CIRCLE Basics

CIRCLE

Definition: shape whose points are equidistant from a given point, called the center

Naming: $\odot J$

CHORD

Definition: a line segment whose endpoints are on the circle

* Longest chord will be the diameter

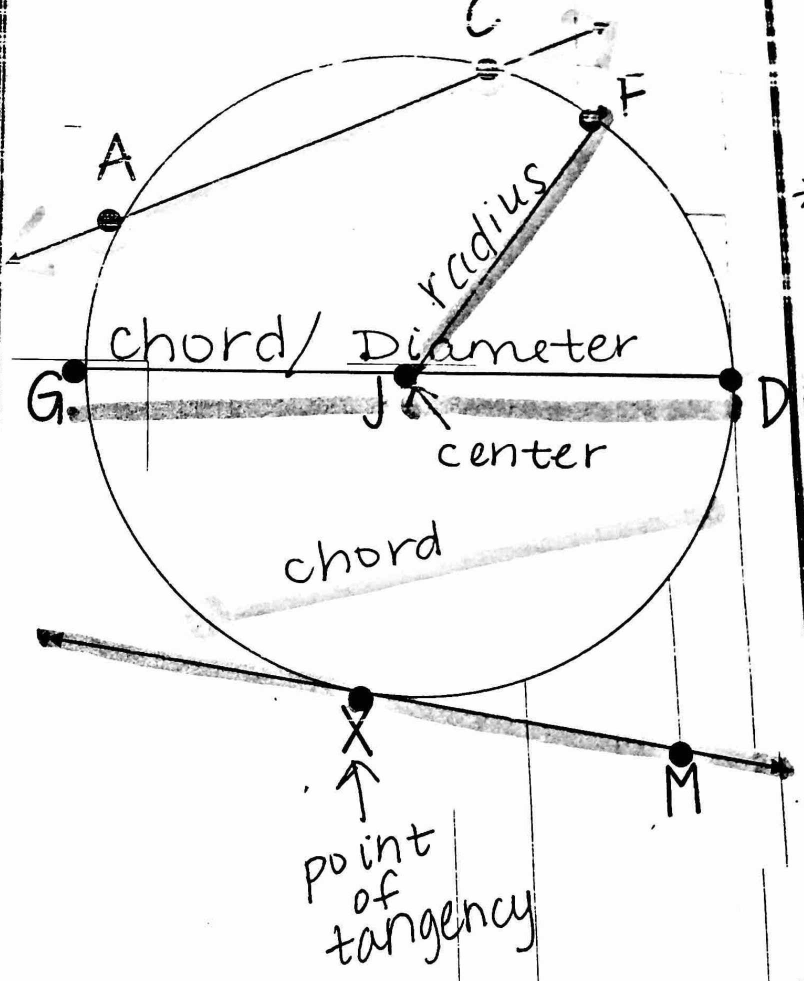
Naming: $\overline{GD}$

TANGENT

Definition: a line, segment or a ray that intersects a circle exactly 1 time (point of tangency)

Naming: $\overline{XM}$

outside the circle



DIAMETER

*double the radius

Definition: a segment that goes through the center with both endpoints on the circle

Naming: $\overline{GD}$

RADIUS

*1/2 of the diameter

Definition: a segment with one endpoint at the center + one endpoint on the circle

Naming: $\overline{JF}$ $\overline{JG}$ $\overline{JD}$

SECANT

Definition: a line that intersects a circle at 2 points

Naming: $\overleftrightarrow{AC}$

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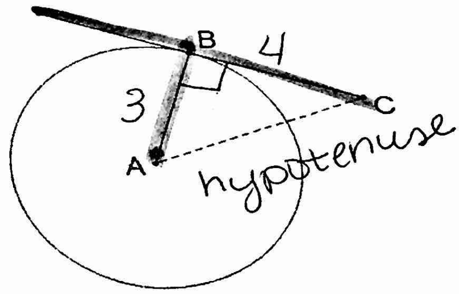
Properties of Tangent Lines

1. **A tangent line is perpendicular to a radius.**
create a right angle
We can use the Pythagorean Theorem ($a^2 + b^2 = c^2$) to find the missing lengths of a triangle formed using the radius and tangent.

