question 6 is 3 marks)

7

65°

x cm

13 cm

y

40°

5 cm

Work out the value of *x*.
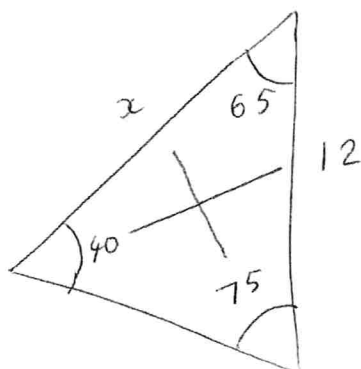Give your answer to 1 decimal place.

13

y

5

$$y^2 + 5^2 = 13^2$$

$$y^2 = 13^2 - 5^2$$

$$y^2 = 144$$

$$y = 12$$

$$180 - 65 - 40 = 75$$

x   65

12

40

75
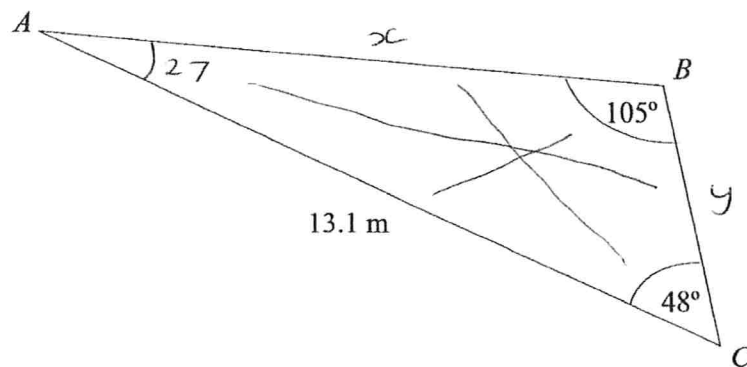
$$\frac{x}{\sin(75)} = \frac{12}{\sin(40)}$$

$$x = \frac{12}{\sin(40)} \times \sin(75)$$

$$= 18.0 \ (1dp)$$

18.0

(Total for question 7 is 5 marks)

8

Work out the perimeter of triangle *ABC*.
Give your answer to 3 significant figures.

$180 - 105 - 48 = 27$

$$\frac{x}{\sin(48)} = \frac{13.1}{\sin(105)}$$

$$x = \frac{13.1}{\sin(105)} \times \sin(48)$$

$$= 10.07861779$$

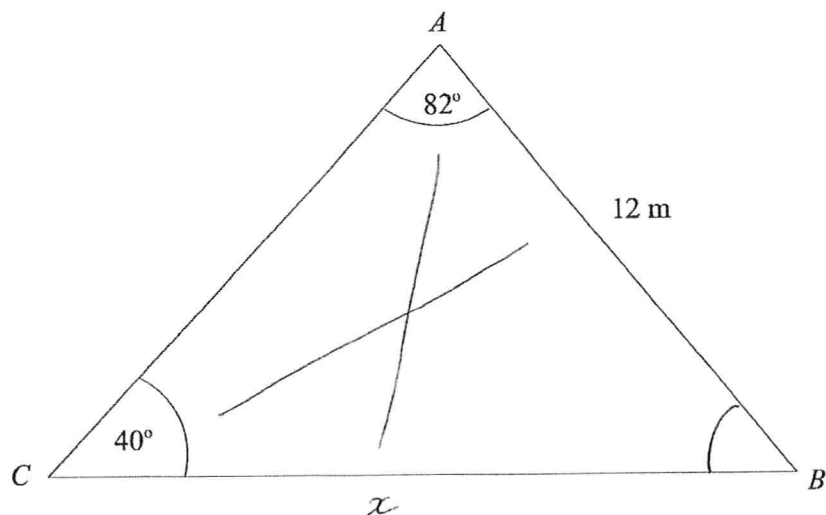$$\frac{y}{\sin(27)} = \frac{13.1}{\sin(105)}$$

$$y = \frac{13.1}{\sin(105)} \times \sin(27)$$

$$= 6.157072712$$

$$x + y + 13.1 = 29.3 \, m \, (3sf)$$

29.3 m

(Total for question 8 is 4 marks)

9

A

82°

12 m

40°

C

B

x

Work out the area of triangle *ABC*

Give your answer to 1 decimal place.

$$\frac{x}{\sin(82)} = \frac{12}{\sin(40)}$$

$$x = \frac{12}{\sin(40)} \times \sin(82)$$

$$x = 18.487\ldots$$

Angle $ABC = 180 - 82 - 40$

$$= 58$$

$$\text{Area} = \frac{1}{2}(18.487\ldots)(12)\sin(58)$$

$$= \underline{94.1 \ m^2} \quad 1dp$$

94.1 ....m²

(Total for question 9 is 5 marks)

10

B

x

12 cm

A

20 cm

35°

C
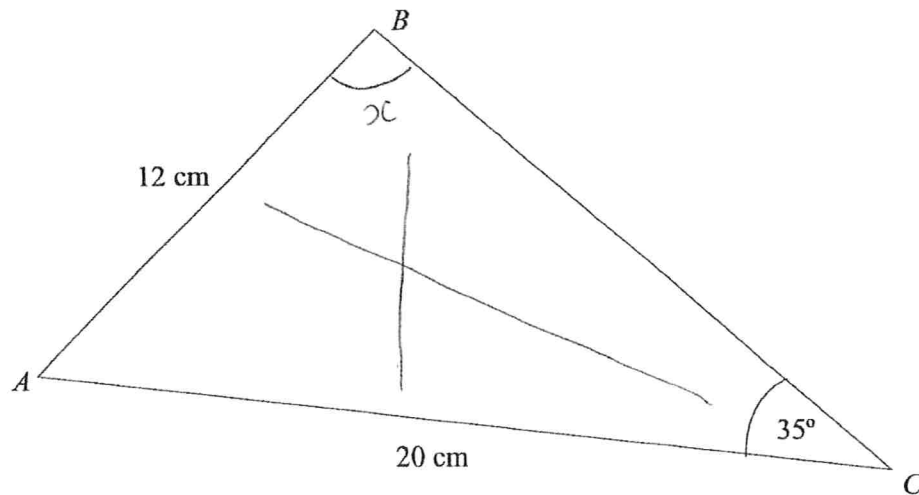
Angle *ABC* is obtuse.
Work out the size of angle *ABC*.
Give your answer to 3 significant figures.

$$\frac{\sin x}{20} = \frac{\sin(35)}{12}$$
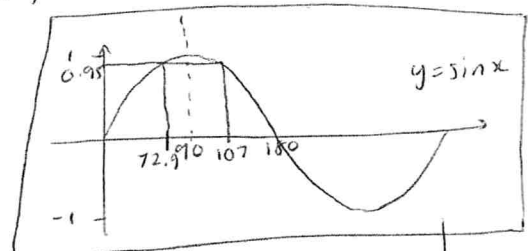
$$\sin(x) = \frac{\sin(35)}{12} \times 20$$

$$\sin(x) = 0.95596...$$

$$x = \sin^{-1}(\text{Ans})$$

$$= 72.9$$

But ABC is obtuse...

