



Maths Questions By Topic:

Geometry & Measures

Edexcel GCSE (Higher)

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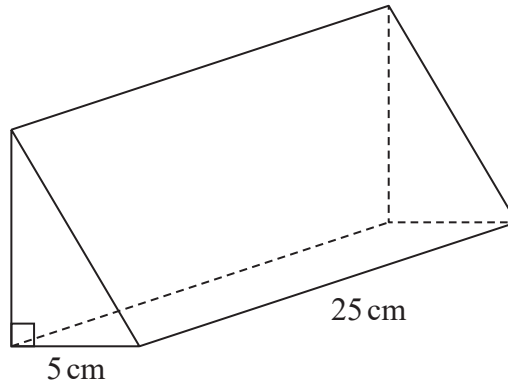
New Spec

Paper 1	Page 1
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Old Spec A (Linear)

Paper 1	Page 156
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1 The diagram shows a prism.



The cross section of the prism is a right-angled triangle.
The base of the triangle has length 5 cm

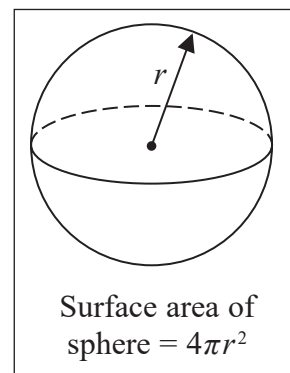
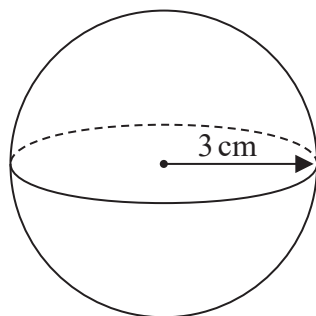
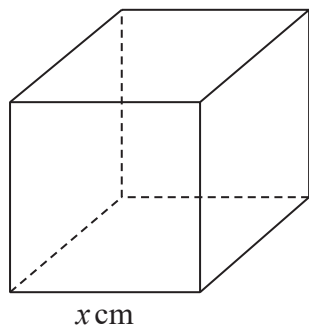
The prism has length 25 cm
The prism has volume 750 cm^3

Work out the height of the prism.

..... cm

(Total for Question 1 is 3 marks)

- 2 The diagram shows a cube with edges of length x cm and a sphere of radius 3 cm.

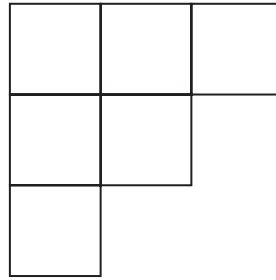


The surface area of the cube is equal to the surface area of the sphere.

Show that $x = \sqrt{k\pi}$ where k is an integer.

(Total for Question 2 is 4 marks)

3 The diagram shows a shape made from 6 identical squares.



The total area of the shape is 5406 cm^2

- (a) Find an estimate for the length of one side of each square.
Give your answer correct to the nearest whole number.

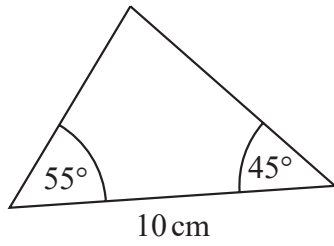
..... cm
(3)

- (b) Is your answer to part (a) an underestimate or an overestimate?
You must give a reason for your answer.

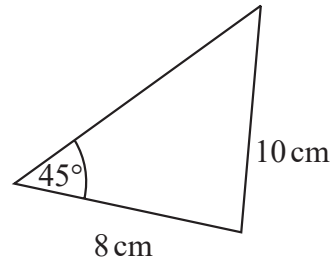
.....
.....
.....
(1)

(Total for Question 3 is 4 marks)

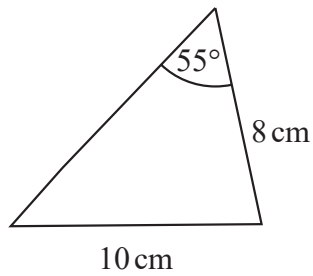
4 The diagram shows four triangles.



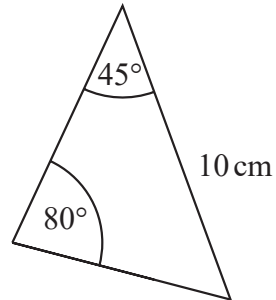
Triangle A



Triangle B



Triangle C



Triangle D

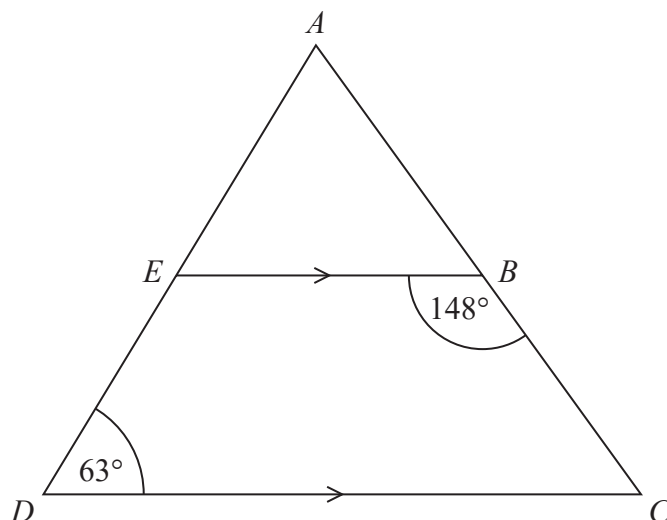
Two of these triangles are congruent.

Write down the letters of these two triangles.

..... and

(Total for Question 4 is 1 mark)

5 ADC is a triangle.



AED and ABC are straight lines.

EB is parallel to DC .

Angle $EBC = 148^\circ$

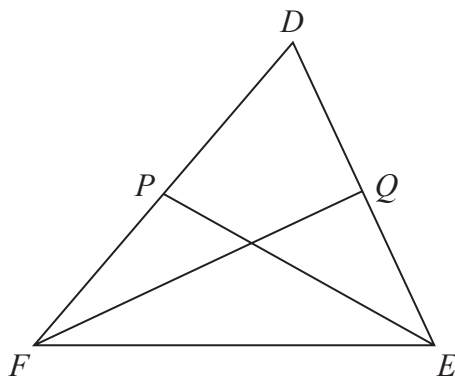
Angle $ADC = 63^\circ$

Work out the size of angle EAB .

You must give a reason for each stage of your working.

(Total for Question 5 is 5 marks)

6 DEF is a triangle.



P is the midpoint of FD .
 Q is the midpoint of DE .

$$\vec{FD} = \mathbf{a} \quad \text{and} \quad \vec{FE} = \mathbf{b}$$

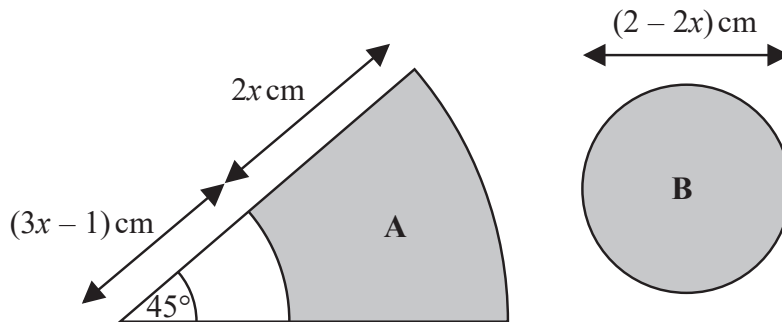
Use a vector method to prove that PQ is parallel to FE .

(Total for Question 6 is 4 marks)

7 The diagram shows two shaded shapes, **A** and **B**.

Shape **A** is formed by removing a sector of a circle with radius $(3x - 1)$ cm from a sector of the circle with radius $(5x - 1)$ cm.

Shape **B** is a circle of diameter $(2 - 2x)$ cm.



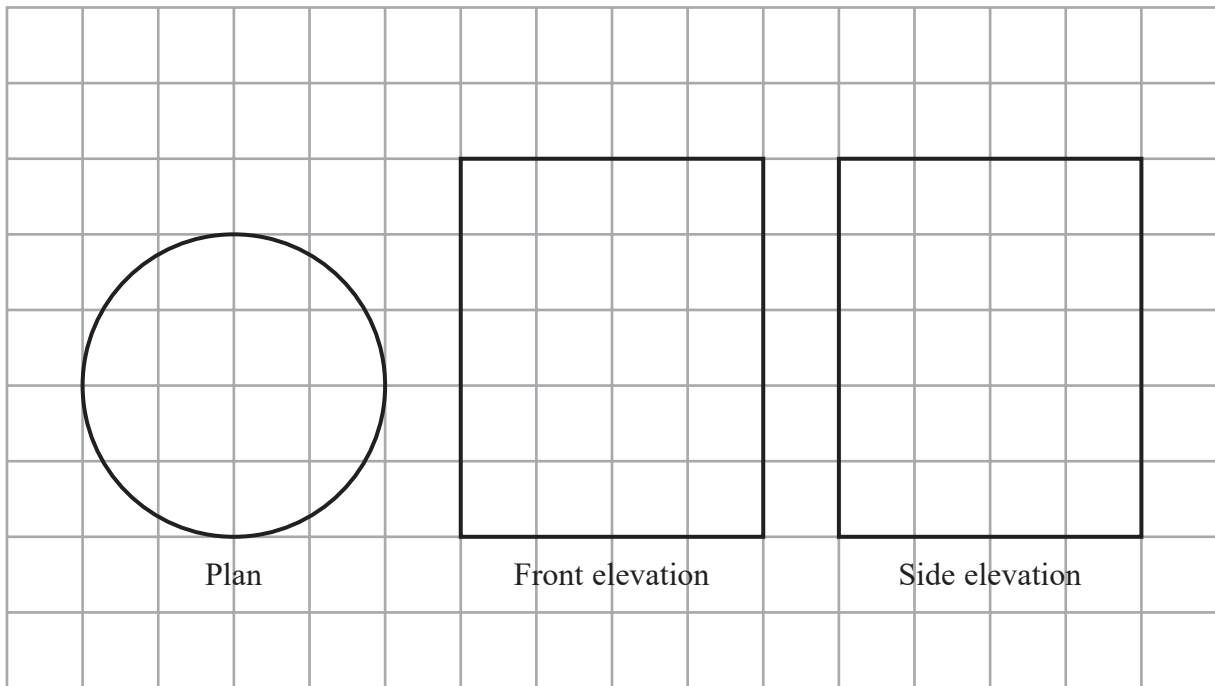
The area of shape **A** is equal to the area of shape **B**.

Find the value of x .

You must show all your working.

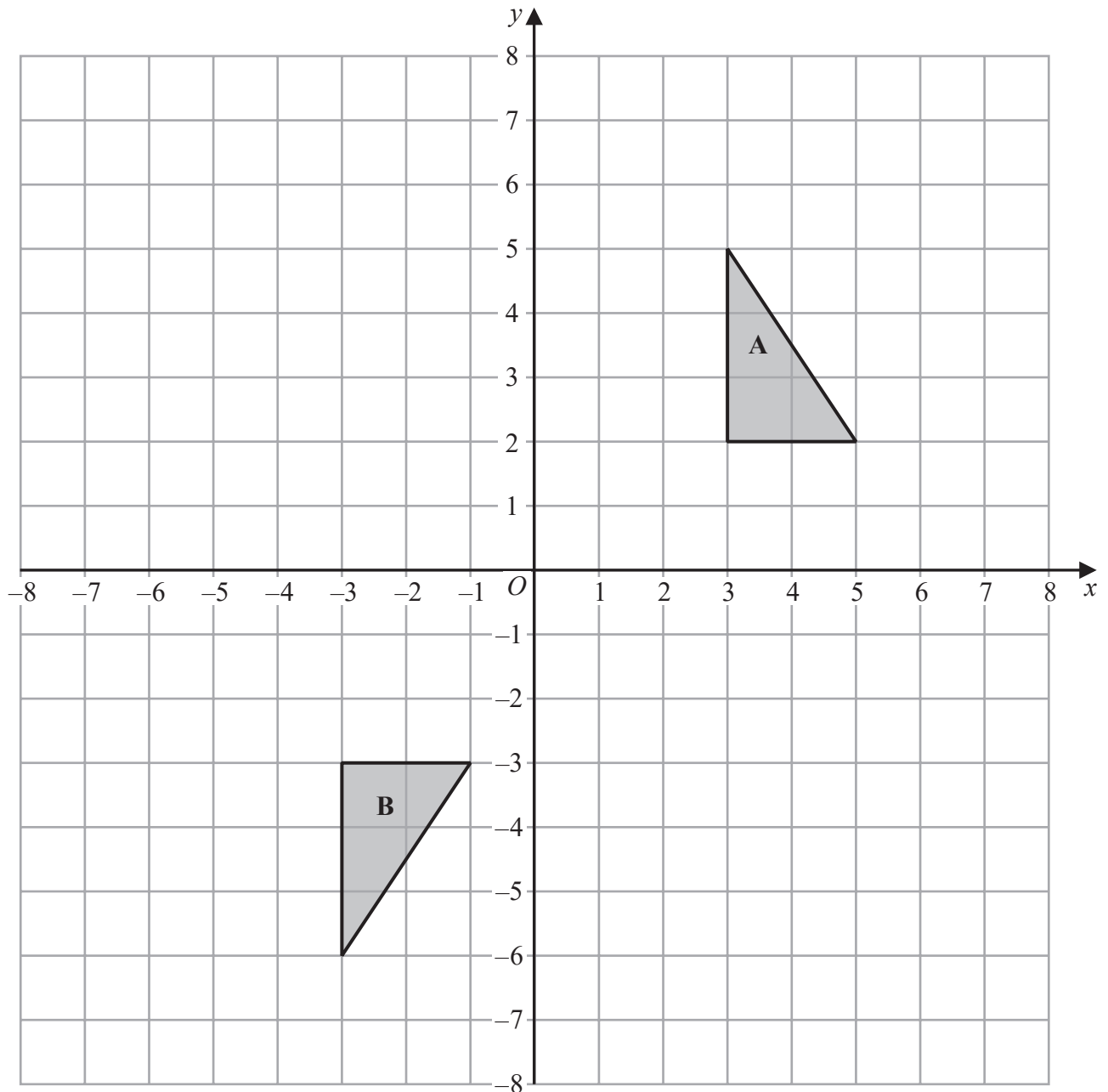
(Total for Question 7 is 5 marks)

- 8 The diagram shows the plan, front elevation and side elevation of a solid shape, drawn on a centimetre grid.



In the space below, draw a sketch of the solid shape.
Give the dimensions of the solid on your sketch.

(Total for Question 8 is 2 marks)



Shape **A** can be transformed to shape **B** by a reflection in the x -axis followed by a translation $\begin{pmatrix} c \\ d \end{pmatrix}$

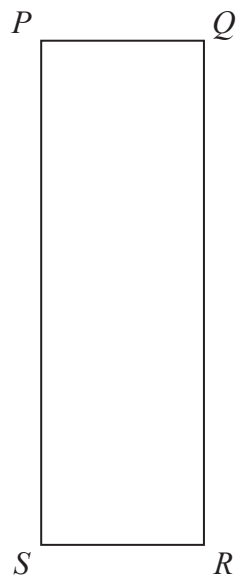
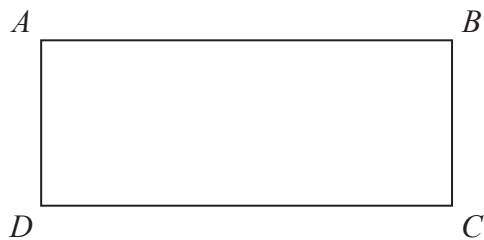
Find the value of c and the value of d .

$c = \dots\dots\dots$

$d = \dots\dots\dots$

(Total for Question 9 is 3 marks)

10 Here are two rectangles.



$$QR = 10 \text{ cm}$$
$$BC = PQ$$

The perimeter of $ABCD$ is 26 cm
The area of $PQRS$ is 45 cm^2

Find the length of AB .

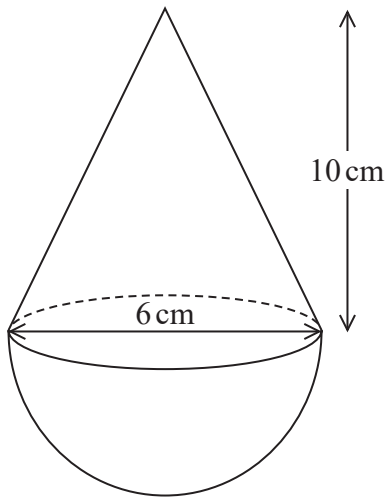
..... cm

(Total for Question 10 is 4 marks)

- 11 Find the exact value of $\tan 30^\circ \times \sin 60^\circ$
Give your answer in its simplest form.

.....
(Total for Question 11 is 2 marks)

- 12 The diagram shows a solid shape.
The shape is a cone on top of a hemisphere.



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

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

The height of the cone is 10 cm.
The base of the cone has a diameter of 6 cm.
The hemisphere has a diameter of 6 cm.

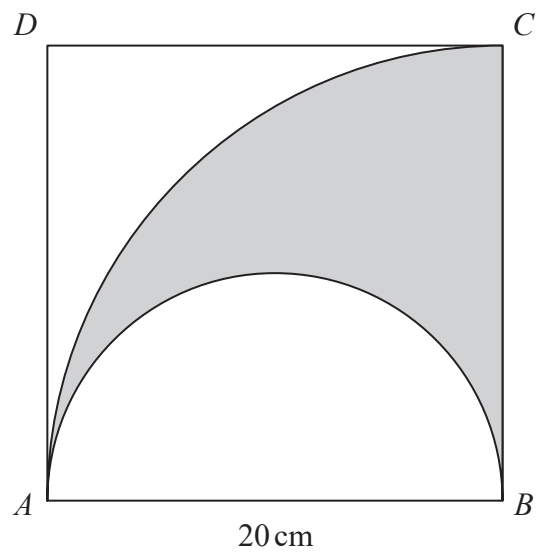
The total volume of the shape is $k\pi \text{ cm}^3$, where k is an integer.

Work out the value of k .

$k = \dots\dots\dots$

(Total for Question 12 is 4 marks)

- 13 The diagram shows a square $ABCD$ with sides of length 20 cm. It also shows a semicircle and an arc of a circle.



AB is the diameter of the semicircle.
 AC is an arc of a circle with centre B .

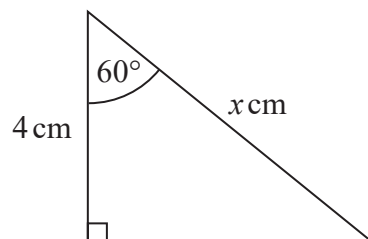
Show that
$$\frac{\text{area of shaded region}}{\text{area of square}} = \frac{\pi}{8}$$

(Total for Question 13 is 4 marks)

14 (a) Write down the exact value of $\tan 45^\circ$

.....
(1)

Here is a right-angled triangle.

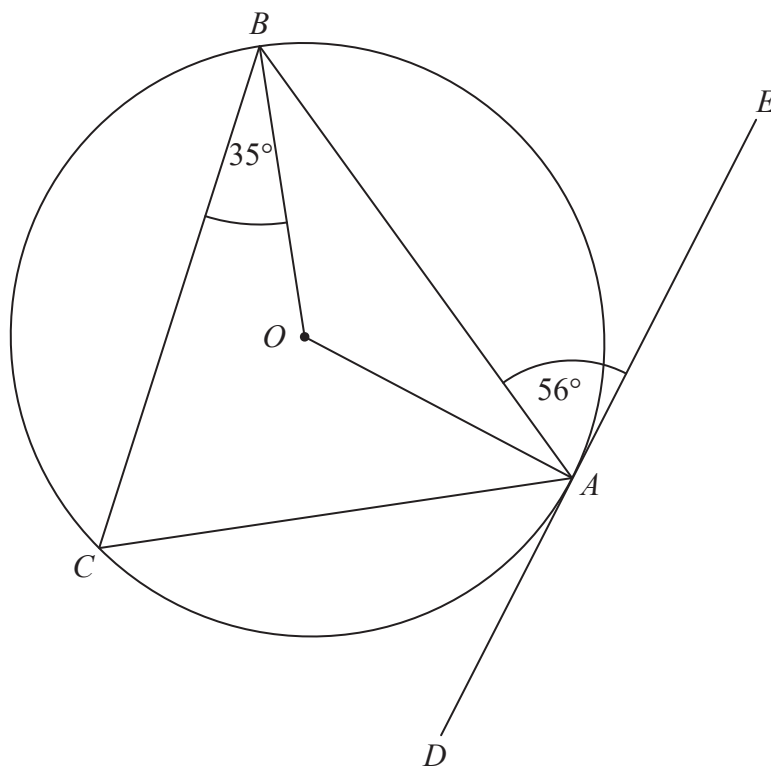


$$\cos 60^\circ = 0.5$$

(b) Work out the value of x .

.....
(2)

(Total for Question 14 is 3 marks)

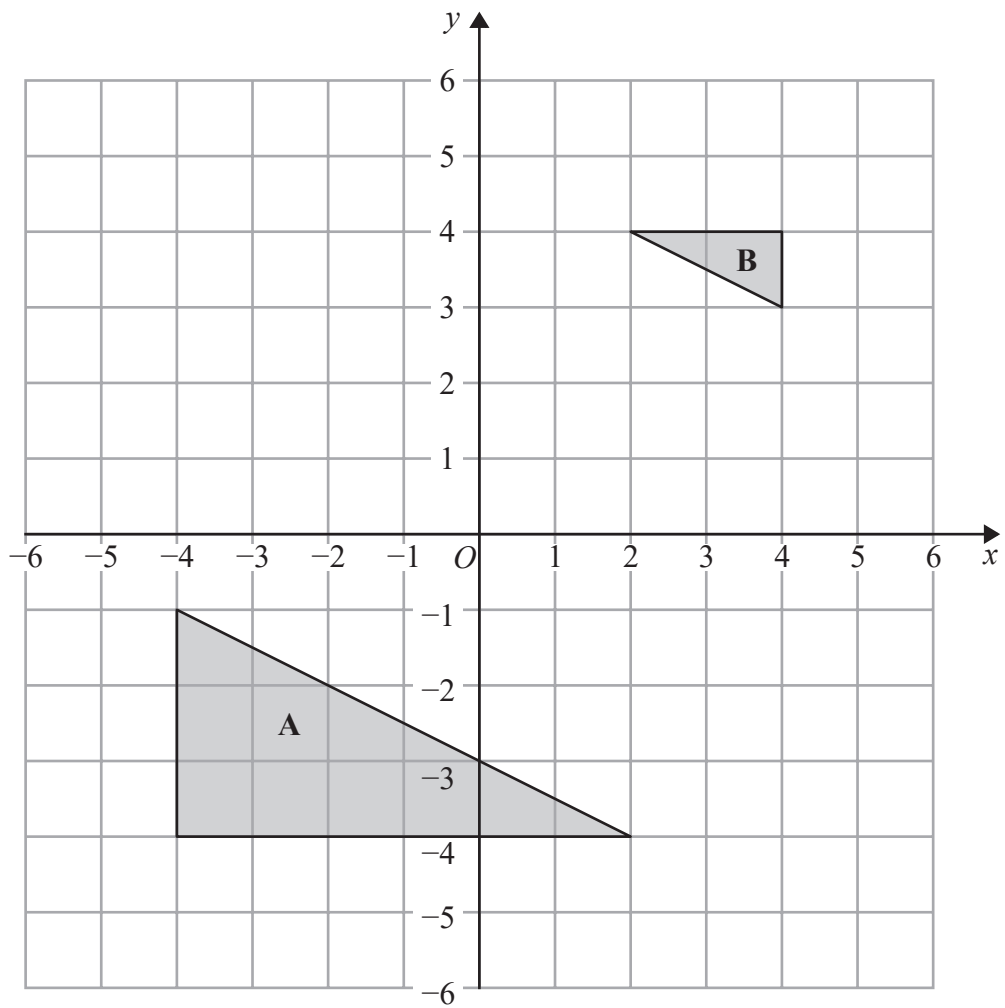


A , B and C are points on the circumference of a circle, centre O .
 DAE is the tangent to the circle at A .

Angle $BAE = 56^\circ$
 Angle $CBO = 35^\circ$

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

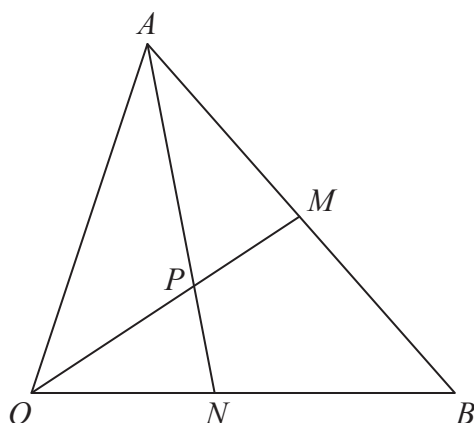
(Total for Question 15 is 3 marks)



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

(Total for Question 16 is 2 marks)

17



OAB is a triangle.

OPM and APN are straight lines.

M is the midpoint of AB .

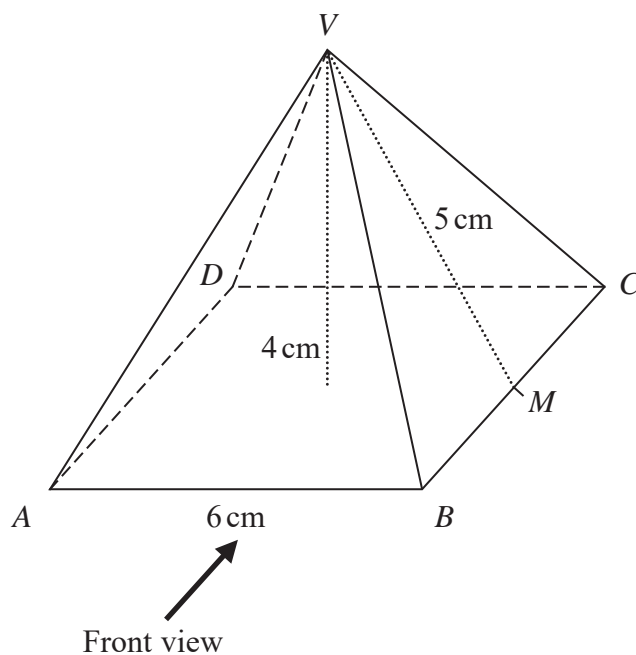
$$\vec{OA} = \mathbf{a} \quad \vec{OB} = \mathbf{b}$$

$$OP:PM = 3:2$$

Work out the ratio $ON:NB$

.....
(Total for Question 17 is 5 marks)

18 Here is a solid square-based pyramid, $VABCD$.



The base of the pyramid is a square of side 6 cm.
 The height of the pyramid is 4 cm.
 M is the midpoint of BC and $VM = 5$ cm.

(a) Draw an accurate front elevation of the pyramid from the direction of the arrow.



(2)

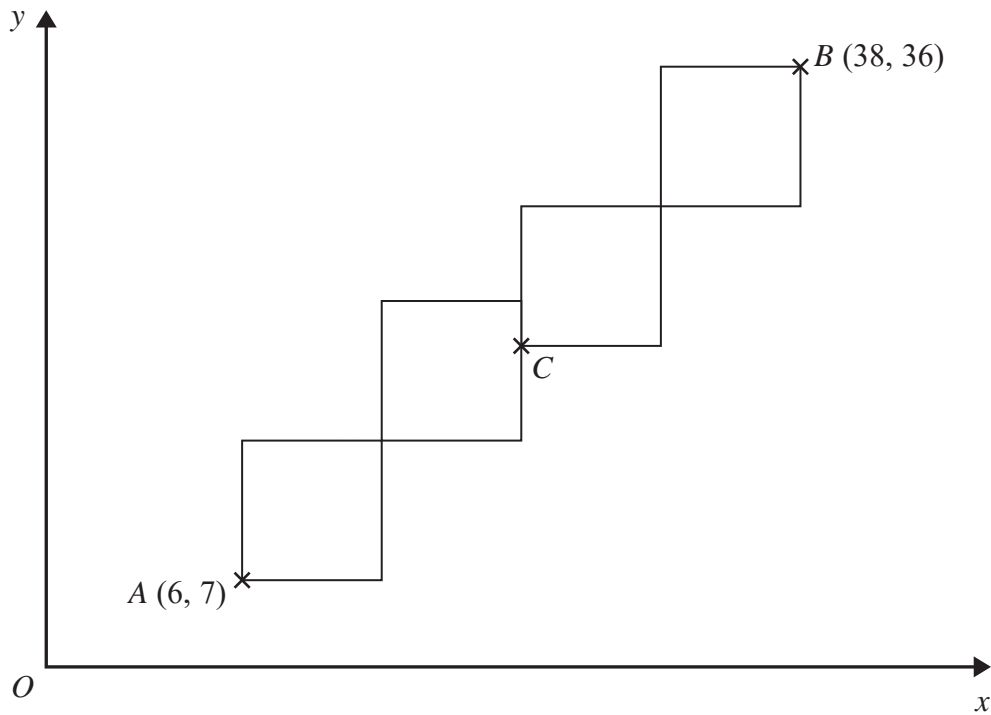
(b) Work out the total surface area of the pyramid.

.....
(4)

(Total for Question 18 is 6 marks)

19 A pattern is made from four identical squares.

The sides of the squares are parallel to the axes.



Point *A* has coordinates (6, 7)

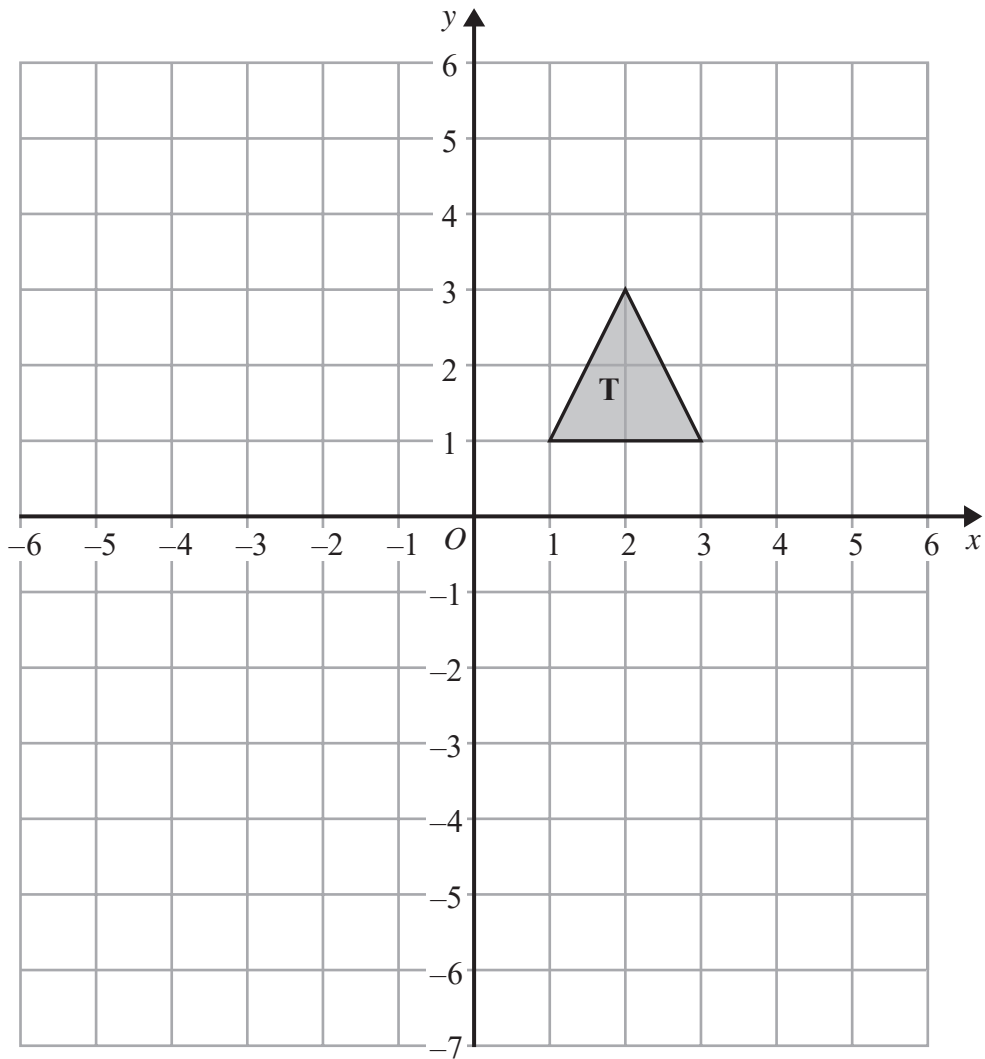
Point *B* has coordinates (38, 36)

Point *C* is marked on the diagram.

Work out the coordinates of *C*.

(.....,))

(Total for Question 19 is 5 marks)



Shape **T** is reflected in the line $x = -1$ to give shape **R**.
Shape **R** is reflected in the line $y = -2$ to give shape **S**.

Describe the **single** transformation that will map shape **T** to shape **S**.

.....

.....

.....

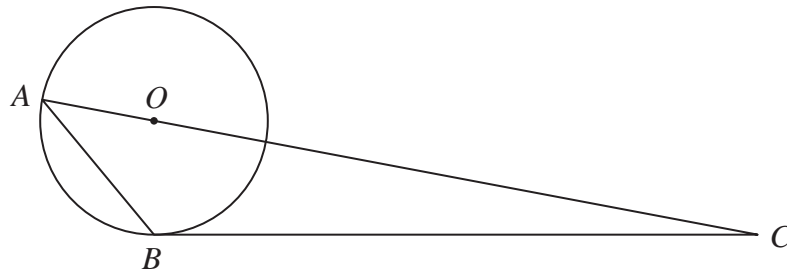
(Total for Question 20 is 2 marks)

- 21** The perimeter of a right-angled triangle is 72 cm.
The lengths of its sides are in the ratio 3 : 4 : 5

Work out the area of the triangle.

.....cm²

(Total for Question 21 is 4 marks)



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

BC is a tangent to the circle.

AOC is a straight line.

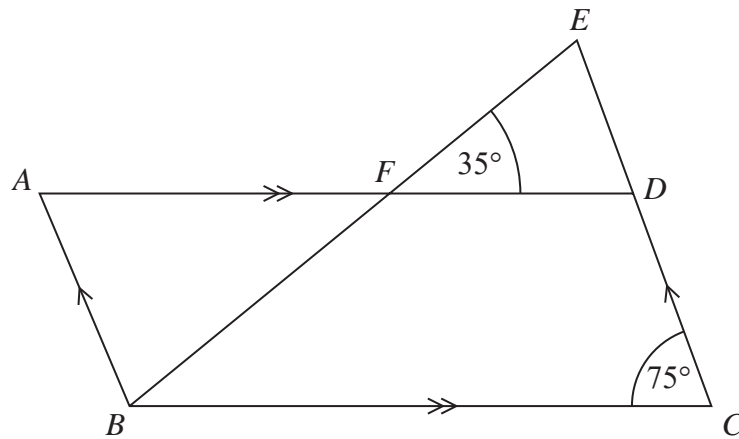
Angle $ABO = x^\circ$.

Find the size of angle ACB , in terms of x .

Give your answer in its simplest form.

Give reasons for each stage of your working.

(Total for Question 22 is 5 marks)



$ABCD$ is a parallelogram.

EDC is a straight line.

F is the point on AD so that BFE is a straight line.

Angle $EFD = 35^\circ$

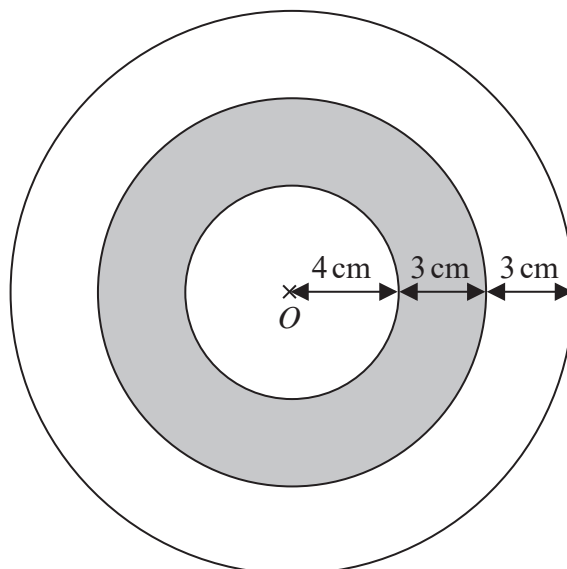
Angle $DCB = 75^\circ$

Show that angle $ABF = 70^\circ$

Give a reason for each stage of your working.

(Total for Question 23 is 4 marks)

24 The diagram shows a logo made from three circles.



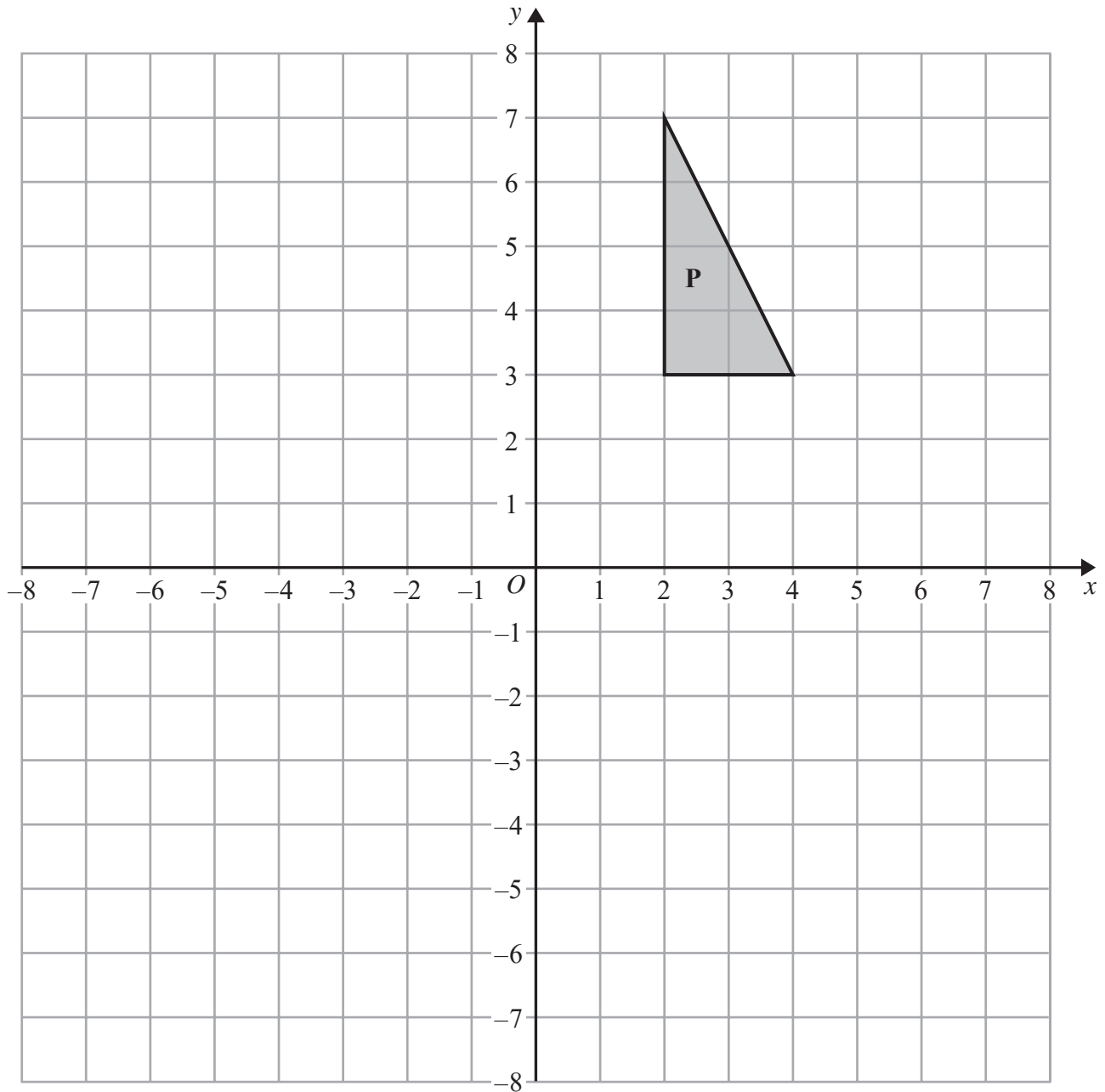
Each circle has centre O .

Daisy says that exactly $\frac{1}{3}$ of the logo is shaded.

Is Daisy correct?

You must show all your working.

(Total for Question 24 is 4 marks)



Enlarge shape **P** by scale factor $-\frac{1}{2}$ with centre of enlargement (0, 0).

Label your image **Q**.

(Total for Question 25 is 2 marks)

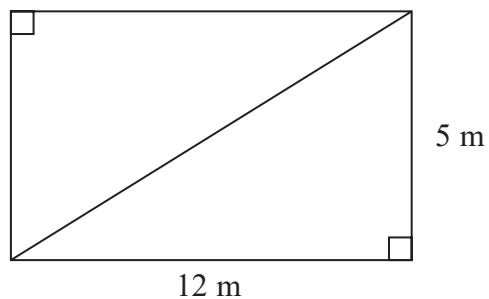
26 The table shows some values of x and y that satisfy the equation $y = a \cos x^\circ + b$

x	0	30	60	90	120	150	180
y	3	$1 + \sqrt{3}$	2	1	0	$1 - \sqrt{3}$	-1

Find the value of y when $x = 45$

.....
(Total for Question 26 is 4 marks)

27 This rectangular frame is made from 5 straight pieces of metal.

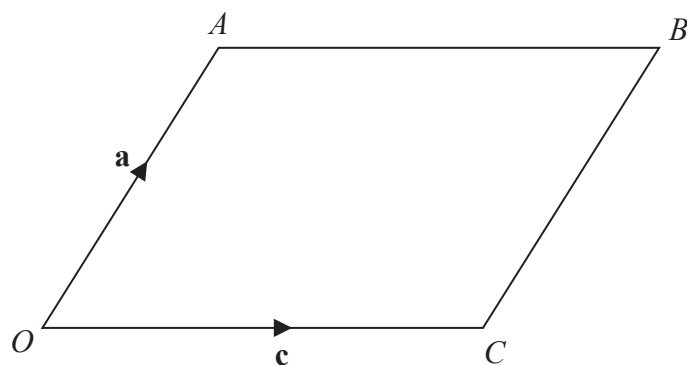


The weight of the metal is 1.5 kg per metre.

Work out the total weight of the metal in the frame.

..... kg

(Total for Question 27 is 5 marks)



$OABC$ is a parallelogram.

$$\vec{OA} = \mathbf{a} \text{ and } \vec{OC} = \mathbf{c}$$

X is the midpoint of the line AC .

OCD is a straight line so that $OC : CD = k : 1$

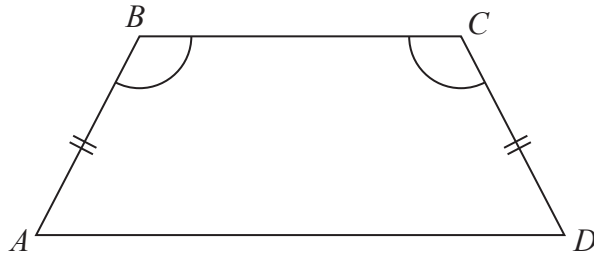
$$\text{Given that } \vec{XD} = 3\mathbf{c} - \frac{1}{2}\mathbf{a}$$

find the value of k .

$$k = \dots\dots\dots$$

(Total for Question 28 is 4 marks)

29 $ABCD$ is a quadrilateral.



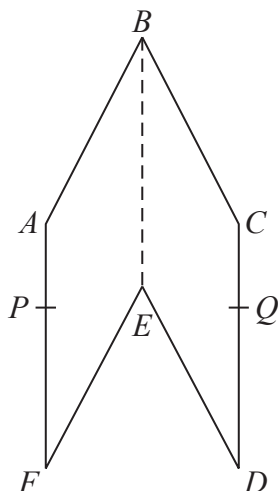
$$AB = CD.$$

$$\text{Angle } ABC = \text{angle } BCD.$$

Prove that $AC = BD$.

(Total for Question 29 is 4 marks)

30 The diagram shows a hexagon $ABCDEF$.



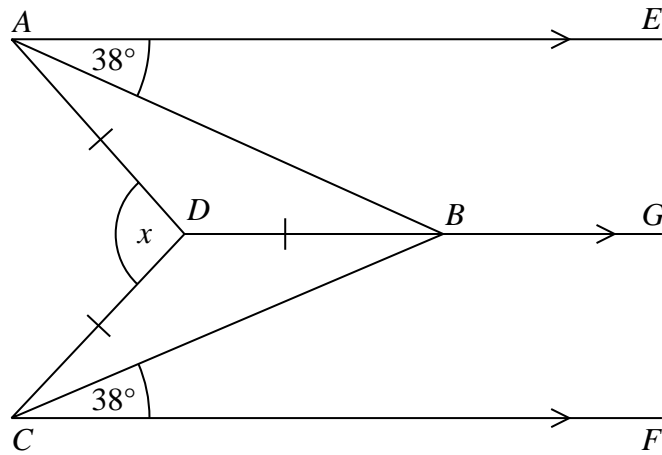
$ABEF$ and $CBED$ are congruent parallelograms where $AB = BC = x$ cm.
 P is the point on AF and Q is the point on CD such that $BP = BQ = 10$ cm.

Given that angle $ABC = 30^\circ$,

prove that $\cos PBQ = 1 - \frac{(2 - \sqrt{3})x^2}{200}$

(Total for Question 30 is 5 marks)

31



AE , DBG and CF are parallel.

$DA = DB = DC$.

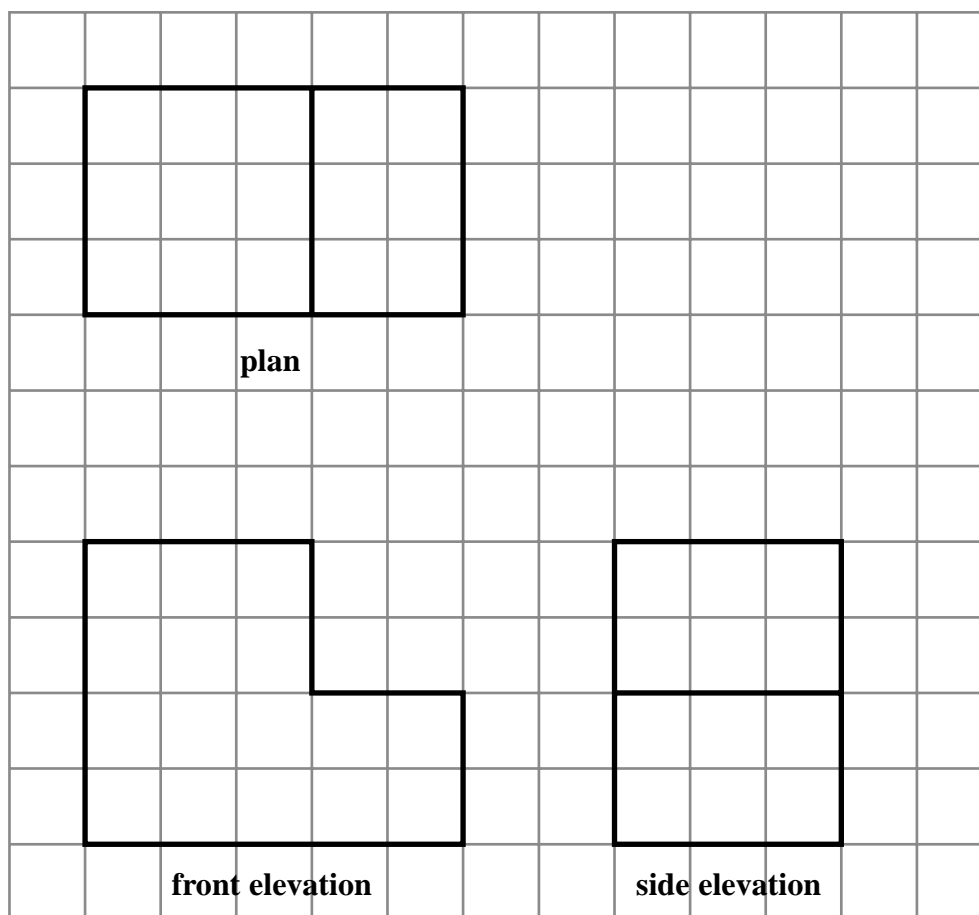
Angle $EAB = \text{angle } BCF = 38^\circ$

Work out the size of the angle marked x .

You must show your working.

(Total for Question 31 is 3 marks)

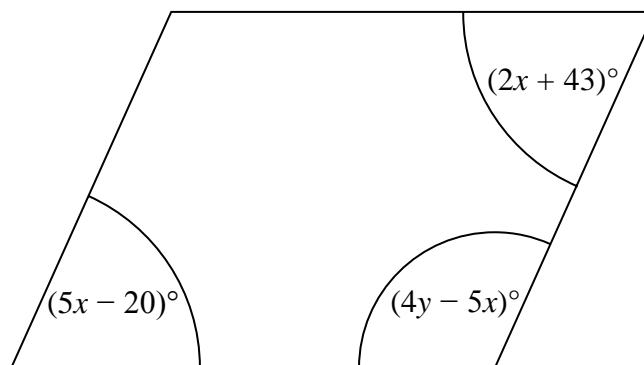
- 32 The plan, front elevation and side elevation of a solid prism are drawn on a centimetre grid.



In the space below, draw a sketch of the solid prism.
Write the dimensions of the prism on your sketch.

(Total for Question 32 is 2 marks)

33 Here is a parallelogram.



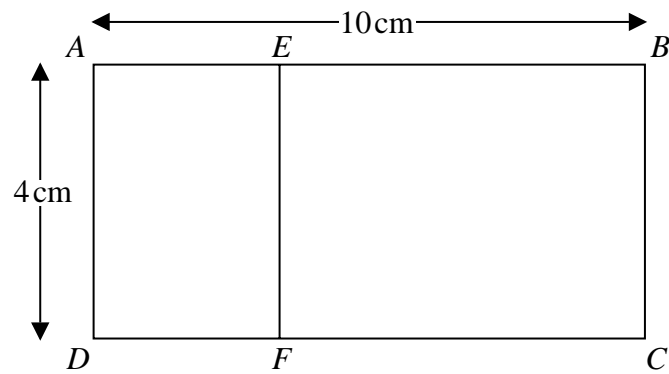
Work out the value of x and the value of y .

$x = \dots\dots\dots$

$y = \dots\dots\dots$

(Total for Question 33 is 5 marks)

34 Rectangle $ABCD$ is mathematically similar to rectangle $DAEF$.



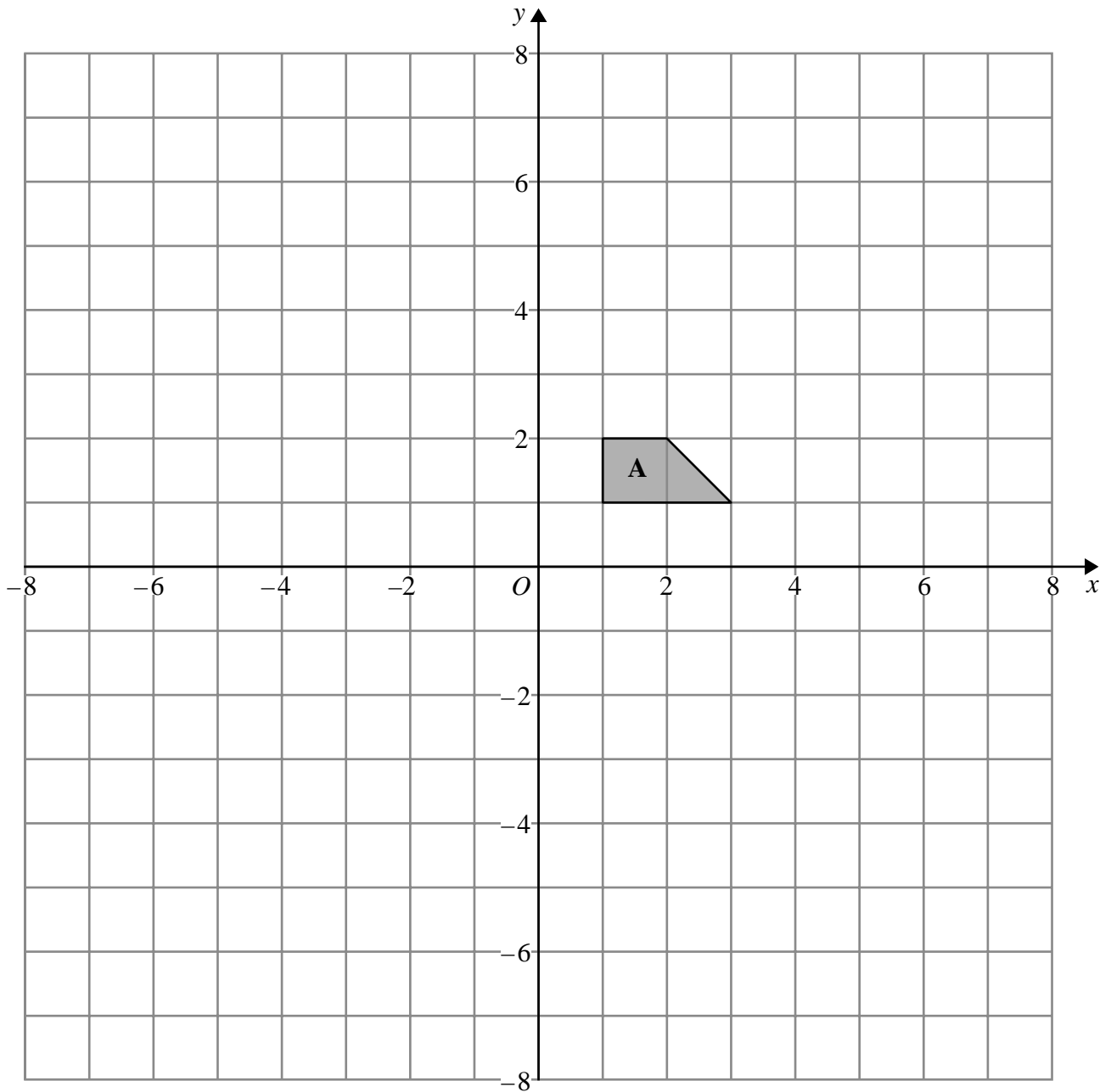
$AB = 10\text{ cm}$.

$AD = 4\text{ cm}$.

Work out the area of rectangle $DAEF$.

..... cm^2

(Total for Question 34 is 3 marks)



- (a) Enlarge shape **A** by scale factor -2 , centre $(0, 0)$
Label your image **B**.

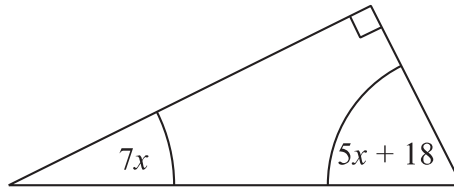
(2)

- (b) Describe fully the single transformation that will map shape **B** onto shape **A**.

(1)

(Total for Question 35 is 3 marks)

36 The diagram shows a right-angled triangle.

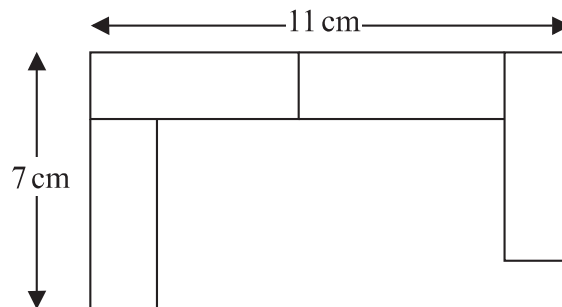


All the angles are in degrees.

Work out the size of the smallest angle of the triangle.

.....
.....
(Total for Question 36 is 3 marks)

37 A pattern is made using identical rectangular tiles.



Find the total area of the pattern.

..... cm²

(Total for Question 37 is 4 marks)

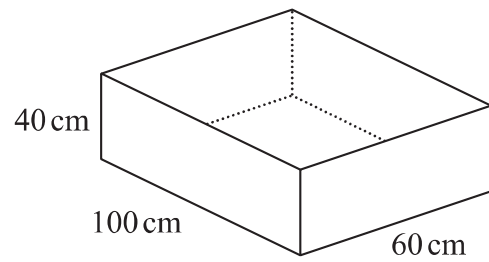
38 The diagram shows a sand pit.
The sand pit is in the shape of a cuboid.

Sally wants to fill the sand pit with sand.
A bag of sand costs £2.50
There are 8 litres of sand in each bag.

Sally says,

“The sand will cost less than £70”

Show that Sally is wrong.

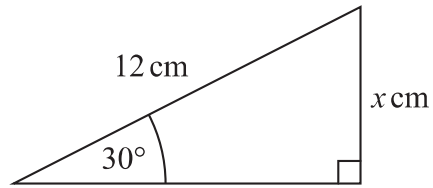


(Total for Question 38 is 5 marks)

39 (a) Write down the exact value of $\cos 30^\circ$

.....
(1)

(b)

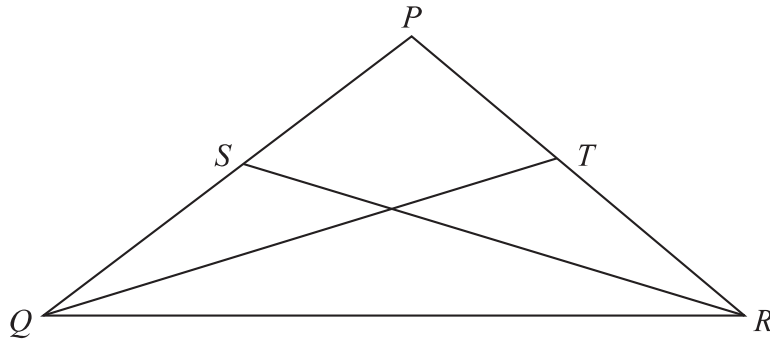


Given that $\sin 30^\circ = 0.5$,
work out the value of x .

.....
(2)

(Total for Question 39 is 3 marks)

40



$PQ = PR.$

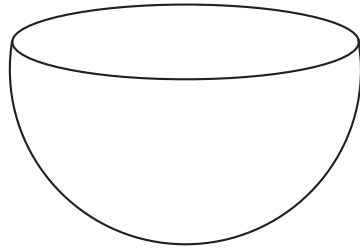
S is the midpoint of $PQ.$

T is the midpoint of $PR.$

Prove triangle QTR is congruent to triangle $RSQ.$

(Total for Question 40 is 3 marks)

41 The diagram shows a solid hemisphere.



Volume of sphere = $\frac{4}{3}\pi r^3$
Surface area of sphere = $4\pi r^2$

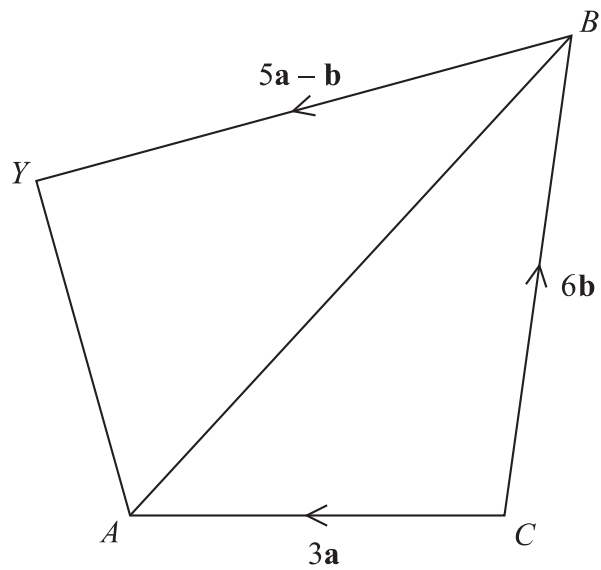
The volume of the hemisphere is $\frac{250}{3}\pi$

Work out the exact total surface area of the solid hemisphere.
Give your answer as a multiple of π .

