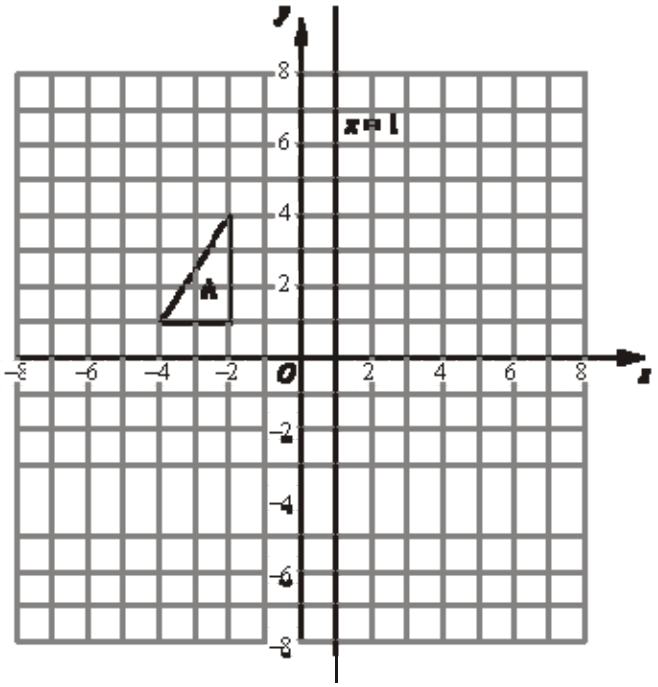
NAME: ……

Foundation/Higher GCSE Mathematics Revision Pack

SHAPE AND SPACE – CALC

Q1.



Triangle **A** is reflected in the x-axis to give triangle **B**.
Triangle **B** is reflected in the line $x = 1$ to give triangle **C**.

Describe the **single** transformation that takes triangle **A** to triangle **C**.

.....

(Total 3 marks)

2.

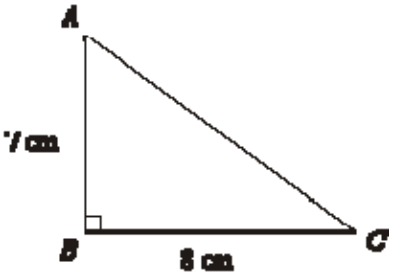


Diagram **NOT** accurately drawn

ABC is a right-angled triangle.
AB = 7 cm,
BC = 8 cm.

(a) Work out the area of the triangle.

..... cm^2

(2)

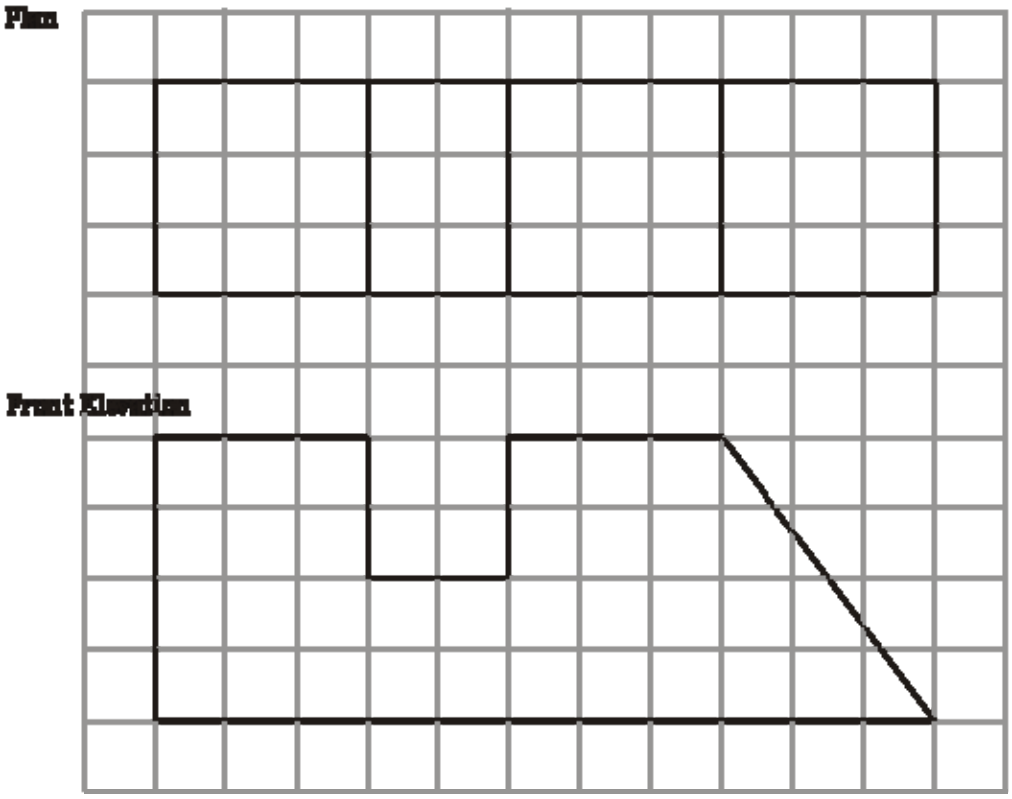
(b) Work out the length of AC.
Give your answer correct to 2 decimal places.

..... cm

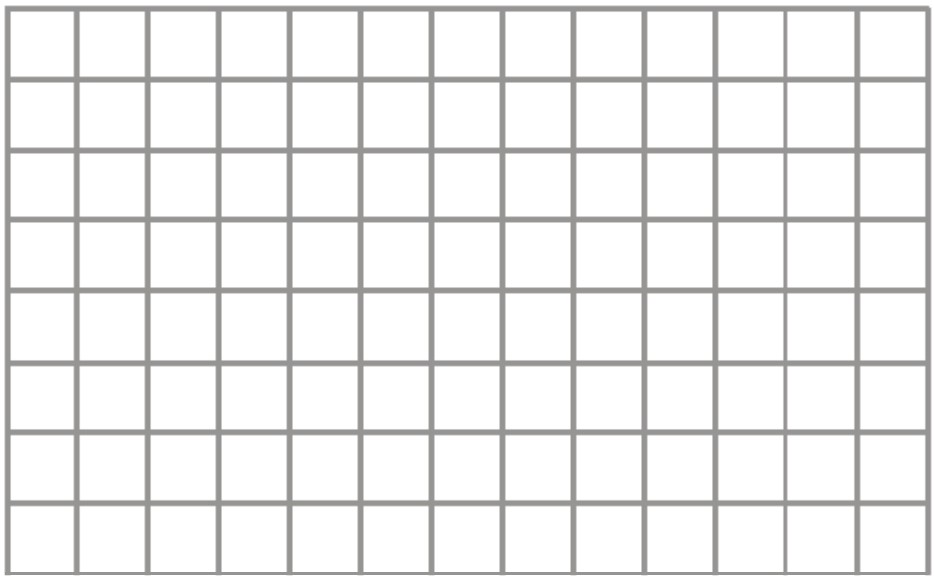
(3)

