

CHAPTER 9

CIRCLES

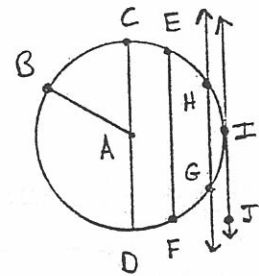
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|---------------------------------------|------------|
| 1. Parts of a Circle | p. 225-228 |
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| 3. Arcs and Central Angles | p. 232-234 |
| 4. Arcs and Chords | p. 235-236 |
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Unit 9.1 Parts of Circles and Spheres E.E. 5B(i), 5B(ii) 225

61 Circle -

Examples:

Circle
Named by
center.



point

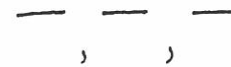
62 Center -

63 radius -

[Segment from the center to a point on the circle.]



64 Chord -



65 Diameter -

[A chord that passes through the center]



66 Secant -

[It intersects it at two points.]

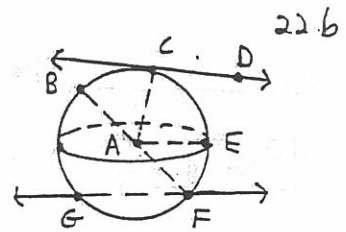


67 Tangent -

(Point of Tangency) point
[It is on the outer surface of the circle.]



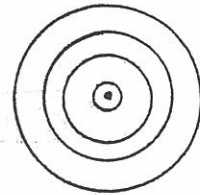
68 Sphere -



Sphere ; Center - point ; Radii - \overline{AC} , \overline{AB} , \overline{AG} ; Diameter - \overline{BD} ;
 Chords - \overline{BE} , \overline{GF} ; Secant - \leftrightarrow ; Tangent - \leftrightarrow ; Point of Tangency - point

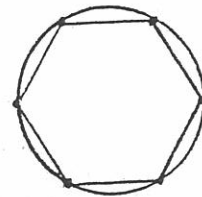
69 Congruent Circles or Spheres -

70 Concentric Circles -

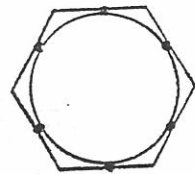


71 Concentric Spheres -

72 A polygon is inscribed in a circle and the circle is about the polygon when each of the polygon lies on the circle.



73 A polygon is circumscribed about a circle and the circle is in the polygon when each of the polygon is a to the circle.



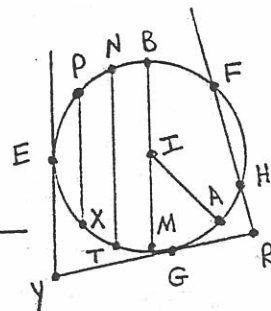
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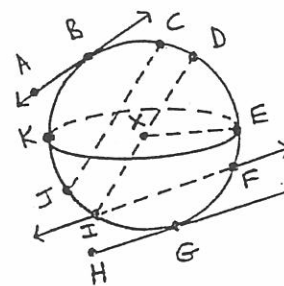
Daily Work Unit 9.1 Geometry

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- ① Name a circle - _____
- ② Name its center - _____
- ③ Name 3 radii - _____, _____, _____
- ④ Name 4 chords - _____, _____, _____, _____
- ⑤ Name a diameter - _____
- ⑥ Name a secant - _____
- ⑦ Name 2 tangents - _____, _____
- ⑧ Name 2 points of tangency - _____, _____



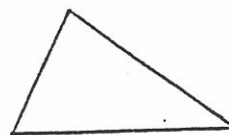
- ⑨ Name a sphere - _____
- ⑩ Name its center - _____
- ⑪ Name 3 radii - _____, _____, _____
- ⑫ Name 3 chords - _____, _____, _____
- ⑬ Name a diameter - _____
- ⑭ Name a secant - _____
- ⑮ Name 2 tangents - _____, _____
- ⑯ Name 2 points of tangency - _____, _____



- ⑰ Circumscribe a circle about the Δ
- ⑱ Inscribe a circle in the Δ .

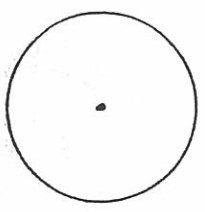


p.s. See theorem 5-8

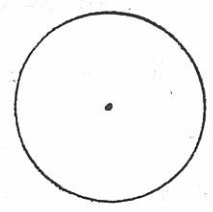


p.s. See theorem 5-7

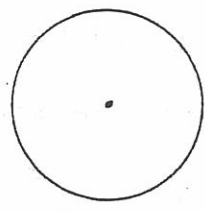
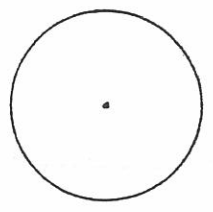
⑱ Inscribe a parallelogram. ⑳ Inscribe a rectangle.