..... cm²

(Total for Question 41 is 4 marks)

42



$CAYB$ is a quadrilateral.

$$\vec{CA} = 3\mathbf{a}$$

$$\vec{CB} = 6\mathbf{b}$$

$$\vec{BY} = 5\mathbf{a} - \mathbf{b}$$

X is the point on AB such that $AX:XB = 1:2$

Prove that $\vec{CX} = \frac{2}{5}\vec{CY}$

(Total for Question 42 is 5 marks)

43 Triangle ABC has perimeter 20 cm.

$$AB = 7 \text{ cm.}$$

$$BC = 4 \text{ cm.}$$

By calculation, deduce whether triangle ABC is a right-angled triangle.

(Total for Question 43 is 4 marks)

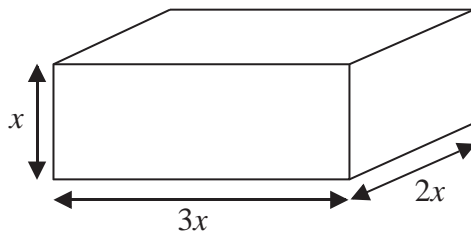
44 One sheet of A3 card has area $\frac{1}{8} \text{ m}^2$.

The card has a mass of 160 g per m^2 .

Work out the total mass of 25 sheets of A3 card.

(Total for Question 44 is 4 marks)

45 Here is a cuboid.



All measurements are in centimetres.

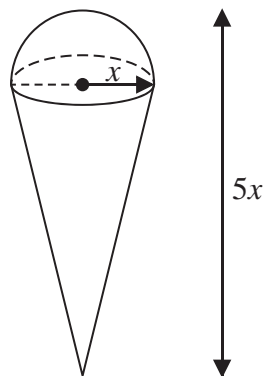
x is an integer.

The total volume of the cuboid is less than 900 cm^3

Show that $x \leq 5$

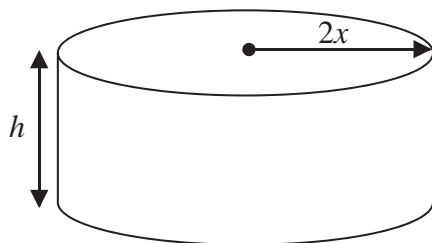
(Total for Question 45 is 3 marks)

46 A solid is made by putting a hemisphere on top of a cone.



<p>Volume of cone = $\frac{1}{3}\pi r^2 h$</p>	
<p>Volume of sphere = $\frac{4}{3}\pi r^3$</p>	

The total height of the solid is $5x$
 The radius of the base of the cone is x
 The radius of the hemisphere is x

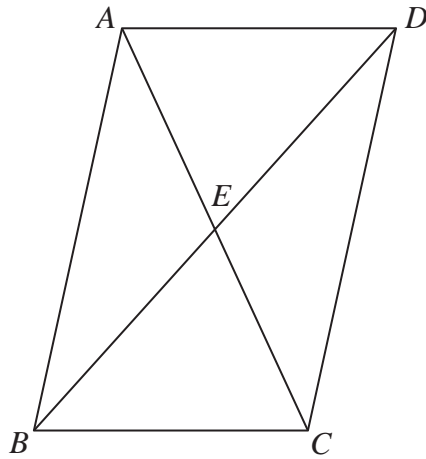


A cylinder has the same volume as the solid.
 The cylinder has radius $2x$ and height h
 All measurements are in centimetres.

Find a formula for h in terms of x
 Give your answer in its simplest form.

(Total for Question 46 is 5 marks)

47 $ABCD$ is a parallelogram.

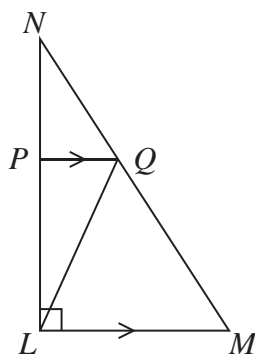


E is the point where the diagonals AC and BD meet.

Prove that triangle ABE is congruent to triangle CDE .

(Total for Question 47 is 3 marks)

48 LMN is a right-angled triangle.



Angle $NLM = 90^\circ$

PQ is parallel to LM .

The area of triangle PNQ is 8 cm^2

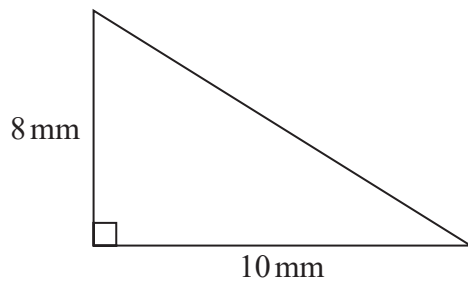
The area of triangle LPQ is 16 cm^2

Work out the area of triangle LQM .

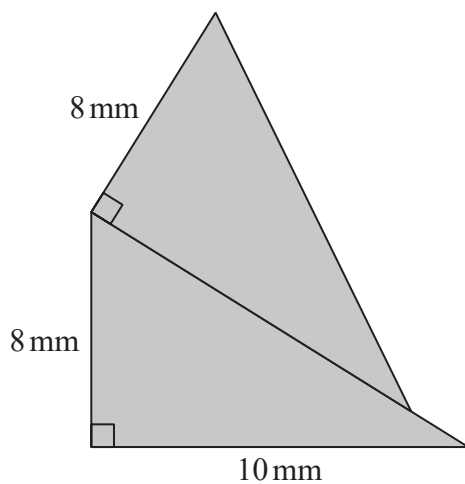
..... cm^2

(Total for Question 48 is 4 marks)

49 Here is a right-angled triangle.



The shaded shape below is made from two of these triangles.

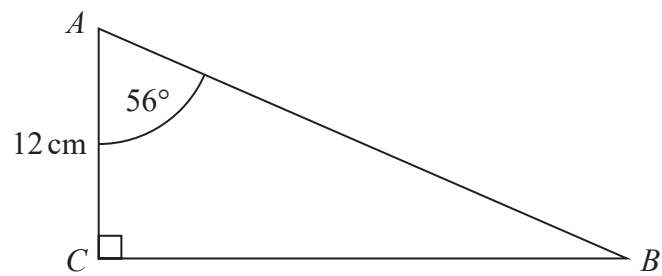


Work out the perimeter of the shaded shape.
Give your answer correct to 3 significant figures.

..... mm

(Total for Question 49 is 4 marks)

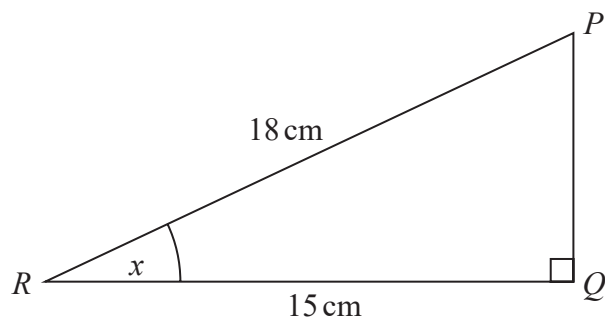
50 ABC is a right-angled triangle.



- (a) Work out the length of BC .
Give your answer correct to 1 decimal place.

..... cm
(2)

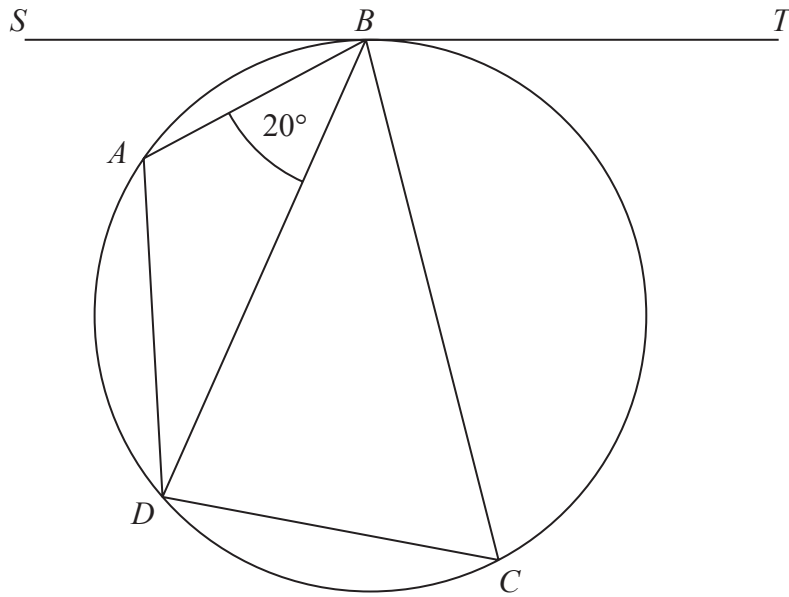
PQR is a right-angled triangle.



- (b) Work out the size of the angle marked x .
Give your answer correct to 1 decimal place.

.....
(2)

(Total for Question 50 is 4 marks)



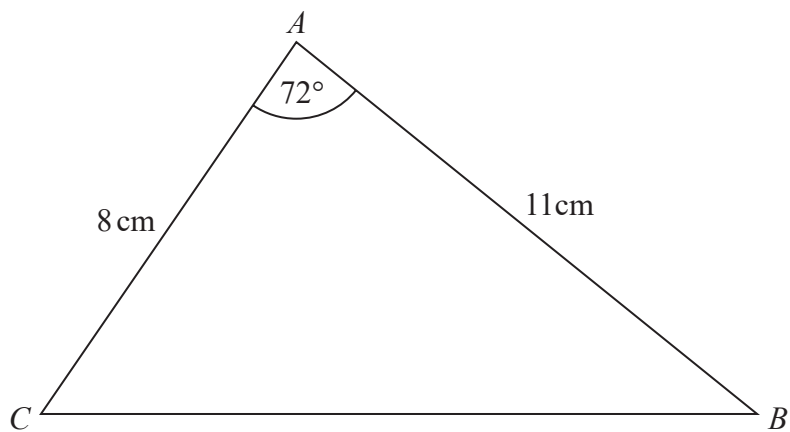
A , B , C and D are four points on a circle.
 SBT is a tangent to the circle.
 Angle $ABD = 20^\circ$

the size of angle BAD : the size of angle $BCD = 3 : 1$

Find the size of angle SBA .
 Give a reason for each stage of your working.

(Total for Question 51 is 4 marks)

52 Here is triangle ABC .



- (a) Find the length of BC .
Give your answer correct to 3 significant figures.

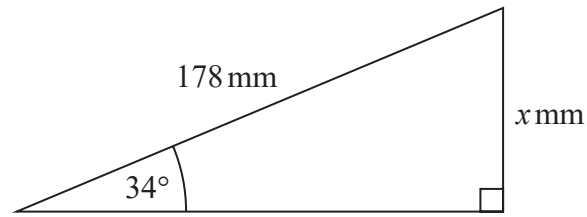
..... cm
(3)

- (b) Find the area of triangle ABC .
Give your answer correct to 3 significant figures.

..... cm^2
(2)

(Total for Question 52 is 5 marks)

53



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

.....
(Total for Question 53 is 2 marks)

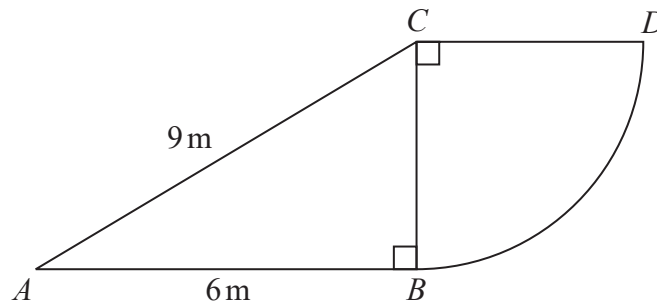
54 $\mathbf{a} = \begin{pmatrix} 3 \\ 4 \end{pmatrix}$ $\mathbf{b} = \begin{pmatrix} 5 \\ -2 \end{pmatrix}$

Find $2\mathbf{a} - 3\mathbf{b}$ as a column vector.

$\begin{pmatrix} \dots \\ \dots \\ \dots \end{pmatrix}$

(Total for Question 54 is 2 marks)

55 The diagram shows a right-angled triangle and a quarter circle.



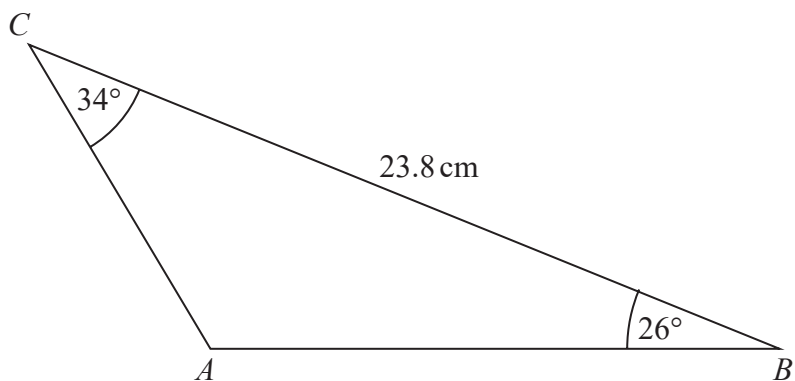
The right-angled triangle ABC has angle $ABC = 90^\circ$
The quarter circle has centre C and radius CB .

Work out the area of the quarter circle.
Give your answer correct to 3 significant figures.
You must show all your working.

..... m²

(Total for Question 55 is 4 marks)

56 Here is triangle ABC .



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

..... cm

(Total for Question 56 is 3 marks)

57 Here are two squares, **A** and **B**.



The length of each side of square **B** is 4 cm greater than the length of each side of square **A**.
The area of square **B** is 70 cm^2 greater than the area of square **A**.

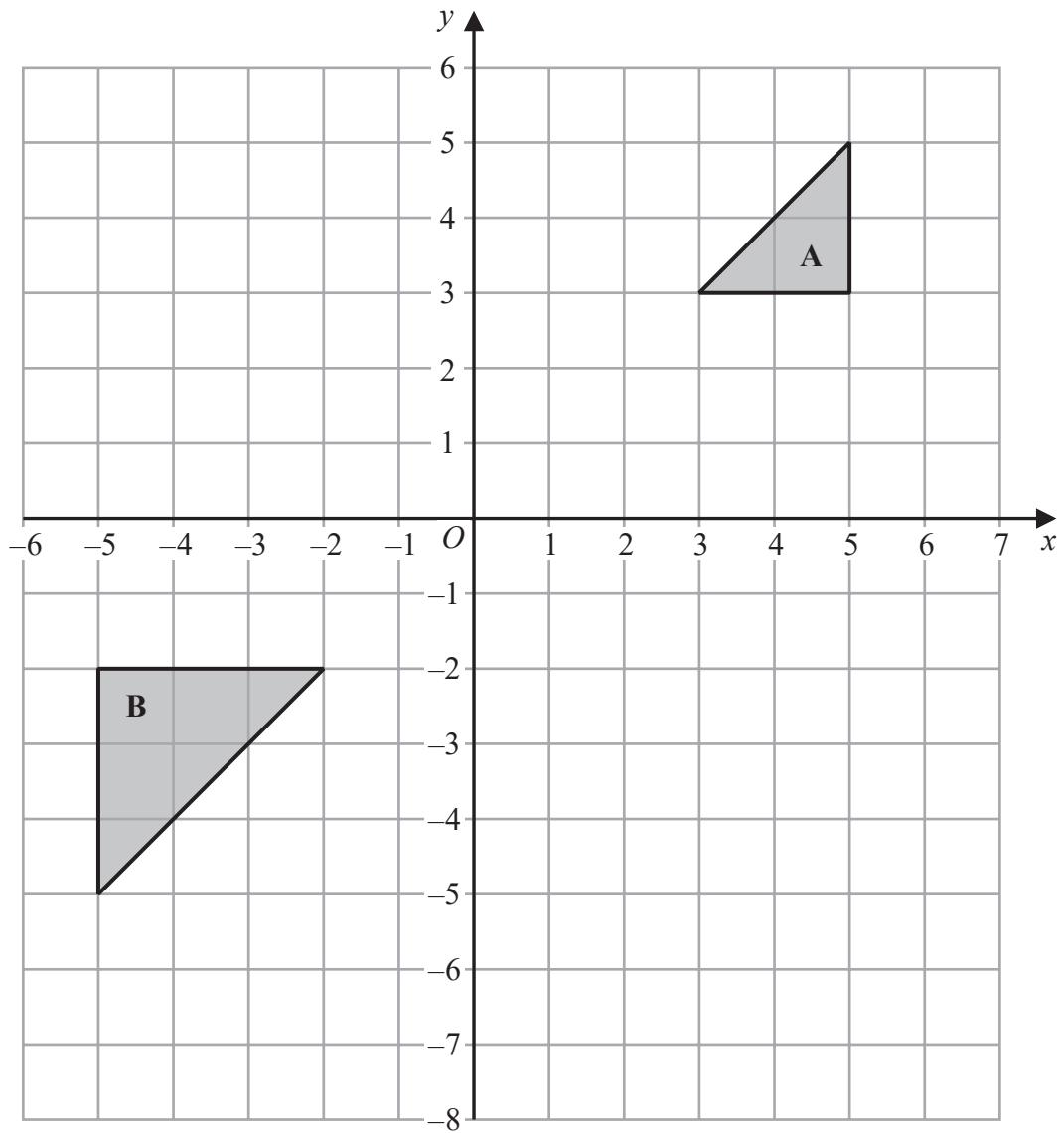
Find the area of square **B**.

Give your answer correct to 3 significant figures.

You must show all your working.

..... cm^2

(Total for Question 57 is 4 marks)



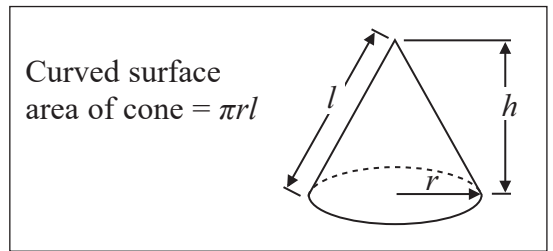
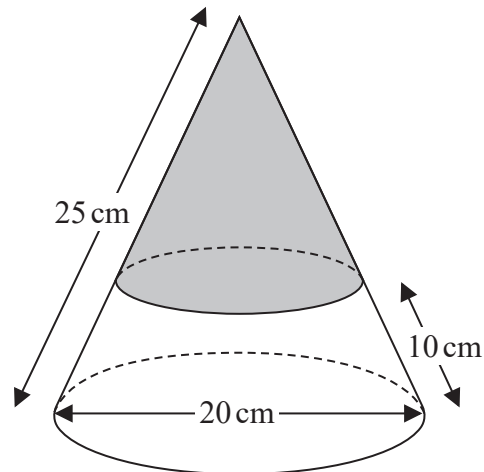
Describe fully the single transformation that maps triangle A onto triangle B.

.....

.....

(Total for Question 58 is 2 marks)

59 The diagram represents a solid cone.



The cone has a base diameter of 20 cm and a slant height of 25 cm.

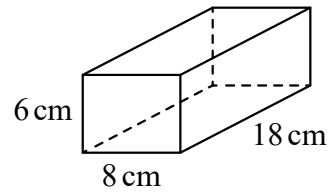
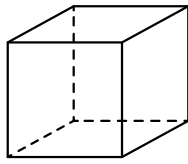
A circle is drawn around the surface of the cone at a slant height of 10 cm above the base. The curved surface of the cone above the circle is painted grey.

Work out the area of the curved surface of the cone that is **not** painted grey.
Give your answer as a multiple of π
You must show all your working.

..... cm²

(Total for Question 59 is 4 marks)

60 The diagram shows a cube and a cuboid.



The total surface area of the cube is equal to the total surface area of the cuboid.

Janet says,

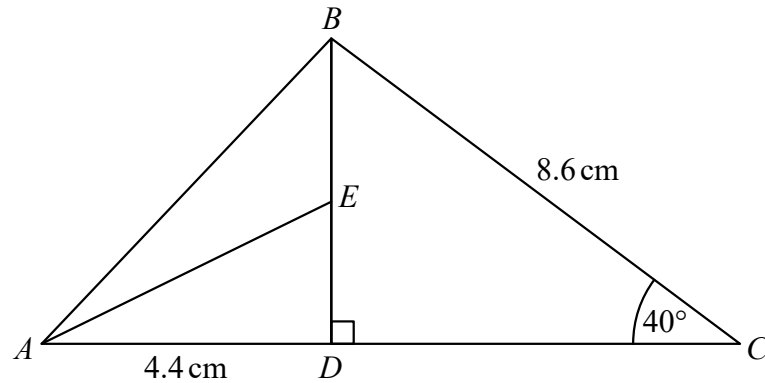
“The volume of the cube is equal to the volume of the cuboid.”

Is Janet correct?

You must show how you get your answer.

(Total for Question 60 is 5 marks)

61 The diagram shows triangle ABC .



ADC and DEB are straight lines.

$$AD = 4.4 \text{ cm}$$

$$BC = 8.6 \text{ cm}$$

E is the midpoint of DB .

$$\text{Angle } CDB = 90^\circ$$

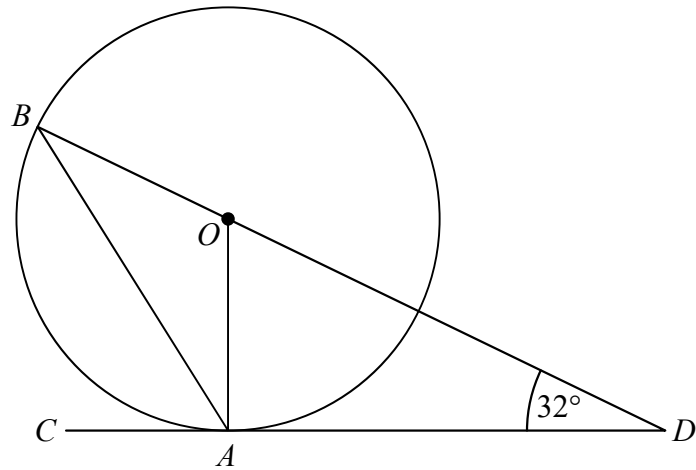
$$\text{Angle } DCB = 40^\circ$$

Work out the size of angle EAD .

Give your answer correct to 1 decimal place.

You must show all your working.

(Total for Question 61 is 4 marks)



A and B are points on a circle with centre O .

CAD is the tangent to the circle at A .

BOD is a straight line.

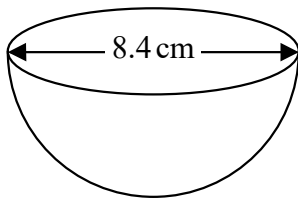
Angle $ODA = 32^\circ$

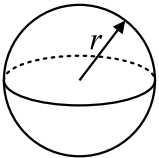
Work out the size of angle CAB .

You must show all your working.

(Total for Question 62 is 3 marks)

63 The diagram shows a hemisphere with diameter 8.4 cm.



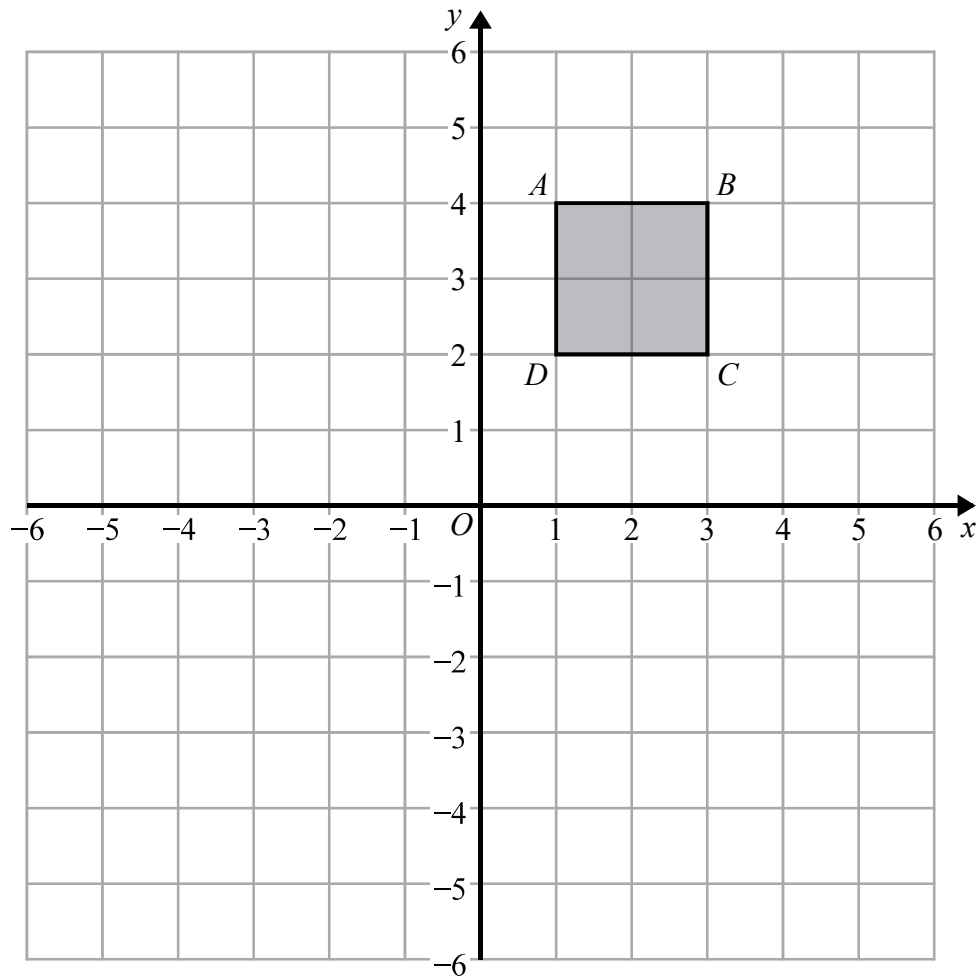
Volume of sphere = $\frac{4}{3} \pi r^3$ 

The diagram shows a sphere with a radius line drawn from the center to the top surface, labeled with the letter 'r'.

Work out the volume of the hemisphere.
Give your answer correct to 3 significant figures.

..... cm³

(Total for Question 63 is 2 marks)



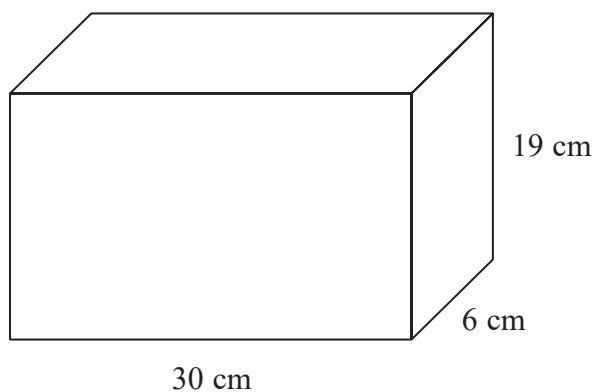
Square $ABCD$ is transformed by a combined transformation of a reflection in the line $x = -1$ followed by a rotation.

Under the combined transformation, two vertices of the square $ABCD$ are invariant.

Describe fully one possible rotation.

(Total for Question 64 is 2 marks)

65 A container is in the shape of a cuboid.



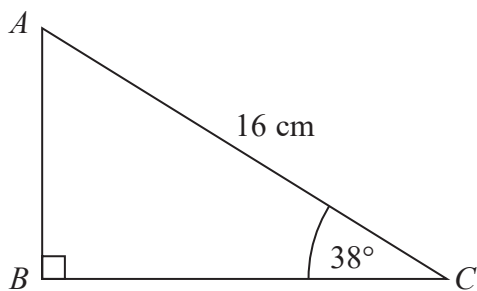
The container is $\frac{2}{3}$ full of water.

A cup holds 275 ml of water.

What is the greatest number of cups that can be completely filled with water from the container?

.....
(Total for Question 65 is 4 marks)

66 ABC is a right-angled triangle.

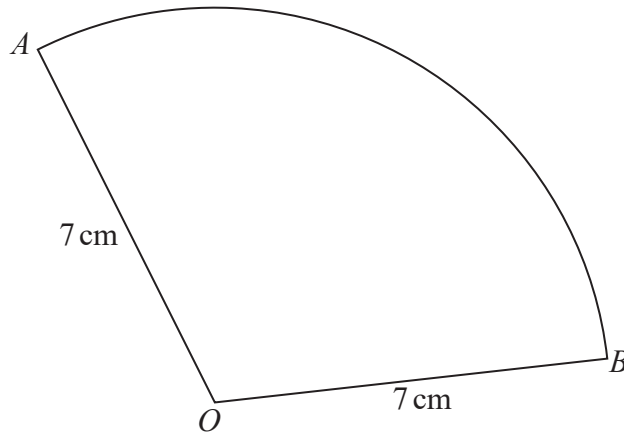


Calculate the length of AB .
Give your answer correct to 2 decimal places.

.....cm

(Total for Question 66 is 2 marks)

67 OAB is a sector of a circle with centre O and radius 7 cm .



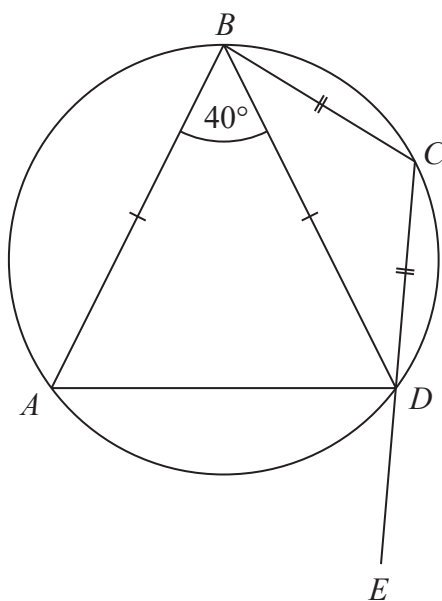
The area of the sector is 40 cm^2

Calculate the perimeter of the sector.
Give your answer correct to 3 significant figures.

..... cm

(Total for Question 67 is 4 marks)

- 68 The points A , B , C and D lie on a circle.
 CDE is a straight line.



$$BA = BD$$

$$CB = CD$$

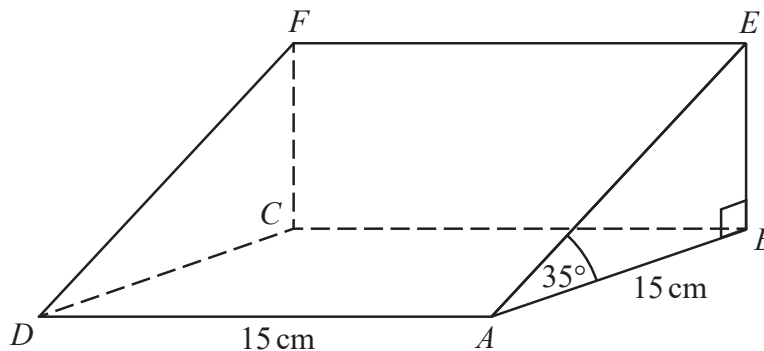
$$\text{Angle } ABD = 40^\circ$$

Work out the size of angle ADE .

You must give a reason for each stage of your working.

(Total for Question 68 is 5 marks)

69 The diagram shows a triangular prism.



The base, $ABCD$, of the prism is a square of side length 15 cm.

Angle ABE and angle CBE are right angles.

Angle $EAB = 35^\circ$

M is the point on DA such that

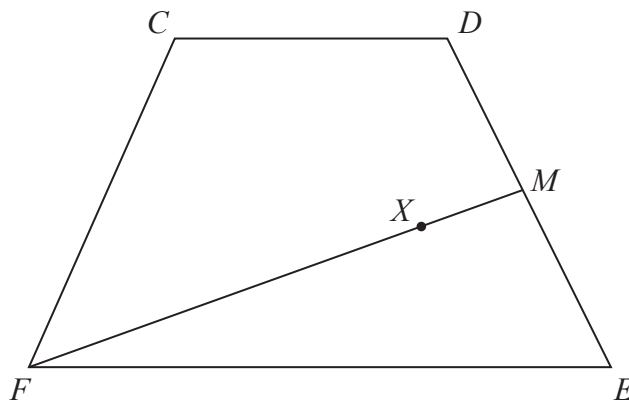
$$DM:MA = 2:3$$

Calculate the size of the angle between EM and the base of the prism.

Give your answer correct to 1 decimal place.

(Total for Question 69 is 4 marks)

70 $CDEF$ is a quadrilateral.



$\vec{CD} = \mathbf{a}$, $\vec{DE} = \mathbf{b}$ and $\vec{FC} = \mathbf{a} - \mathbf{b}$.

- (a) Express \vec{FE} in terms of \mathbf{a} and/or \mathbf{b} .
Give your answer in its simplest form.

.....
(2)

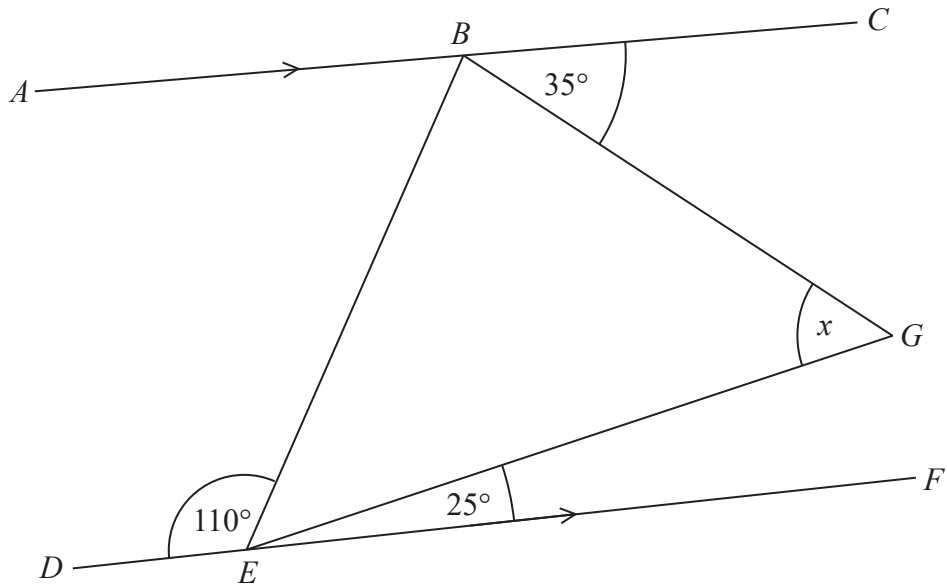
M is the midpoint of DE .
 X is the point on FM such that $FX:XM = n:1$
 CXE is a straight line.

- (b) Work out the value of n .

$n =$
(4)

(Total for Question 70 is 6 marks)

71 BEG is a triangle.

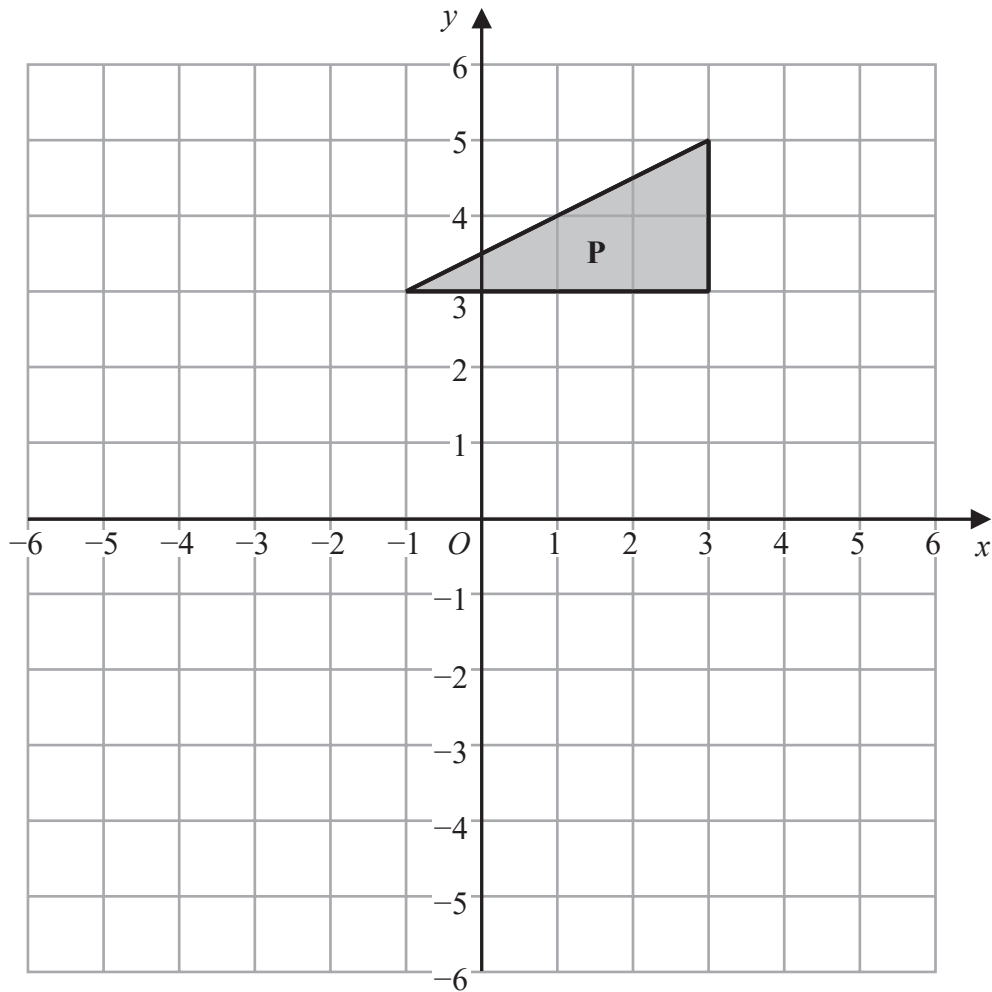


ABC and DEF are parallel lines.

Work out the size of angle x .

Give a reason for each stage of your working.

(Total for Question 71 is 4 marks)



Triangle **P** is reflected in the line $y = -x$ to give triangle **Q**.

Triangle **Q** is reflected in the line $x = -1$ to give triangle **R**.

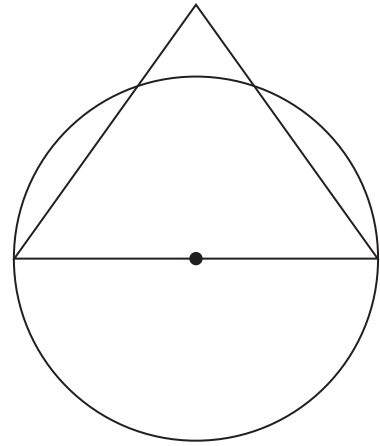
Describe fully the single transformation that maps triangle **R** to triangle **P**.

(Total for Question 72 is 3 marks)

73 The diagram shows a circle and an equilateral triangle.

One side of the equilateral triangle is a diameter of the circle.
The circle has a circumference of 44 cm.

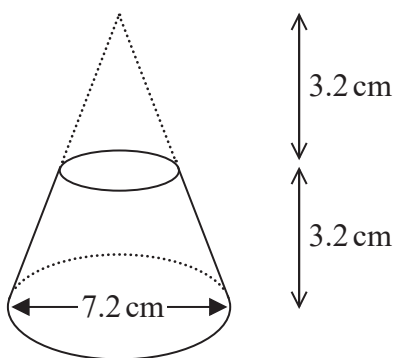
Work out the area of the triangle.
Give your answer correct to 3 significant figures.



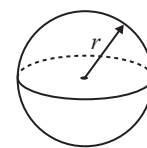
.....cm²

(Total for Question 73 is 3 marks)

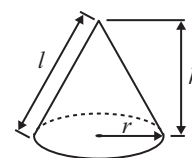
74 Here is a frustum of a cone.



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

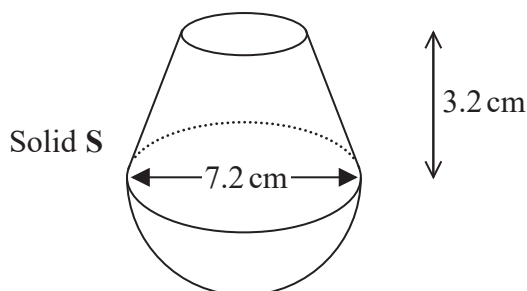


$$\text{Volume of cone} = \frac{1}{3} \pi r^2 h$$



The diagram shows that the frustum is made by removing a cone with height 3.2 cm from a solid cone with height 6.4 cm and base diameter 7.2 cm.

The frustum is joined to a solid hemisphere of diameter 7.2 cm to form the solid **S** shown below.



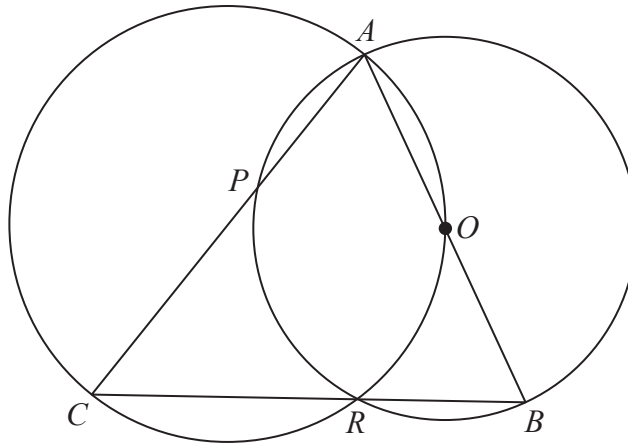
The density of the frustum is 2.4 g/cm^3

The density of the hemisphere is 4.8 g/cm^3

Calculate the average density of solid **S**.

.....g/cm³

(Total for Question 74 is 5 marks)

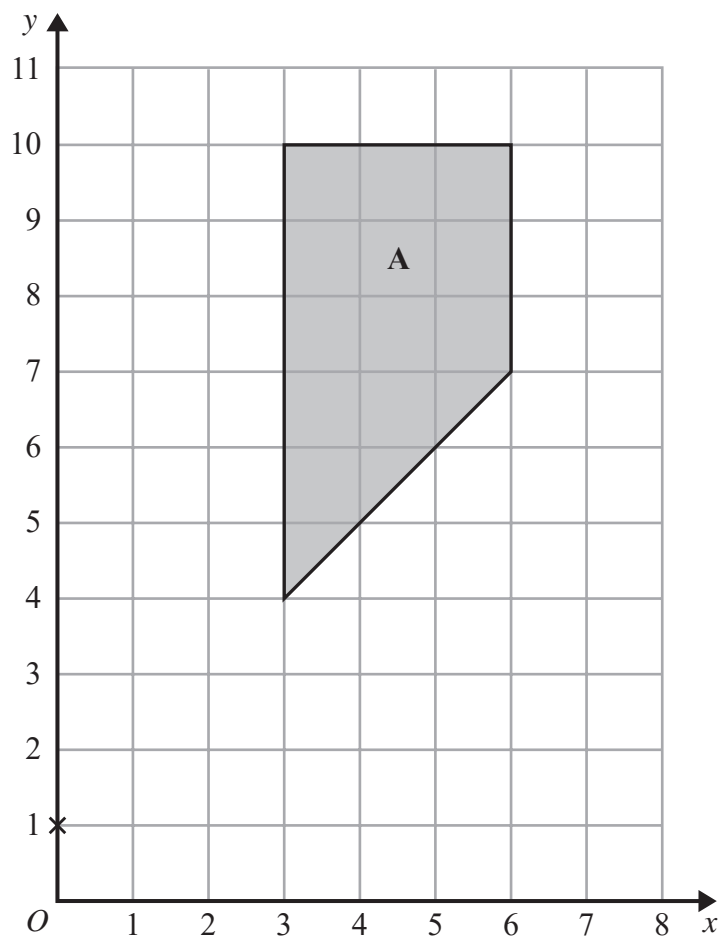


A, B, R and P are four points on a circle with centre O .
 A, O, R and C are four points on a different circle.
 The two circles intersect at the points A and R .

CPA , CRB and AOB are straight lines.

Prove that angle $CAB =$ angle ABC .

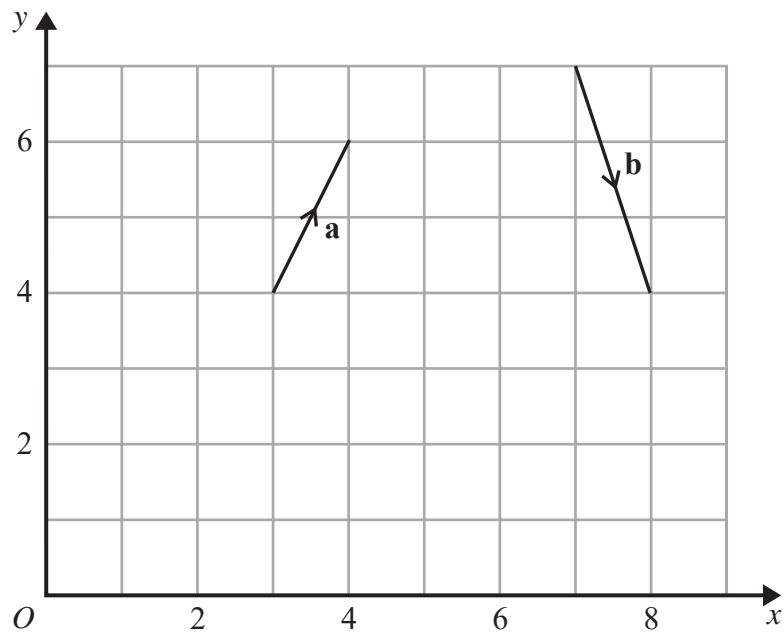
(Total for Question 75 is 4 marks)



Enlarge shape A by scale factor $\frac{1}{3}$ centre (0, 1)

(Total for Question 76 is 2 marks)

77 The vector **a** and the vector **b** are shown on the grid.



(a) On the grid, draw and label vector $-2\mathbf{a}$

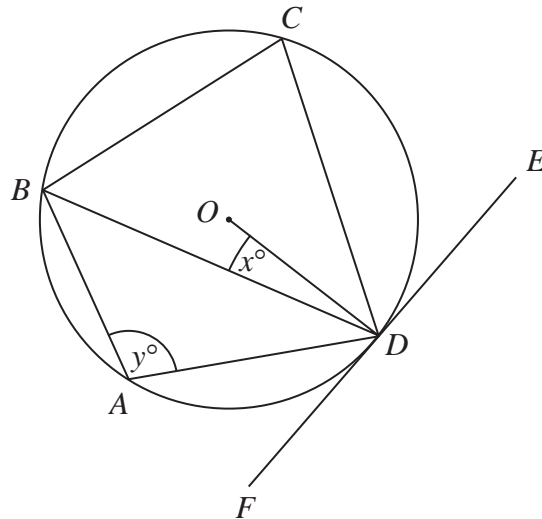
(1)

(b) Work out $\mathbf{a} + 2\mathbf{b}$ as a column vector.

$\begin{pmatrix} \\ \text{---} \\ \end{pmatrix}$

(2)

(Total for Question 77 is 3 marks)



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

- (a) Show that $y - x = 90$
 You must give a reason for each stage of your working.

(3)

Dylan was asked to give some possible values for x and y .

He said,

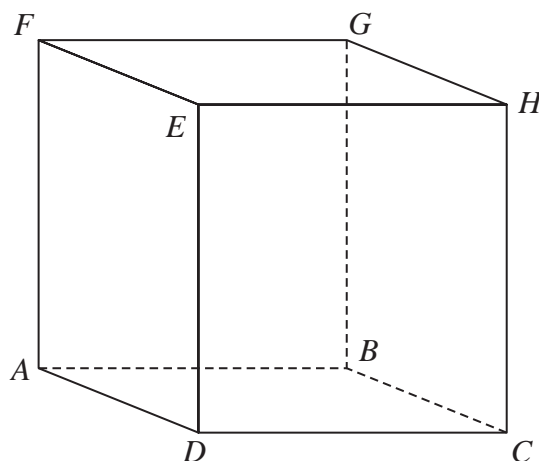
“ y could be 200 and x could be 110, because $200 - 110 = 90$ ”

- (b) Is Dylan correct?
 You must give a reason for your answer.

(1)

(Total for Question 78 is 4 marks)

79 $ABCDEFGH$ is a cuboid.



$$AB = 7.3 \text{ cm}$$

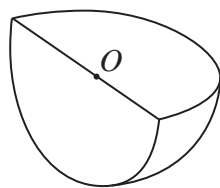
$$CH = 8.1 \text{ cm}$$

$$\text{Angle } BCA = 48^\circ$$

Find the size of the angle between AH and the plane $ABCD$.
Give your answer correct to 1 decimal place.

(Total for Question 79 is 4 marks)

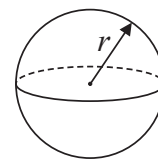
80 Shape S is one quarter of a solid sphere, centre O .



Shape S

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

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



The volume of S is $576\pi \text{ cm}^3$

Find the surface area of S.

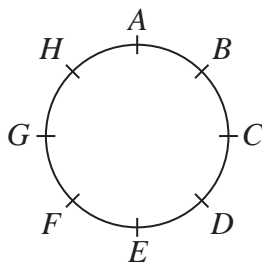
Give your answer correct to 3 significant figures.

You must show your working.

..... cm^2

(Total for Question 80 is 5 marks)

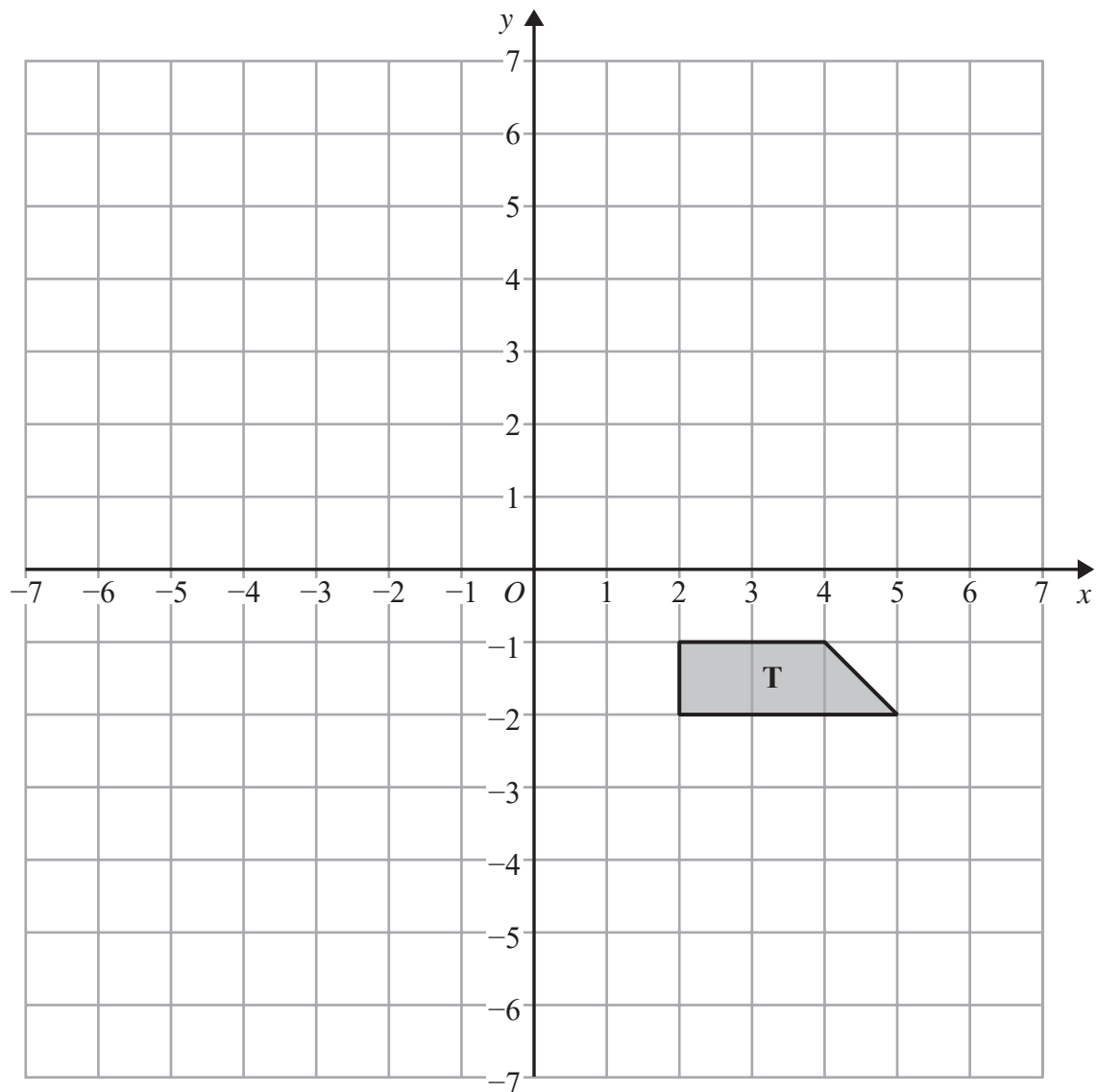
81 " Hasmeet walks once round a circle with diameter 80 metres.



- " There are 8 points equally spaced on the circumference of the circle.
- " Find the distance Hasmeet walks between one point and the next point.

.....m
(2)

(Total for Question 81 is 2 marks)



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

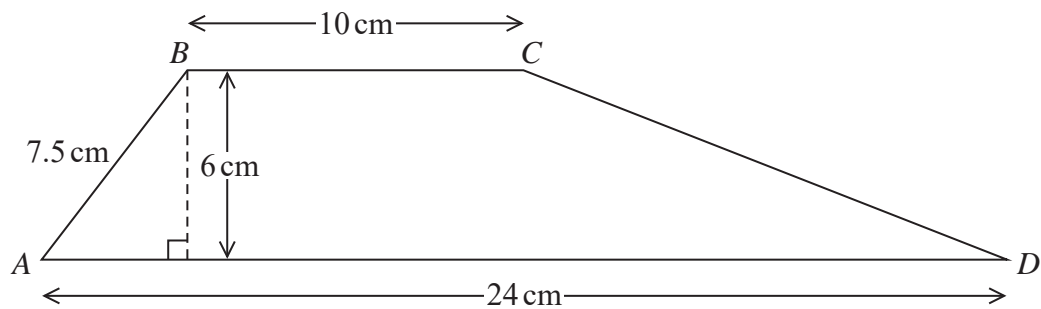
(1)

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

(1)

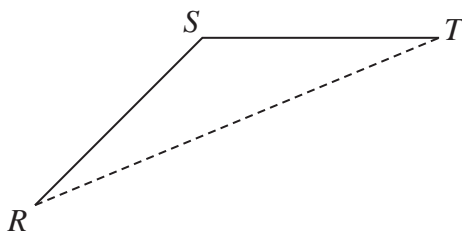
(Total for Question 82 is 2 marks)

83 $ABCD$ is a trapezium.



Work out the size of angle CDA .
Give your answer correct to 1 decimal place.

(Total for Question 83 is 5 marks)



RS and ST are 2 sides of a regular 12-sided polygon.
 RT is a diagonal of the polygon.

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

.....
(Total for Question 84 is 3 marks)

85 "A triangle has vertices P , Q and R .

The coordinates of P are $(-3, -6)$

The coordinates of Q are $(1, 4)$

The coordinates of R are $(5, -2)$

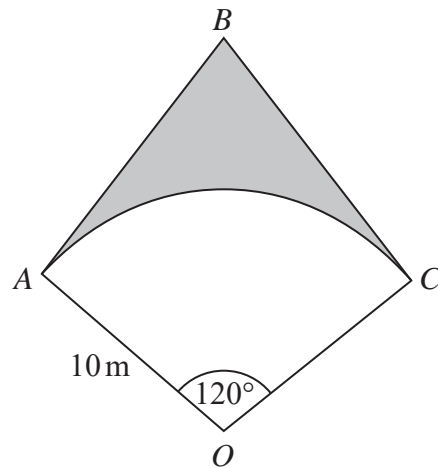
M is the midpoint of PQ .

N is the midpoint of QR .

Prove that MN is parallel to PR .

You must show each stage of your working.

(Total for Question 85 is 4 marks)



OAC is a sector of a circle, centre O , radius 10 m .

BA is the tangent to the circle at point A .

BC is the tangent to the circle at point C .

Angle $AOC = 120^\circ$

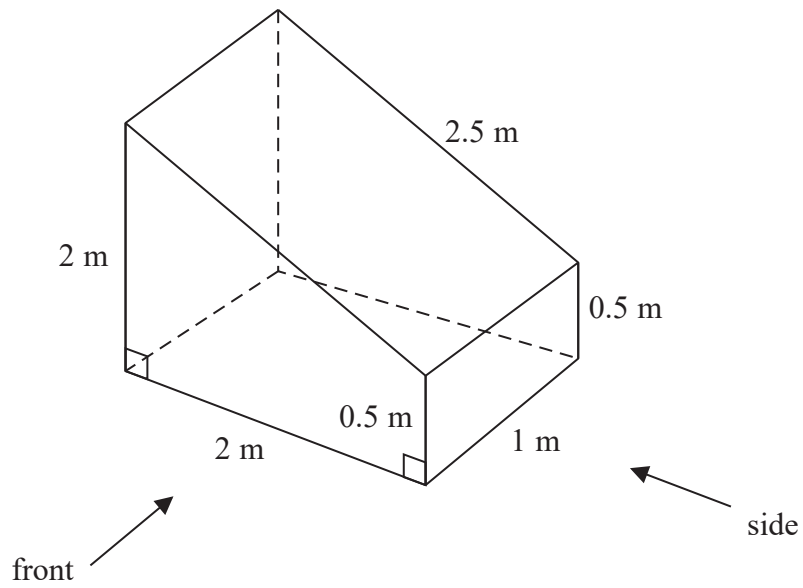
Calculate the area of the shaded region.

Give your answer correct to 3 significant figures.