(Total 5 marks)

Q3. Here are the plan and front elevation of a prism.
The front elevation shows the cross section of the prism.

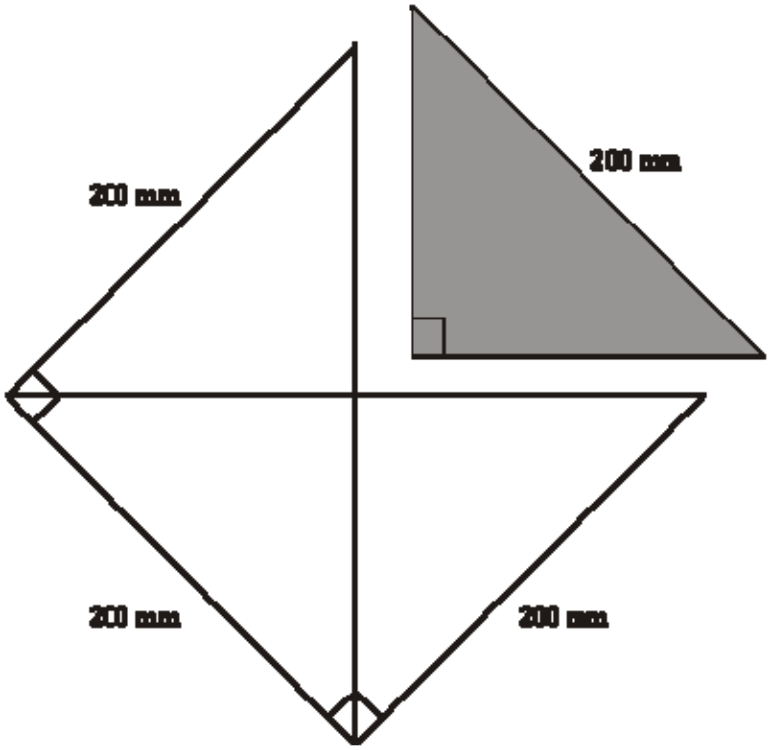


On the grid below draw a side elevation of the prism.



(Total 3 marks)

Q4. The shaded isosceles right angled triangle is cut out of a large square of side 200 mm.



The squares are cut out of an A0 sized rectangular piece of paper which has dimensions 1189 mm by 841 mm.

More triangles are cut from the paper that is left after the squares have been cut out.

What is the greatest total number of these triangles that can be cut out of the large, rectangular sheet of paper?

..... triangles

(Total 5 marks)

Q5.

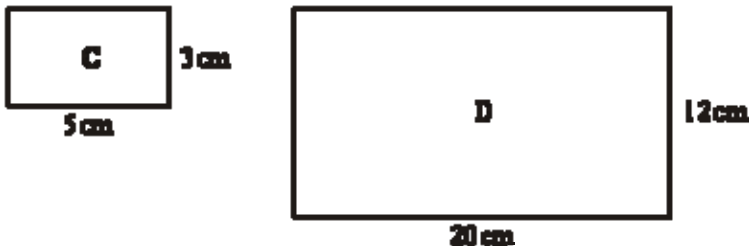


Diagram **NOT** accurately drawn

Rectangle **D** is an enlargement of rectangle **C**.

Find the scale factor of the enlargement.

.....

(Total 2 marks)

Q6. The volume of a gold bar is 100 cm^3.
The density of gold is 19.3 grams per cm^3.

Work out the mass of the gold bar.

..... grams

(Total 2 marks)

Q7.

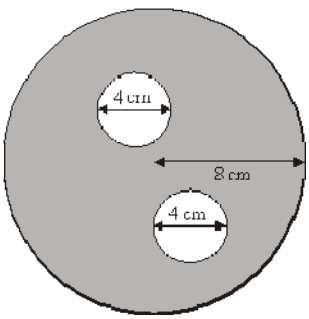


Diagram **NOT** accurately drawn

The diagram shows two small circles inside a large circle.
The large circle has a radius of 8 cm.

Each of the two small circles has a diameter of 4 cm.

(a) Write down the radius of each of the small circles.

..... cm

(1)

(b) Work out the area of the region shown shaded in the diagram.
Give your answer correct to one decimal place.

..... cm^2

(4)

(Total 5 marks)

Q8.

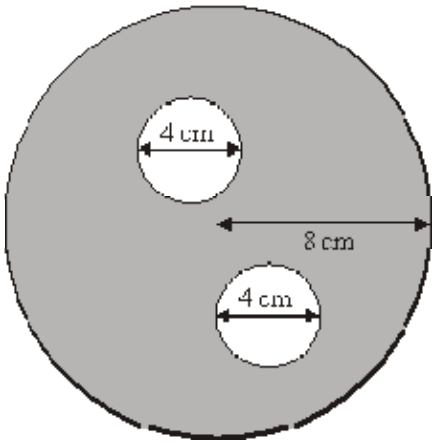


Diagram **NOT** accurately drawn

The diagram shows two small circles inside a large circle.
The large circle has a radius of 8 cm.

Each of the two small circles has a diameter of 4 cm.

(a) Write down the radius of each of the small circles.

..... cm

(1)

(b) Work out the area of the region shown shaded in the diagram.
Give your answer correct to one decimal place.

..... cm^2

(4)

(Total 5 marks)

Q9. Draw the locus of all points that are exactly 2 cm from the line *PQ*.

