MATHS ONLINE

By: Kru Tar

TOPMaths
A* Level

Radians

P1

TOPMaths
A* Level

Objectives

1) Convert between degrees and radians

2) Arc length

3) Sector area

4) Segment area

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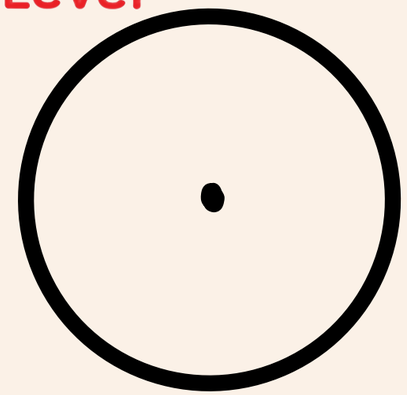
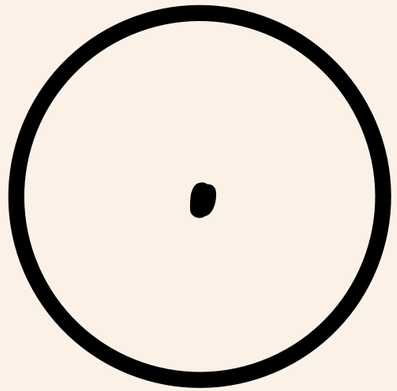
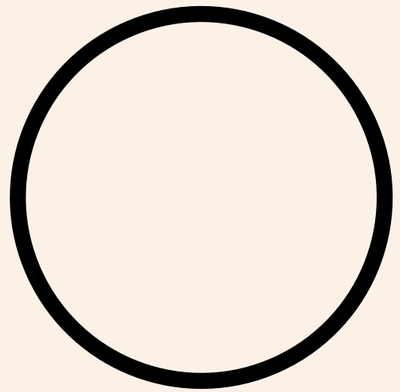
TOPMaTh
A* Level

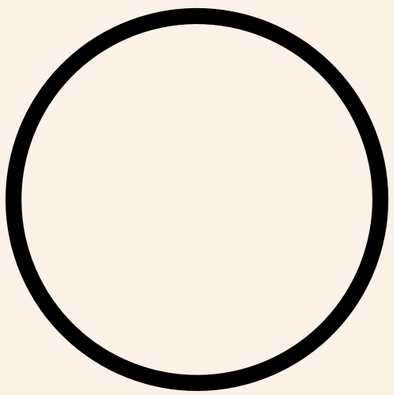
Recap

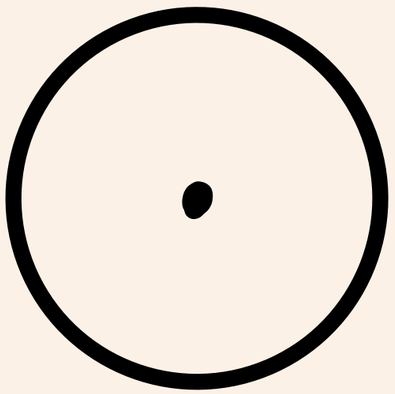
Circle

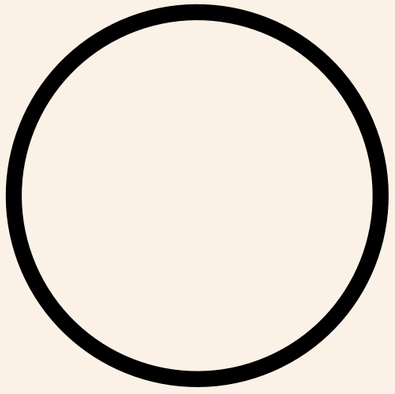












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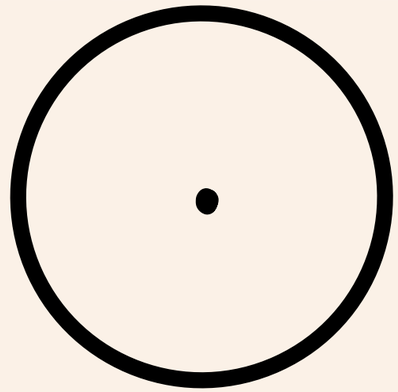
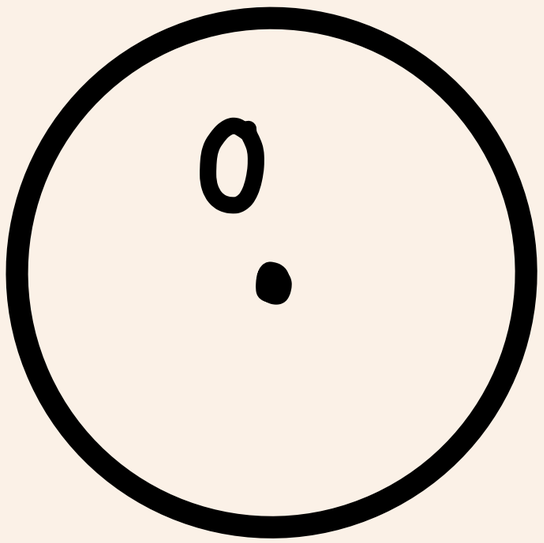
Recap