0.95 $y = \sin x$

72.9 90 107 180

-1

$$180 - 72.9 = 107 \quad (3sf)$$

The sine graph is symmetrical about 90°

.......107....... °

(Total for question 10 is 4 marks)

1

100°
A

b
13 cm

10 cm *c*

x cm
a
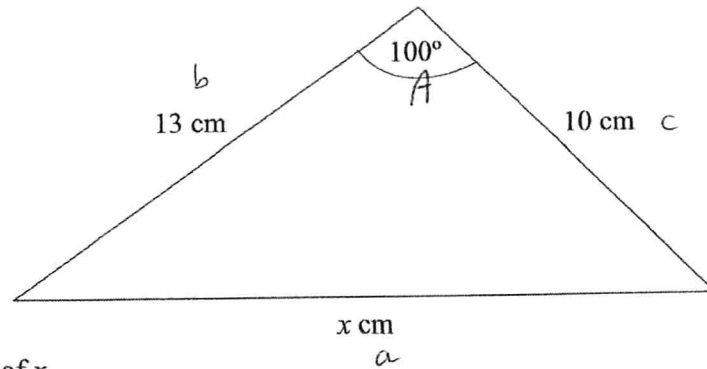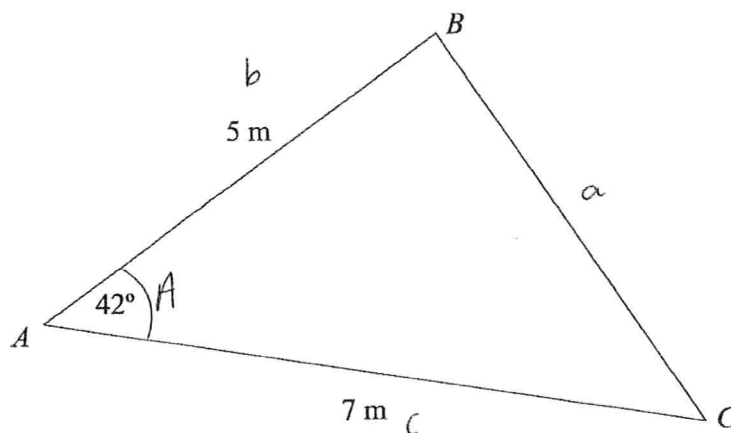
Work out the value of *x*.
Give your answer to 1 decimal place.

$$a^2 = b^2 + c^2 - 2bc \cos A$$
$$x^2 = (13)^2 + (10)^2 - 2(13)(10) \cos (100)$$
$$x^2 = 314.1485...$$
$$x = \sqrt{Ans}$$
$$= 17.7 \ (1dp)$$

17.7

(Total for question 1 is 3 marks)

2

B

b
5 m

a

42° *A*

A

7 m *c*

C
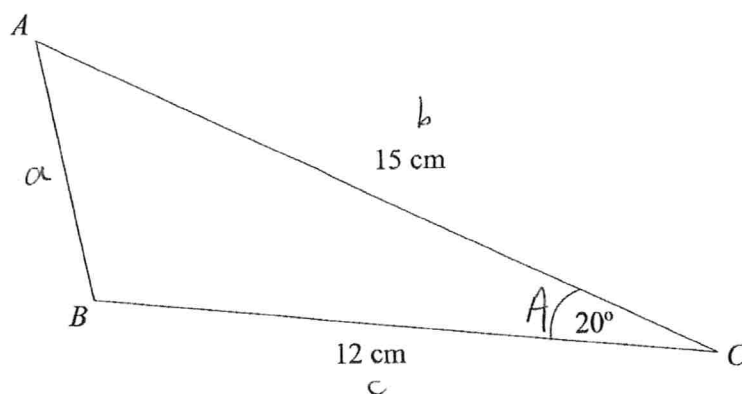
Work out the length of BC.
Give your answer to 3 significant figures.

$$a^2 = (5)^2 + (7)^2 - 2(5)(7) \cos (42)$$
$$a^2 = 21.97986...$$
$$a = \sqrt{Ans}$$
$$= 4.69 \ (3sf)$$

4.69 m

(Total for question 2 is 3 marks)

3

A

a

b

15 cm

B

A 20°

12 cm

c

C

Work out the length of AB.
Give your answer to 1 decimal place.

$$a^2 = (15)^2 + (12)^2 - 2(15)(12)\cos(20)$$
$$a^2 = 30.7106\ldots$$
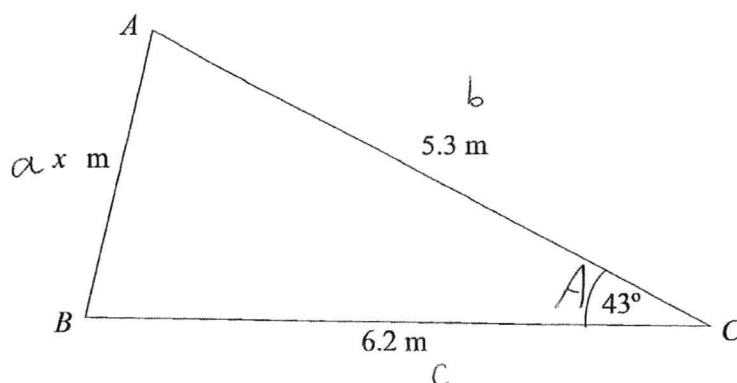$$a^2 = \sqrt{Ans}$$
$$a = 5.5 \ (1dp)$$

5.5 cm

(Total for question 3 is 3 marks)

4

A

a x m

b

5.3 m

B

A 43°

6.2 m

c

C

Work out the value of x.
Give your answer to 3 significant figures.

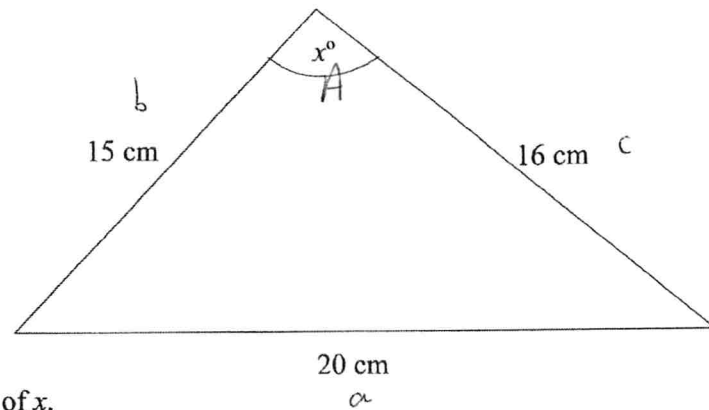$$x^2 = (5.3)^2 + (6.2)^2 - 2(5.3)(6.2)\cos(43)$$
$$x^2 = 18.4654\ldots$$
$$x = \sqrt{Ans}$$
$$x = 4.30 \ (3sf)$$

4.30

(Total for question 4 is 3 marks)

5

15 cm b

$x°$ A

16 cm c

20 cm
a

Work out the value of x.
Give your answer to 3 significant figures.

$$\cos A = \frac{b^2 + c^2 - a^2}{2bc}$$

$$\cos x = \frac{(15)^2 + (16)^2 - (20)^2}{2(15)(16)}$$
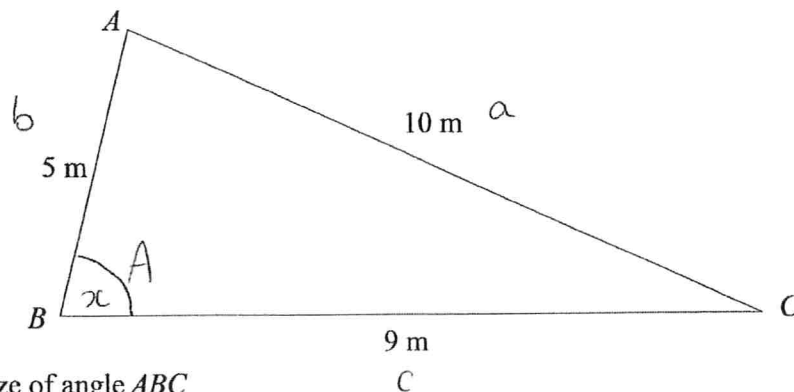
$$\cos x = \frac{27}{160}$$

$$x = \cos^{-1}(Ans)$$

$$= 80.3 \ (3sf)$$

..........80.3..........

