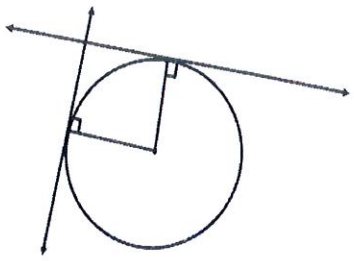
Geometry
Line Segments (Tangents)

Name: Key
Date: _____

Tangent: a line in the plane of a circle that intersects the circle in exactly one point.

Theorems involving Tangents

If a line is tangent to a circle, then it is perpendicular to the radius drawn to the point of tangency.

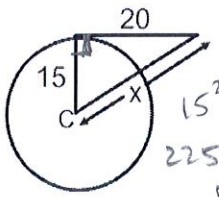


In a plane, if a line is perpendicular to a radius of a circle at its endpoint on the circle, then the line is a tangent of the circle.

Examples

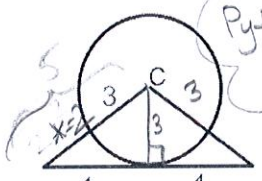
Find the value of x. Assume that C is the center of the circle and that segments that appear to be tangent are tangent.

1. x= 25



$15^2+20^2=x^2$
$225+400=x^2$
$\sqrt{625}=\sqrt{x^2}$
$x=25$

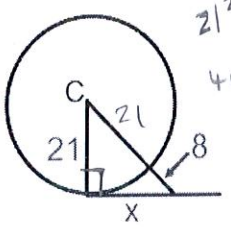
2. x= 2



Pythagorean Triple 3, 4, 5

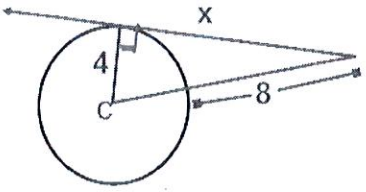
$3^2+4^2=(x+3)^2$
$9+16=(x+3)(x+3)$
$25=x^2+3x+3x+9$
$25=x^2+6x+9$
$0=x^2+6x-16$
$0=(x+8)(x-2)$
$x=-8, 2$

3. x= 20



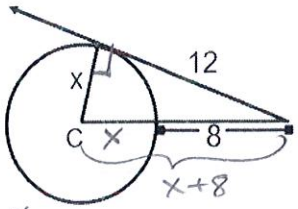
$21^2+x^2=29^2$
$441+x^2=841$
$\sqrt{x^2}=\sqrt{400}$
$x=20$

4. x= $8\sqrt{2}$



$4^2+x^2=12^2$
$16+x^2=144$
$\sqrt{x^2}=\sqrt{128}=\sqrt{64}\sqrt{2}$
$x=8\sqrt{2}$

5. x= 5

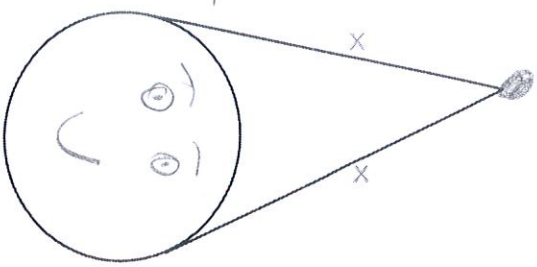


$x^2+12^2=(x+8)^2$
$x^2+144=(x+8)(x+8)$
$x^2+144=x^2+8x+8x+64$
$x^2+144=x^2+16x+64$
$-64 \quad -64$
$\frac{80}{16}=\frac{16x}{16}$
$5=x$

Another Theorem involving Tangents

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

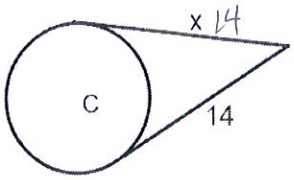
Party Hat Problem!



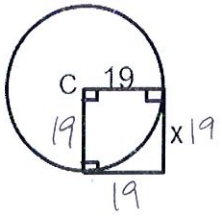
Examples

Find the value of x. Assume that C is the center of the circle and that segments that appear to be tangent are tangent.

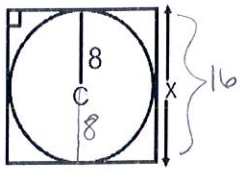
1. x= 14



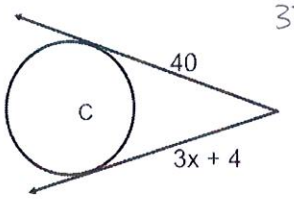
2. x= 19



3. x= 16

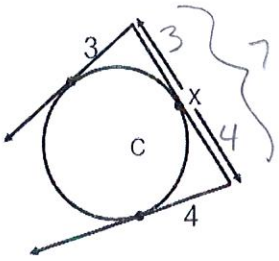


4. x= 12



$3x+4=40$
$3x=36$
$x=12$

5. x= 7



6. perimeter = 47.2 units