Circle



Circumference =

Area =



Arc length =

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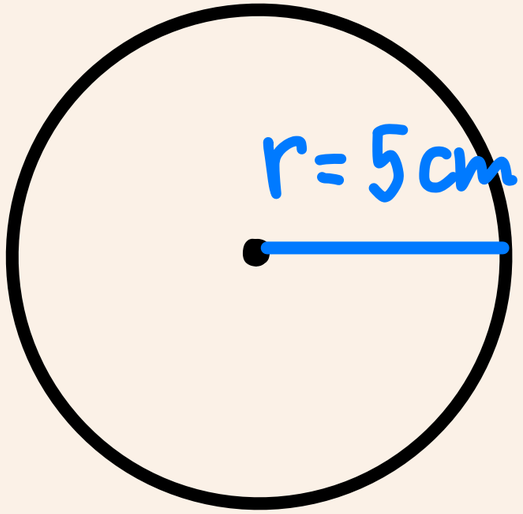
A* Level

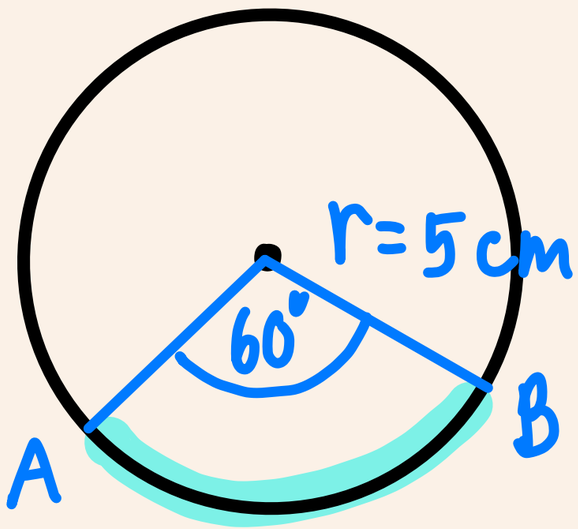
Ex.



Circumference =

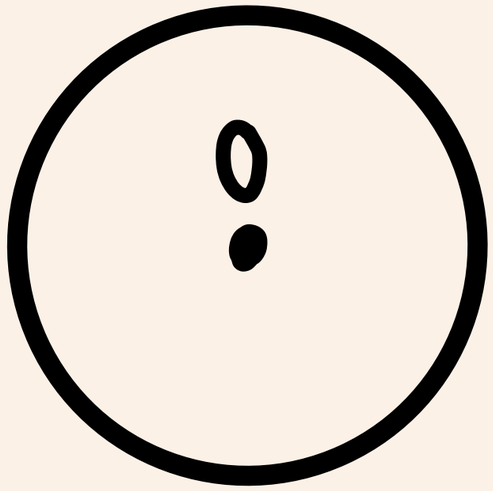
Area =

Ex.



Length of minor arc AB =

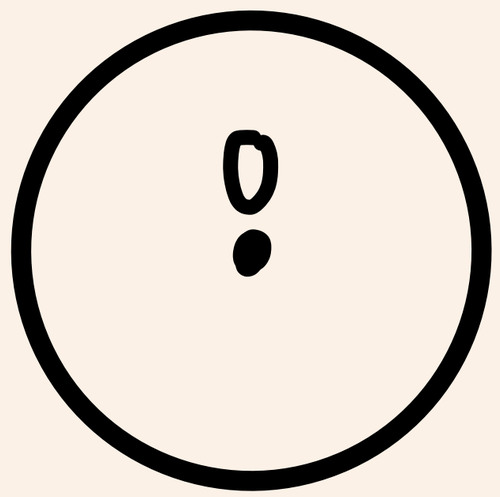
Recap



Circle

Sector area =

Area of triangle =



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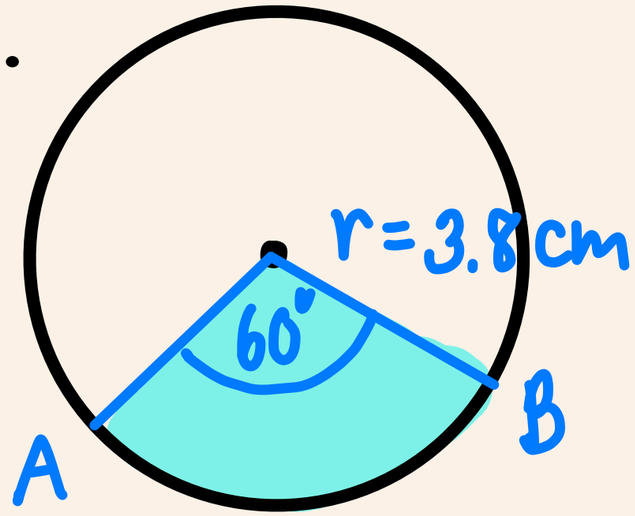
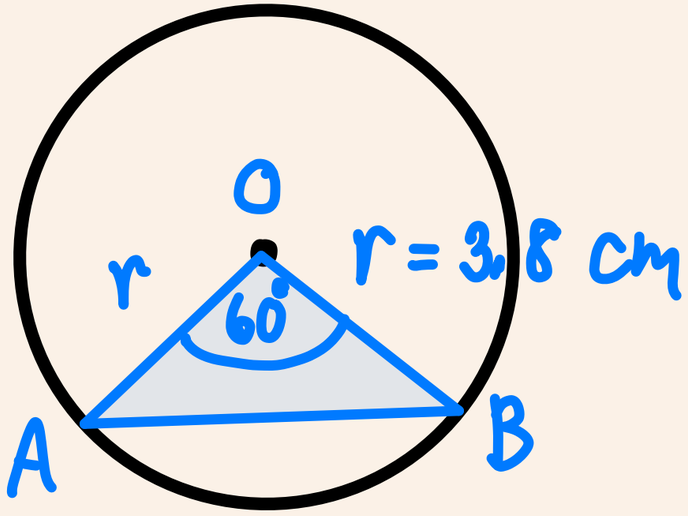
Ex.



Ex.