P _____ *Q*

(Total 2 marks)

Q10.

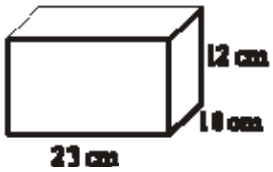


Diagram **NOT** accurately drawn

(a) Work out the volume of this solid cuboid.

..... cm^3

(2)

The solid cuboid is made of plastic.
The plastic has a density of 0.8 grams per cm^3.

(b) Work out the mass of the cuboid.

..... grams

(2)

(Total 4 marks)

Q11.

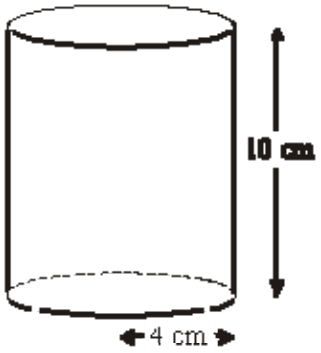


Diagram **NOT** accurately drawn

A solid cylinder has a radius of 4 cm and a height of 10 cm.

(a) Work out the volume of the cylinder.
Give your answer correct to 3 significant figures.

..... cm^3

(2)

The cylinder is made from wood.
The density of the wood is 0.6 grams per cm^3.

(b) Work out the mass of the cylinder.
Give your answer correct to 3 significant figures.

..... grams

(2)
(Total 4 marks)

Q12.

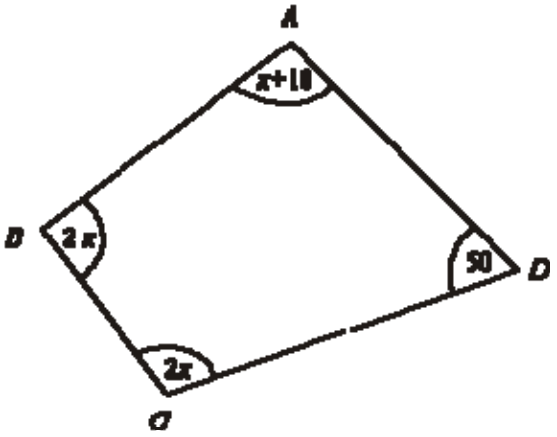


Diagram **NOT** accurately drawn

In this quadrilateral, the sizes of the angles, in degrees, are

x + 10
$2x$
$2x$
50

(a) Use this information to write down an equation in terms of x.

.....

(2)

(b) Work out the value of x.

x = ...

(3)
(Total 5 marks)

Q13.

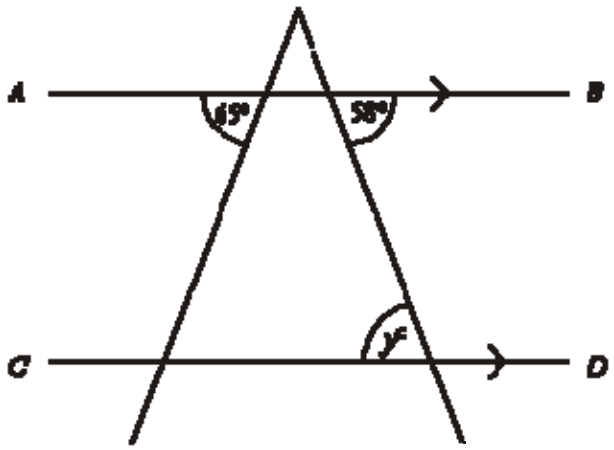


Diagram **NOT** accurately drawn

AB is parallel to *CD*.

(i) Write down the value of *y*.

.....

(ii) Give a reason for your answer.

.....

(Total 2 marks)

Q14.

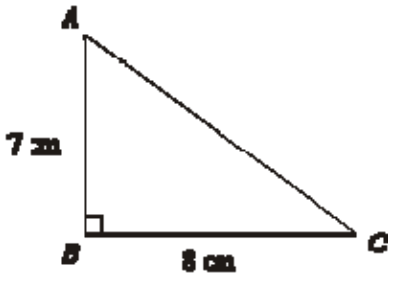


Diagram **NOT** accurately drawn

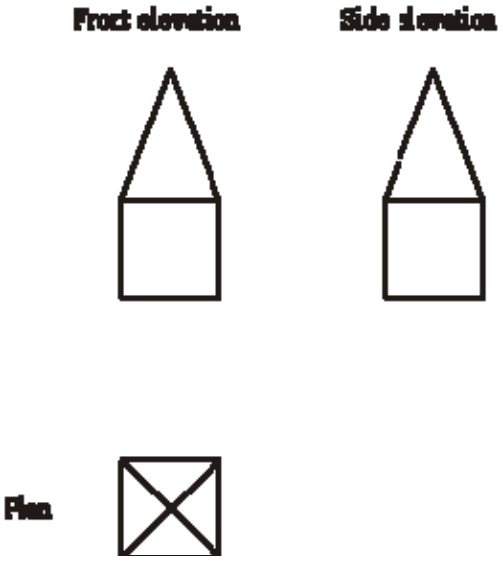
ABC is a right-angled triangle.
AB = 7 cm,
BC = 8 cm.

Work out the length of *AC*.
Give your answer correct to 2 decimal places.

..... cm

(Total 3 marks)

Q15. Here are the front elevation, side elevation and the plan of a 3-D shape.



In the space below, draw a sketch of the 3-D shape.

(Total 2 marks)

Q16.

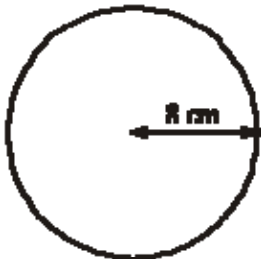


Diagram **NOT** accurately drawn

The radius of this circle is 8 cm.

Work out the circumference of the circle.
Give your answer correct to 2 decimal places.

..... cm

(Total 2 marks)

Q17.