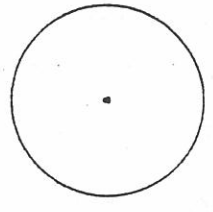
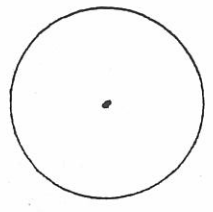
Try a rhombus.
Try any thing
whoompy jawed.
why will only
a rectangle
and square
work?



㉑ Inscribe a square. ㉒ Inscribe a right Δ .



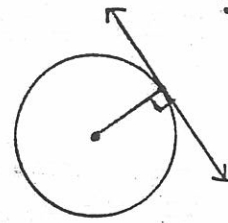
㉓ Inscribe an obtuse Δ ㉔ Inscribe an acute Δ .



Unit 9.2 Tangents EE. 5B(i), 5B(iii)

Theorem 9-1

A radius drawn to a point of tangency is perpendicular to the tangent line.



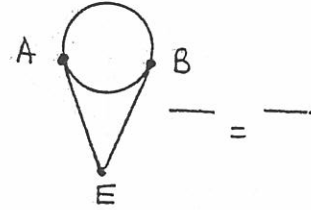
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[Think - Right Δ Chapter 8]

Corollary 1

Tangents to a circle from a point are equal.

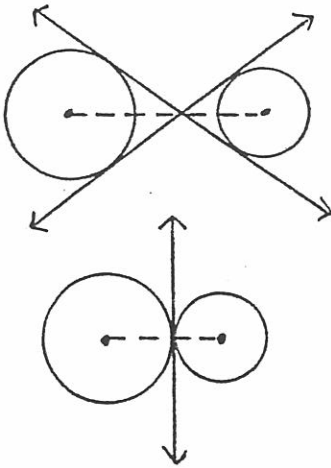
[Snow Cone Effect]



74 Common Tangent -

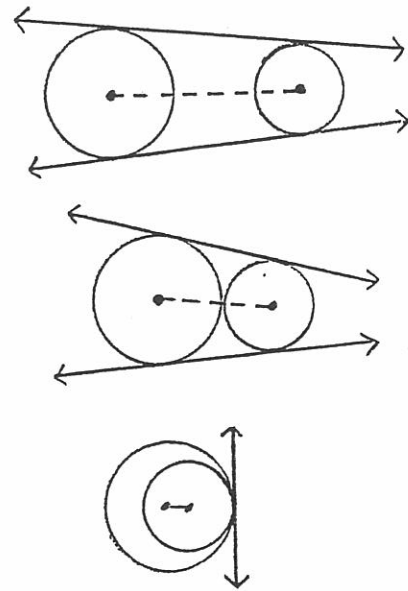
75 Common Internal Tangent Lines

Pass through the line that joins the centers of the circles.



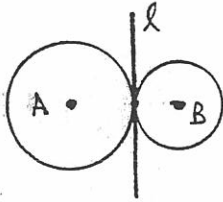
76 Common External Tangent Lines

Do not pass through the line that joins the centers of the circles.



77) Tangent Circles -

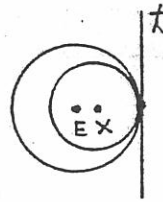
78) Externally Tangent Circles of each other.



$\odot A$ is tangent to $\odot B$.

l is a common tangent line.

79) Internally Tangent Circles One the other.



$\odot E$ is tangent to $\odot X$

t is a common tangent line

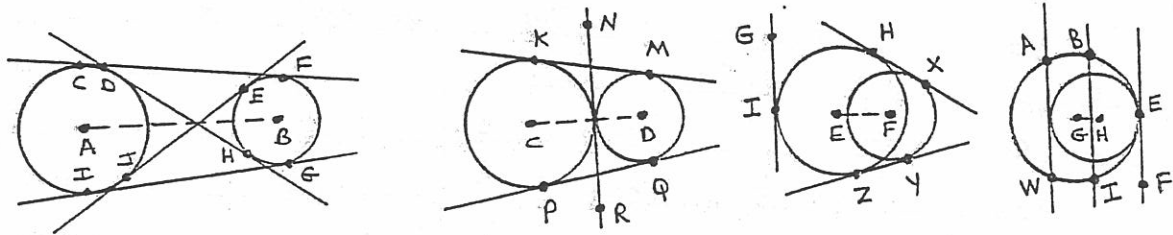
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Date: _____

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Daily Work Unit 9.2 Geometry