Sector area =

Area of triangle OAB =

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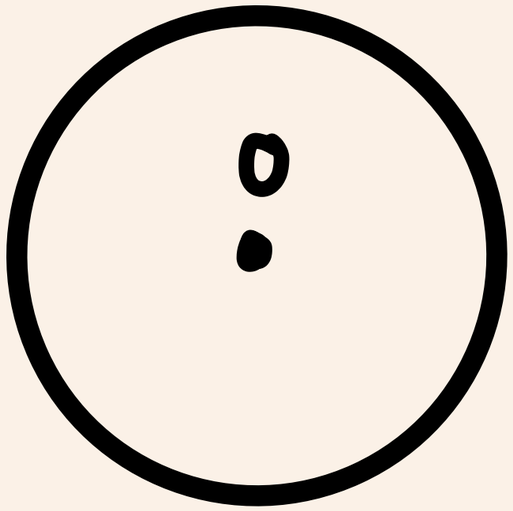
Recap

Circle



Segment area = Sector area - Area of triangle

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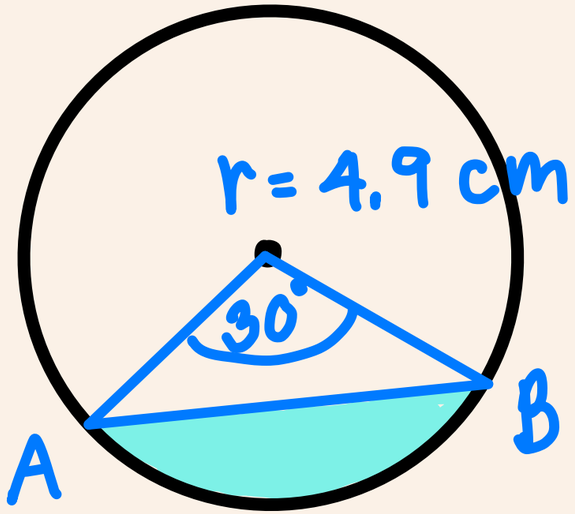
Ex.



