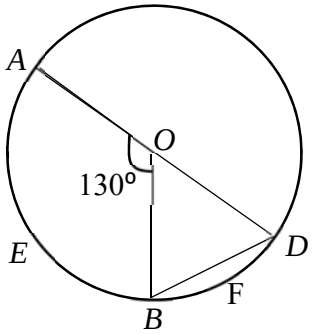
20. The diagram shows a circle with centre O. AD is the diameter of circle.
If radius OA is 5 cm, and $\angle AOB = 130^{\circ}$, calculate the

(a) area of ***major*** sector AOB,
(b) arc length AEB,
(c) angle OBD,
(d) area of minor segment BDF.



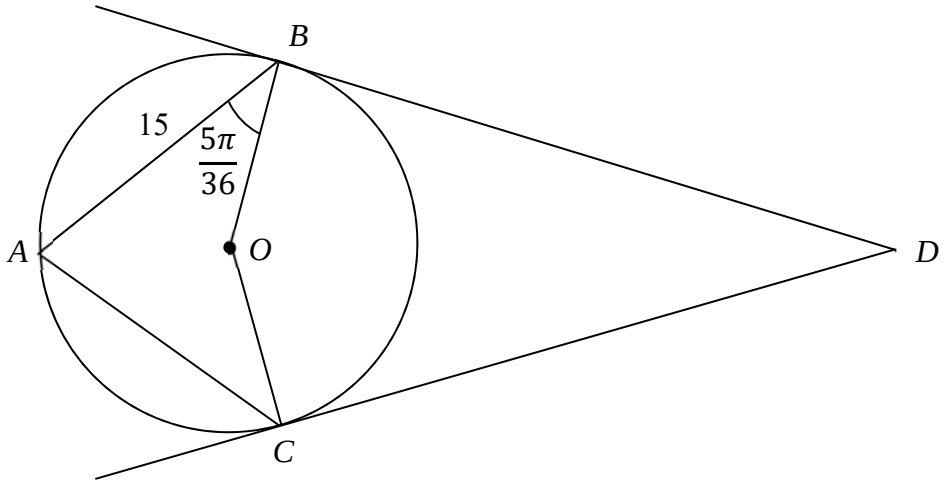
Answer (20a) _____ [1]

(20b) _____ [1]

(20c) _____ [1]

(20d) _____[2]

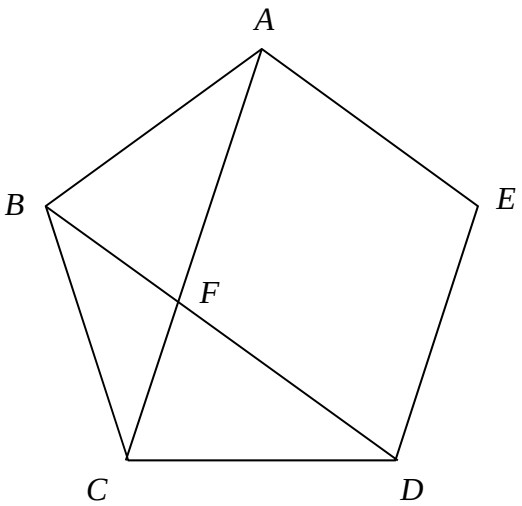
8. (a) In the figure, A, B and C are points on the circle with centre at O. BD and CD are tangents to the circle at points B and C respectively. It is given that $AB = 15$ cm and $\angle ABO = \frac{5\pi}{36}$ rad.



(i) Find the radius of the circle. [3]

(ii) Suppose that $\angle OAC = \frac{5\pi}{18}$ rad, find the area enclosed by the tangents BD and CD and minor arc BC. [4]

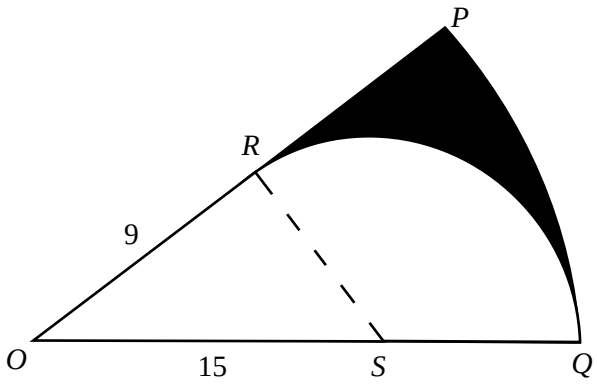
(b) The diagram shows a regular pentagon $ABCDE$. AC and BD intersect at F.



(i) Find the value of $\angle CDF$. [2]

(ii) Show that $\angle DFA = 108°$. [2]

5



In the diagram, *OPQ* is the cross section of a wooden door stopper.
PQ is an arc of a circle, centre *O* and *RQ* is an arc of another circle, centre *S*.
OR = 9 cm, *OS* = 15 cm and *OP* is a tangent to arc *RQ* at *R*.

