LESSON 3.4 and 3.5

Challenge Practice

1. Does it make a difference what two points on a line you choose when finding slope? Does it make a difference which point is (x_1, y_1) and which point is (x_2, y_2) in the formula for slope? Is the order of subtraction in the formula for slope important? *Explain* your reasoning.

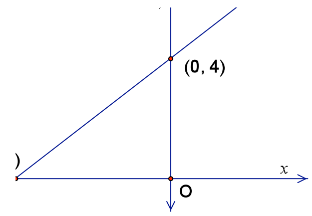
2. Find the value of k: if the line through the points $(2k + 1, -4)$ and $(5, 3 - k)$ is parallel to the line through the points $(-4, -9)$ and $(2, -3)$.

3. Find the value of k: if the line through the points $(4k + 3, k + 1)$ and $(k - 6, -2k + 3)$ is perpendicular to the line through the points $(2, 3)$ and $(2, 8)$.

4. A segment has endpoints at $(-5, -3)$ and $(9, 1)$. Find the equation of the perpendicular bisector of this segment.

5. The center of a circle has coordinates $(-4, 2)$. The point $(2, -1)$ lies on this circle. Find the equation of the tangent line through the point $(2, -1)$.

6. The figure shows line *l* in the *xy*-coordinate plane. Line *m* (not shown) is obtained by horizontally translating each point on line *l* 2 units to the left. If the equation of *m* is $y = \frac{4}{5}x + k$, what is the value of *k*?



A *tangent line* intersects a curve at one point. Finding the slope of a line tangent to a circle at a given point is really easy (see Q5), but it's more difficult for other nonlinear graphs since there is no radius for the line to be perpendicular to. For graphs like a parabola, you use a *secant line*, which intersects the graph at two points, to get close to the tangent line. It was this discovery that lead to the development of *differential calculus*.

The graph of the equation $y = x^2 + 6x + 6$ is shown at the right. Find the equation of each of the following secant lines.

7. $\overleftrightarrow{AD}$

8. $\overleftrightarrow{AC}$

9. $\overleftrightarrow{AB}$

10. Now approximate the equation of the tangent line at point A.