Find $\overline{AC}$

m $\overline{AB}$ = 3 cm
m $\overline{BC}$ = 4 cm



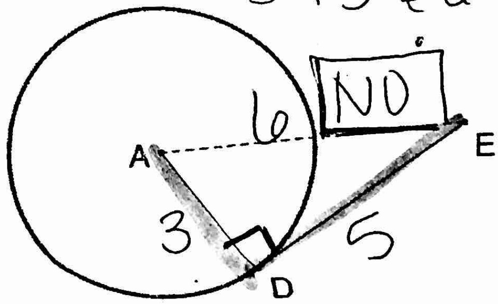
$\boxed{\overline{AC} = 5}$

2. **We can use the converse of the Pythagorean Theorem to prove or disprove that a line is tangent to a circle.**
"Test"

$3^2+5^2 \overset{?}{=} 6^2$

A line is tangent to a circle if the line and the radius make a right angle.
* if the pthy. thm is true *

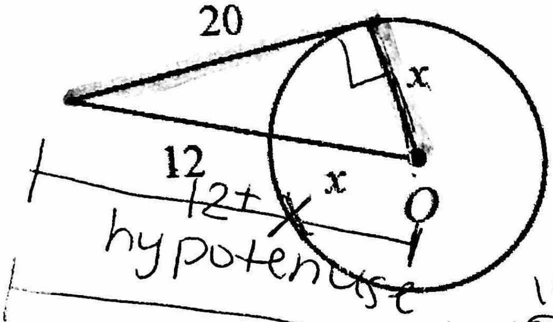
m $\overline{AD}$ = 3 cm
m $\overline{DE}$ = 5 cm
m $\overline{AE}$ = 6 cm



$\boxed{NO}$

We can find the radius of a circle by using the Pythagorean Theorem.

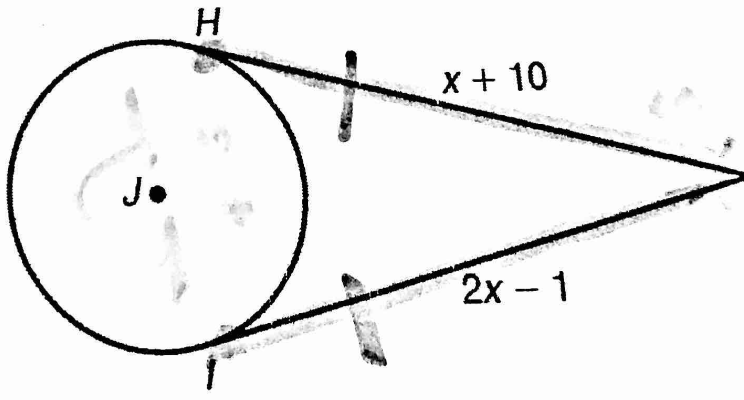
$x^2+20^2=(12+x)^2$
$x^2+400=(12+x)(12+x)$
$x^2+400=144+12x+12x+x^2$
$256=24x$
$\boxed{x=10.7}$



10.7+12 = [illegible]

3. **Two tangents from a common external point are congruent.**

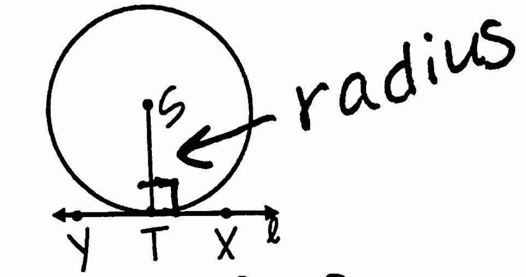
$x+10=2x-1$
$\boxed{x=11}$



Property 1

WORDS: In a plane, a line is tangent to a circle if and only if it is perpendicular to a radius drawn to the point of tangency.

