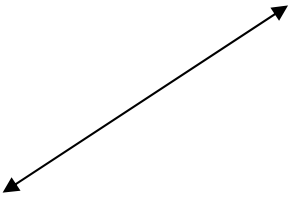
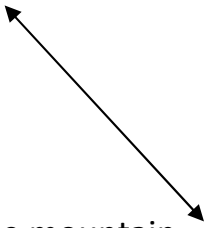
Linear Equations

Slope (m) – steepness of a line

4 types of slope:

Positive Slope -> line rises  Going up ski the mtn on ski lift	**Negative Slope ->** line falls  Skiing down the mountain
Zero Slope -> Horizontal Line (y = #)  Cross Country Skiing	**No Slope ->** Vertical Line (x = #)  Skiing off side of mountain & falling straight down ("Oh NO!")

* Note: Positive & negative sign give direction of the line.
Numeric value tells how steep line is. Greater the numeric value, the steeper the line.

To find slope of a line:

Given 2 points on a line (x_1, y_1) & (x_2, y_2)	$m = \frac{y_2 - y_1}{x_2 - x_1}$
From any 2 points on graph	1. Start at the leftmost point. 2. Find RISE by counting up (positive) or down (negative) until at the same level as other point 3. Find RUN by counting right until you get to other point 4. Write slope as: $m = \frac{rise}{run}$
Rate of Change (real-life situations)	Rate of Change = $\frac{change\ \ in\ \ amount}{change\ \ in\ \ time}$ * Be sure to include units with answer

Linear Equations – equations whose graphs are straight lines:

Standard Form	**Ax + By = C** A, B, C – integers (no fractions/decimals) A & B both ≠ 0 A ≥ 0 (A can't be negative)
Slope-intercept Form	**y = mx + b** m -> slope of line / b-> y-intercept (0, b) x & y are variables because they represent any point on the line **Use slope-intercept form to easily graph lines** begin with "b" (y-intercept) & plot point on y-axis move with "m" (slope) – from y-intercept use rise/run to find other points on line * If need to graph eqn that is not in slope-intercept form, re-write it in slope-intercept form first.
Point-Slope Form	$y - y_1 = m(x - x_1)$ m is slope (x_1, y_1) is one of the actual points on the line
Special Linear Eqns	x = # (x + 0y = #) -> Vertical Line -> No Slope y = # (0x + y = #) -> Horizontal Line -> Zero Slope

x & y –intercepts:

x-intercept (#, 0)	**y-intercept (0, #)**
Point where graph crosses the x-axis * Also called the solutions or roots of eqn. To find x-intercept: 1. Substitute y = 0 into eqn 2. Solve for x 3. x-intercept is located on the x-axis at the	Point where graph crosses y-axis To find y-intercept: 1. Substitute x = 0 into eqn 2. Solve for y 3. y-intercept is located on y-axis at the point

point (#, 0)	(0, #)

To write equations of lines in slope-intercept form:

Given 1 point & slope	1. Substitute slope in for m in y = mx + b 2. Substitute given point (x, y) into y = mx + b for x and y. Solve for b. 3. Final eqn will be in form y = mx + b with given slope, m, and the y-intercept, b, you found in step 2
Given 2 points	1. Use slope formula to find slope $m = \frac{y_2 - y_1}{x_2 - x_1}$ 2. In the eqn y = mx + b, substitute slope you found in step 1 for m and 1 of given points in for x & y. Solve for b. 3. Final eqn will be in form y = mx + b with slope, m, you found in step 1 and the y-intercept, b, you found in step 2
Through a given point & parallel or perpendicular to a given line	1. Write given eqn in slope-intercept form (y = mx + b) & identify the slope, m. 2. State the slope of the line that is || (same slope) or ⊥ (opposite reciprocal slopes) to given line. 3. In y = mx + b, substitute the slope in from step 2 in for m and the given point in for x & y. Solve the eqn for b. 4. Final eqn will be in form y = mx + b with slope, m, that is || or ⊥ given line you found in step 2 and the y-intercept, b, you found in step 3.