6.2: Parallel and Perpendicular Lines

#### Two lines can be said to be parallel or perpendicular.

Two lines are parallel if Two lines are perpendicular if



1. Go to the following site: https://www.geogebra.org/m/cSYbC98W
2. Which pair of lines are parallel?
3. Which line is perpendicular to the others?
4. Complete the following table. Record the slopes of all three lines. Drag points A, B, C and/or D to change their slopes. Record the new slopes values. Repeat.

|  |  |  |  |
| --- | --- | --- | --- |
| Example | Slope of the Green Line | Slope of the Blue Line | Slope of the Red Line |
| 1 |  |  |  |
| 2 |  |  |  |
| 3 |  |  |  |
| 4 |  |  |  |
| 5 |  |  |  |

1. What do you notice about the slopes of the parallel lines?
2. What do you notice about the slopes of perpendicular lines?

By comparing the slopes of the pairs of lines that were parallel, develop a rule for the slopes of parallel lines.

If lines are parallel, then

By comparing the slopes of the pairs of lines that were perpendicular, develop a *rule* for the slopes of Perpendicular Lines..

If lines are perpendicular, then

### SUMMARY

PARALLEL Lines:

* Have the same slope
* But different y-intercepts
* Are always a constant distance apart

PERPENDICULAR Lines:

* Meet at a right angle
* The slopes are NEGATIVE RECIPROCAL of each other.
* If $m\_{1}=\frac{a}{b}$ then $m\_{2}=-\frac{b}{a}$

Ex. 1) Which of the following pairs of lines are parallel?

|  |  |
| --- | --- |
| a) y = 2x + 3 and $y=5x+3$  | b) $y=-7x-9 and y=-7x-11$ |
| c) $y=6x+1 and y=-6x+4$ | *d)* $y=-3x-2 and y=-3x$ |

### Ex. 2) Which of the following pairs of lines are perpendicular?

|  |  |
| --- | --- |
| a) y = 2x + 7 and $y=\frac{1}{2}x+9$  | b) y = 5x +1 and $y=-5x-3$ |
| c) y = *9x + 8 and* $y=-\frac{1}{9}x+5$ | *d)* $y=-\frac{2}{3}x-11$ *and* $y=\frac{3}{2}x-16$ |

|  |  |
| --- | --- |
| Ex. 3) Find an equation of a line that is parallel to y = —5x +1 and passes through the point (0, 0). | Ex. 4) Find an equation of a line that is parallel to *y = 4x* - 3 and has the same y-intercept as *y* = *3x* - 9. |
| Ex . 5) Find an equation of a line that is perpendicular *to* $y=\frac{1}{3}x-2$and passes through (0, 3). | Ex. 6) Find an equation of a line that is perpendicular to *y* = *4x* + 2 and has a y-intercept of 5 |
| Ex. 7) Find an equation of a line that is perpendicular to *y = 2x +* 1 and has the same y-intercept as $y=6x-2$. |
| Seatwork: CP page 76, 77 |

Ex. 3) Find an equation of a line that is parallel to y = —5x +1 and passes through the point (-2, -1).

Ex. 4) Find an equation of a line that is parallel to *y = 4x* - 3 and has the same x-intercept as *y* = *3x* - 9.

Ex . 5) Find an equation of a line that is perpendicular *to* $y=\frac{1}{3}x-2$and passes through (-1, 3).

Ex. 6) Find an equation of a line that is perpendicular to *y* = *4x* + 2 and has a y-intercept of 5

Ex. 7) Find an equation of a line that i