EXAMPLE: Line YX is tangent to circle S if and only if line YX is perpendicular to ST.



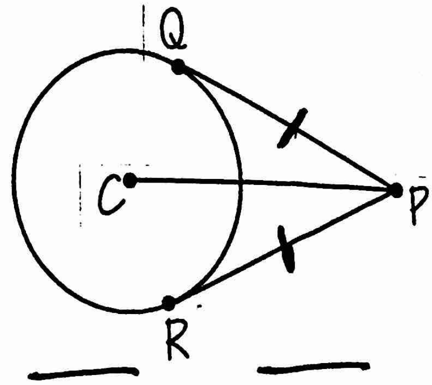
m∠STX = 90°

Point of tangency: T

Property 3

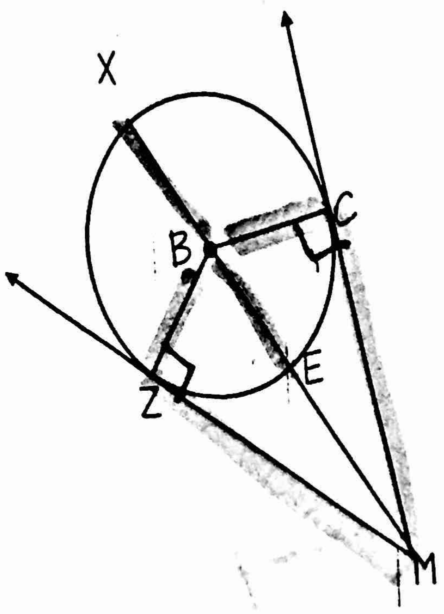
WORDS: If two segments from the same exterior point are tangent to a circle, then they are congruent.

EXAMPLE: If $\overline{QP}$ and $\overline{RP}$ are tangent to circle C, then QP = RP



$\overline{QP} \cong \overline{RP}$

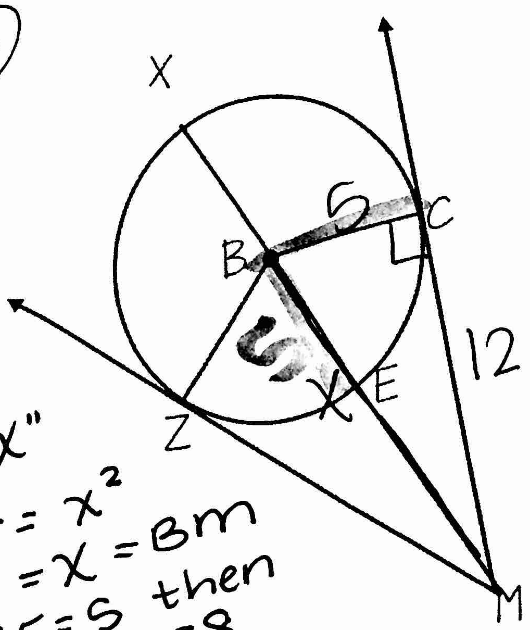
Use the diagram below to answer the following questions. $\overrightarrow{MC}$ and $\overrightarrow{MZ}$ are tangents to circle B.



1. Find m∠BCM. $\boxed{90°}$	**2.** Find the length of CM if CM = 5x − 9 and MZ = x + 7. $\boxed{CM = 11}$
3. Find the length of EM if CM = 12 and BC = 5. Hint: Find BM first $\boxed{EM = 8}$	**4.** If m∠CBM = 60°, CM = 13√3, then find the length of BC. Hint: use right Δ trig ratios $\boxed{BC = 13}$
5. Find the length of CM if BC = 12 and BM = 20. $\boxed{16}$	**6.** Find the length of XE if BM = 25 and ZM = 20. Hint: Find BZ first $\boxed{30}$

Tangent to a circle {properties}

(3)



Find "x"