(Total for question 5 is 3 marks)

6

A

b

5 m

10 m a

A

B

x

9 m
c

C

Work out the size of angle ABC
Give your answer to the nearest degree.

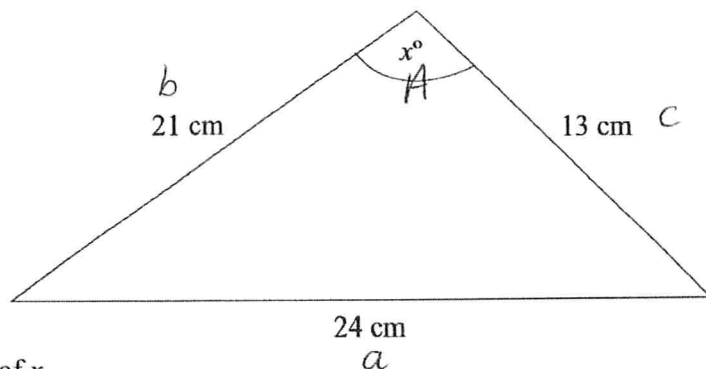$$\cos x = \frac{(5)^2 + (9)^2 - (10)^2}{2(5)(9)}$$

$$\cos x = \frac{i}{15}$$

$$x = \cos^{-1}(Ans)$$

$$= 86 \ (Nearest \ degree)$$

..........86.......... °

(Total for question 6 is 3 marks)

7

b
21 cm

$x°$
A

13 cm C

24 cm
a

Work out the value of x.
Give your answer to 1 decimal place.

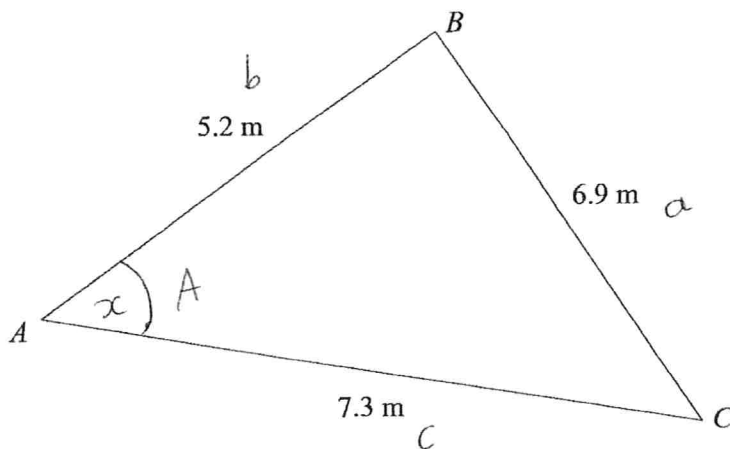$$\cos x = \frac{(21)^2 + (13)^2 - (24)^2}{2(21)(13)}$$

$$\cos x = \frac{17}{273}$$

$$x = \cos^{-1}(Ans)$$

$$= 86.4 \ (1dp)$$

.....86.4.....

(Total for question 7 is 3 marks)

8

B

b
5.2 m

6.9 m a

x A

A

7.3 m
C

C

Work out the size of angle BAC.
Give your answer to 3 significant figures.

$$\cos x = \frac{(5.2)^2 + (7.3)^2 - (6.9)^2}{2(5.2)(7.3)}$$
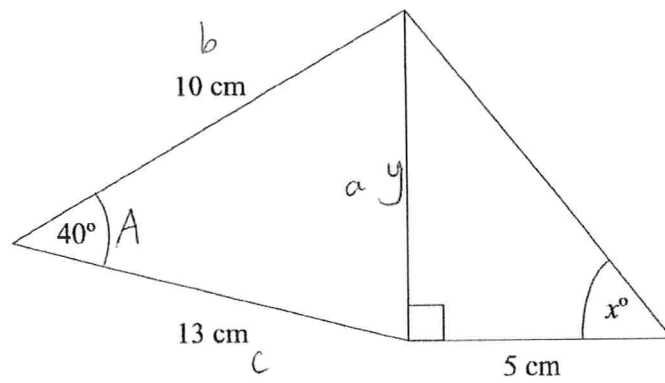
$$\cos x = \frac{409}{949}$$

$$x = \cos^{-1}(Ans)$$

$$= 64.5 \ (3sf)$$

.....64.5..... °

(Total for question 8 is 3 marks)

9

b
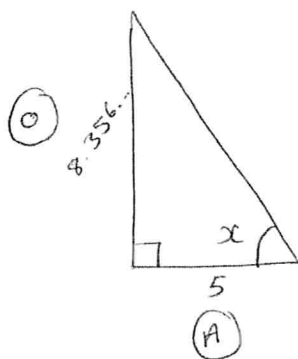10 cm

a y

40° A

13 cm
C

x°

5 cm

Work out the value of x.
Give your answer to 1 decimal place.

$$y^2 = (10)^2 + (13)^2 - 2(10)(13) \cos(40)$$

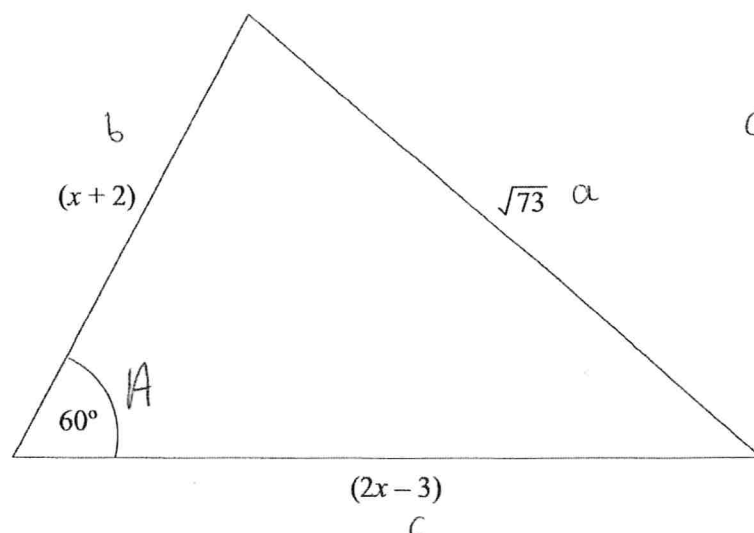$$y^2 = 69.828\ldots$$

$$y = \sqrt{Ans}$$

$$y = 8.35634159\,1$$

$$\tan x = \frac{Ans}{5}$$

$$x = \tan^{-1}\left(\frac{Ans}{5}\right)$$

$$= 59.1° \quad (1dp)$$

59.1

(Total for question 9 is 5 marks)

10

$\cos 60 = \frac{1}{2}$

Work out the value of x.

