# Starter

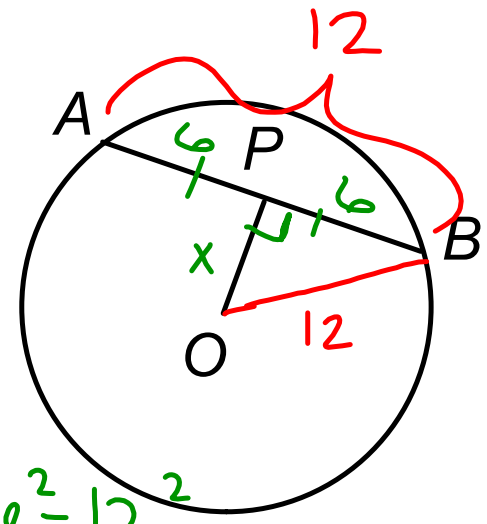
Given: Circle O

r = 12

AB = 12

OP ⊥ AB

Find: OP




$x^2 + 6^2 = 12^2$

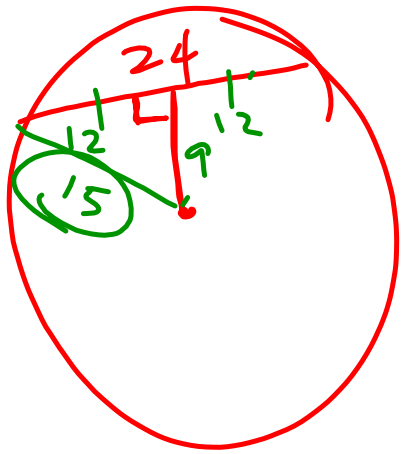
$x^2 + 36 = 144$

$\sqrt{x^2} = \sqrt{108}$

$x = \sqrt{108}$

p443 #12

Find r, if 24 cm chord is 9 cm from the center.

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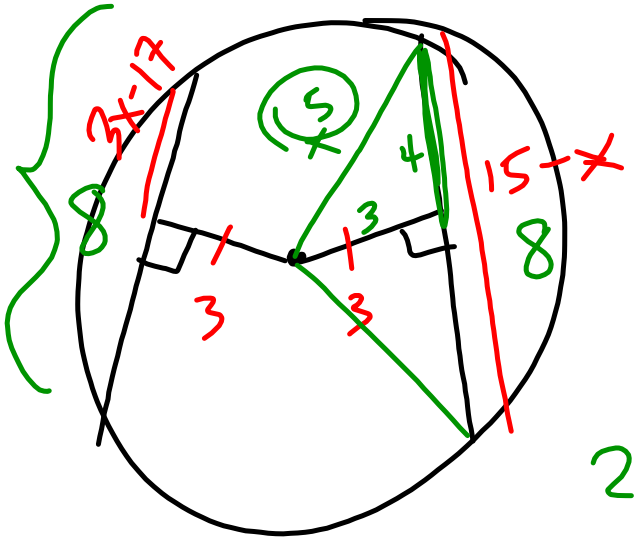