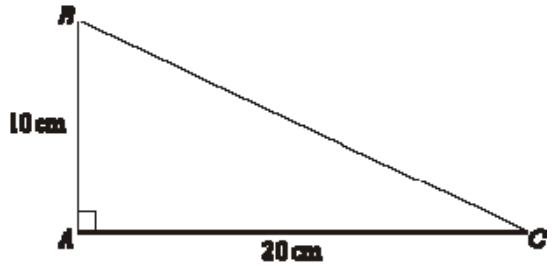


Diagram **NOT** accurately drawn

In triangle ABC,

AB = 10 cm
AC = 20 cm
angle BAC = 90°

Work out the length of BC.
Give your answer correct to 3 significant figures.
You must state the units in your answer.

....

(Total 4 marks)

Q18. (a) Draw the locus of all points which are equidistant from the points A and B.

(2)

(b) Draw the locus of all points that are exactly 2 cm from the line PQ.

P Q

(2)
(Total 4 marks)

Q19.

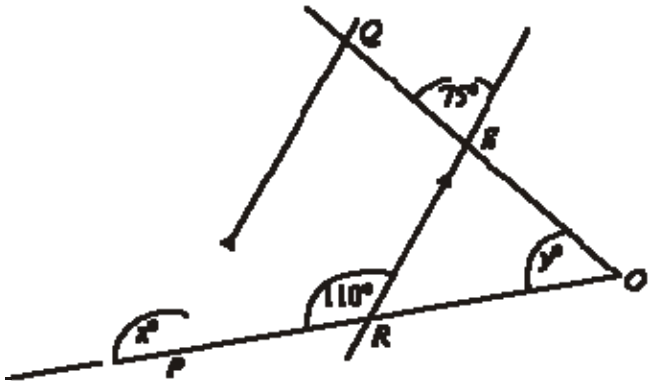


Diagram **NOT** accurately drawn

PQ is parallel to *RS*.

OSQ and *ORP* are straight lines.

(a) (i) Write down the value of x.

x = ...

(ii) Give a reason for your answer.

.....

(2)

(b) Work out the value of *y*.

y = ...

(2)
(Total 4 marks)

Q20. Draw the locus of all points which are equidistant from the points A and B.

A ■ ■ B

(Total 2 marks)

Q21.

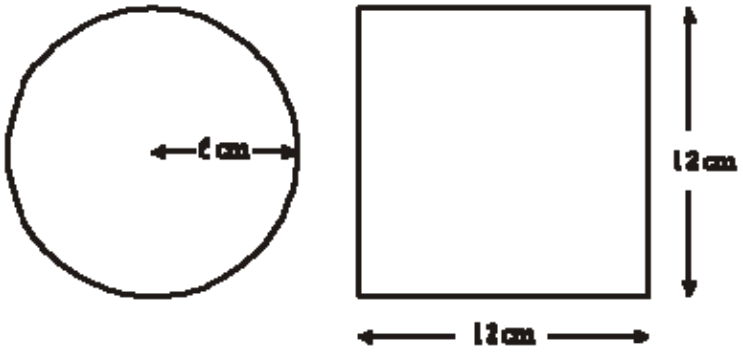


Diagram **NOT** accurately drawn

A circle has a radius of 6 cm.

A square has a side of length 12 cm.

Work out the difference between the area of the circle and the area of the square.
Give your answer correct to one decimal place.

..... cm^2

(Total 4 marks)

Q22.

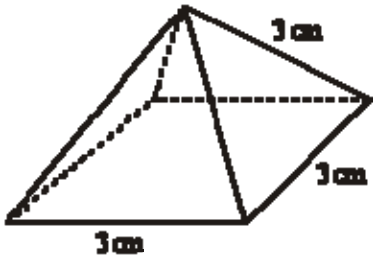


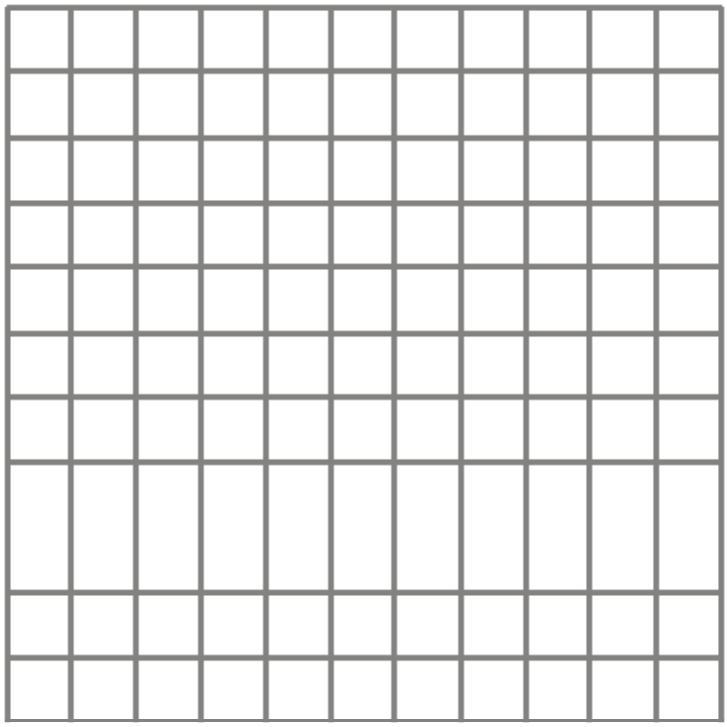
Diagram **NOT** accurately drawn

The diagram shows a pyramid with a square base.

The length of each side of the base is 3 cm.

The length of each sloping edge is 3 cm.

On the grid of centimetre squares, draw an accurate net of the pyramid.



(Total 3 marks)

Q23.

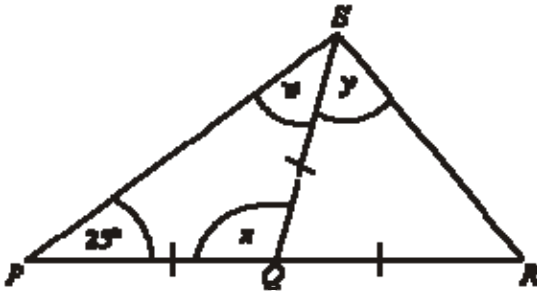


Diagram **NOT** accurately drawn

PQR is a straight line.

PQ = QS = QR.

Angle *SPQ* = 25°.

(a) (i) Write down the size of angle w.

.....°

(ii) Work out the size of angle x.

.....°

(2)

(b) Work out the size of angle y.

