1 Convert to degrees:

a $\frac{\pi}{5}$ **b** $\frac{2\pi}{3}$ **c** $\frac{5\pi}{4}$ **d** $\frac{7\pi}{6}$ **e** 3π

f $\frac{7\pi}{9}$ **g** $\frac{4\pi}{3}$ **h** $\frac{7\pi}{3}$ **i** $\frac{\pi}{9}$ **j** $\frac{5\pi}{18}$

2 Convert to radians in terms of π:

a 135° **b** 30° **c** 150° **d** 240° **e** 300°

f 63° **g** 15° **h** 450° **i** 225° **j** 120°

3 Change to radians, correct to 2 decimal places:

a 56° **b** 68° **c** 127° **d** 289° **e** 312°

4 Change to radians, correct to 2 decimal places:

a 18°34′ **b** 35°12′ **c** 101°56′ **d** 88°29′ **e** 50°39′

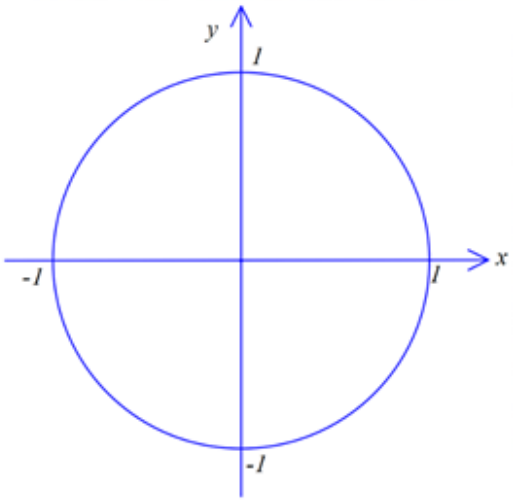
5 Convert each radian measure into degrees and minutes, to the nearest minute:

a 1.09 **b** 0.768 **c** 1.16 **d** 0.99 **e** 0.32

6 Find correct to 2 decimal places:

a sin 0.342 **b** cos 1.5 **c** tan 0.056 **d** cos 0.589 **e** tan 2.29

ALL EXACT VALUES FROM ANGLES IN RADIANS



Angle in radians	Sine	Cosine	Tangent
0			
$\frac{\pi}{6}$			
$\frac{\pi}{4}$			
$\frac{\pi}{3}$			
$\frac{\pi}{2}$			
$\frac{2\pi}{3}$			
$\frac{3\pi}{4}$			
$\frac{5\pi}{6}$			
π			
$\frac{7\pi}{6}$			
$\frac{5\pi}{4}$			
$\frac{4\pi}{3}$			
$\frac{3\pi}{2}$			
$\frac{5\pi}{3}$			
$\frac{7\pi}{4}$			
$\frac{11\pi}{6}$			
2π			

1 Find the exact arc length of a circle with:

a radius 4 cm and angle subtended π

b radius 3 m and angle subtended $\frac{\pi}{3}$

c radius 10 cm and angle subtended $\frac{5\pi}{6}$

2 Find the arc length, correct to 2 decimal places, given:

a radius 1.5 m and angle subtended 0.43

b radius 3.21 cm and angle subtended 1.22

3 The angle subtended at the centre of a circle of radius 3.4 m is 29°51′. Find the length of the arc cut off by this angle, correct to 1 decimal place.

4 The arc length when a sector of a circle is subtended by an angle of $\frac{\pi}{5}$ at the centre is $\frac{3\pi}{2}$ m. Find the radius of the circle.

5 The radius of a circle is 3 cm and an arc is $\frac{2\pi}{7}$ cm long. Find the angle subtended at the centre of the circle by the arc.

7 A circle with area 60 cm^2 has an arc 8 cm long. Find the angle that is subtended at the centre of the circle by the arc.

8 A circle with circumference 124 mm has a chord cut off it that subtends an angle of 40° at the centre. Find the length of the arc cut off by the chord.

1 Find the exact area of the sector of a circle whose radius is:

a 4 cm and the subtended angle is π

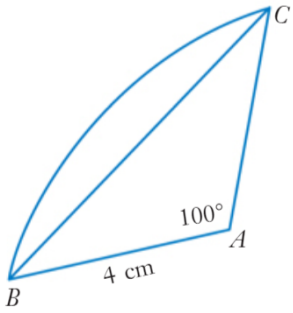
b 3 m and the subtended angle is $\frac{\pi}{3}$

c 10 cm and the subtended angle is $\frac{5\pi}{6}$

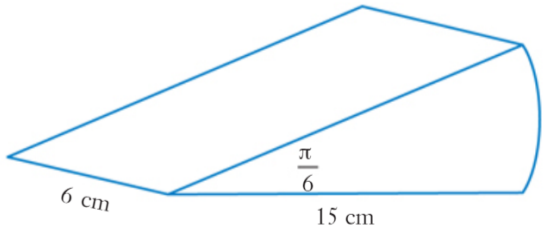
d 3 cm and the subtended angle is 30°

10 The area of a sector is $\frac{3\pi}{10}$ cm^2 and the arc length cut off by the sector is $\frac{\pi}{5}$ cm.
Find the angle subtended at the centre of the circle and the radius of the circle.

16 Arc BC subtends an angle of 100° at the centre A of a circle with radius 4 cm. Find the perimeter of sector ABC.



17 A wedge is cut so that its cross-sectional area is a sector of a circle with radius 15 cm and subtending an angle of $\frac{\pi}{6}$ at the centre. Find the exact volume of the wedge.

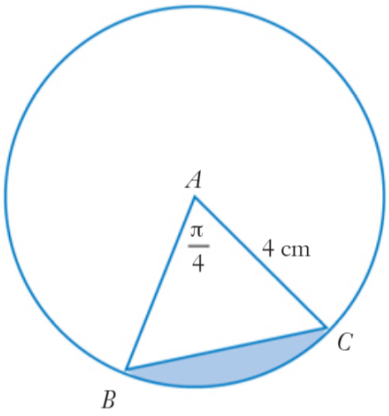


14 **a** Find the area of the sector of a circle with radius 4 cm if the angle subtended at the centre is $\frac{\pi}{4}$.

b Find the length of BC to 1 decimal place.

c Find the exact area of triangle ABC.

d Hence find the exact area of the shaded minor segment of the circle.



15 A triangle OAB is formed where O is the centre of a circle of radius 12 cm and A and B are endpoints of a 15 cm chord.

a Find the angle subtended at the centre of the circle, in degrees and minutes.

b Find the area of ΔOAB correct to 1 decimal place.

c Find the area of the minor segment cut off by the chord, correct to 2 decimal places.

d Find the area of the major segment cut off by the chord, correct to 2 decimal places.