$$2(3x-17)=15-x$$

$$6x-34=15-x$$

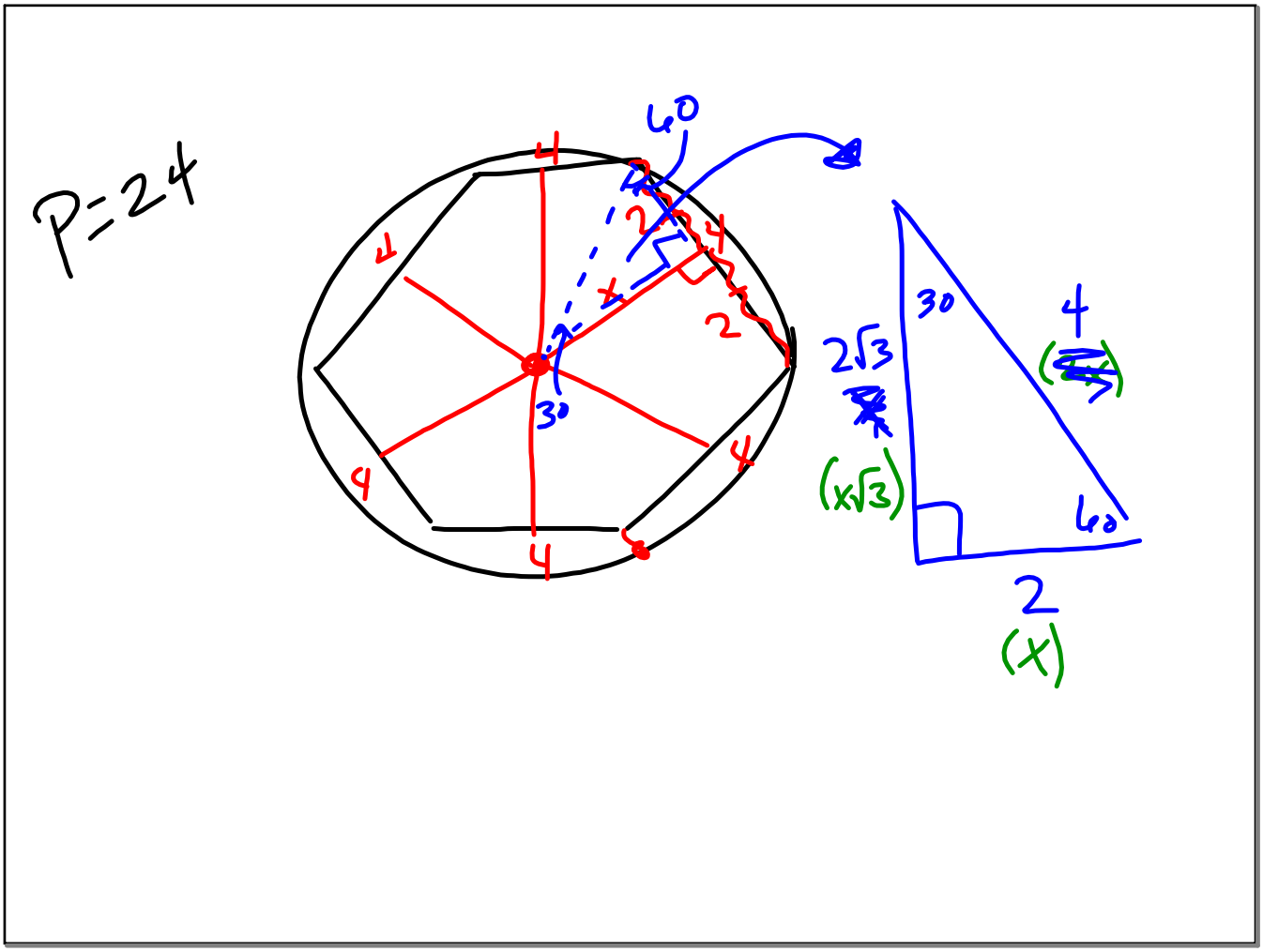
$$+x \quad +x$$

$$7x-34=15$$

$$+34 \quad +34$$

$$7x=49$$

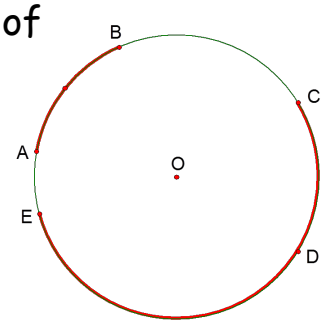
$$x=7$$


P=24
4
4
4
4
4
4
60
2
2
x
30
2
30
4
(4)
2√3
(x√3)
60
2
(x)

# The Circle and their Arcs

## ARC

- An arc consists of two points on a circle and all of the points on the circle needed to connect the points by a single path




## Center of an ARC

- The center of an arc is the center of the circle of which the arc is a part.

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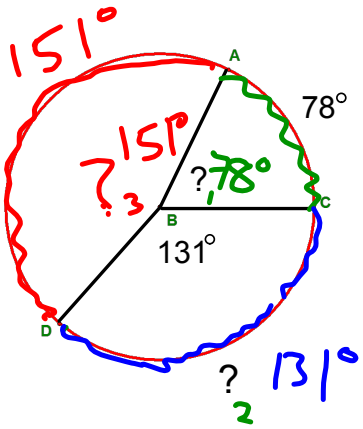
## Central Angle

A central angle is an angle whose vertex is at the center of a circle.

The measure of a central angle is equal to the measure of it's intercepted arc!

Note: the measure of a central angle is less than 180 degrees

$49 < ? < 180$

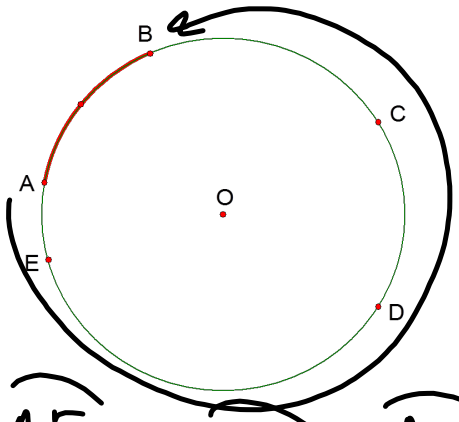


## Minor ARC

- The measure of a minor arc is always less than 180 degrees

$\overset{\frown}{AB}$

A minor arc is named with its endpoints.