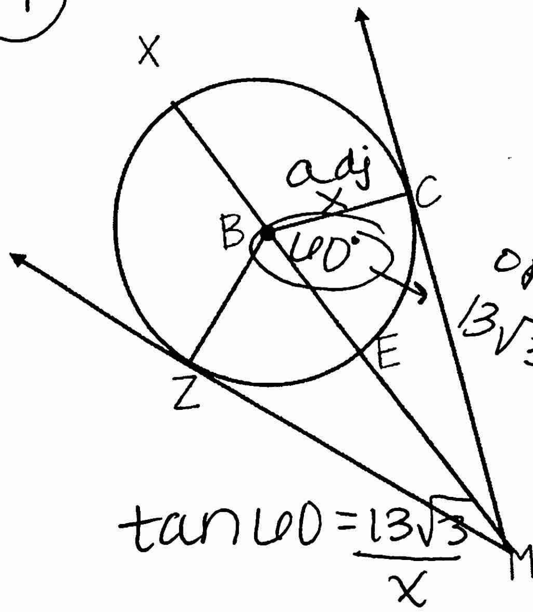
$5^2 + 12^2 = x^2$

$13 = x = BM$

If $BE = 5$ then

$EM = 8$

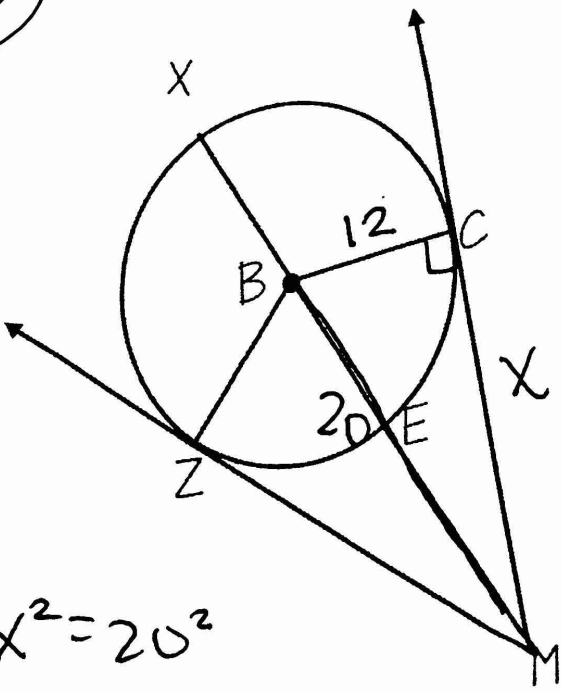
(4)



$\tan 60 = \frac{13\sqrt{3}}{x}$

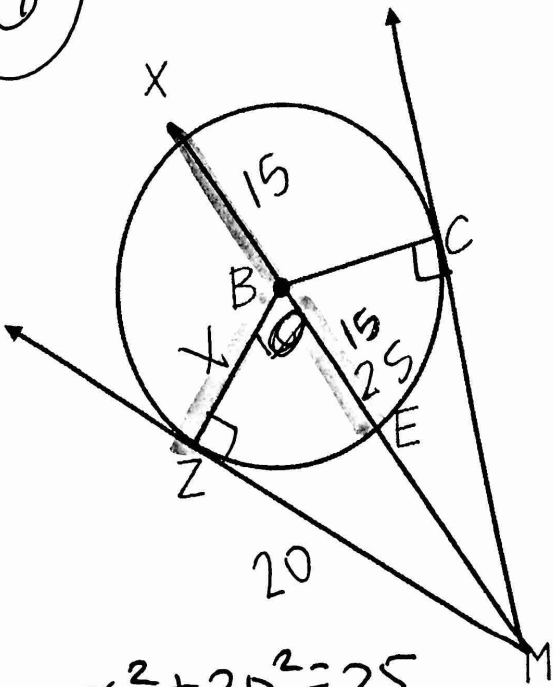
$\tan 60 = \frac{22.5}{x}$

(5)



$2^2 + x^2 = 20^2$

(6)



$x^2 + 20^2 = 25$

$x = 15$

So XB is also 15

and so is BE

So $XB + BE = XM$

$\boxed{30}$