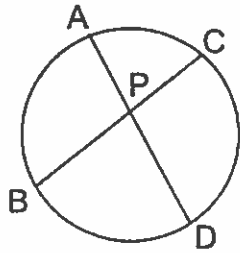
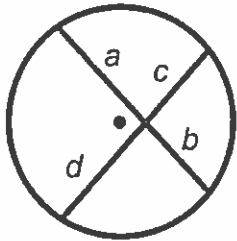


Segments of Chords:



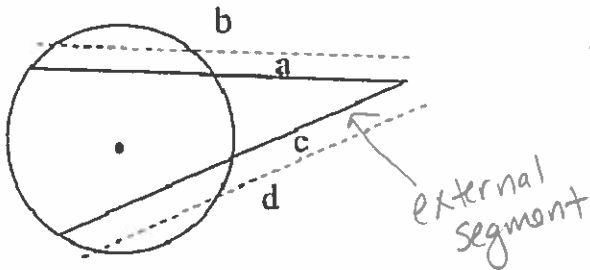
\overline{AP} is a segment of chord \overline{AD}
 \overline{BP} is a segment of chord \overline{BC}

Theorem 9-11 - When two chords intersect inside a circle, the product of the segments of one chord equals the product of the segments of the other chord.



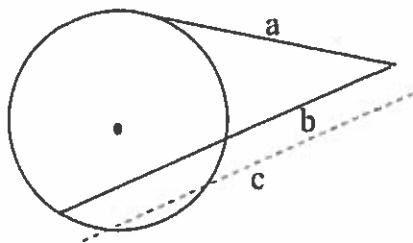
$$a \cdot b = c \cdot d$$

Theorem 9-12 - When two secant segments are drawn to a circle from an external point, the product of one secant segment and its external segment equals the product of the other secant segment and its external segment.



$$b \cdot a = d \cdot c$$

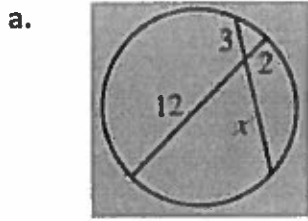
Theorem 9-13 - When a secant segment and a tangent segment are drawn to a circle from an external point, the product of the secant segment and its external segment is equal to the square of the tangent segment.



$$c \cdot b = a^2$$

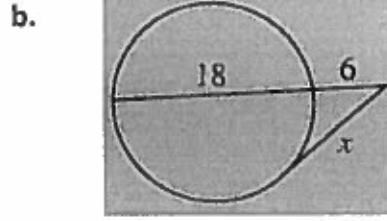
Examples:

1. Find the value of x .



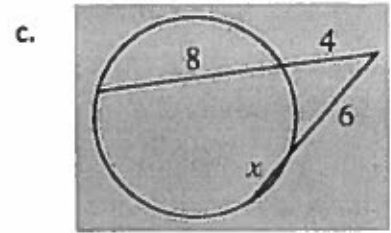
$$2 \cdot 12 = 3x$$

$$8 = x$$



$$6 \cdot 24 = x^2$$

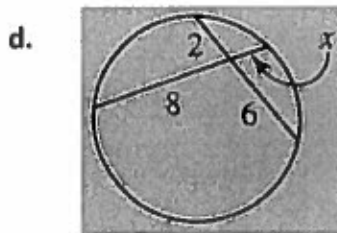
$$12 = x$$



$$4 \cdot 12 = 6 \cdot (6+x)$$

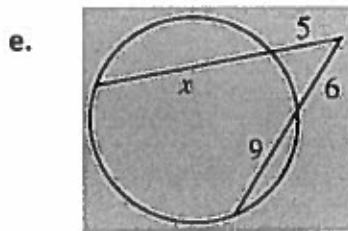
$$48 = 36 + 6x$$

$$2 = x$$



$$8x = 2 \cdot 6$$

$$x = \frac{12}{8} = \frac{3}{2}$$

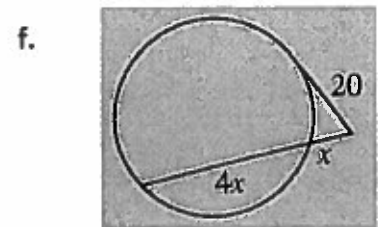


$$5(5+x) = 6(15)$$

$$25 + 5x = 90$$

$$5x = 65$$

$$x = 13$$



$$x(5x) = 20^2$$

$$5x^2 = 400$$

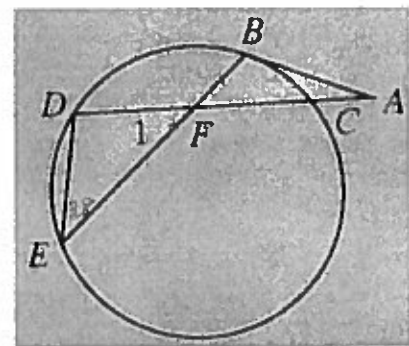
$$x^2 = 80$$

$$x = \sqrt{80} = 4\sqrt{5}$$

2.

\overline{AB} is tangent to the circle.

- If $m\widehat{BC} = 32$, $m\widehat{BD} = 72$,
 $m\angle BAD = 20$
- If $DF = 8$, $CF = 6$,
 $BF = 4$, $EF = 12$
- If $m\widehat{BC} = 32$ and
 $m\angle 1 = 42$, $m\widehat{DE} = 52$
- If $m\angle E = 38$, $m\widehat{DB} = 76$



1) $\frac{1}{2}(72-32) = 20$ 2) $6 \cdot 8 = 4x$
 $12 = x$

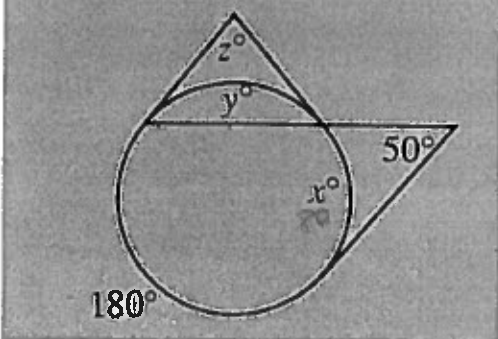
3) $42 = \frac{1}{2}(32+x)$
 $84 = 32+x$
 $52 = x$

4) $38 \cdot 2 =$

3.

5. Find the values of x , y , and z .

$x = 80$, $y = 100$, $z = 80$



$$50 = \frac{1}{2}(180 - x)$$

$$100 = 180 - x$$

$$y = 360 - (180 + 80)$$

$$y = 100$$

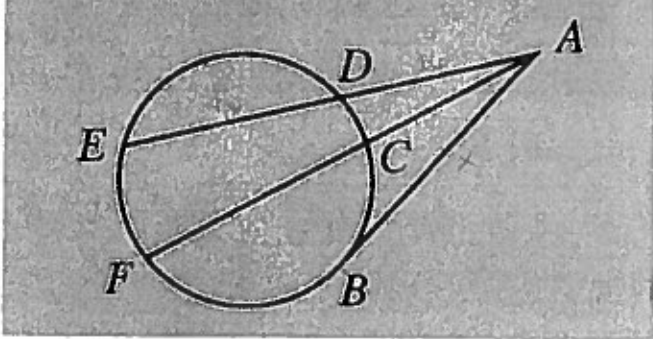
$$z = \frac{1}{2}(260 - 100)$$

$$z = \frac{1}{2} \cdot 160$$

$$z = 80$$

4.

\overleftrightarrow{AE} and \overleftrightarrow{AF} are secants; \overleftrightarrow{AB} is a tangent.



- 6. If $m\widehat{DC} = 40$ and $m\widehat{EF} = 70$, then $m\angle EAF = 15$
- 7. If $AC = 8$, $CF = 12$, and $AD = 10$, then $ED = 6$
- 8. If $AD = 16$ and $ED = 10$, then $AB = 4\sqrt{26}$

$$6) m\angle EAF = \frac{1}{2}(70 - 40)$$

$$7) 8 \cdot 20 = 10 \cdot (10 + x)$$

$$160 = 100 + 10x$$

$$6 = x$$

$$8) 16 \cdot 26 = x^2$$

$$416 = x^2$$

$$x = \sqrt{416} = 4\sqrt{26}$$