$\overset{\frown}{AEB}$, $\overset{\frown}{ADB}$, $\overset{\frown}{ACB}$

The measure of the minor arc is indicated by $m\overset{\frown}{AB}$

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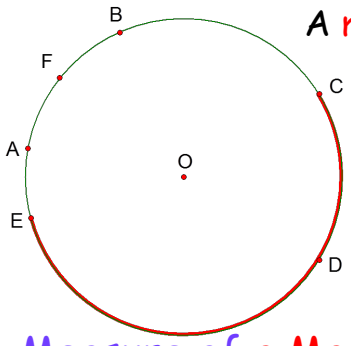
## Major ARC

- The measure of a major arc is always greater than 180 degrees




A major arc must be named with three points on the circle!

## Measure of a Major ARC

- The measure of a major arc is equal to the 360 minus the measure of its central angle

The measure of the major arc is indicated by $m\overset{\frown}{EDC}$

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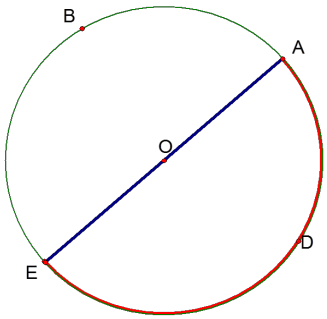
## Semicircle

- A semicircle is an arc whose endpoints are on the diameter of a circle
- The measure of a semicircle is always equal to 180 degrees




A semicircle must be named with three points on the circle!

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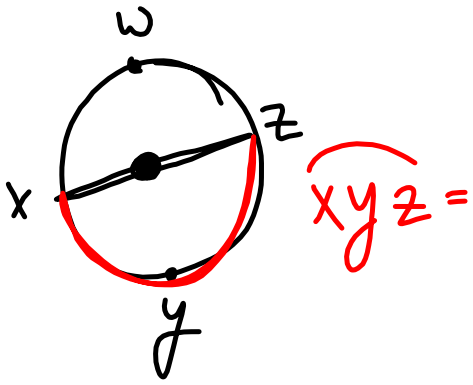
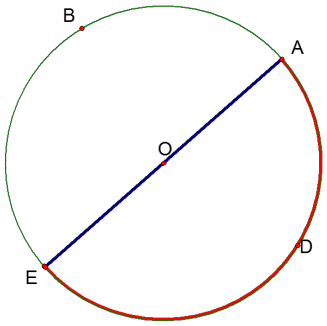
## Congruent Arcs

- Two arcs are congruent whenever they have the same measure and are parts of the same circle or congruent circles.

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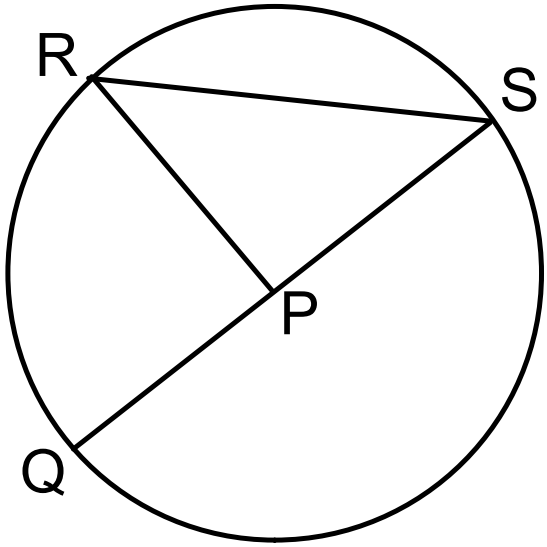
Name each of the following:
(include correct notation!)

