Geometry The Geometry of the Circle
Notes - 13- 8 Tangents and Secants in the Coordinate Plane

(5)

Ex. 1: Find the coordinates of the point at which the line $y = 2x - 1$ intersects a circle with center (0, -1) and the radius of length $\sqrt{20}$

line $y = 2x - 1$

circle $x^2 + (y+1)^2 = 20$

$(x-h)^2 + (y-k)^2 = r^2$

$x^2 + (2x-1+1)^2 = 20$

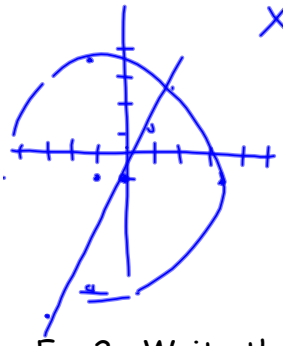
$x^2 + (2x)^2 = 20$

$x^2 + 4x^2 = 20$

$\frac{5x^2}{5} = \frac{20}{5}$

$x^2 = 4$

$x = \pm 2$



find y

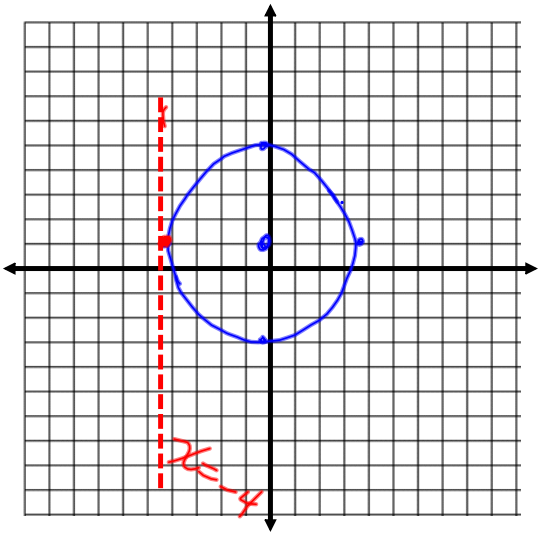
$x = 2 \quad y = 2(2) - 1 = 3$ (2,3)

$x = -2 \quad y = 2(-2) - 1 = -5$ (-2,-5)

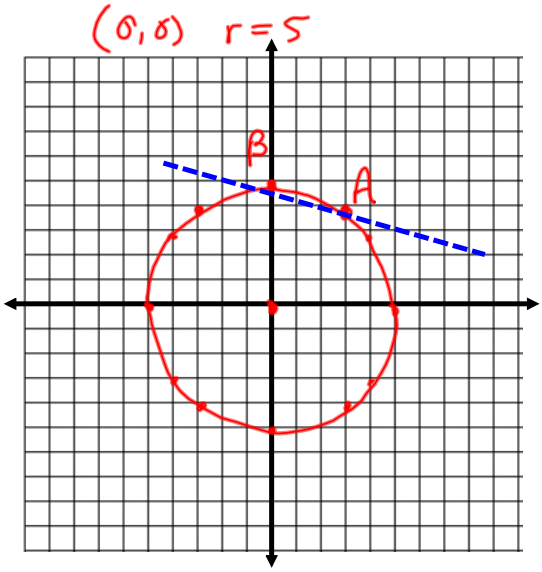
$(x-h)^2 + (y-k)^2 = r^2$

Ex. 2: Write the equation of a line tangent to the circle $x^2 + y^2 = 16$ at the point (-4,0).

(0,0) $r = 4$



Ex. 3: Write an equation of the secant that intersects $x^2 + y^2 = 25$ at A(3,4) and B(0,5).



Slope $\frac{y_2 - y_1}{x_2 - x_1} = \frac{5-4}{0-3} = \frac{1}{-3} = -\frac{1}{3}$

B(0,5)

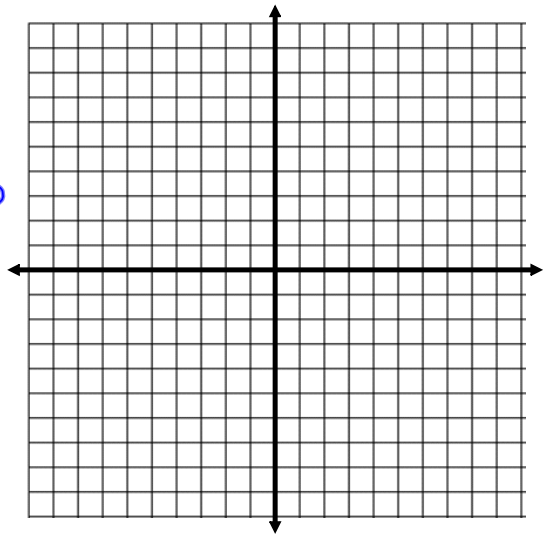
$y = mx + b$

$5 = -\frac{1}{3}(0) + b$

$5 = b$

$y = -\frac{1}{3}x + 5$

Ex. 4: Find the coordinates of the points of intersection of the circle $x^2 + y^2 = 100$ and the line $x + y = 14$. Is the line a secant or a tangent?



$x + y = 14$

$-x \quad -x$

$y = -x + 14$

$x^2 + y^2 = 100$

$x^2 + (-x+14)^2 = 100$

$x^2 + (-x+14)(-x+14) = 100$

$x^2 + x^2 - 14x - 14x + 196 = 100$

$2x^2 - 28x + 196 = 100$

$-100 \quad -100$

$2x^2 - 28x + 96 = 0$

$\frac{2x^2}{2} - \frac{28x}{2} + \frac{96}{2} = \frac{0}{2}$

$x^2 - 14x + 48 = 0$

$(x-6)(x-8) = 0$

$x = 6, 8$ → find y

(6,8)

$x + y = 14$

$6 + y = 14$

$y = 8$

(8,6)

$8 + y = 14$

$y = 6$