Segment area =

Calculator

RESET

TOPMaths
A* Level

Casio fx-991ES Plus

Shift

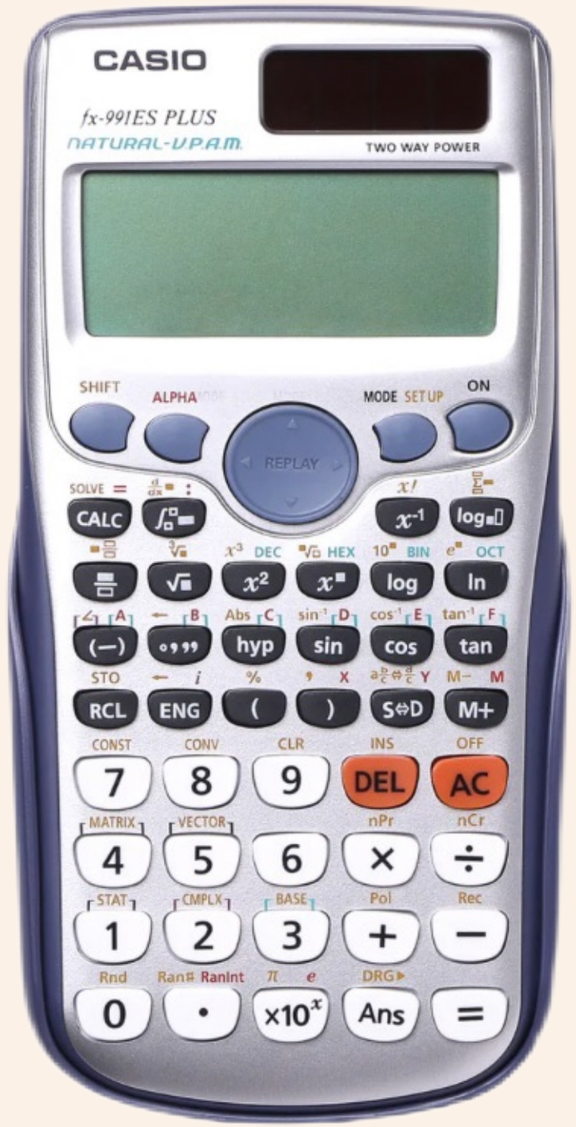
CLR

9

3:All

=

AC



Casio fx-991EX Classwiz

Shift

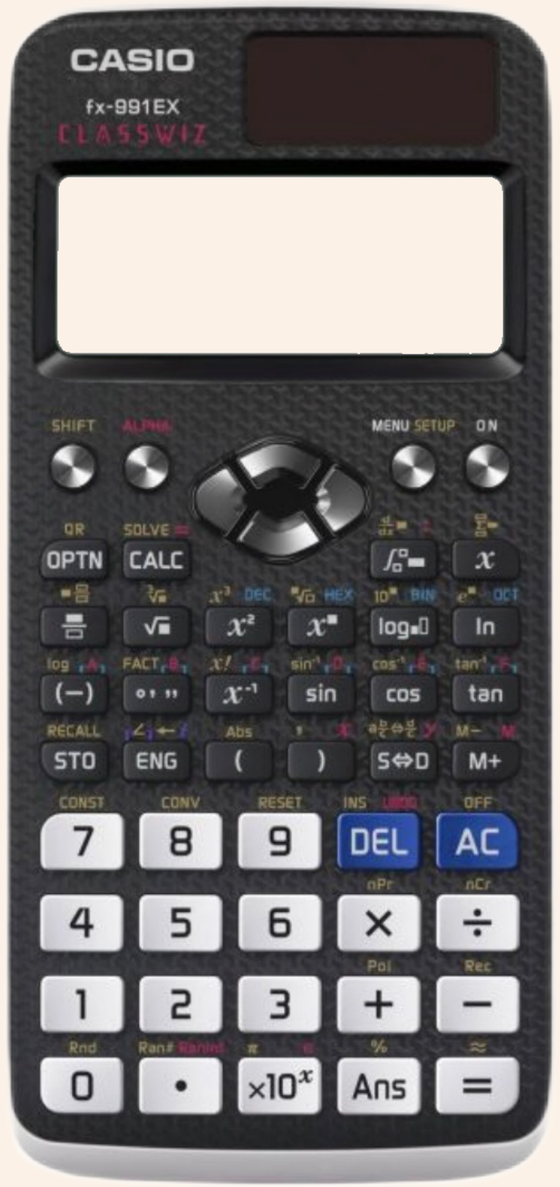
RESET

9

3:Initialize All

=

AC



Calculator

Degrees and Radians

TOPMaths
A* Level

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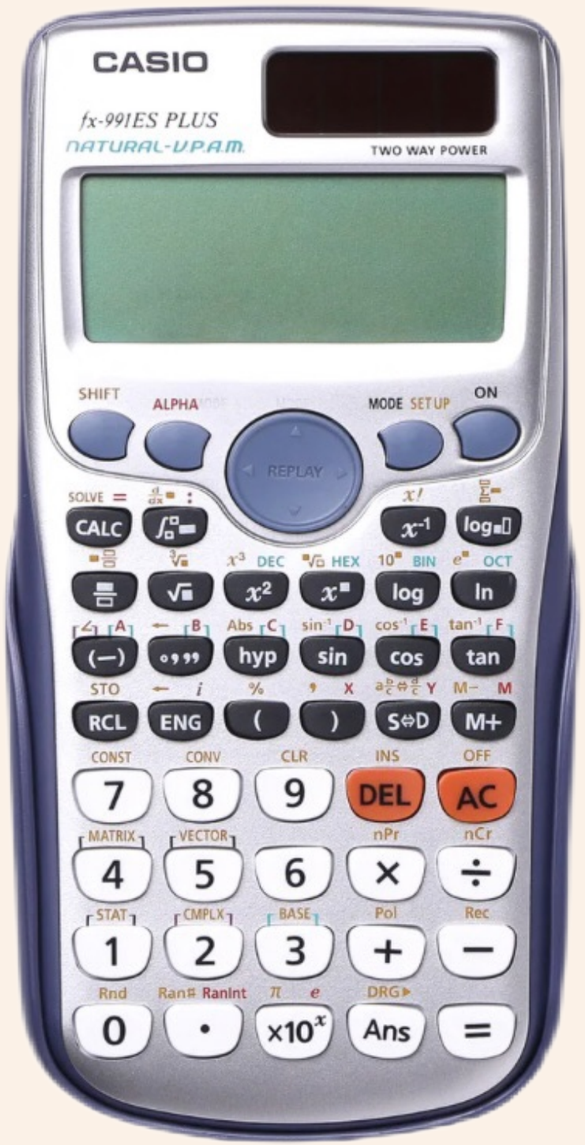
Shift

