**Point-Slope Form of an Equation**

1. Graph the equation $y=\frac{3}{4}x+4 $by starting at (0,4) and moving to another point on the line using the slope.



1. Now draw another graph of $y=\frac{3}{4}x+4$. This time pick the point (–8, –2) which is a point on the line, and use slope to count up and right from that point to find other points on the graph. Do you end up with the same line as you did in part 1a above?



1. Notice that you can find points on a line or graph a line by starting at a point and moving according to the slope. Does it matter which point on the line is chosen to start with?

**Facts about Point-Slope Form**

The point-slope form of a line is a special form that tells you the SLOPE of a line and one POINT on the line.

The point-slope formula is: $y-y\_{1}=m(x-x\_{1})$

*m* is the slope of the line; it will be a number

$x\_{1}$ is the *x* coordinate of a particular point on the line, and it will be a number

$y\_{1}$ is the *y* coordinate of a particular point on the line, and it will be a number

*x* is the variable *x*

*y* is the variable *y*

Point-slope form comes from the fact that the slope between any two points on a line is always the same. Use the slope formula between the specific fixed point ($x\_{1}$,$y\_{1}$) and any moveable point (*x*,*y*): $\frac{y-y\_{1}}{x-x\_{1}}=m$

Multiply both sides of this equation by the denominator $x-x\_{1}$ to obtain: $y-y\_{1}=m(x-x\_{1})$

When you substitute the values of the specific point ($x\_{1}$,$y\_{1}$) into the point slope formula, you will obtain a true statement “0=0” which proves that ($x\_{1}$,$y\_{1}$) is a point on the line.

The slope-intercept form of a line is *y* = *mx* + *b*. *m* is the same value in both forms. Notice that it is the coefficient of the *x* variable.

**EXAMPLE:** For the equation $y-7=\frac{3}{4}(x-2)$, the particular point is (2,7). The

*x*-coordinate of this point is 2 and the *y*-coordinate of this point is 7. The line has slope of $\frac{3}{4}$ .

1. Verify that (2,7) is a solution to the equation $y-7 =\frac{3}{4}(x-2)$ by evaluating the equation when *x*=2 and *y*=7.
2. For each equation in point-slope form, identify the particular point and the slope. Then graph each equation. Test your point in the equation to be sure that the point makes the equation true.
3. $y-3 =\frac{2}{5}(x-1)$



1. $y-8 =-\frac{3}{2}(x-2)$



1. $y-2 =\frac{4}{5}(x-(–5))$



1. $y+6 =\frac{3}{2}(x+2)$



1. Use the point and the slope to write an equation of the line in point-slope form.

$$y-y\_{1}=m(x-x\_{1})$$

1. (3,5), *m* = 2
2. (2,6), $m=\frac{-2}{7}$
3. (3,0), parallel to the line $y=9x+5$
4. (0,4), perpendicular to the line $y=\frac{-8}{5}x+2$
5. (3,2), *m* = 0
6. (-3,2), *m* = $\frac{7}{5}$
7. (-5,-1), *m*=3
8. Plot the two points (*–*3,7) and (1,–3).
* Draw the line containing the two points.
* What is the slope between the two points?
* Write an equation in point-slope form:



1. Find an equation of the line between the given two points by first finding the slope, then finding the point-slope form of the equation.
2. through points (5,8) and (–2, 7)
3. through points (–2, -6) and (–7, 5)
4. This February and March, the middle school students had their most successful food drive, topping last year’s total by 57 items. They started the food drive on day 0 with 8 cans of fruit juice which had been donated too late to be included in the November food drive. Contributions poured in at a constant rate of 12 food items per day. By the time the drive was over, the cans covered the cafeteria stage.
5. What is the dependent variable?
6. What is the independent variable?
7. Find the slope described in the situation.
8. Find a point described in the situation.
9. Write an equation of the line in point-slope form.
10. Write an equation of the line in slope-intercept form.
11. Use either equation to tell how many food items had been collected by the 10th day.
12. Use either equation to tell how many days it took to collect 488 items

***Transforming a function from point-slope form into slope-intercept form***

1. a. Sketch the graph of the function *y* – 2 = 4(*x* – 3).



b. Transform the previous equation into slope intercept form by applying the distributive property on the right side and solving for *y*.

1. What are the slope and *y*-intercept?
2. Confirm that the equation in slope-intercept form gives the same graph as the equation in point-slope form.

11. a. Sketch the graph of the function $y+4 =\frac{5}{4}(x+6)$.



1. Transform the previous equation into slope-intercept form by applying the distributive property on the right side and solving for *y*.
2. What are the slope and *y*-intercept?
3. Confirm that the equation in slope-intercept form gives the same graph as the equation in point-slope form.