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

$$73 = (x+2)^2 + (2x-3)^2 - 2(x+2)(2x-3)\cos(60)$$

$$73 = (x+2)(x+2) + (2x-3)(2x-3) - (x+2)(2x-3)$$

$$73 = x^2 + 2x + 2x + 4 + 4x^2 - 6x - 6x + 9 - (2x^2 - 3x + 4x - 6)$$

$$73 = 5x^2 - 8x + 13 - (2x^2 + x - 6)$$

$$73 = 3x^2 - 9x + 19$$

$$0 = 3x^2 - 9x - 54$$

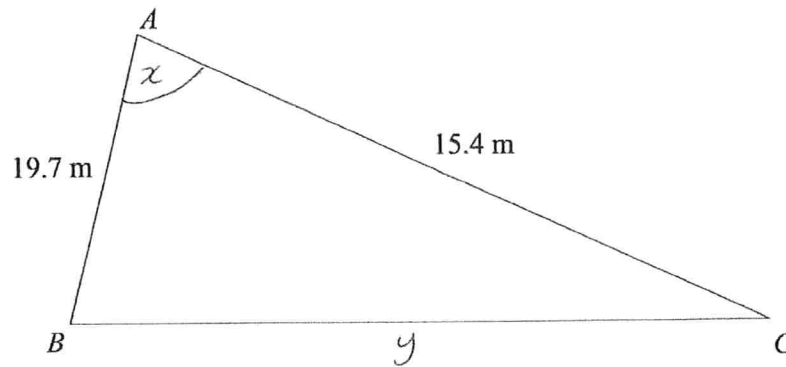$$0 = x^2 - 3x - 18$$

$$0 = (x - 6)(x + 3)$$

$$x = 6 \qquad x = -3$$

x cannot $= -3$ as the lengths would be negative.

$$\underline{\underline{x = 6}}$$

6

(Total for question 10 is 5 marks)

11

A

x

19.7 m

15.4 m

B   y   C

The area of the triangle is 100m²
Calculate the perimeter of triangle *ABC*.
Give your answer to 3 significant figures.

$$\frac{1}{2} \, a \, b \, \sin C = 100$$

$$\frac{1}{2}(19.7)(15.4) \sin x = 100$$

$$151.69 \, \sin x = 100$$

$$\sin x = \frac{100}{151.69}$$

$$x = \sin^{-1}\left(\frac{100}{151.69}\right)$$

$$= 41.24187853$$

$$y^2 = (19.7)^2 + (15.4)^2 - 2(19.7)(15.4) \cos(41.24187...)$$

$$y^2 = 169.0069753$$

$$y = \sqrt{Ans}$$

$$= 13.0 \quad (3sf)$$

$$Perimeter = 19.7 + 15.4 + 13.0$$

$$= 48.1 \, m$$

48.1 ....m

(Total for question 11 is 5 marks)

1   Given that $P(A) = 0.9$, find $P(A')$

$1 - 0.9$

.............................0.1.............................

(Total for question 1 is 1 mark)

2   Shade the region that represents $(A \cap B)$
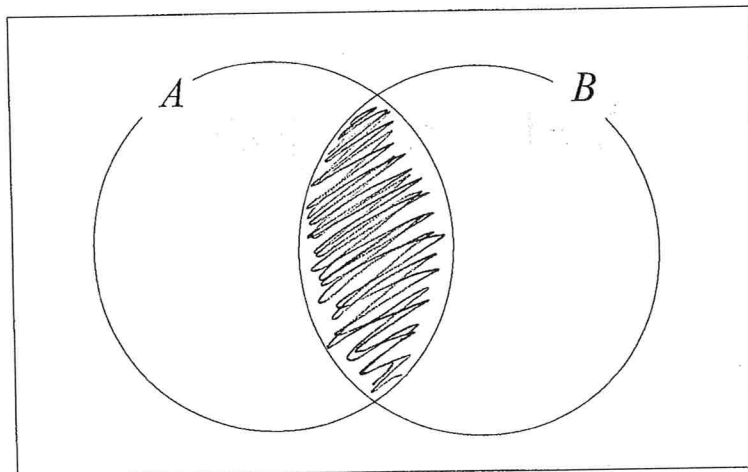
(Total for question 2 is 1 mark)

3   Shade the region that represents $(A \cup B)$
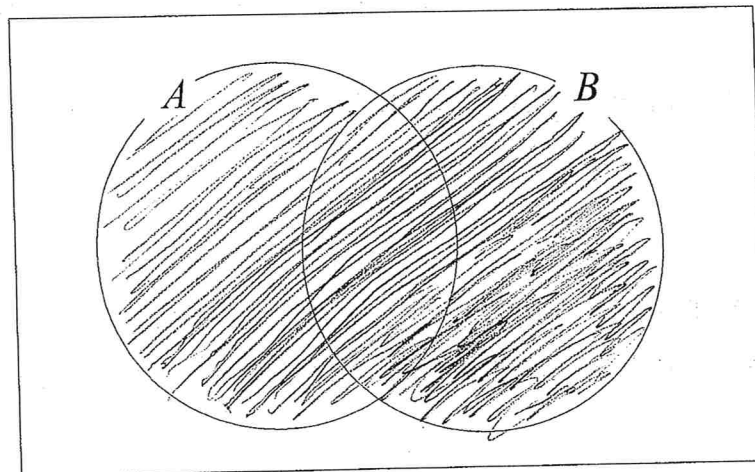

(Total for question 3 is 1 mark)

4 Shade the region that represents $(A' \cap B')$
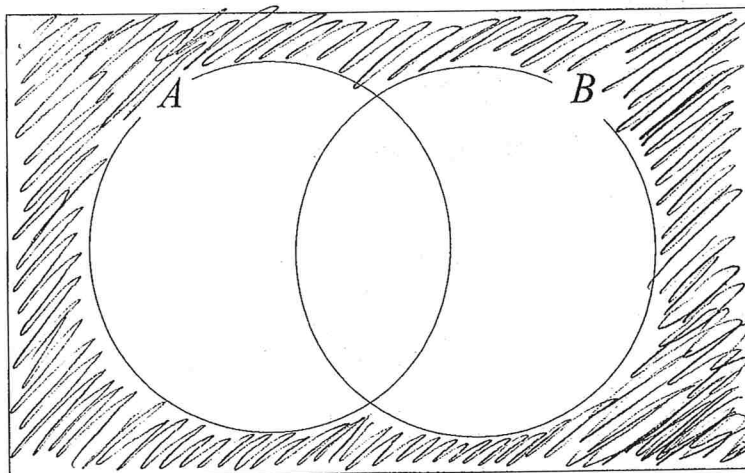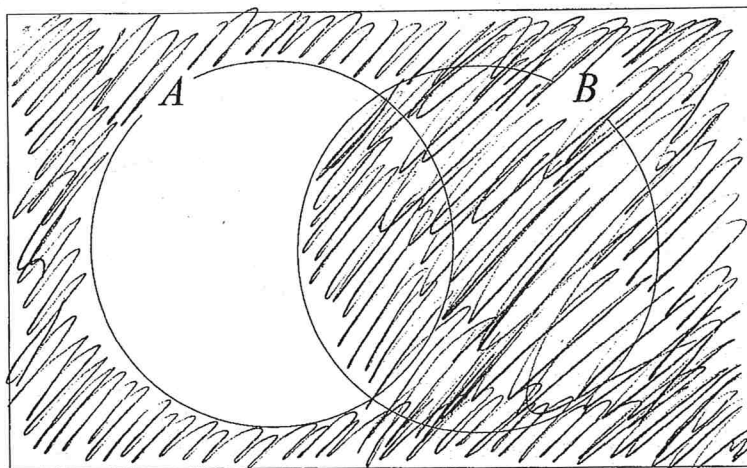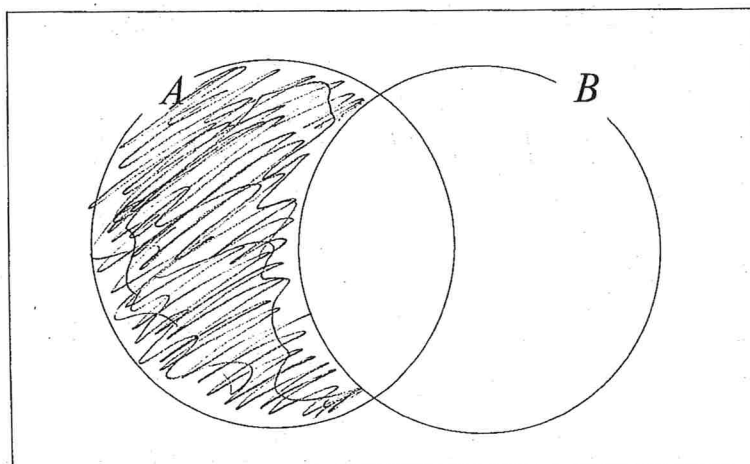