.....°

(2)

(Total 4 marks)

Q24.

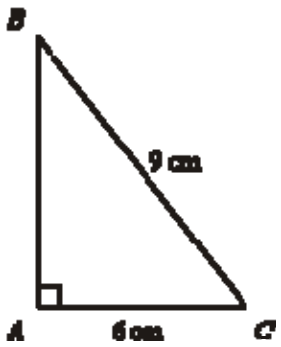


Diagram **NOT** accurately drawn

ABC is a right-angled triangle.

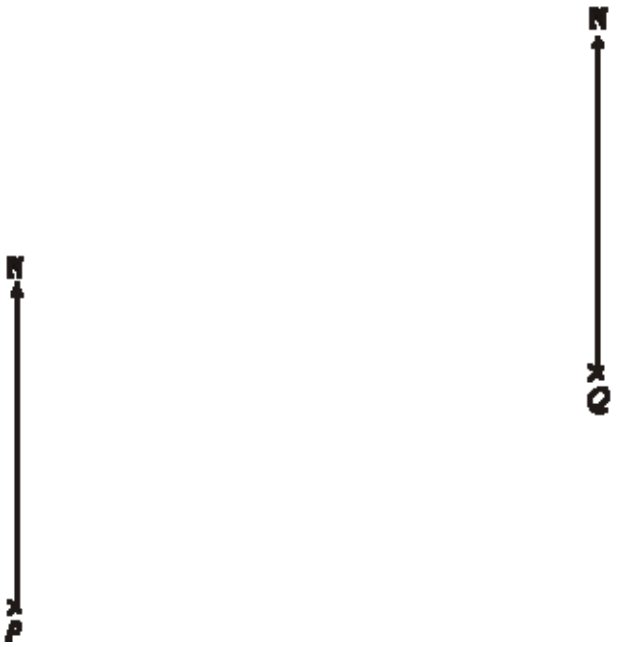
AC = 6 cm.
BC = 9 cm.

Work out the length of AB.
Give your answer correct to 3 significant figures.

..... cm

(Total 3 marks)

Q25. The diagram shows the position of two boats, P and Q.



The bearing of a boat R from boat P is 060°
The bearing of boat R from boat Q is 310°

In the space above, draw an accurate diagram to show the position of boat R.
Mark the position of boat R with a cross (✕). Label it R.

(Total 3 marks)

Q26. Here is a tile in the shape of a semicircle.

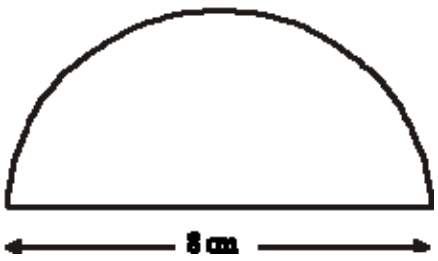


Diagram **NOT** accurately drawn

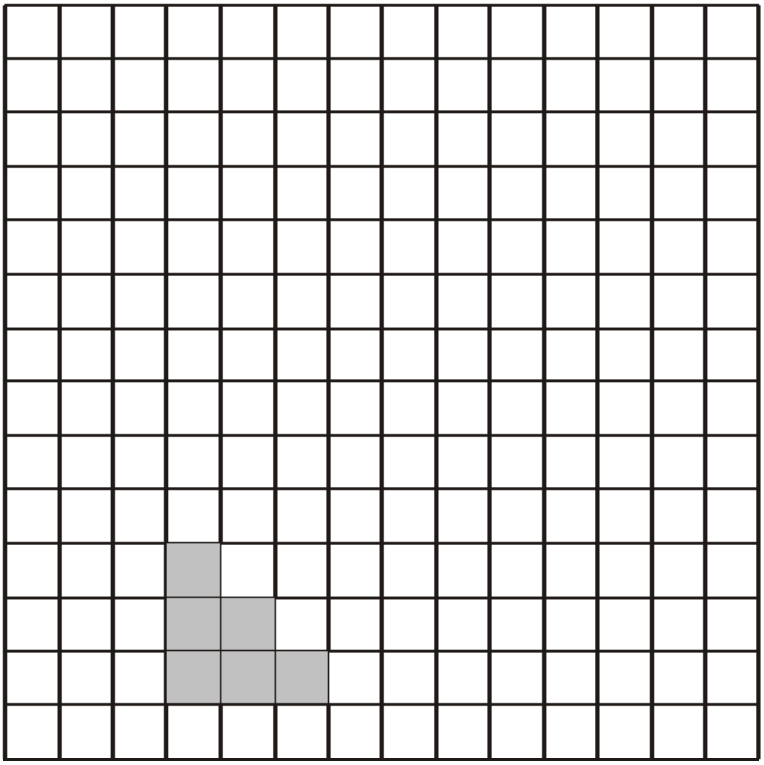
The diameter of the semicircle is 8 cm.

Work out the perimeter of the tile.
Give your answer correct to 2 decimal places.

..... cm

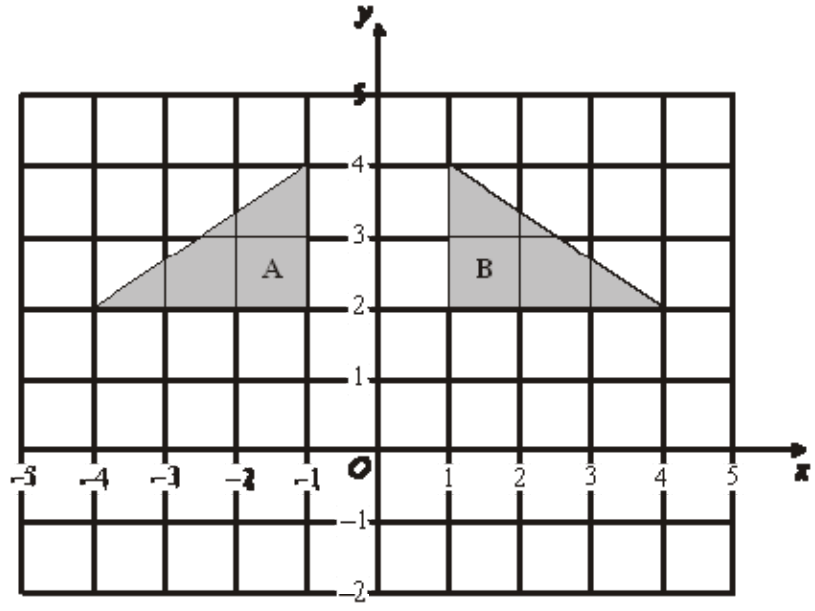
(Total 3 marks)

Q27.



