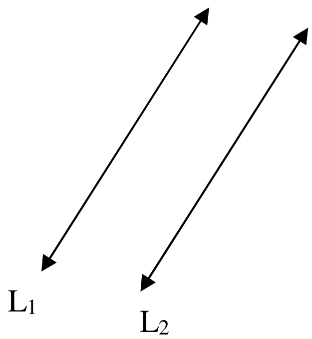
MPM 1D1

Name: ____________________________

Date: ____________________________

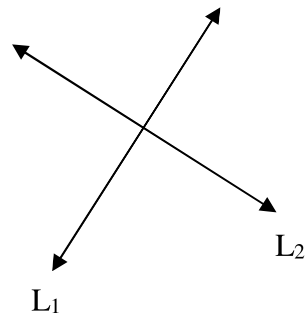
Parallel and Perpendicular Lines

If the lines have the same slope, they are parallel.



$m_1 = m_2$

If the lines are perpendicular, the product of their slopes is – 1. Their slopes are negative reciprocals.



$m_1 \times m_2 = -1$

1 Given the two slopes, determine if the lines are parallel, perpendicular or neither.

a) $m_1 = \frac{2}{3}$ $\quad m_2 = \frac{3}{2}$

b) $m_1 = \frac{1}{2}$ $\quad m_2 = \frac{3}{6}$

c) $m_1 = -3$ $\quad m_2 = \frac{1}{3}$

d) $m_1 = \frac{4}{3}$ $\quad m_2 = -\frac{3}{4}$

e) $m_1 = \frac{2}{5}$ $\quad m_2 = -\frac{2}{5}$

f) $m_1 = 0.6$ $\quad m_2 = \frac{3}{5}$

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

A (3, 2) B(6, 4) and C(-8, -2) D(-2, 2)

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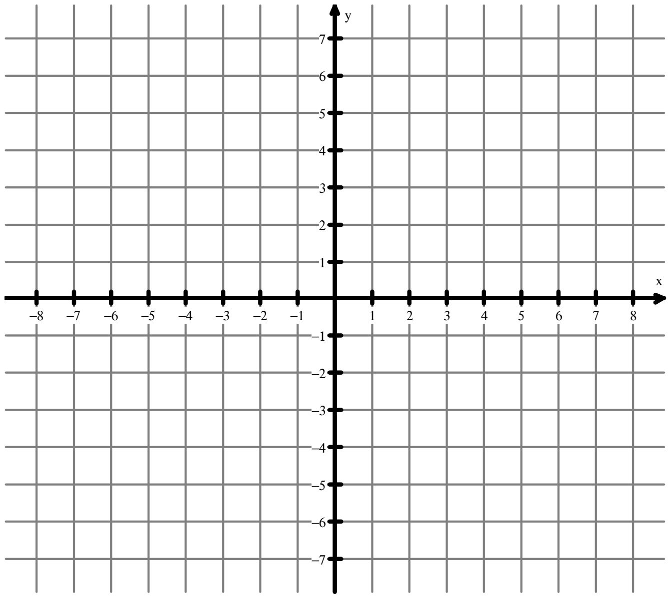
3 Graph the following lines. Find their slopes and determine if the lines are parallel, perpendicular or neither.



$y = x + 1$ and $4x + 4y + 8 = 0$

4 Indicate if the lines defined by the following equations are parallel, perpendicular or neither.

$3x - 2y + 12 = 0$ and $y = -\frac{2}{3}x - 4$

5 Find the slope of a line that is perpendicular to another line with the given slope.

a) $m_1 = 4$

b) $m_1 = -\frac{3}{8}$

c) $m_1 = undefined$

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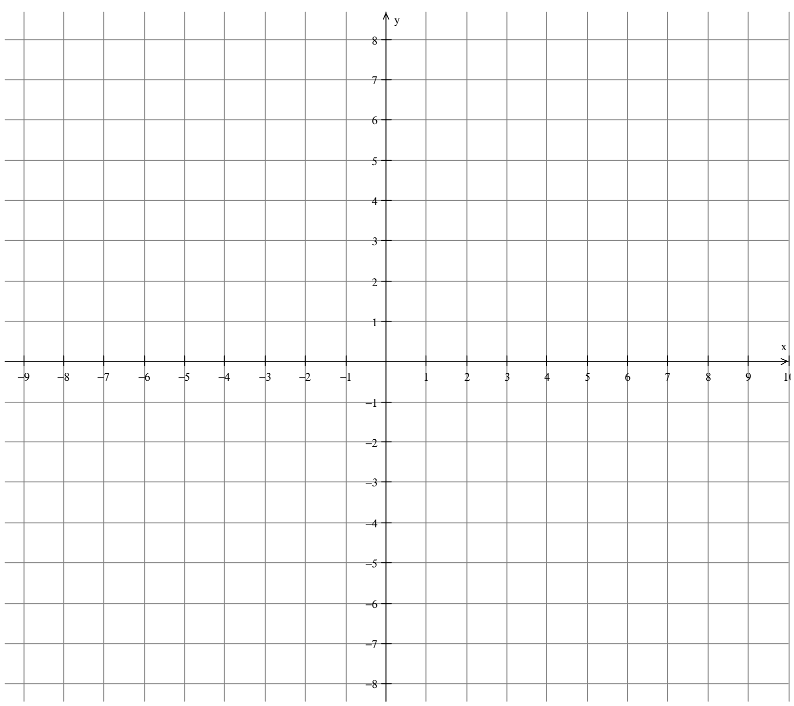
6 Write the equation of a line that is parallel and that is perpendicular to the given line.