(Total for question 4 is 1 mark)

5 Shade the region that represents $(A' \cup B)$

(Total for question 5 is 1 mark)

6 Shade the region that represents $(A \cap B')$
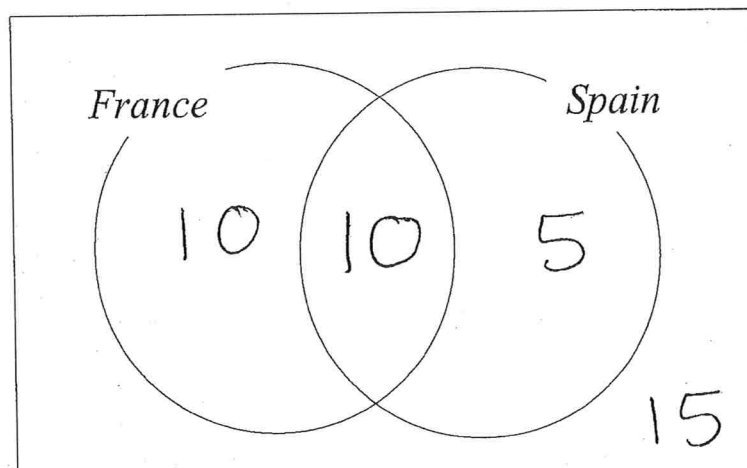

(Total for question 6 is 1 mark)

7 40 students were surveyed:

 20 have visited France
 15 have visited Spain
 10 have visited both France and Spain

Use this information to complete the Venn Diagram

France   Spain

10   10   5

15

(Total for question 7 is 3 marks)

8 Out of 50 people surveyed:
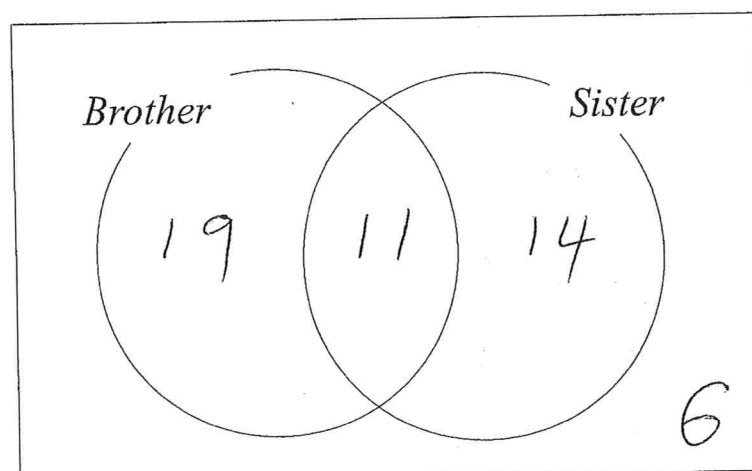
 30 have a brother   55
 25 have a sister
 6 have neither a brother or a sister

Use this information to complete the Venn Diagram

$$55 - 44 = 11$$

Brother   Sister

19   11   14

6

(Total for question 8 is 3 marks)

9   Sami asked 50 people which drinks they liked from tea, coffee and milk.

All 50 people like at least one of the drinks
19 people like all three drinks.
16 people like tea and coffee but do not like milk.
21 people like coffee and milk.
24 people like tea and milk.
40 people like coffee.
1 person likes only milk.

Sami selects at random one of the 50 people.

Work out the probability that this person likes tea.
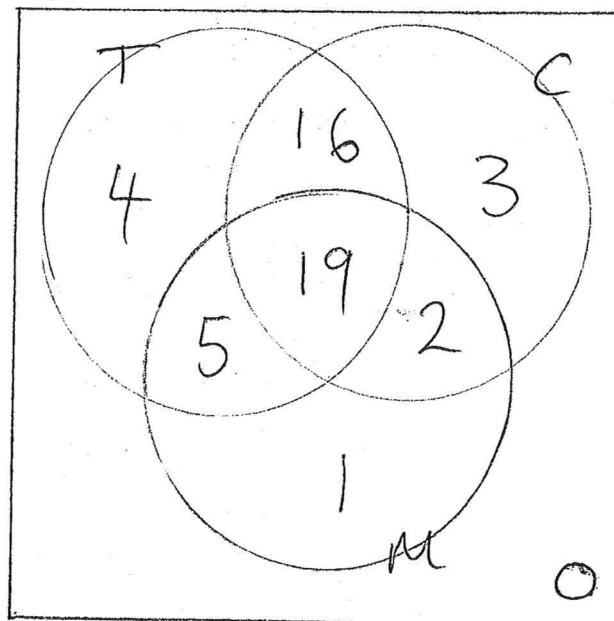
$$\frac{44}{50}$$

....

(Total for question 9 is 4 marks)

10   Sami asked 60 people which sports they liked from rugby, football and cricket.

8 people like all three sports.
17 people like rugby and football.
13 people like football and cricket.
19 people like rugby and cricket.
35 people like football.
27 people like cricket
30 people like rugby.

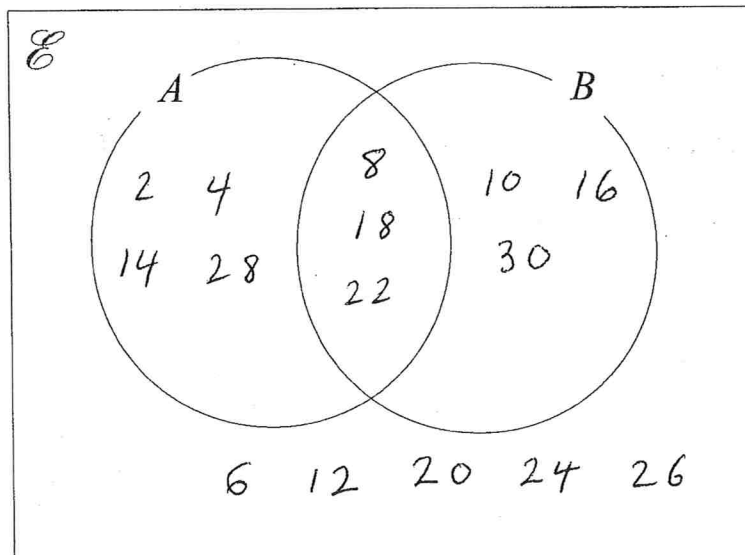a) How many people liked neither rugby or football or cricket?
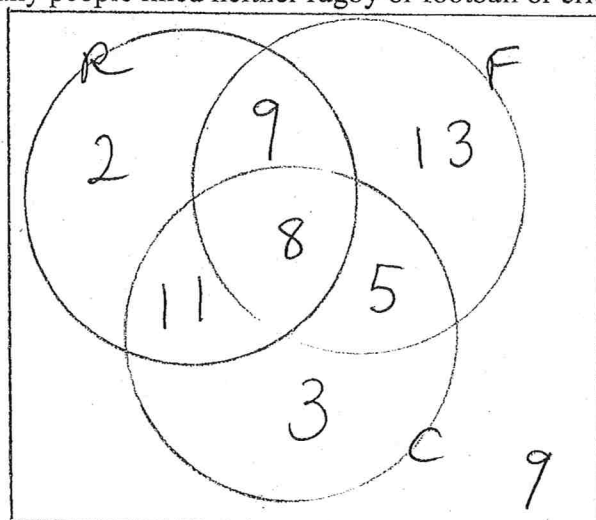
9

....