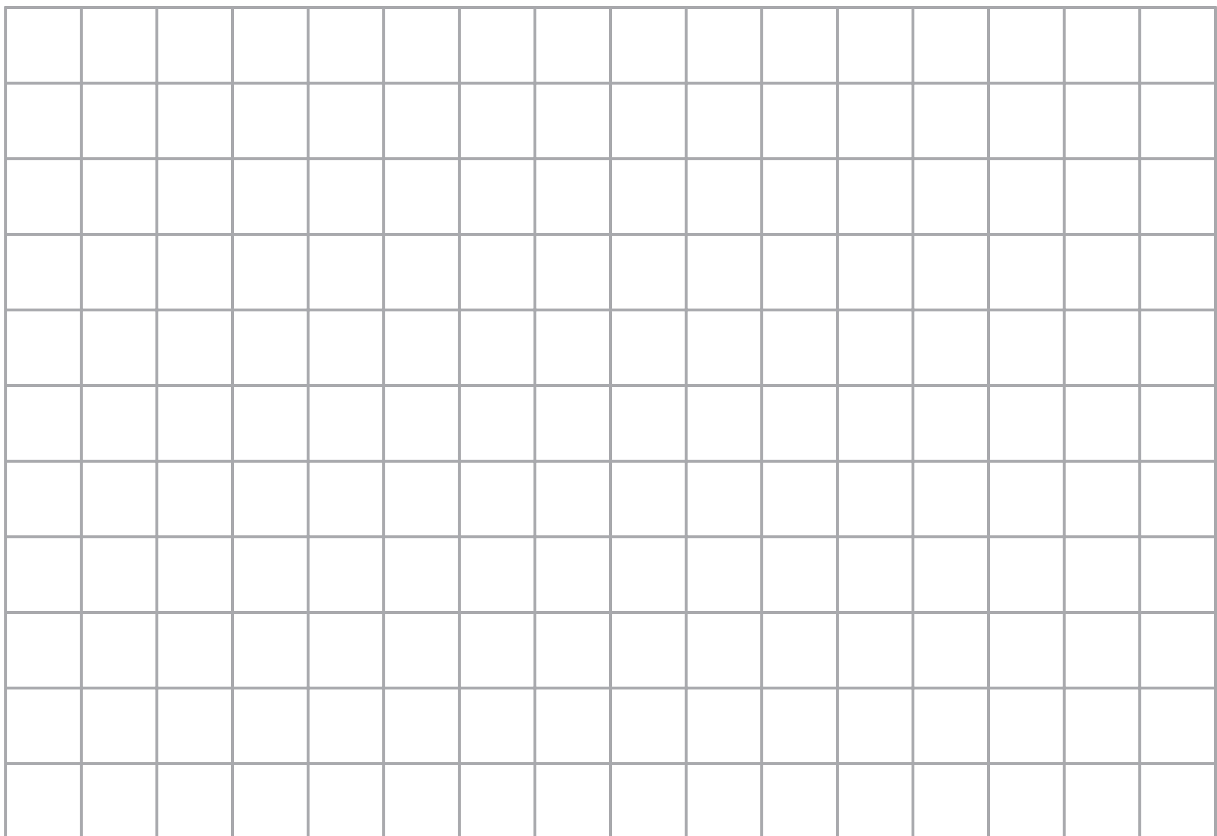
..... m^2

(Total for Question 86 is 5 marks)

87 The diagram shows a prism with a cross section in the shape of a trapezium.

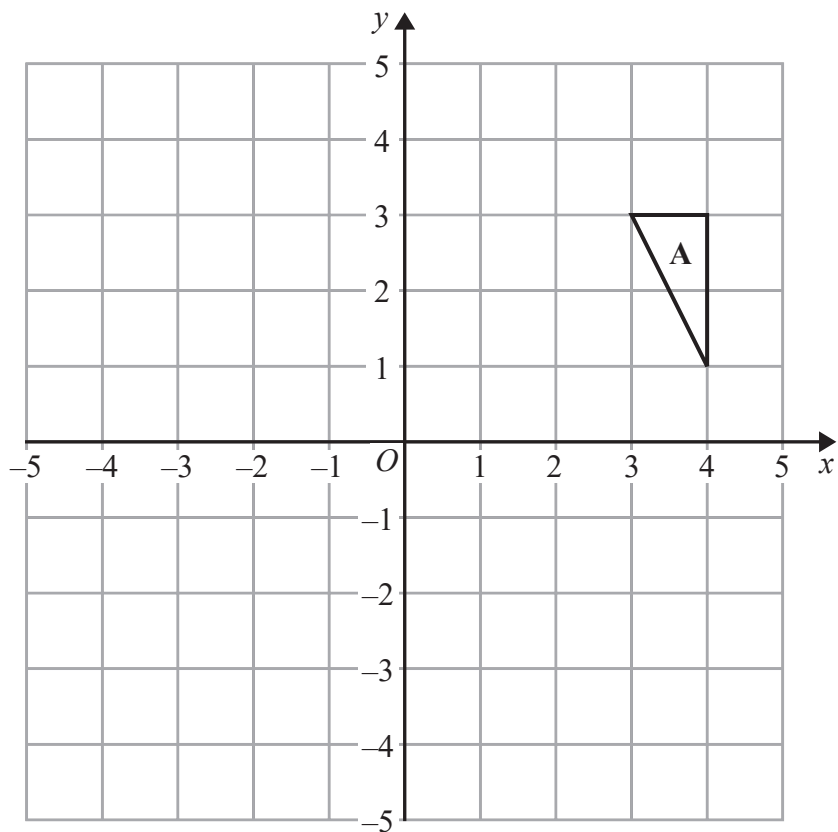


On the centimetre grid below, draw the front elevation and the side elevation of the prism. Use a scale of 2 cm to 1 m.



(Total for Question 87 is 4 marks)

88 The diagram shows triangle **A** drawn on a grid.



Kyle reflects triangle **A** in the x -axis to get triangle **B**.
He then reflects triangle **B** in the line $y = x$ to get triangle **C**.

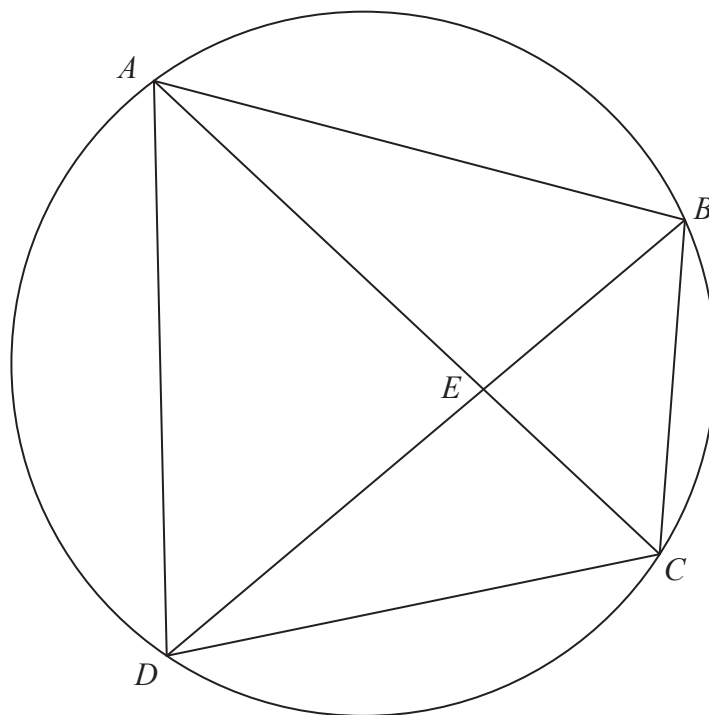
Amy reflects triangle **A** in the line $y = x$ to get triangle **D**.
She is then going to reflect triangle **D** in the x -axis to get triangle **E**.

Amy says that triangle **E** should be in the same position as triangle **C**.

Is Amy correct?
You must show how you get your answer.

(Total for Question 88 is 3 marks)

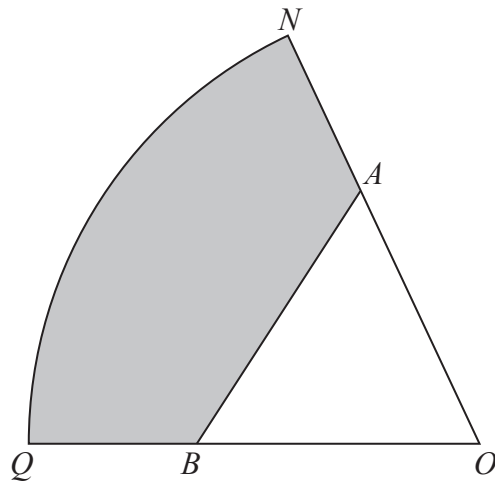
89 A , B , C and D are four points on the circumference of a circle.



AEC and BED are straight lines.

Prove that triangle ABE and triangle DCE are similar.
You must give reasons for each stage of your working.

(Total for Question 89 is 3 marks)



ONQ is a sector of a circle with centre O and radius 11 cm.

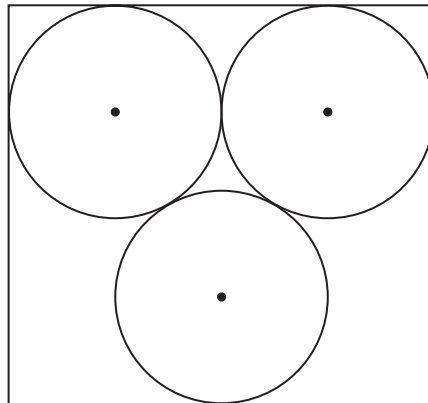
A is the point on ON and B is the point on OQ such that AOB is an equilateral triangle of side 7 cm.

Calculate the area of the shaded region as a percentage of the area of the sector ONQ .
Give your answer correct to 1 decimal place.

.....%

(Total for Question 90 is 5 marks)

- 91 The diagram shows 3 identical circles inside a rectangle.
Each circle touches the other two circles and the sides of the rectangle, as shown in the diagram.



The radius of each circle is 24 mm.

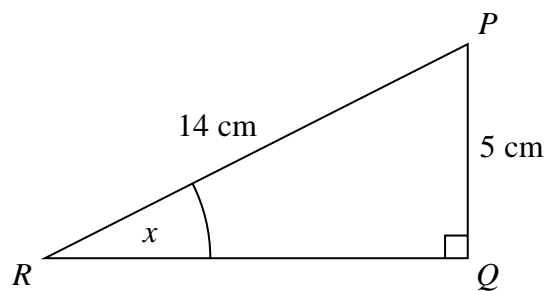
Work out the area of the rectangle.

Give your answer correct to 3 significant figures.

..... mm²

(Total for Question 91 is 4 marks)

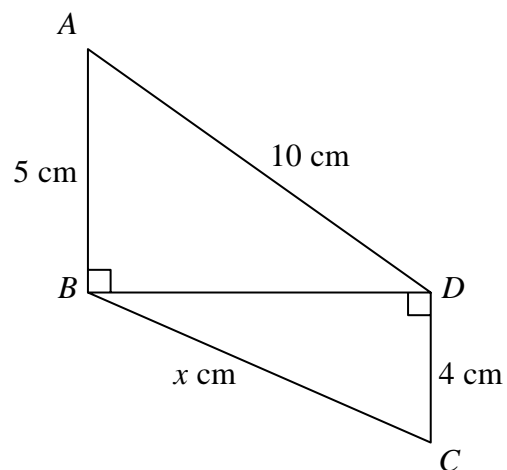
92 PQR is a right-angled triangle.



Work out the size of the angle marked x .
Give your answer correct to 1 decimal place.

.....
(Total for Question 92 is 2 marks)

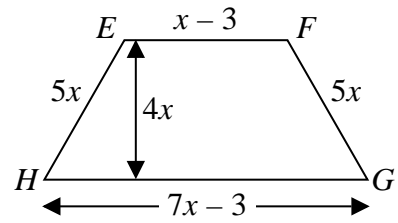
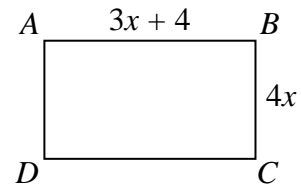
93 Triangles ABD and BCD are right-angled triangles.



Work out the value of x .
Give your answer correct to 2 decimal places.

.....
(Total for Question 93 is 4 marks)

- 94 $ABCD$ is a rectangle.
 $EFGH$ is a trapezium.

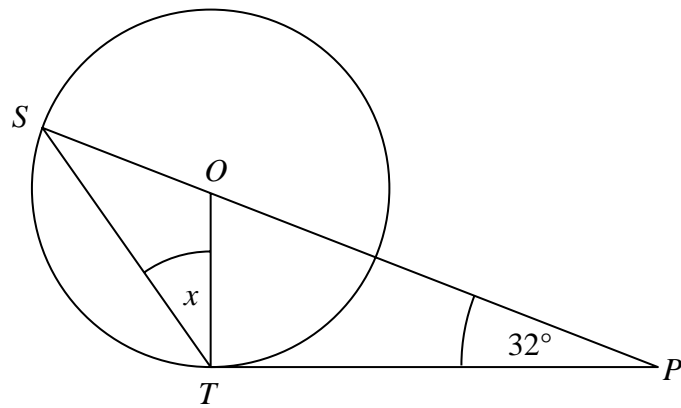


All measurements are in centimetres.
 The perimeters of these two shapes are the same.

Work out the area of the rectangle.

..... cm^2

(Total for Question 94 is 5 marks)

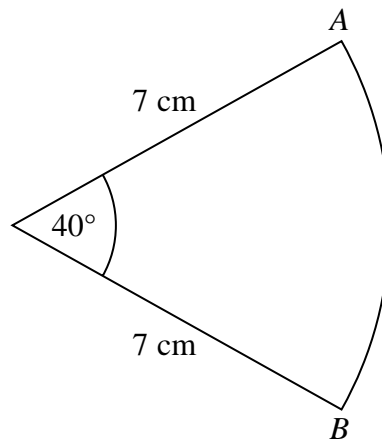


S and T are points on the circumference of a circle, centre O .
 PT is a tangent to the circle.
 SOP is a straight line.
Angle $OPT = 32^\circ$

Work out the size of the angle marked x .
You must give a reason for each stage of your working.

(Total for Question 95 is 4 marks)

96 The diagram shows a sector of a circle of radius 7 cm.



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

..... cm

(Total for Question 96 is 2 marks)

97 In triangle RPQ ,

$$RP = 8.7 \text{ cm}$$

$$PQ = 5.2 \text{ cm}$$

$$\text{Angle } PRQ = 32^\circ$$

- (a) Assuming that angle PQR is an acute angle, calculate the area of triangle RPQ .
Give your answer correct to 3 significant figures.

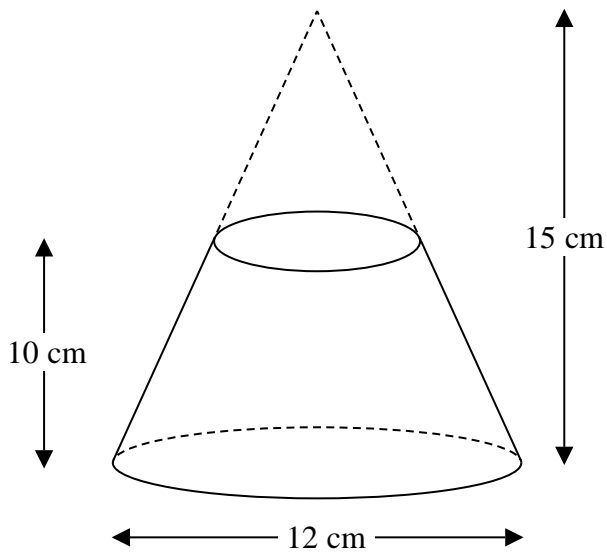
.....cm²
(4)

- (b) If you did not know that angle PQR is an acute angle, what effect would this have on your calculation of the area of triangle RPQ ?

.....
.....
.....
(1)

(Total for Question 97 is 5 marks)

98 A frustum is made by removing a small cone from a large cone as shown in the diagram.



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

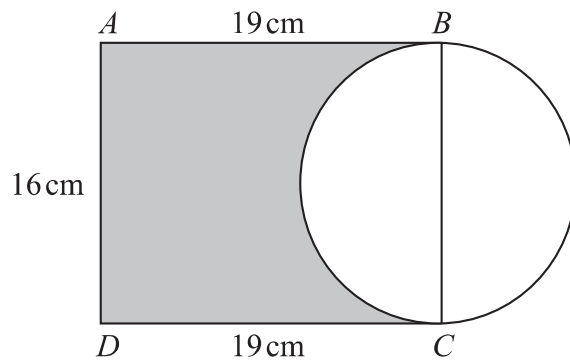
The frustum is made from glass.
 The glass has a density of 2.5 g/cm^3

Work out the mass of the frustum.
 Give your answer to an appropriate degree of accuracy.

..... g

(Total for Question 98 is 5 marks)

99 Here is a diagram showing a rectangle, $ABCD$, and a circle.



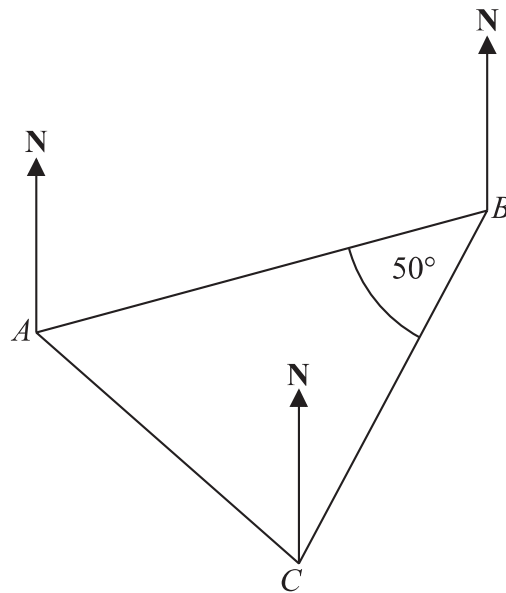
BC is a diameter of the circle.

Calculate the percentage of the area of the rectangle that is shaded.
Give your answer correct to 1 decimal place.

..... %

(Total for Question 99 is 4 marks)

100 The diagram shows the positions of three points, A , B and C , on a map.



The bearing of B from A is 070°

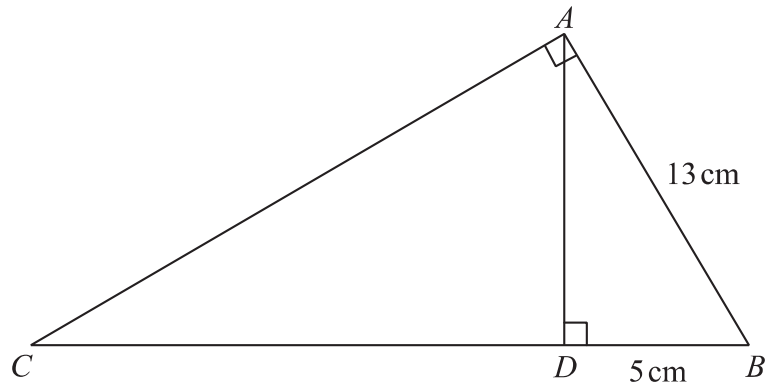
Angle ABC is 50°

$AB = CB$

Work out the bearing of C from A .

.....
(Total for Question 100 is 3 marks)

101 ABC and ABD are two right-angled triangles.



Angle $BAC = \text{angle } ADB = 90^\circ$

$AB = 13 \text{ cm}$

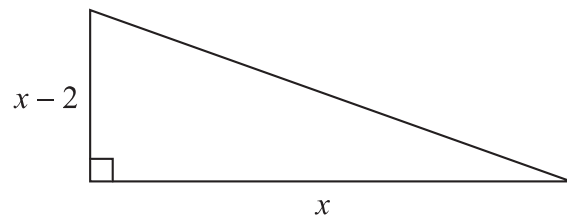
$DB = 5 \text{ cm}$

Work out the length of CB .

..... cm

(Total for Question 101 is 3 marks)

102 Here is a right-angled triangle.



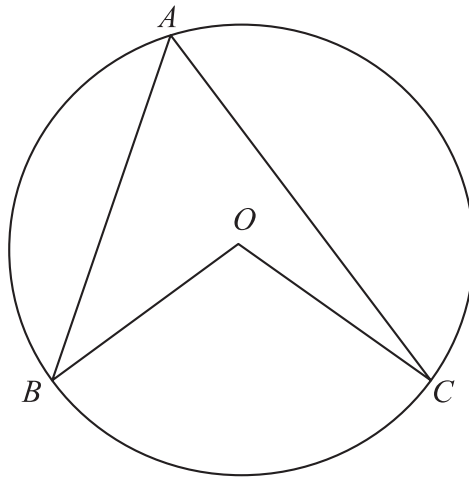
All measurements are in centimetres.
The area of the triangle is 2.5 cm^2 .

Find the perimeter of the triangle.
Give your answer correct to 3 significant figures.
You must show all of your working.

..... cm

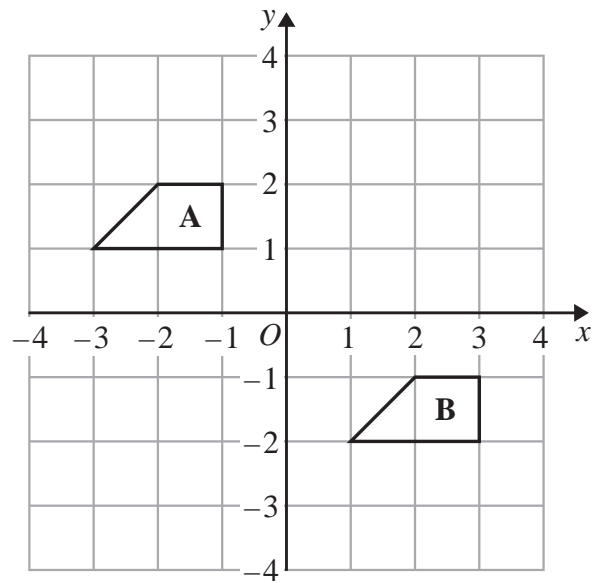
(Total for Question 102 is 6 marks)

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



Prove that angle BOC is twice the size of angle BAC .

(Total for Question 103 is 4 marks)

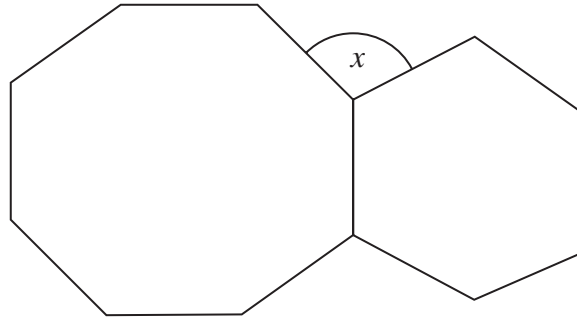


Describe the single transformation that maps shape A onto shape B.

.....

.....

(Total for Question 104 is 2 marks)

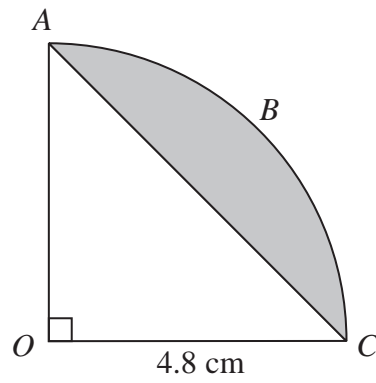


The diagram shows a regular octagon and a regular hexagon.

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

$$x = \dots\dots\dots^\circ$$

(Total for Question 105 is 3 marks)

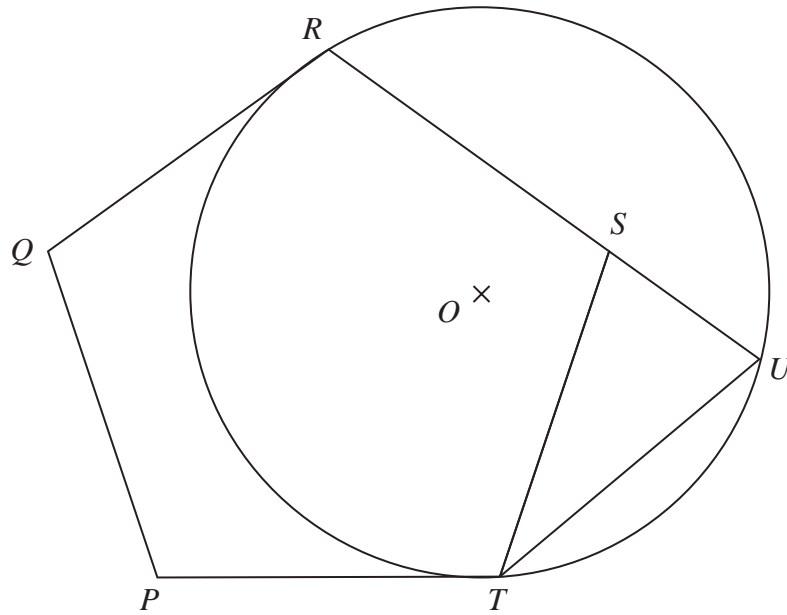


The arc ABC is a quarter of a circle with centre O and radius 4.8 cm.
 AC is a chord of the circle.

Work out the area of the shaded segment.
Give your answer correct to 3 significant figures.

.....cm²

(Total for Question 106 is 3 marks)

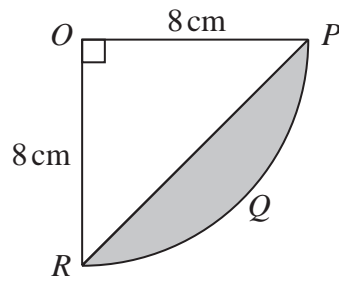


$PQRST$ is a regular pentagon.
 R , U and T are points on a circle, centre O .
 QR and PT are tangents to the circle.
 RSU is a straight line.

Prove that $ST = UT$.

(Total for Question 107 is 5 marks)

108 The diagram shows a sector $OPQR$ of a circle, centre O and radius 8 cm.



OPR is a triangle.

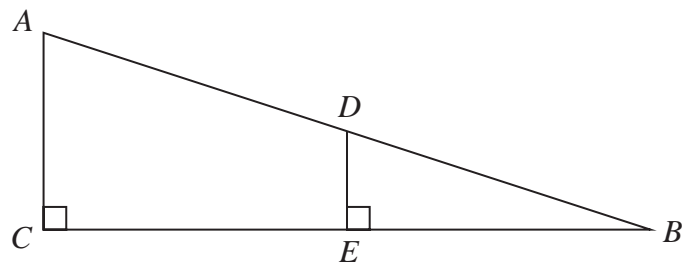
Work out the area of the shaded segment PQR .

Give your answer correct to 3 significant figures.

..... cm²

(Total for Question 108 is 4 marks)

109 The diagram shows two right-angled triangles ACB and DEB .



$$AD = 9 \text{ cm}$$

$$DE = 2 \text{ cm}$$

$$DB = 6 \text{ cm}$$

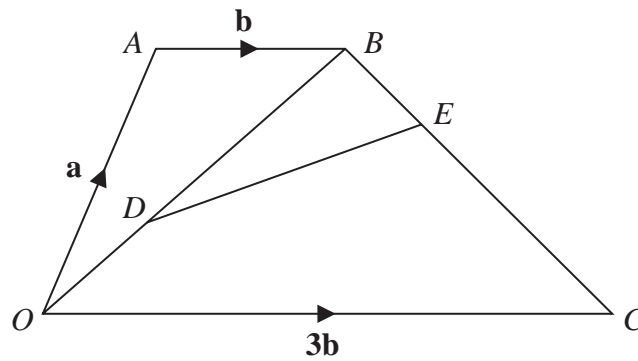
Calculate the length of CB .

Give your answer correct to 2 decimal places.

..... cm

(Total for Question 109 is 4 marks)

110 $OABC$ is a trapezium.



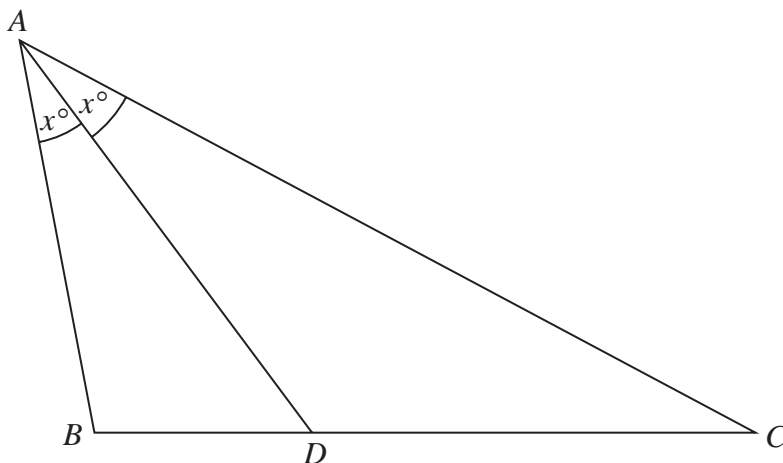
$$\begin{aligned}\vec{OA} &= \mathbf{a} \\ \vec{AB} &= \mathbf{b} \\ \vec{OC} &= 3\mathbf{b}\end{aligned}$$

D is the point on OB such that $OD:DB = 2:3$
 E is the point on BC such that $BE:EC = 1:4$

Work out the vector \vec{DE} in terms of \mathbf{a} and \mathbf{b} .
Give your answer in its simplest form.

(Total for Question 110 is 4 marks)

111 ABC is a triangle.

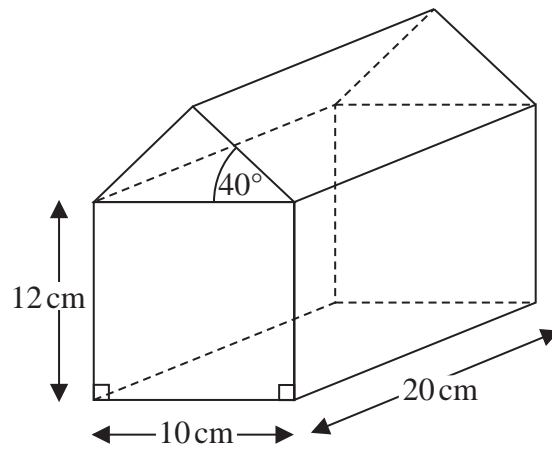


D is the point on BC such that angle $BAD = \text{angle } DAC = x^\circ$

Prove that $\frac{AB}{BD} = \frac{AC}{DC}$

(Total for Question 111 is 4 marks)

112 The diagram shows a prism.



The cross section of the prism has exactly one line of symmetry.

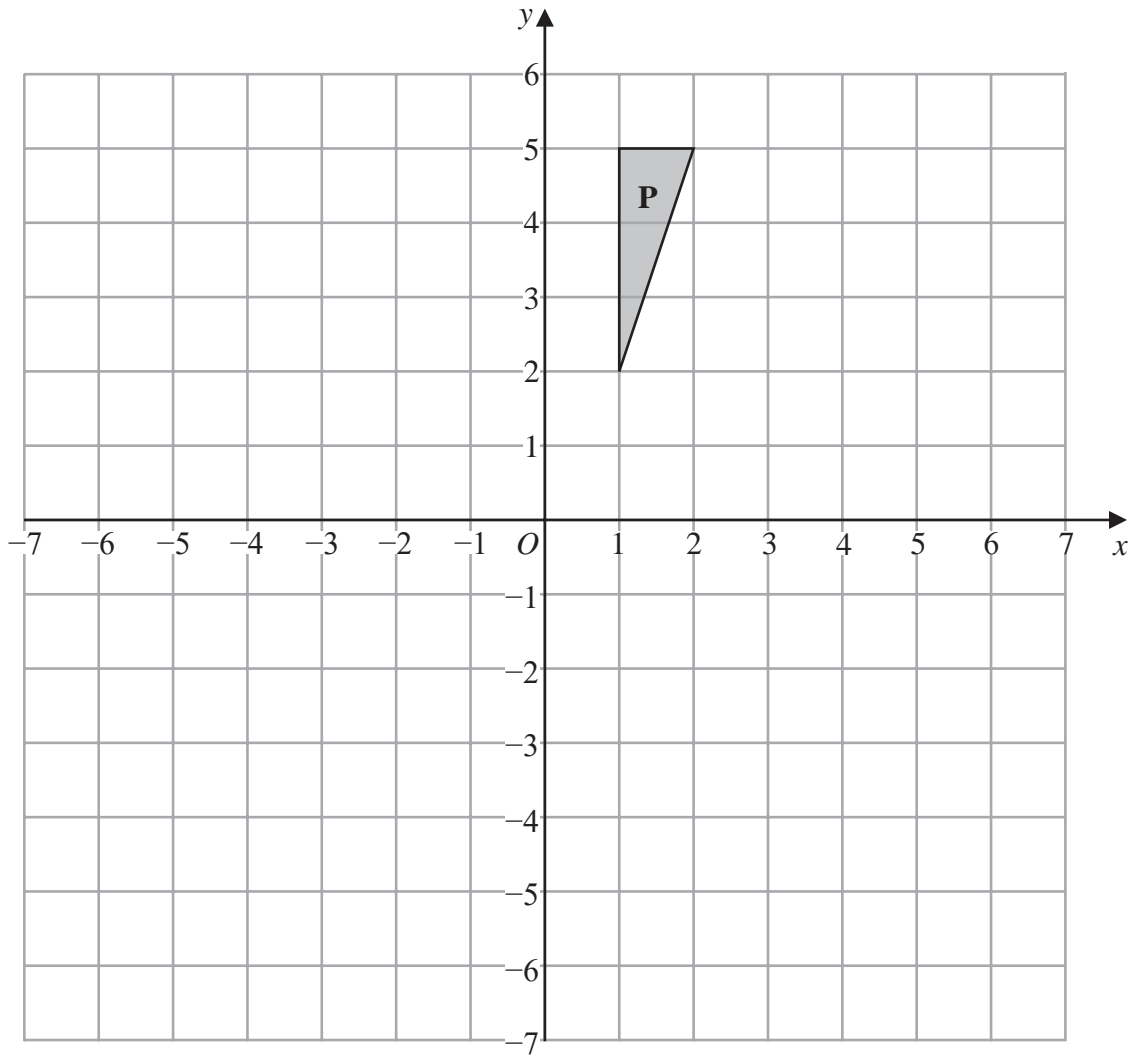
Work out the volume of the prism.

Give your answer correct to 3 significant figures.

..... cm³

(Total for Question 112 is 5 marks)

113 The diagram shows a triangle **P** on a grid.



Triangle **P** is rotated 180° about $(0, 0)$ to give triangle **Q**.

Triangle **Q** is translated by $\begin{pmatrix} 5 \\ -2 \end{pmatrix}$ to give triangle **R**.

(a) Describe fully the single transformation that maps triangle **P** onto triangle **R**.

.....

.....

(3)

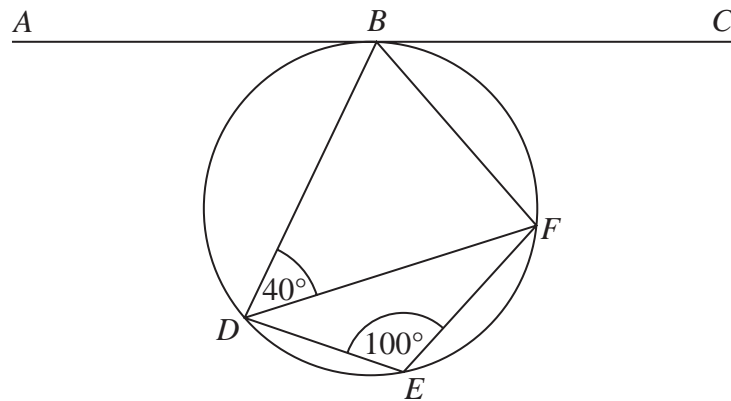
Under the transformation that maps triangle **P** onto triangle **R**, the point **A** is invariant.

(b) Write down the coordinates of point **A**.

(.....,))

(1)

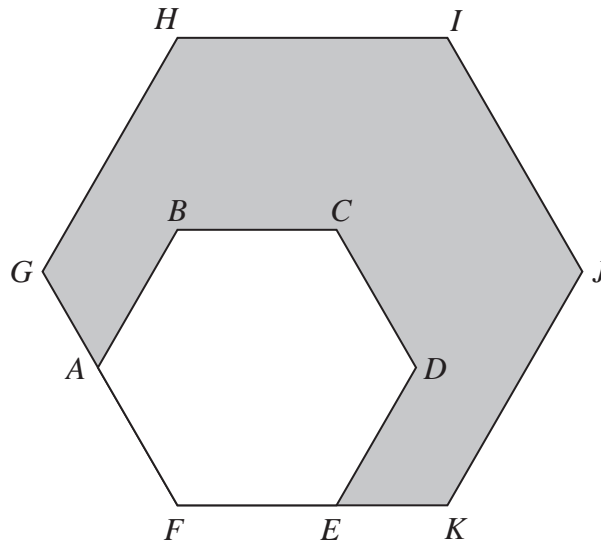
(Total for Question 113 is 4 marks)



Points B , D , E and F lie on a circle.
 ABC is the tangent to the circle at B .

Find the size of angle ABD .
You must give a reason for each stage of your working.

(Total for Question 114 is 4 marks)



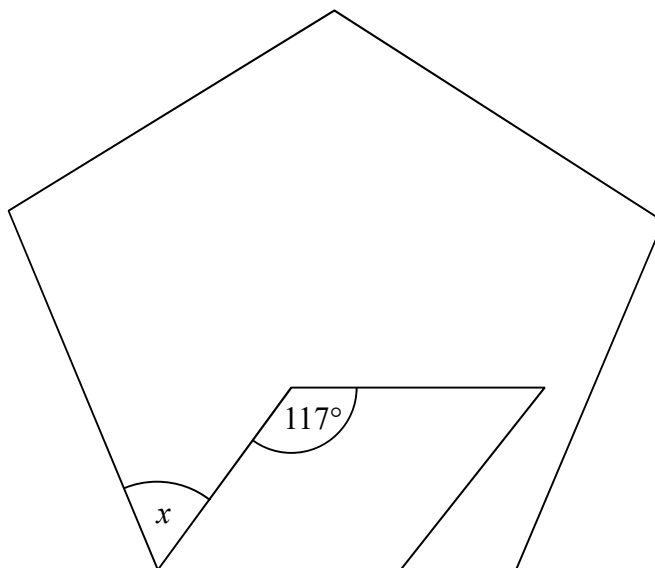
$ABCDEF$ is a regular hexagon with sides of length x .

This hexagon is enlarged, centre F , by scale factor p to give hexagon $FGHIJK$.

Show that the area of the shaded region in the diagram is given by $\frac{3\sqrt{3}}{2}(p^2 - 1)x^2$

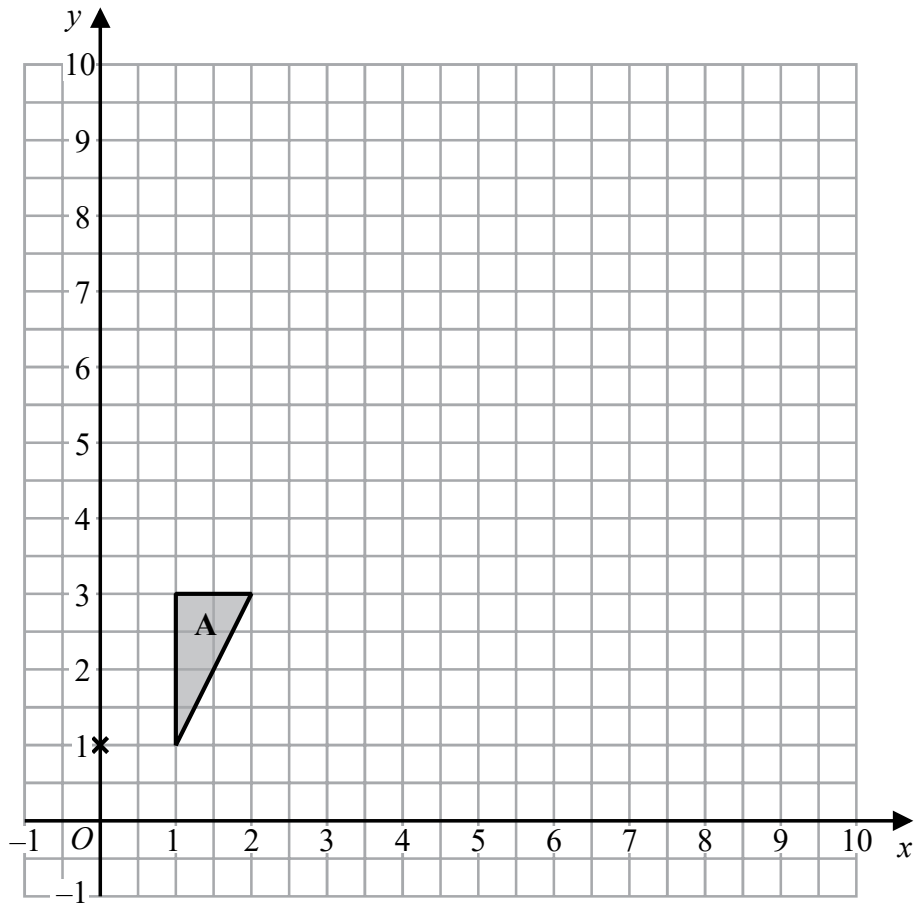
(Total for Question 115 is 4 marks)

116 The diagram shows a regular pentagon and a parallelogram.



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

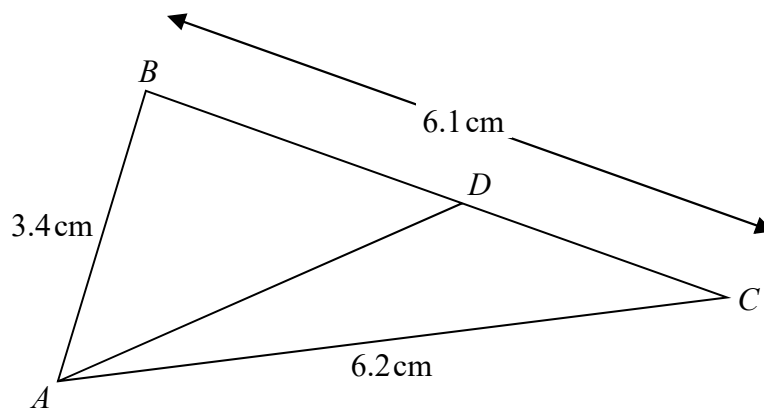
.....
(Total for Question 116 is 4 marks)



Enlarge triangle **A** by scale factor 2.5 with centre (0, 1)

(Total for Question 117 is 2 marks)

118 The diagram shows triangle ABC .



$$AB = 3.4\text{ cm} \quad AC = 6.2\text{ cm} \quad BC = 6.1\text{ cm}$$

D is the point on BC such that

$$\text{size of angle } DAC = \frac{2}{5} \times \text{size of angle } BCA$$

Calculate the length DC .

Give your answer correct to 3 significant figures.

You must show all your working.

..... cm

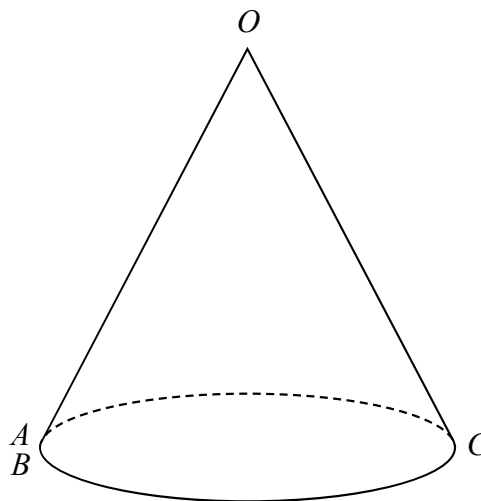
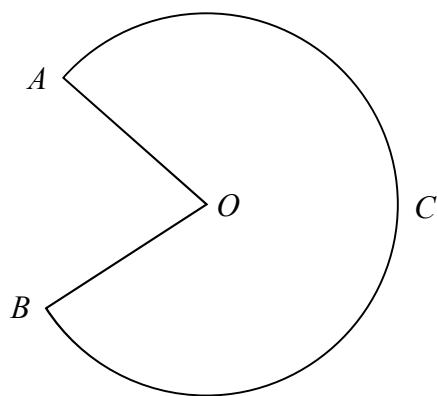
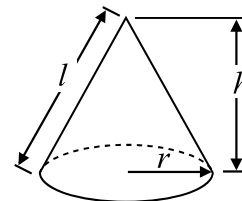
(Total for Question 118 is 5 marks)

119 The diagram shows a sector $OACB$ of a circle with centre O .
The point C is the midpoint of the arc AB .

The diagram also shows a hollow cone with vertex O .
The cone is formed by joining OA and OB .

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

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

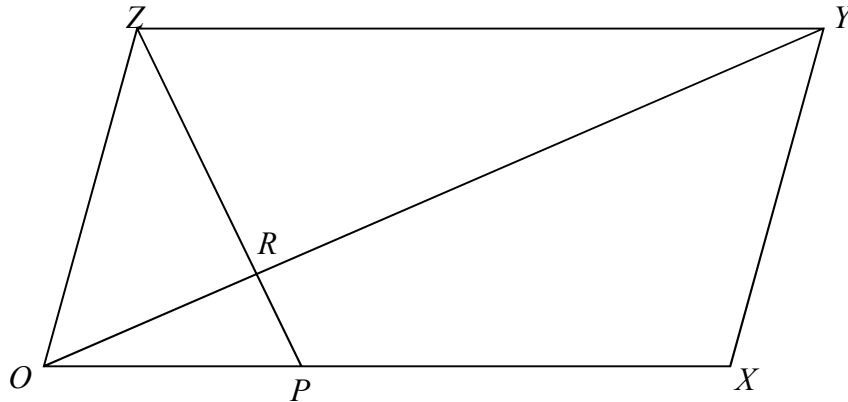


The cone has volume 56.8 cm^3 and height 3.6 cm .

Calculate the size of angle AOB of sector $OACB$.
Give your answer correct to 3 significant figures.
You must show all your working.

.....
(Total for Question 119 is 5 marks)

120 $OXYZ$ is a parallelogram.



$$\vec{OX} = \mathbf{a}$$

$$\vec{OY} = \mathbf{b}$$

P is the point on OX such that $OP:PX = 1:2$

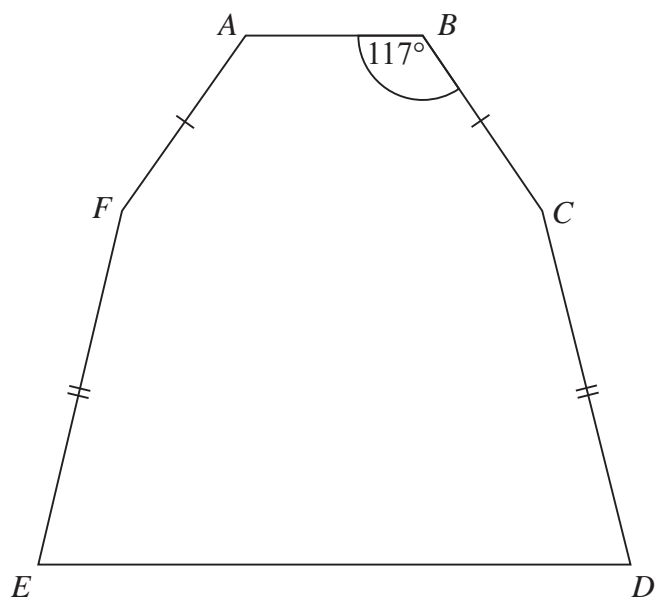
R is the point on OY such that $OR:RY = 1:3$

Work out, in its simplest form, the ratio $ZP:ZR$

You must show all your working.

.....
(Total for Question 120 is 5 marks)

- 121 The diagram shows a hexagon.
The hexagon has one line of symmetry.



$$FA = BC$$

$$EF = CD$$

$$\text{Angle } ABC = 117^\circ$$

$$\text{Angle } BCD = 2 \times \text{angle } CDE$$

Work out the size of angle AFE .

You must show all your working.

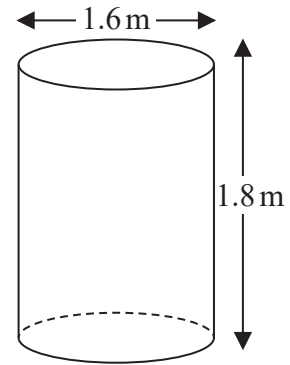
.....
(Total for Question 121 is 4 marks)

122 Jeremy has to cover 3 tanks completely with paint.

Each tank is in the shape of a cylinder with a top and a bottom.
The tank has a diameter of 1.6 m and a height of 1.8 m.

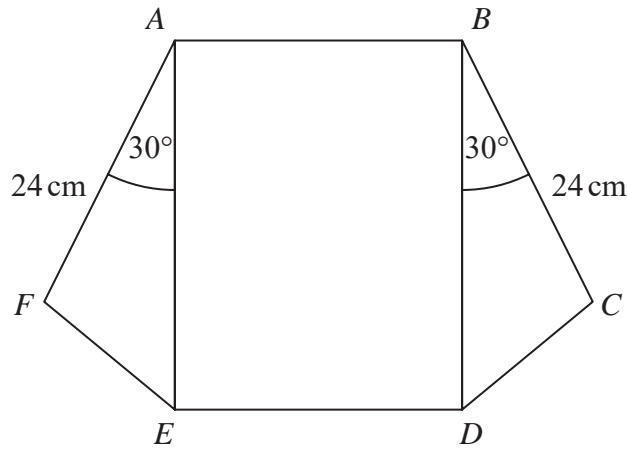
Jeremy has 7 tins of paint.
Each tin of paint covers 5 m^2

Has Jeremy got enough paint to cover completely the 3 tanks?
You must show how you get your answer.



(Total for Question 122 is 5 marks)

123 The diagram shows a rectangle, $ABDE$, and two congruent triangles, AFE and BCD .



area of rectangle $ABDE$ = area of triangle AFE + area of triangle BCD

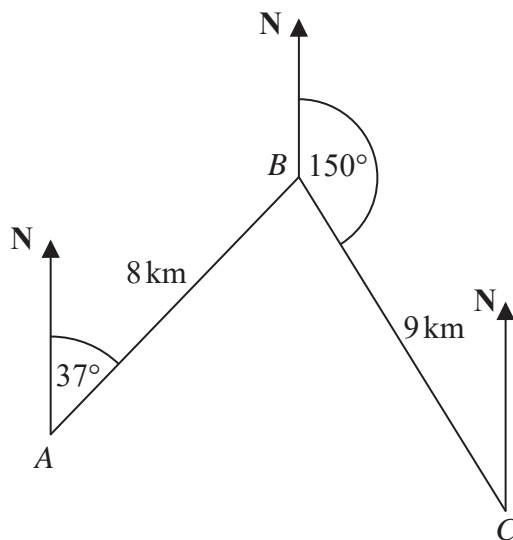
$$AB : AE = 1 : 3$$

Work out the length of AE .

..... cm

(Total for Question 123 is 4 marks)

124 The diagram shows the positions of three towns, Acton (A), Barston (B) and Chorlton (C).

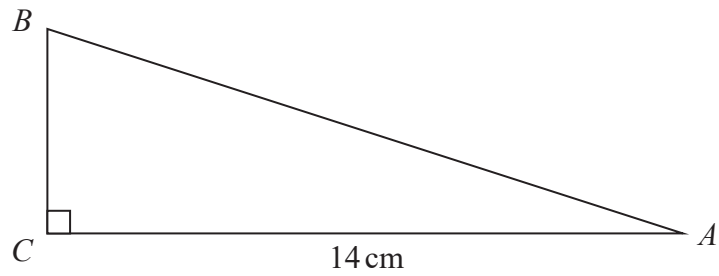


Barston is 8 km from Acton on a bearing of 037°
Chorlton is 9 km from Barston on a bearing of 150°

Find the bearing of Chorlton from Acton.
Give your answer correct to 1 decimal place.
You must show all your working.

(Total for Question 124 is 5 marks)

125 ABC is a right-angled triangle.



$AC = 14$ cm.
Angle $C = 90^\circ$

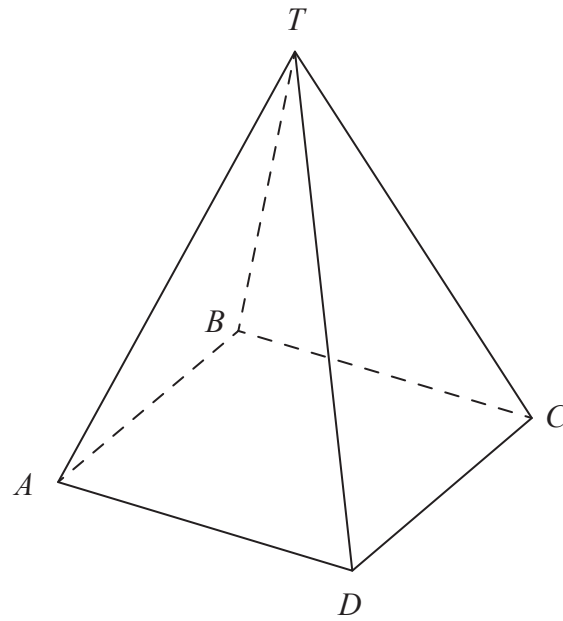
size of angle B : size of angle $A = 3 : 2$

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

.....cm

(Total for Question 125 is 4 marks)

126 Here is a pyramid with a square base $ABCD$.



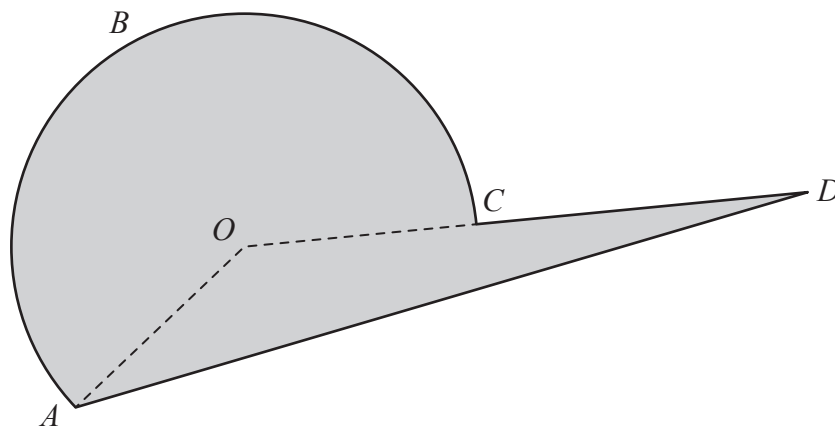
$$AB = 5 \text{ m}$$

The vertex T is 12 m vertically above the midpoint of AC .

Calculate the size of angle TAC .

.....
(Total for Question 126 is 4 marks)

127 Here is a shaded shape $ABCD$.



The shape is made from a triangle and a sector of a circle, centre O and radius 6 cm.
 OCD is a straight line.

$$AD = 14 \text{ cm}$$

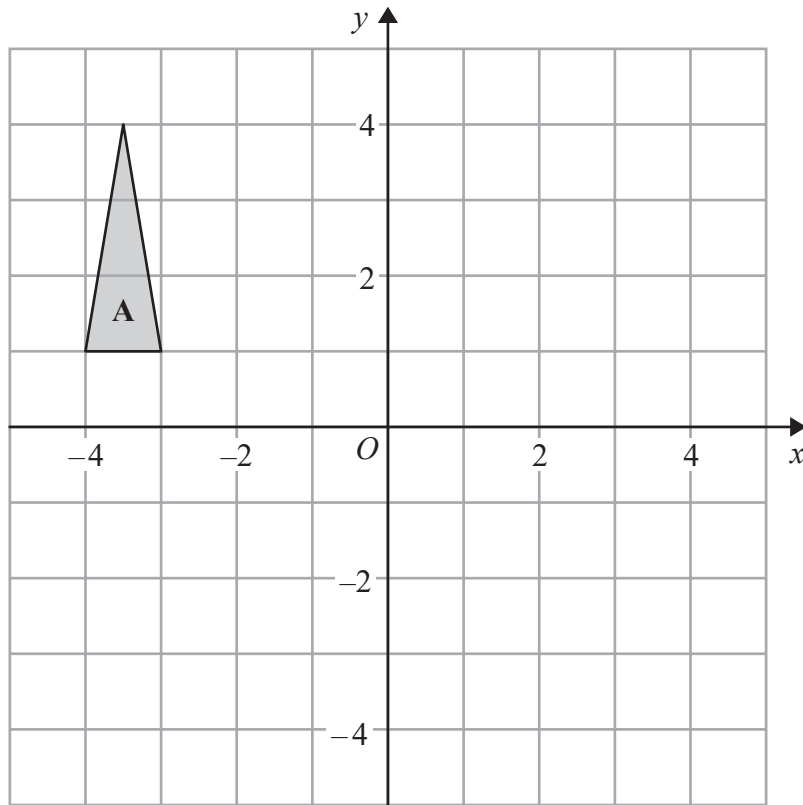
$$\text{Angle } AOD = 140^\circ$$

$$\text{Angle } OAD = 24^\circ$$

Calculate the perimeter of the shape.
Give your answer correct to 3 significant figures.

.....cm

(Total for Question 127 is 5 marks)



Triangle **A** is transformed by the combined transformation of a rotation of 180° about the point $(-2, 0)$ followed by a translation with vector $\begin{pmatrix} -3 \\ 2 \end{pmatrix}$

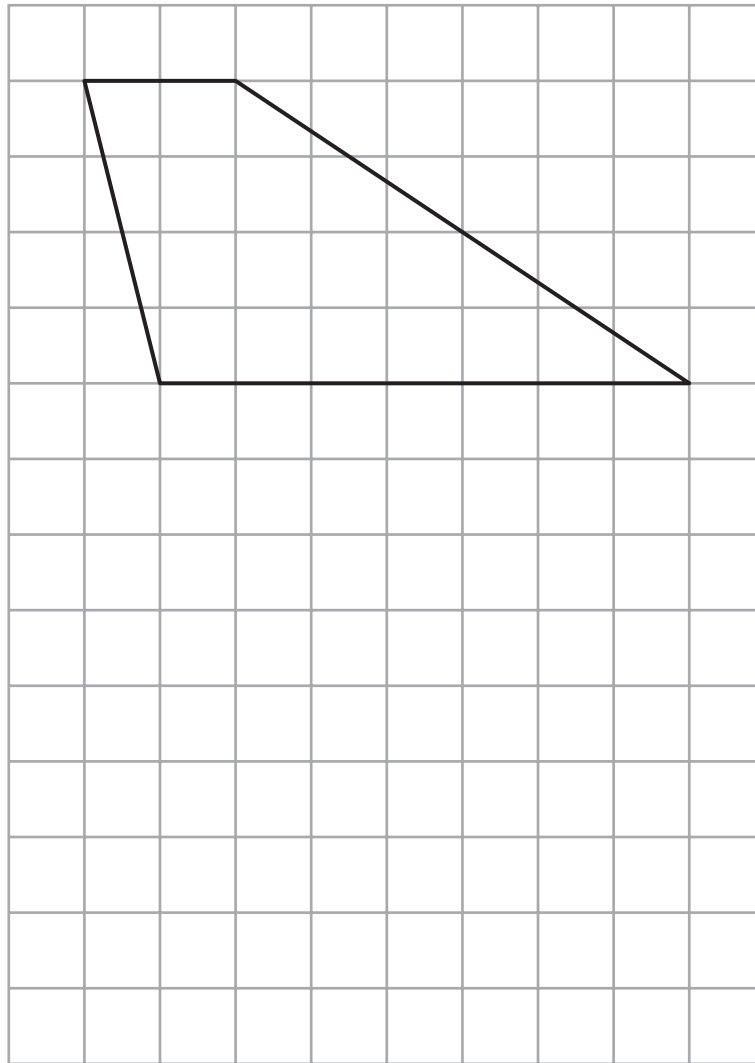
One point on triangle **A** is invariant under the combined transformation.

Find the coordinates of this point.

(.....,))

(Total for Question 128 is 2 marks)

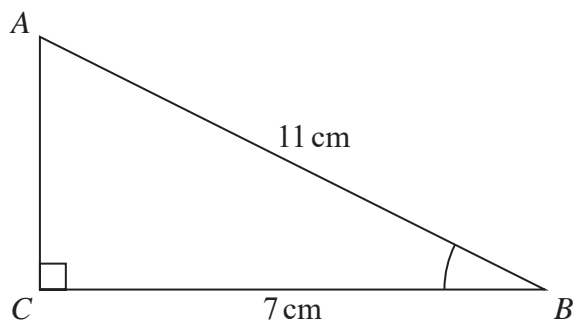
129 Here is a trapezium drawn on a centimetre grid.