1. Radius
2. Diameter
3. Chord
4. Minor arc
5. Major arc
6. Semicircle
7. Central angle

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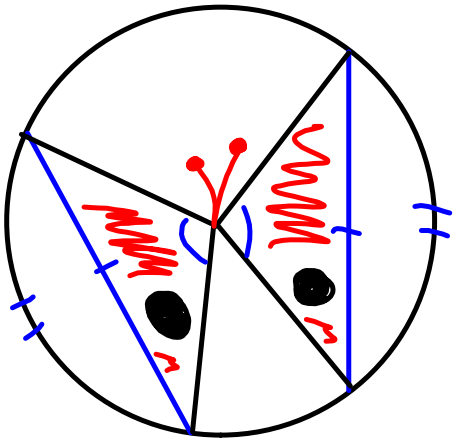
# Theorems

- In the same or congruent circles…

≅ chords ⇔ ≅ arcs ⇔ ≅ central angles



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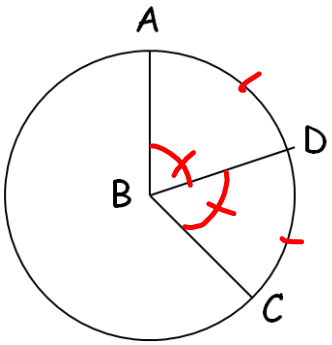
# Example 1

Given: Circle B → B is the center

D is the midpt of arc AC

Conclusion: $\overrightarrow{BD}$ bisects $\angle ABC$




| Statements | Reasons |
|---|---|
| 1. Circle B | 1. Given |
| 2. D is the midpt of arc AC | 2. Given |
| 3. $\overset{\frown}{AD} \cong \overset{\frown}{CD}$ | 3. The midpt of an arc divides the arc into two ≅ arcs |
| 4. $\angle ABD \cong \angle DBC$ | 4. ≅ arcs → ≅ central angles |
| 5. $\overrightarrow{BD}$ bisects $\angle ABC$ | 5. Def of ∠ bisector |

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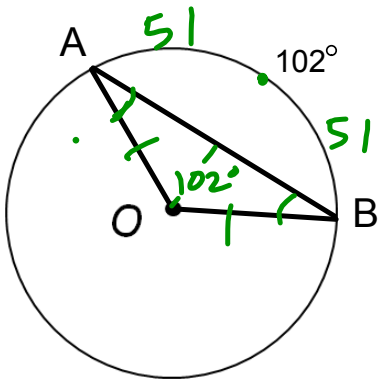
# Example 2

If $m\overset{\frown}{AB} = 102^\circ$ in Circle O, find $m\angle A$ and $m\angle B$ in $\Delta AOB$

39° 39°




$180 - 102 = 78$

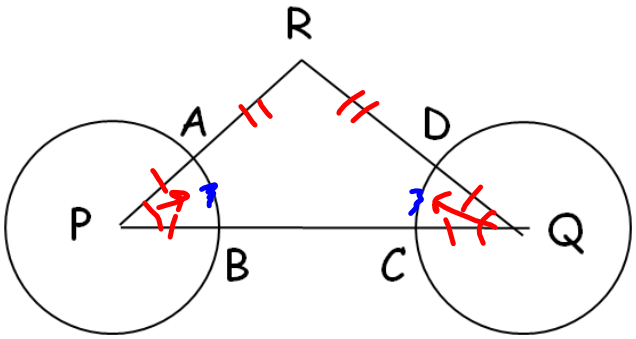
$\frac{78}{2} = 39^\circ$

# Example 3

**Given:** Circle P ≅ Circle Q

$\overline{AR} \cong \overline{RD}$

**Prove:** $\overset{\frown}{AB} \cong \overset{\frown}{CD}$




| Statements | Reasons |
|---|---|
| 1) Circle P ≅ Circle Q | 1) Given |
| 2) AR ≅ RD | 2) Given |
| 3) AP ≅ QD | 3) ≅ circles ⟹ ≅ radii |
| 4) RP ≅ RQ | 4) Addition |
| 5) ∠P ≅ ∠Q | 5) If △ , then △ |
| 6) $\overset{\frown}{AB} \cong \overset{\frown}{CD}$ | 6) ≅ central angles ⟹ ≅ arcs |

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# Example 4

- A) What fractional part of a circle is an arc of 36°?

$\frac{36^\circ}{360^\circ} \rightarrow \boxed{\frac{1}{10}}$

  - Of 200°?

$\frac{200}{360} = \frac{20}{36} \rightarrow \boxed{\frac{5}{9}}$

- B) Find the measure of an arc that is 7/12 of its circle.

