

EQUATIONS OF LINES IN SLOPE-Y-INTERCEPT FORM

Recall that in \mathbb{R}^2 , 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 \mathbb{R}^2 .



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 $y = \frac{2}{3}x + 7$, 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 $-\frac{7}{4}$, 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 $\begin{matrix} x = -8 + 3t \\ y = 9 - 4t \end{matrix}$, 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 $y = \frac{1}{6}x + 4$, state a direction vector for the line and the coordinates of a point on the line.

Direction vector: _____ Coordinates of point on line: _____

2

Part Two – Switching Between Forms

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

9) Write $y = \frac{7}{3}x + 9$ 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 $\begin{matrix} x = 5 - 3t \\ y = 2 + 11t \end{matrix}$ in slope- y -intercept form: _____

3

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 $\begin{matrix} x = 9 - 5t \\ y = 7 \end{matrix}$ in slope- y -intercept form: _____

4

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.