Unit 9: Circle Geometry
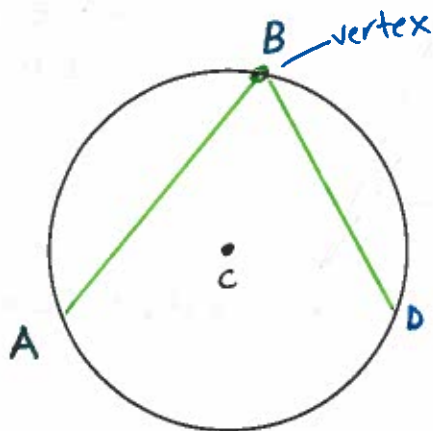## A: Exploring Angles in a Circle

i) **Inscribed Angles**
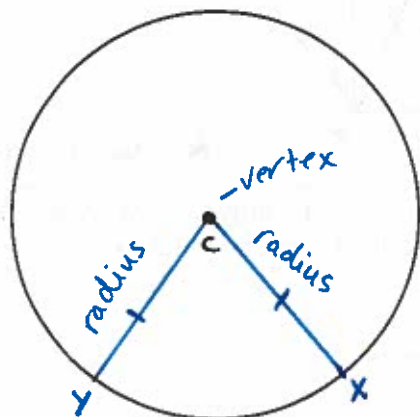- An angle whose vertex is on the circumference and arms are **two** chords.

$\overline{AB}$ is a chord
$\overline{BD}$ is a chord

∠ABD is inscribed

ii) **Central Angle**
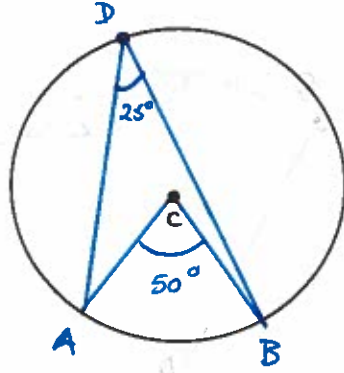- An angle whose vertex is at the centre of the circle and arms are therefore radii.

∠YCX is central

Angles in a Circle Theorem

> **1)**   The central angle is **twice** the measure of an inscribed angle.
>   An inscribed angle is **one half** the measure of the central angle.
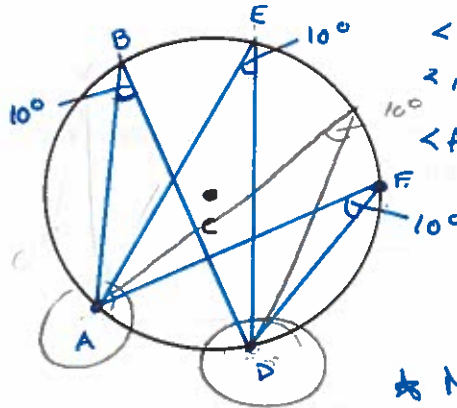
$(25°) \times 2 = 50°$

$50° \div 2 = 25°$

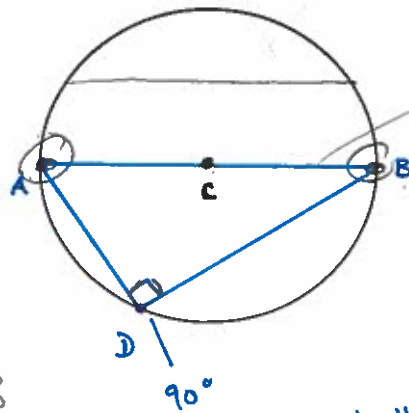

<ACB is central
<ADB " inscribed

* Must have same "end points"

> **2)** Inscribed angles attached to the same arc are equal.

<ABD is inscribed
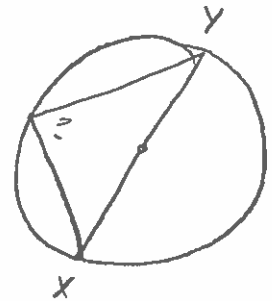<AED "   "
<AFD "   "

* Must have same "endpoints".

> **3)** An angle inscribed by a semi – circle is a right – angle, (90°). When the inscribed angle is subtended by a diameter, the inscribed angle is equal to 90°.
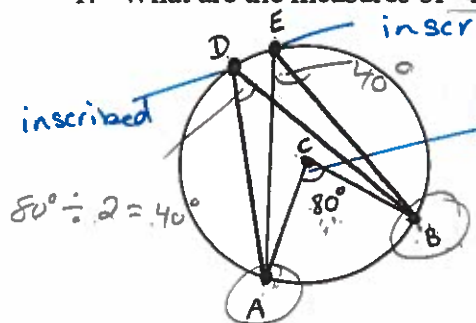

diameter

<ADB   90°

* "Endpoints" must make a diameter

Steps for solving angles in a circle:
1) Look for semi – circles/diameters first.
2) Look for points on the same arc, (equal angles)
3) Look for central angles.

Examples:
1. What are the measures of <ADB and AEB? Justify your answers.

inscribed

inscribed
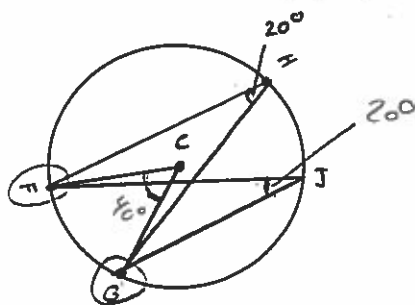
$80° \div 2 = 40°$

central angle with endpoints A ÷ B.
All inscribed angles with end points A ÷ B
will be **half** the central (80°).

<ADB ÷ <AEB $= \dfrac{80°}{2} = 40°$

2. What is the measure of <FJG and <FCG? Justify your answer?

<FCG is
central So
° x2 $= 40°$

<FHG is inscribed with endpoints
F ÷ G.
< FJG is inscribed with endpoints F ÷ G
So it will equal 20°.

<FHG = <FJG

3. Point C is the centre of the circle.
diameter AD = 20cm
chord BD = 18 cm
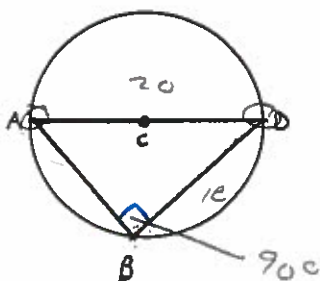
since
AD is diameter so <ABD has endpoints
that make a diameter (AD) it is
90°.

a. What is the measure of <ABD? Explain?
b. What is the length of chord AB?

must be hypotenuse.

20 cm

18 cm
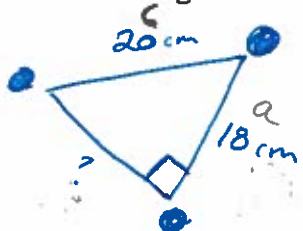
$\Rightarrow a^2 + b^2 = c^2$
$18^2 + b^2 = 20^2$
$324 + b^2 = 400$ $324 + b^2 = 400$
-324 -324 $\sqrt{b^2} = \sqrt{76}$
$\sqrt{b^2} = \sqrt{76}$

$b = 8.72 cm$

4. One flashlight projects light through an angle of 12°. A second projects light through an angle of 24°. Use a diagram to show where the first flashlight could be placed so that it illuminates the same area as the second.

1. Draw circle with a compass. (Mark centre)

2. Draw central angle of 24°. (Vertex must be at c.)
   ↳ Use protractor.

3. Use the endpoints of the central angle to create an inscribed angle, "behind" it.

4. Measure the inscribed angle. It should be 12°

5. Show where both flashlights would illuminate.

area of illumination.