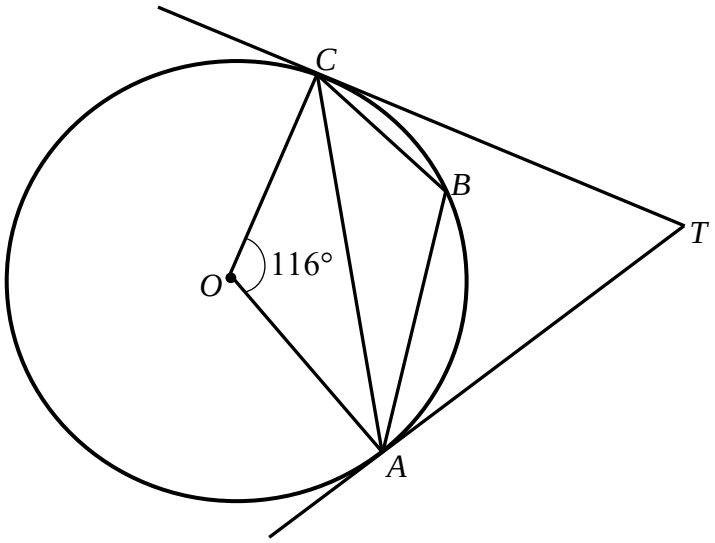
(a) Show that angle *ROS* = 0.927 radians, correct to 3 significant figures. [2]

The wooden door stopper is 30 mm thick. The shaded region represents the portion that will be cut off to remove its sharp edge.

(b) Calculate the perimeter of the shaded region. [5]

(c) Calculate the volume of wood, in cm^3, that needs to be cut off. [5]

8 **(a)** In the diagram, A, B and C lie on a circle, centre O.
The tangents at A and C meet at T.
Angle $COA = 116°$.



Find, stating your reasons clearly,

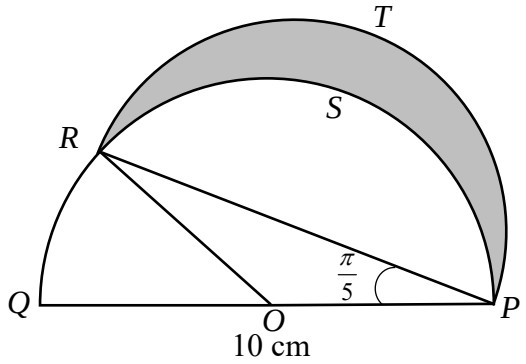
(i) obtuse angle ABC, [1]

(ii) angle CAT, [1]

(iii) angle CTA. [1]

(b) The figure shows a semicircle PQS with centre O with diameter PQ and a semicircle PRT with diameter PR.

PQ =10 cm and angle $RPO = \frac{\pi}{5}$ radians.

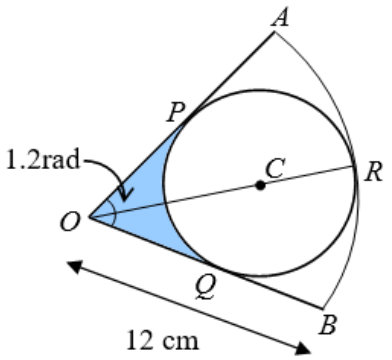


(i) Show that $PR = 8.0902$ cm, correct to 5 significant figures. [2]

(ii) Find the perimeter of the shaded region. [3]

(iii) Find the area of the shaded region. [3]