On the grid, draw a triangle equal in area to this trapezium.

(Total for Question 129 is 2 marks)

130 ABC is a right-angled triangle.



- (a) Work out the size of angle ABC .
Give your answer correct to 1 decimal place.

.....
(2)

The length of the side AB is reduced by 1 cm .

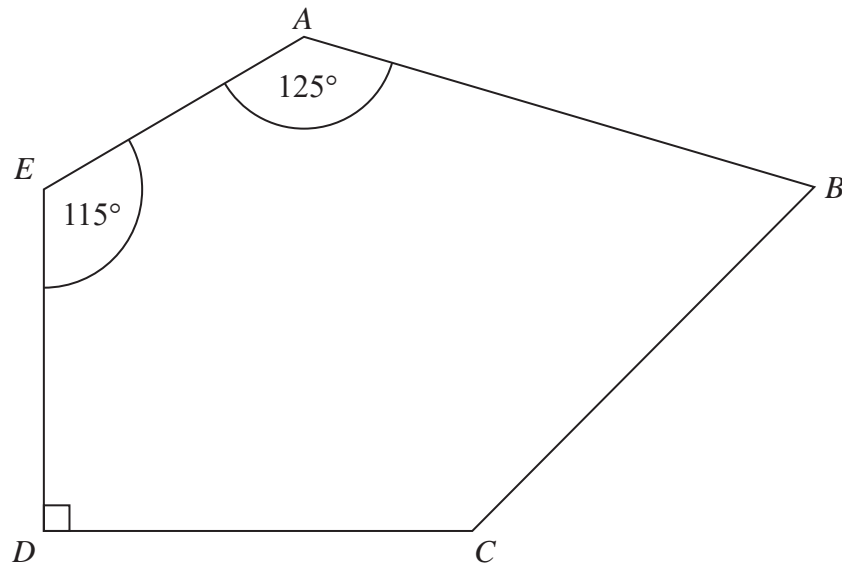
The length of the side BC is still 7 cm .
Angle ACB is still 90°

- (b) Will the value of $\cos ABC$ increase or decrease?
You must give a reason for your answer.

.....
.....
(1)

(Total for Question 130 is 3 marks)

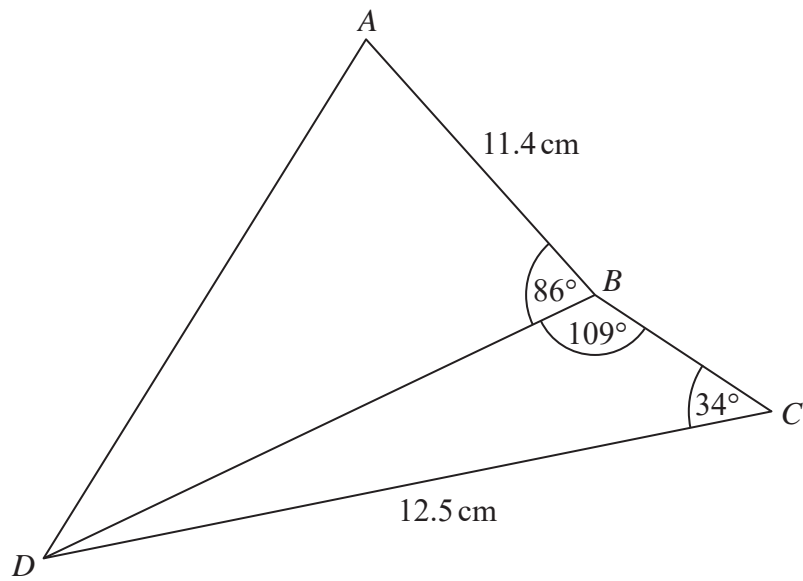
131 $ABCDE$ is a pentagon.



Angle $BCD = 2 \times$ angle ABC

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

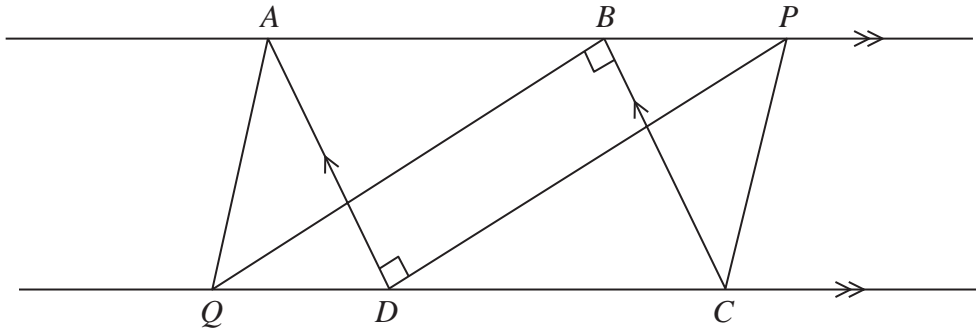
.....
(Total for Question 131 is 5 marks)



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

..... cm

(Total for Question 132 is 5 marks)



$ABCD$ is a parallelogram.

ABP and QDC are straight lines.

Angle $ADP = \text{angle } CBQ = 90^\circ$

(a) Prove that triangle ADP is congruent to triangle CBQ .

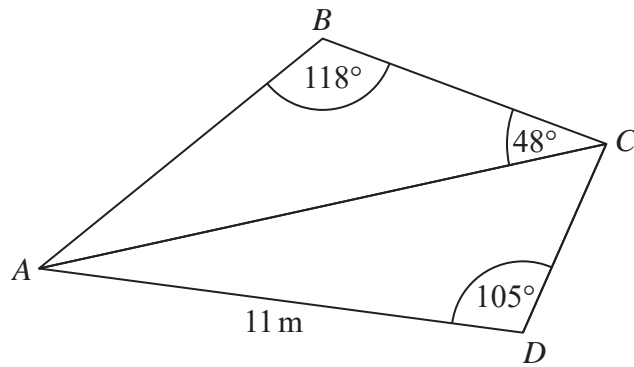
(3)

(b) Explain why AQ is parallel to PC .

(2)

(Total for Question 133 is 5 marks)

134 ABC and ADC are triangles.



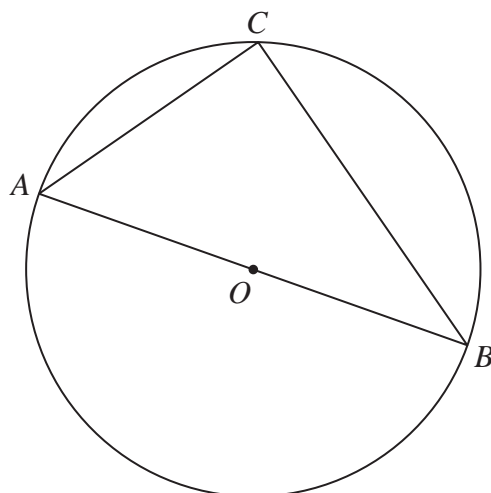
The area of triangle ADC is 56 m^2

Work out the length of AB .

Give your answer correct to 1 decimal place.

..... m

(Total for Question 134 is 5 marks)

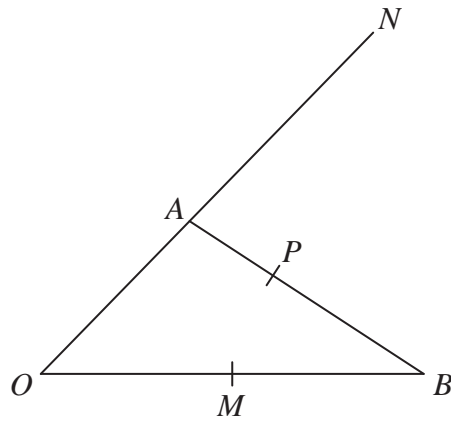


A , B and C are points on the circumference of a circle, centre O .
 AOB is a diameter of the circle.

Prove that angle ACB is 90°

You must **not** use any circle theorems in your proof.

(Total for Question 135 is 4 marks)



OAN , OMB and APB are straight lines.

$AN = 2OA$.

M is the midpoint of OB .

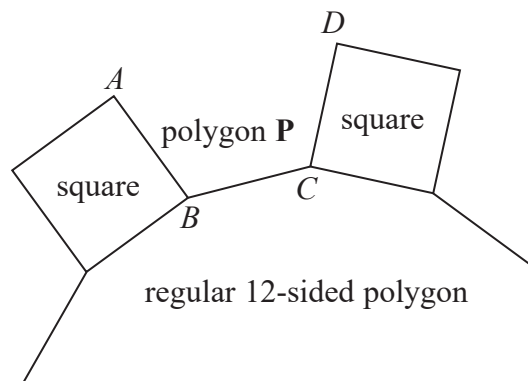
$$\vec{OA} = \mathbf{a} \quad \vec{OB} = \mathbf{b}$$

$\vec{AP} = k\vec{AB}$ where k is a scalar quantity.

Given that MPN is a straight line, find the value of k .

(Total for Question 136 is 5 marks)

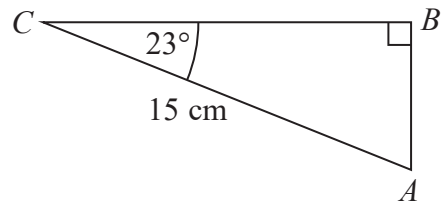
137 In the diagram, AB , BC and CD are three sides of a regular polygon P .



Show that polygon P is a hexagon.
You must show your working.

(Total for Question 137 is 4 marks)

138 ABC is a right-angled triangle.



Calculate the length of AB .

Give your answer correct to 3 significant figures.

.....cm

(Total for Question 138 is 2 marks)

139 A square, with sides of length x cm, is inside a circle.
Each vertex of the square is on the circumference of the circle.

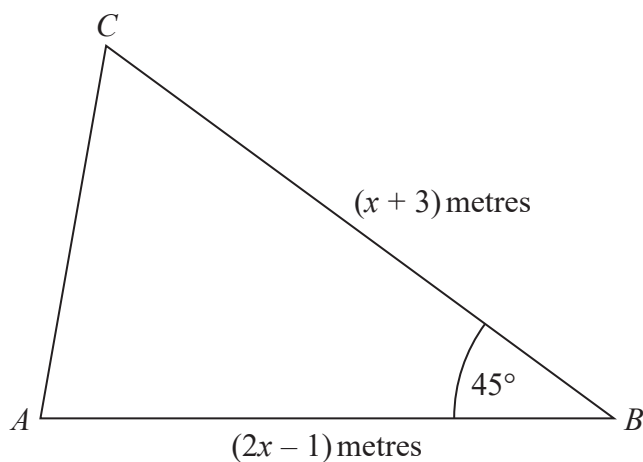
The area of the circle is 49 cm^2 .

Work out the value of x .

Give your answer correct to 3 significant figures.

.....
(Total for Question 139 is 4 marks)

140



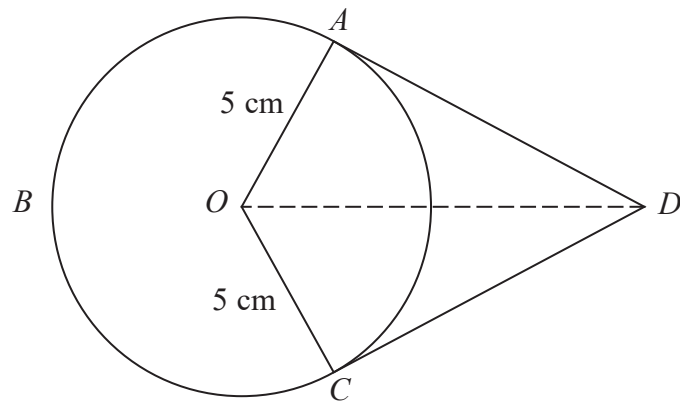
The area of triangle ABC is $6\sqrt{2}$ m².

Calculate the value of x .

Give your answer correct to 3 significant figures.

.....
(Total for Question 140 is 5 marks)

141



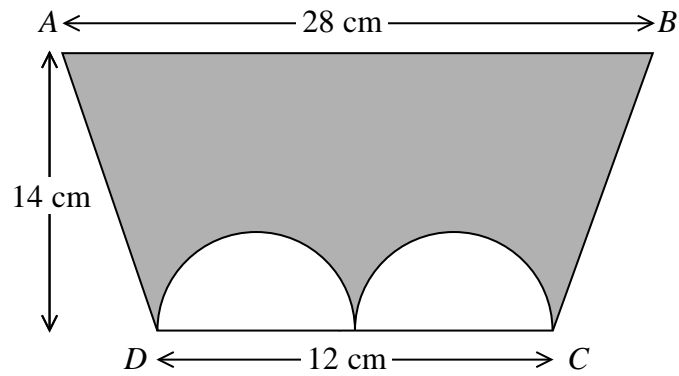
A , B and C are points on a circle of radius 5 cm, centre O .
 DA and DC are tangents to the circle.
 $DO = 9$ cm

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

..... cm

(Total for Question 141 is 5 marks)

142 The diagram shows a trapezium $ABCD$ and two identical semicircles.



The centre of each semicircle is on DC .

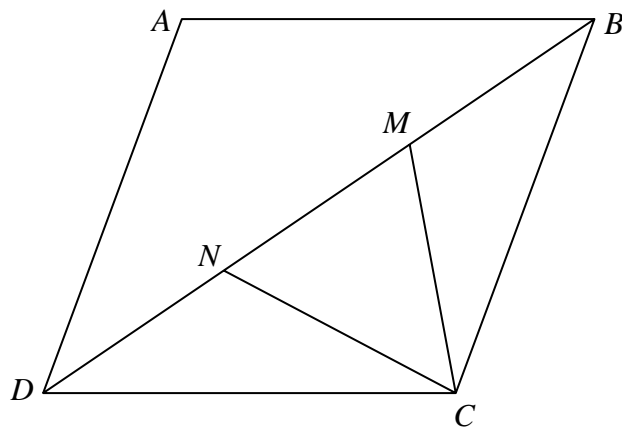
Work out the area of the shaded region.

Give your answer correct to 3 significant figures.

..... cm^2

(Total for Question 142 is 4 marks)

143 $ABCD$ is a rhombus.

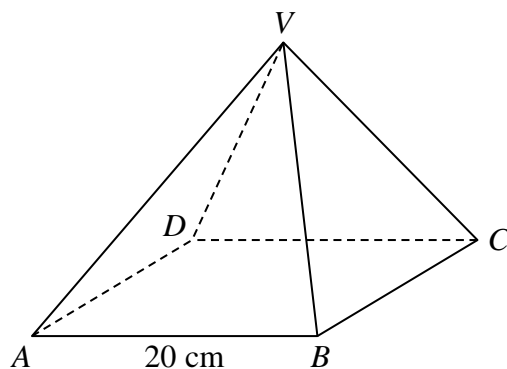


M and N are points on BD such that $DN = MB$.

Prove that triangle DNC is congruent to triangle BMC .

(Total for Question 143 is 3 marks)

144 $VABCD$ is a solid pyramid.



$ABCD$ is a square of side 20 cm.

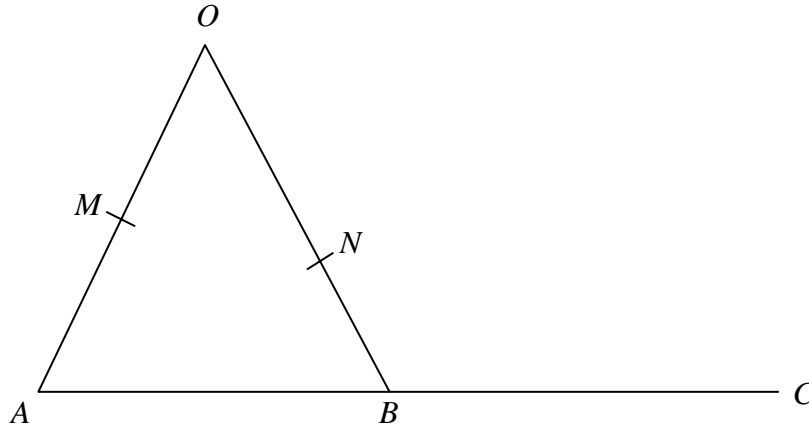
The angle between any sloping edge and the plane $ABCD$ is 55°

Calculate the surface area of the pyramid.

Give your answer correct to 2 significant figures.

.....cm²

(Total for Question 144 is 5 marks)



OMA , ONB and ABC are straight lines.

M is the midpoint of OA .

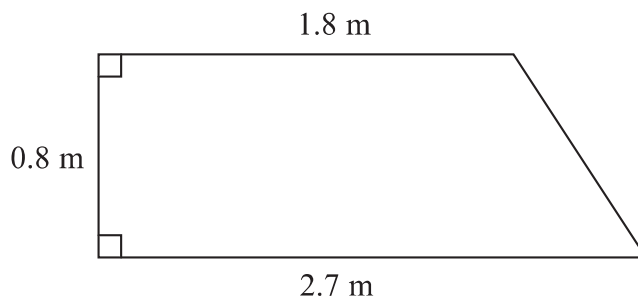
B is the midpoint of AC .

$\vec{OA} = 6\mathbf{a}$ $\vec{OB} = 6\mathbf{b}$ $\vec{ON} = k\mathbf{b}$ where k is a scalar quantity.

Given that MNC is a straight line, find the value of k .

(Total for Question 145 is 5 marks)

146 The diagram shows a wall in the shape of a trapezium.



Karen is going to cover this part of the wall with tiles.
Each tile is rectangular, 15 cm by 7.5 cm

Tiles are sold in packs.
There are 9 tiles in each pack.

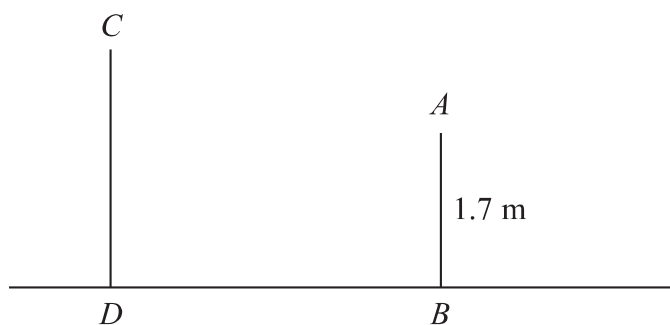
Karen divides the area of this wall by the area of a tile to work out an estimate for the number of tiles she needs to buy.

Use Karen's method to work out the estimate for the number of packs of tiles she needs to buy.

.....
(5)

(Total for Question 146 is 5 marks)

147 The diagram shows two vertical posts, AB and CD , on horizontal ground.



$AB = 1.7$ m
 $CD : AB = 1.5 : 1$

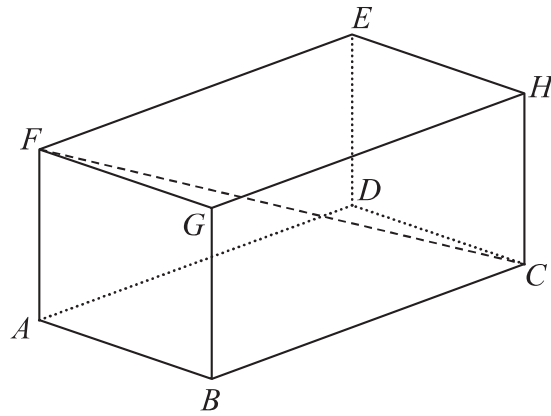
The angle of elevation of C from A is 52°

Calculate the length of BD .
Give your answer correct to 3 significant figures.

.....m

(Total of Question 147 is 4 marks)

148 The diagram shows a cuboid $ABCDEFGH$.



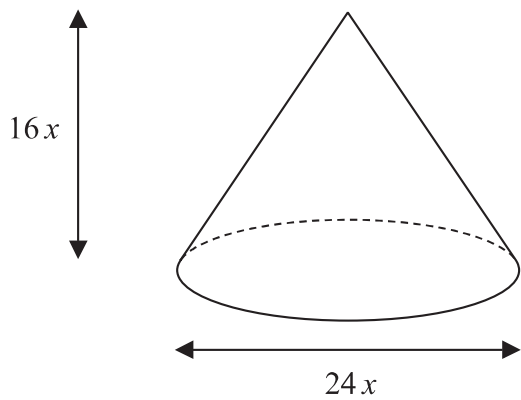
$AB = 7$ cm, $AF = 5$ cm and $FC = 15$ cm.

Calculate the volume of the cuboid.
Give your answer correct to 3 significant figures.

..... cm³

(Total for Question 148 is 4 marks)

149 The diagram shows a solid cone.



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

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

A diagram of a cone with its apex at the top. A vertical double-headed arrow to the right of the cone is labeled h , representing its height. A horizontal double-headed arrow from the center of the base to the edge is labeled r , representing its radius. A double-headed arrow along the side of the cone is labeled l , representing its slant length. The base is an ellipse with a dashed back edge.

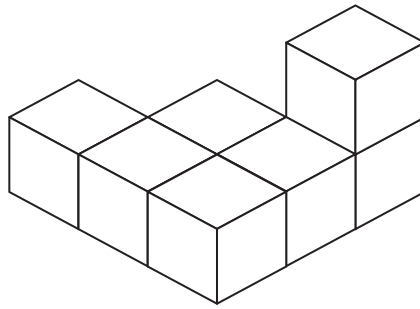
The diameter of the base of the cone is $24x$ cm.
The height of the cone is $16x$ cm.

The curved surface area of the cone is 2160π cm².
The volume of the cone is $V\pi$ cm³, where V is an integer.

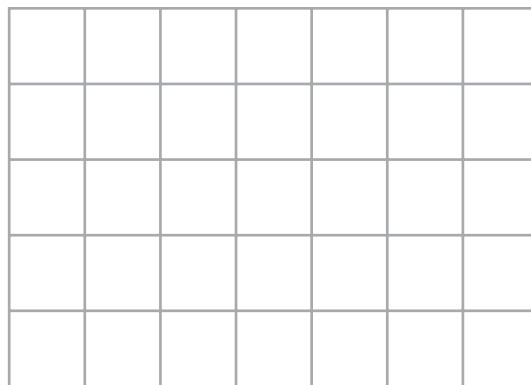
Find the value of V .

(Total for Question 149 is 5 marks)

150 The diagram represents a solid made from seven centimetre cubes.

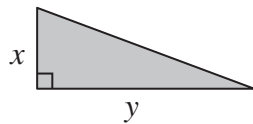


On the centimetre grid below, draw a plan of the solid.

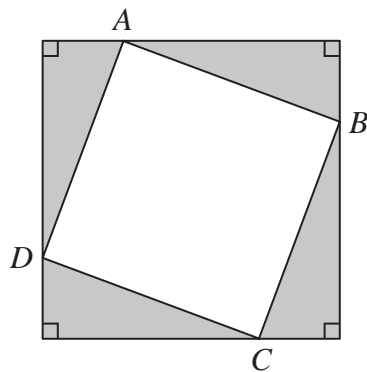


(Total for Question 150 is 2 marks)

151 Here is a right-angled triangle.

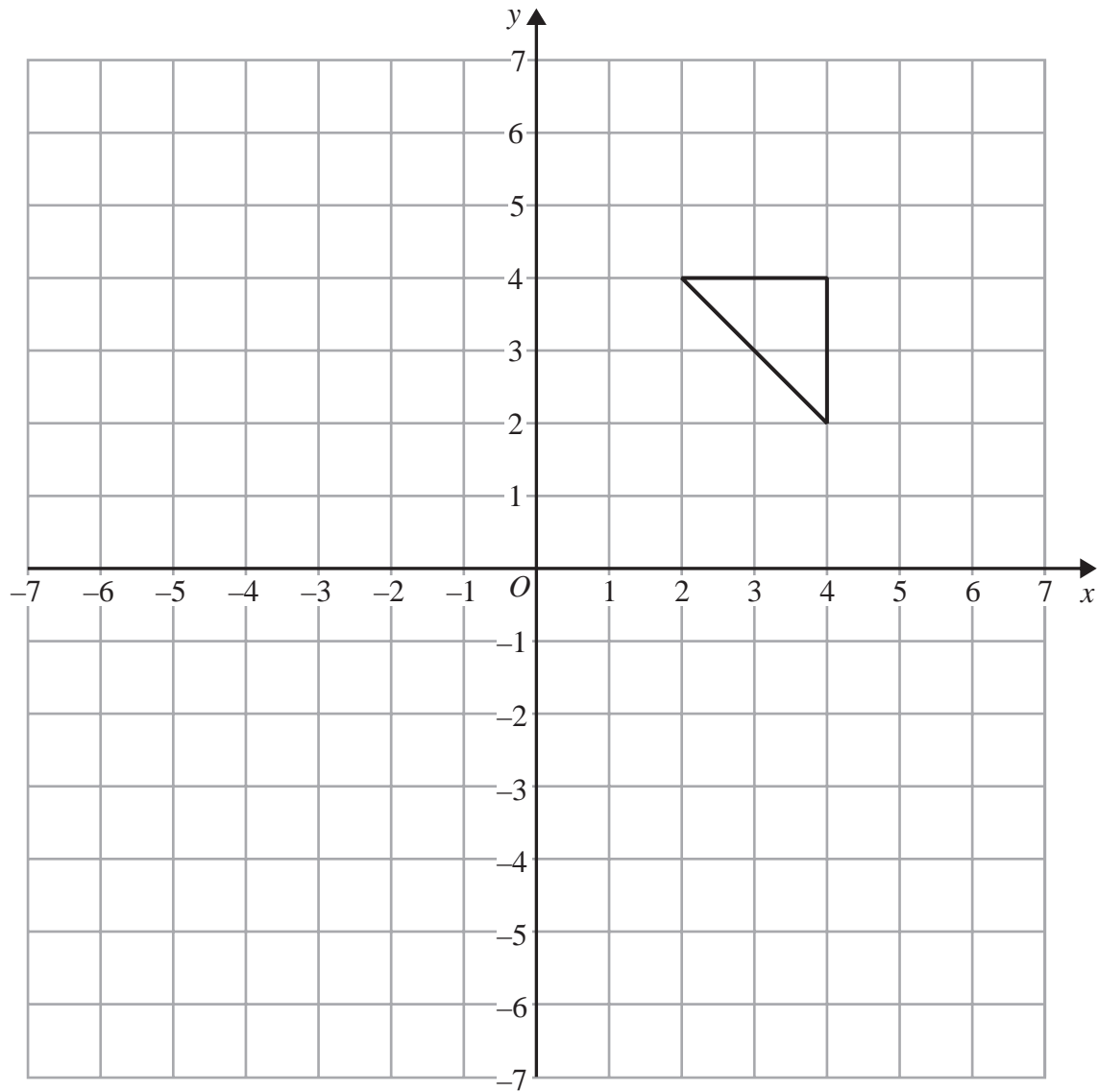


Four of these triangles are joined to enclose the square $ABCD$ as shown below.



Show that the area of the square $ABCD$ is $x^2 + y^2$

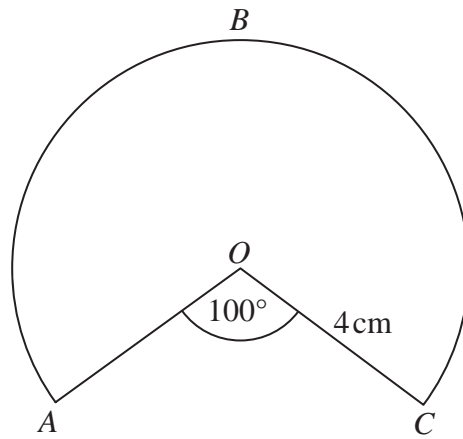
(Total for Question 151 is 3 marks)



On the grid, enlarge the triangle by scale factor $-1\frac{1}{2}$, centre (0, 2)

(Total for Question 152 is 2 marks)

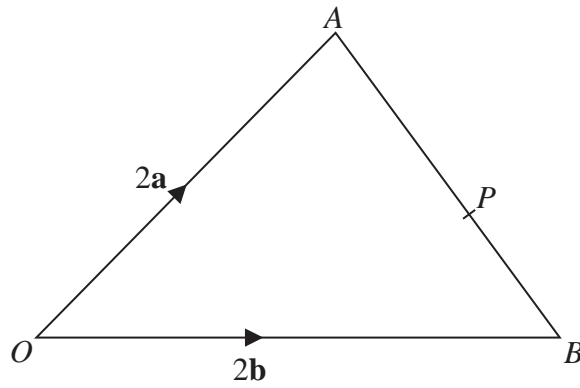
153 The diagram shows a sector of a circle of radius 4 cm.



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

.....cm

(Total for Question 153 is 2 marks)



OAB is a triangle.

P is the point on AB such that $AP:PB = 5:3$

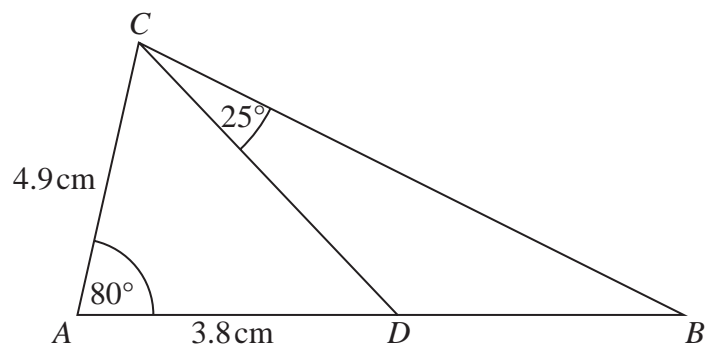
$$\vec{OA} = 2\mathbf{a}$$

$$\vec{OB} = 2\mathbf{b}$$

$$\vec{OP} = k(3\mathbf{a} + 5\mathbf{b}) \text{ where } k \text{ is a scalar quantity.}$$

Find the value of k .

(Total for Question 154 is 4 marks)



ABC is a triangle.
 D is a point on AB .

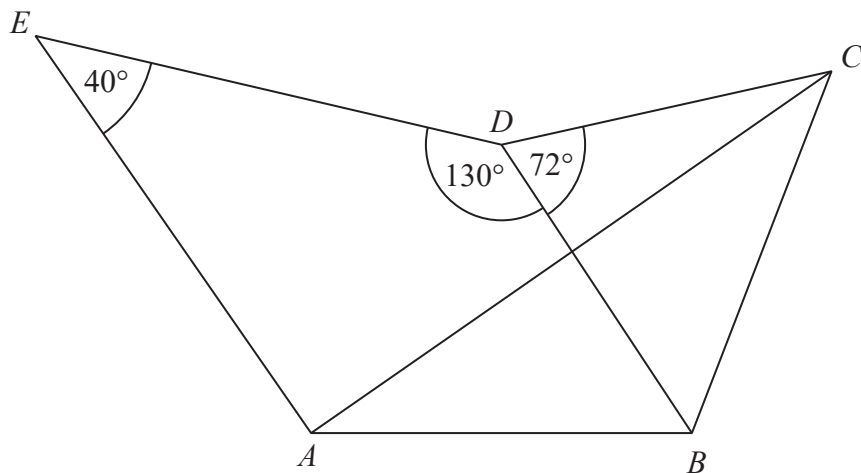
Work out the area of triangle BCD .
Give your answer correct to 3 significant figures.

..... cm^2

(Total for Question 155 is 5 marks)

156 Here is a pentagon $ABCDE$.

Diagram **NOT**
accurately drawn



$AB = BC = BD$
 $ABDE$ is a kite.

Angle $AED = 40^\circ$
Angle $EDB = 130^\circ$
Angle $BDC = 72^\circ$

Work out the size of angle ACB .

.....
(Total for Question 156 is 3 marks)

- 157 Frances grows plants in a container.
Each of the 5 faces of the container is made of glass.

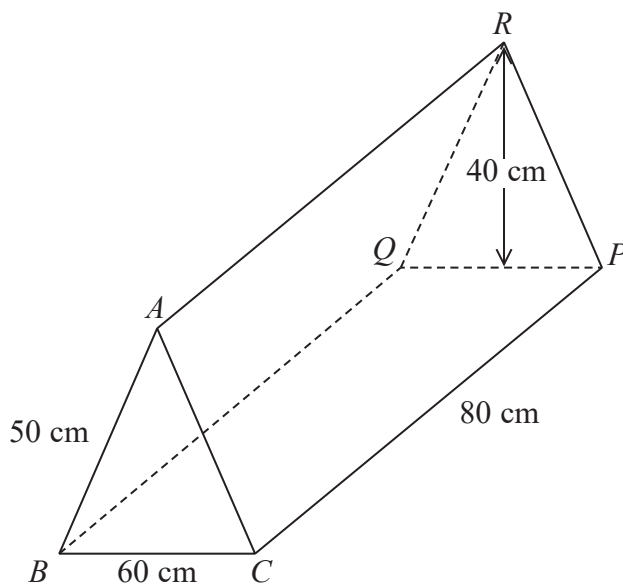


Diagram **NOT**
accurately drawn

The container is in the shape of a prism.
The cross section of the prism is an isosceles triangle with height 40 cm.

$$BC = 60 \text{ cm}$$

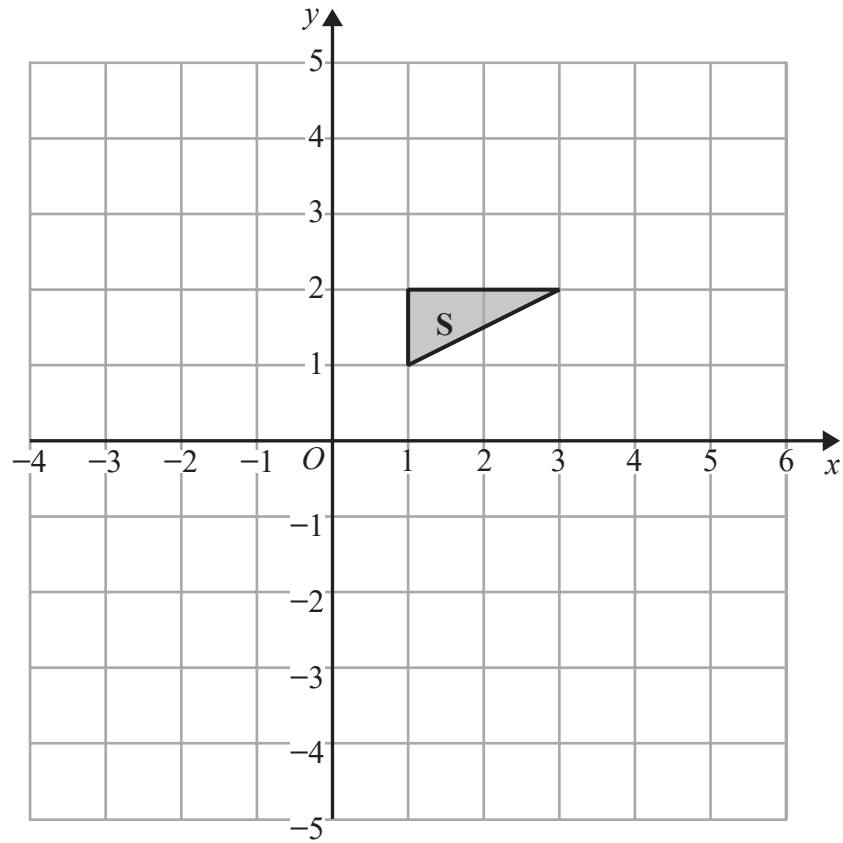
$$AB = AC = 50 \text{ cm}$$

$$CP = 80 \text{ cm}$$

Work out the total area of glass needed to make the container.

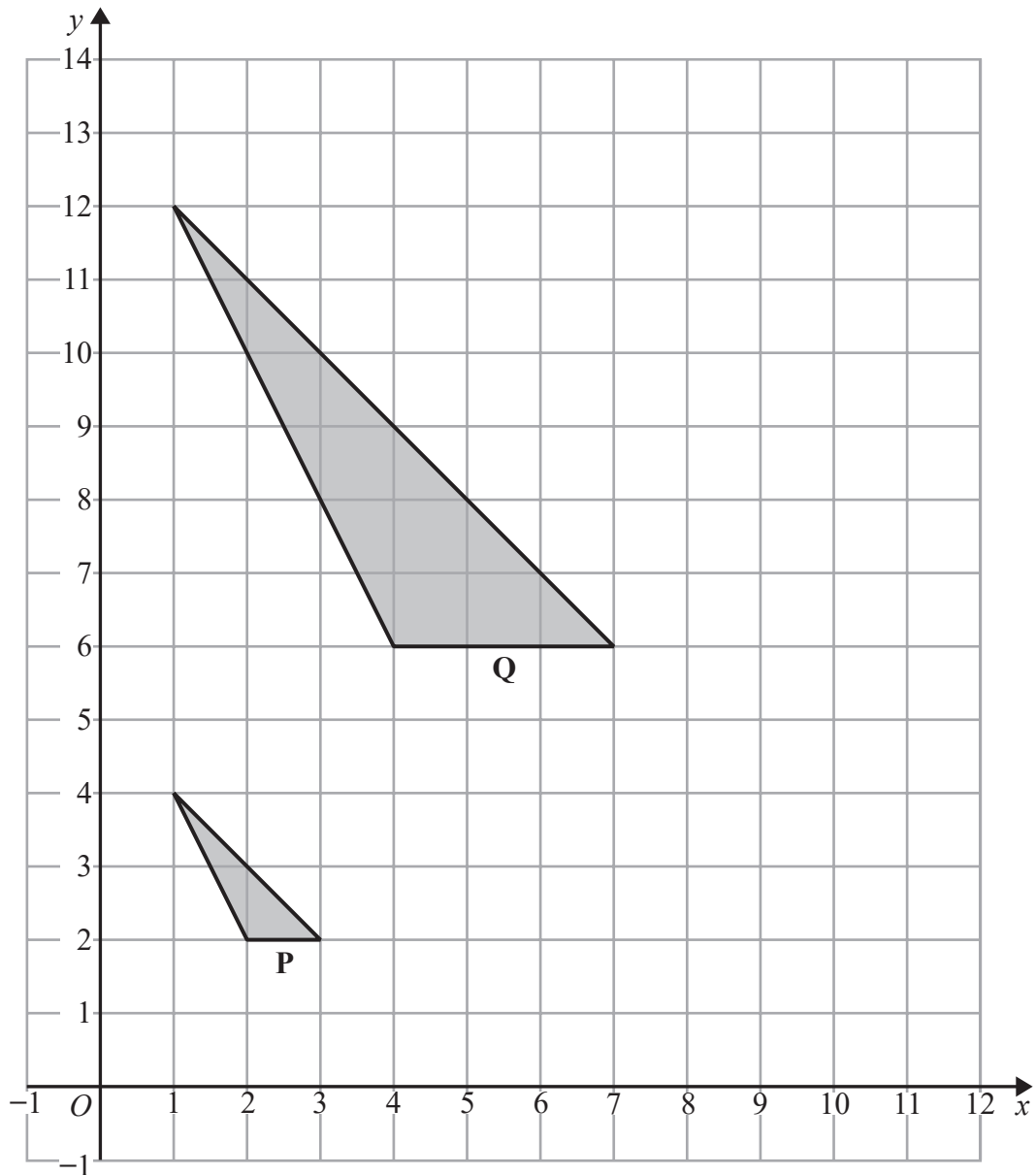
.....cm²

(Total for Question 157 is 3 marks)



(a) On the grid, rotate shape **S** by 90° anticlockwise about the origin.

(2)



(b) Describe fully the single transformation that maps shape **P** onto shape **Q**.

.....

.....

(3)

(Total for Question 158 is 5 marks)

159 Sanders has a water tank for storing rainwater.

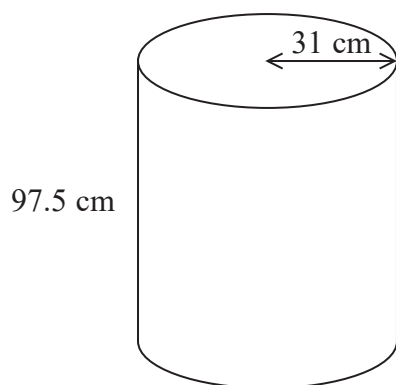


Diagram **NOT** accurately drawn

The tank is in the shape of a cylinder.
The radius of the cylinder is 31 cm.
The height of the cylinder is 97.5 cm.

The tank is full of water.

Work out an estimate for the volume of water in the tank.

Give your answer in litres.

You must show your working.

Use $1000 \text{ cm}^3 = 1 \text{ litre}$.

.....litres

(Total for Question 159 is 3 marks)

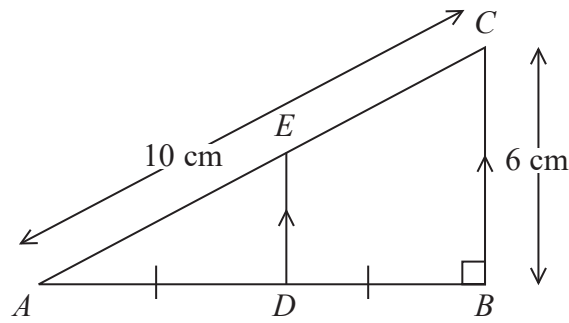


Diagram NOT accurately drawn

ADB and AEC are straight lines.
 DE is parallel to BC .

Angle $ABC = 90^\circ$
 $AC = 10$ cm.
 $BC = 6$ cm.

D is the midpoint of AB .

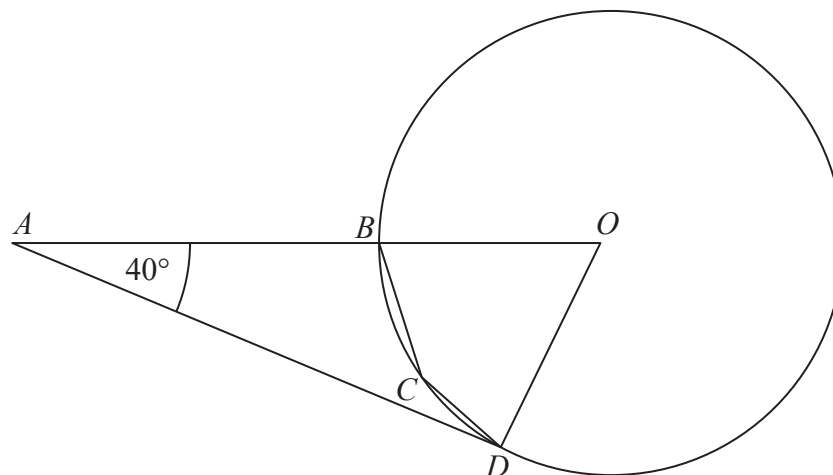
Work out the area of trapezium $BCED$.

.....cm²

(Total for Question 160 is 4 marks)

*161

Diagram **NOT**
accurately drawn



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

ABO is a straight line.

AD is the tangent at D to the circle.

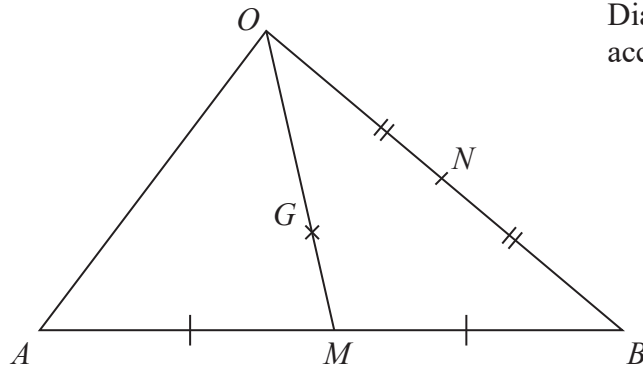
Angle $DAO = 40^\circ$

Work out the size of angle BCD .

Give a reason for each stage of your working.

(Total for Question 161 is 5 marks)

Diagram **NOT**
accurately drawn



$\vec{OA} = 6\mathbf{a}$ and $\vec{OB} = 6\mathbf{b}$
 M is the midpoint of AB .

- (a) Write \vec{OM} in terms of \mathbf{a} and \mathbf{b} .
 Give your answer in its simplest form.

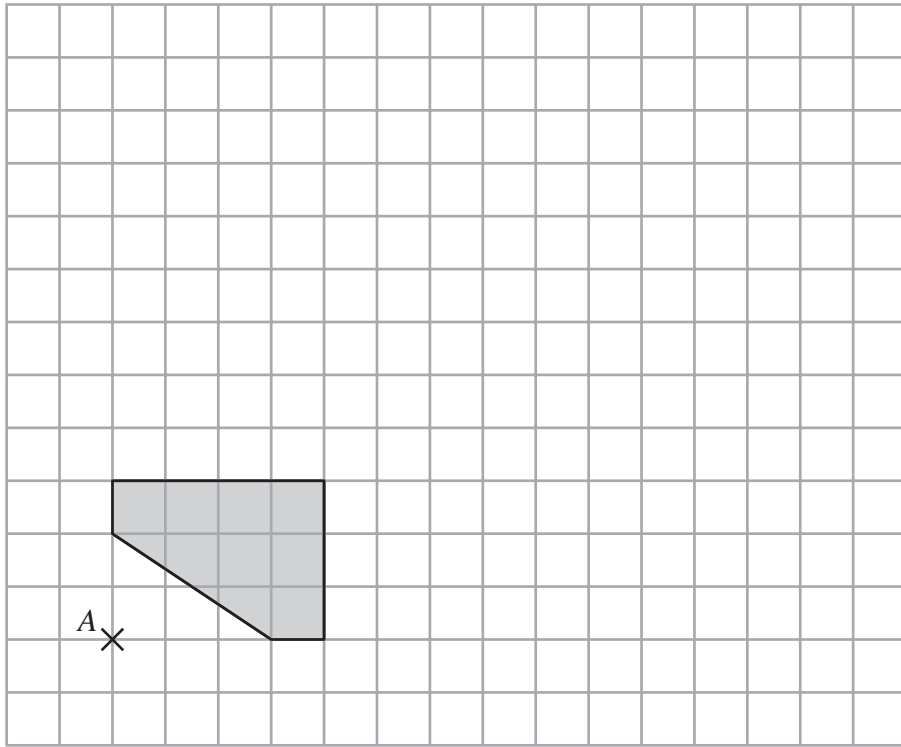
.....
 (2)

N is the midpoint of OB .
 G is the point on OM such that $OG : GM = 2 : 1$

- *(b) Show that AGN is a straight line.

(4)

(Total for Question 162 is 6 marks)

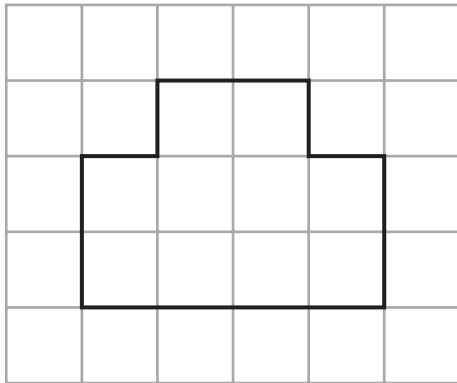


On the grid, enlarge the shape by scale factor 3, centre A.

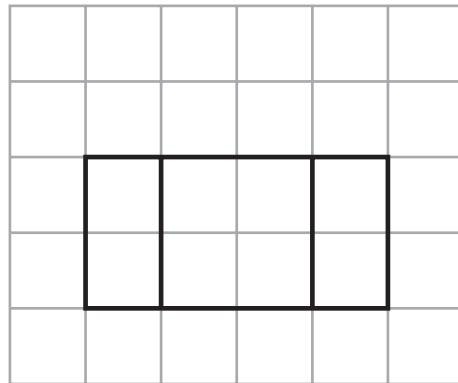
(Total for Question 163 is 3 marks)

164 Here are the front elevation and the plan of a prism."

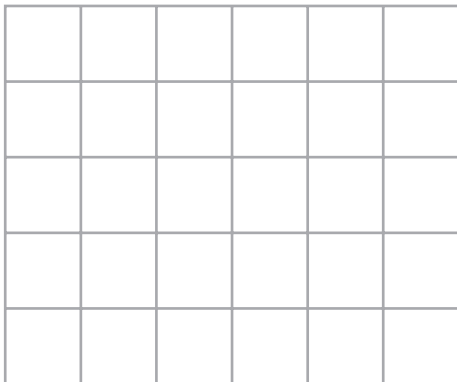
Front elevation



Plan



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



(Total for Question 164 is 2 marks)

165 The diagram shows a path around a pond.

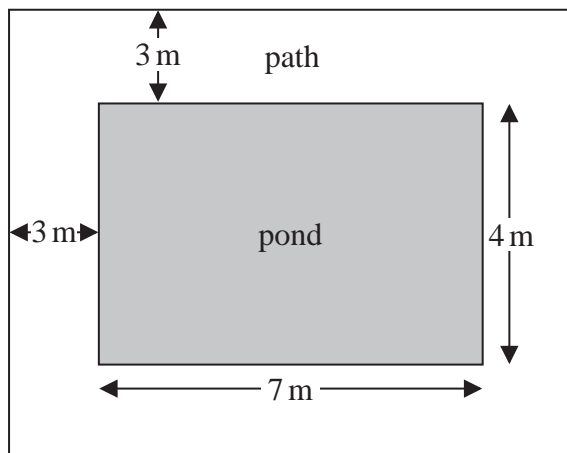


Diagram **NOT** accurately drawn

The pond is in the shape of a rectangle with length 7 m and width 4 m.
The path is 3 m wide.

Ali is going to cover the path with gravel.
One bag of gravel will cover 10 m^2 of the path.

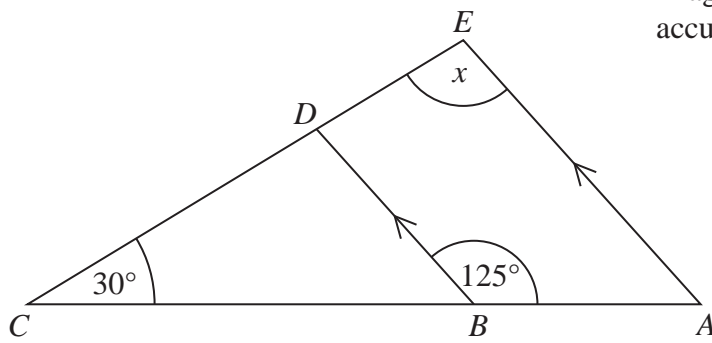
How many bags of gravel does Ali need to buy?
You must show your working.

..... bags

(Total for Question 165 is 4 marks)

*166

Diagram **NOT**
accurately drawn



ABC and EDC are straight lines.

AE and BD are parallel.

Angle $ABD = 125^\circ$

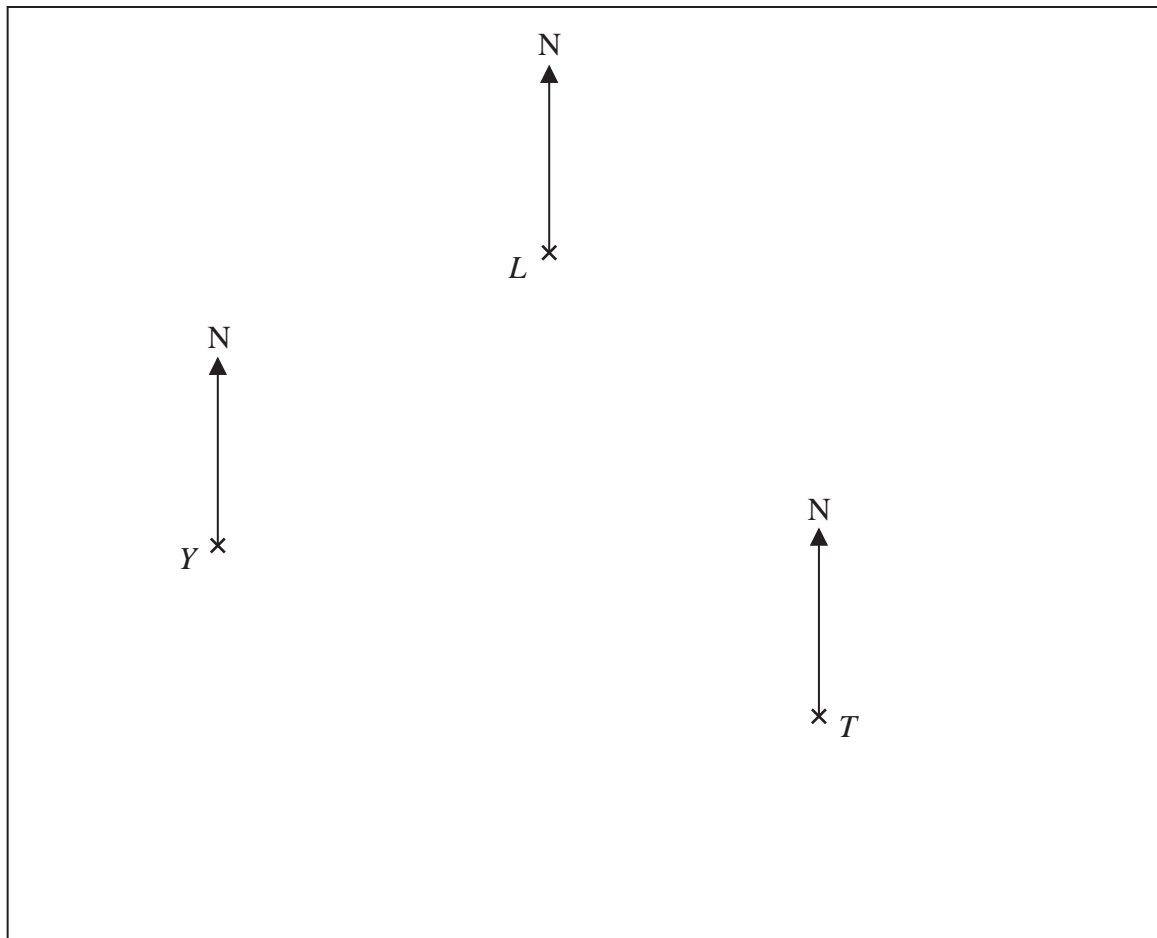
Angle $BCD = 30^\circ$

Work out the size of the angle marked x .

Give reasons for your answer.

(Total for Question 166 is 4 marks)

167 The diagram shows the positions of a lighthouse L , a yacht Y and a tanker T on a map.



Scale 1 cm represents 10 km

(a) Measure the bearing of L from Y .

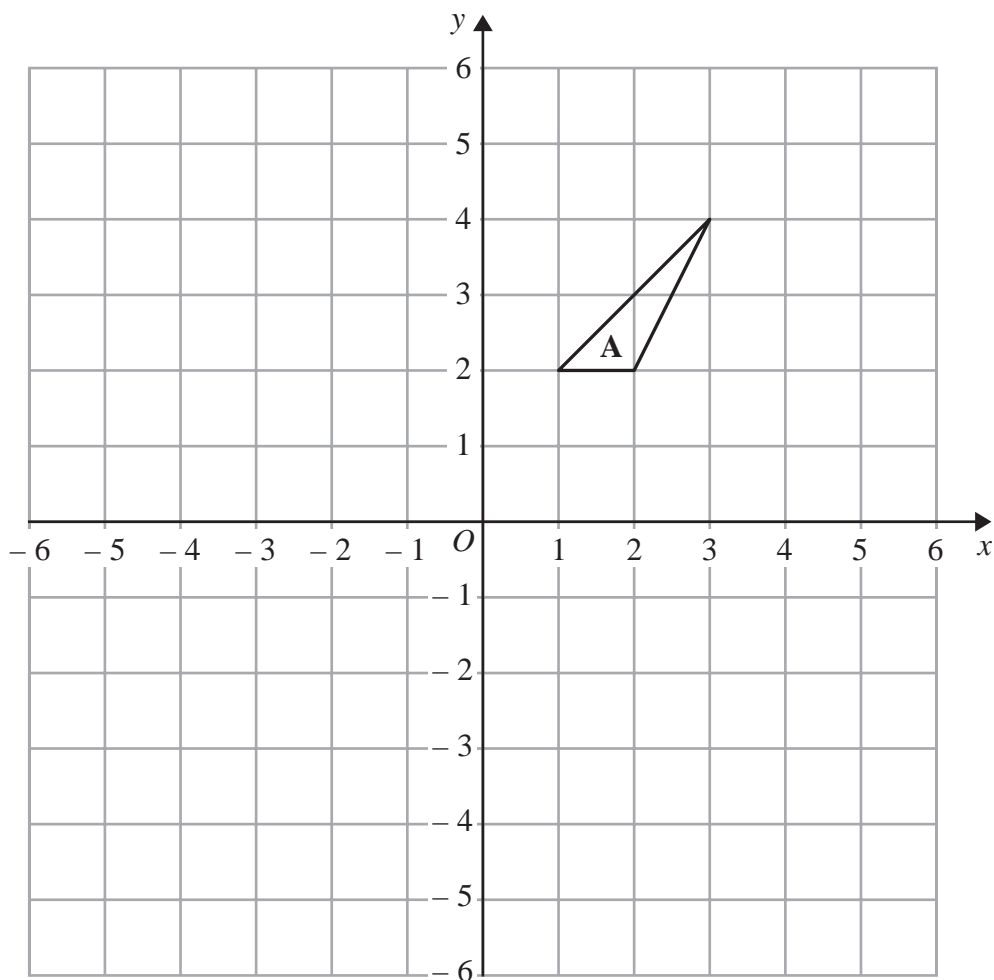
.....
 (1)

The tanker, T , sails 80 km on a bearing of 320° .

(b) Find the distance, in km, between the tanker and the lighthouse when the tanker is closest to the lighthouse.

..... km
 (2)

(Total for Question 167 is 3 marks)



Triangle **A** is rotated 90° clockwise about the point $(0, 1)$ to give triangle **B**.

Triangle **B** is translated by the vector $\begin{pmatrix} -3 \\ -1 \end{pmatrix}$ to give triangle **C**.

Describe fully the single transformation that maps triangle **A** onto triangle **C**.

.....

.....

(Total for Question 168 is 3 marks)

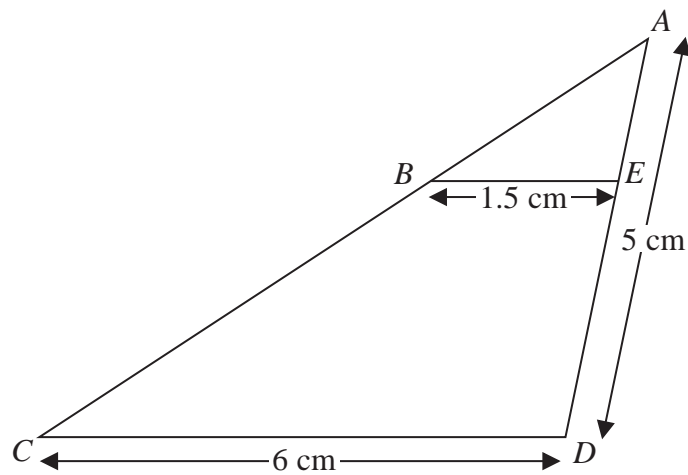


Diagram **NOT**
accurately drawn

ABC and AED are straight lines.

BE and CD are parallel.

$BE = 1.5$ cm.

$CD = 6$ cm.

$AD = 5$ cm.

Calculate the length of ED .

