Attachment 2.2a

Example 1: A circle has a radius of 3 units and a center at (1, -2). Find the equation of the tangent line at the point (5, -2). Write the equation in slope-intercept form.

Step 1: Find the slope of the line that contains the radius.

$M = \frac{y_2 - y_1}{x_2 - x_1}$

Step 2: Find the slope of the tangent line. *(Perpendicular lines have opposite reciprocal slopes.)*

Step 3: Solve for the y-intercept.

$y = mx + b$

Substitute the slope m and the point of tangency (x, y) into the equation.

Solve for b.

Step 4: Write the final equation.

Example 2: Write the slope intercept form of the line tangent to $(x - 2)^2 + (y + 3)^2 = 9$ at the point (-1, -3).

Step 1: Identify the center.

Step 2: Find the slope of the line passing through the center and the point of tangency.

Step 3: Find the slope of the tangent line. *(Perpendicular lines have opposite reciprocal slopes.)*

Step 4: Solve for the y-intercept.

$y = mx + b$

Substitute the slope m and the point of tangency (x, y) into the equation.

Solve for b.

Step 5: Write the final equation.

Example 3: A circle has a radius of 5 units and a center at (1, -2). Find the equation of the tangent line at the point (-3, 2). Write the equation in point-slope form and convert to slope-intercept form.

Step 1: Find the slope of the line that contains the radius.

Step 2: Find the slope of the tangent line. *(Perpendicular lines have opposite reciprocal slopes.)*

Step 3: Write the equation in point-slope form.

$y - y_1 = m(x - x_1)$

Substitute the slope m and the point of tangency (x, y) into the equation.

Step 4: Convert to slope-intercept form. *(Distribute m and solve for y.)*

Attachment 2.2b

Self checklist:

1. Find the slope of the line passing through the center and point of tangency. (Identify the center if needed).	
2. Identify the slope of the line perpendicular to the first line and the point of tangency.	
3. Write the equation of the tangent line using the point of tangency and the perpendicular slope.	

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Problems 1 - 6:

a. Find the slopes of the lines passing through the given points.
b. Find the slopes of the lines perpendicular to the given points.

1. (0,2) and (-2, -5)	2. (3, 5) and (-4, 7)	3. (2, 9) and (2 , 5)
4. (-7, 12) and (5, -22)	5. (6, -9) and (3, -9)	6. (1, 1) and (-5, 5)

Find the equation of the tangent line with the given center and point of tangency.

7. Center (2, -8); Point of Tangency (7, -3)	8. Center (0, 0); Point of Tangency (4, -2)
9. Center (6, -8); Point of Tangency (3, -4)	10. Center (-4, -6); Point of Tangency (-4, -9)

Find the equation of the tangent line to the given circle at the given point.

11. $x^2 + y^2 = 25$; (-3, 4)	12. $x^2 + y^2 = 100$; (6, 8)
13. $(x - 1)^2 + (y + 2)^2 = 100$; (7, -10)	14. $(x + 9)^2 + (y + 5)^2 = 100$; (-15, 3)