

Unit #8 – Analyse Linear Functions

Progress Check

The purpose of the progress check is to diagnose areas that you need more practice with before the test.

1. Answer the questions on this handout. Treat it like a test. DO NOT look at the answers until you have finished all of the questions.
2. Use the answers provided to check and see how you did.
3. Use the additional review questions provided in the textbook to practice more questions like the ones you had trouble with in this package.
4. Although this progress check contains a wide selection of questions from this unit, it does not cover ALL of the possible questions from the unit.

1. Express $y = 4x - 3$ in standard form.

2. Express $2x - 3y + 6 = 0$ in the form $y = mx + b$.

3. Calculate the slope of the line that passes through the given points.

a) E (3, 5) and F (5, 9)

b) P (0, -9) and Q (1, -6)

4. Determine the slope and y-intercept of each line:

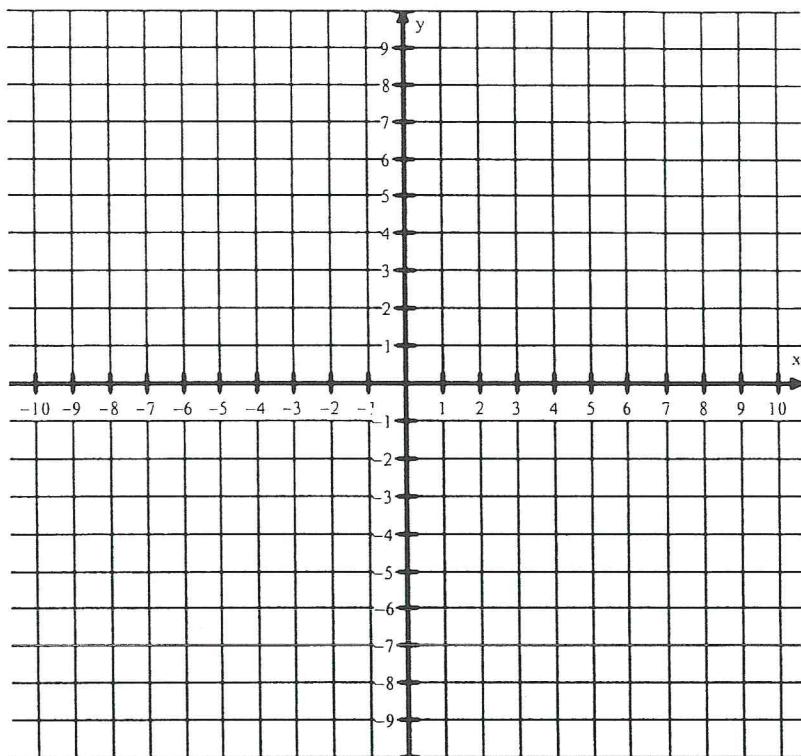
Equation	Slope	y-intercept
a) $y = 4x + 6$		
b) $2x - 12 = 3y$		

5. Draw the graph of each of the following lines.

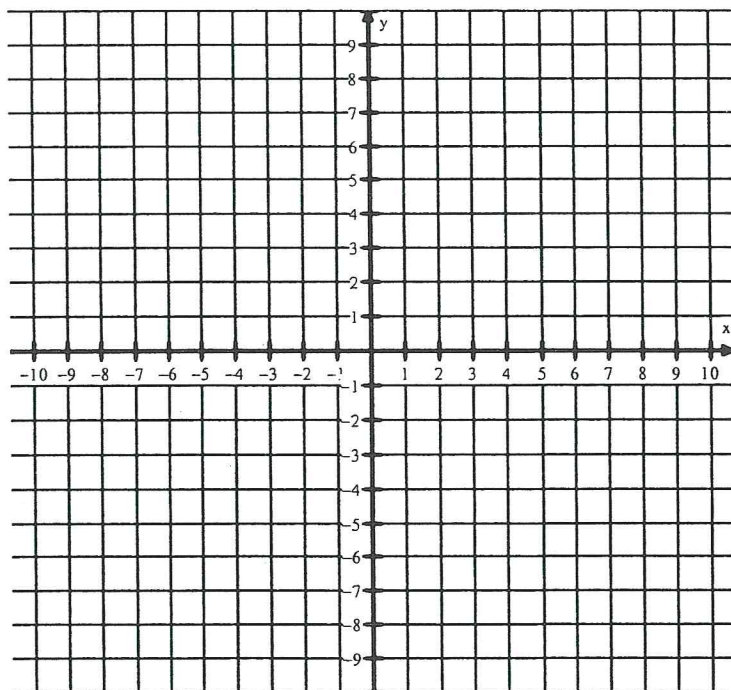
a) $y = \frac{1}{2}x - 1$

b) $y = -2x$

c) $x = 4$



6. Determine the x-intercept and the y-intercept of the equation $7x - 2y - 14 = 0$. Draw the graph of the relation using the two points.



7. Determine the equation of the line with slope $m = \frac{2}{3}$ passing through the point $(0, 4)$.
8. Determine the equation of the line passing through the point $(2, -6)$ with a slope of $m = -1$.
9. Determine the equation of the line passing through the points $(-2, 7)$ and $(-1, 4)$.
10. Determine the equation in standard form of the line whose x-intercept is 2 and whose y-intercept is -4 .
11. Determine the equation of a line perpendicular to the line $3x + 2y - 4 = 0$ passing through the point $(2, 3)$.