Equation	Parallel Line	Perpendicular Line
$4x - 2y + 12 = 0$		

7 A triangle has vertices A(-2, 3), B(8, -2) and C(4, 6). Determine if the triangle is a right triangle or not.



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Determine an equation for each of the following lines:

a) line parallel to the line $2x - 3y + 1 = 0$ and passing through the point (1, 2).

b) line perpendicular to the line $x - 5y + 2 = 0$ and passing through the point (-2, 5).

c) line parallel to the line $x + 2y - 5 = 0$ and has the same x-intercept as the line $3x - 6y + 18 = 0$.

d) line parallel to the line $x + 3 = 0$ and passing through the point (-6, -7).

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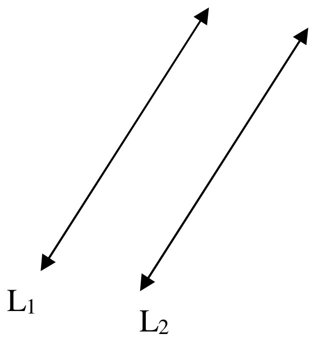
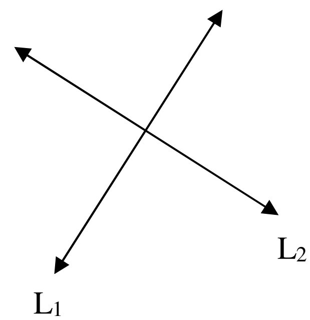
Parallel and Perpendicular Lines

If the lines have the same slope, they are parallel.



$m_1 = m_2$

If the lines are perpendicular, the product of their slopes is – 1. Their slopes are negative reciprocals.



$m_1 \times m_2 = -1$

1 Given the two slopes, determine if the lines are parallel, perpendicular or neither.

a) $m_1 = \frac{2}{3}$ $m_2 = \frac{3}{2}$ neither

b) $m_1 = \frac{1}{2}$ $m_2 = \frac{3}{6}$ parallel

c) $m_1 = -3$ $m_2 = \frac{1}{3}$ perpend.

d) $m_1 = \frac{4}{3}$ $m_2 = -\frac{3}{4}$ perpend.

e) $m_1 = \frac{2}{5}$ $m_2 = -\frac{2}{5}$ neither

f) $m_1 = 0.6$ $m_2 = \frac{3}{5}$ parallel

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

A (3, 2) B(6, 4) and C(-8, -2) D(-2, 2)

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

$m = \frac{4-2}{6-3}$

$m = \frac{2}{3}$

x	y
-8	-2
-2	2

+6 +4

$m = \frac{\Delta y}{\Delta x} = \frac{4}{6} = \frac{2}{3}$

$\therefore$ parallel

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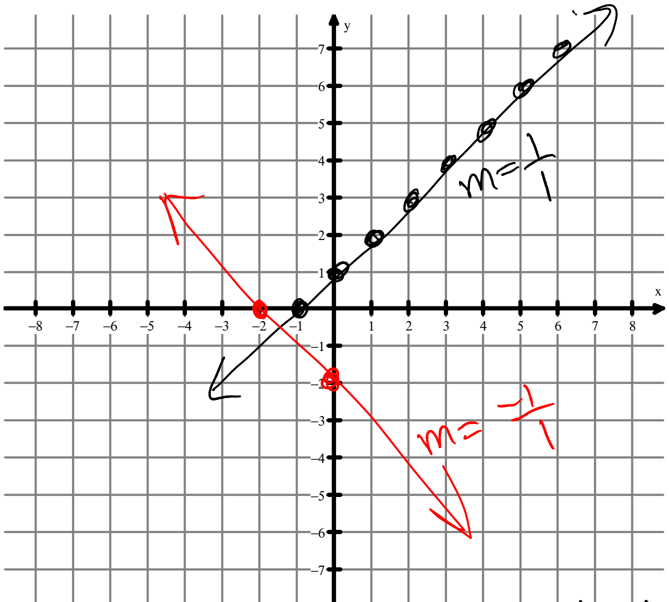
3 Graph the following lines. Find their slopes and determine if the lines are parallel, perpendicular or neither.