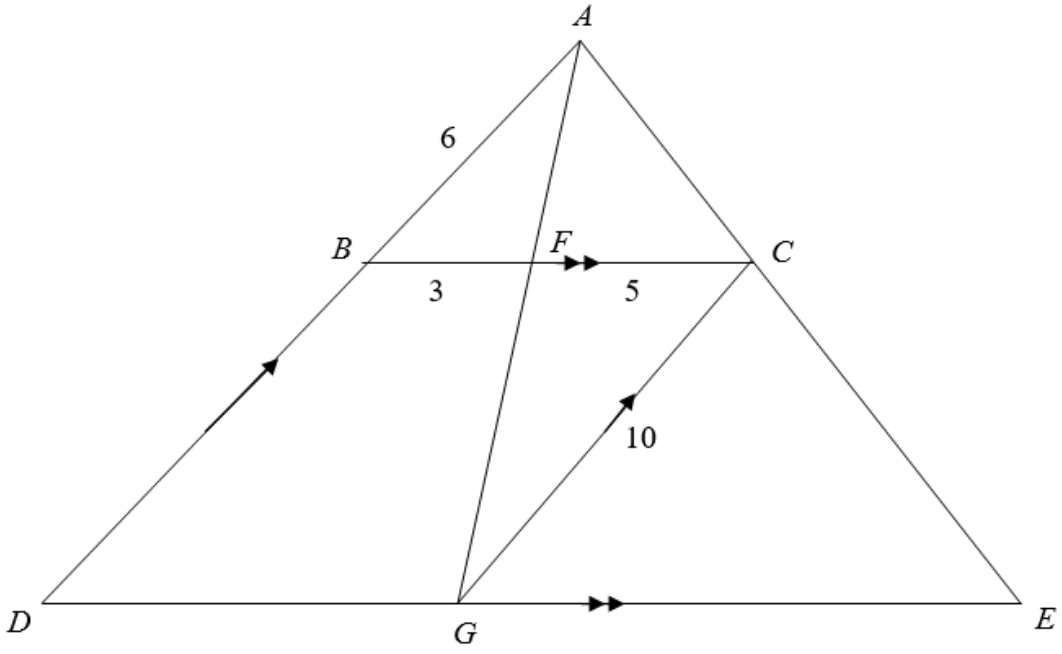
7 **(a)** In the diagram, *OARB* is a sector of a circle with centre *O*, radius 12 cm and angle *AOB* = 1.2 radians. *C* is the centre of the circle enclosed inside the sector, *OCR* is a straight line and the circle touches the sector at *P*, *Q* and *R*.



(i) Show that the radius of the enclosed circle is 4.3305 cm, correct to 4 decimal places. [3]

(ii) Calculate the perimeter of the shaded region *POQ*. [2]

(b) In the diagram below, *ABD, AFG, ACE, BFC* and *DGE* are straight lines.
BFC is parallel to *DGE* and *DBA* is parallel to *GC*.
AB = 6 cm, *BF* = 3 cm, *FC* = 5 cm and *GC* = 10 cm.



(i) Prove that triangle *BFA* is similar to triangle *CFG*. [2]

(ii) Calculate *GE*. [2]

(iii) Given the area of triangle *ABF* is 6.4 cm^2, find the area of trapezium *ACGD*. [3]

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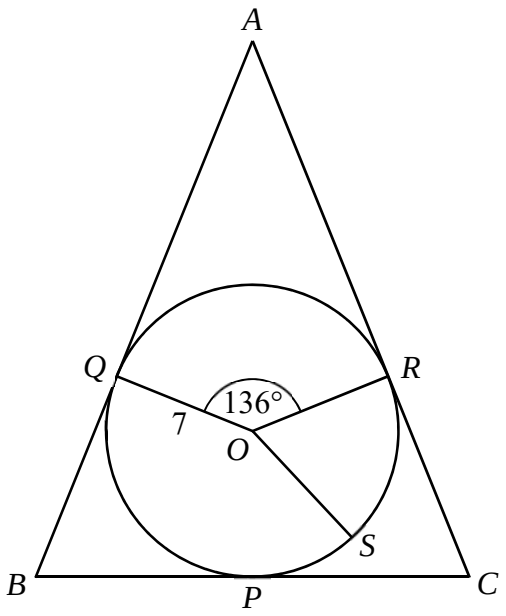


The diagram shows a circle with centre O and radius 7 cm.
P, Q, R and S are points on the circle.
The tangents to the circle at P, Q and R form the triangle ABC.
Triangle ABC is isosceles with $AB = AC$.
Angle $QOR = 136°$.

(a) Show that angle $OAR = 22°$.
Give a reason for each step of your working. [3]

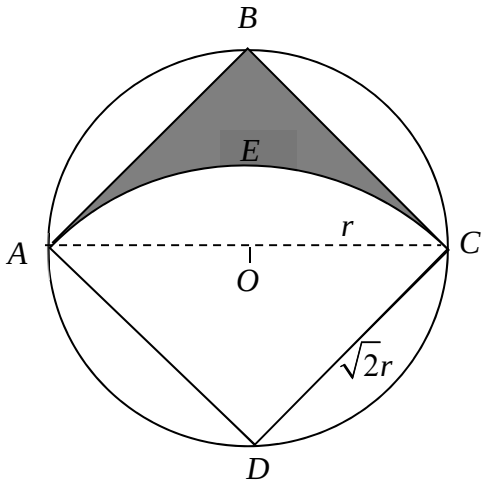
(b) Calculate the area of the triangle ABC. [4]

(c) Angle $ROS = \theta$ radians.
The perimeter of the sector ORS is $2(\theta + 10)$ cm.

Calculate the length of the arc RS. [3]

24 *ABCD* is a square of sides $\sqrt{2}r$ cm. Its vertices lie on the circumference of a circle, with centre *O* and radius *r*. Arc *AEC* has centre *D*.

What fraction of the circle *ABCD* is **not** shaded? Give your answer in terms of π.