(a) On the grid, draw an enlargement, scale factor 2, of the shaded shape.

(2)



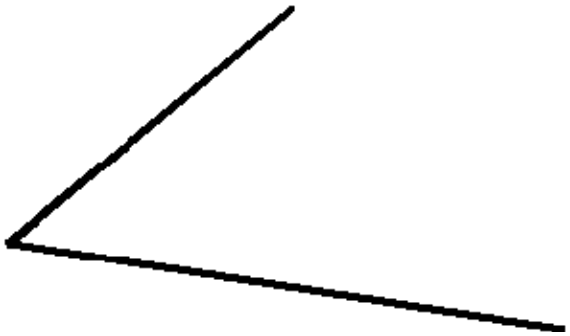
(b) Describe fully the single transformation that maps triangle **A** onto triangle **B**.

.....

(2)

(Total 4 marks)

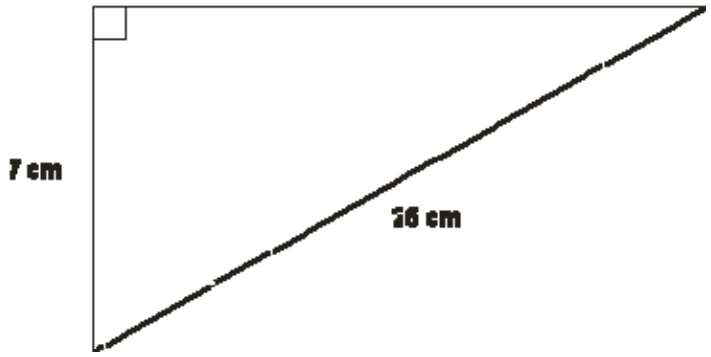
Q28. Use ruler and compasses to **construct** the bisector of this angle.
You must show all your construction lines.



(Total 2 marks)

Q29.

Diagram **NOT** accuartely drawn



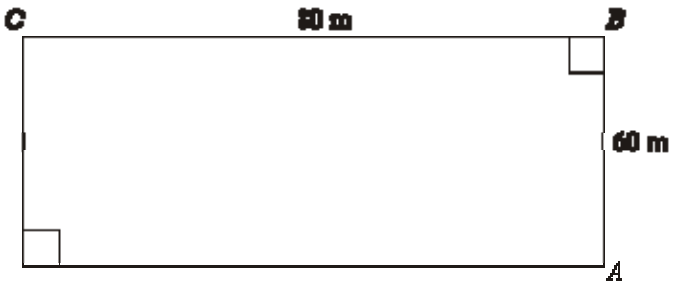
Calculate the area of this right-angled triangle.

.....

(Total 4 marks)

Q30. Alan and Bhavana are planning their fitness program.
They plan to run on parts of a field.
The diagram below shows a rectangular field 80 metres by 60 metres.

Diagram **NOT** accuartely drawn



Alan runs **around** the field from A to C (via B) at 5 m/s.

Bhavana runs directly across the diagonal of the field from A to C at 3 m/s.

If they both started at the same time, who would reach point C first?

You must explain your answer.

.....

.....

(Total 6 marks)

M1.

Working	Answer	Mark	Additional Guidance
B at (– 2, –1), (– 4, –1), (– 2, –4) **C** at (4, –1), (6, –1), (4, –4)	Rotation 180° about (1, 0)	3	**B1** for rotation **B1** for 180° **B1** for centre (1,0) **OR** **B1** Enlargement **B1** Scale Factor –1 Accept – 1 on its own if it is clear candidate is describing an enlargement **B1** Centre (1,0) Ignore diagram unless no marks scored, in which case SC **B1** for showing both **B and C** correctly NB Award no marks for the description if more than one transformation is given
			Total for Question: 3 marks

M2.

	Working	Answer	Mark	Additional Guidance
(a)	½ × 7 × 8 = ½ × 56 = 28	28	2	**M1** ½ × 7 × 8 or – × 7 × 8 × sin 90° **A1** cao
(b)	$8^2 + 7^2$ 64 + 49 = 113 √113 = 10.630145	10.63	3	**M1** $8^2 + 7^2$ or 64+49 or 113 or $8^2 + 7^2 – 2 \times 7 \times 8 \times \cos 90$ **M1** √"(64 + 49)" or √"113" where it is clear that the 8 and 7 have been squared **A1** Any answer in 10.63 – 10.631 inclusive SC **B1** 10.6 with no working with or without a scale drawing
(c)	tan y = 32/46 = 0.6956 $\tan^{-1}$ 0.6956 = 34.82°	34.8	3	**M1** tan (y =) $\frac{32}{46}$ **M1** $\tan^{-1}$ 0.695(6) or $\tan^{-1}\left(\frac{32}{46}\right)$ or $\tan^{-1}\frac{32}{46}$ oe (e.g. 'shift tan' or 'inv tan' for $\tan^{-1}$)

				A1 34.79° – 34.85° **Or** **M1** for $\sqrt{(32^2 + 46^2)}$ (=56.03(5..)) and either $\frac{\sin 90}{68(0..)} = \frac{\sin y}{32}$ or $\frac{68.(1..)}{\sin 90} = \frac{32}{\sin y}$ **M1** $(y =) \sin^{-1}\left(\frac{32 \times \sin 90}{68.(0...)}\right)$ $(= \sin^{-1}(0.671(08..))$ **A1** 34.79° – 34.85° SC1 **B2** Radians 0.607-0.608 **B2** Gradians 38.65 – 38.7 (both using tan) Alternative methods using Pythagoras and then sin or cos must have a fully correct method for Pythagoras and sin/cos before they score the first M1. The trigonometry could be SOHCAHTOA or Sine rule/Cosine rule
				Total for Question: 8 marks

M3.