$y = x + 1$ and $4x + 4y + 8 = 0$

$m = \frac{1}{1}$

$b = 1$

x-int

$4(0) + 4y + 8 = 0$

$4y = -8$

$y = -2$ $(0, -2)$

y-int

$4x + 4(0) + 8 = 0$

$4x = -8$

$x = -2$ $(-2, 0)$

$\therefore$ perpendicular

4 Indicate if the lines defined by the following equations are parallel, perpendicular or neither.

$3x - 2y + 12 = 0$ and $y = -\frac{2}{3}x - 4$

isolate y

$3x + 12 = 2y$

$\frac{3}{2}x + 6 = y$

$m = \frac{3}{2}$

$m = -\frac{2}{3}$

$\therefore$ perpendicular

5 Find the slope of a line that is perpendicular to another line with the given slope.

a) $m_1 = 4$

$m_2 = \frac{-1}{4}$

b) $m_1 = -\frac{3}{8}$

$m_2 = \frac{8}{3}$

c) m_1 = *undefined*

$m_2 = \emptyset$

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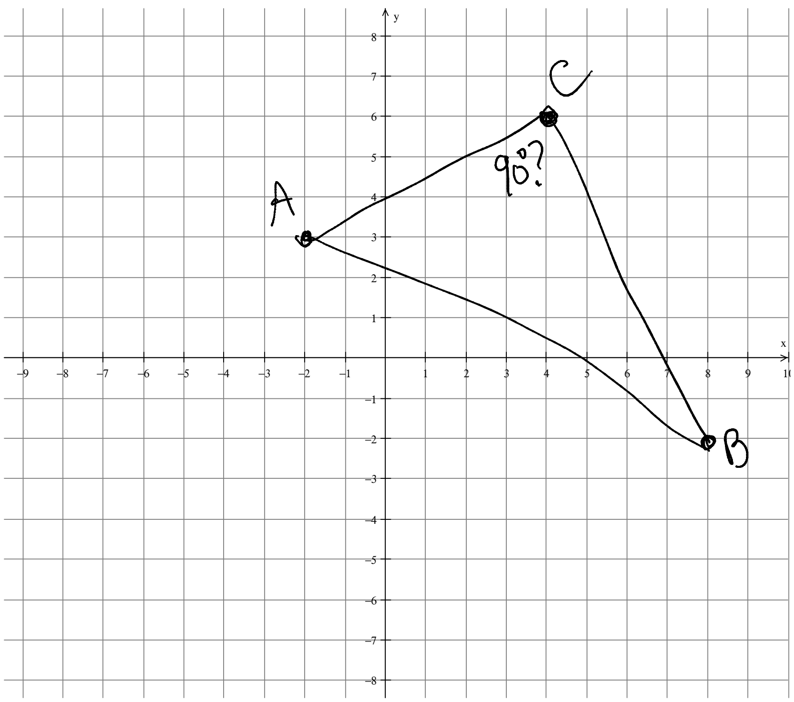
Write the equation of a line that is parallel and that is perpendicular to the given line.

Equation	Parallel Line	Perpendicular Line
$4x - 2y + 12 = 0$ $4x + 12 = 2y$ $2x + 6 = y$	$y = 2x +$ any #	$y = -\frac{1}{2}x +$ any #

7

A triangle has vertices A(-2, 3), B(8, -2) and C(4, 6). Determine if the triangle is a right triangle or not.

Look at a drawing is not a proof!



$m_{AC} = \frac{\text{rise}}{\text{run}} = \frac{3}{6} = \frac{1}{2}$

$m_{BC} = \frac{\text{rise}}{\text{run}} = \frac{-8}{4} = -2$

$\therefore \Delta$ is a right Δ since slopes are perpendicular

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Determine an equation for each of the following lines:

a) line parallel to the line 2x – 3y + 1 = 0 and passing through the point (1, 2).

$2x + 1 = 3y$

$\frac{2}{3}x + \frac{1}{3} = y$

$\therefore m_1 = 2/3$

for parallel use $m_2 = \frac{2}{3}$ x y

$y - y_1 = m(x - x_1)$

$\therefore y - 2 = \frac{2}{3}(x - 1)$ or $y = \frac{2}{3}x + \frac{4}{3}$

b) line perpendicular to the line x – 5y + 2 = 0 and passing through the point (-2, 5).

$x + 2 = 5y$

$\frac{1}{5}x + \frac{2}{5} = y$

$\therefore m_1 = \frac{1}{5}$

for $\perp$ use $m_2 = -\frac{5}{1}$

$\therefore y - 5 = -5(x + 2)$ or $y = -5x - 5$

c) line parallel to the line x + 2y – 5 = 0 and has the same x-intercept as the line 3x – 6y + 18 = 0.

$2y = -x + 5$

$y = -\frac{1}{2}x + \frac{5}{2}$

$\therefore m_1 = -\frac{1}{2}$ for $\parallel$ use $m_2 = -\frac{1}{2}$

x-int

$3x - 6(0) + 18 = 0$

$3x = -18$

$x = -6$

$\therefore$ x-int $(-6, 0)$

$\therefore$ eqn is

$y - 0 = -\frac{1}{2}(x + 6)$

or

$y = -\frac{1}{2}x - 3$

d) line parallel to the line x + 3 = 0 and passing through the point (-6, -7).

$x = -3$

is a vertical line

with m = undefined

for $\parallel$ line use another vertical line $x = ?$

$\therefore x = -6$ or $x + 6 = 0$