Answer ..... [5]

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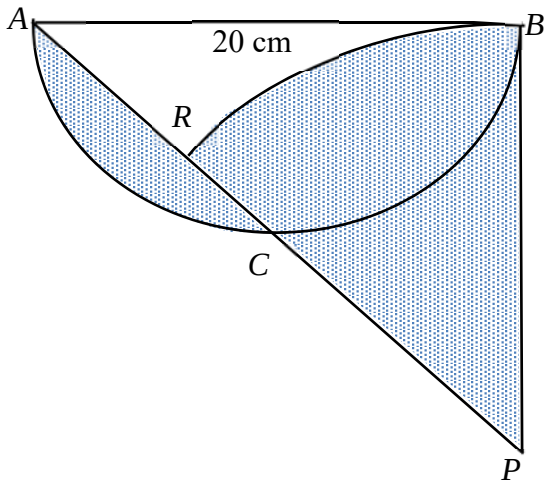


The diagram shows a semi-circle *ACB* and a sector *PBR* of a circle with centre *P*. It is given that *AB* is perpendicular to *BP* and *AB*=*RP* = 20 cm.

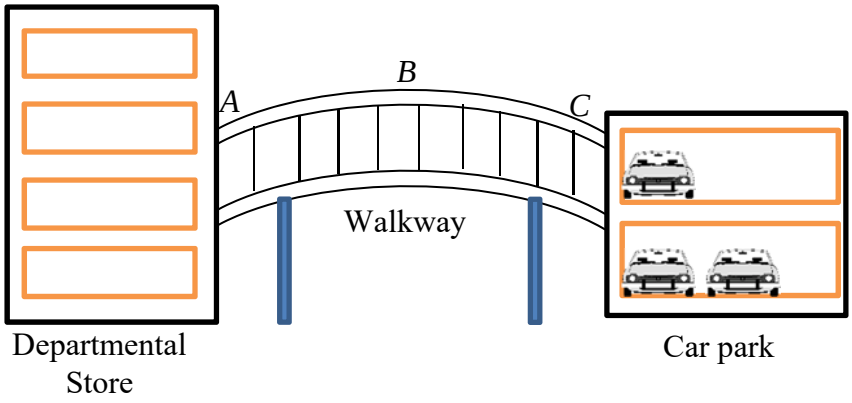
(i) Find, in radians, the angle *BPA*. [1]

(ii) For the shaded region *ACBRA* , find, correct to one decimal place,

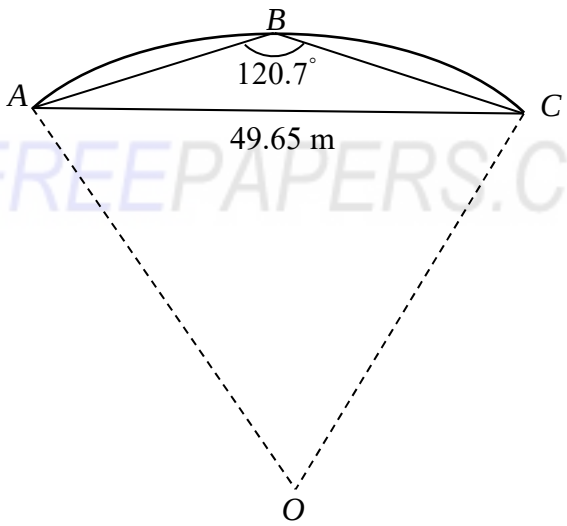
(a) the area, [3]

(b) the perimeter. [2]

11 The figure shows a pedestrian walkway joining a multi-storey car park and a Departmental Store.



To estimate its length the walkway is modelled by the arc ABC as shown in the figure below, where A is the entrance to the department store and C is the exit to the car park.
The arc ABC is part of a sector with centre O.

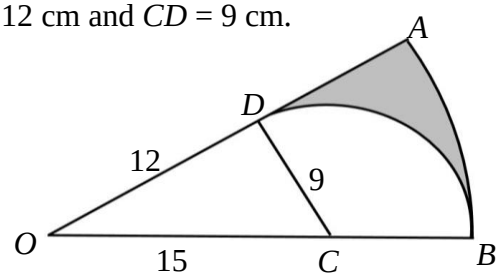


Given $AC = 49.65$ m and angle $ABC = 120.7^\circ$,

(a) show that $AO = 29$ m. [3]

(b) show that the length of arc ABC is 60 m. [1]

21 The figure shows a sector OAB with centre O, and an arc BD of another circle with centre C. It is given that OC = 15 cm, OD = 12 cm and CD = 9 cm.



(a) Prove that ΔODC is a right-angled triangle.

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…… [1]

(b) Find

(i) $\angle AOB$, in radian,

(ii) the perimeter of the shaded region,

(iii) the area of the shaded region.

Answer : **(b)(i)** ……. radian [1]

(ii) ……..…… cm [2]

(iii) ……..…… cm^2 [2]

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