(Total for question 10 is 4 marks)

11 $\mathscr{E}$ = {even numbers between 1 and 31}
   A = {2, 4, 8, 14, 18, 22, 28}
   B = {8, 10, 16, 18, 22, 30}

(a) Complete the Venn diagram to represent this information.

(4)

A number is chosen at random from the universal set, $\mathscr{E}$

(b) What is the probability that the number is in the set $A \cup B$?

$$\frac{10}{15}$$

....
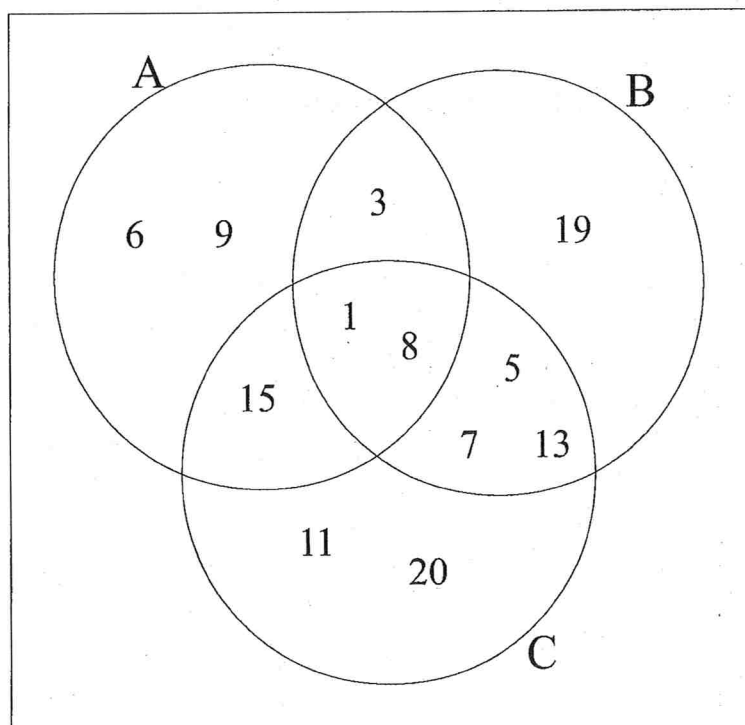
(2)

(Total for question 11 is 6 marks)

$$\left[\frac{2}{3} \right]$$

12 Here is a Venn diagram.

(a) List the members of A ∩ B

......1, 3 and 8......

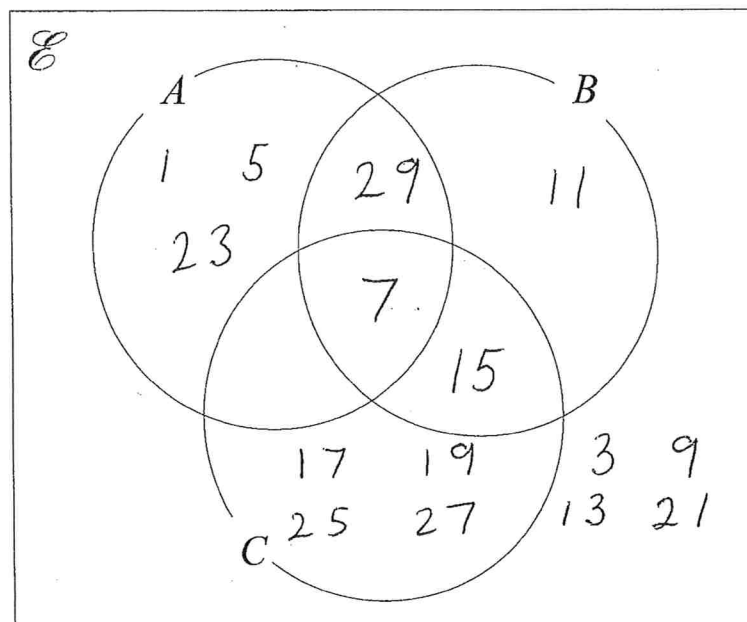A number is chosen at random from $\mathcal{E}$

(b) Find $P(B \cup C)$

$$\frac{10}{12}$$

......

(Total for question 12 is 3 marks)

$$\left[\frac{5}{6}\right]$$

13 $\mathscr{E}$ = {odd numbers less than 30}

$A = \{1, 5, 7, 23, 29\}$
$B = \{7, 11, 15, 29\}$
$C = \{7, 15, 17, 19, 25, 27\}$

(a) Complete the Venn diagram to represent this information.

A number is chosen at random from $\mathscr{E}$.

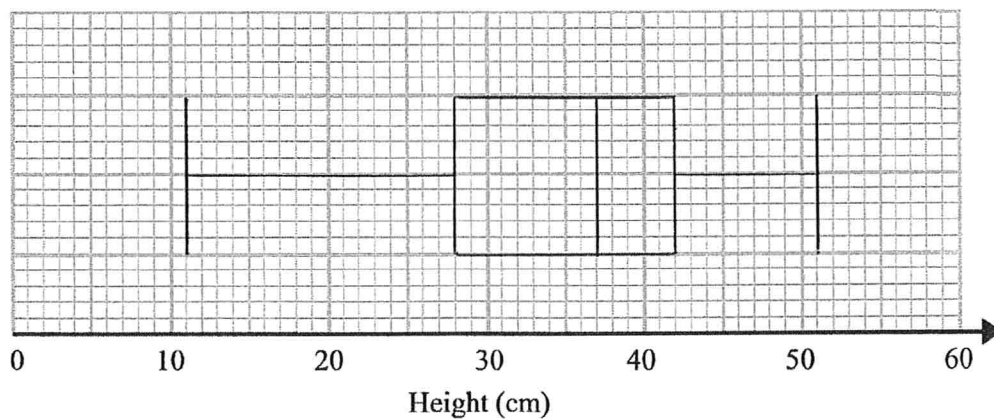(b)   Find the probability that the number is a member of $(A \cap B)$.

$$\frac{2}{15}$$

....