Mode/Set up

3:Deg or 4:Rad

↓ D ↓ R



Casio fx-991EX Classwiz

Shift

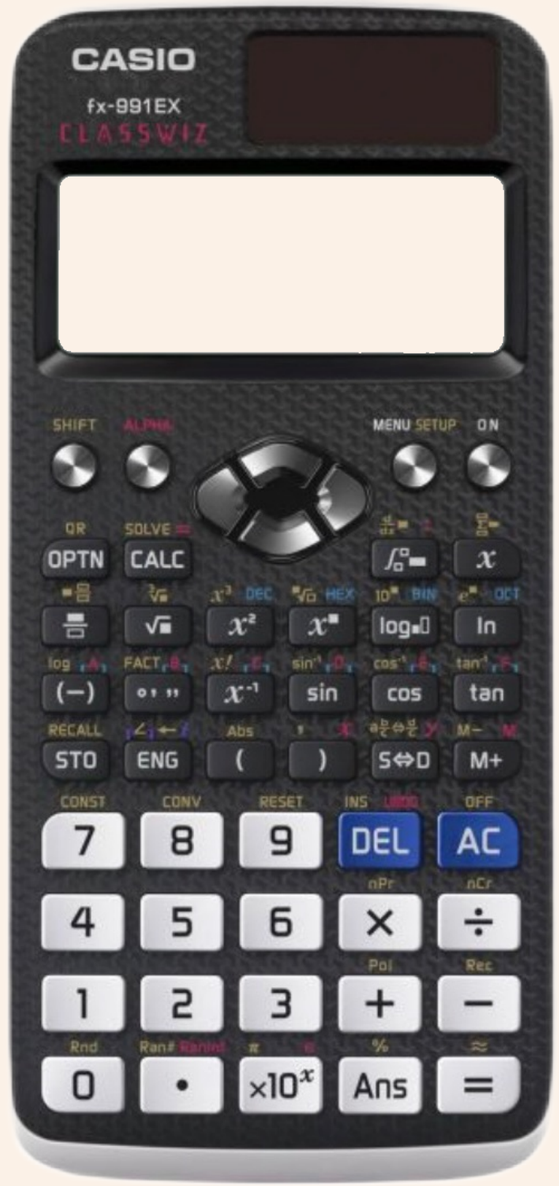
Menu/Set up

2:Angle Unit

1:Degree → D

or

2:Radian → R



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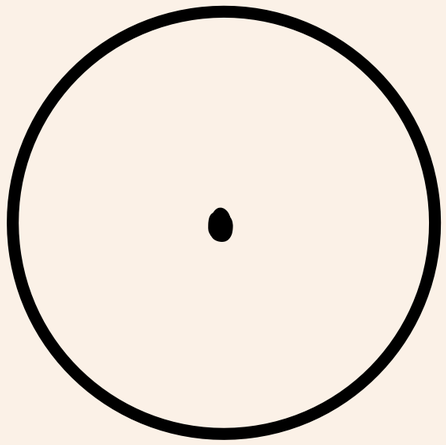
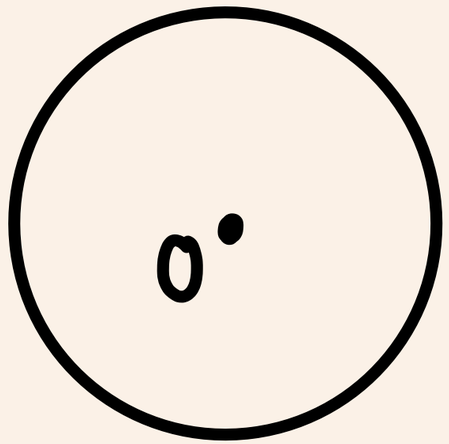
A* Level

Radians





Arc length cm = radian = rad =

Arc length cm = radians

D Degree

R Radian

Radians

Ex. Change degrees into radians.

a) 120°

b) 315°

Ex. Change radians into degrees.

a) $\frac{3\pi}{4}$

b) 2.15

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A* Level

Important angles

$360^\circ = 2\pi$ radians

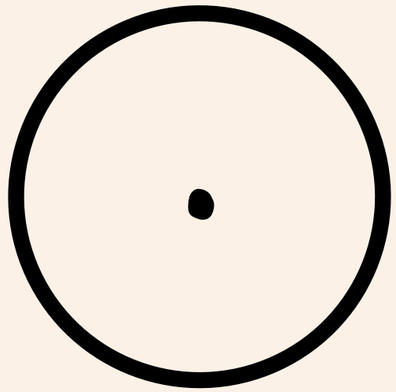
$180^\circ = \pi$ radians

$60^\circ = \frac{\pi}{3}$ radians

$45^\circ = \frac{\pi}{4}$ radians

$30^\circ = \frac{\pi}{6}$ radians

Arc length



Arc length =

(θ is radian.)

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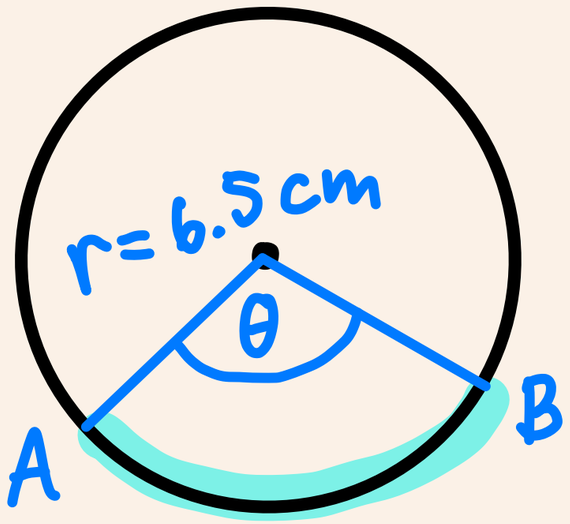
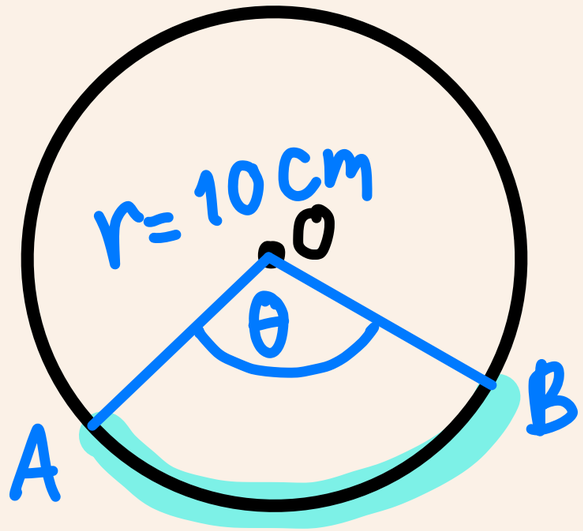
Ex.



θ = 3.12 radians

Length of Minor Arc AB = ?

Ex.



Minor Arc AB = 28.5 cm

Angle AOB = ?

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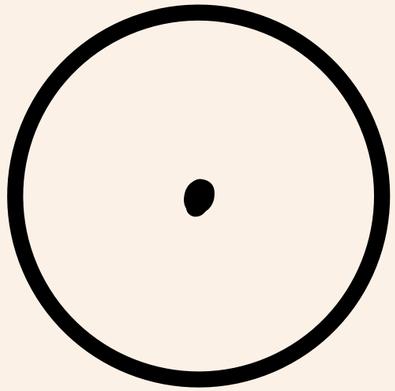
Sector area



Sector area =

$$\frac{1}{2}r^2\theta$$

(θ is radian.)

