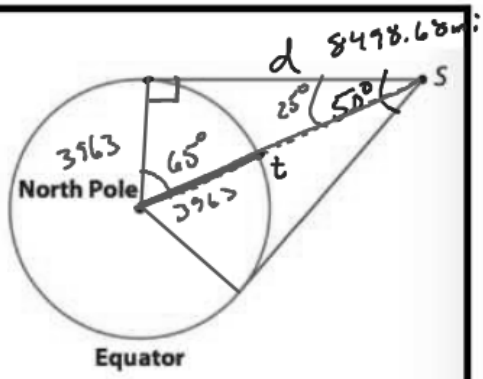
SOH-CAH-TOA

Suppose a satellite is located in space at point S. In this view of Earth in the plane of the equator, the angle between the lines of sight at S is 50°. The radius of the Earth is 3,963 miles.



1847.97

What is the distance from S to the horizontal along the equator, that is, the length of a tangent from S to the Earth's surface along the equator?

$d(\tan 25°) = \left(\frac{3963}{d}\right)d$

$\tan 65° = \frac{d}{3963}$

$d = 3963 \cdot \tan 65°$

$d \cdot \tan 25° = 3963$

$d = \frac{3963}{\tan 25}$

8498.68 mi

How high is the satellite S above Earth's surface, that is, the length of a segment S to the closest point on Earth's surface along the equator?

$(3963)^2 + (8498.68)^2 = c^2$

$C - r = ST$

9377.256 − 3963

5414.256 mi

Measure of Central Angle is the same as intercepted arc.

Chords, Arcs, and Central Angles

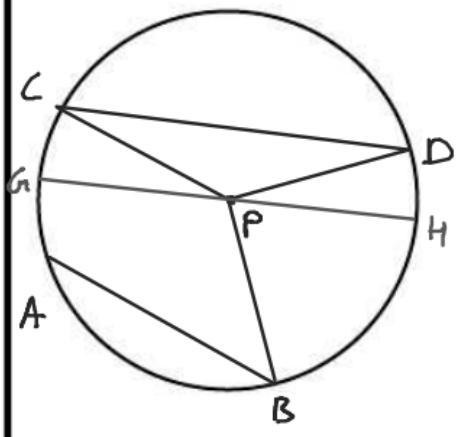
Chords – Line segment with endpoints on Circle.

Central Angle – ∠ with Vertex at center of ⊙

Minor Arc – $0°$ and $180°$
$0 < x < 180$

Major Arc – $180° - 360°$
$180 < x < 360$

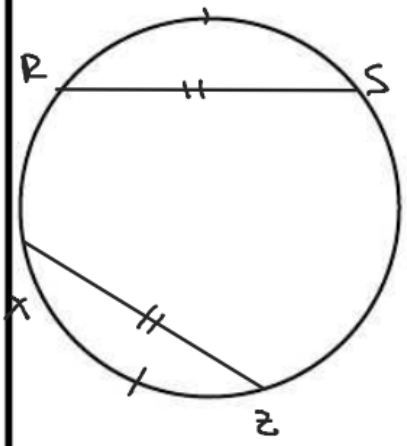
Semicircle → $180°$
Half Circle



Central ∠'s → ∠CPB
∠GPD

minor arc → $\overset{\frown}{AB}$ $\overset{\frown}{CD}$ $\overset{\frown}{BD}$

major arc – $\overset{\frown}{BDC}$ $\overset{\frown}{DAC}$ $\overset{\frown}{ABC}$



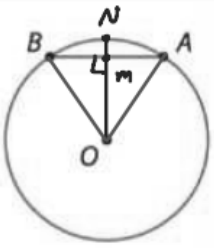
$\overset{\frown}{RS} \cong \overset{\frown}{XZ}$

$\overline{RS} \cong \overline{XZ}$

Congruent Arcs

Relationships between Chords

Given the figure at the right.



Estimate the midpoint M on segment $\overline{AB}$ and label that point.

Draw a line through O and M so that $\overline{OM} \perp \overline{AB}$.

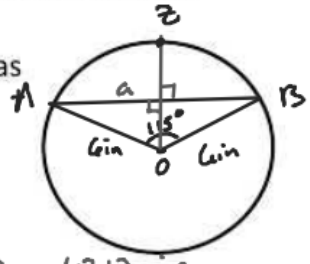
What Three things happen?

- Bisect Chord $\overline{AM} \cong \overline{BM}$
- Bisect Intercepted arc $\overset{\frown}{AN} \cong \overset{\frown}{BN}$
- Bisect Central Angle $\angle AOM \cong \angle BOM$

SOH-CAH-TOH

Suppose that a given circle has a radius of 6 inches.

What is the length of a chord that has a central angle of 115°?



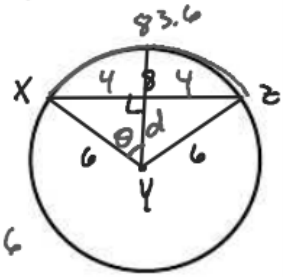
$\sin 57.5^\circ = \frac{a}{6}$

$a = 6 \sin 57.5$

$a = 5.06$

Chord $2(5.06) = 10.12$ in

What is the measure of the arc of a chord that is 8 inches long? What is the perpendicular distance from the center of the circle to the chord?



$d^2 + 4^2 = 6^2$

$d^2 + 16 = 36$

$d^2 = 20$

$d = \sqrt{20} \approx 4.47$

$m\overset{\frown}{XZ} = 83.6$

$m\angle XYZ = 83.6$

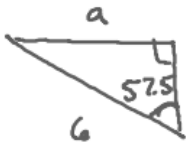
$\sin\theta = \frac{4}{6}$

$\sin^{-1}\frac{4}{6} = \theta$

$\theta = 41.8$

Congruent Chords

- Have $\cong$ intercepted Arc
- Same Distance from center



θ → theta

Angle measure

Inverse trig Function

$\sin^{-1}$ $\cos^{-1}$ $\tan^{-1}$