

1. Slope-Intercept Form of a Line
2. You should be familiar with the equation for slope, with the concept of intercepts, the Cartesian Coordinate System and functions that are defined recursively. In this lesson, we will write the equation of a line, given information about its graph, including the slope and y -intercept. We will also graph lines, given the slope-intercept form of the line.
3.
 - (a) Certain applications have an additive pattern, that is, some quantity being measured is increasing at a constant rate, in this case, the temperature is increasing at one-half degree per hour. We are given an initial condition, and often are asked to find a future value. We could arrive at the answer by continuing to follow the pattern.
 - (b) By adding one-half of a degree each hour for ten hours, we find the temperature at 10AM to be 11 degrees.
 - (c) Since repeated addition is multiplication, we have a natural short cut. We begin with the initial temperature at midnight of 6 degrees. To the initial temperature, we add one-half of a degree ten times. The temperature will go up 5 degrees from the initial temperature. The general formula is to start with an initial value for the temperature T , then add the change in temperature, which is found by taking the rate of change of temperature with respect to time and multiplying it by the change in time.
4. In mathematical notation, we often use y as the dependent variable, the quantity we are interested in measuring, and x as the independent variable. In this case, we will let y stand for the temperature and x for time. We need to be given a rate of change of y with respect to x , called the slope, which we denote by the letter m . We also need to be given an initial value. The initial value typically corresponds to the y -value when the x -value is zero, which is the y -intercept. We denote the y -intercept by the letter b . The equation then becomes $y = mx + b$. y is the initial value plus the change, which is found by multiplying the rate of change by the input.
5. This is the slope-intercept form of a line. If we know where the line crosses the y -axis and the slope of the line, we can write the slope-intercept form of the line, $y = mx + b$.
6.
 - (a) Here is another example. We are given the slope and y -intercept.
 - (b) We can directly write the slope-intercept form of the line.
7.
 - (a) Here we are given the graph of the line, including the y -intercept. We first compute the slope using the slope formula.
 - (b) In this case, the slope is $-\frac{3}{5}$
 - (c) So the slope-intercept equation of the line is $y = -\frac{3}{5}x + 5$

8. (a) In this example, we are given the equation, and wish to graph the line. The y -intercept is -3
- (b) so we can place a point at $(0, -3)$. The slope is $\frac{3}{4}$...
- (c) so we can place new points by counting right 4, up 3
- (d) right 4, up 3
- (e) and connect the points.
9. To recap: Given the rate of change or slope of a line, m , and an initial value, the y -intercept b , we can write an equation of the line, the slope-intercept form $y = mx + b$