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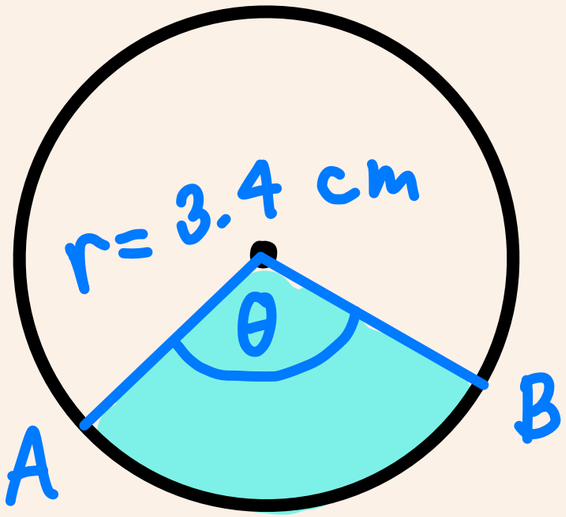
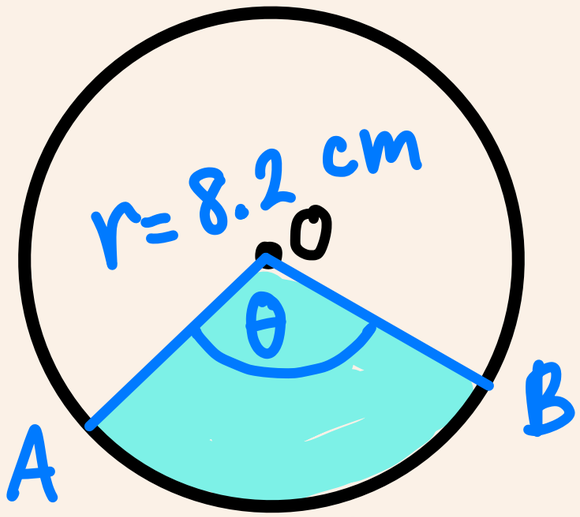
Ex.



θ = 1.4 radians

Area of minor sector = ?

Ex.



Area of sector AOB = 32.4cm^2

Angle AOB = ?

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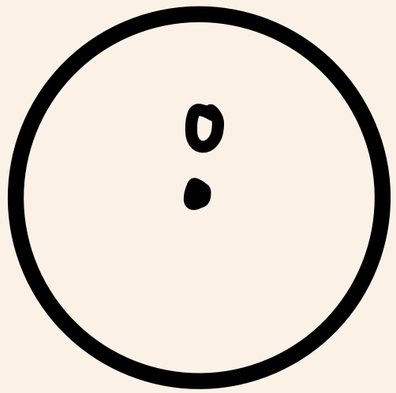
Segment area



Segment area = Sector area - Area of triangle

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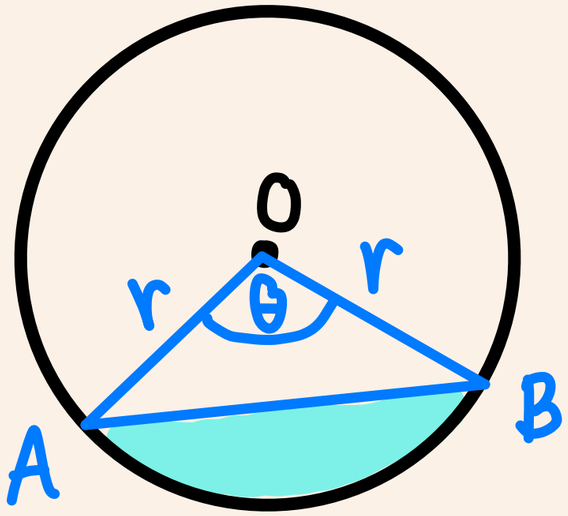
Ex.



$r = 7.6$ cm

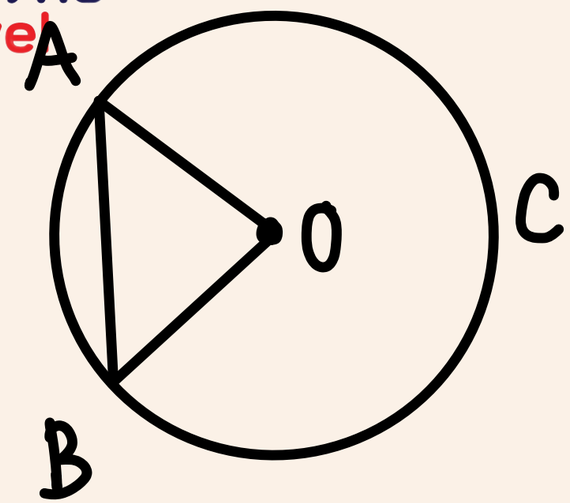
$\theta = 3.05$ radians

Area of shaded segment = ?

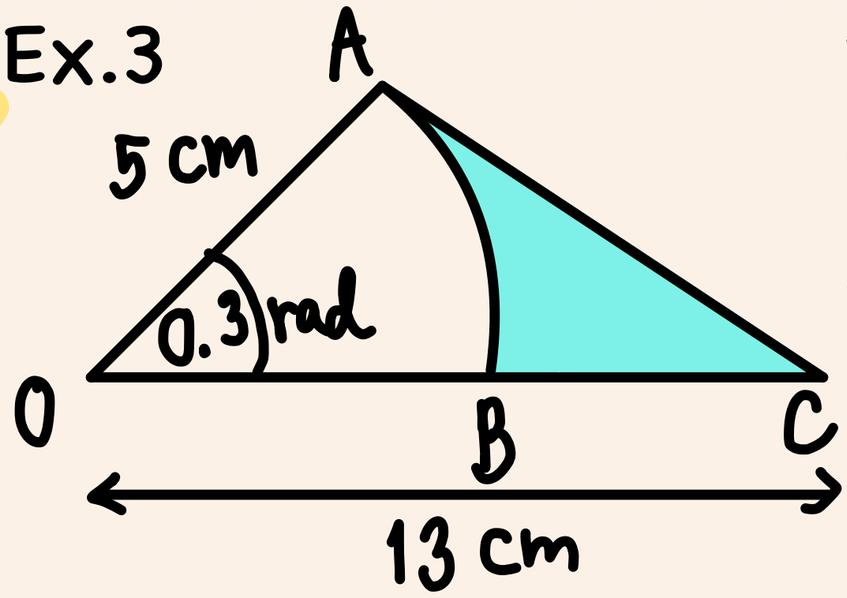
TOPMaths
A* Level

Ex.1 An arc AB of a circle, with centre O and radius 2.5 cm, subtends an angle of 3.1 radians at O. Calculate the perimeter of the sector OAB.