Name common internal & external tangent lines from the following

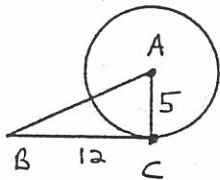


- ① Int. - _____ ③ Int. - _____ ⑤ Int. - _____ ⑦ Int. - _____
 ② Ext. - _____ ④ Ext. - _____ ⑥ Ext. - _____ ⑧ Ext. - _____

- ⑨ Name a pair of internally tangent circles - _____
 ⑩ Name a pair of externally tangent circles - _____

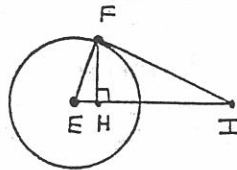
Find the missing lengths or angle measures.

BC is tangent to $\odot A$



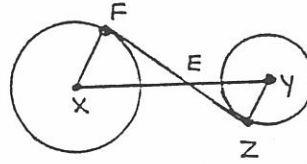
- ⑪ $\angle ACB =$ _____
 ⑫ $AB =$ _____
 ⑬ $\angle B =$ _____

\overline{FI} is tangent to $\odot E$

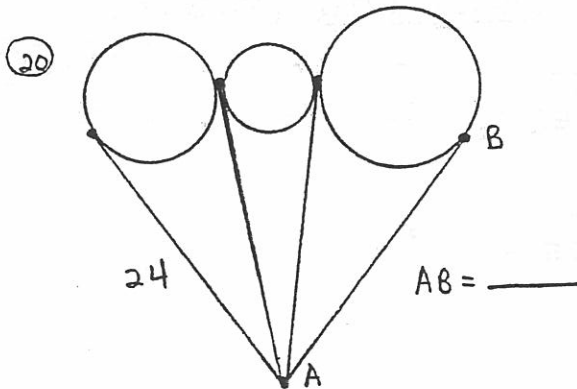


- ⑭ $\angle FFI =$ _____
 ⑮ If $\overline{EH} = 2$ and $\overline{HI} = 18$ then $\overline{FH} =$ _____

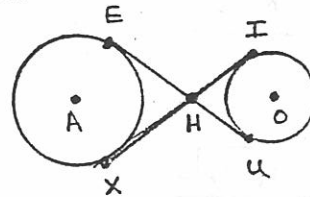
\overline{FZ} is tangent to $\odot X$ and $\odot Y$



- ⑯ $\angle XFE =$ _____ ⑰ $\angle YZF =$ _____
 ⑱ $\triangle XFE \sim \triangle$ _____ by _____
 ⑲ If $\overline{XF} = 6$, $\overline{FE} = 8$, and $\overline{ZY} = 3$ then $\overline{ZE} =$ _____



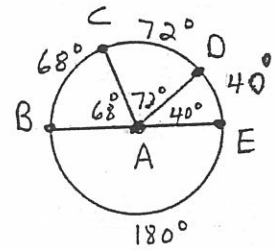
⑳ \overline{EU} & \overline{XI} are common internal tangents to $\odot A$ and $\odot O$



- If $\overline{EH} = 3.7$ and $\overline{HI} = 1.6$ then $\overline{EU} =$ _____

Short cut Study Chart for Upcoming Units			
Angle Description	Theorem/Def.#	Vertex	Rule
Central Angle	Definition # 80		
Inscribed Angle	Theorem 9-5		
Formed by chord & tangent	Theorem 9-6		
2 Chords	Theorem 9-7		
Formed by ^{2 secants} _{2 tangents} & ^{secant} _{tangent}	Theorem 9-8		

Examples:



80 Central Angle -

$\angle BAC, \angle CAD,$
 $\angle DAE, \angle BAD,$
 $\angle CAE$

Rule - A central \angle is equal to the measure of its intercepted arc. (see picture)

81 Arc -

$\widehat{BC}, \widehat{CD}, \widehat{DE}$ minor arcs
 [Cover these up to find major arcs]
 $\widehat{BCE}, \widehat{CDB}, \widehat{DEB}$ major arcs
 [Look at a diameter to find a semicircle]
 \widehat{BCE} , (You can't name the one on bottom)

82 Minor Arc -

[= to its central angle]

$\widehat{BC} = \angle BAC = 68^\circ$; $\widehat{CE} = \angle CAE = 112^\circ$

Postulate 11-1: Arc Addition - $[\widehat{CD} + \widehat{DE} = \widehat{CE}]$

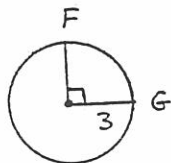
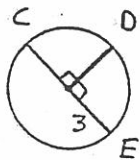
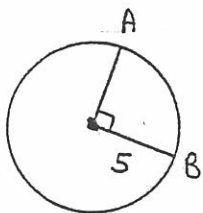
83 Major Arc -