..... cm

(Total for Question 169 is 3 marks)

170 The diagram shows a prism.

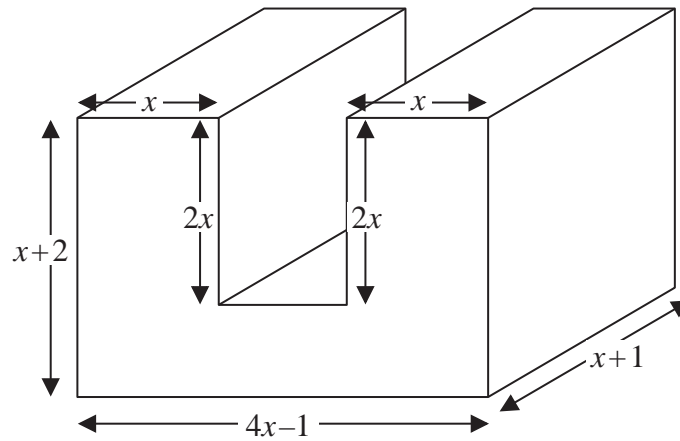


Diagram **NOT** accurately drawn

All measurements are in centimetres.
All corners are right angles.

Find an expression, in terms of x , for the volume, in cm^3 , of the prism.
You must show your working.
Give your answer in its simplest form.

(Total for Question 170 is 4 marks)

*171 The diagram shows a triangle DEF inside a rectangle $ABCD$.

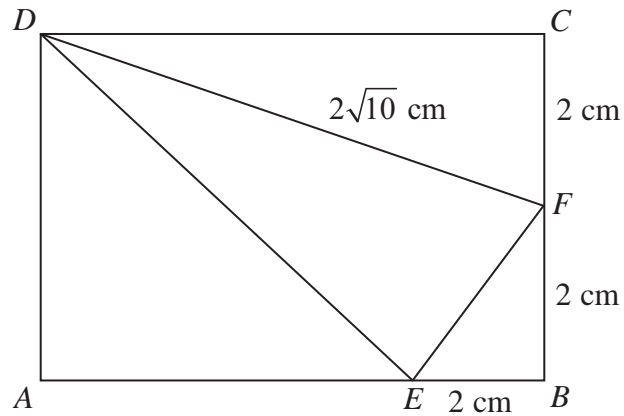


Diagram **NOT** accurately drawn

Show that the area of triangle DEF is 8 cm^2 .
You must show all your working.

(Total for Question 171 is 4 marks)

172 The diagram shows a prism.

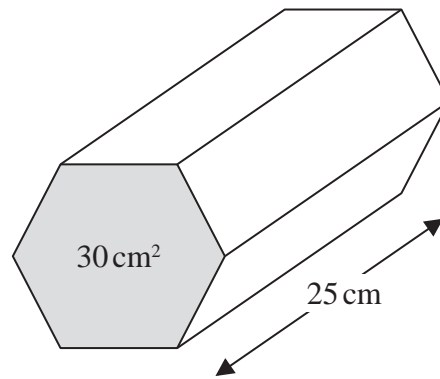
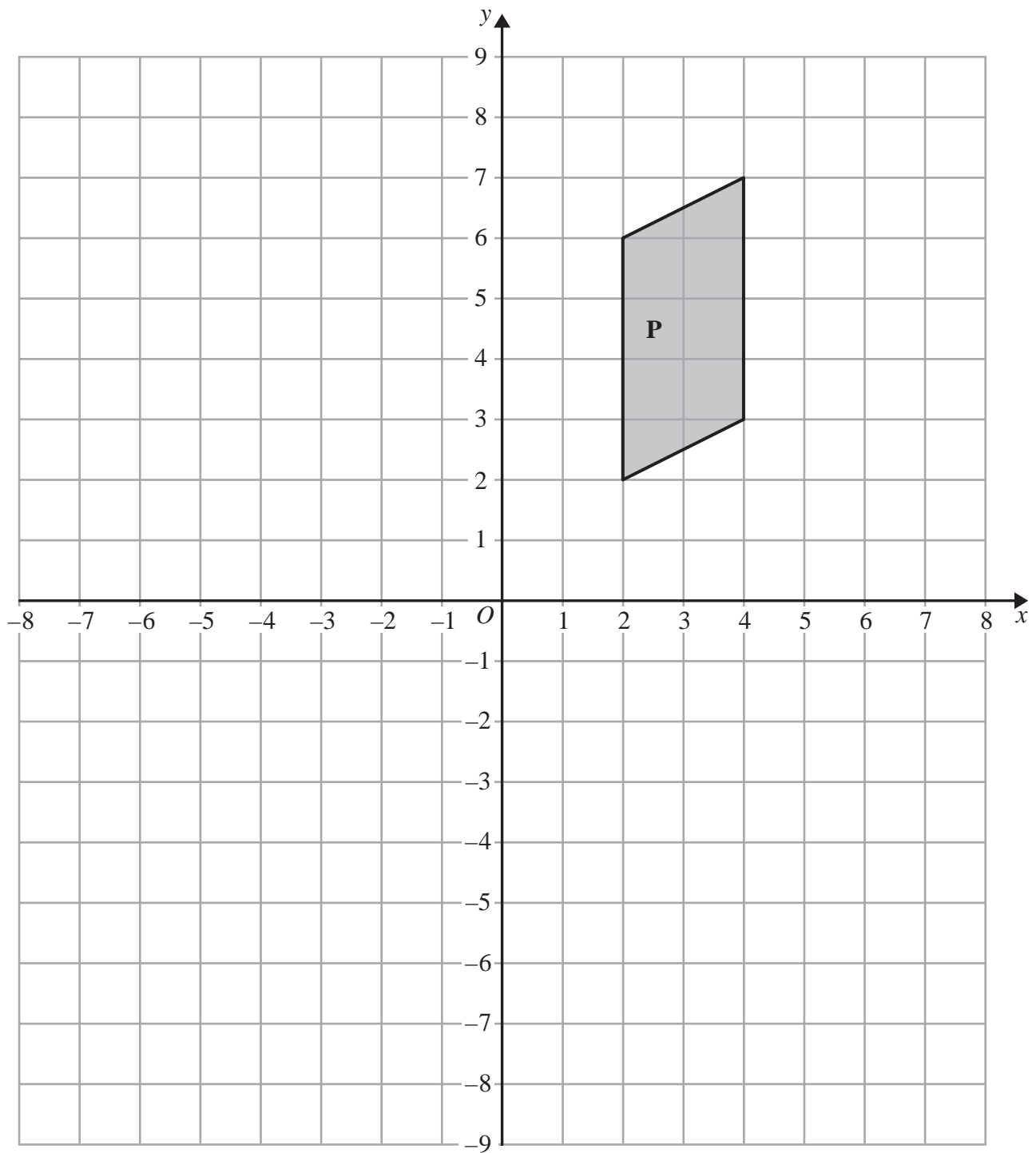


Diagram **NOT**
accurately drawn

The area of the cross section of the prism is 30 cm^2 .
The length of the prism is 25 cm .

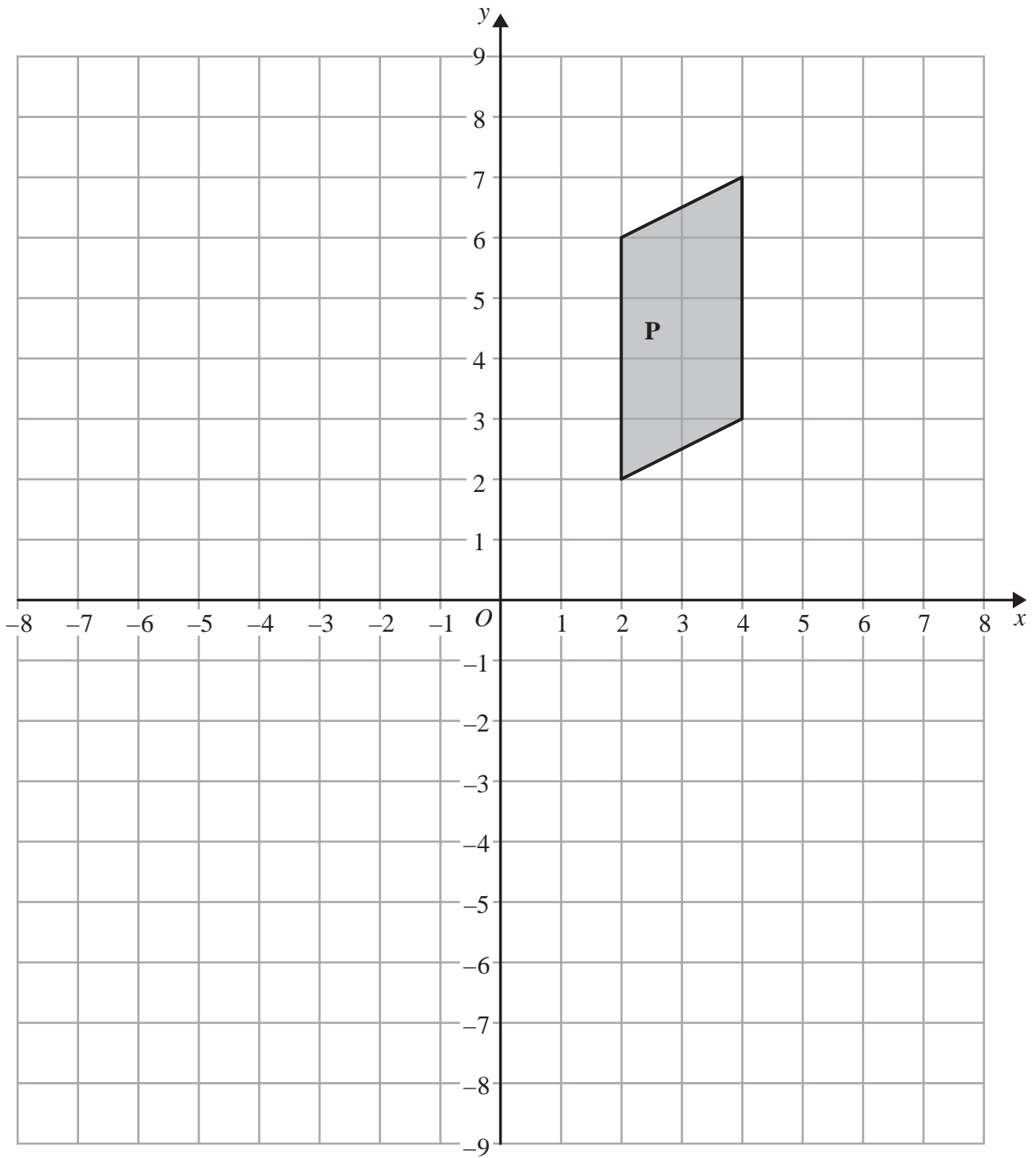
Work out the volume of the prism.

.....
(Total for Question 172 is 3 marks)



(a) Reflect shape **P** in the line $x = -1$

(2)



(b) Rotate shape **P** 90° anticlockwise about (0, 1).

(2)

(Total for Question 173 is 4 marks)

*174 The diagram shows the plan of a floor.

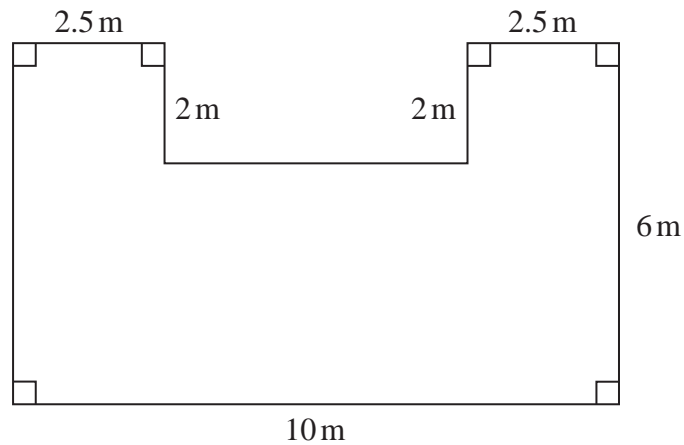


Diagram **NOT** accurately drawn

Angie is going to varnish the floor.

She needs 1 litre of varnish for 5 m^2 of floor.

There are 2.5 litres of varnish in each tin of varnish.

Angie has 3 tins of varnish.

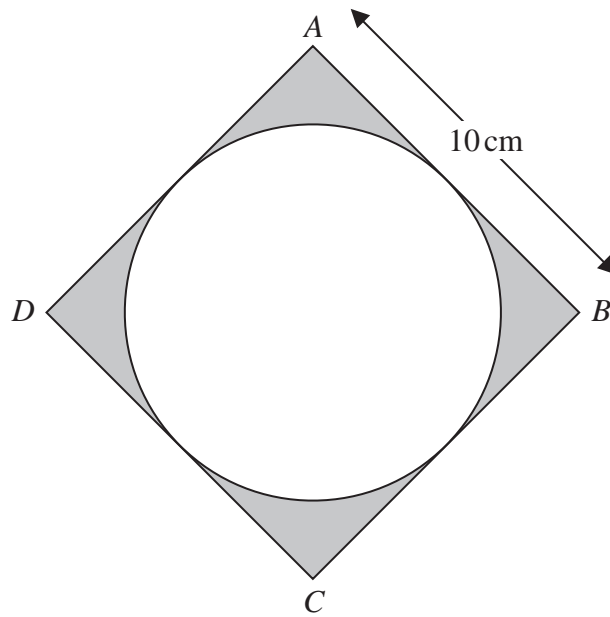
Does she have enough varnish for all the floor?

You must show all your working.

(Total for Question 174 is 5 marks)

175 The diagram shows a circle inside a square.

Diagram **NOT**
accurately drawn



$ABCD$ is a square of side 10 cm.

Each side of the square is a tangent to the circle.

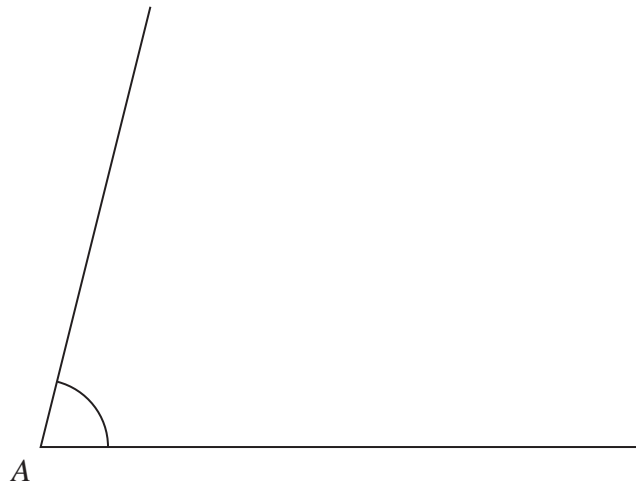
Work out the total area of the shaded regions in terms of π .

Give your answer in its simplest form.

..... cm^2

(Total for Question 175 is 3 marks)

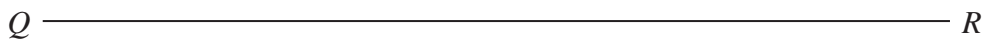
- 176 (a) Use ruler and compasses to bisect the angle at A .
You must show all your construction lines.



(2)

- (b) Use ruler and compasses to construct the perpendicular from the point P to the line QR .
You must show all your construction lines.

P
 \times



(2)

(Total for Question 176 is 4 marks)

*177

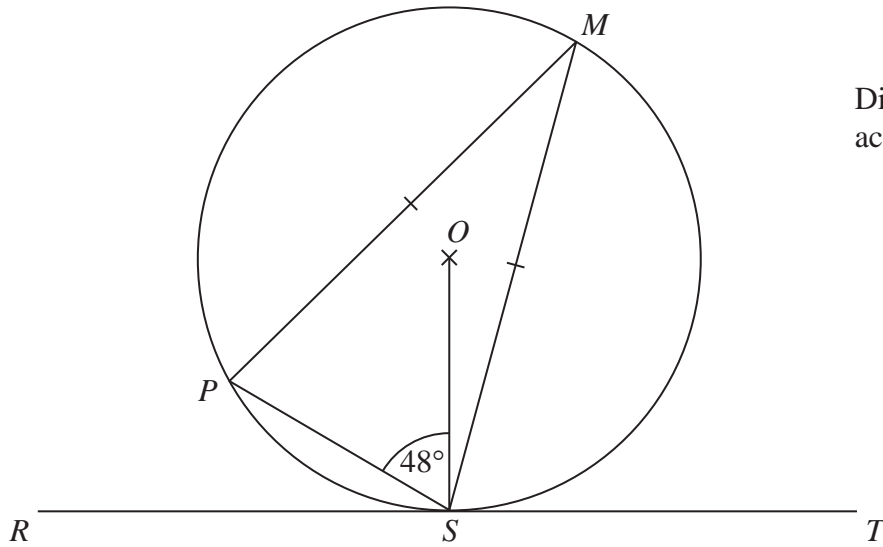


Diagram **NOT**
accurately drawn

P , M and S are points on a circle, centre O .
 RST is a tangent to the circle.

Angle $PSO = 48^\circ$
 $MP = MS$

Work out the size of angle MST .
Give reasons for each stage of your working.

(Total for Question 177 is 5 marks)

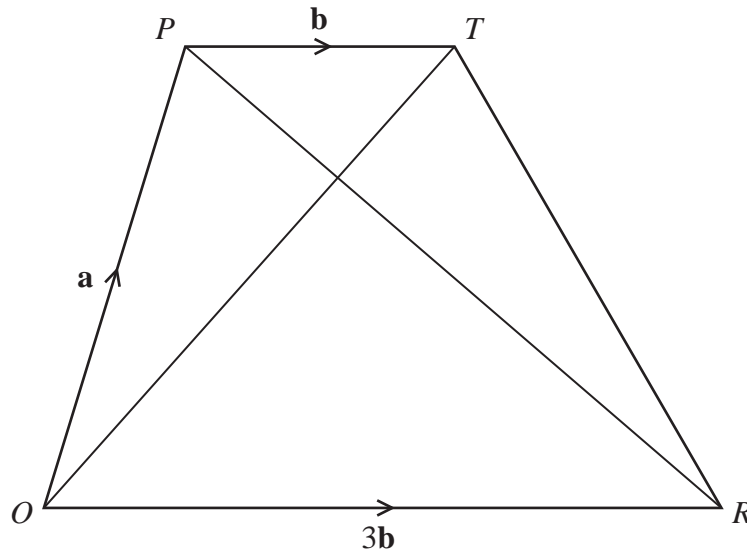


Diagram **NOT**
accurately drawn

$OPTR$ is a trapezium.

$$\vec{OP} = \mathbf{a}$$

$$\vec{PT} = \mathbf{b}$$

$$\vec{OR} = 3\mathbf{b}$$

(a) (i) Find \vec{OT} in terms of \mathbf{a} and \mathbf{b}

(ii) Find \vec{PR} in terms of \mathbf{a} and \mathbf{b}
Give your answer in its simplest form.

(2)

S is the point on PR such that $PS : SR = 1 : 3$

- (b) Find \vec{OS} in terms of \mathbf{a} and \mathbf{b}
Give your answer in its simplest form.

.....
(2)

- *(c) What does your answer to part (b) tell you about the position of point S ?

.....
.....
.....
.....
(2)

(Total for Question 178 is 6 marks)

179 ABD is a right angled triangle.

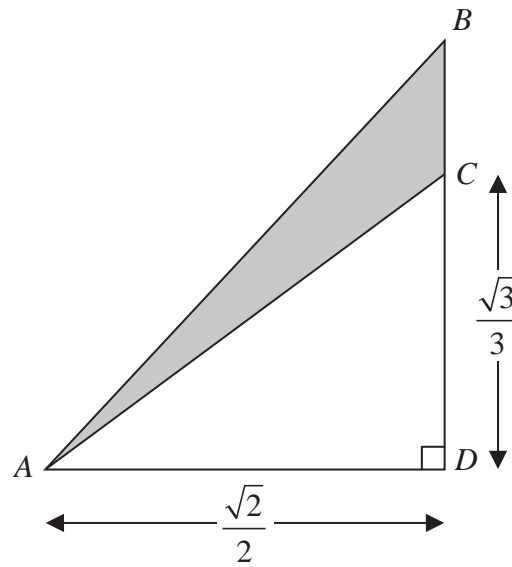


Diagram **NOT** accurately drawn

All measurements are given in centimetres.

C is the point on BD such that $CD = \frac{\sqrt{3}}{3}$

$$AD = BD = \frac{\sqrt{2}}{2}$$

Work out the exact area, in cm^2 , of the shaded region.

..... cm^2

(Total for Question 179 is 3 marks)

*180

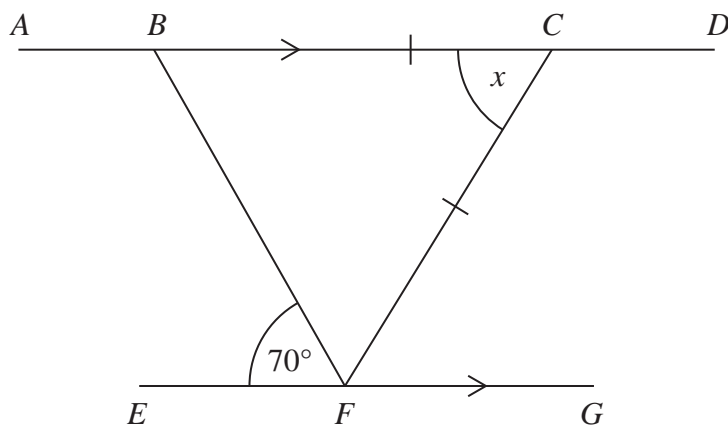


Diagram **NOT**
accurately drawn

$ABCD$ and EFG are parallel lines.

$BC = CF$

Angle $BFE = 70^\circ$

Work out the size of the angle marked x .

Give reasons for each stage of your working.

(Total for Question 180 is 4 marks)

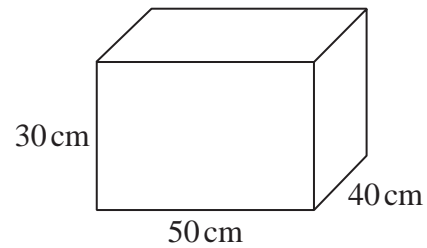
- *181 The diagram shows a container for oil.
The container is in the shape of a cuboid.
The container is empty.

Diagram **NOT**
accurately drawn

Sally has to fill the container with oil.
A bottle of oil costs £3.50
There are 3000 cm^3 of oil in each bottle.

Sally must **not** spend more than £60 buying the oil.

Can Sally buy enough oil to fill the container?
You must show all your working.



(Total for Question 181 is 4 marks)

182 Manchester airport is on a bearing of 330° from a London airport.

(a) Find the bearing of the London airport from Manchester airport.

.....
(2)

The London airport is 200 miles from Manchester airport.

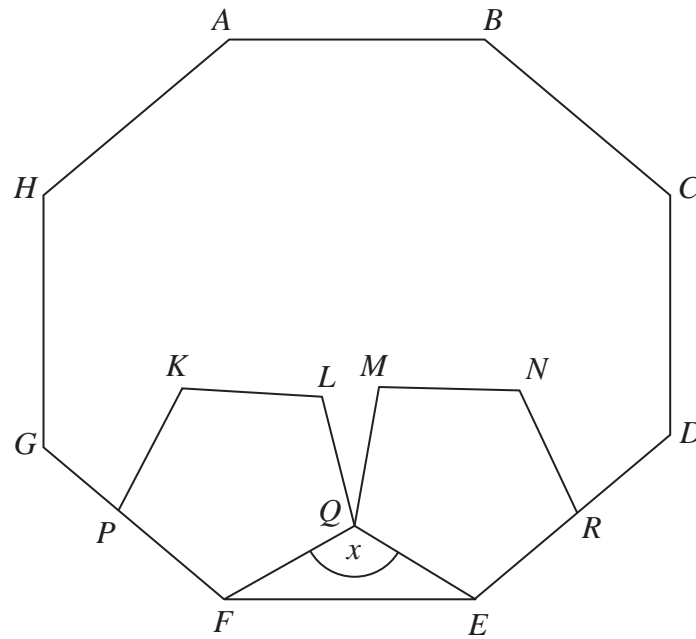
A plane leaves Manchester airport at 10 am to fly to the London airport.
The plane flies at an average speed of 120 mph.

(b) What time does the plane arrive at the London airport?

.....
(4)

(Total for Question 182 is 6 marks)

Diagram **NOT**
accurately drawn



$ABCDEFGH$ is a regular octagon.
 $KLQFP$ and $MNREQ$ are two identical regular pentagons.

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

(Total for Question 183 is 4 marks)

184 $ABCD$ is a trapezium.
 $STUV$ is a rectangle.

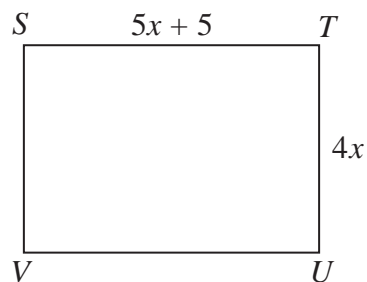
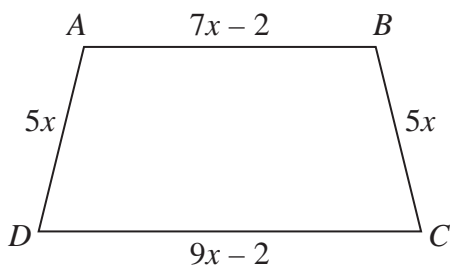


Diagram **NOT**
accurately drawn

All measurements are in centimetres.

The two shapes have the same perimeter.

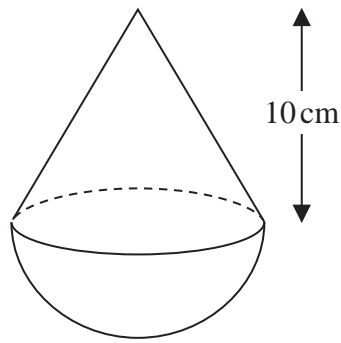
Work out the length of ST .

..... cm

(Total for Question 184 is 5 marks)

185 The diagram shows a solid shape.

Diagram **NOT**
accurately drawn



The solid shape is made from a hemisphere and a cone.
The radius of the hemisphere is equal to the radius of the base of the cone.

The cone has a height of 10 cm.
The volume of the cone is $270\pi\text{ cm}^3$.

Work out the total volume of the solid shape.
Give your answer in terms of π .

..... cm^3

(Total for Question 185 is 5 marks)

*186

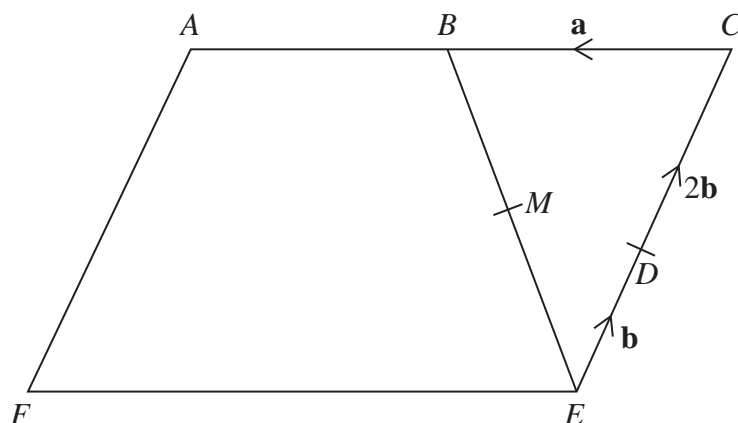


Diagram NOT
accurately drawn

$ACEF$ is a parallelogram.
 B is the midpoint of AC .
 M is the midpoint of BE .

$$\vec{CB} = \mathbf{a}$$

$$\vec{ED} = \mathbf{b}$$

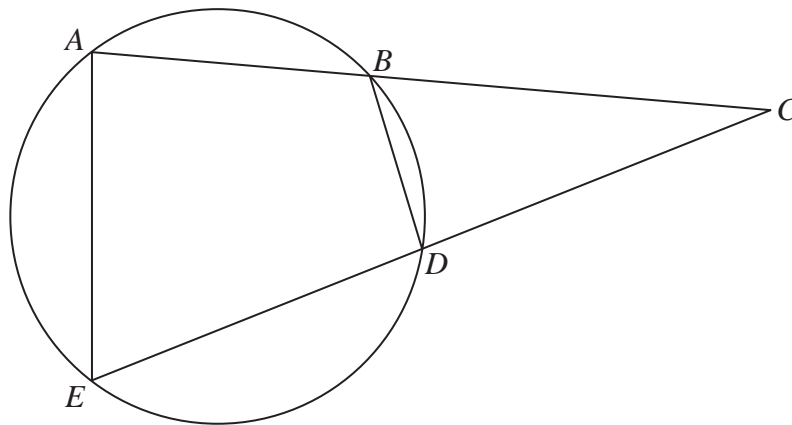
$$\vec{DC} = 2\mathbf{b}$$

Show that AMD is a straight line.

(Total for Question 186 is 5 marks)

*187

Diagram **NOT**
accurately drawn



A , B , D and E are points on a circle.
 ABC and EDC are straight lines.

Prove that triangle BCD is similar to triangle ECA .
You must give reasons for your working.

(Total for Question 187 is 5 marks)

188 Jane makes cheese.

The cheese is in the shape of a cuboid.

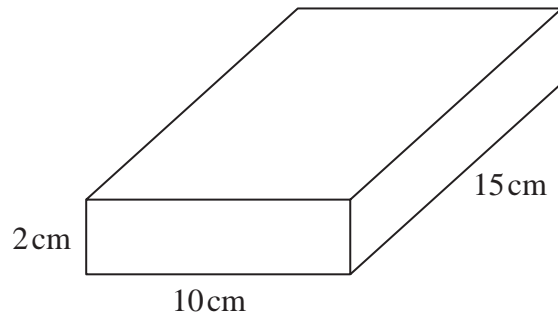


Diagram **NOT** accurately drawn

Jane is going to make a new cheese.

The new cheese will also be in the shape of a cuboid.

The cross section of the cuboid will be a 5 cm by 5 cm square.

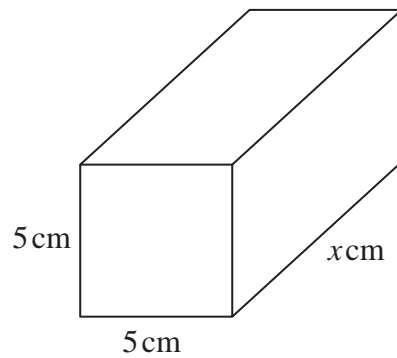
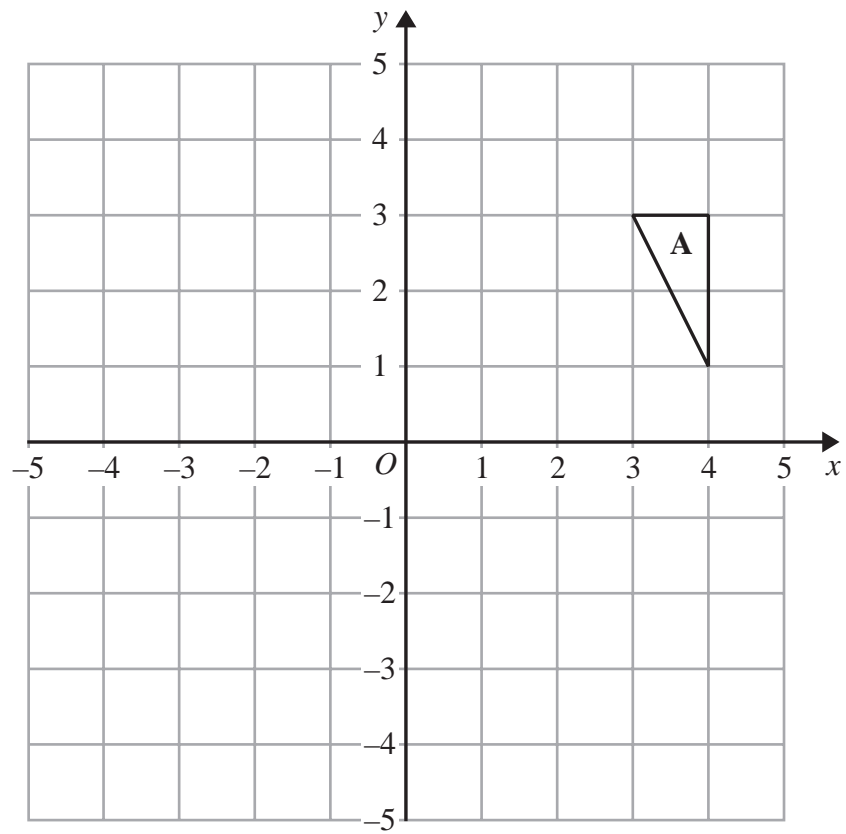


Diagram **NOT** accurately drawn

Jane wants the new cuboid to have the same volume as the 2 cm by 10 cm by 15 cm cuboid.

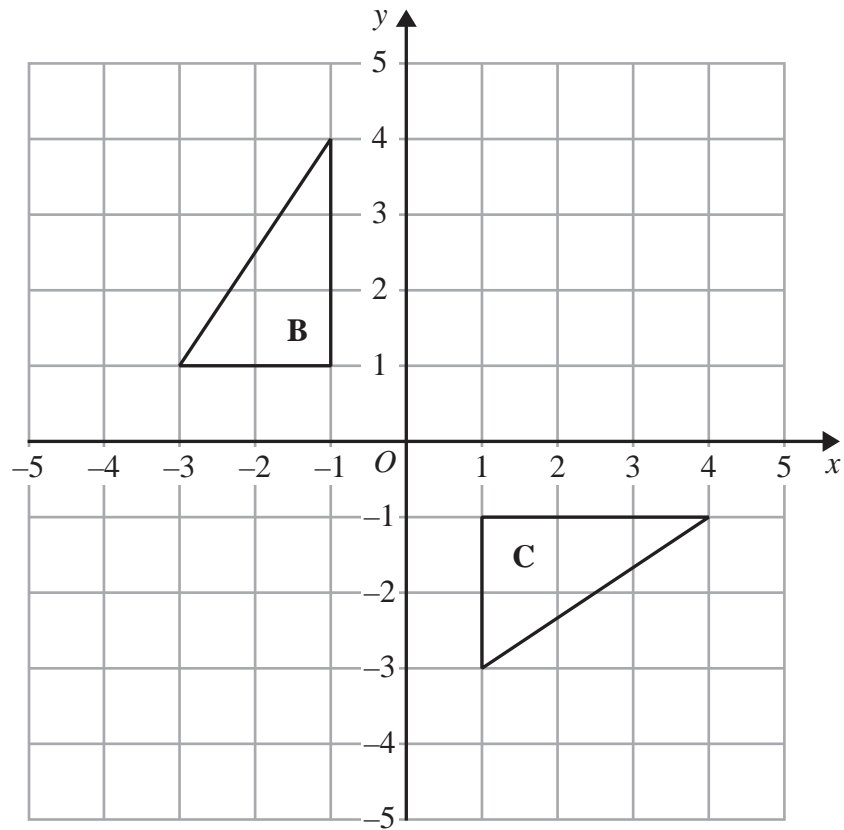
Work out the value of x .

(Total for Question 188 is 3 marks)



(a) Rotate triangle A 90° anticlockwise with centre O.

(2)



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

.....

.....

(2)

(Total for Question 189 is 4 marks)

*190 The diagram shows the floor plan of Mary's conservatory.

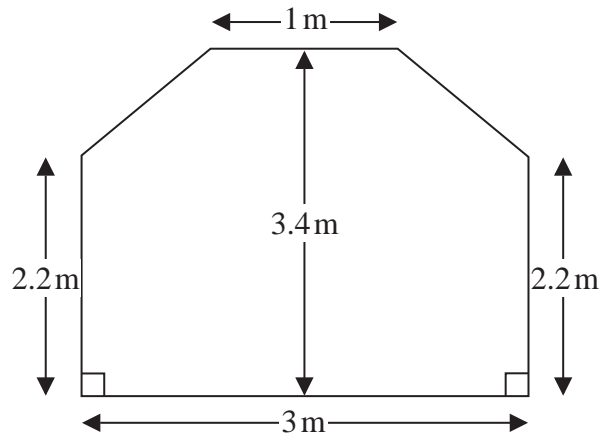


Diagram **NOT**
accurately drawn

Mary is going to cover the floor with tiles.

The tiles are sold in packs.

One pack of tiles will cover 2 m^2

A pack of tiles normally costs £24.80

Mary gets a discount of 25% off the cost of the tiles.

Mary has £100

Does Mary have enough money to buy all the tiles she needs?

You must show all your working.

(Total for Question 190 is 5 marks)

*191

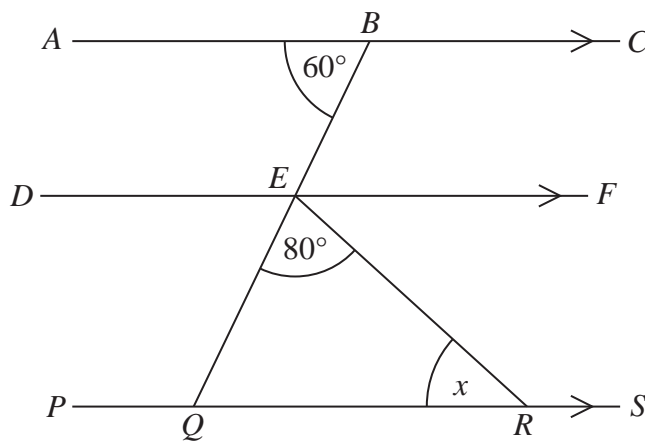


Diagram **NOT**
accurately drawn

ABC , DEF and $PQRS$ are parallel lines.
 BEQ is a straight line.

Angle $ABE = 60^\circ$

Angle $QER = 80^\circ$

Work out the size of the angle marked x .

Give reasons for each stage of your working.

(Total for Question 191 is 4 marks)

192 Here is a rectangle.

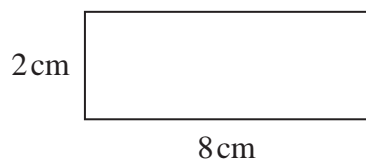


Diagram **NOT**
accurately drawn

The 8-sided shape below is made from 4 of these rectangles and 4 congruent right-angled triangles.

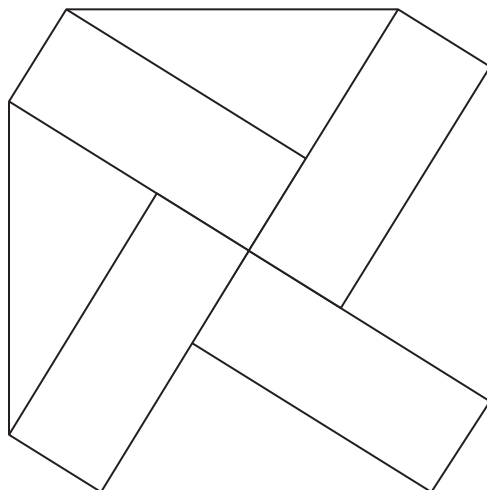


Diagram **NOT**
accurately drawn

Work out the perimeter of the 8-sided shape.
You must show all your working.

..... cm

(Total for Question 192 is 5 marks)

193

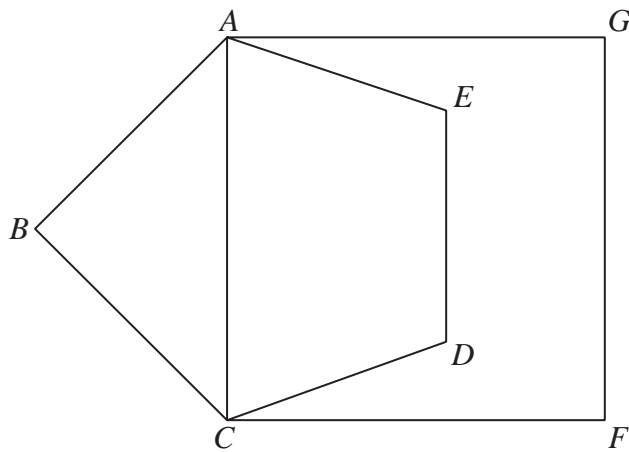


Diagram **NOT**
accurately drawn

$ABCDE$ is a regular pentagon.
 $ACFG$ is a square.

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

.....
(Total for Question 193 is 4 marks)

194 The diagram shows a container for grain.

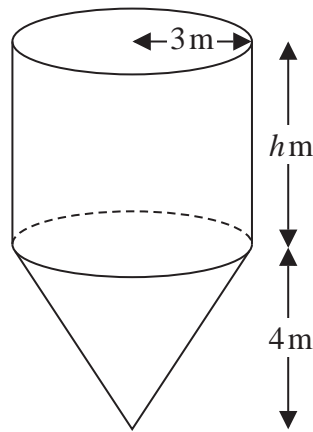


Diagram **NOT**
accurately drawn

The container is a cylinder on top of a cone.
The cylinder has a radius of 3 m and a height of h m.
The cone has a base radius of 3 m and a vertical height of 4 m.

The container is empty.
The container is then filled with grain at a constant rate.

After 5 hours the depth of the grain is 6 metres above the vertex of the cone.
After 9 hours the container is full of grain.

Work out the value of h .
Give your answer as a fraction in its simplest form.
You must show all your working.

(Total for Question 194 is 5 marks)

195 The diagram shows the plan of a floor.

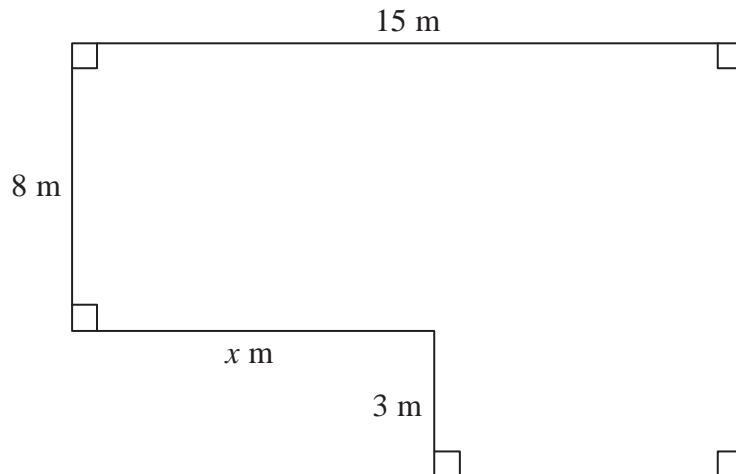


Diagram **NOT** accurately drawn

The area of the floor is 138 m^2 .

Work out the value of x .

.....
(Total for Question 195 is 4 marks)

*196

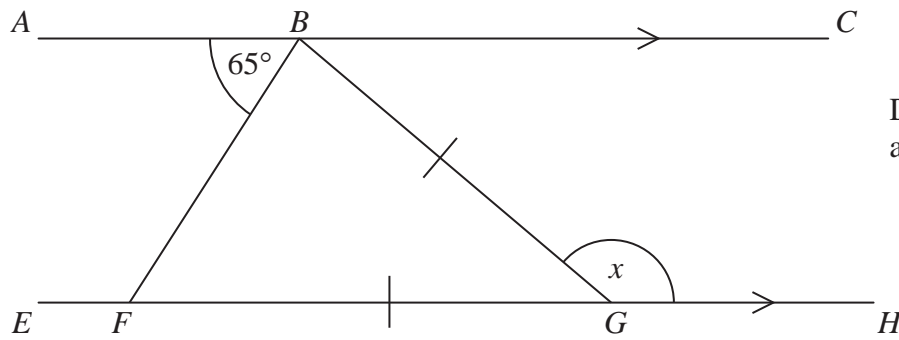


Diagram **NOT**
accurately drawn

ABC is parallel to $EFGH$.

$GB = GF$

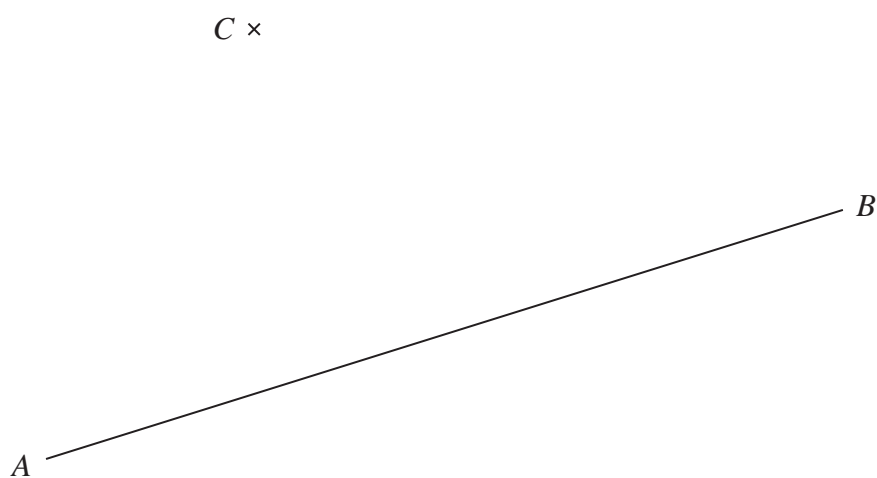
Angle $ABF = 65^\circ$

Work out the size of the angle marked x .

Give reasons for your answer.

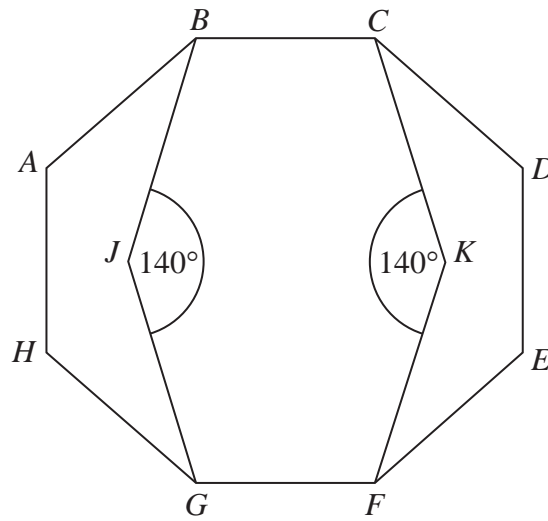
(Total for Question 196 is 4 marks)

197 Use ruler and compasses to **construct** the perpendicular from point C to the line AB .
You must show all your construction lines.



(Total for Question 197 is 2 marks)

Diagram **NOT**
accurately drawn



$ABCDEFGH$ is a regular octagon.
 $BCKFGJ$ is a hexagon.

JK is a line of symmetry of the hexagon.
Angle $BJG = \text{angle } CKF = 140^\circ$

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

(Total for Question 198 is 4 marks)

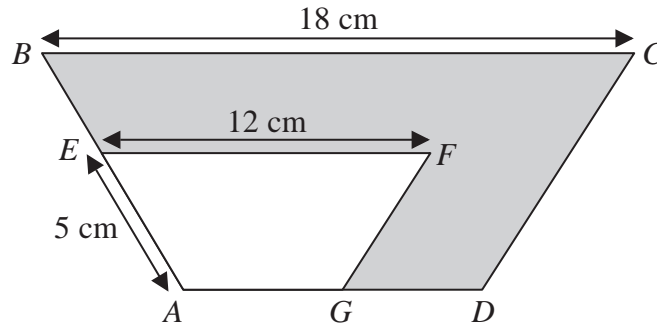


Diagram **NOT** accurately drawn

$ABCD$ and $AEFG$ are mathematically similar trapeziums.

- $AE = 5 \text{ cm}$
- $EF = 12 \text{ cm}$
- $BC = 18 \text{ cm}$

(a) Work out the length of AB .

..... cm

(2)

Trapezium $AEFG$ has an area of 36 cm^2 .

(b) Work out the area of the shaded region.

..... cm^2

(3)

(Total for Question 199 is 5 marks)

200 The diagram shows a solid shape.

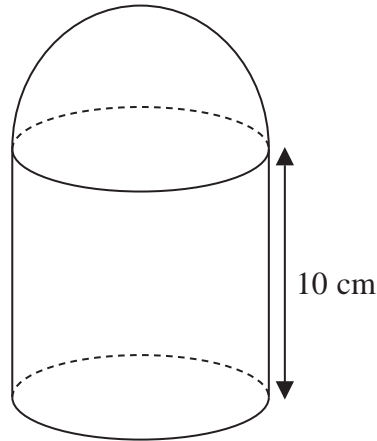


Diagram **NOT** accurately drawn

The solid shape is made from a cylinder and a hemisphere.
The radius of the cylinder is equal to the radius of the hemisphere.

The cylinder has a height of 10 cm.
The curved surface area of the hemisphere is $32\pi \text{ cm}^2$.

Work out the total surface area of the solid shape.
Give your answer in terms of π .

..... cm^2

(Total for Question 200 is 5 marks)

***201** The diagram shows the plan of a small field.

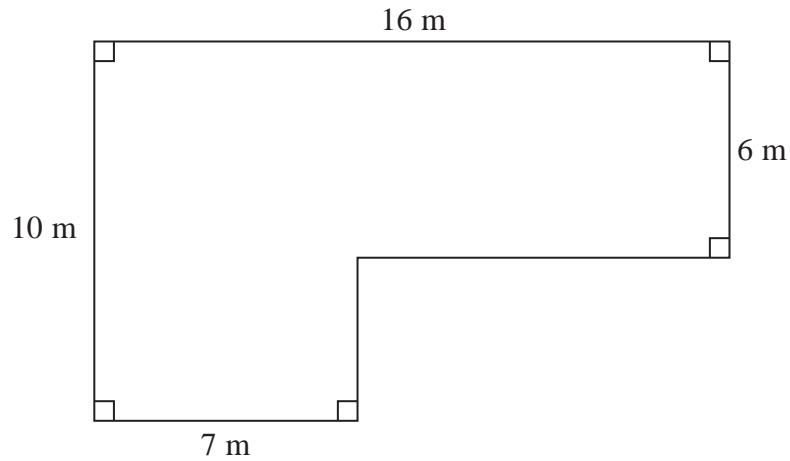
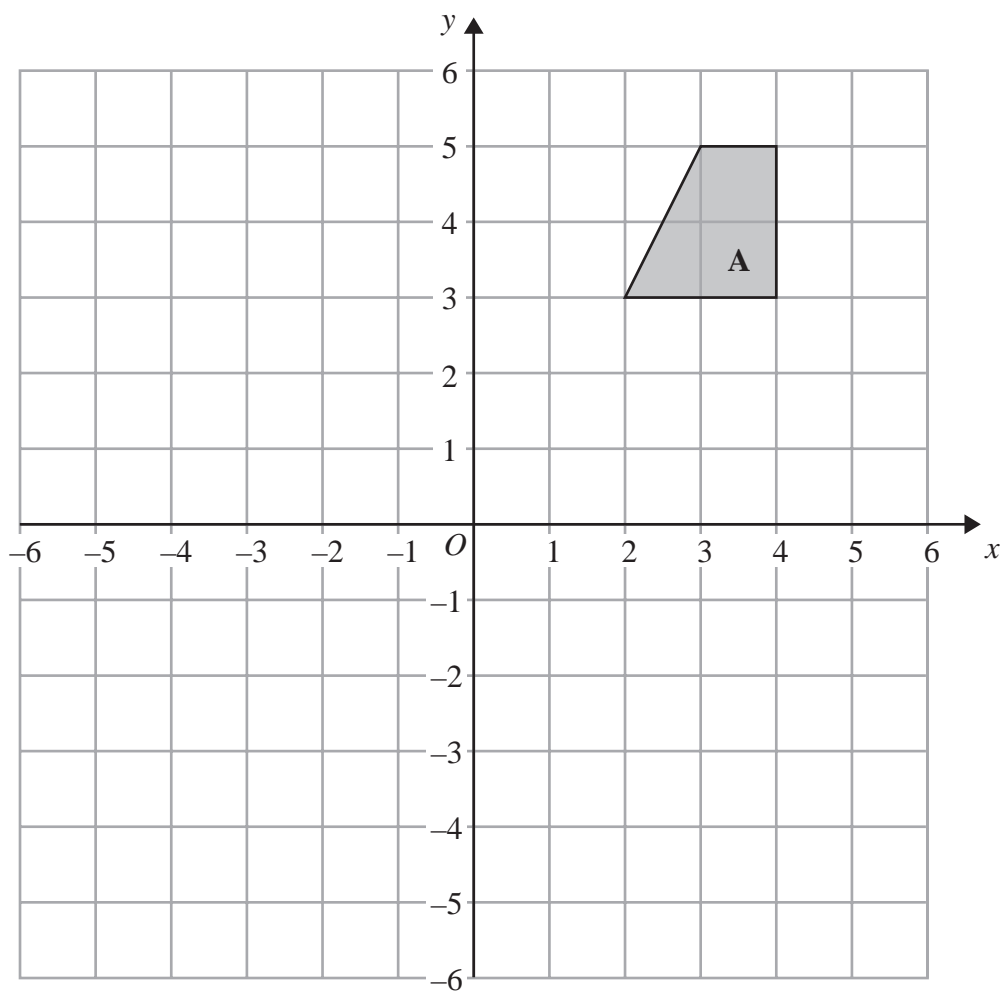


Diagram **NOT** accurately drawn

Kevin is going to keep some pigs in the field.
Each pig needs an area of 36 square metres.

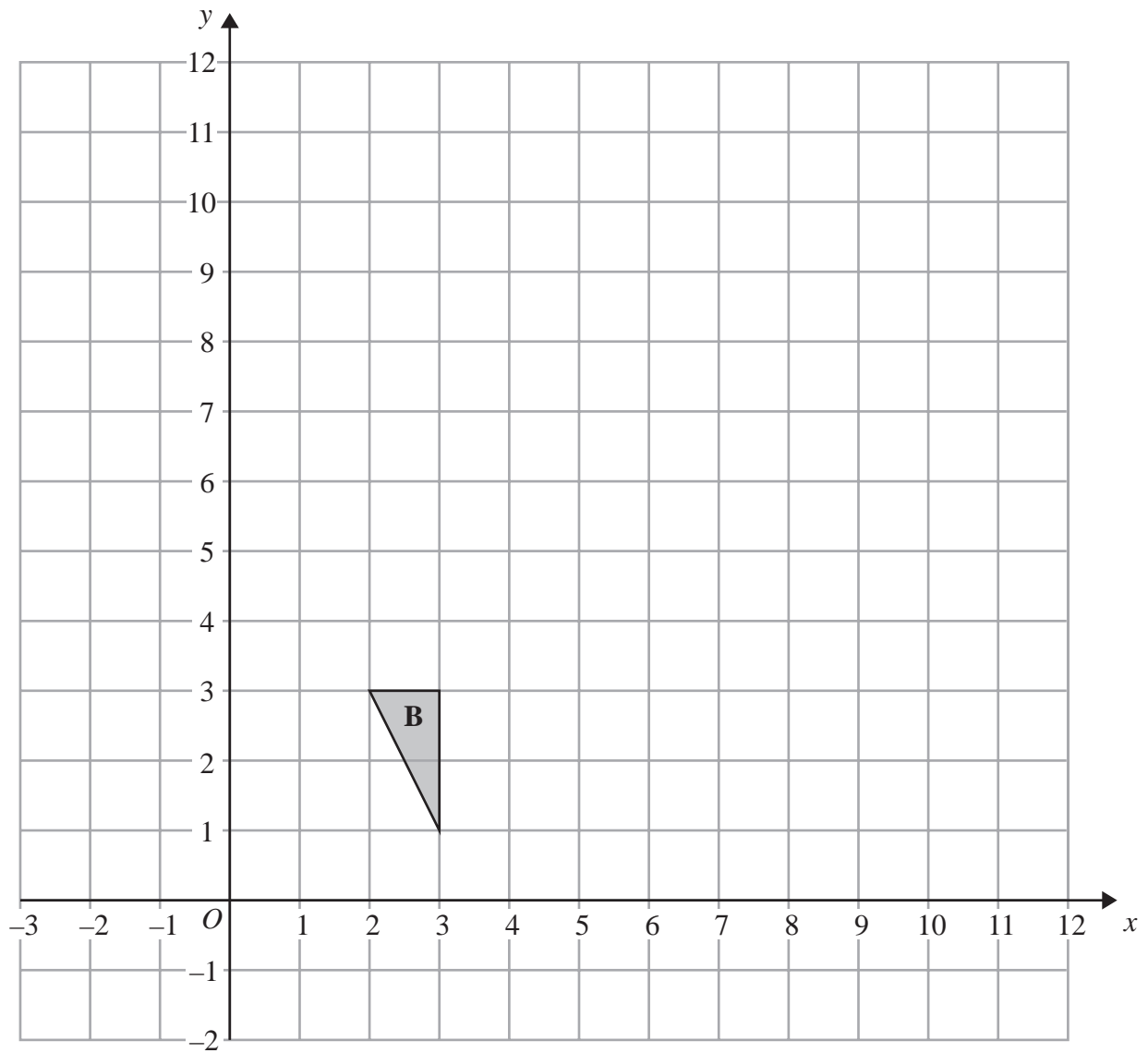
Work out the greatest number of pigs Kevin can keep in the field.

(Total for Question 201 is 4 marks)



(a) On the grid, rotate shape A 180° about the point (1, 1).

(2)



(b) On the grid, enlarge triangle **B** by scale factor 3, centre (0, 0).

(2)

(Total for Question 202 is 4 marks)

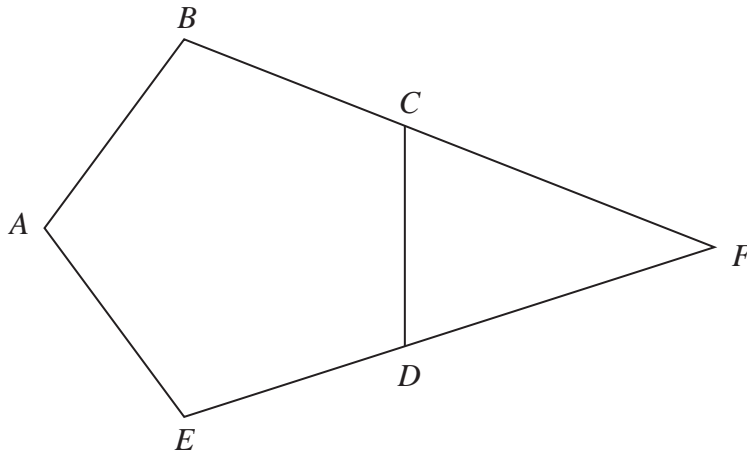


Diagram **NOT**
accurately drawn

$ABCDE$ is a regular pentagon.
 BCF and EDF are straight lines.

Work out the size of angle CFD .
You must show how you got your answer.

.....
(Total for Question 203 is 3 marks)

204 Steve has a photo and a rectangular piece of card.

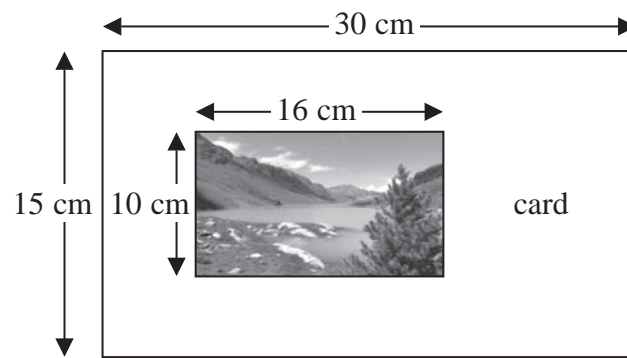
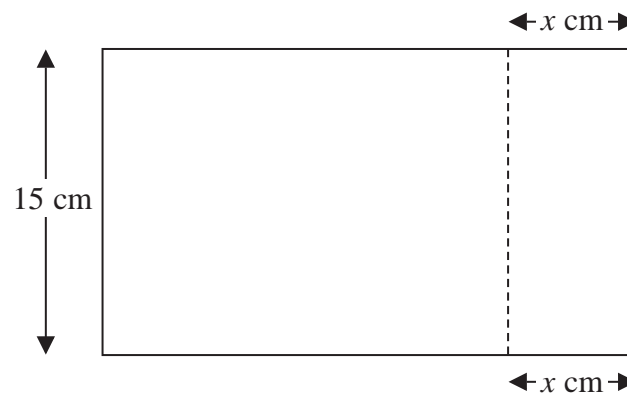


Diagram **NOT** accurately drawn

The photo is 16 cm by 10 cm.
The card is 30 cm by 15 cm.