Working	Answer	Mark	Additional Guidance
	Correct front elevation	3	**B1** for rectangle of width 3 cm **B1** for rectangle of height 4 cm **B1** for hidden line shown dotted
			Total for Question: 3 marks

M4.

Working	Answer	Mark	Additional Guidance
1189 ÷ 200 or 891 ÷ 200 = 5 and 4 or 20 squares $200^2 \div 2$	90	5	**M1** for attempt to divide 1189 ÷ 200 or 891 ÷ 200 **M1** for $200^2 \div 2$

$= \sqrt{(200^2 \div 2)}$ $= 141.4$ Realising that another row of squares of side 141.4 fits or $891 \div 141.4 = 5$ squares			**M1** for $\sqrt{(200^2 \div 2)}$ **M1** for realising that another row of squares of side 141.4 fits or $891 \div 141.4$ **A1** cao for 90 triangles
			Total for Question: 5 marks

M5.

Answer	Mark	Additional Guidance
4	2	**M1** for $\frac{20}{6}$ or $\frac{6}{20}$ or $\frac{12}{3}$ or $\frac{3}{12}$ **OR** 3×4 and 5×4 seen **A1** cao SC: **B1** for 4:1 or 1:4 oe
		Total for Question: 2 marks

M6.

Answer	Mark	Additional Guidance
1930	2	**M1** for 100×19.3 **A1** for 1930 cao
		Total for Question: 2 marks

M7.

	Working	Answer	Mark	Additional Guidance
(a)		2 cm^2	1	**B1** cao
(b)	$\pi \times 8^2 - 2 \times \pi \times 2^2$	175.9 cm	4	**M1** $\pi \times 8^2$ (= 201.06…) May be implied by 201 **M1** $\pi \times 2^2$ (= 12.566…) May be implied by 12.5 **or** 12.6 **M1** (dep on at least **M1**) "201…" – 2 × "12.56.." **A1** 175.8 – 176 inclusive
				Total for Question: 5 marks

M8.

	Working	Answer	Mark	Additional Guidance
(a)		2	1	**B1** cao
(b)	$\pi \times 8^2 - 2 \times \pi \times 2^2$	175.9	4	**M1** $\pi \times 8^2$ (= 201.06…) may be implied by 201 **M1** $\pi \times 2^2$ (= 12.566…) may be implied by 12.5 or 12.6 **M1**(dep on at least **M1**) for "201…" – 2 × "12.56..." **A1** 175.8 – 176
				Total for Question: 5 marks

M9.

Answer	Mark	Additional Guidance
Within guidelines	2	**B2** for fully correct shape within or touching guidelines (**B1** for two correct parallel lines within or touching guidelines **or** two correct semicircles at ends within or touching guidelines **or** correct shape outside guidelines) NB: Accept dotted lines. Ignore any additional lines or drawings, e.g. full circles drawn at ends

	Total for Question: 2 marks

M10.

	Working	Answer	Mark	Additional Guidance
(a)	23 × 10 × 12	2760	2	**M1** for 23 × 10 × 12 **A1** cao
(b)	2760 × 0.8	2208	2	**M1** for '2760' × 0.8 **A1** f.t.
				Total for Question: 4 marks

M11.

	Working	Answer	Mark	Additional Guidance
(a)	$\pi \times 4^2 \times 10$ = 502.65 (502-503)	503	2	**M1** $\pi \times 4^2 \times 10$ (= 502.65) **A1** 502-503 SC **B1** $\pi \times 8^2 \times 10$
(b)	"502.65" × 0.6 = 301.59	302	2	**M1** "502.65" × 0.6 **A1** 300 – 302 ft on "502.65" to an answer which would be correct on ft if rounded or truncated to 3SF
				Total for Question: 4 marks

M12.

	Working	Answer	Mark	Additional Guidance
(a)	$2x + 2x + x + 10 + 50 = 360$	$5x + 60 = 360$	2	**M1** 3 or 4 out of $2x$, $2x$, $x + 10$, 50 added together **A1** $2x + 2x + x + 10 + 50 = 360$ oe including $x = 60$
(b)	$5x + 60 = 360$ $5x = 300$	60	3	**M1** for isolating their terms in x **M1** for dividing their numerical term by the coefficient of their x term **A1** cao All the marks in (b) may be given for work done in answering (a) providing there is no contradiction Candidates can score full marks in (b) independent of their answer in (a) (e. g. by starting again)
				Total for Question: 5 marks

M13.

Answer	Mark	Additional Guidance
58° Reason	2	**B1** cao **B1** (dep) alternate or Z angle (oe)
		Total for Question: 2 marks

M14.

Working	Answer	Mark	Additional Guidance
$8^2 + 7^2$ $64 + 49 = 113$ $\sqrt{113} = 10.630145$	10.63-10.631	3	**M1** $8^2 + 7^2$ or $64 + 49$ or 113. **M1** √"(64 + 49)" or √"113"; where it is clear that the 8 and 7 have been squared. **A1** 10.63 – 10.631 inclusive. SC **B1** for 10.6 with no working, with or without a scale drawing.

Total for Question: 3 marks	

M15.

Answer	Mark	Additional Guidance
Sketch	2	**B2** complete 3-D sketch (**B1** for partial 3-D sketch e.g. pyramid or base only, or a shape with a box and 2 pyramids either end) NB: If more than one shape is shown: For 2 marks there should be no choices or alternatives other than those also worth 2 marks; if there are several diagrams of which at least one is worth 1 or 2 marks, award **B1**. 2D diagrams get B0.
Total for Question: 2 marks		

M16.

Working	Answer	Mark	Additional Guidance
C = 2 × π × 8	50.24-50.29	2	**M1** C = 2 × π × 8 or π ×16 oe **A1** 50.24-50.29
Total for Question: 2 marks			

M17.

Working	Answer	Mark	Additional Guidance
$BC^2 = 20^2 + 10^2 = 500$	22.4cm	4	**M1** for (BC^2 =) $20^2 + 10^2$ or 400 + 100 or 500 or $20^2 + 10^2 - 2 \times 20 \times 10 \times \cos 90$ oe

			M1 for $\sqrt{400+100}$ or $\sqrt{500}$ where it is clear that the 20 and 10 have been squared (could be implied by either 400 or 100 seen) **A1** for any answer in 22.36 – 22.4 inclusive **B1** (indep)cm
			Total for Question: 4 marks

M18.

