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5.6
Perpendic...

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5.6 Perpendicular Lines

Two lines are perpendicular if they intersect at a right angle.

To determine if lines are perpendicular:

- 1) Find the slope of both lines. OR If the slopes of 2 lines are "reciprocals", but one is negative and 1 is positive, then the lines are perpendicular.
- 2) Multiply the 2 slopes.
- 3) If the product = -1 , the lines are perpendicular.

Example 1: Are the lines represented by these equations perpendicular?

- a) $y = 1/5x - 3$ and $y = -5x + 3$
 $m = 1/5$ $m = -5$
 $1/5(-5) = -1$ yes
- b) $y = 3/8x + 1$ and $y = 8/3x - 2$
 $m = 3/8$ $m = 8/3$
 $3/8(8/3) = 1$ NO

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 ① NO
 $3(-3) = -9$
 ② YES
 $3/2(-2/3) = -1$

Example 2: Show that two lines are perpendicular.

- a) Line 1 passes through (2,5) and (4,4) $m = -1/2$
 Line 2 has the equation $y = 2x + 1$ $m = 2$
 Line 1: $m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{4 - 5}{4 - 2} = -1/2$ $-1/2(2) = -1$

- b) Line 1 passes through (1, 3) and (3,6) $m = 3/2$
 Line 2 has the equation $y = -2/3x - 5$ $m = -2/3$
 Line 1: $m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{6 - 3}{3 - 1} = 3/2$ Proof: $-2/3(3/2) = -1$

Example 3: Are the lines perpendicular?

- Line 1 passes through (0,0) and (1,2) $m = 2$
 Line 2 has the equation $y = 1/2x + 7$ $m = 1/2$
 Line 1: $m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{2 - 0}{1 - 0} = 2/1 = 2$ $2(1/2) = 1$ NO

Parallel Lines - lines that have the same slope