Steve cuts the card along the dotted line shown in the diagram below.



Steve throws away the piece of card that is 15 cm by x cm.
The piece of card he has left is mathematically similar to the photo.

Work out the value of x .

(Total for Question 204 is 3 marks)

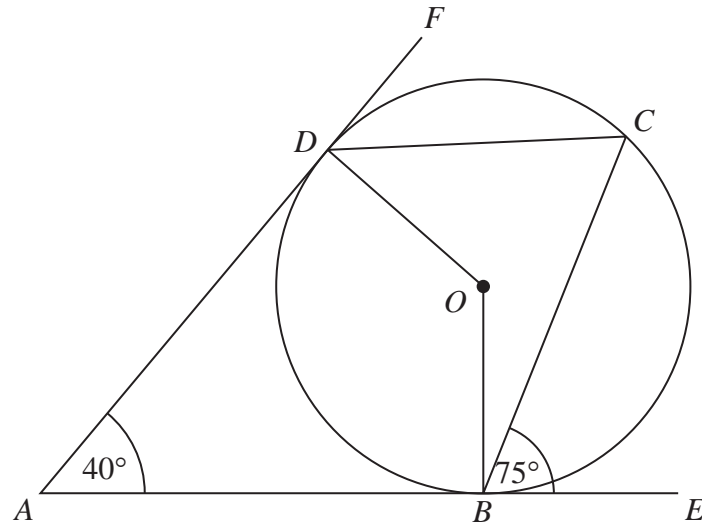


Diagram **NOT**
accurately drawn

B , C and D are points on the circumference of a circle, centre O .
 ABE and ADF are tangents to the circle.

Angle $DAB = 40^\circ$

Angle $CBE = 75^\circ$

Work out the size of angle ODC .

(Total for Question 205 is 3 marks)

*206

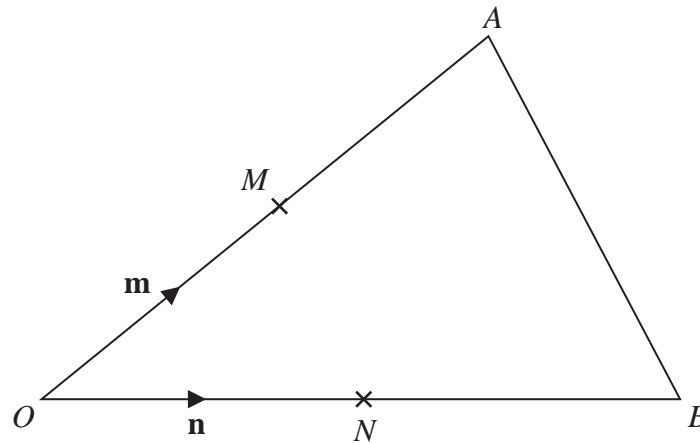


Diagram **NOT**
accurately drawn

OAB is a triangle.

M is the midpoint of OA .

N is the midpoint of OB .

$$\vec{OM} = \mathbf{m}$$

$$\vec{ON} = \mathbf{n}$$

Show that AB is parallel to MN .

(Total for Question 206 is 3 marks)

207 Here is a triangular prism.

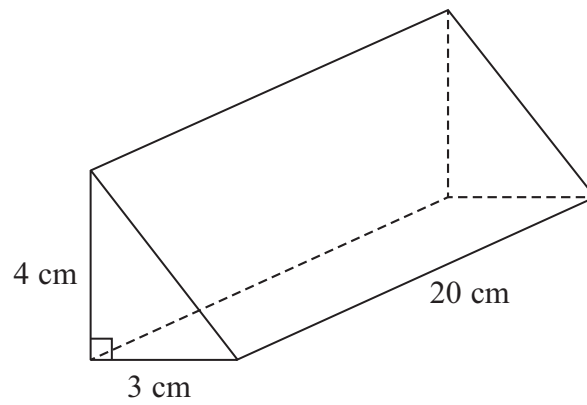
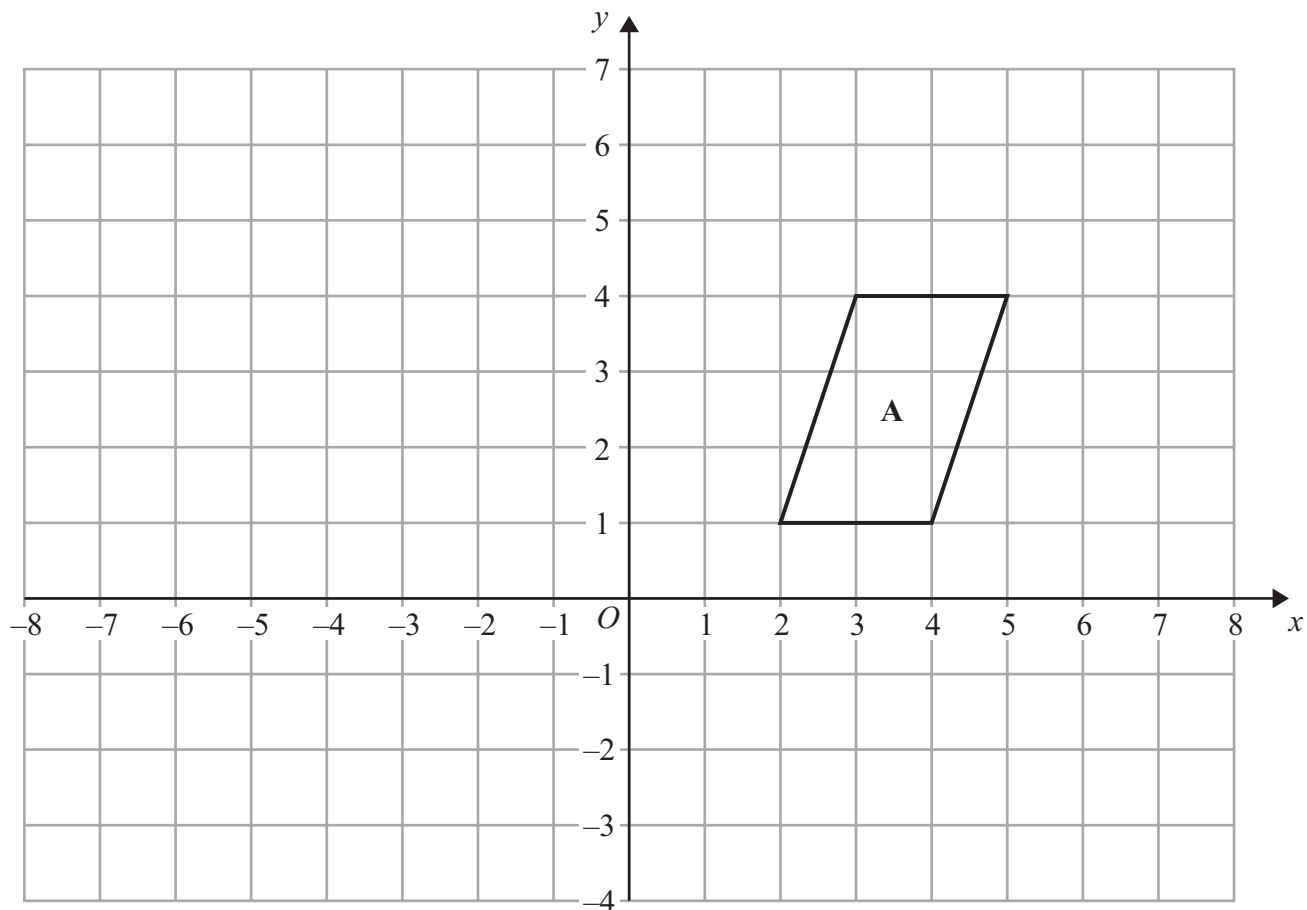


Diagram **NOT**
accurately drawn

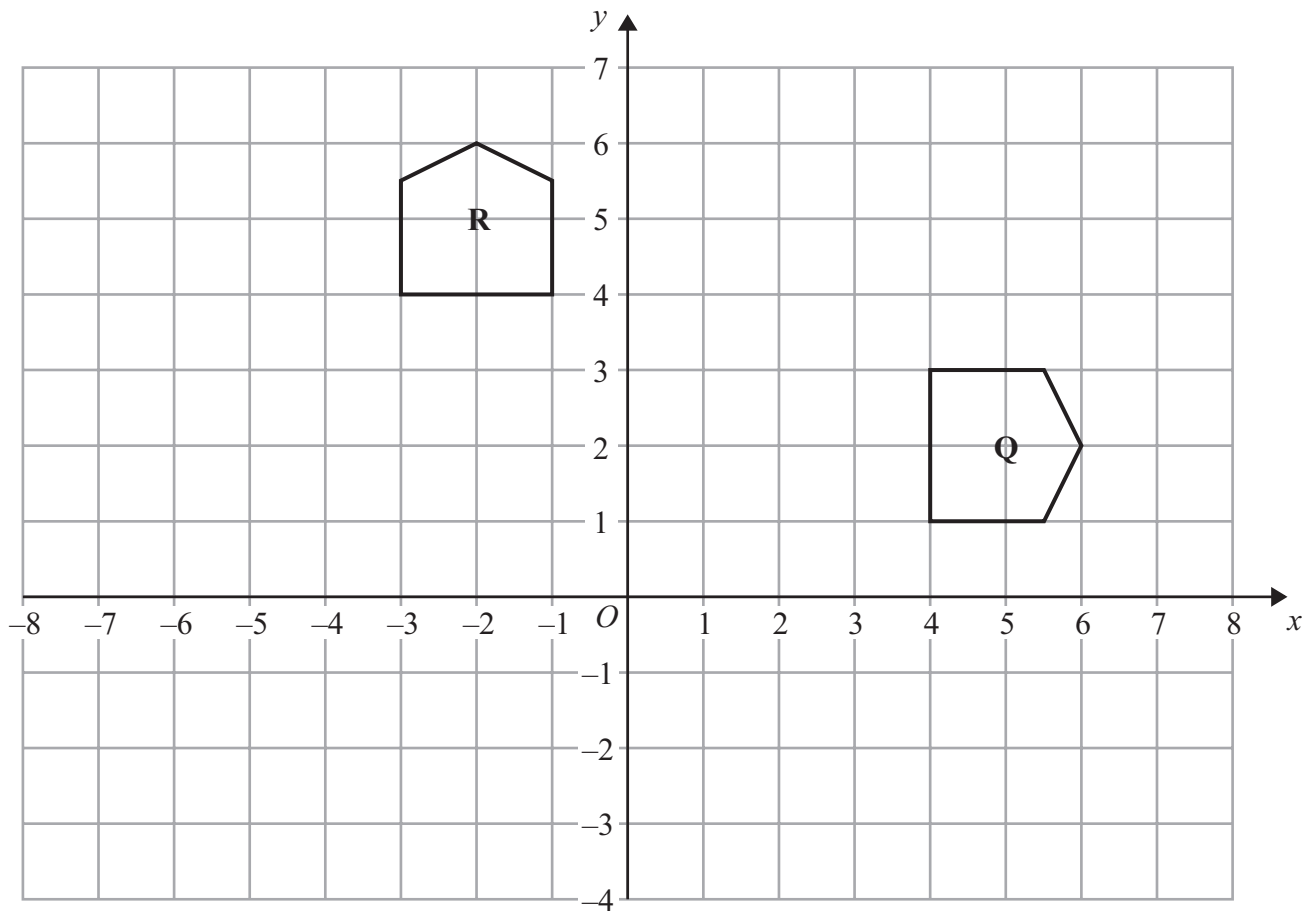
Work out the volume of this triangular prism.

.....
(Total for Question 207 is 4 marks)



(a) Translate shape **A** by the vector $\begin{pmatrix} -3 \\ 2 \end{pmatrix}$.

(1)



(b) Describe fully the single transformation that maps shape Q onto shape R.

.....

.....

.....

.....

(3)

(Total for Question 208 is 4 marks)

209 ABC is a triangle.

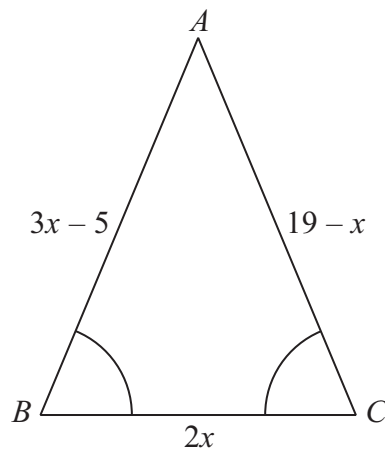


Diagram **NOT** accurately drawn

Angle $ABC =$ angle BCA .

The length of side AB is $(3x - 5)$ cm.

The length of side AC is $(19 - x)$ cm.

The length of side BC is $2x$ cm.

Work out the perimeter of the triangle.

Give your answer as a number of centimetres.

..... cm

(Total for Question 209 is 5 marks)

***210** The diagram shows the floor of a village hall.

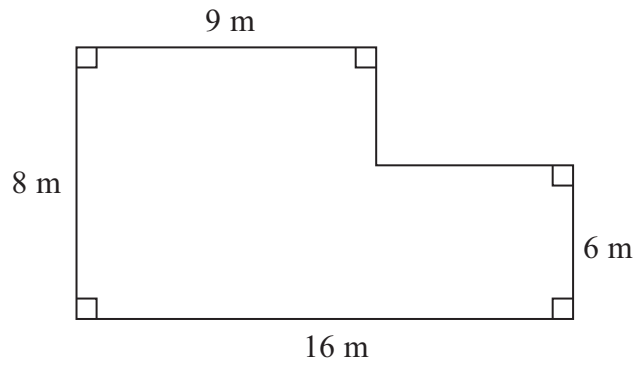


Diagram **NOT**
accurately drawn

The caretaker needs to polish the floor.

One tin of polish normally costs £19

One tin of polish covers 12 m^2 of floor.

There is a discount of 30% off the cost of the polish.

The caretaker has £130

Has the caretaker got enough money to buy the polish for the floor?

You must show all your working.

(Total for Question 210 is 5 marks)

*211

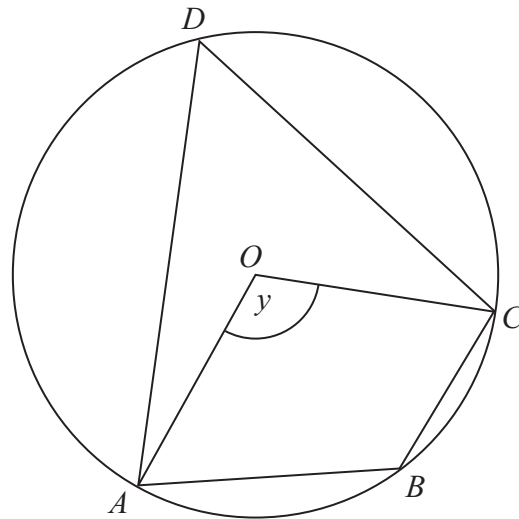


Diagram **NOT**
accurately drawn

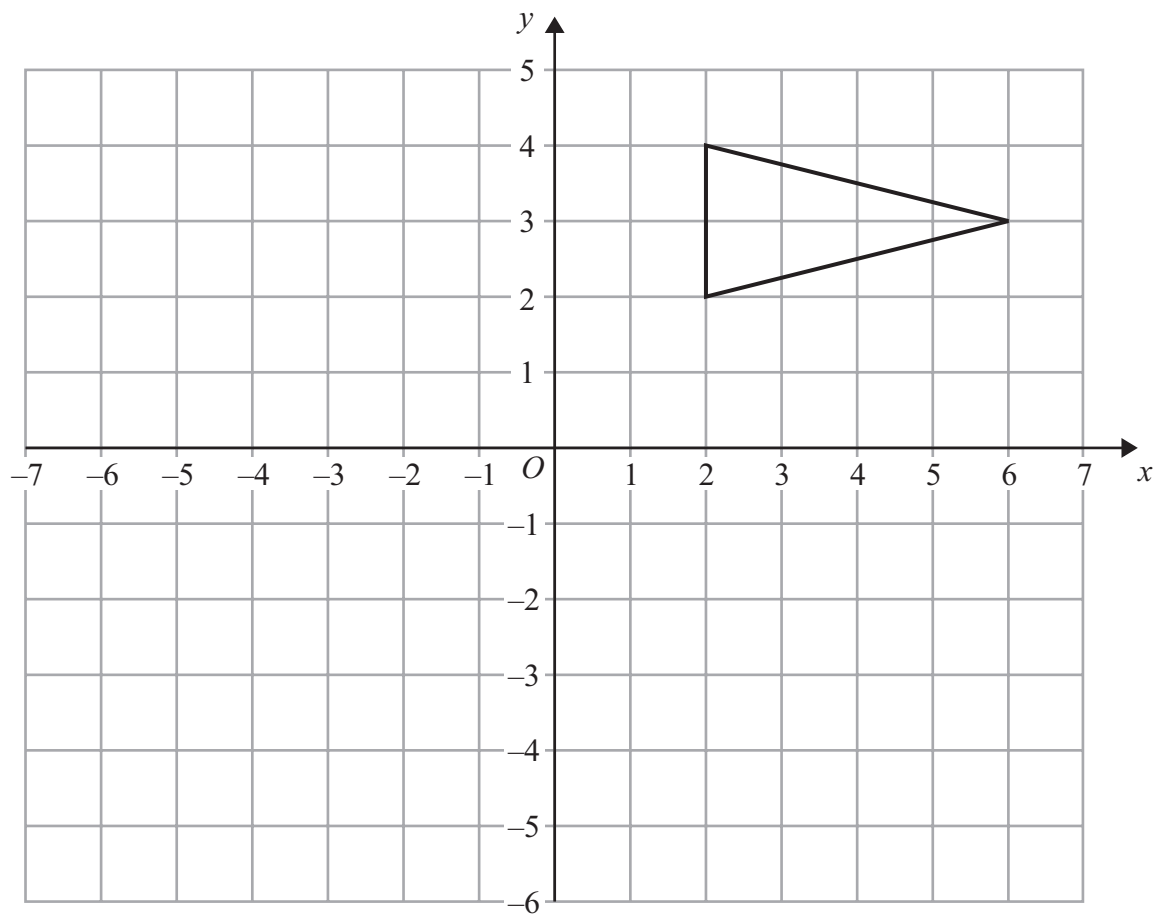
A , B , C and D are points on the circumference of a circle, centre O .

Angle $AOC = y$.

Find the size of angle ABC in terms of y .

Give a reason for each stage of your working.

(Total for Question 211 is 4 marks)



On the grid, enlarge the triangle by scale factor $-\frac{1}{2}$, centre $(0, -2)$.

(Total for Question 212 is 2 marks)

213 $OACB$ is a parallelogram.

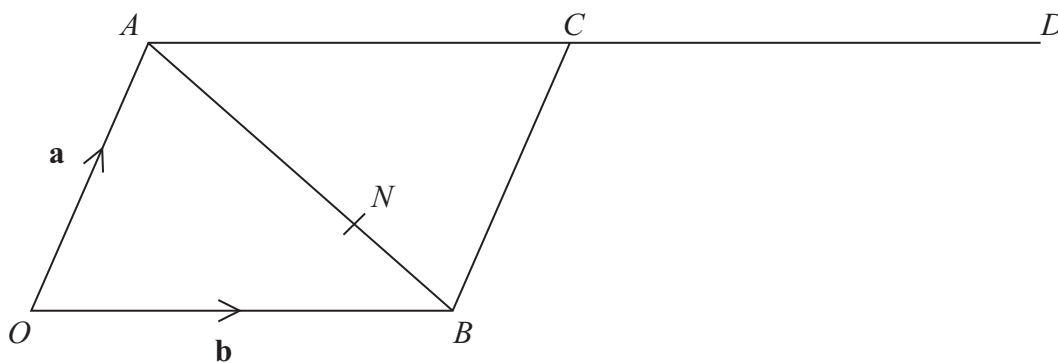


Diagram **NOT**
accurately drawn

$$\vec{OA} = \mathbf{a} \text{ and } \vec{OB} = \mathbf{b}$$

D is the point such that $\vec{AC} = \vec{CD}$

The point N divides AB in the ratio $2:1$

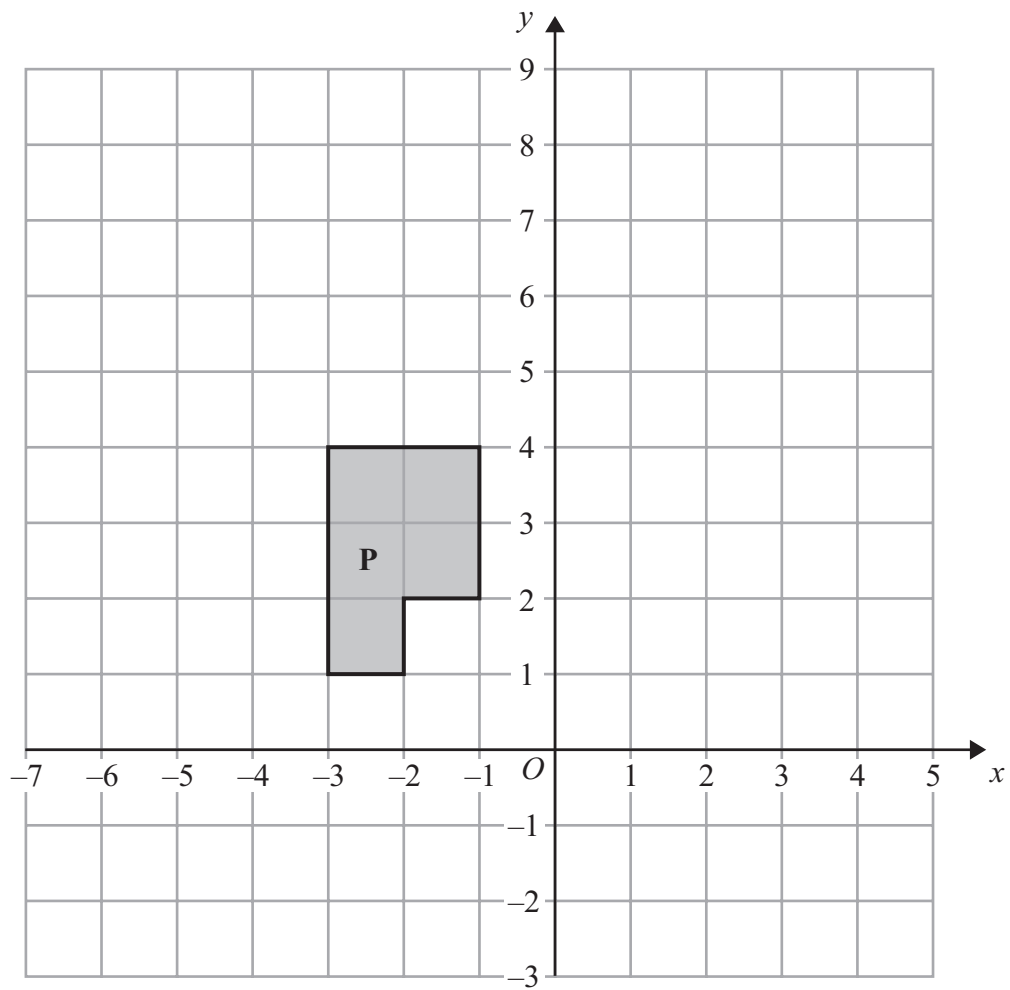
(a) Write an expression for \vec{ON} in terms of \mathbf{a} and \mathbf{b} .

.....
(3)

*(b) Prove that OND is a straight line.

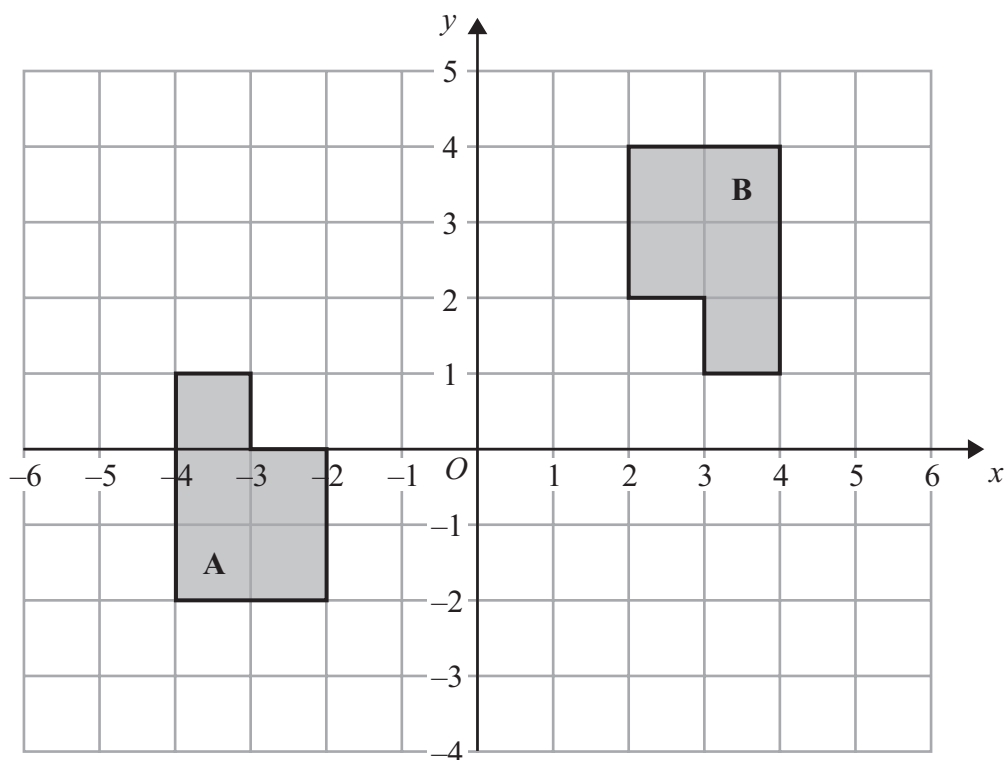
(3)

(Total for Question 213 is 6 marks)



(a) Translate shape **P** by the vector $\begin{pmatrix} 5 \\ -2 \end{pmatrix}$

(2)



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

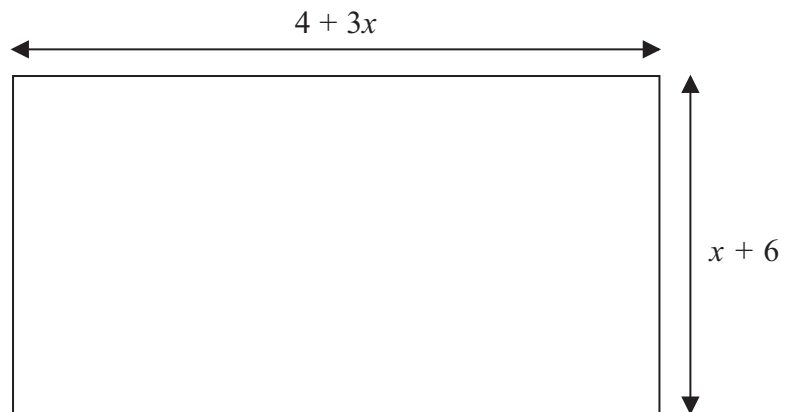
.....

.....

(3)

(Total for Question 214 is 5 marks)

215 The diagram shows a garden in the shape of a rectangle.

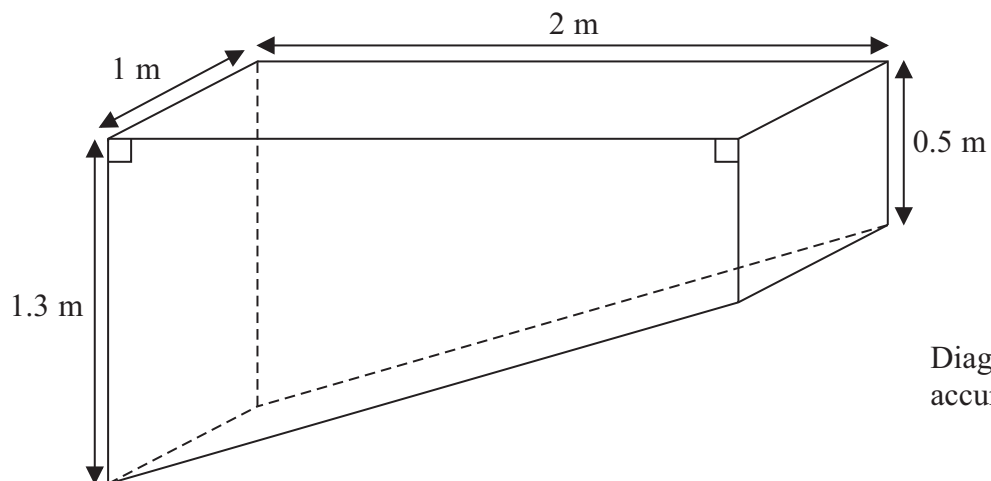


All measurements are in metres.
The perimeter of the garden is 32 metres.

Work out the value of x

(Total for Question 215 is 4 marks)

216 Sumeet has a pond in the shape of a prism.



The pond is completely full of water.
Sumeet wants to empty the pond so he can clean it.
Sumeet uses a pump to empty the pond.

The volume of water in the pond decreases at a constant rate.
The level of the water in the pond goes down by 20 cm in the first 30 minutes.

Work out how much more time Sumeet has to wait for the pump to empty the pond completely.

(Total for Question 216 is 6 marks)

217

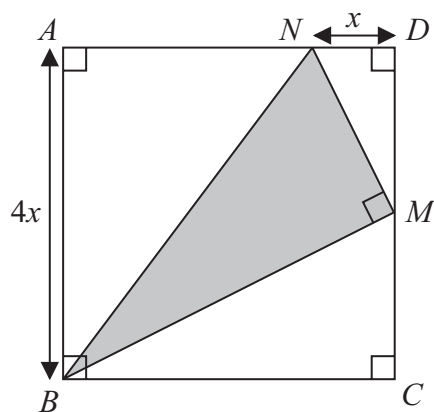


Diagram NOT
accurately drawn

$ABCD$ is a square with a side length of $4x$

M is the midpoint of DC .

N is the point on AD where $ND = x$

BMN is a right-angled triangle.

Find an expression, in terms of x , for the area of triangle BMN .

Give your expression in its simplest form.

(Total for Question 217 is 4 marks)

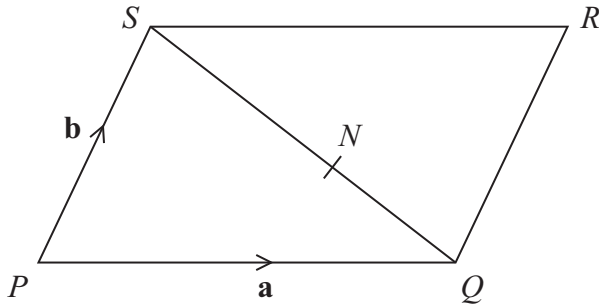


Diagram **NOT**
accurately drawn

$PQRS$ is a parallelogram.

N is the point on SQ such that $SN : NQ = 3 : 2$

$$\vec{PQ} = \mathbf{a}$$

$$\vec{PS} = \mathbf{b}$$

(a) Write down, in terms of \mathbf{a} and \mathbf{b} , an expression for \vec{SQ} .

$$\vec{SQ} = \dots\dots\dots (1)$$

(b) Express \vec{NR} in terms of \mathbf{a} and \mathbf{b} .

$$\vec{NR} = \dots\dots\dots (3)$$

(Total for Question 218 is 4 marks)

*219

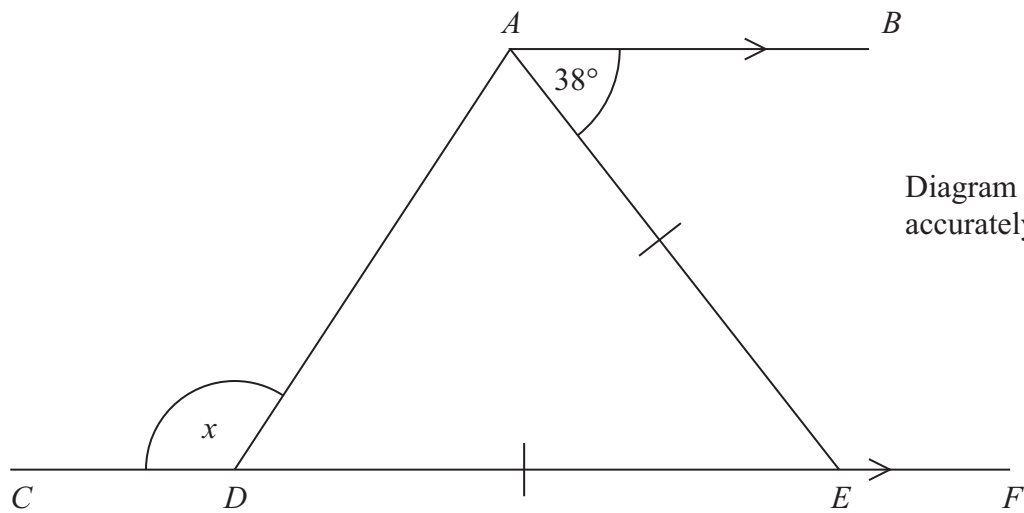


Diagram **NOT**
accurately drawn

$CDEF$ is a straight line.
 AB is parallel to CF .
 $DE = AE$.

Work out the size of the angle marked x .
You must give reasons for your answer.

(Total for Question 219 is 4 marks)

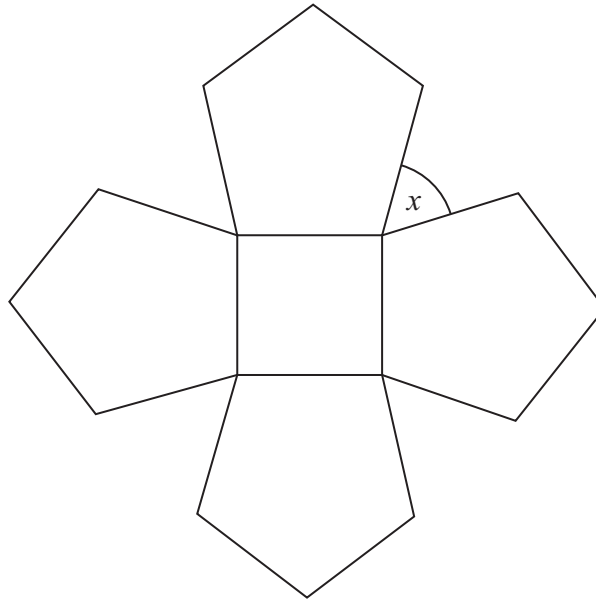
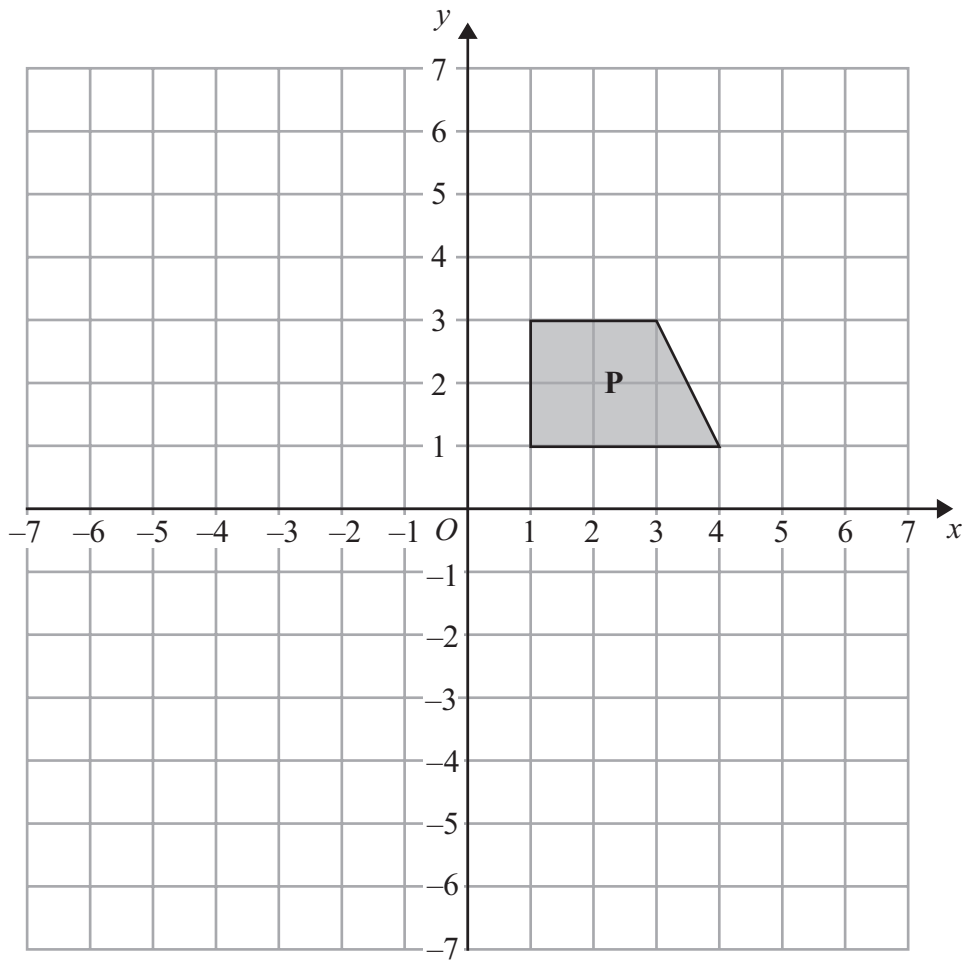


Diagram **NOT**
accurately drawn

The diagram shows a square and 4 regular pentagons.

Work out the size of the angle marked x .

.....
(Total for Question 220 is 3 marks)



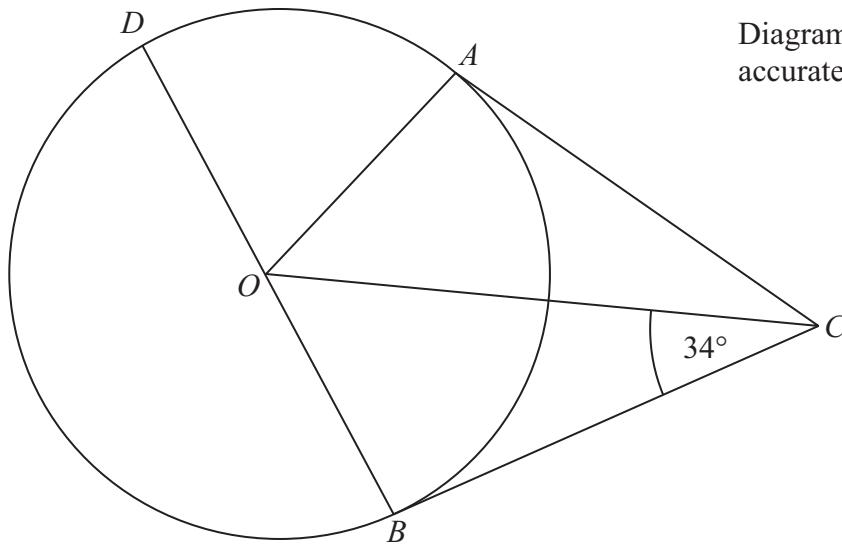
Shape **P** is reflected in the line $x = -1$ to give shape **Q**.

Shape **Q** is reflected in the line $y = 0$ to give shape **R**.

Describe fully the **single** transformation that maps shape **P** onto shape **R**.

(Total for Question 221 is 3 marks)

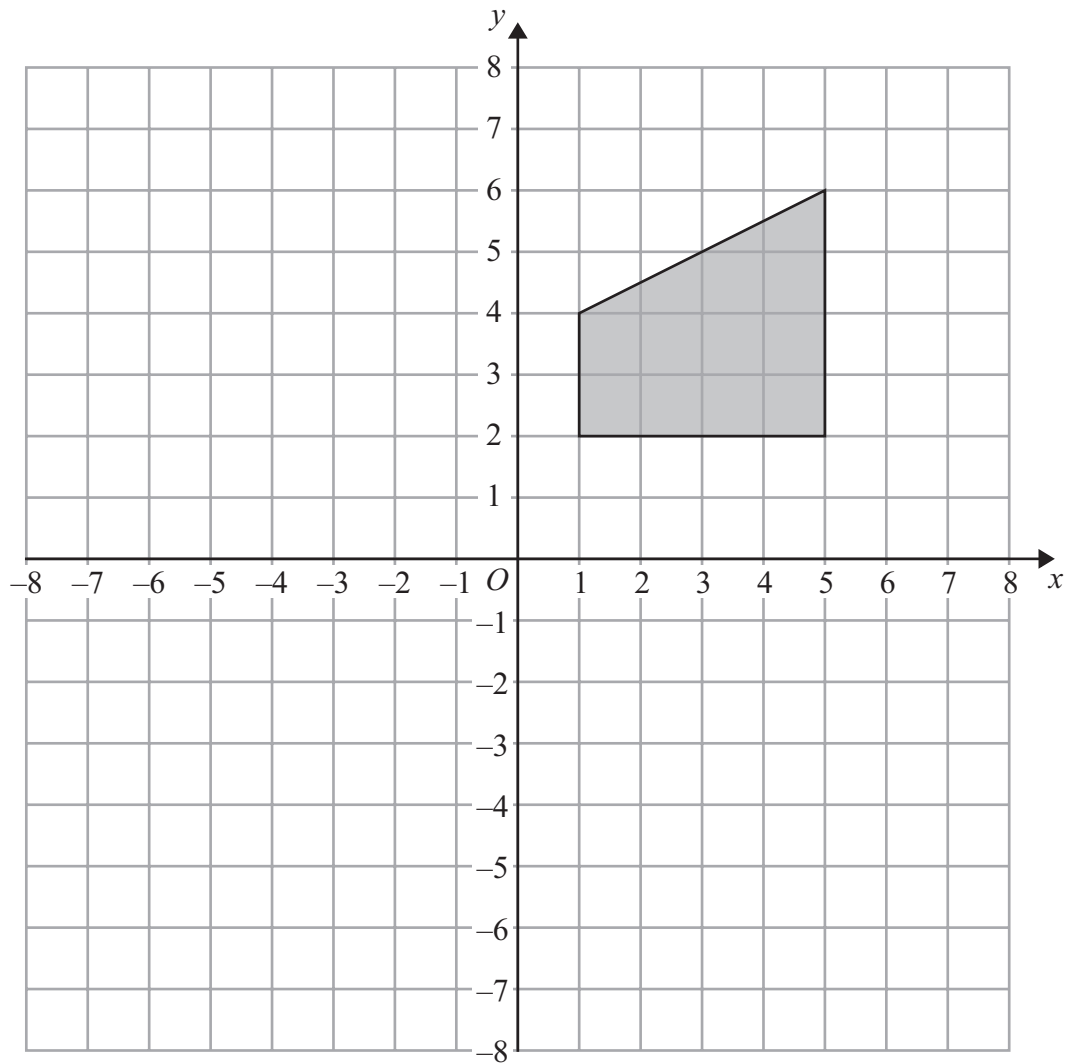
Diagram **NOT**
accurately drawn



A , B and D are points on the circumference of a circle, centre O .
 BOD is a diameter of the circle.
 BC and AC are tangents to the circle.
 Angle $OCB = 34^\circ$.

Work out the size of angle DOA .

.....
 (Total for Question 222 is 3 marks)

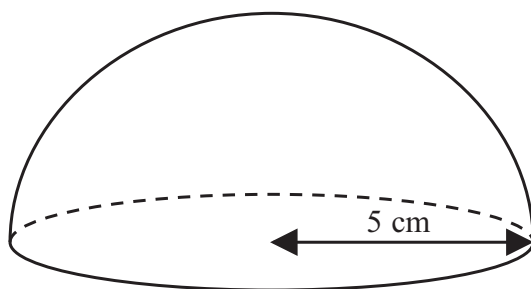


Enlarge the shaded shape by scale factor $-\frac{1}{2}$ with centre $(-1, -2)$.

(Total for Question 223 is 3 marks)

224 The diagram shows a solid hemisphere of radius 5 cm.

Diagram **NOT**
accurately drawn



Find the **total** surface area of the solid hemisphere.
Give your answer in terms of π .

..... cm²

(Total for Question 224 is 3 marks)

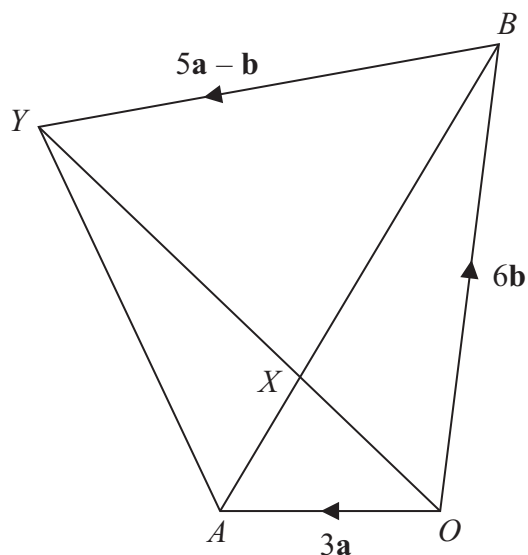


Diagram **NOT**
accurately drawn

$OAYB$ is a quadrilateral.

$$\vec{OA} = 3\mathbf{a}$$

$$\vec{OB} = 6\mathbf{b}$$

(a) Express \vec{AB} in terms of \mathbf{a} and \mathbf{b} .

.....
(1)

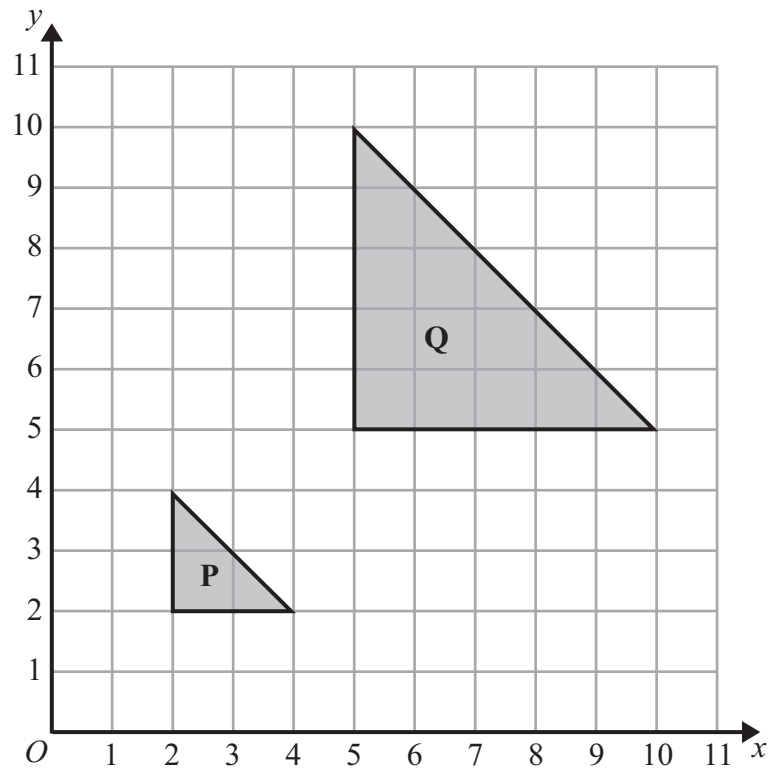
X is the point on AB such that $AX : XB = 1 : 2$

and $\vec{BY} = 5\mathbf{a} - \mathbf{b}$

* (b) Prove that $\vec{OX} = \frac{2}{5}\vec{OY}$

(4)

(Total for Question 225 is 5 marks)



Describe fully the single transformation that maps shape **P** onto shape **Q**.

.....

.....

(Total for Question 226 is 3 marks)

227 Here is a diagram of Jim's garden.

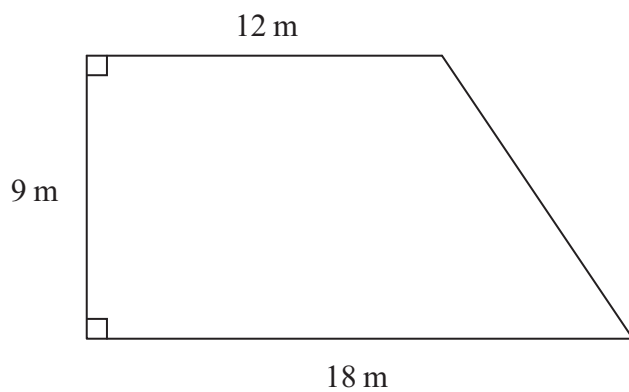


Diagram **NOT**
accurately drawn

Jim wants to cover his garden with grass seed to make a lawn.

Grass seed is sold in bags.

There is enough grass seed in each bag to cover 20 m^2 of garden.

Each bag of grass seed costs £4.99

Work out the least cost of putting grass seed on Jim's garden.

£.....

(Total for Question 227 is 4 marks)

228 The diagram shows a prism.

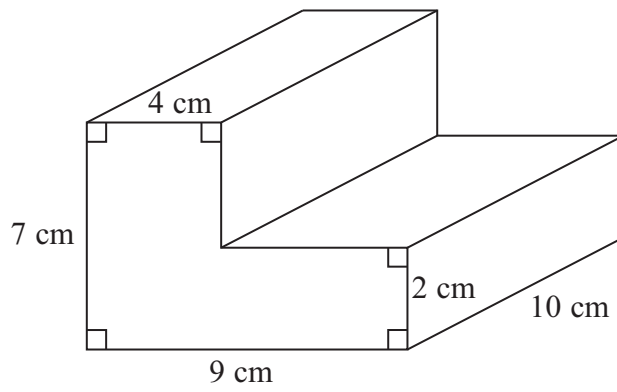


Diagram **NOT** accurately drawn

Work out the volume of the prism.

.....cm³

(Total for Question 228 is 3 marks)

229 The diagram shows a circle drawn inside a square.

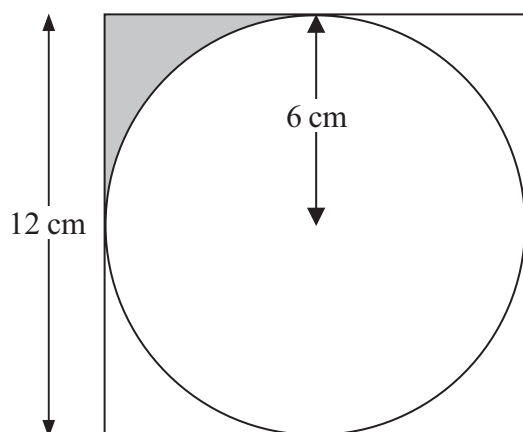


Diagram **NOT** accurately drawn

The circle has a radius of 6 cm.
The square has a side of length 12 cm.

Work out the shaded area.
Give your answer in terms of π .

.....cm²

(Total for Question 229 is 3 marks)

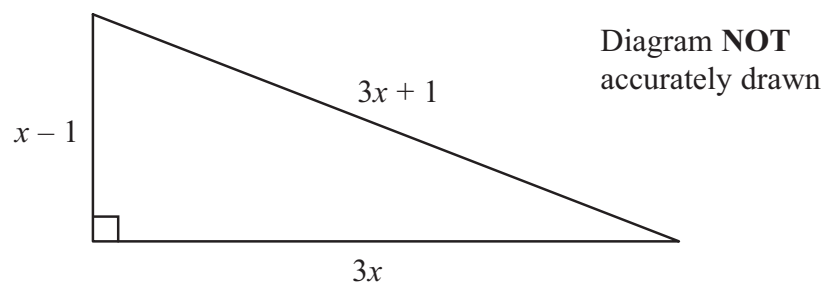
230 The bearing of a ship from a lighthouse is 050°

Work out the bearing of the lighthouse from the ship.

o

.....
(Total for Question 230 is 2 marks)

231 The diagram shows a triangle.



In the diagram, all the measurements are in metres.

The perimeter of the triangle is 56 m.

The area of the triangle is $A \text{ m}^2$.

Work out the value of A .

.....
(Total for Question 231 is 4 marks)

232 The diagram shows part of a pattern made from tiles.

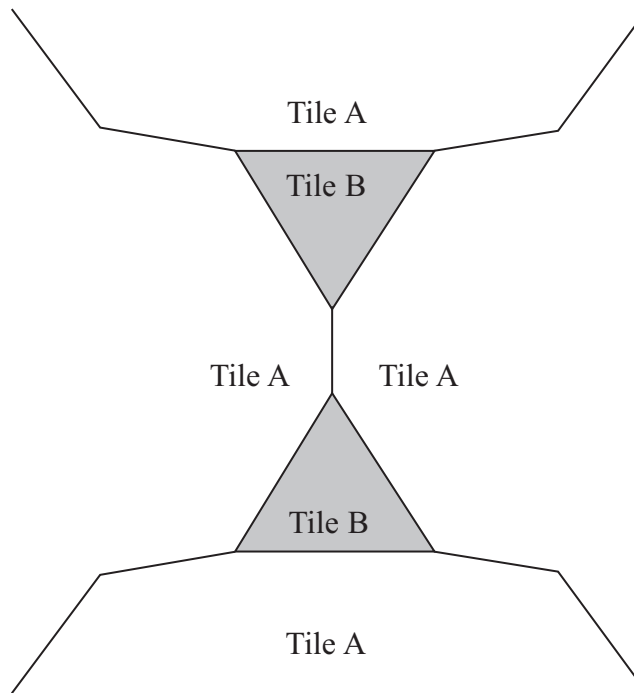


Diagram **NOT**
accurately drawn

The pattern is made from two types of tiles, tile A and tile B.

Both tile A and tile B are regular polygons.

Work out the number of sides tile A has.

.....
(Total for Question 232 is 4 marks)

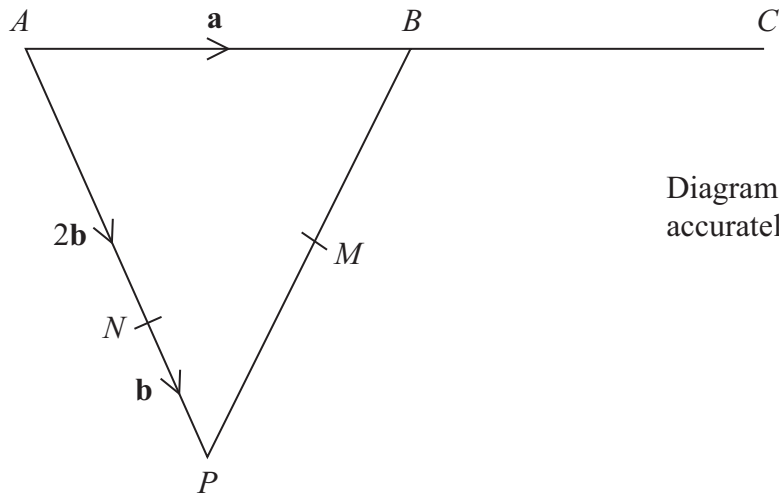


Diagram **NOT**
accurately drawn

APB is a triangle.
 N is a point on AP .

$$\vec{AB} = \mathbf{a} \quad \vec{AN} = 2\mathbf{b} \quad \vec{NP} = \mathbf{b}$$

(a) Find the vector \vec{PB} , in terms of \mathbf{a} and \mathbf{b} .

.....
(1)

B is the midpoint of AC .
 M is the midpoint of PB .

* (b) Show that NMC is a straight line.

(4)

(Total for Question 233 is 5 marks)

234 The diagram shows a patio in the shape of a rectangle.

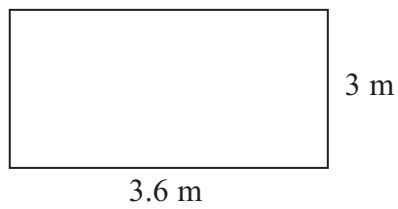


Diagram **NOT**
accurately drawn

The patio is 3.6 m long and 3 m wide.

Matthew is going to cover the patio with paving slabs.
Each paving slab is a square of side 60 cm.

Matthew buys 32 of the paving slabs.

- (a) Does Matthew buy enough paving slabs to cover the patio?
You must show all your working.

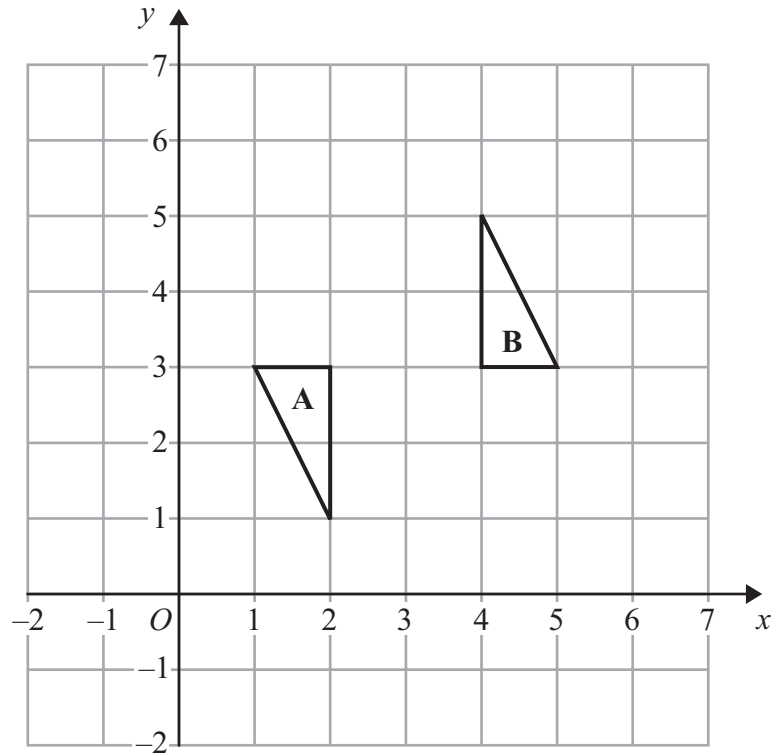
.....
(3)

The paving slabs cost £8.63 each.

- (b) Work out the total cost of the 32 paving slabs.

£
(3)

(Total for Question 234 is 6 marks)



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

.....

.....

(Total for Question 235 is 3 marks)

236

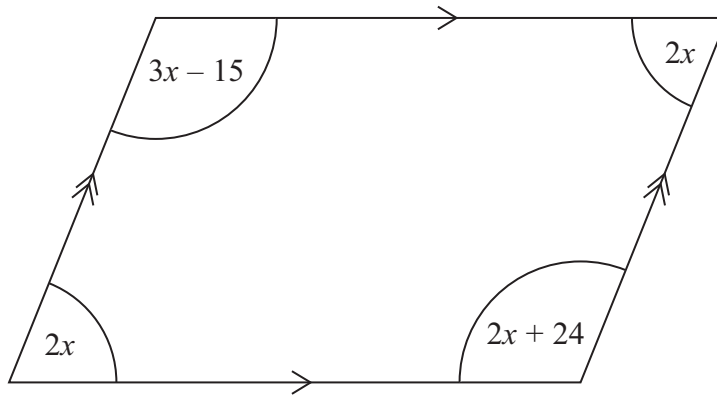


Diagram **NOT** accurately drawn

The diagram shows a parallelogram.
The sizes of the angles, in degrees, are

$2x$

$3x - 15$

$2x$

$2x + 24$

Work out the value of x .