Ex.2 A circle, with centre O, has a radius 4 cm. A chord AB has a length of 4.8 cm. Find the length of major arc ACB.



Ex.3



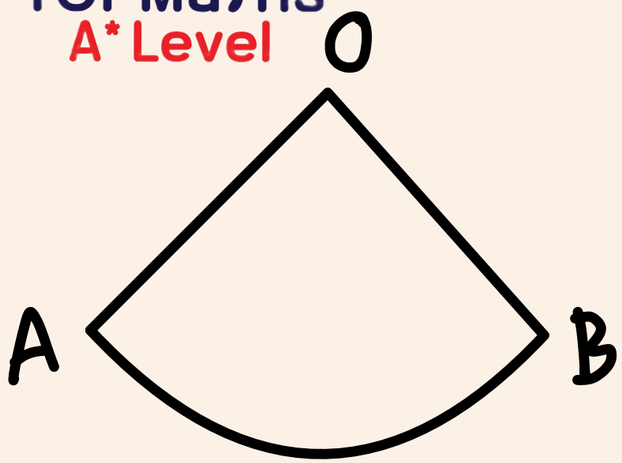
The diagram consists of a triangle OAC, with OA = 5 cm, OC = 13 cm and an arc AB of a circle, with centre O and radius 5 cm. An angle AOB is 0.3 radians.

a) find the length of arc AB

b) find the perimeter of the shaded regions.

Give your answer to 3 significant figures.

Ex.4 A sector of a circle, with centre O, has a radius of 54 m. The perimeter of a sector is 228 m. Calculate the area of the sector.



TOPMaths
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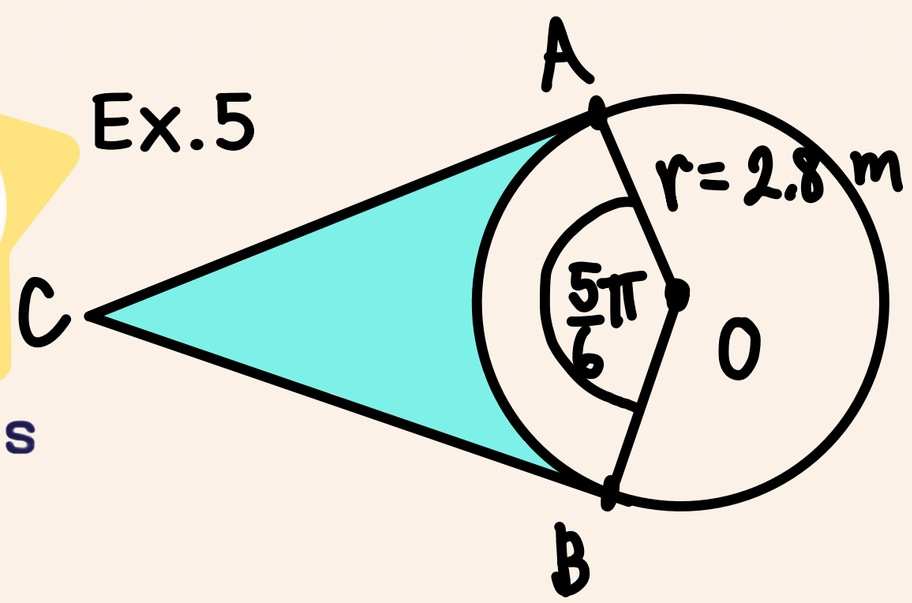
Ex.5



AC and BC are tangents to a circle, centre O and radius 2.8 m. The angle AOB is $\frac{5\pi}{6}$ radians. Work out the area of shaded region.

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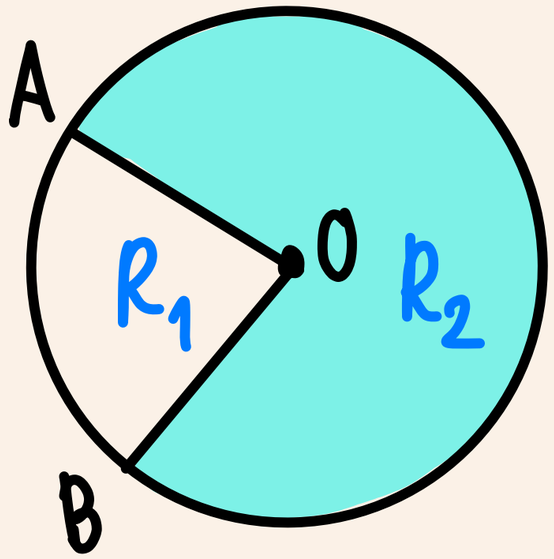
Ex.6



A circle, with centre O has a radius 12 cm. The length of a minor arc is 33.6 cm.

a) Find the acute angle AOB.

b) Find the ratio of Area R1 : Area R2 in the form 1:n where n is correct to 3 s.f.

