Common Math 10
Lesson 6.2 ~ Slopes of Parallel & Perpendicular Lines

Parallel lines are always the same distance apart; they never intersect. The slopes of parallel lines are equal.

Example #1: Line $EF$ passes through $E(-3,-2)$ and $F(-1,6)$. Line $CD$ passes through $C(-1,-3)$ and $D(1,7)$. Sketch the lines. Are they parallel? Justify your answer using slopes.

\[ m_{EF} = \frac{\text{rise}}{\text{run}} = \frac{8}{2} = 4 \]

\[ m_{CD} = \frac{\text{rise}}{\text{run}} = \frac{10}{2} = 5 \]

\[ m_{EF} \neq m_{CD}, \text{ so lines are not parallel} \]

Example #2: Determine the slope of a line parallel to the line graphed below. Sketch a parallel line on the same graph.

\[ m_{GH} = \frac{\text{rise}}{\text{run}} = \frac{-1}{3} \]
Perpendicular lines intersect at a right angle (90°). The slope of one line is the negative reciprocal of the other.

Example #3: Line ST passes through S(−2, 7) and T(2, −5). Line UV passes through U(−2, 3) and V(7, 6). Sketch the lines. Are they perpendicular? Justify your answer using slopes.

\[ m_{ST} = \frac{\text{rise}}{\text{run}} = -\frac{12}{4} = -\frac{3}{1} \]

\[ m_{UV} = \frac{\text{rise}}{\text{run}} = \frac{3}{9} = \frac{1}{3} \]

Since \( m_{ST} \) is the negative reciprocal of \( m_{UV} \), the lines are perpendicular.

Example #4: Determine the slope of a line perpendicular to the line graphed below. Sketch a perpendicular line on the same graph.

\[ m_{EF} = \frac{\text{rise}}{\text{run}} = \frac{3}{2} \]

\[ m_{GH} = -\frac{2}{3} \]