(Total for question 26 is 3 marks)

1 The table shows some information about the heights, in cm, of some plants.

Minimum	Lower Quartile	Median	Upper Quartile	Maximum
11	28	37	42	51

Draw a box plot for this information.
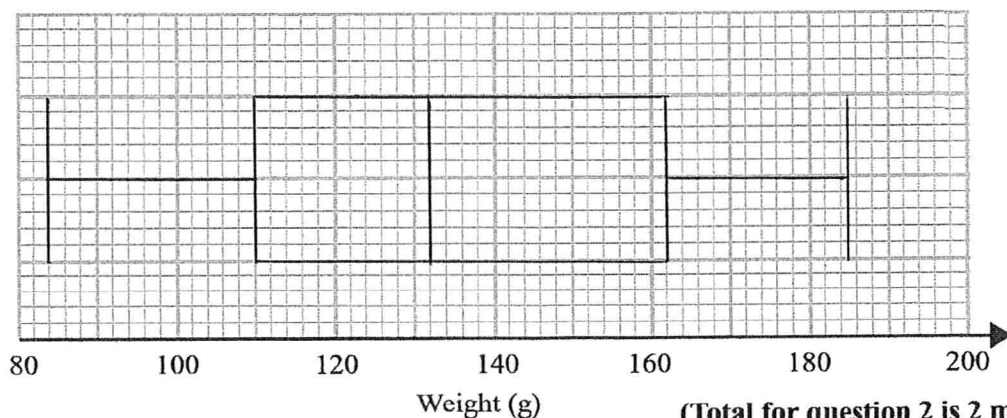

Height (cm)

(Total for question 1 is 2 marks)

2 The table shows some information about the weights, in grams, of some potatoes.

Range	Lower Quartile	Median	Upper Quartile	Maximum
101	110	132	162	185

Draw a box plot for this information.

minimum = 185 − 101
= 84

Weight (g)

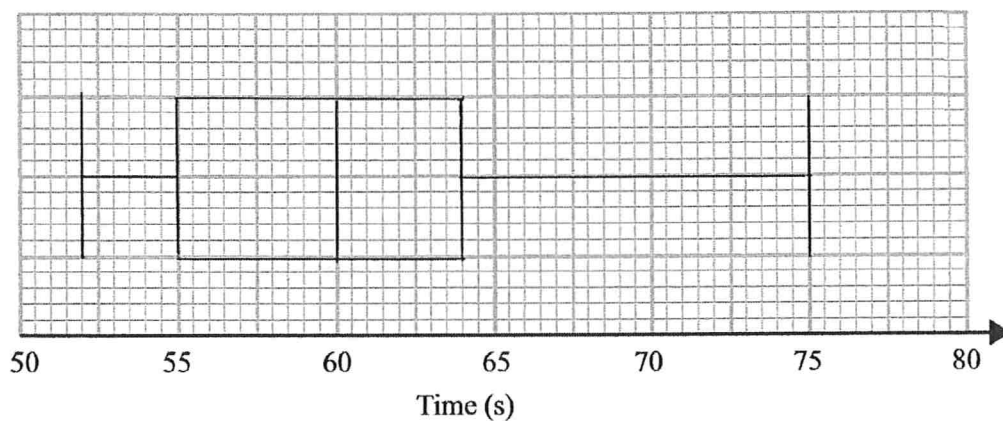**(Total for question 2 is 2 marks)**

3 The times, in seconds, of 15 students running a race are recorded below.

52   54   54   55   58   58   59   (60)   60   61   61   64   67   70   75

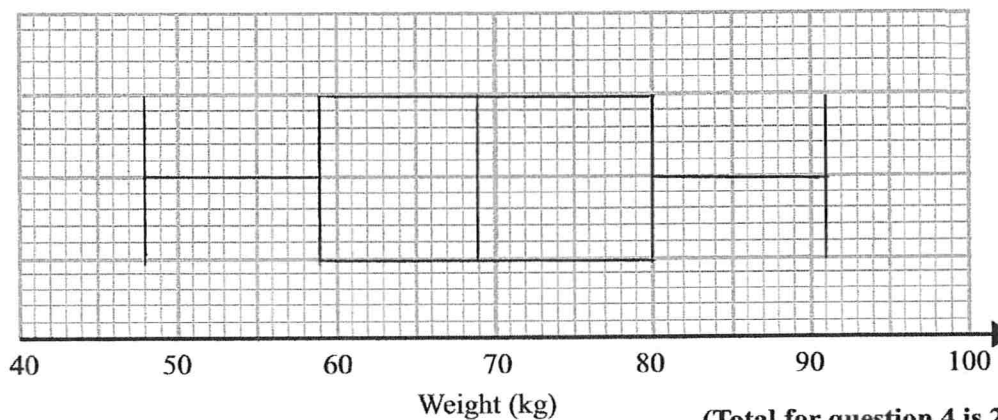Draw a box plot for this information.

median = 60

LQ = 55

UQ = 64

Time (s)

(Total for question 3 is 2 marks)

4 The weights of 11 pigs, in kg, are recorded below.

48   55   59   65   69   (69)   72   74   80   81   91

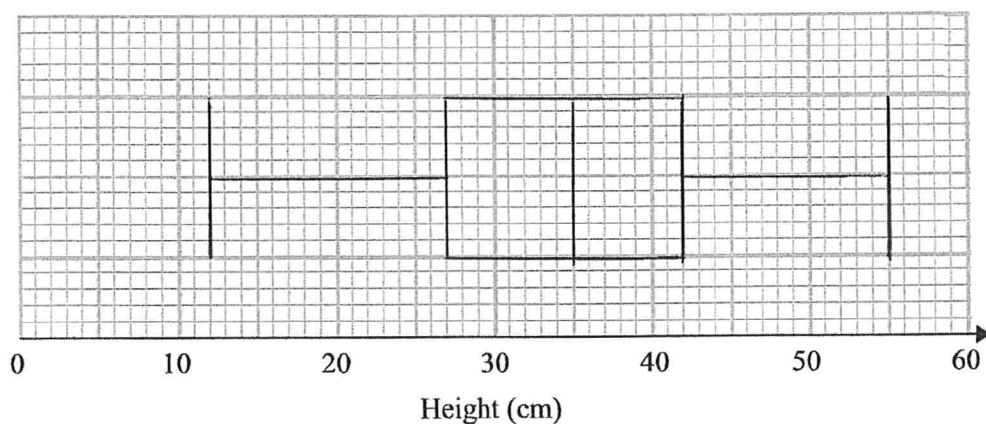Draw a box plot for this information.

median   69

LQ   59

UQ   80

Weight (kg)

(Total for question 4 is 2 marks)

5 The table shows some information about the heights, in cm, of some tomato plants in Maggie's garden.

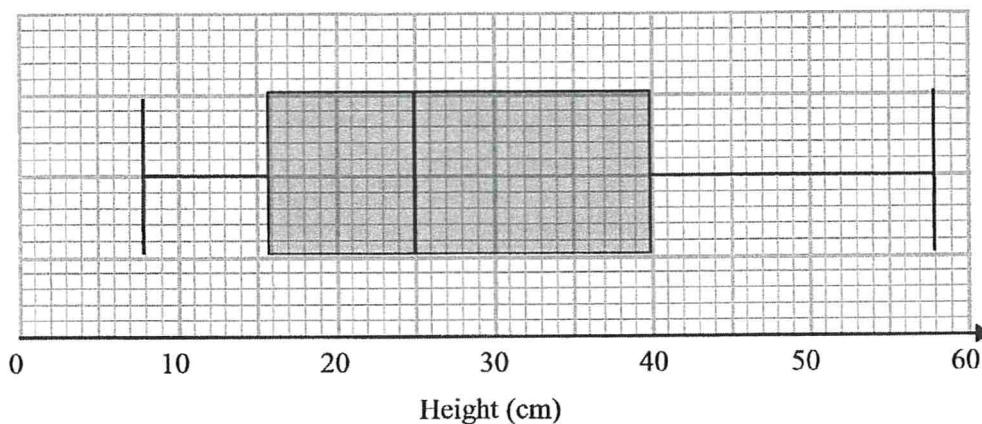| Minimum	Lower Quartile	Median	Upper Quartile	Maximum
12	27	35	42	55

(a) Draw a box plot for this information.