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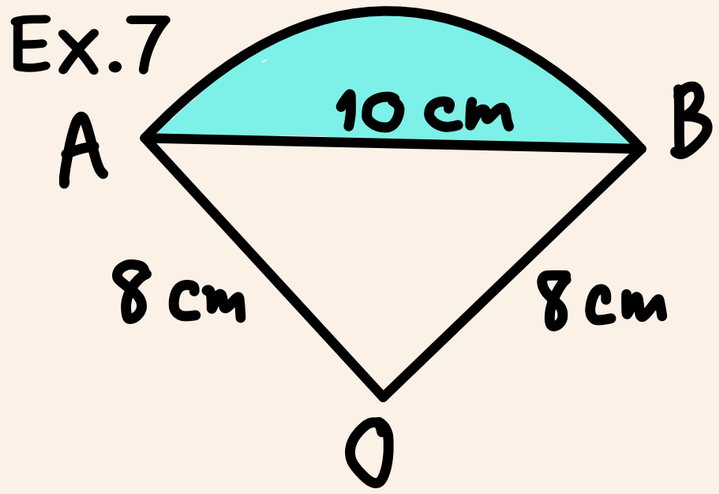
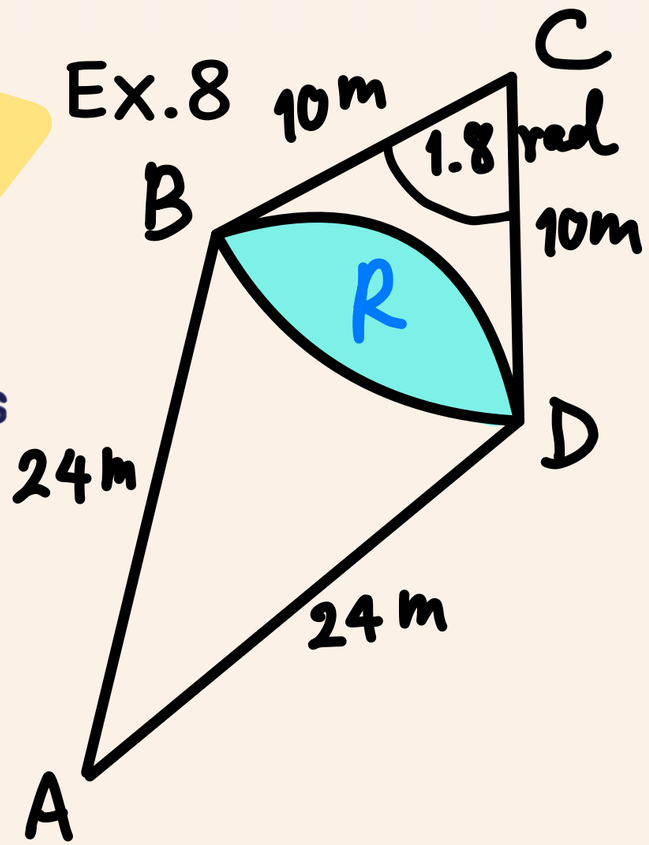
Ex.7



A sector of a circle, with centre O has a radius 8 cm. The chord AB is 10 cm long. Calculate the shaded segment area.

TOPMaths
A* Level

Ex.8



Sector ABD has a radius of 24 m. Sector BCD has a radius of 10 m and subtended by an angle 1.8 radians. Two sectors intersect at points B and D. Find the shaded area R.

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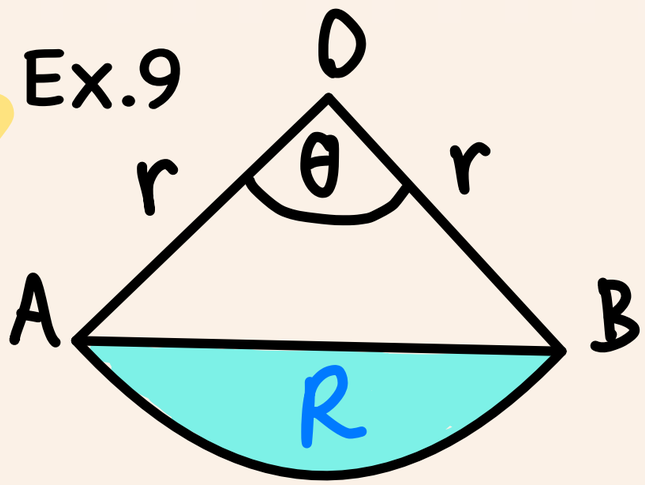
Ex.9



OAB is a sector of a circle of radius r cm. The area of the sector is 25 cm^2 and angle AOB is 0.5 radians.

a) Find the radius, r.

b) Calculate the area of R to 3 s.f.

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Conclusion

1) Circumference of circle = $\pi d = 2\pi r$

2) Area of circle = πr^2

3) $180^\circ = \pi$ radians

4) Arc length = $\frac{\theta^\circ}{360^\circ} \times 2\pi r$ ➡ $L = r\theta$ (θ is radian.)

5) Sector area = $\frac{\theta^\circ}{360^\circ} \times \pi r^2$ ➡ $A = \frac{1}{2}r^2\theta$ (θ is radian.)

6) Area of triangle = $\frac{1}{2}ab\sin(C) = \frac{1}{2} \times r \times r \times \sin(\theta)$

7) Segment area = Sector area - Area of triangle

$= \frac{\theta^\circ}{360^\circ} \times \pi r^2 - \frac{1}{2} \times r \times r \times \sin(\theta)$ ➡ $\frac{1}{2}r^2\theta - \frac{1}{2} \times r \times r \times \sin(\theta)$

(θ is radian.)