

Notes for 2.4 Equations of Lines; Curve Fitting
(pp. 227 – 235)

Name:
Date:
Instructor:

Topics: Point Slope; Slope Intercept; Vertical; Horizontal;
Parallel and Perpendicular Lines; Applications

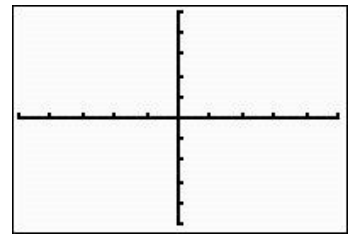
I. Writing the Equation of a Line Using Point-Slope Form (pp. 227 – 228)

* The *point-slope* form of the equation of a line comes from the original slope formula

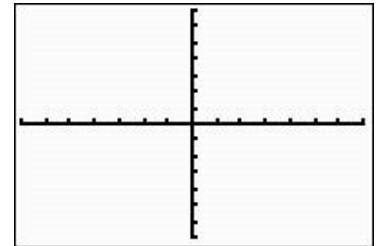
of $m = \frac{y_2 - y_1}{x_2 - x_1}$, but with only one point known.

The line with the slope m passing through (x_1, y_1) has the equation, $y - y_1 = m(x - x_1)$, which is called the **point-slope** form of the equation of the line.

Ex. Find the equation of a line through $(5, -2)$ with a slope of -4 .



Ex. Find the equation of a line through $(-1, 7)$ and $(2, 1)$.
First you need to find _____.



* Graph these lines using your favorite (convenient) point and the slope (rise / run).

* To write the equation using point-slope, you **must** have the slope (find it if you need to) and any point on the line.

* Make sure that you put arrows at the end of the graphed line and that you label the line with its equation. Also, label the scale used on the axes.

II. Writing the Equation of a Line Using Slope-Intercept Form (pp. 228 – 229)

The line with slope m and y-intercept b has an equation, $y = mx + b$, which is called the **slope-intercept** form of the equation of the line.

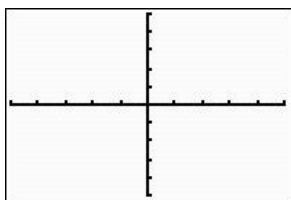
Ex. Find the slope and the y-intercept of $2x - y = 1$.

* Isolate a positive y .

III. Special Lines that are Vertical and Horizontal (p. 229)

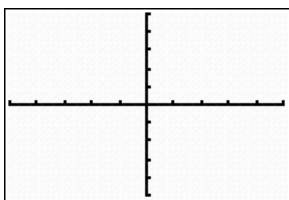
*When writing the equation of a **vertical line or horizontal line**, plot the point on the line, then “stretch out” the point so that it is a vertical (up and down) or a horizontal line (across).
The equation of the vertical line is $x =$ the value on the x-axis that the stretched line hit.
The equation of the horizontal line is $y =$ the value on the y-axis that the stretched line hit.

Ex. Write the equation of the vertical line that passes through (1, 4).



*Plot the point, then stretch it out vertically. The graph hits the x-axis at 1, so the equation of the vertical line is _____.

Ex. Write the equation of the horizontal line that passes through (1, -3).



*Plot the point, then stretch it out horizontally. The graph hits the y-axis at -3 , so the equation of the horizontal line is _____.

In general, for a vertical line that contains (a, b) , the equation is $x = a$.
and for a horizontal line that contains (a, b) , the equation is $y = b$.

IV. Equations of Parallel and Perpendicular Lines (pp. 229 – 231)

Parallel lines have the **same slopes** and different y-intercepts.

Perpendicular lines have slopes that have a **product of -1 or negative (opposite) reciprocals**.

Ex. Find the equation in standard form of the line through $(-2, 4)$ which is *parallel* to $3x + 8y = 7$.

*First find the slope of the given line, then borrow it as is.

Ex. Find the equation in standard form of the line through $(-2, 4)$ which is *perpendicular* to $3x + 8y = 7$.

*Find the slope of the given line, then use the **opposite reciprocal** to write the equation of your line.

V. Summary of Linear Equations (p. 232)

General Equation	Characteristics of Equation
$Ax + By = C$	Standard form where A is positive and $A \neq 0$ and $B \neq 0$, x-intercept = $(\frac{C}{A}, 0)$, y-intercept = $(0, \frac{C}{B})$ slope = $-\frac{A}{B}$
$x = a$	Vertical line with x-intercept of $(a, 0)$, no y-intercept, slope is undefined
$y = b$	Horizontal line with y-intercept of $(0, b)$, no x-intercept, slope = 0
$y = mx + b$	Slope-intercept form with y-intercept of $(0, b)$, slope = m
$y - y_1 = m(x - x_1)$	Point-slope form that contains (x_1, y_1) , slope = m

VI. Applications of Linear Equations (pp. 232 – 235)

Ex. The following table lists the total federal debt in 1985 and 1989.

Use 1985 as $x = 0$.

Year	Federal Debt
1985	1828 billion
1989	2881 billion

Equation describing data: _____

Using this equation, what was the debt in 1984? _____

Using this equation, what was the debt in 1990? _____

*Your instructor may show you another method using your calculator (STAT) and **linear regression** to write an equation of a line when given many points of information.

Assignment:

pp. 236 – 241 #1 – 4, 5 – 25 odd, 26, 35 – 41 odd, 47ac