

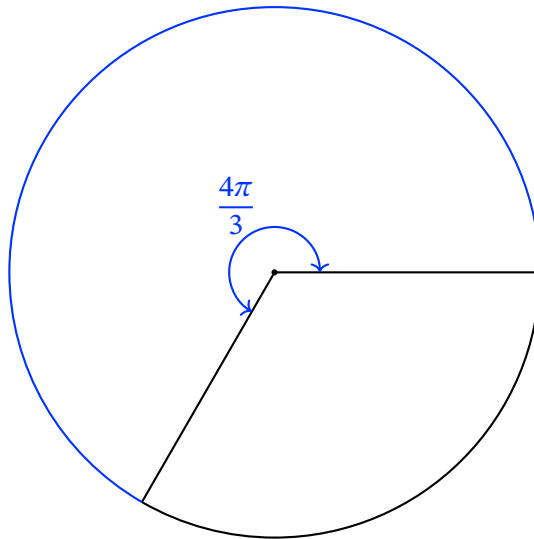
# Worksheet: Arc Length



In this worksheet, we will practice finding the length of an arc subtended by a given central angle and finding the central angle subtended by a given arc.

**Q1:**

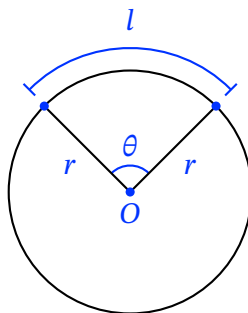
Find the length of the blue arc given the radius of the circle is 8 cm. Give the answer to one decimal place.



**Q2:**

An arc has a measure of  $\frac{2\pi}{3}$  radians and a radius of 9. Work out the length of the arc, giving your answer in terms of  $\pi$ , in its simplest form.

**Q3:** For the given figure,  $O$  is the center of the circle and  $\theta$  is the measure of arc  $l$ .



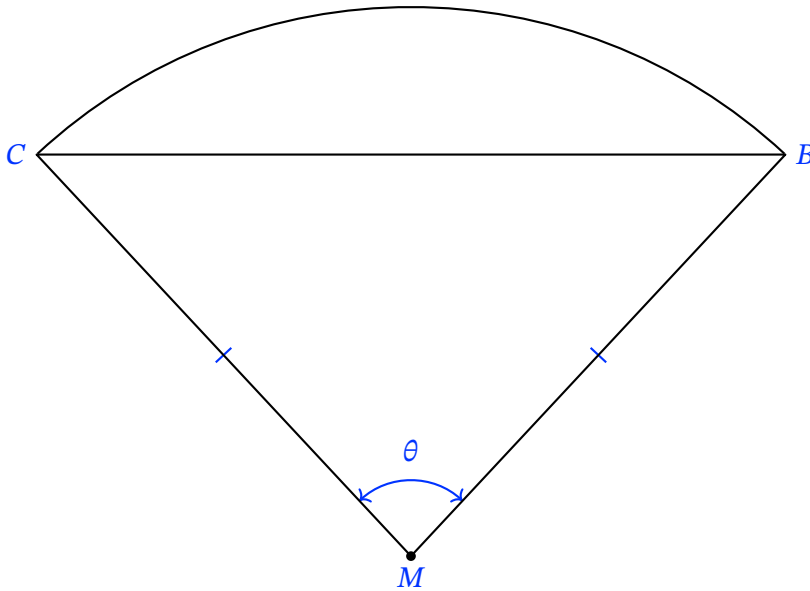
▶  
Write down an expression for the circumference of the circle.

▶  
If  $\theta$  is measured in degrees, what fraction of the circle's circumference is arc  $l$ ?

▶  
Write an expression for the length of arc  $l$ , given that  $\theta$  is measured in degrees.