$x = \dots\dots\dots$

(Total for Question 236 is 3 marks)

237 Jane has a carton of orange juice.
The carton is in the shape of a cuboid.

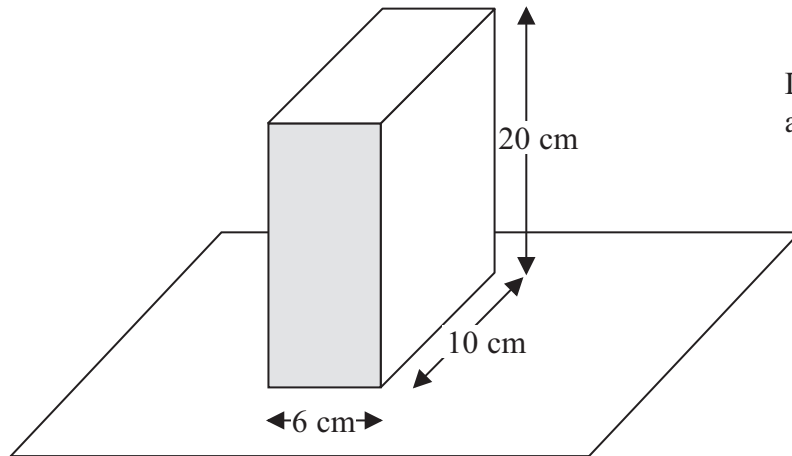


Diagram **NOT**
accurately drawn

The depth of the orange juice in the carton is 8 cm.

Jane closes the carton.

Then she turns the carton over so that it stands on the shaded face.

Work out the depth, in cm, of the orange juice now.

..... cm

(Total for Question 237 is 3 marks)

238

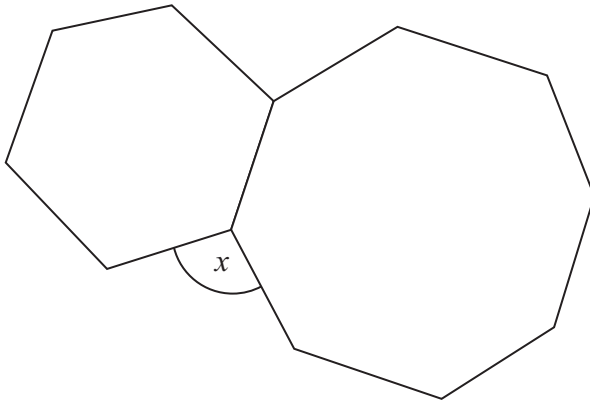


Diagram **NOT**
accurately drawn

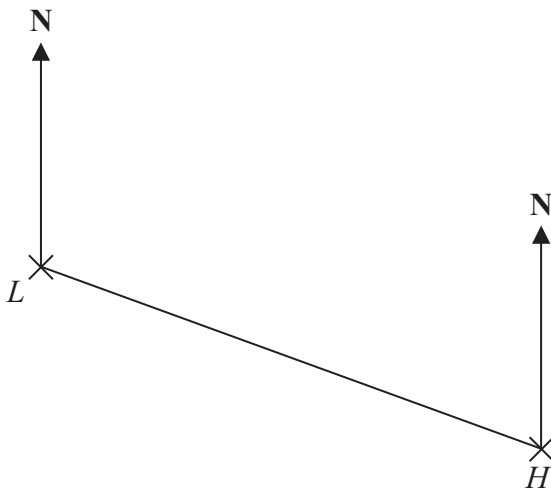
The diagram shows a regular hexagon and a regular octagon.

Calculate the size of the angle marked x .

You must show all your working.

.....
(Total for Question 238 is 4 marks)

239 The diagram shows the position of a lighthouse L and a harbour H .



The scale of the diagram is 1 cm represents 5 km.

(a) Work out the real distance between L and H .

..... km
(1)

(b) Measure the bearing of H from L .

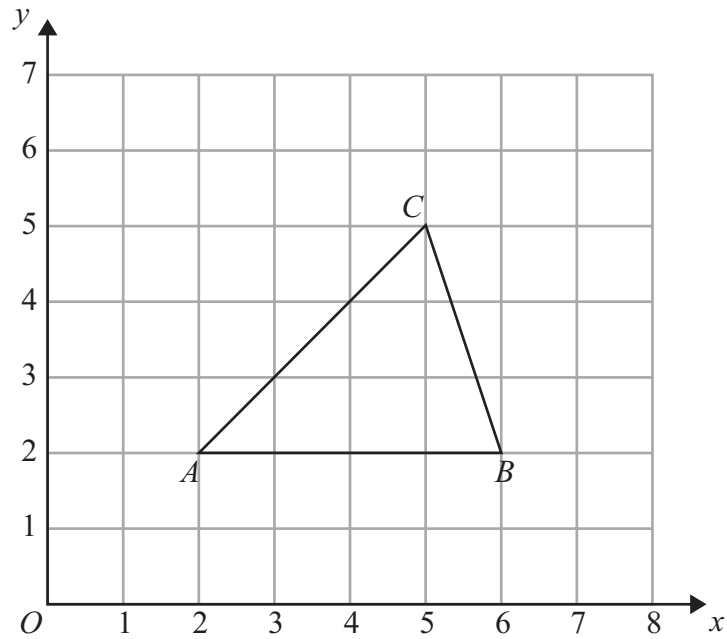
.....
(1)

A boat B is 20 km from H on a bearing of 040° .

(c) On the diagram, mark the position of boat B with a cross (\times).
Label it B .

(2)

(Total for Question 239 is 4 marks)



Triangle ABC is drawn on a centimetre grid.

A is the point $(2, 2)$.

B is the point $(6, 2)$.

C is the point $(5, 5)$.

Triangle PQR is an enlargement of triangle ABC with scale factor $\frac{1}{2}$ and centre $(0, 0)$.

Work out the area of triangle PQR .

..... cm^2

(Total for Question 240 is 3 marks)

*241

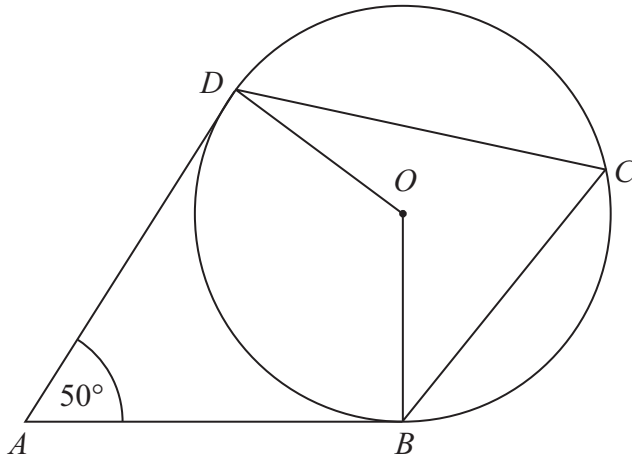


Diagram **NOT**
accurately drawn

B , C and D are points on the circumference of a circle, centre O .
 AB and AD are tangents to the circle.

Angle $DAB = 50^\circ$

Work out the size of angle BCD .
Give a reason for each stage in your working.

(Total for Question 241 is 4 marks)

242 The diagram shows a solid metal cylinder.

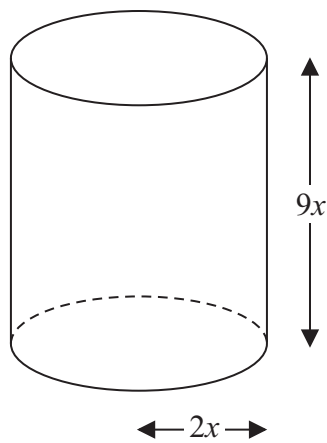


Diagram **NOT**
accurately drawn

The cylinder has base radius $2x$ and height $9x$.

The cylinder is melted down and made into a sphere of radius r .

Find an expression for r in terms of x .

.....
(Total for Question 242 is 3 marks)

243

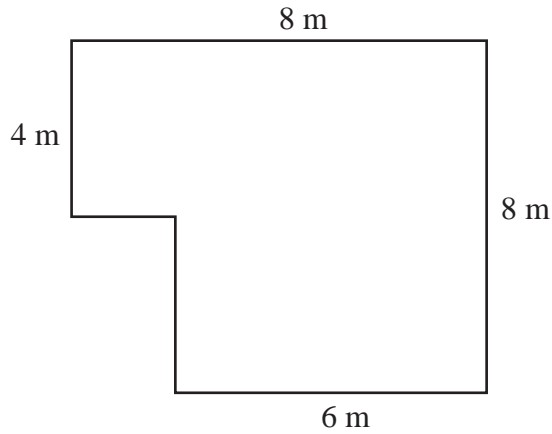


Diagram **NOT**
accurately drawn

The diagram is a plan of the floor of Nikola's room.

All the angles are right angles.

Nikola is going to lay carpet tiles to cover all the floor.

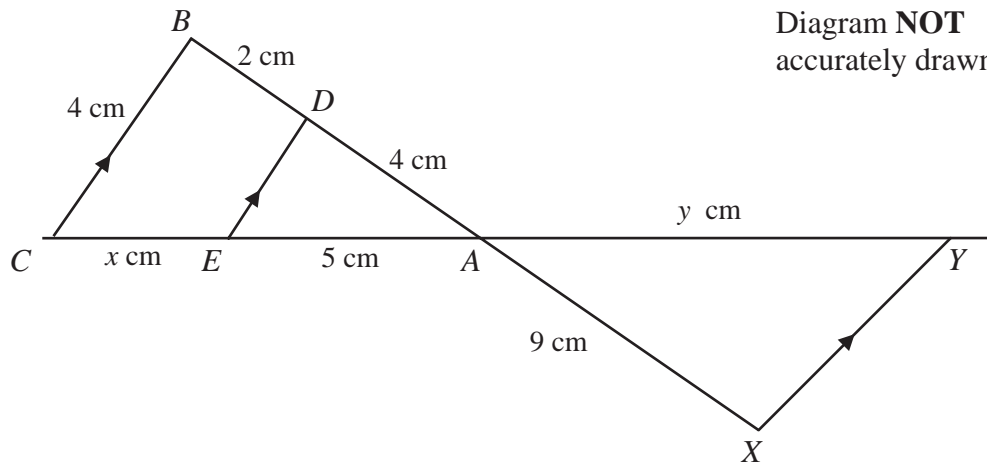
Each tile is a square 50 cm by 50 cm.

Each tile costs £4

Work out the total cost of the carpet tiles needed to cover all the floor.

£

(Total for Question 243 is 6 marks)



$CEAY$ and $BDAX$ are straight lines.

XY , ED and CB are parallel.

$AE = 5$ cm.

$AX = 9$ cm.

$AD = 4$ cm.

$BC = 4$ cm.

$BD = 2$ cm.

$CE = x$ cm.

$XY = y$ cm.

Find the value of x and the value of y .

$x = \dots\dots\dots$

$y = \dots\dots\dots$

(Total for Question 244 is 4 marks)

245

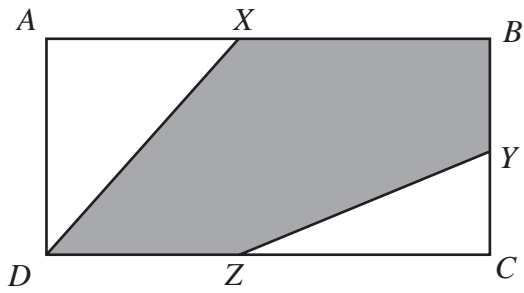


Diagram **NOT**
accurately drawn

$ABCD$ is a rectangle.

X is the midpoint of AB .

Y is the midpoint of BC .

Z is the midpoint of CD .

What fraction of the total area of $ABCD$ is shaded?

Show clearly how you get your answer.

Blank area for showing the solution.

.....
(Total for Question 245 is 4 marks)

*247

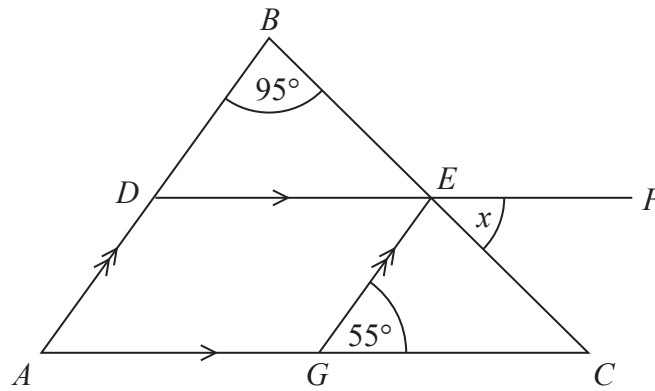


Diagram **NOT**
accurately drawn

AGC and *DEF* are parallel lines.
ADB and *GE* are parallel lines.
BEC is a straight line.

Angle $DBE = 95^\circ$
Angle $CGE = 55^\circ$

Work out the size of the angle marked x .
Give reasons for each stage of your working.

(Total for Question 247 is 4 marks)

248 The diagram shows the position of two churches, *A* and *B*.



Church *C* is on a bearing of 130° from church *A*.

Church *C* is on a bearing of 245° from church *B*.

In the space above, draw an accurate diagram to show the position of church *C*.

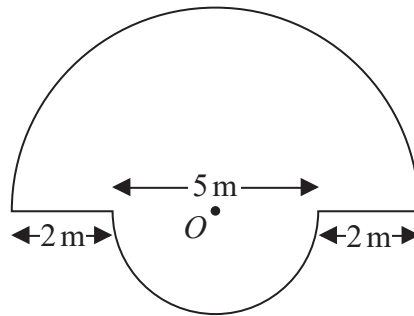
Mark the position of church *C* with a cross (×).

Label it *C*.

(Total for Question 248 is 3 marks)

*249 The diagram shows a plan of Brian's lawn.

Diagram **NOT**
accurately drawn



The edge of the lawn consists of two semicircles and two straight lines.

Each semicircle has centre O .

The diameters of the semicircles are 9 m and 5 m.

Brian is going to put lawn edging around the edge of the lawn.

Lawn edging is sold in 2.4 metre rolls.

Brian has £35

Has Brian got enough money to buy all the rolls of lawn edging he needs?

You must show all your working.

Lawn edging

£3.99 per roll

or

3 rolls for £10

(Total for Question 249 is 5 marks)

250 $ABCDEFGHI$ is a regular 9-sided polygon.

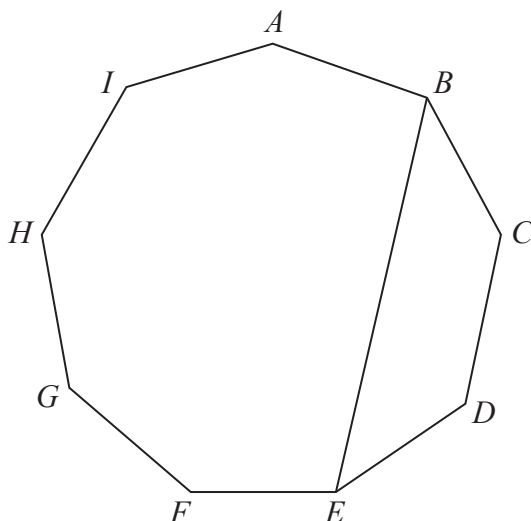


Diagram **NOT** accurately drawn

The vertices B and E are joined with a straight line.

Work out the size of angle BEF .

You must show how you get your answer.

.....
(Total for Question 250 is 4 marks)

*251 The diagram shows a swimming pool in the shape of a prism.

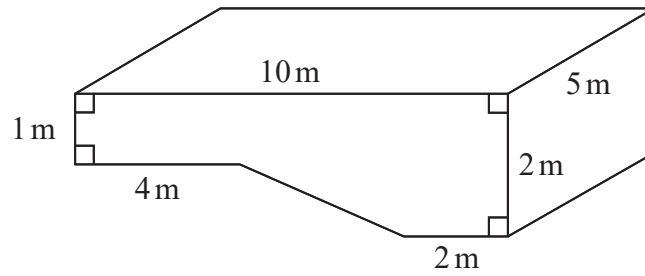


Diagram **NOT** accurately drawn

The swimming pool is empty.

Water from 3 water tankers is going to be put into the pool.
There are 20 000 litres of water in each water tanker.

Sam thinks that the surface of the water in the pool will be 10 cm below the top of the pool.

Is Sam correct?

You must show how you get your answer.

($1 \text{ m}^3 = 1000 \text{ litres}$)

(Total for Question 251 is 5 marks)

252 ABC is an acute angled triangle.

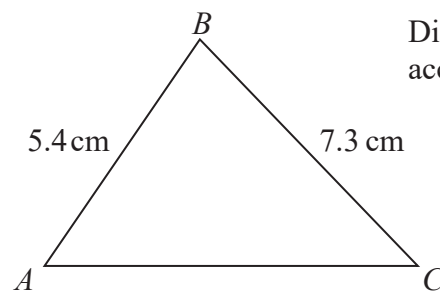


Diagram **NOT**
accurately drawn

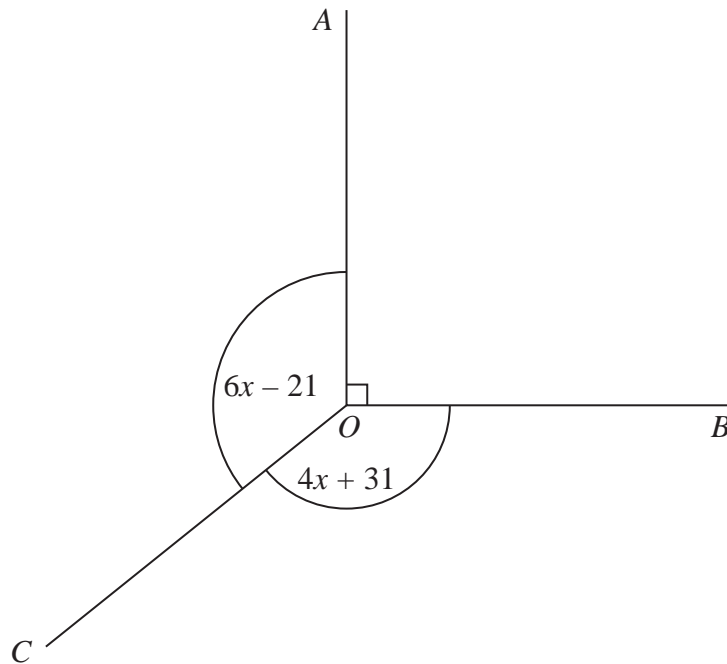
The area of triangle ABC is 19 cm^2 .

Work out the size of angle ACB .

Give your answer correct to 3 significant figures.

.....
(Total for Question 252 is 6 marks)

Diagram **NOT**
accurately drawn



In the diagram, all angles are in degrees.

Angle AOB is a right angle.

Angle $AOC =$ Angle BOC .

Work out the value of x .

(Total for Question 253 is 3 marks)

254 Jack is building a wall.

He uses 300 bricks to build part of the wall.

This part of the wall is 5 metres long and 1.5 metres high.

The complete wall will be 8 metres long and 1.5 metres high.

How many more bricks does Jack need to complete the wall?

.....
(Total for Question 254 is 3 marks)

255 The diagram shows a rectangular framework.

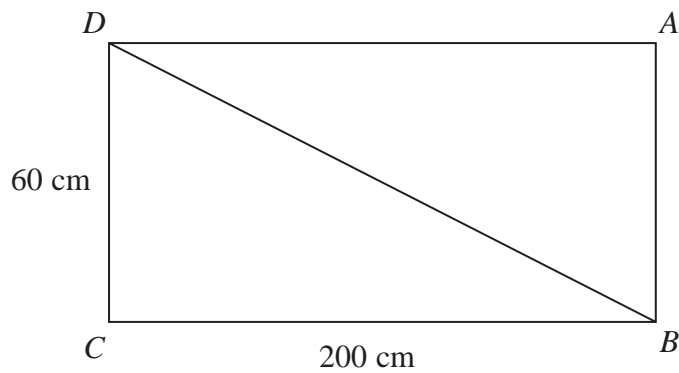


Diagram **NOT** accurately drawn

The framework is made from 5 metal rods.
The metal rods have a weight of 0.9 kg per metre.

Work out the total weight of the framework.
Give your answer, in kg, correct to 3 significant figures.

..... kg

(Total for Question 255 is 4 marks)

256 The diagram shows a square $ABCD$ inside a circle.

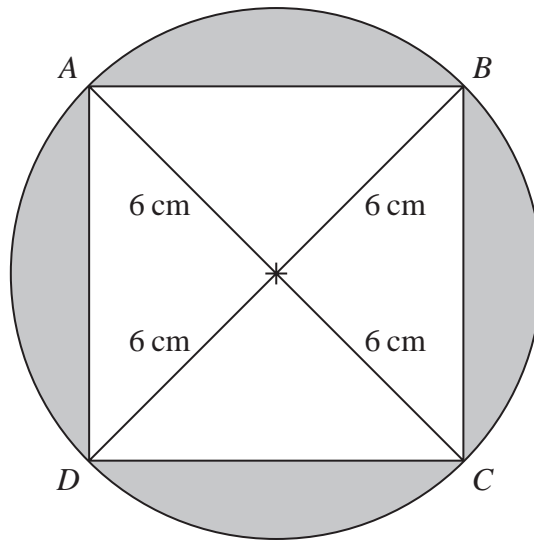


Diagram **NOT** accurately drawn

The points A , B , C and D lie on the circle.

The radius of the circle is 6 cm.

Work out the total area of the shaded regions.

Give your answer correct to 3 significant figures.

..... cm^2

(Total for Question 256 is 4 marks)

257 $ABCDE$ and $PQRST$ are regular pentagons.

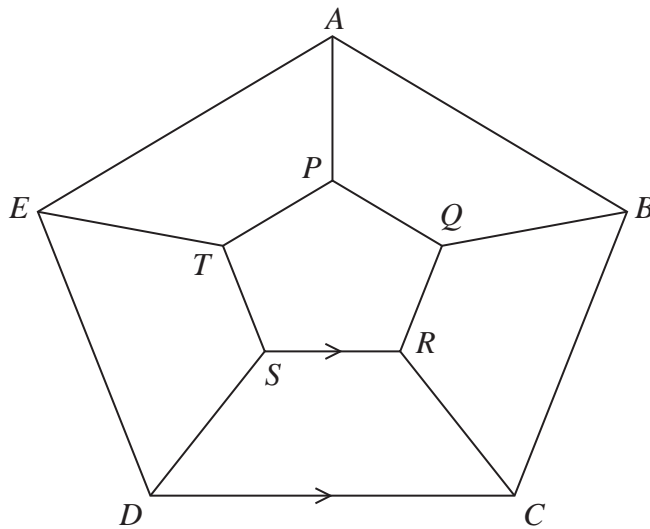


Diagram **NOT**
accurately drawn

SR is parallel to DC
 $AP = BQ = CR = DS = ET$

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

(Total for Question 257 is 3 marks)

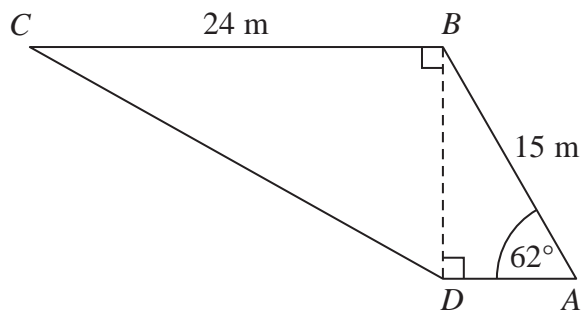


Diagram **NOT**
accurately drawn

$$AB = 15 \text{ m}$$

$$BC = 24 \text{ m}$$

$$\text{Angle } BAD = 62^\circ$$

Work out the size of angle BCD .

Give your answer correct to 1 decimal place.

.....
(Total for Question 258 is 5 marks)

*259

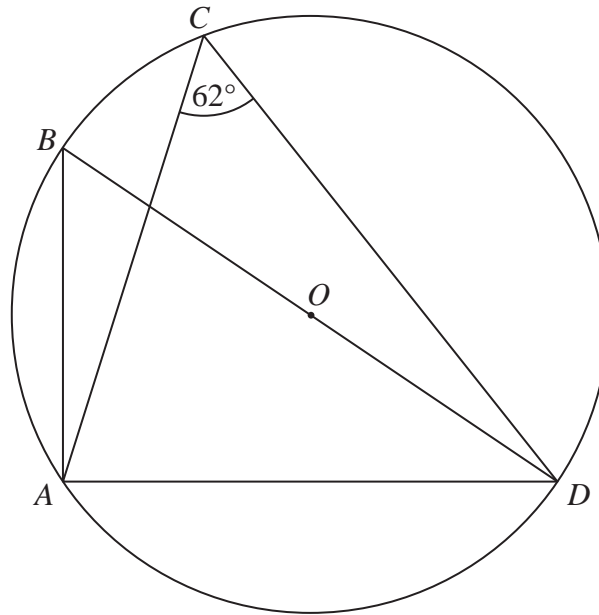


Diagram **NOT**
accurately drawn

A , B , C and D are points on the circumference of a circle, centre O .
 BOD is a straight line.
Angle $ACD = 62^\circ$

Find the size of angle ADB .
Give a reason for each stage in your working.

(Total for Question 259 is 4 marks)

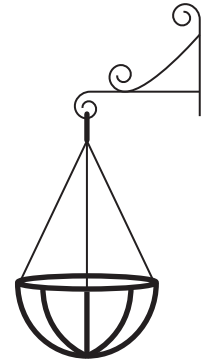
***260** Anne wants to fill 12 hanging baskets with compost.

Each hanging basket is a hemisphere of diameter 40 cm.

Anne has 4 bags of compost.

There are 50 litres of compost in each bag.

Has Anne got enough compost to fill the 12 hanging baskets?



hanging basket

(Total for Question 260 is 4 marks)

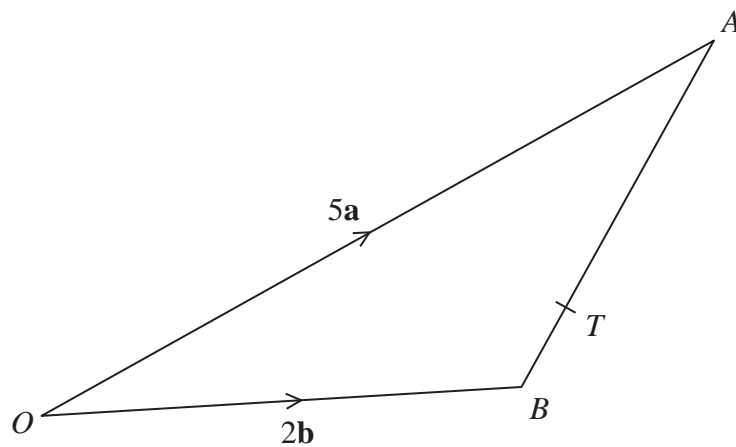


Diagram **NOT**
accurately drawn

OAB is a triangle.

$$\vec{OA} = 5\mathbf{a}$$

$$\vec{OB} = 2\mathbf{b}$$

T is the point on AB such that $AT : TB = 5 : 1$

Show that OT is parallel to the vector $\mathbf{a} + 2\mathbf{b}$

(Total for Question 261 is 4 marks)

262 The diagram shows a rectangle.

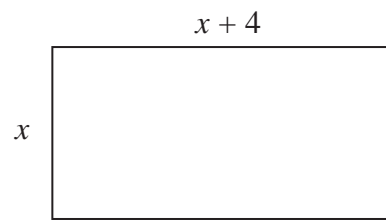


Diagram **NOT**
accurately drawn

All measurements are given in centimetres.

The perimeter of the rectangle is 45 cm.

Work out the value of x .

$x = \dots\dots\dots$

(Total for Question 262 is 3 marks)

*263

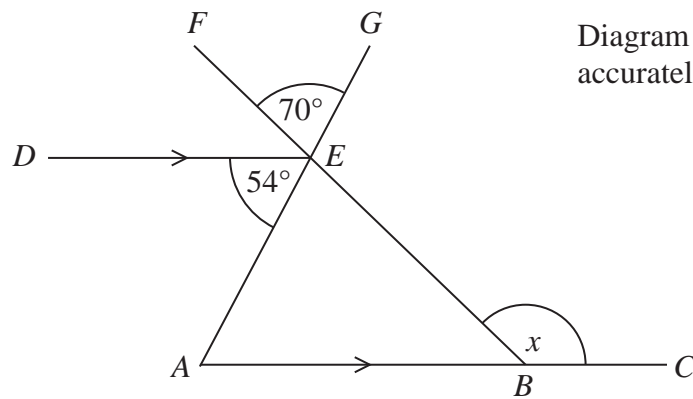


Diagram **NOT**
accurately drawn

ABC and DE are parallel lines.
 AEG and BEF are straight lines.

Angle $AED = 54^\circ$

Angle $FEG = 70^\circ$

Work out the size of the angle marked x .
Give a reason for each stage of your working.

(Total for Question 263 is 4 marks)

264 The diagram shows a metal bar in the shape of a prism.

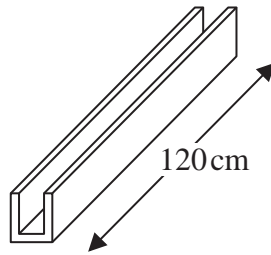


Diagram **NOT** accurately drawn

The length of the metal bar is 120 cm.
The cross section of the metal bar is shown below.

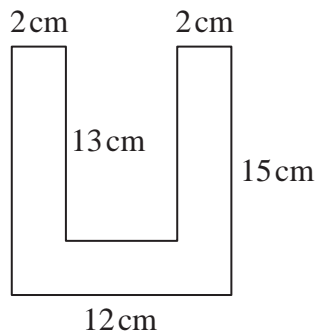


Diagram **NOT** accurately drawn

All corners are right angles.

The metal bar is made from steel with density 8 g/cm^3 .

Sean has a trolley.

The trolley can carry a maximum mass of 250 kg.

How many metal bars can the trolley carry at the same time?
You must show your working.

.....
(Total for Question 264 is 5 marks)

265

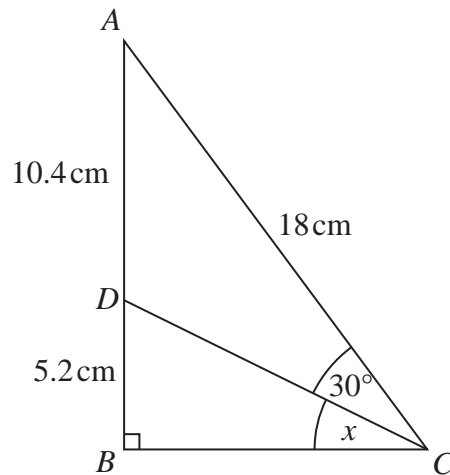


Diagram **NOT**
accurately drawn

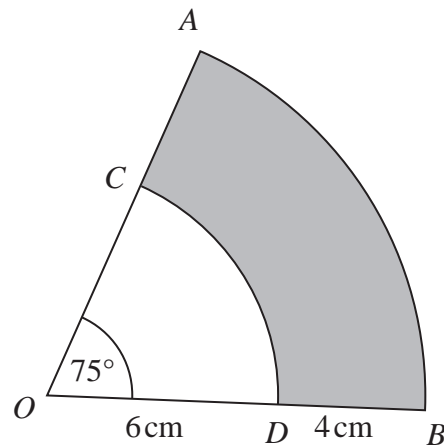
ABC is a right-angled triangle.
 D is a point on AB .

Angle $ACD = 30^\circ$
 $AD = 10.4$ cm
 $DB = 5.2$ cm
 $AC = 18$ cm

Work out the size of the angle marked x .
Give your answer correct to 1 decimal place.

(Total for Question 265 is 4 marks)

Diagram **NOT**
accurately drawn



OAB is a sector of a circle, centre O .
 OCD is a sector of a circle, centre O .
 OCA and ODB are straight lines.

Angle $AOB = 75^\circ$

$OD = 6\text{ cm}$

$DB = 4\text{ cm}$

Calculate the perimeter of the shaded region.
 Give your answer correct to 3 significant figures.

..... cm

(Total for Question 266 is 3 marks)

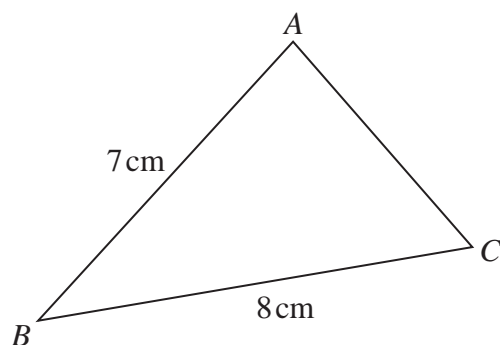


Diagram **NOT**
accurately drawn

ABC is an acute-angled triangle.

$BA = 7$ cm

$BC = 8$ cm

The area of triangle ABC is 18 cm².

Work out the size of angle BAC .

Give your answer correct to 3 significant figures.

You must show all your working.

.....
(Total for Question 267 is 6 marks)

268 A rectangle has an area of 4m^2 .

Write this area in cm^2 .

..... cm^2

(Total for Question 268 is 2 marks)

*269 Here is part of a field.

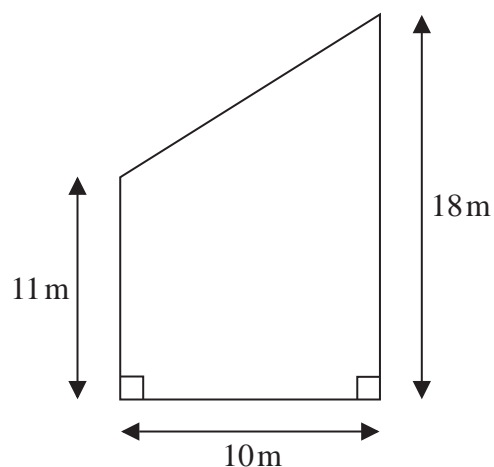


Diagram **NOT**
accurately drawn

This part of the field is in the shape of a trapezium.

A farmer wants to put a fence all the way around the edge of this part of the field.

The farmer has 50m of fence.

Does he have enough fence?

You must show all your working.

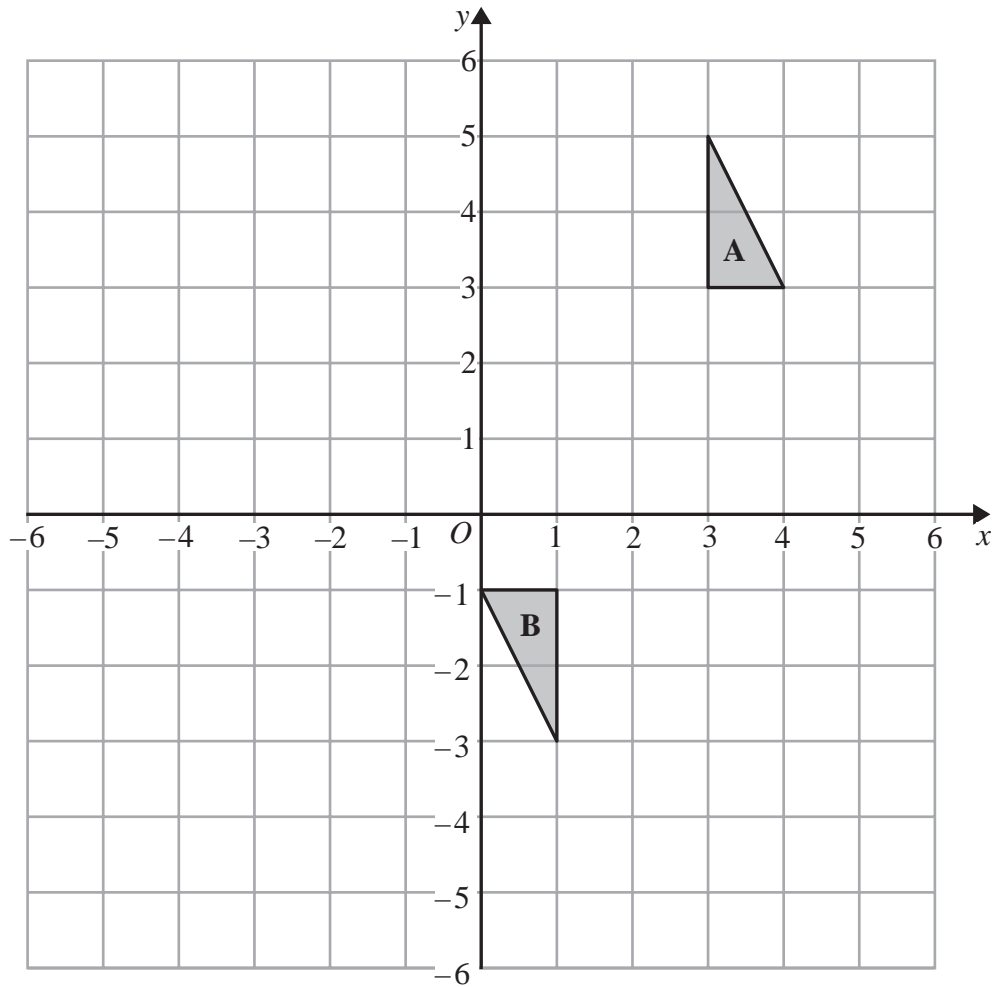
(Total for Question 269 is 5 marks)

270



Use ruler and compasses to **construct** the perpendicular bisector of the line segment AB .
You must show all your construction lines.

(Total for Question 270 is 2 marks)



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

.....

.....

.....

(Total for Question 271 is 3 marks)

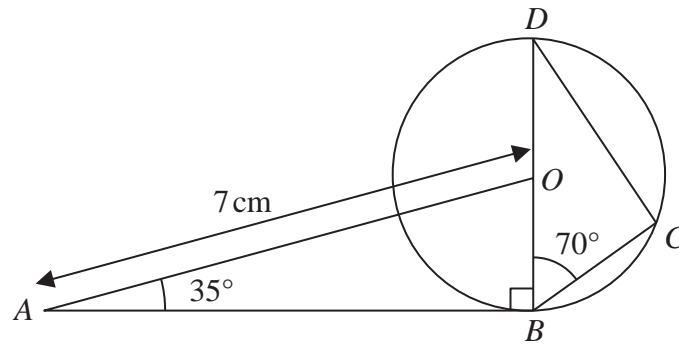


Diagram **NOT**
accurately drawn

B , C and D are points on the circumference of a circle, centre O .
 BOD is a diameter of the circle.

$AO = 7 \text{ cm}$ Angle $ABO = 90^\circ$ Angle $OAB = 35^\circ$ Angle $DBC = 70^\circ$

*(a) Explain why angle BCD is 90°

(1)

(b) Calculate the length of BC .
Give your answer correct to 3 significant figures.

..... cm.

(4)

(Total for Question 272 is 5 marks)

273 ABC is a triangle.

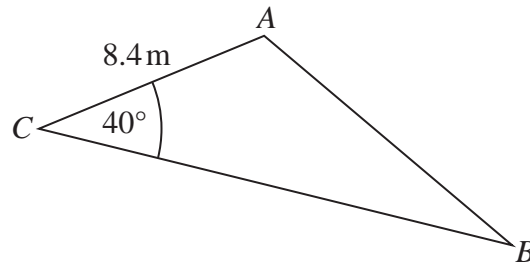


Diagram **NOT**
accurately drawn

$AC = 8.4\text{ m}$
Angle $ACB = 40^\circ$

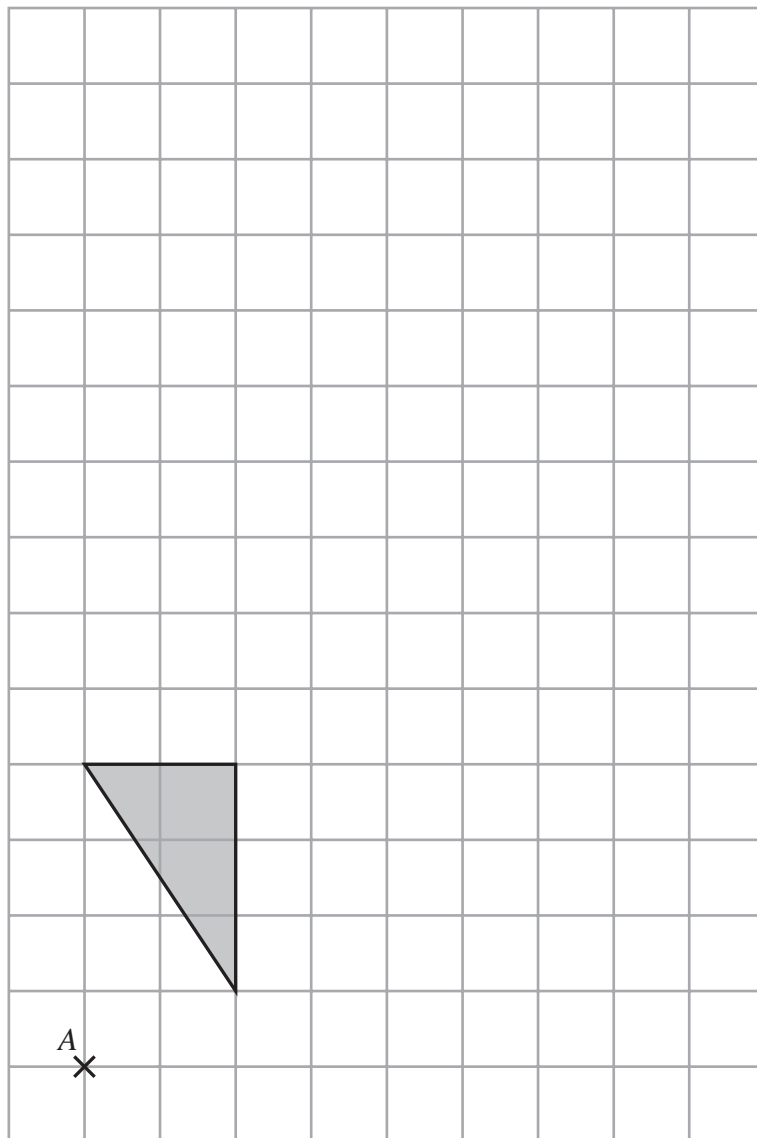
The area of the triangle = 100 m^2 .

Work out the length of AB .
Give your answer correct to 3 significant figures.
You must show all your working.

..... m

(Total for Question 273 is 5 marks)

274 A shaded shape is shown on the grid.



On the grid, enlarge the shape by a scale factor of 2, centre A.

(Total for Question 274 is 2 marks)

*275 The diagram shows the top of Levi's birthday cake.

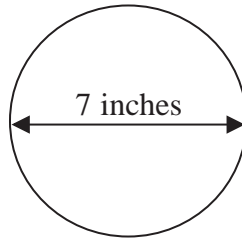


Diagram **NOT**
accurately drawn

The top of the cake is in the shape of a circle.
The diameter of the circle is 7 inches.

A ribbon is going to be put around the side of the cake.
Ribbons are sold in 50 cm lengths.

1 inch is 2.54 cm.

Work out if one length of ribbon is long enough to go all the way around the cake.
You must show your working.

(Total for Question 275 is 4 marks)

276 Martin and Janet are in an orienteering race.

Martin runs from checkpoint *A* to checkpoint *B*, on a bearing of 065°
Janet is going to run from checkpoint *B* to checkpoint *A*.

Work out the bearing of *A* from *B*.

○

.....
(Total for Question 276 is 2 marks)

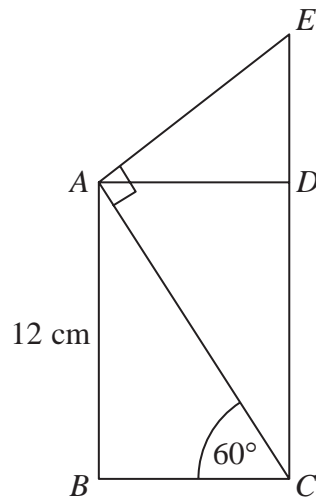


Diagram **NOT**
accurately drawn

$ABCD$ is a rectangle.
 CDE is a straight line.

$AB = 12$ cm
Angle $ACB = 60^\circ$
Angle $EAC = 90^\circ$

Calculate the length of CE .
You must show all your working.

..... cm

(Total for Question 277 is 4 marks)

278 Here is a parallelogram.

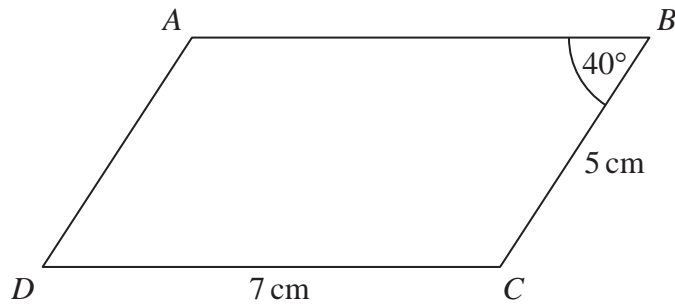


Diagram **NOT** accurately drawn

$DC = 7 \text{ cm}$
 $CB = 5 \text{ cm}$
Angle ABC is 40°

Work out the area of the parallelogram.
Give your answer correct to 1 decimal place.

..... cm^2

(Total for Question 278 is 3 marks)

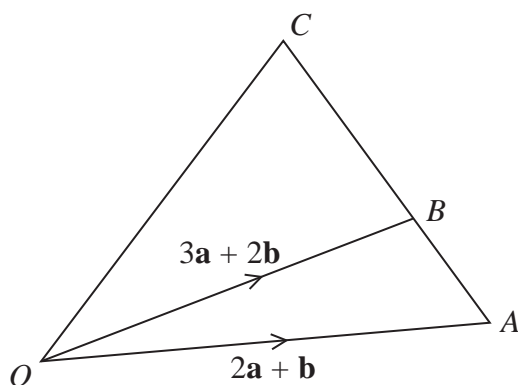


Diagram **NOT**
accurately drawn

ABC is a straight line.

$$AB : BC = 2 : 5$$

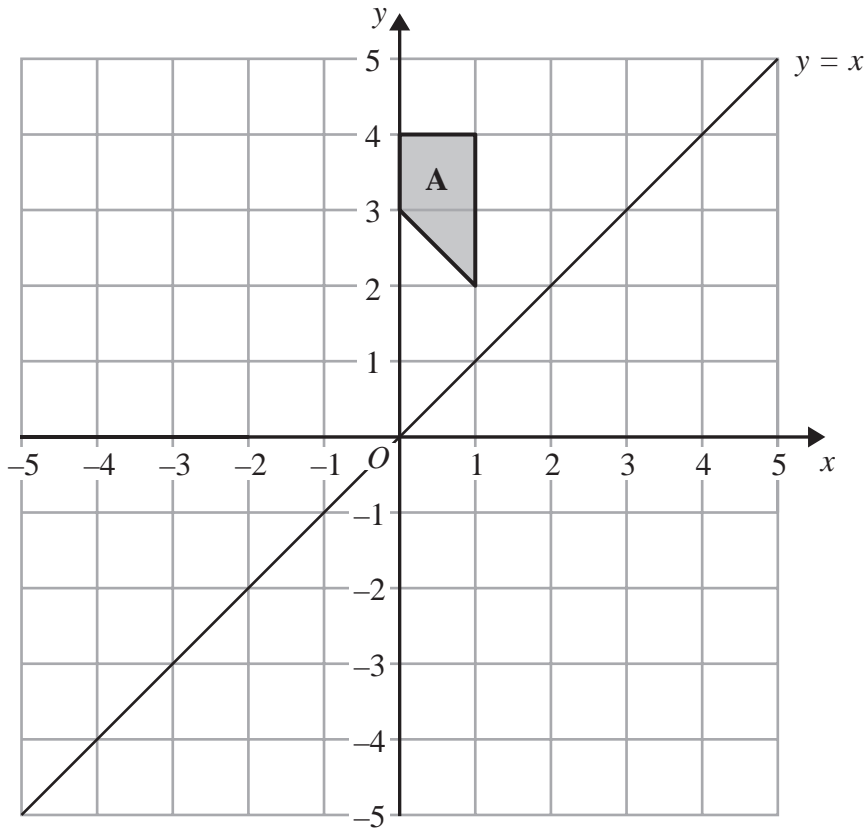
$$\vec{OA} = 2\mathbf{a} + \mathbf{b}$$

$$\vec{OB} = 3\mathbf{a} + 2\mathbf{b}$$

Express \vec{OC} in terms of \mathbf{a} and \mathbf{b} .

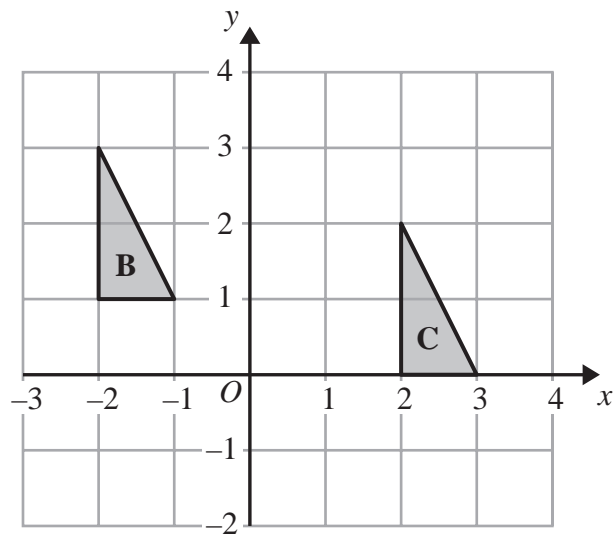
Give your answer in its simplest form.

.....
(Total for Question 279 is 4 marks)



(a) On the grid, reflect shape **A** in the line $y = x$.

(2)



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

(2)

(Total for Question 280 is 4 marks)

- *281** Saphia is organising a conference.
People at the conference will sit at circular tables.



Diagram **NOT**
accurately drawn

Each table has a diameter of 140 cm.
Each person needs 60 cm around the circumference of the table.

There are 12 of these tables in the conference room.
A total of 90 people will be at the conference.

Are there enough tables in the conference room?

(Total for Question 281 is 4 marks)

282 The diagram shows a swimming pool in the shape of a prism.

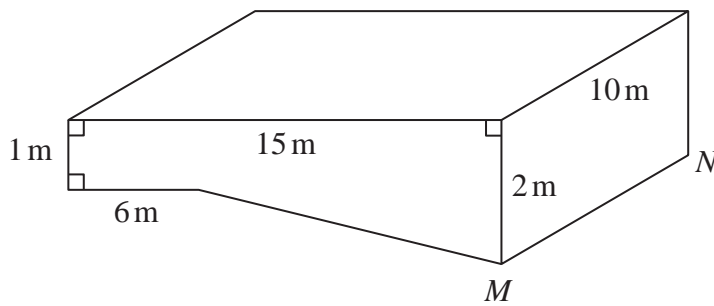


Diagram **NOT**
accurately drawn

The swimming pool is empty.

The swimming pool is filled with water at a constant rate of 50 litres per minute.

- (a) Work out how long it will take for the swimming pool to be completely full of water.
Give your answer in hours.
($1 \text{ m}^3 = 1000 \text{ litres}$)

..... hours
(5)

(Total for Question 282 is 5 marks)

283 The diagram represents a metal frame.

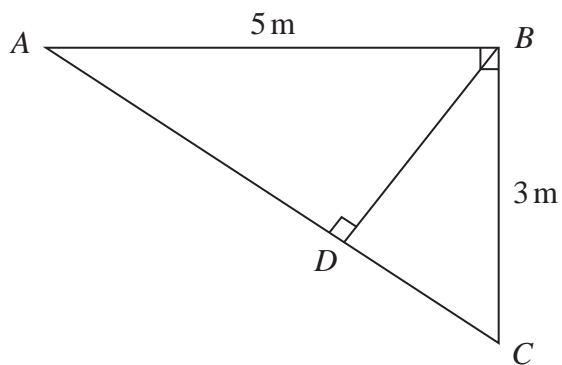


Diagram **NOT**
accurately drawn

The frame is made from four metal bars, AB , AC , BC and BD .

Angle $ABC = \text{angle } ADB = 90^\circ$

$AB = 5 \text{ m}$

$BC = 3 \text{ m}$

Work out the total length of the four metal bars of the frame.

Give your answer correct to 3 significant figures.

..... m

(Total for Question 283 is 5 marks)

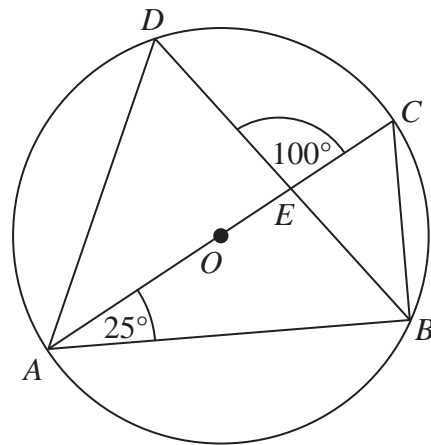


Diagram **NOT**
accurately drawn

A , B , C and D are points on the circumference of a circle, centre O .
 AC is a diameter of the circle.
 AC and BD intersect at E .

Angle $CAB = 25^\circ$
 Angle $DEC = 100^\circ$

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

.....
 (Total for Question 284 is 4 marks)

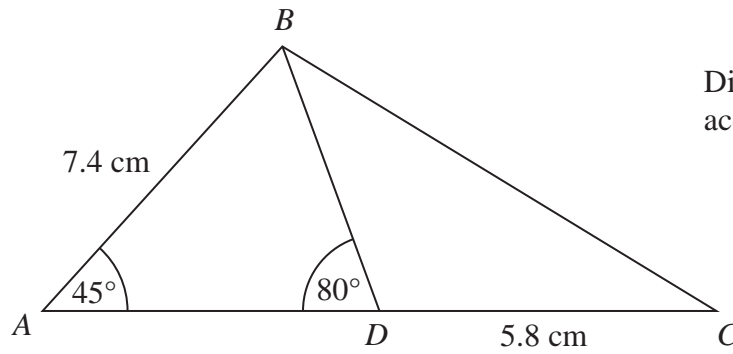


Diagram **NOT**
accurately drawn

ABC is a triangle.
 D is a point on AC .
Angle $BAD = 45^\circ$
Angle $ADB = 80^\circ$
 $AB = 7.4\text{ cm}$
 $DC = 5.8\text{ cm}$

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

..... cm

(Total for Question 285 is 5 marks)

286 Here is a circle.

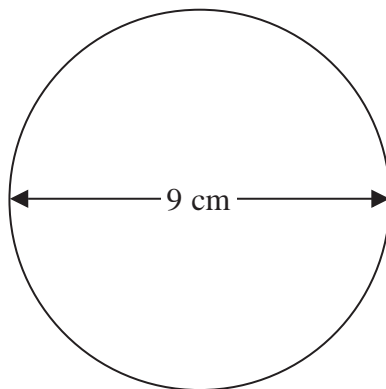


Diagram **NOT**
accurately drawn

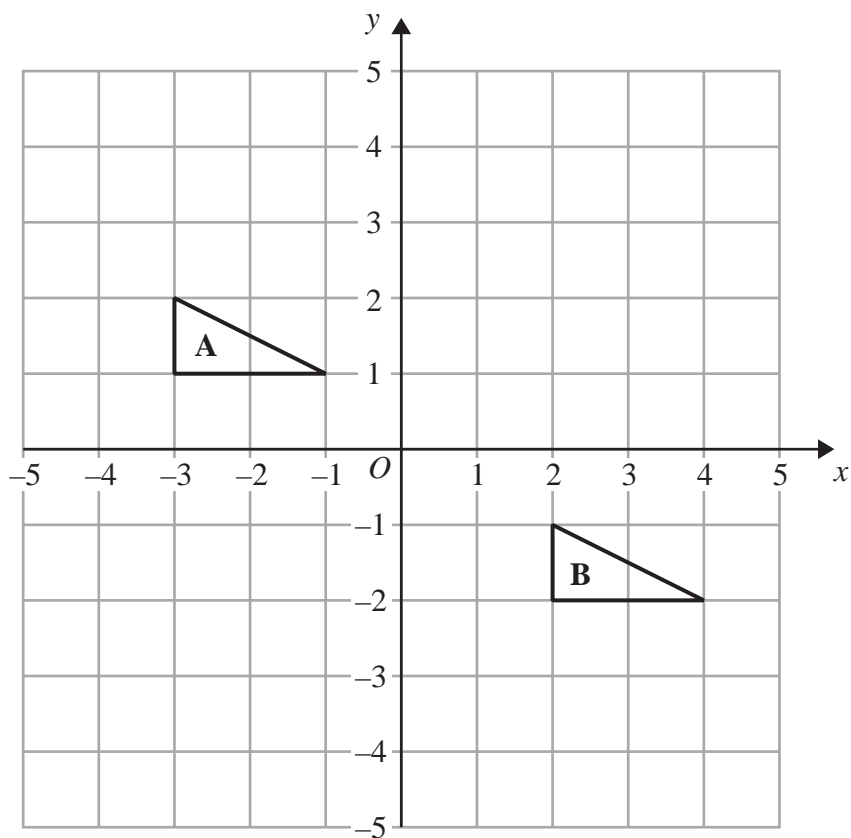
The diameter of the circle is 9 cm.

Work out the circumference of this circle.

Give your answer correct to 3 significant figures.

..... cm

(Total for Question 286 is 2 marks)



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

.....

.....

(Total for Question 287 is 2 marks)

*288

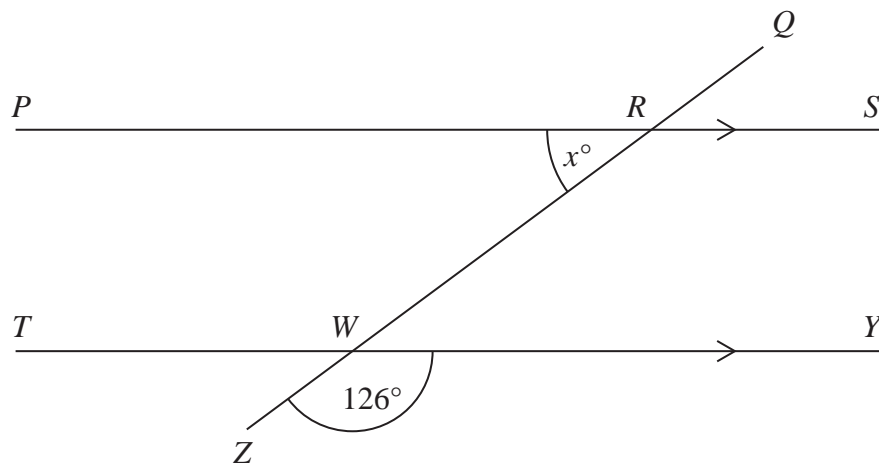


Diagram **NOT**
accurately drawn

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

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

(Total for Question 288 is 3 marks)

289 The diagram shows a trapezium.

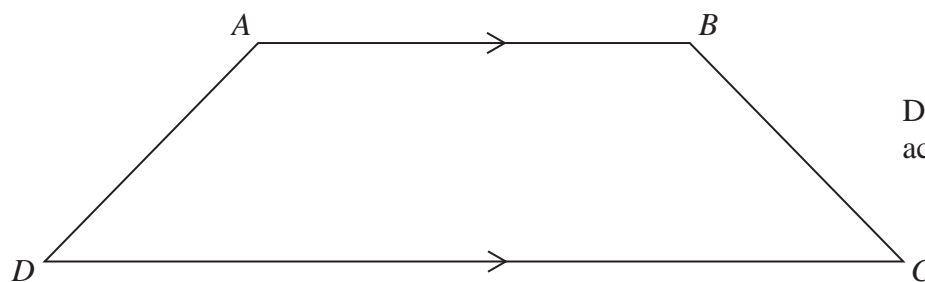


Diagram **NOT**
accurately drawn

$AD = x$ cm.