$\widehat{EBD} = 360^\circ - \widehat{ED} = 360^\circ - 40^\circ = 320^\circ$
 $\widehat{CEB} = 360^\circ - \widehat{CB} = 360^\circ - 68^\circ = 292^\circ$

84 Semicircle -

$\widehat{BCE} = 180^\circ$

85) Congruent arcs -



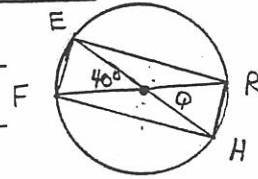
$$\widehat{CD} = \widehat{DE} = \widehat{FG} \neq \widehat{AB}$$

Name: _____

Date: _____

Daily Work Unit 9.3 Geometry

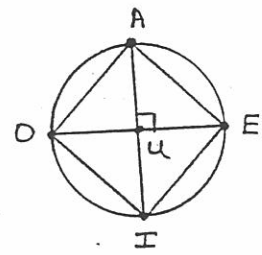
- ① Name 4 central angles - _____, _____, _____, _____
- ② Name 4 minor arcs - _____, _____, _____, _____
- ③ Name 4 major arcs - _____, _____, _____, _____
- ④ Name 4 semicircles - _____, _____, _____, _____



- ⑤ $\widehat{EF} =$ _____[°] ⑥ $\widehat{ER} =$ _____[°] ⑦ $\angle RQH =$ _____[°] ⑧ $\angle FQH =$ _____[°]
- ⑨ $\widehat{EHF} =$ _____[°] ⑩ $\widehat{EFR} =$ _____[°] ⑪ $\widehat{FER} =$ _____[°] ⑫ $\angle EQR =$ _____[°]
- ⑬ $\angle ERF =$ _____[°] ⑭ $\angle QRH =$ _____[°] ⑮ $\angle ERH =$ _____[°] ⑯ $\angle RFH =$ _____[°]
- ⑰ $\angle EFR =$ _____[°] ⑱ $\angle EFH =$ _____[°] ⑲ $\square ERHF$ is a _____

If $EF = 5$ and $ER = 12$ then: ⑳ $FR =$ _____ ㉑ $QH =$ _____

- ⑳ $\square AEIO$ is a _____
- ㉒ $\angle OUI =$ _____[°] ㉓ $\angle OAE =$ _____[°] ㉔ $\widehat{EI} =$ _____[°]
- ㉕ $\widehat{IAE} =$ _____[°] ㉖ $\angle AIO =$ _____[°] ㉗ $\widehat{DAE} =$ _____[°]



If $OE = 8$ then: ㉘ $AI =$ _____ ㉙ $AU =$ _____

- ㉚ $AE =$ _____ ㉛ $EI =$ _____

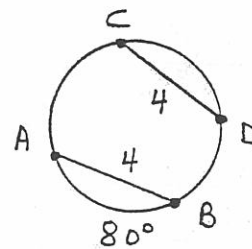
Theorem 9-2 In the same circle or in congruent circles:

- ① = arcs have = chords
- ② = chords have = arcs

Example:

Since $\overline{CD} = \overline{AB}$, $\widehat{CD} = \widehat{AB} \rightarrow$

$\widehat{CD} = 80^\circ$ and is the same length as \widehat{AB} .

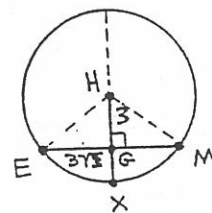


Theorem 9-3 A diameter (or radius) that is \perp to a chord bisects the chord and the arc of the chord.

Example:

Since $HG \perp EM$, $EG = GM$ and $\widehat{EX} = \widehat{MX}$

$\triangle EHM$ is isosceles ($EH = HM$ radii)
 $\triangle EHM$ is a $30^\circ-60^\circ-90^\circ \triangle$ ($\angle E = 30^\circ$)
 $EH = \frac{1}{2}EM$ ($h = \frac{1}{2}c$) $\angle EHG = 60^\circ$ (opp. \angle)
 $\widehat{EX} = 60^\circ$ (= cent. \angle) $\widehat{EXM} = 120^\circ$ (thm. 9-3)



Theorem 9-4 In the same circle or in congruent circles:

- ① Chords equally distant from the center are =
- ② = chords are equally distant from the center

Example:

\overline{EX} is the distance from \overline{AB} to point

\overline{EY} is the distance from \overline{HF} to point

Since $EX = EY$, AB must be = to HF

note: Remember isosceles \triangle ; right \triangle Geometry

