2.2 Slope of a Line and Rate of Change

1. Definition:

a. The slope of a line is a number that describes the direction and steepness of the line.

b. The slope of a line is the ratio of the vertical and horizontal changes between two points on a line (Also calls as **rate of change**)

2. The Slope Formula:
The slope of a line passing through the distinct points (x_1, y_1) and (x_2, y_2) is

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

Example 1: Find the slope of the line passing through the points (1, -1) and (7, 2)

Your Turn: Find the slope of the line passing through the points (-4, 5) and (6, 8)

Find the slope of the line passing through the points (3, -4) and (-5, -1)

Find the slope of the line passing through the points (1, -8) and (-5, -4)

3. Parallel and Perpendicular Lines:

a. Parallel lines have **same slope**. ($m_1 = m_2$)

b. Perpendicular lines have **negative reciprocal slopes**. ($m_1 = -\frac{1}{m_2}$ *or* $m_1 m_2 = -1$)

Example 2: Determine if the lines are parallel, perpendicular, or neither.

L_1 : (2, -3), (4, 1); L_2 : (5, -6), (-3, -2)

Your Turn:
L_1 : (4, -1), (-3, 6); L_2 : (-1, 3), (2, 0)

Example 3: Applications and interpretation of slope: At a university, the number of students enrolled in 2005 was 14,985. In 2010, this number increased to 17,982. Find the slope. Explain the meaning of the slope.