$210^\circ$

$\frac{7}{12} \times \frac{210}{360}$ (30)

30

p. 455 #3, 4, 6 - 11, 13, 15, 17

6, 7, 8, 9, 10, 11 Proof P P

# Homework

~~Read p. 499-501, Notecard:~~

- ~~Arc length (formula)~~

~~Read p. 537-538, Notecards:~~

- ~~Definition of sector~~
- ~~Area of sector formula~~
- ~~Definition of segment~~

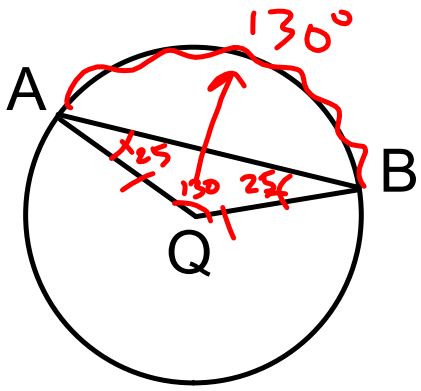
~~Watch the video: Arc length, sector & segment area~~

# EXIT SLIP

Given: Circle Q

$\angle A = 25°$

Find: $m\overset{\frown}{AB}$

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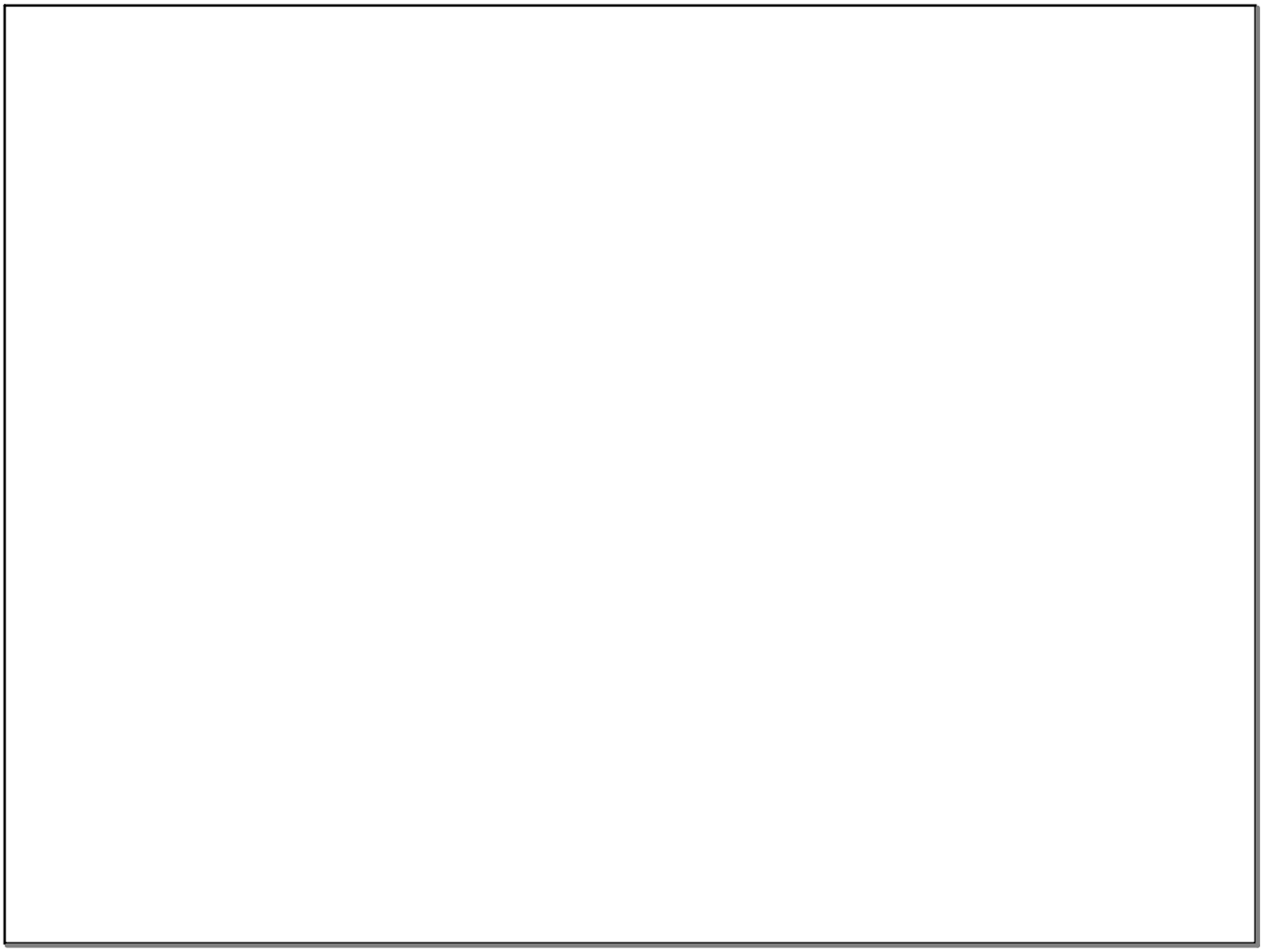

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