BC is the same length as AD .

AB is twice the length of AD .

DC is 4 cm longer than AB .

The perimeter of the trapezium is 38 cm.

Work out the length of AD .

..... cm

(Total for Question 289 is 4 marks)

290 Here is a plan of Martin's driveway.

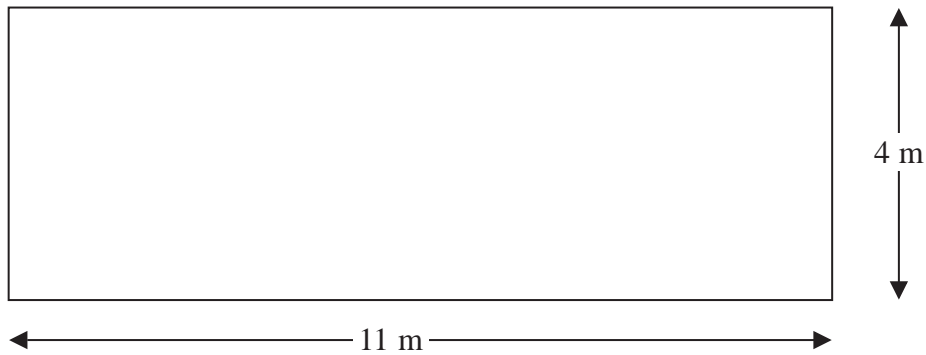


Diagram **NOT** accurately drawn

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

Gravel is sold in bags.
There are 0.4 m^3 of gravel in each bag.
Each bag of gravel costs £38

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

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

£.....

(Total for Question 290 is 5 marks)

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

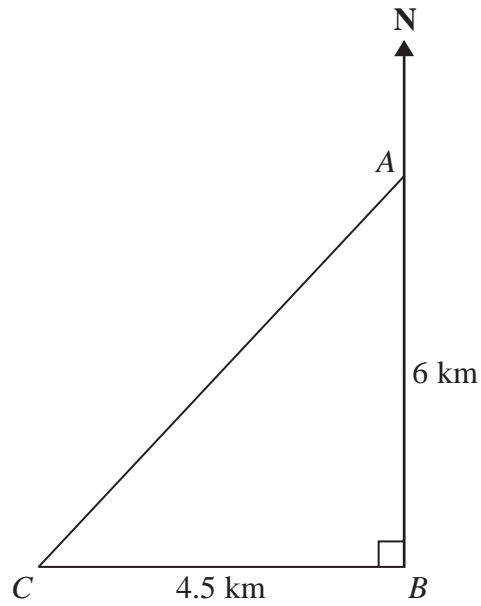


Diagram **NOT** accurately drawn

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

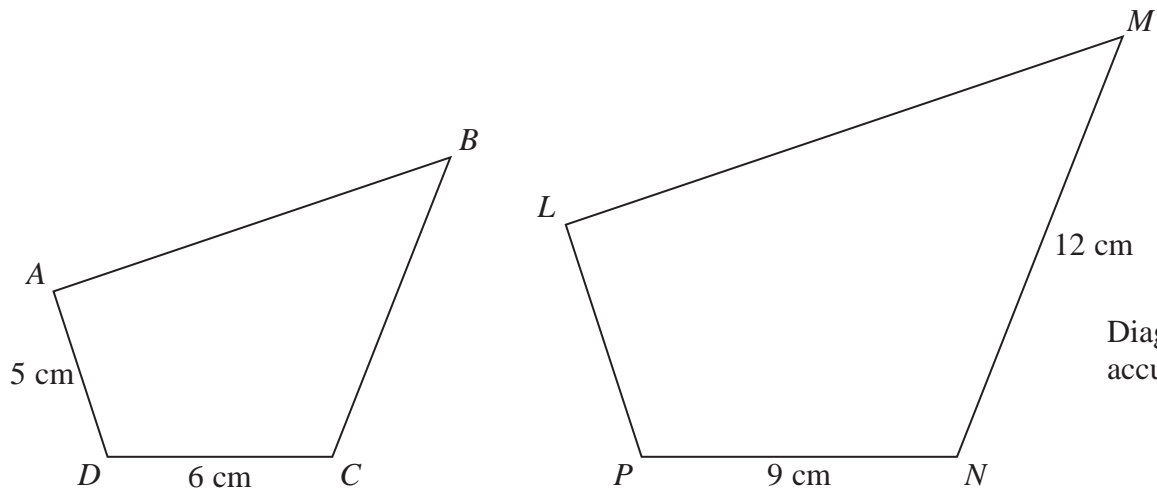
(a) Calculate the distance AC .

..... km
(3)

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

.....
(4)

(Total for Question 291 is 7 marks)



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

Angle A = angle L

Angle B = angle M

Angle C = angle N

Angle D = angle P

(a) Work out the length of LP .

..... cm
(2)

(b) Work out the length of BC .

..... cm
(2)

(Total for Question 292 is 4 marks)

293 The diagram shows a solid made from a hemisphere and a cone.

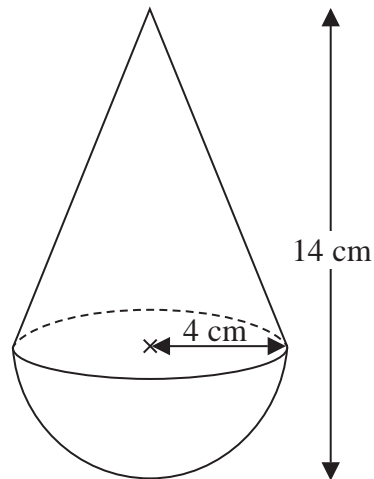


Diagram **NOT** accurately drawn

The radius of the hemisphere is 4 cm.

The radius of the base of the cone is 4 cm.

Calculate the volume of the solid.

Give your answer correct to 3 significant figures.

..... cm³

(Total for Question 293 is 3 marks)

294 $ABCD$ is a parallelogram.

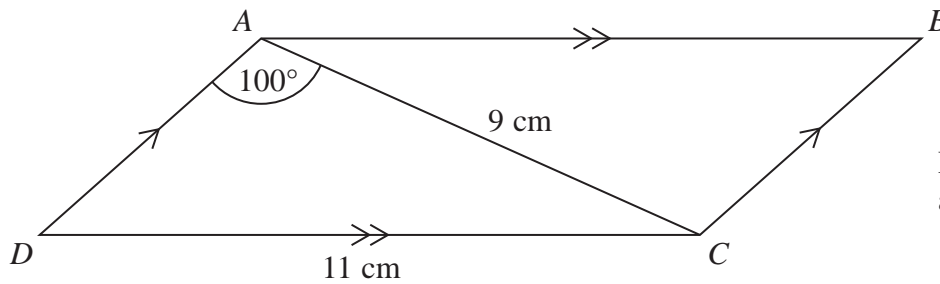


Diagram **NOT** accurately drawn

$$AC = 9 \text{ cm}$$

$$DC = 11 \text{ cm}$$

$$\text{Angle } DAC = 100^\circ$$

Calculate the area of the parallelogram.

Give your answer correct to 3 significant figures.

..... cm^2

(Total for Question 294 is 5 marks)

295 The diagram shows a solid prism.

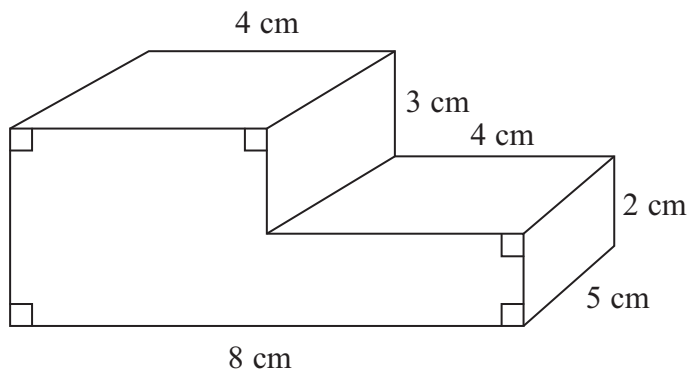
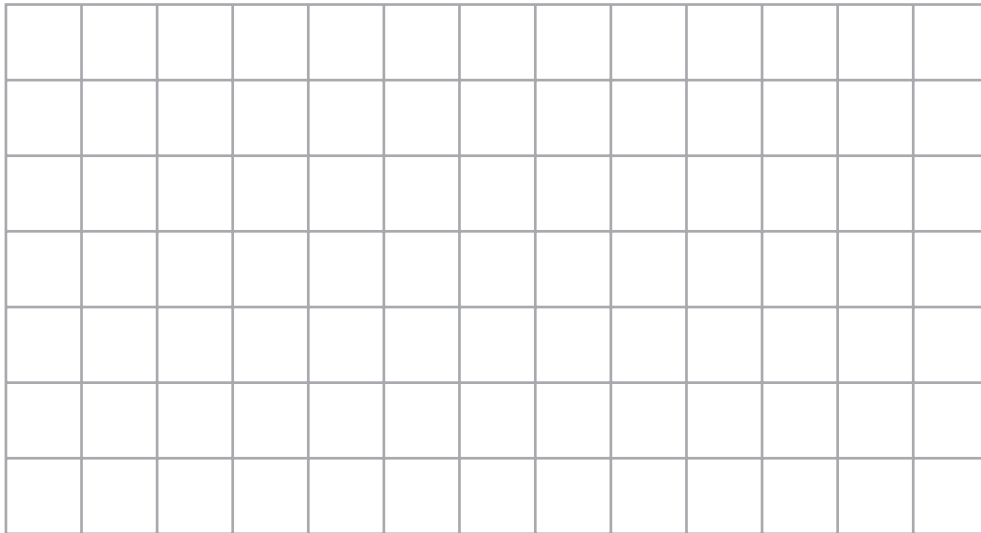


Diagram **NOT** accurately drawn

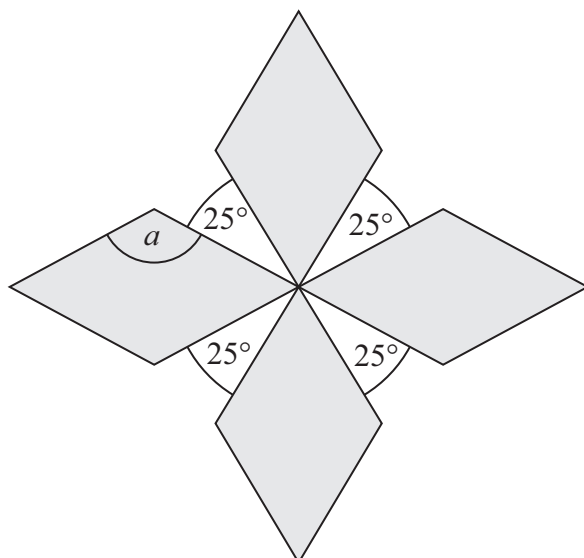
On the centimetre square grid, draw the side elevation of the solid prism from the direction shown by the arrow.



(Total for Question 295 is 2 marks)

296 The diagram shows a pattern using four identical rhombuses.

Diagram **NOT**
accurately drawn



Work out the size of the angle marked a .
You must show your working.

(Total for Question 296 is 4 marks)

297 A circle has a diameter of 140 cm.

Work out the circumference of the circle.
Give your answer correct to 3 significant figures.

..... cm

(Total for Question 297 is 2 marks)

298 Here is a right-angled triangle.

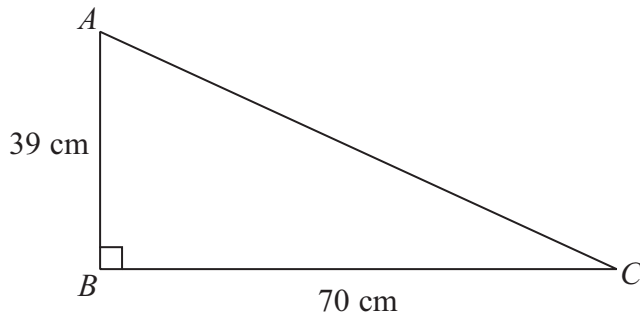


Diagram **NOT**
accurately drawn

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

..... cm

(Total for Question 298 is 3 marks)

299 ABC is an isosceles triangle.

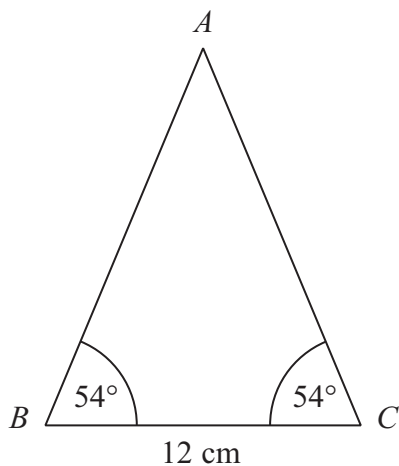


Diagram **NOT** accurately drawn

Work out the area of the triangle.
Give your answer correct to 3 significant figures.

..... cm²

(Total for Question 299 is 4 marks)

300 The diagram shows a trapezium.

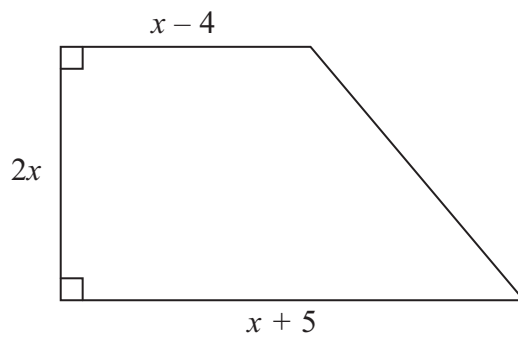


Diagram **NOT**
accurately drawn

All the measurements are in centimetres.

The area of the trapezium is 351 cm^2 .

(a) Show that $2x^2 + x - 351 = 0$

(2)

(b) Work out the value of x .

.....
(3)

(Total for Question 300 is 5 marks)

301 The diagram shows a large tin of pet food in the shape of a cylinder.

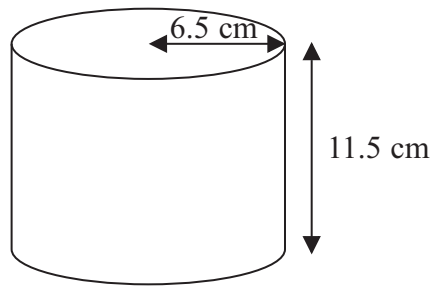


Diagram **NOT**
accurately drawn

The large tin has a radius of 6.5 cm and a height of 11.5 cm.

A pet food company wants to make a new size of tin.

The new tin will have a radius of 5.8 cm.
It will have the same volume as the large tin.

Calculate the height of the new tin.
Give your answer correct to one decimal place.

..... cm

(Total for Question 301 is 3 marks)

302 The diagram shows triangle LMN .

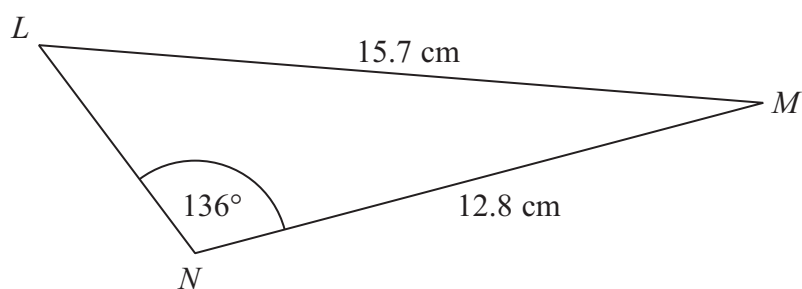


Diagram **NOT** accurately drawn

Calculate the length of LN .
Give your answer correct to 3 significant figures.

..... cm

(Total for Question 302 is 5 marks)

*303

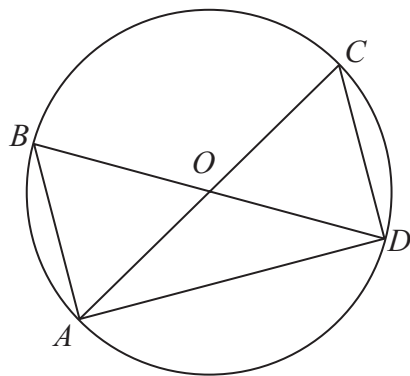


Diagram **NOT**
accurately drawn

AOC and BOD are diameters of a circle, centre O .

Prove that triangle ABD and triangle DCA are congruent.

(Total for Question 303 is 3 marks)

304 Here is a cuboid.

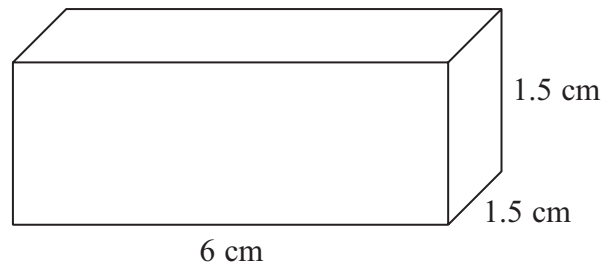


Diagram **NOT** accurately drawn

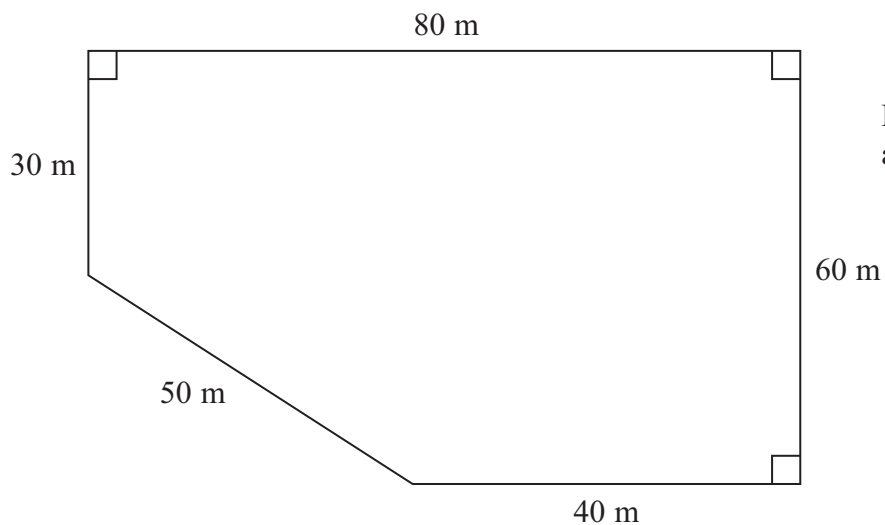
The cuboid is 6 cm by 1.5 cm by 1.5 cm.

Work out the total surface area of the cuboid.

..... cm²

(Total for Question 304 is 3 marks)

305 The diagram shows the plan of a playground.



Bill is going to cover the playground with tarmac.
It costs £2.56 to cover each square metre with tarmac.

Work out the total cost of the tarmac Bill needs.

£.....

(Total for Question 305 is 4 marks)

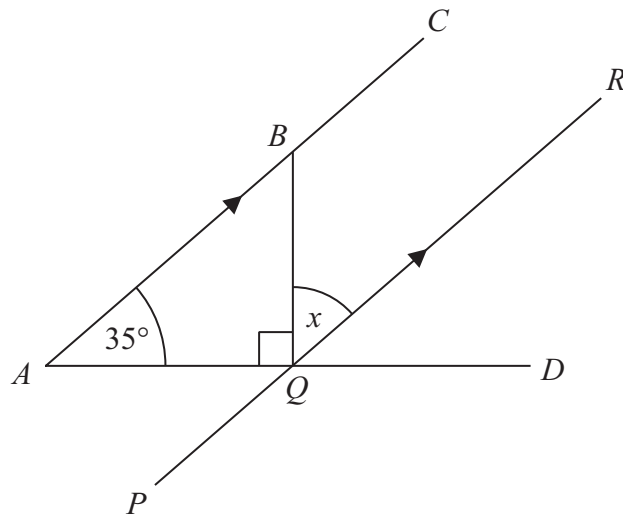


Diagram **NOT**
accurately drawn

ABC , PQR and AQD are straight lines.
 ABC is parallel to PQR .

Angle $BAQ = 35^\circ$
Angle $BQA = 90^\circ$

Work out the size of the angle marked x .
Give reasons for each stage of your working.

$x = \dots\dots\dots$ °

(Total for Question 306 is 4 marks)

307 XYZ is a right-angled triangle.

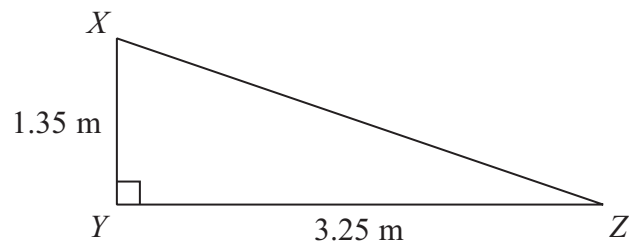


Diagram **NOT** accurately drawn

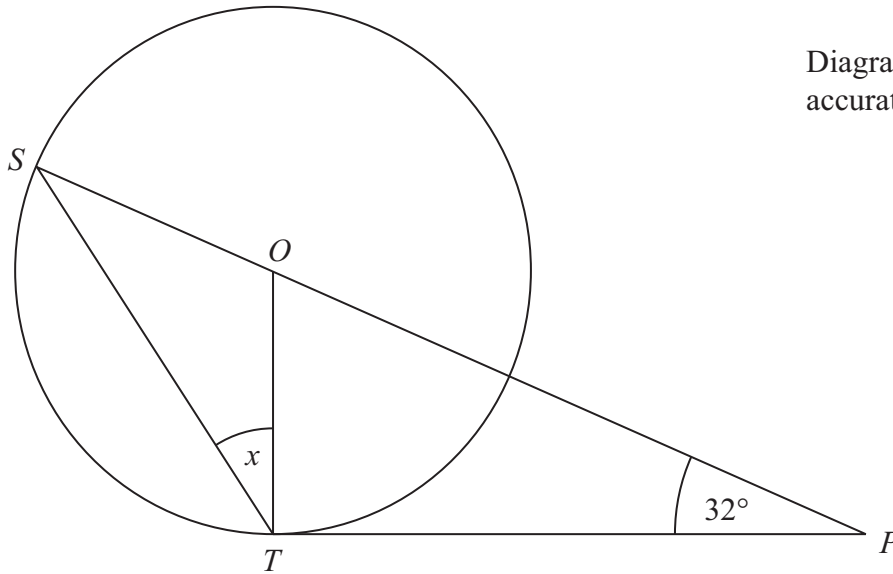
Calculate the length of XZ .
Give your answer correct to 3 significant figures.

..... m

(Total for Question 307 is 3 marks)

*308

Diagram **NOT**
accurately drawn



S and T are points on the circumference of a circle, centre O .
 PT is a tangent to the circle.
 SOP is a straight line.

Angle $OPT = 32^\circ$

Work out the size of the angle marked x .
Give reasons for your answer.

(Total for Question 308 is 5 marks)

***309** The diagram shows a ladder leaning against a vertical wall.

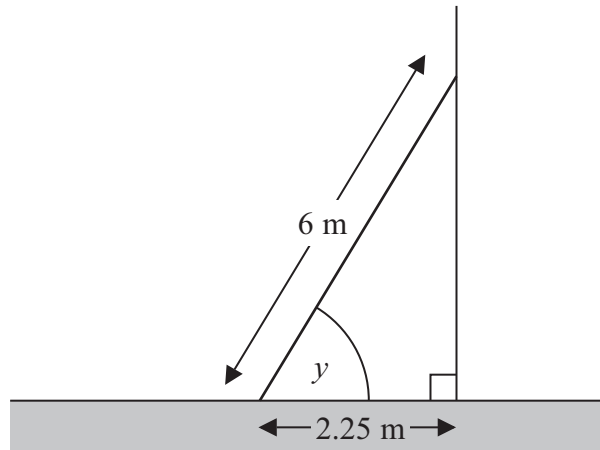


Diagram **NOT**
accurately drawn

The ladder stands on horizontal ground.

The length of the ladder is 6 m.

The bottom of the ladder is 2.25 m from the bottom of the wall.

A ladder is safe to use when the angle marked y is about 75° .

Is the ladder safe to use?

You must show all your working.

(Total for Question 309 is 3 marks)

310 ABC is a triangle.

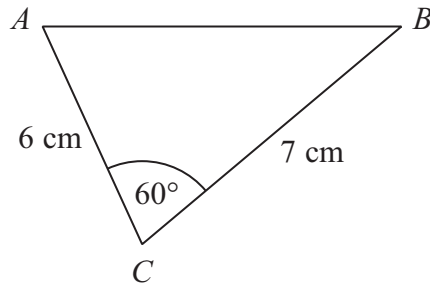


Diagram **NOT** accurately drawn

- (a) Work out the area of triangle ABC .
Give your answer correct to 3 significant figures.

..... cm^2
(2)

- (b) Work out the length of the side AB .
Give your answer correct to 3 significant figures.

..... cm
(3)

(Total for Question 310 is 5 marks)

311

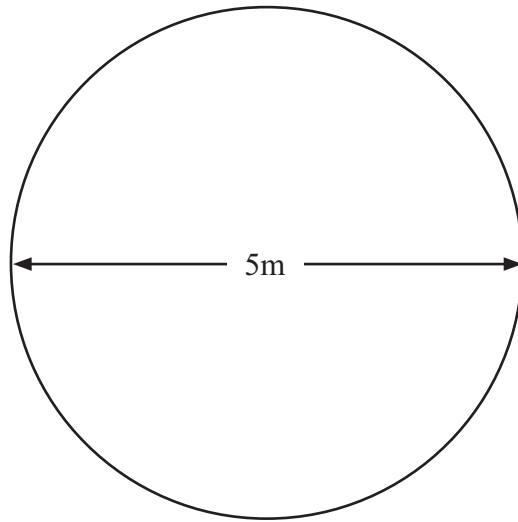


Diagram **NOT**
accurately drawn

Jon has a flower garden in the shape of a circle.
The diameter of the garden is 5 metres.

Jon wants to put fencing around the edge of the garden.
The fencing costs £1.80 per metre.

Work out the total cost of the fencing.

£.....

(Total for Question 311 is 3 marks)

312 Here is a solid prism.

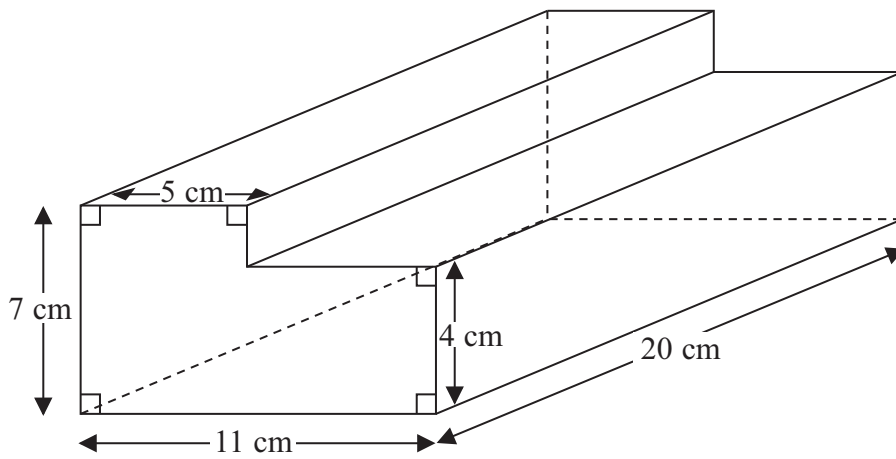
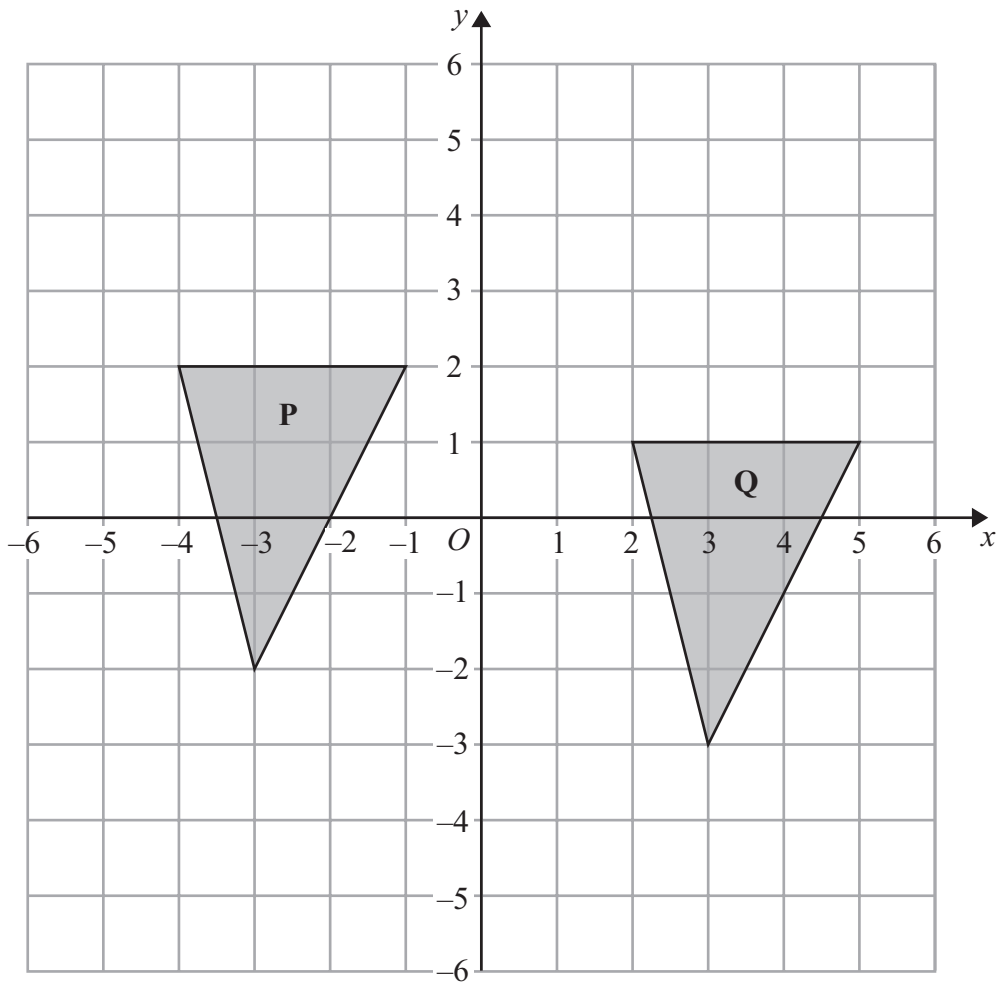


Diagram **NOT** accurately drawn

Work out the volume of the prism.

..... cm³

(Total for Question 312 is 3 marks)



Describe fully the single transformation that maps triangle **P** onto triangle **Q**.

.....

.....

(Total for Question 313 is 2 marks)

314

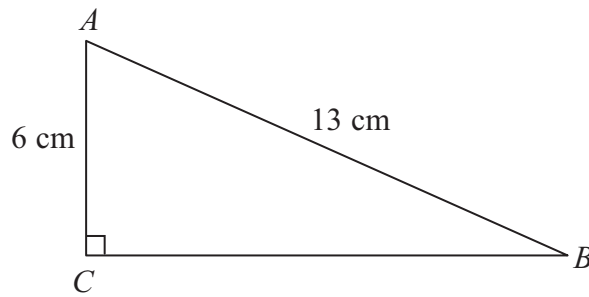


Diagram **NOT** accurately drawn

ABC is a right-angled triangle.

$$AC = 6 \text{ cm}$$

$$AB = 13 \text{ cm}$$

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

..... cm
(3)

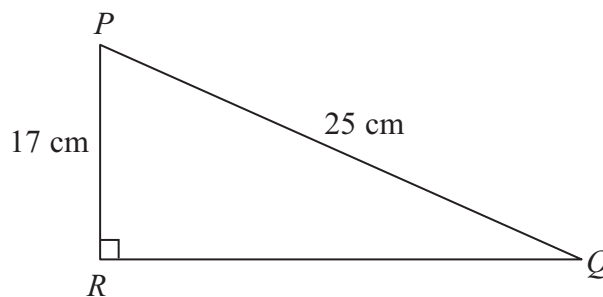


Diagram **NOT** accurately drawn

PQR is a right-angled triangle.

$$PR = 17 \text{ cm}$$

$$PQ = 25 \text{ cm}$$

- (b) Work out the size of angle RPQ .
Give your answer correct to 1 decimal place.

.....
(3)

(Total for Question 314 is 6 marks)

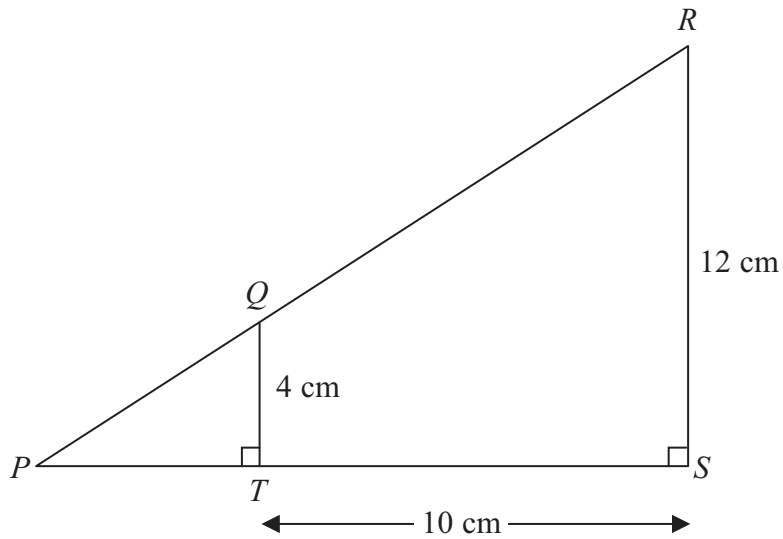


Diagram **NOT**
accurately drawn

PQR and PTS are straight lines.

Angle $PTQ = \text{Angle } PSR = 90^\circ$

$QT = 4 \text{ cm}$

$RS = 12 \text{ cm}$

$TS = 10 \text{ cm}$

(a) Work out the area of the trapezium $QRST$.

..... cm^2
(2)

(b) Work out the length of PT .

..... cm
(3)

(Total for Question 315 is 5 marks)

316

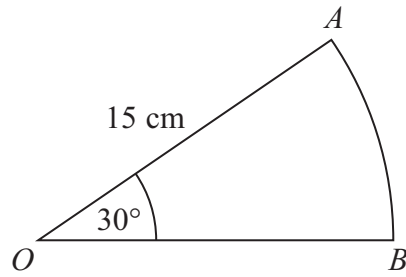


Diagram **NOT**
accurately drawn

OAB is a sector of a circle, centre O .
The radius of the circle is 15 cm.
The angle of the sector is 30° .

Calculate the area of sector OAB .
Give your answer correct to 3 significant figures.

..... cm²

(Total for Question 316 is 2 marks)

317

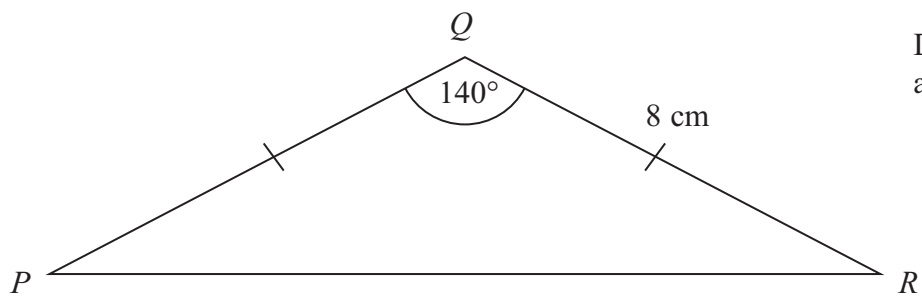


Diagram **NOT** accurately drawn

Calculate the length of PR .
Give your answer correct to 3 significant figures.

..... cm

(Total for Question 317 is 3 marks)

318

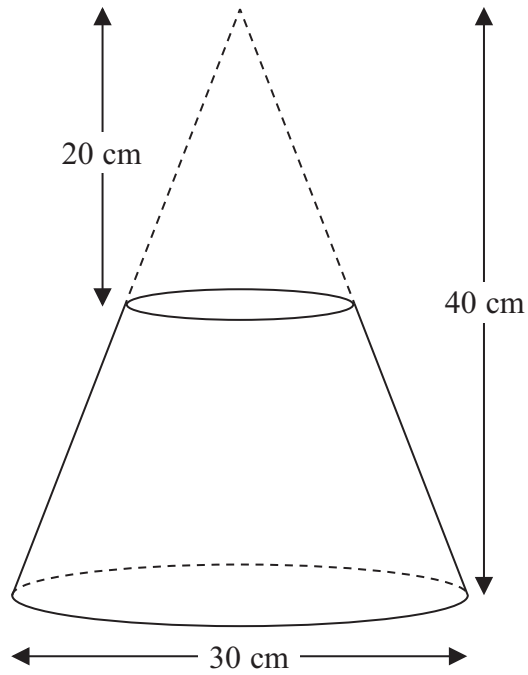


Diagram **NOT**
accurately drawn

A frustum is made by removing a small cone from a similar large cone.

The height of the small cone is 20 cm.

The height of the large cone is 40 cm.

The diameter of the base of the large cone is 30 cm.

Work out the volume of the frustum.

Give your answer correct to 3 significant figures.

..... cm³

(Total for Question 318 is 4 marks)

319 Here are two triangles T_1 and T_2 .

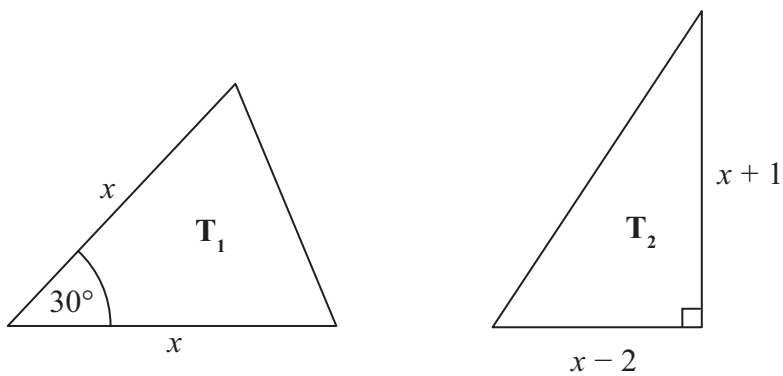


Diagram **NOT**
accurately drawn

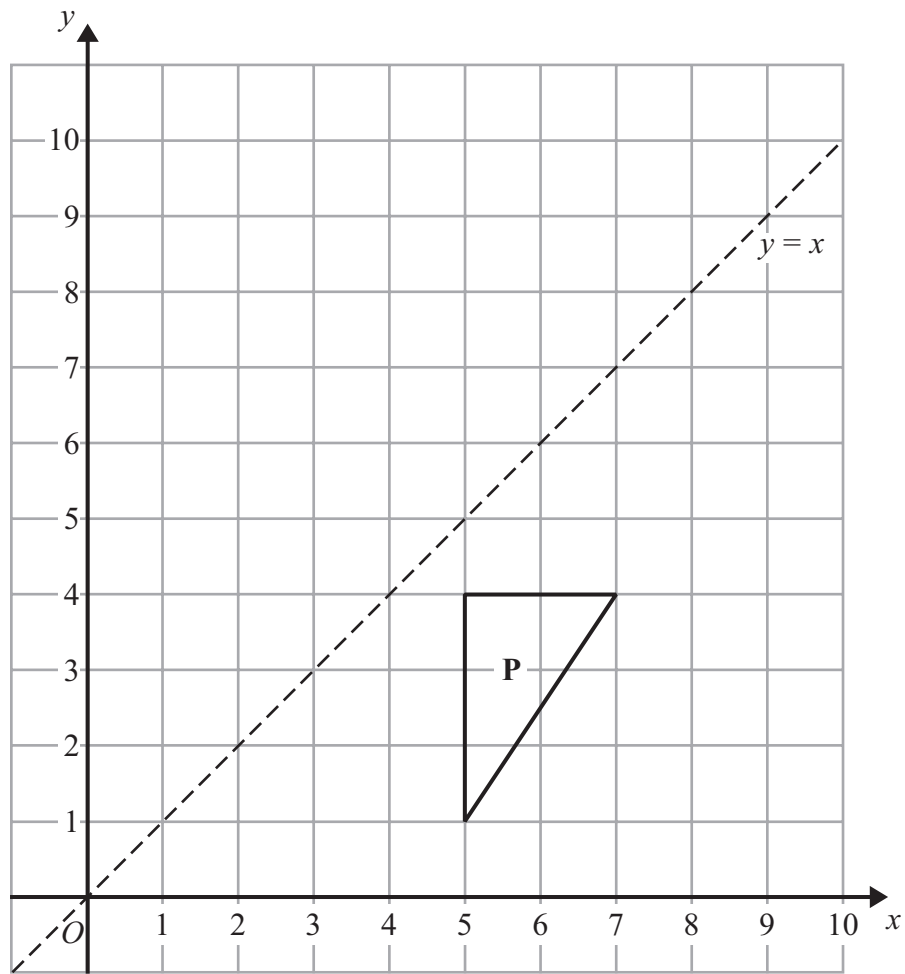
The lengths of the sides are in centimetres.

The area of triangle T_1 is equal to the area of triangle T_2 .

Work out the value of x , giving your answer in the form $a + \sqrt{b}$ where a and b are integers.

.....
(Total for Question 319 is 5 marks)

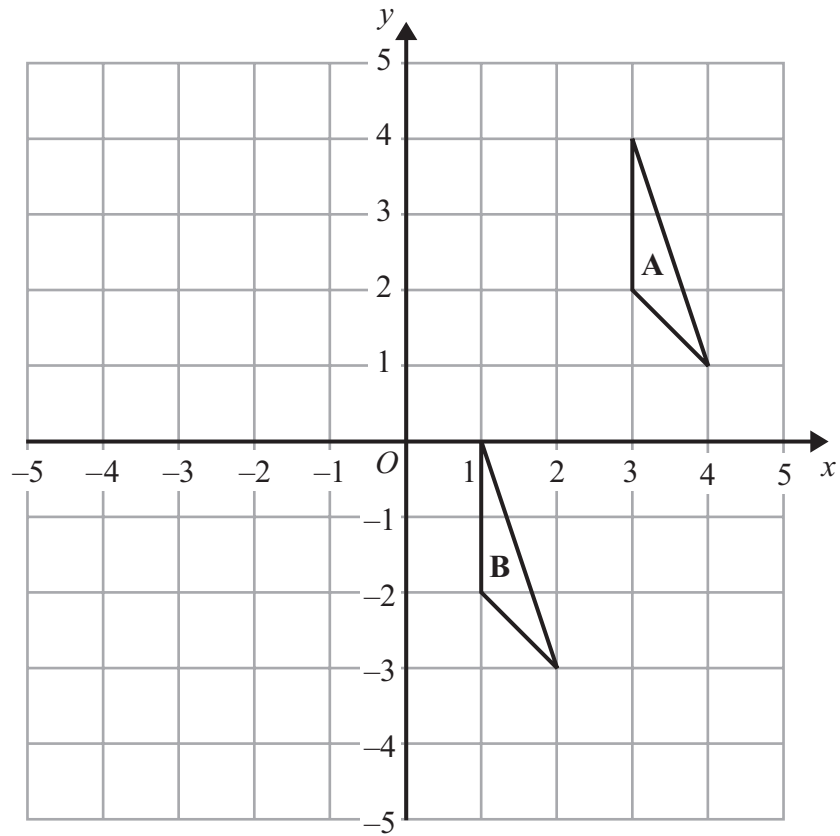
320 (a)



Reflect shape **P** in the line $y = x$

(2)

(b)



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

(2)

(Total for Question 320 is 4 marks)

*321

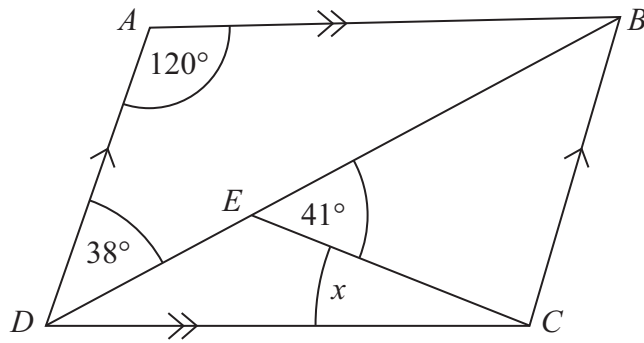


Diagram **NOT**
accurately drawn

$ABCD$ is a parallelogram.

Angle $ADB = 38^\circ$.

Angle $BEC = 41^\circ$.

Angle $DAB = 120^\circ$.

Calculate the size of angle x .

You must give reasons for your answer.

(Total for Question 321 is 4 marks)

322 160 cm of gold wire has a weight of 17.8 grams."

Work out the weight of 210 cm of the gold wire.

..... grams

(Total for Question 322 is 3 marks)

323 The diagram shows a cube and a cuboid.

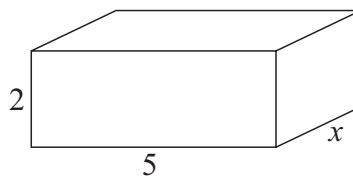
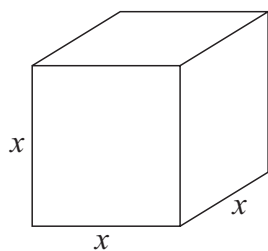


Diagram **NOT**
accurately drawn

All the measurements are in cm.

The volume of the cube is 100 cm^3 more than the volume of the cuboid.

(a) Show that $x^3 - 10x = 100$

(2)

(b) Use a trial and improvement method to find the value of x .

Give your answer correct to 1 decimal place.

You must show **all** your working.

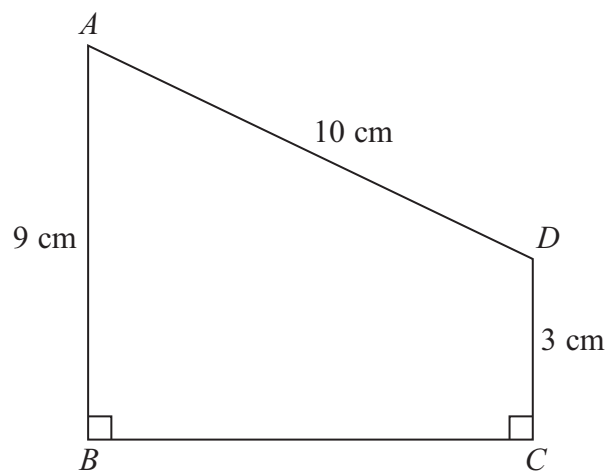
$x = \dots\dots\dots$

(4)

(Total for Question 323 is 6 marks)

324 $ABCD$ is a trapezium.

Diagram **NOT**
accurately drawn



$$AD = 10 \text{ cm}$$

$$AB = 9 \text{ cm}$$

$$DC = 3 \text{ cm}$$

$$\text{Angle } ABC = \text{angle } BCD = 90^\circ$$

Calculate the length of AC .

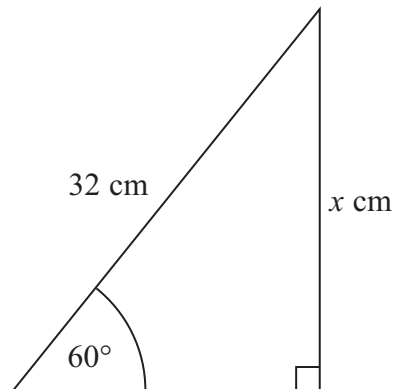
Give your answer correct to 3 significant figures.

..... cm

(Total for Question 324 is 5 marks)

325

Diagram **NOT**
accurately drawn



Calculate the value of x .
Give your answer correct to 3 significant figures.

.....
(Total for Question 325 is 3 marks)

326 The diagram shows a pyramid.

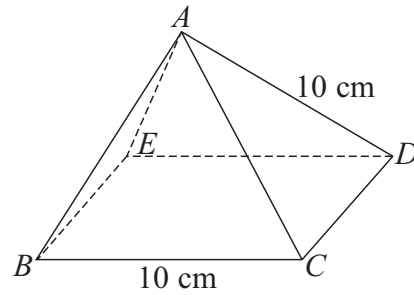


Diagram **NOT**
accurately drawn

$BCDE$ is a square with sides of length 10 cm.

The other faces of the pyramid are equilateral triangles with sides of length 10 cm.

- (a) Calculate the volume of the pyramid.
Give your answer correct to 3 significant figures.

..... cm^3
(4)

- (b) Find the size of angle DAB .

.....
(2)

(Total for Question 326 is 6 marks)

*327 The diagram shows the triangle PQR .

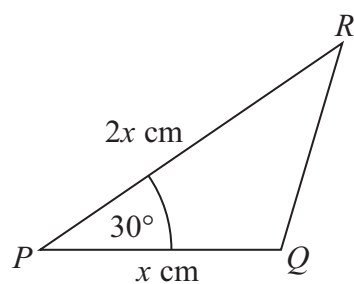


Diagram **NOT** accurately drawn

$$PQ = x \text{ cm}$$

$$PR = 2x \text{ cm}$$

$$\text{Angle } QPR = 30^\circ$$

The area of triangle $PQR = A \text{ cm}^2$

Show that $x = \sqrt{2A}$

(Total for Question 327 is 3 marks)

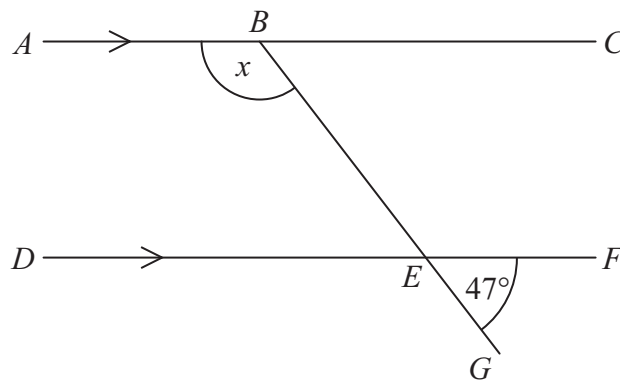


Diagram **NOT**
accurately drawn

ABC and DEF are parallel lines.

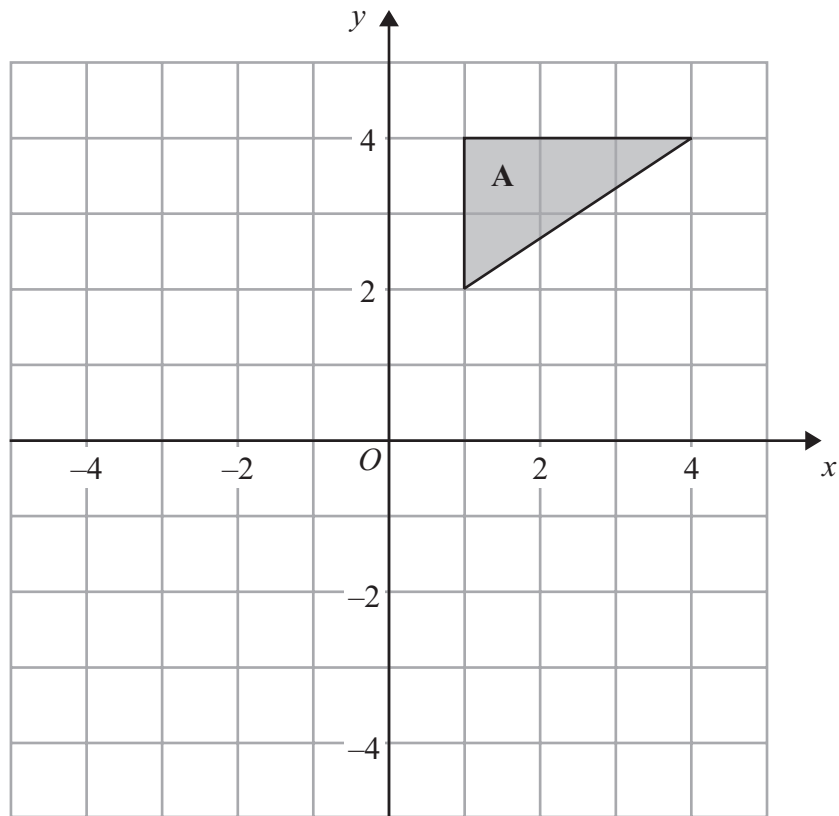
BEG is a straight line.

Angle $GEF = 47^\circ$.

Work out the size of the angle marked x .

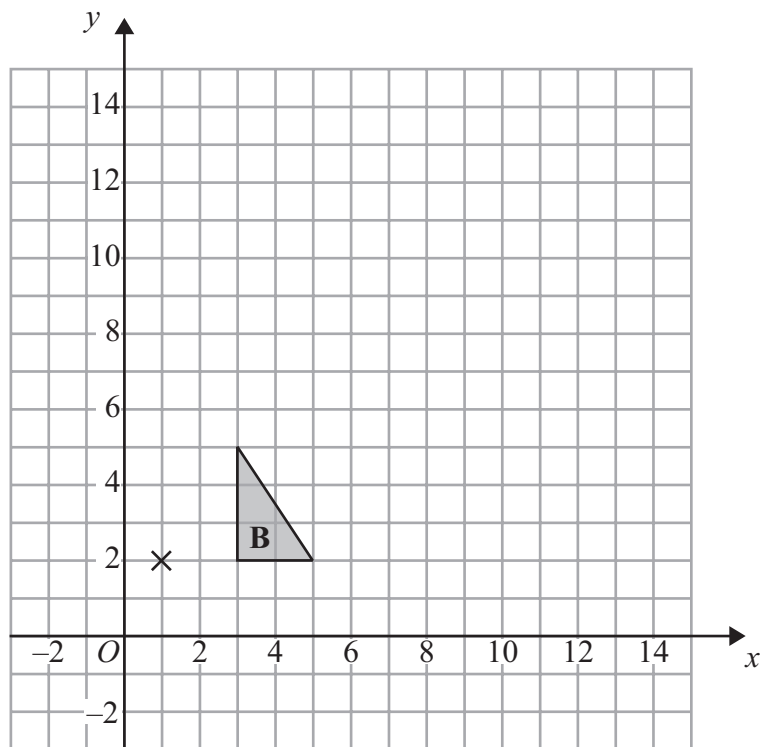
Give reasons for your answer.

.....
(Total for Question 328 is 3 marks)



(a) Rotate triangle A 90° clockwise, centre O .

(2)



(b) Enlarge triangle B by scale factor 3, centre (1, 2).

(3)

(Total for Question 329 is 5 marks)

330

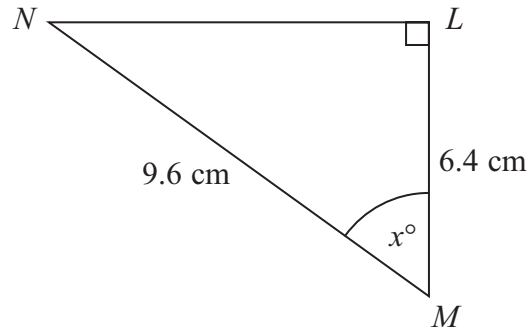


Diagram **NOT**
accurately drawn

LMN is a right-angled triangle.

$MN = 9.6 \text{ cm}$.

$LM = 6.4 \text{ cm}$.

Calculate the size of the angle marked x° .

Give your answer correct to 1 decimal place.

.....
(Total for Question 330 is 3 marks)

331 The diagram shows a quadrilateral $ABCD$.

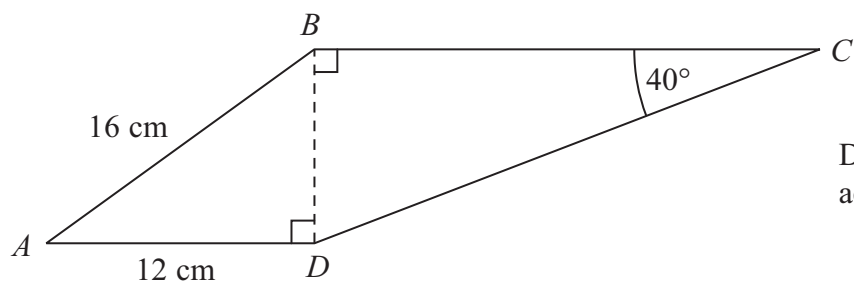


Diagram **NOT** accurately drawn

$AB = 16$ cm.

$AD = 12$ cm.

Angle $BCD = 40^\circ$.

Angle $ADB = \text{angle } CBD = 90^\circ$.

Calculate the length of CD .

Give your answer correct to 3 significant figures.

..... cm

(Total for Question 331 is 5 marks)

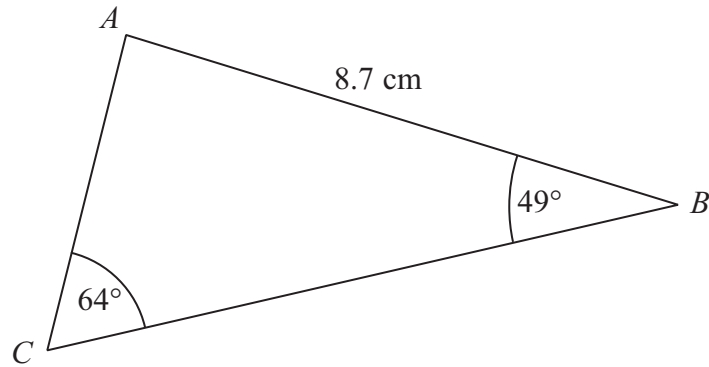


Diagram **NOT**
accurately drawn

ABC is a triangle.

$AB = 8.7$ cm.

Angle $ABC = 49^\circ$.

Angle $ACB = 64^\circ$.

Calculate the area of triangle ABC .

Give your answer correct to 3 significant figures.

.....cm²

(Total for Question 332 is 5 marks)

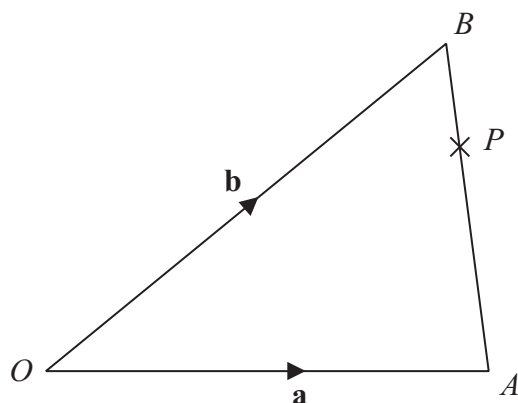


Diagram **NOT**
accurately drawn

OAB is a triangle.

$$\vec{OA} = \mathbf{a}$$

$$\vec{OB} = \mathbf{b}$$

(a) Find \vec{AB} in terms of \mathbf{a} and \mathbf{b} .

.....
(1)

P is the point on AB such that $AP : PB = 3 : 1$

(b) Find \vec{OP} in terms of \mathbf{a} and \mathbf{b} .

Give your answer in its simplest form.

.....
(3)

(Total for Question 333 is 4 marks)