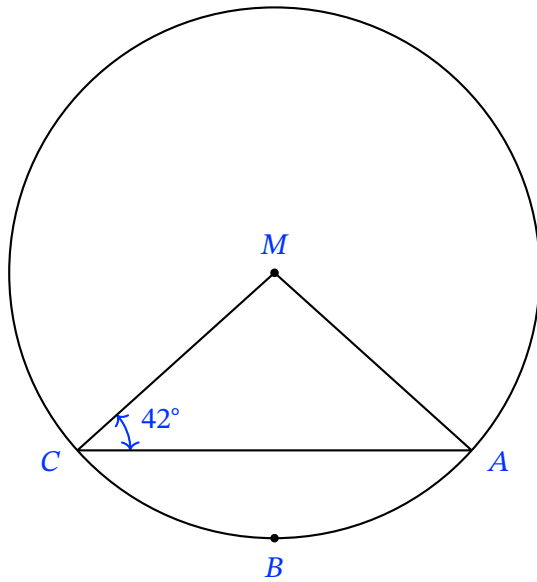
**Q4:**

Circle  $M$  has a radius of 12 cm where the length of  $\overline{CB}$  is 16 cm. Find the length of arc  $CB$  giving the answer to two decimal places.



**Q5:**

Given that  $AM = 11$  cm, find the length of  $\widehat{ABC}$  rounded to the nearest integer.

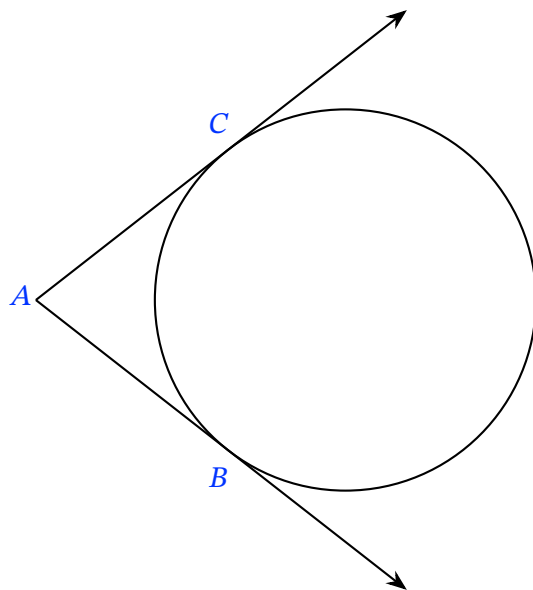


**Q6:**

Write an expression for the length of an arc whose measure is  $\theta$  radians, knowing that the expression for the length of an arc in degrees is  $\frac{2\pi r\theta}{360}$ .

**Q7:**

If  $m\angle A = 76^\circ$  and the radius of the circle equals 3 cm, find the length of the major arc  $BC$ .



**Q8:**

An arc has a measure of  $\frac{\pi}{8}$  radians and a radius of 6. Work out the length of the arc, giving your answer in terms of  $\pi$ , in its simplest form.

**Q9:**

What is the length of the arc subtended by a central angle of  $261^\circ$  on a circle of radius  $r$ ?

**Q10:**

An arc on a circle with a radius of 50 has a length of 115. Determine the arc's measure to the nearest tenth of a degree.

**Q11:**

A circle has a radius of 7.22 cm. Find the central angle that subtends an arc of length 12.53 cm, giving the answer to the nearest second.

**Q12:**

The length of an arc in a circle is  $1.2r$  where  $r$  is the radius of the circle. Find the central angle subtending the arc in radians giving the answer to one decimal place.

**Q13:**

An arc in a circle measures  $\frac{1}{6}\pi r$ . What angle does it subtend?

**Q14:**

What angle is subtended by an arc of length 20 in a circle of circumference 80?

**Q15:**

An arc covers  $\frac{2}{9}$  of a circle's circumference and the circle has a radius of 78 cm. Find, to the nearest hundredth, the measure and the length of the arc, using  $\frac{22}{7}$  as an approximation for  $\pi$ .

A  $80^\circ$ , 54.45 cm

B  $80^\circ$ , 108.91 cm

C  $40^\circ$ , 54.45 cm

D  $40^\circ$ , 108.91 cm

**Q16:**

The length of an arc in a circle is  $2r$  where  $r$  is the radius of the circle. Find the central angle subtending the arc in degrees giving the answer to the nearest second.