	Answer	Mark	Additional Guidance
(a)	Within guide	2	**B2** for line at least 2cm long within inner guideline **B1** for line at least 2cm long completely or partially outside inner guidelines but within outer guidelines **or** line within inner guidelines of length less than 2cm or at least 3 relevant points within inner guidelines **or** 2 pairs of relevant intersecting arcs within inner guidelines. NB : Ignore any additional lines or drawings
(b)	Within guide	2	**B2** for fully correct shape within or touching guidelines (**B1** two correct parallel lines within or touching guidelines allow **or** two correct semicircles at ends within or touching guidelines allow **or** correct shape outside guidelines) NB: Accept dotted lines. Ignore any additional lines or drawings eg. Full circles drawn at ends
			Total for Question: 4 marks

M19.

	Working	Answer	Mark	Additional Guidance
(a)(i)		110	2	**B1** cao **B1** (dep on **B1** in (i)) for corresponding angles **or** F angles
(ii)		Corresponding		

		angles		
(b)	180 – 70 – 75	35	2	**M1** 180 – (180-110) – 75 or 110 – 75 **A1** cao
				Total for Question: 4 marks

M20.

Answer	Mark	Additional Guidance
Within guide	2	**B2** for line at least 2cm long within inner guideline **B1** for line at least 2cm long completely or partially outside inner guidelines but within outer guidelines **or** line within inner guidelines of length less than 2cm **or** at least 3 relevant points within inner guidelines **or** 2 pairs of relevant intersecting arcs within inner guidelines. NB : Ignore any additional lines or drawings
		Total for Question: 2 marks

M21.

Working	Answer	Mark	Additional Guidance
$\pi \times 6^2$ $12^2 - \pi \times 6^2$	30.9	4	**M1** for 12^2 or 144 seen **M1** for $\pi \times 6^2$ or 113. … seen **M1** (dep on **M2**) for "12^2" – "$\pi \times 6^2$" **A1** for 30.88 – 31
			Total for Question: 4 marks

M22.

Answer	Mark	Additional Guidance
(Net)	3	**B3** for fully correct net (**B2** for 3 or 4 out of 5 drawn faces (of 4 triangles and one quadrilateral) correct **OR** correct square and 4 isosceles triangles that together form the net of a pyramid) (**B1** for 1 or 2 out of 5 drawn faces correct)
		Total for Question: 3 marks

M23.

	Working	Answer	Mark	Additional Guidance
(a)(i)		25	2	**B1** cao
(ii)	180 – 25 – '25'	130		**B1** ft for 155 – '(i)'
(b)	180 – 130 = 50 y = ½ (180 – 50)	65	2	**M1** ½ "(a)(ii)" or any complete correct method **A1** ft from (a)(ii)
				Total for Question: 4 marks

M24.

Working	Answer	Mark	Additional Guidance
$9^2 - 6^2$ 81 – 36 = 45 $\sqrt{45}$	6.705 – 6.71	3	**M1** for $9^2 - 6^2$ or 81 – 36 or 45 or $9^2 = AB^2 + 6^2$ oe **M1** for $\sqrt{81-36}$ or $\sqrt{45}$ **A1** for 6.705 – 6.71

			[**SC: M1** for $\sqrt{81+36}$ or $\sqrt{117}$]
			Total for Question: 3 marks

M25.

Answer	Mark	Additional Guidance
diagram	3	**M1** for line drawn or point marked within guidelines from *P* **M1** for line drawn or point marked within guidelines from *Q* up to top guideline from *P* **A1** for point indicated within region where guidelines intersect
		Total for Question: 3 marks

M26.

Working	Answer	Mark	Additional Guidance
(0.5 × 3.14... × 8) + 8	20.56 – 20.58	3	**M2** for (0.5 × π × 8) or π × 4 or (π × 8 + 8) or (0.5 × π × 8 + 8) oe (**M1** for π × 8 or 2π × 4; for a value 25.1-25.2 inclusive unless seen with incorrect working eg πr^2) **A1** for 20.56 – 20.58 (**SC**: **B2** if M0 scored for 12.56 – 12.58)
			Total for Question: 3 marks

M27.

	Answer	Mark	Additional Guidance
(a)	Correct shape	2	**B2** for correct shape; any orientation. (**B1** for any two sides correct or all correct for scale factor other than 1 or 2), tolerance to within half square
(b)	Reflection in line $x = 0$	2	**B1** for reflection, reflect, reflected. **B1** for line $x = 0$ or y-axis NB: more than one transformation should be awarded 0 marks.
			Total for Question: 4 marks

M28.

Answer	Mark	Additional Guidance
construction	2	**M1** for a pair of arcs drawn from the same centre on 2 lines at same distance from meeting point; or a single arc crossing both lines; using an arc with a radius which is the length of the shorter line will imply an intersection with the end of that line. (± 2mm) **A1** for bisector (± 2°) and correct arcs **SC: B1** for bisector (± 2°) with no arcs, or incorrect arcs if **M0** awarded. Accept bisectors that are dashed or dotted.
		Total for Question: 2 marks

M29.

Working	Answer	Mark	Additional Guidance
$25^2 - 7^2 = 576$ $\sqrt{576} = 24$ $\frac{1}{2} \times 24 \times 7$	84cm^2	4	**M1** $25^2 - 7^2$ **M1** $\sqrt{25^2 - 7^2}$

			M1 (dep) $\frac{1}{2} \times 24 \times 7$ **A1** cao
			Total for Question: 4 marks

M30.

	Working	Answer	Mark	Additional Guidance
QWC ii	Alan 60 + 80 = 140 140 ÷ 5 = 28 Bhavana $60^2 + 80^2$ = 10000 $\sqrt{10000} = 100$ 100 ÷ 3=33.33333.... .	Alan, with statement supporting explanation	6	**B1** Alan runs 140 **M1** '140'÷ 5 **M1** $60^2 + 80^2$ **A1** 100 **A1** 28 or 33.33333... seen **C1** Alan stated with comparison of times and times attributed to correct person **QWC: Decision stated with statement supporting explanation**
				Total for Question: 6 marks