EQUATIONS OF LINES IN SLOPE-Y-INTERCEPT FORM

Recall that in R², we can write the equation of a line in the form *y* = *mx* + *b*. This form is known as **slope-y-intercept form**. AS we will see, it is very simple to switch between the vector form, parametric form and slope-*y*-intercept form for the equation of a line in R².

Investigation - Complete the following.

Part One – Making the Connections

1) When the equation of a line is written in the form *y* = *mx* + *b*, what does *m* represent? _____

2) When the equation of a line is written in the form *y* = *mx* + *b*, what does *b* represent? _____

3) For the line $y = \dfrac{2}{3}x + 7$, state the slope and the coordinates of the *y*-intercept.

   Slope = _____   Coordinates of *y*-intercept: ___(___,___)___

4) If a line has a direction vector of (5, 2), what is the line's slope? _____

5) If a line has a slope of $-\dfrac{7}{4}$, determine a possible direction vector for the line. _____

6) If a line has vector equation $\vec{r} = (3,8) + t(4,5)$, state the slope of the line and the coordinates of a point on the line.

   Slope = _____   Coordinates of point on line: ___(___,___)___

7) If a line has parametric equations $\begin{array}{l} x = -8 + 3t \\ y = 9 - 4t \end{array}$, state the slope of the line and the coordinates of a point on the line.

   Slope = _____   Coordinates of point on line: ___(___,___)___

8) If a line has equation $y = \dfrac{1}{6}x + 4$, state a direction vector for the line and the coordinates of a point on the line.

   Direction vector:_____(___,___)_____   Coordinates of point on line: ___(___,___)___

Part Two – Switching Between Forms

Using the connections made in Part One, rewrite the following equations of lines in the stated form.

9) Write $y = \dfrac{7}{3}x + 9$ in vector form: _____

10) Write $y = -6x - 5$ in parametric form:

[ ]

11) Write $\vec{r} = (-8, 15) + t(4, -7)$ in slope-y-intercept form: _____

12) Write $\begin{array}{l} x = 5 - 3t \\ y = 2 + 11t \end{array}$ in slope-y-intercept form: _____

Part Three – Horizontal and Vertical Lines

13) Write $y = 6$ in vector and parametric form.

      Vector form: _____   Parametric form: [ ]

14) Write $x = -8$ in vector and parametric form.

      Vector form: _____   Parametric form: [ ]

15) Write $\vec{r} = (8, -1) + t(0, 2)$ in slope-y-intercept form: _____

16) Write $\begin{array}{l} x = 9 - 5t \\ y = 7 \end{array}$ in slope-y-intercept form: _____

Part Four – Analysis

17) Are the vector and parametric form of a line's equation unique? Explain.

18) Is the slope-y-intercept form of a line's equation unique? Explain.