Height (cm)

(2)

There are also tomato plants in Nigel's garden.
The box plot below shows the distribution of the heights of Nigel's tomato plants.

Height (cm)

(b) Compare the distribution of the heights of Maggie's plants with the distribution of height of Nigel's plants.

The median height of Maggie's tomatos is greater -
on average they are taller

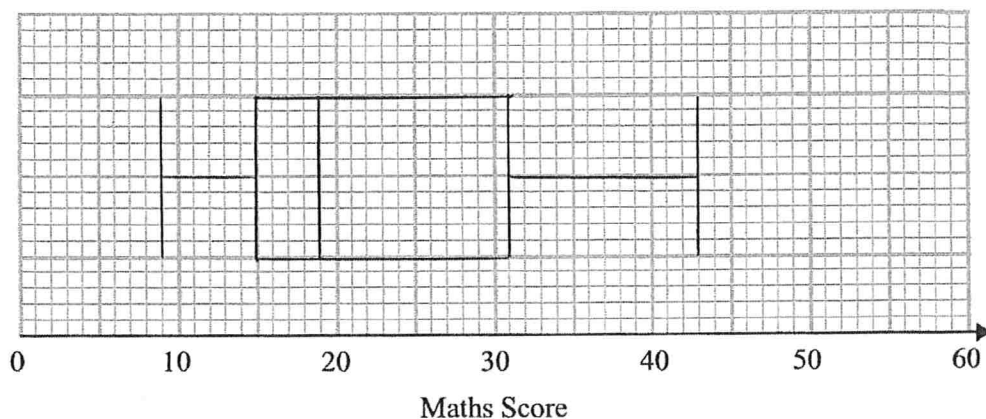The interquartile range of Maggies tomatos is less -
they are less spread out.

(2)

(Total for question 5 is 4 marks)

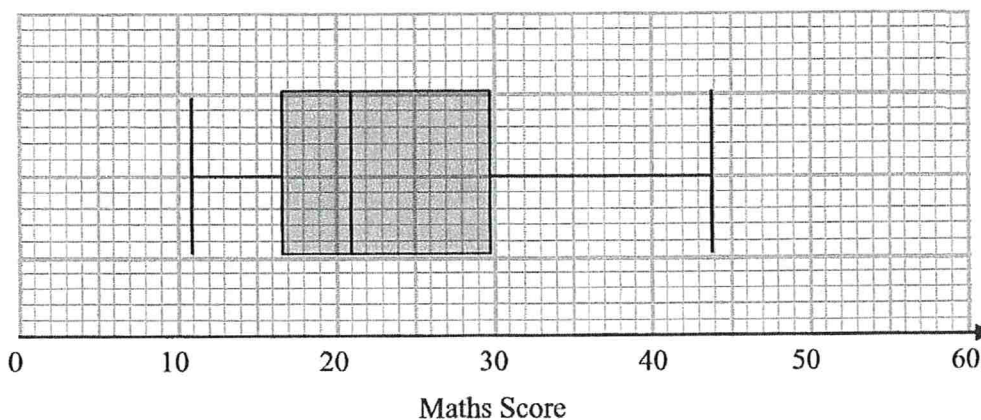**6** The table shows some information about the maths scores of students in class A.

Minimum	Lower Quartile	Median	Upper Quartile	Maximum
9	15	19	31	43

(a) Draw a box plot for this information.

Maths Score

(2)

The box plot below shows the distribution of the maths scores of students in class B.

Maths Score

(b) Compare the distribution of the maths scores of students in class A and class B.

The median score in class B is greater - on average they did better

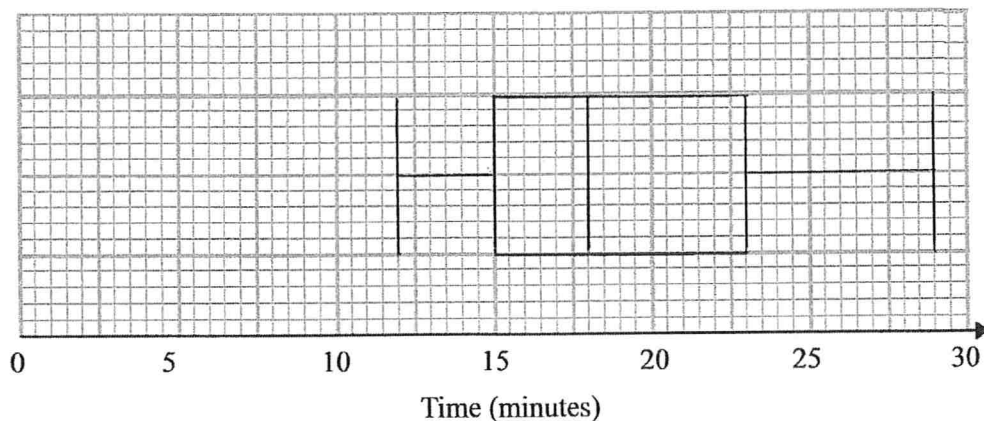The inter quartile range of class B is lower - their scores are less spread out

(2)

(Total for question 6 is 4 marks)

7 The table shows some information about times, in minutes, it took some boys to complete a puzzle.

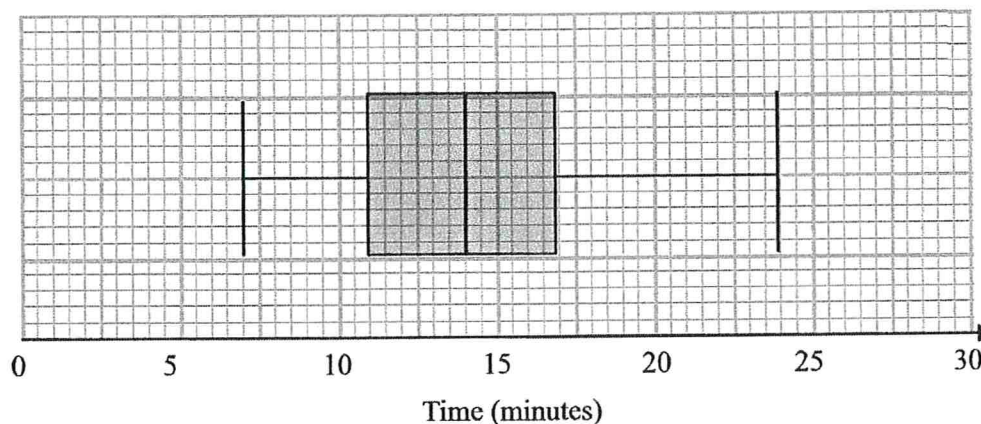| Inter Quartile Range	Minimum	Median	Upper Quartile	Maximum
8	12	18	23	29

(a) Draw a box plot for this information.   Lower Q = 23 − 8 = 15

Time (minutes)

(2)

Some girls also completed the puzzle.
The box plot below shows the distribution of times the girls took to complete the puzzle.

Time (minutes)

(b) Compare the distribution of girls' times and the boys' times.

The median for the boys is greater - on average
it took them longer to complete the puzzle.
The inter quartile range for the girls is lower -
their times were less spread out.

(2)

(Total for question 7 is 4 marks)

Workout

Question 1: 2000

Question 2: 80

Question 3: (a) 1220

(b) Selection is random/marks don't wear off etc

Question 4: 174 or 175

Question 5: (a) 9333 or 9334

(b) Selection is random/all the jelly beans actually went back into the jar/random selection

Apply

Question 1: 80

Question 2: 12

Question 3: 1:2

Question 4: 150