**Q17:**

The radius of a sundial is 15 cm and the shadow changes at a rate of  $15^\circ$  every hour. Find in terms of  $\pi$  the arc length of the rotation of the shadow after 2 hours.

**Q18:**

The radius of a circle is 15 cm and the arc length of a sector is 16 cm. Find the central angle giving the answer to the nearest second.

**Q19:**

A circle has a central angle of  $64^\circ 54' 58''$  which subtends an arc of length  $4\pi$  cm. Find the diameter of the circle to the nearest centimetre.

**Q20:**

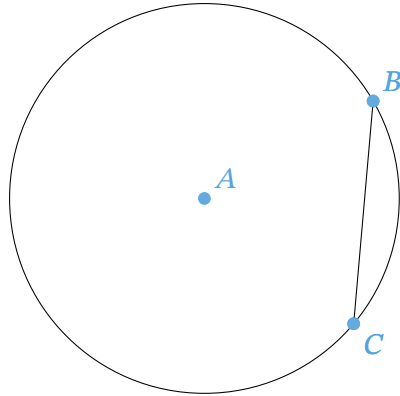
Calculate the length of an arc on Earth's surface that subtends an angle of 7 minutes at Earth's center knowing that 1 minute =  $\frac{1}{60}$  degrees of a degree. Take Earth's radius to be 3 960 miles.

**Q21:**

The area of a circular sector is  $815.1 \text{ cm}^2$  and the central angle is  $62^\circ$ . Find the arc length of the sector giving the answer to the nearest centimetre.

**Q22:**

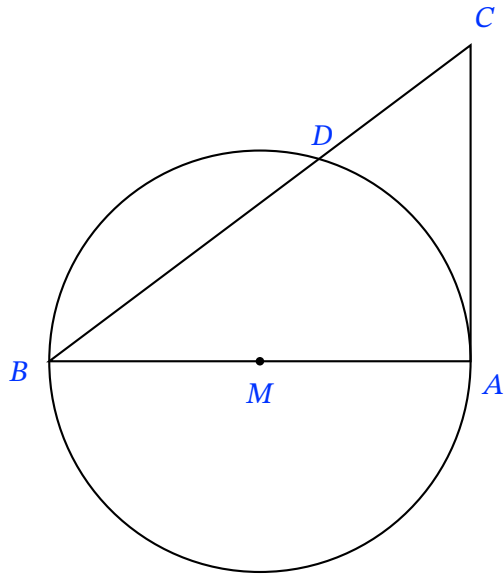
In the given figure, which of the following would represent the minor arc passing through  $B$  and  $C$ ?



- A  $\overleftrightarrow{BC}$
- B  $\overrightarrow{CB}$
- C  $\overrightarrow{BC}$
- D  $\widehat{BC}$
- E  $\overline{BC}$

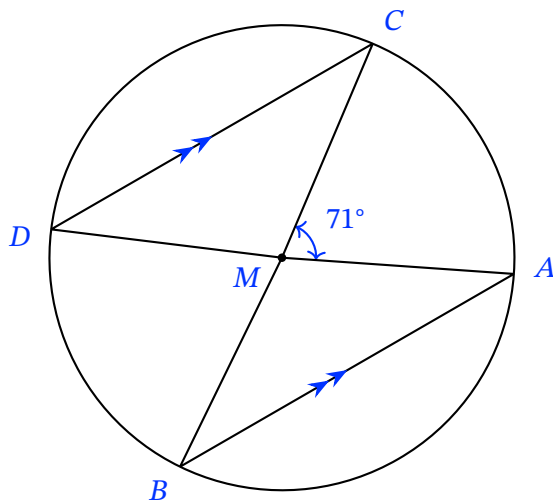
**Q23:**

Given that  $\overrightarrow{AC}$  is a tangent to the circle  $M$ , where it touches it at the point  $A$ ,  $BM = 36$  cm, and  $AC = 54$  cm, find the length of  $\overline{AD}$ .



**Q24:**

$M$  is a circle of radius 19 cm. Determine, to the nearest hundredth, the length of  $\widehat{BD}$ .



**Q25:**

Determine, to the nearest hundredth, the length of  $\widehat{ZY}$ .

