Practice
Equations of Lines: Parallel, Perpendicular, Intersecting, and Coinciding Lines

Answer these problems, then check your answers using the key on the next page. If you missed something, look at the solutions after the answer key, and if you still don't understand, watch the review video again.

#1) State whether these lines are parallel, perpendicular, intersecting, or coinciding:

$$12x - 3y = -3$$
$$8x - 2y = 2$$

#2) State whether these lines are parallel, perpendicular, intersecting, or coinciding:

$$6x - 2y = -4$$
$$6x - 3y = -9$$

#3) State whether these lines are parallel, perpendicular, intersecting, or coinciding:

$$5x - 6y = 6$$
$$12x + 10y = -10$$

#4) State whether these lines are parallel, perpendicular, intersecting, or coinciding:

$$3x + 6y = 6$$
$$y = -\frac{1}{2}x + 1$$

#5) Write the equation of a line in slope-intercept form which is <u>parallel</u> to the given line: $y = 3x - 1$

#6) Write the equation of a line in slope-intercept form which is <u>parallel</u> to the given line: $x+2y=6$

#7) Write the equation of a line in slope-intercept form which is <u>perpendicular</u> to the given line:
$y=3x-1$

#8) Write the equation of a line in slope-intercept form which is <u>perpendicular</u> to the given line:
$x+2y=6$

Answers:

#1) *parallel*
#2) *intersecting*
#3) *perpendicular*
#4) *coinciding*

#5) *many correct answers, including :*

$y = 3x + 2$

$y = 2x + 1$

$y = 3x + 15$

$y = 3x + (anything\ except\ -1)$

#6) *many correct answers, including :*

$y = -\dfrac{1}{2}x + 1$

$y = -\dfrac{1}{2}x$

$y = -\dfrac{1}{2}x + 582$

$y = -\dfrac{1}{2}x + (anything\ except\ 3)$

#7) *many correct answers, including :*

$y = -\dfrac{1}{3}x - 1$

$y = -\dfrac{1}{3}x + 542$

$y = -\dfrac{1}{3}x$

$y = -\dfrac{1}{3}x + (anything)$

#8) *many correct answers, including :*

$y = 2x$

$y = 2x + 1$

$y = 2x - 14$

$y = 2x + (anything)$

Solutions:

#1) State whether these lines are parallel, perpendicular, intersecting, or coinciding:

$12x - 3y = -3$
$8x - 2y = 2$

$12x - 3y = -3$
$\underline{-12x} \qquad \underline{-12x}$
$\dfrac{-3y}{-3} = \dfrac{-12x}{-3} - \dfrac{3}{-3}$
$y = \boxed{4}x + 1$

$8x - 2y = 2$
$\underline{-8x} \qquad \underline{-8x}$
$\dfrac{-2y}{-2} = \dfrac{-8x}{-2} + \dfrac{2}{-2}$
$y = \boxed{4}x - 2$

slopes equal
y-int different
$\boxed{\text{parallel}}$

#2) State whether these lines are parallel, perpendicular, intersecting, or coinciding:

$6x - 2y = -4$
$6x - 3y = -9$

$6x - 2y = -4$
$\underline{-6x} \qquad \underline{-6x}$
$\dfrac{-2y}{-2} = \dfrac{-6x}{-2} - \dfrac{4}{-2}$
$y = \boxed{3}x + 2$

$6x - 3y = -9$
$\underline{-6x} \qquad \underline{-6x}$
$\dfrac{-3y}{-3} = \dfrac{-6x}{-3} - \dfrac{9}{-3}$
$y = \boxed{2}x + 6$

slopes different,
not negative
reciprocal
$\boxed{\text{intersecting}}$

#3) State whether these lines are parallel, perpendicular, intersecting, or coinciding:

$5x - 6y = 6$
$12x + 10y = -10$

$5x - 6y = 6$
$\underline{-5x} \qquad \underline{-5x}$
$\dfrac{-6y}{-6} = \dfrac{-5x}{-6} + \dfrac{6}{-6}$
$y = \boxed{\dfrac{5}{6}}x - 1$

$12x + 10y = -10$
$\underline{-12x} \qquad \underline{-12x}$
$\dfrac{10y}{10} = \dfrac{-12x}{10} - \dfrac{10}{10}$
$y = -\dfrac{12}{10}x - 1$
$y = \boxed{-\dfrac{6}{5}}x - 1$

slopes are
negative,
reciprocal
$\boxed{\text{perpendicular}}$

#4) State whether these lines are parallel, perpendicular, intersecting, or coinciding:

$3x + 6y = 6$

$y = \boxed{-\dfrac{1}{2}}x + \boxed{1}$

$3x + 6y = 6$
$\underline{-3x} \qquad \underline{-3x}$
$\dfrac{6y}{6} = \dfrac{-3x}{6} + \dfrac{6}{6}$
$y = \boxed{-\dfrac{1}{2}}x + \boxed{1}$

both slope
and y-intercept
are equal,
same line
$\boxed{\text{coinciding}}$

#5) Write the equation of a line in slope-intercept form which is <u>parallel</u> to the given line: $y = 3x - 1$

$y = \boxed{3}x - 1$

new line slope $= 3$

$y = 3x + (\text{anything except } -1)$

$\boxed{y = 3x + 2}$

$\boxed{y = 3x + 1}$

$\boxed{y = 3x + 15}$ etc.

#6) Write the equation of a line in slope-intercept form which is <u>parallel</u> to the given line: $x + 2y = 6$

$x + 2y = 6$
$\underline{-x \qquad -x}$
$\dfrac{2y}{2} = \dfrac{-x}{2} + \dfrac{6}{2}$

$y = \left(\dfrac{1}{2}\right)x + 3$

new line slope $= -\dfrac{1}{2}$

$y = -\dfrac{1}{2}x + (\text{anything except } 3)$

$\boxed{y = -\dfrac{1}{2}x + 1}$

$\boxed{y = -\dfrac{1}{2}x}$

$\boxed{y = -\dfrac{1}{2}x + 582}$ etc.

#7) Write the equation of a line in slope-intercept form which is <u>perpendicular</u> to the given line:
$y = 3x - 1$

$y = \boxed{3}x - 1$

new line slope $= -\dfrac{1}{3}$

$y = -\dfrac{1}{3}x + (\text{anything})$

$\boxed{y = -\dfrac{1}{3}x - 1}$

$\boxed{y = -\dfrac{1}{3}x + 542}$

$\boxed{y = -\dfrac{1}{3}x}$ etc.

#8) Write the equation of a line in slope-intercept form which is <u>perpendicular</u> to the given line:
$x + 2y = 6$

$x + 2y = 6$
$\underline{-x \qquad -x}$
$\dfrac{2y}{2} = \dfrac{-x}{2} + \dfrac{6}{2}$

$y = \left(-\dfrac{1}{2}\right)x + 3$

new line slope $= \dfrac{2}{1}$

$= 2$

$y = 2x + (\text{anything})$

$\boxed{y = 2x}$

$\boxed{y = 2x + 1}$

$\boxed{y = 2x - 14}$

etc.