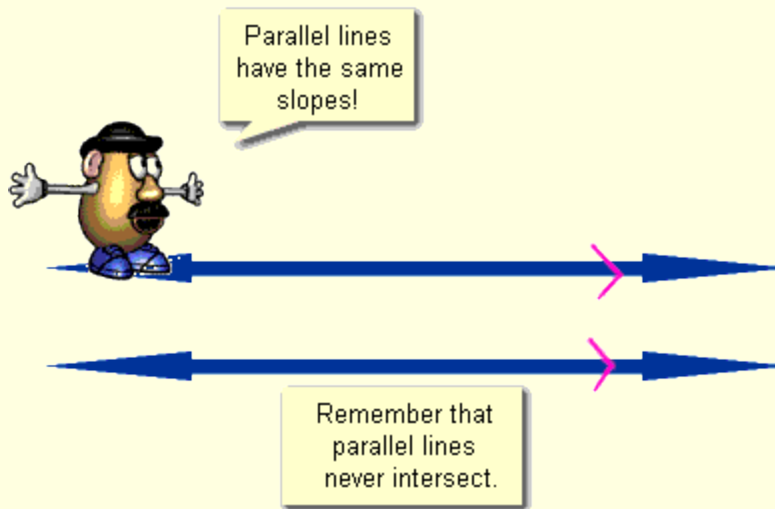


Parallel and Perpendicular Lines

Mathematics problems often deal with parallel and perpendicular lines. Since these are such popular lines, it is important that we remember some information about their slopes.

Parallel Lines: (same slope!)



Parallel lines are marked with "feathers" to show that they are parallel. These "feathers" look like "greater than" symbols.

Parallel lines have the same slope.

The symbol to indicate parallel lines is two vertical bars. It looks something like the number 11.

$$l_1 \parallel l_2 \rightarrow m_1 = m_2$$

where l_1 and l_2 are lines
 m_1 and m_2 are slopes

$$y = 3x + 5$$

$$y = 3x - 7$$

$$y = 3x + 0.5$$

These lines are ALL parallel.
They all have the same slope (m).
(Remember $y = mx + b$.)

$$y = 3x$$

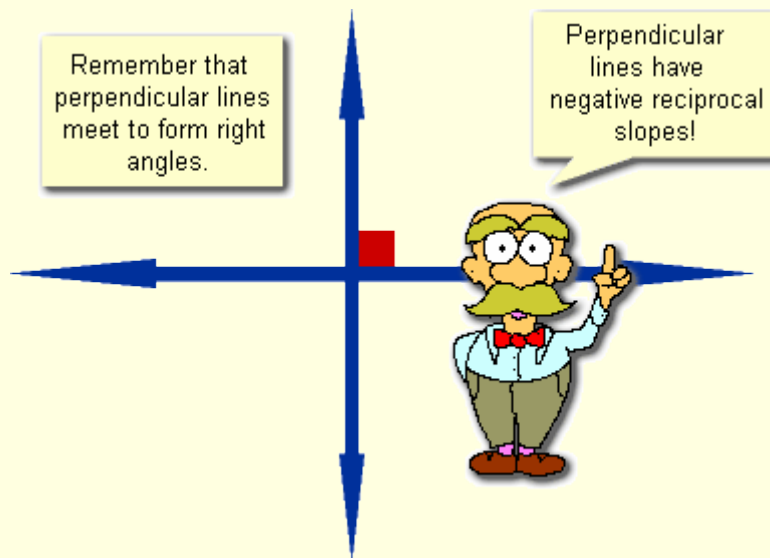
Example:

The slope of l_1 is $\frac{3}{5}$ and $l_1 \parallel l_2$. Find the slope of l_2 .
Since the lines are parallel, the slopes are the same.

The slope of l_2 is also $\frac{3}{5}$. **ANSWER**

Perpendicular Lines:

(negative reciprocal slopes!)



Perpendicular lines have negative reciprocal slopes.

The symbol to indicate perpendicular is an up-side-down capital T.

$$l_1 \perp l_2 \rightarrow m_1 = -\frac{1}{m_2}$$

where l_1 and l_2 are lines
 m_1 and m_2 are slopes

To find a negative reciprocal of a number, flip the number over (invert) and negate that value.

$$\frac{1}{2} \rightarrow -\frac{2}{1} = -2$$

$$-\frac{4}{5} \rightarrow \frac{5}{4}$$

$$3 = \frac{3}{1} \rightarrow -\frac{1}{3}$$

$$-5 \rightarrow \frac{1}{5}$$

$$y = 4x + 7$$

$$y = -\frac{1}{4}x - 6$$

These lines are perpendicular.
Their slopes (m) are negative reciprocals.
(Remember $y = mx + b$.)

Example:

The slope of l_1 is $\frac{3}{5}$ and $l_1 \perp l_2$. Find the slope of l_2 .
Since the lines are perpendicular, the slopes are negative reciprocals.

The slope of l_2 is $-\frac{5}{3}$. **ANSWER**