12. Determine an equation that is parallel to the given line and an equation that is perpendicular to the given line.

a)

$$y = -7x + 3$$

b)

$$4x - 8y + 2 = 0$$

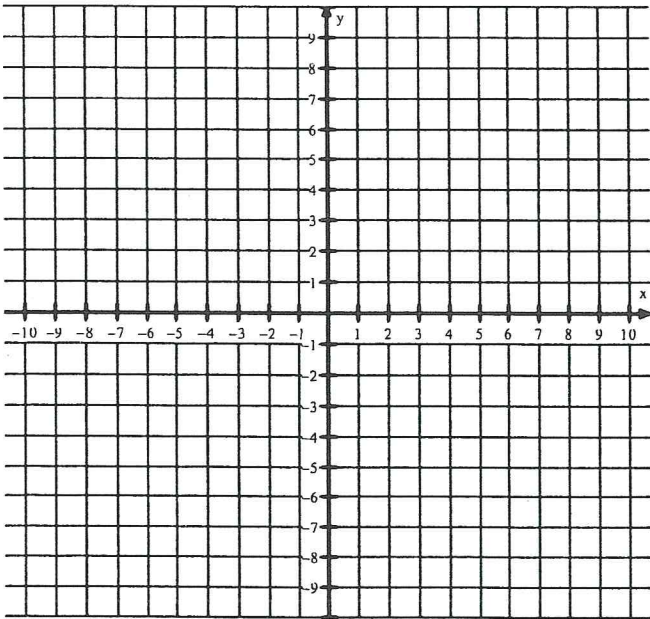
c)

$$5y + 10 = 0$$

Line	Parallel	Perpendicular
$y = -7x + 3$		
$4x - 8y + 2 = 0$		
$5y + 10 = 0$		

13. Determine the value of k if the lines defined by the equations $3x - 2y - 5 = 0$ and $kx - 6y + 1 = 0$ are parallel.

14. The triangle ABC has vertices $A(1, 4)$, $B(-2, -2)$ and $C(4, -1)$. Determine if the shape is a right triangle or not. Justify your answer.



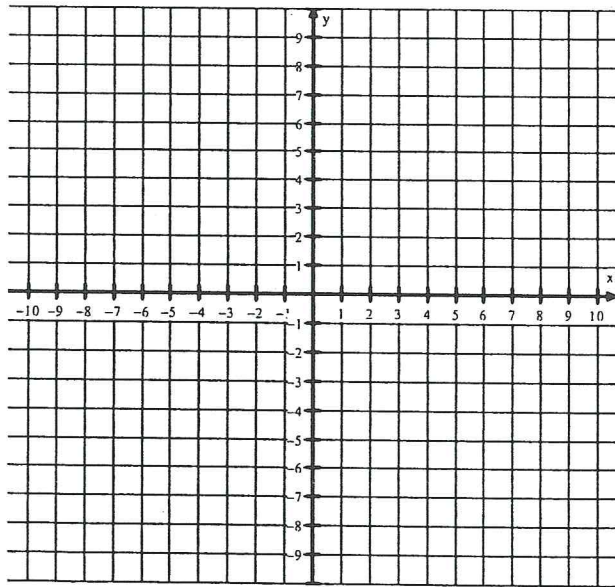
15. The White family is returning home by car. They are using their speedometer: their speed is thus constant. After 3 hours on the road, they are 350 km from home. After 5 hours, they are 130 km from home.

a) What is the independent variable? What is the dependent variable?

b) Write an equation for the line passing through the two points.

16. In an air traffic control tower, a screen shows the approach of two planes at 10 000 m. The path of one the planes corresponds to the equation $y = -2x + 4$ and the path of the other plane is defined by the equation $x - y = 1$.

a) Represent the two equations graphically.



b) Determine if the two planes can continue their approach as scheduled. Explain your answer.

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$$Ax + By + C = 0$$

1. Express $y = 4x - 3$ in standard form.

$$0 = 4x - y - 3$$

2. Express $2x - 3y + 6 = 0$ in the form $y = mx + b$.

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

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

3. Calculate the slope of the line that passes through the given points.

a) $E(3, 5)$ and $F(5, 9)$

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{9 - 5}{5 - 3} = \frac{4}{2} = 2$$

b) $P(0, -9)$ and $Q(1, -6)$

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-6 - (-9)}{1 - 0} = \frac{-6 + 9}{1} = \frac{3}{1} = 3$$

4. Determine the slope and y-intercept of each line:

Equation	Slope	y-intercept
$y = 4x + 6$	4	6
$\frac{2x - 12}{3} = 8y$	$\frac{2}{3}$	-4

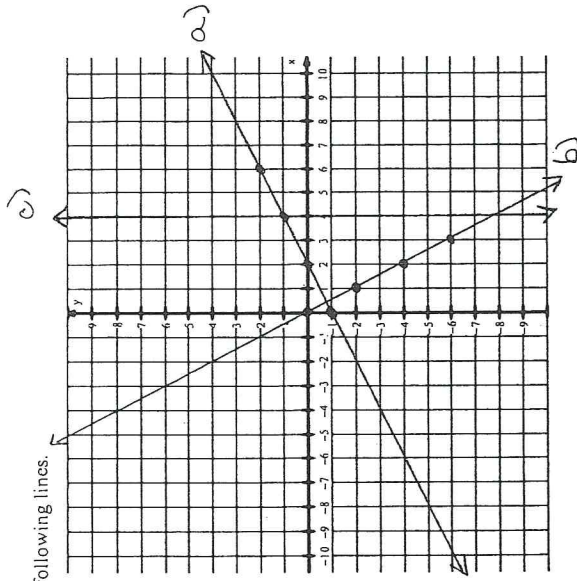
$$y = \frac{2}{3}x - 4$$

5. Draw the graph of each of the following lines.

a) $y = \frac{1}{2}x - 1$

b) $y = -2x$

c) $x = 4$



6. Determine the x-intercept and the y-intercept of the equation $7x - 2y - 14 = 0$. Draw the graph of the relation using the two points.

TO FIND X-INTERCEPT, MAKE $y = 0$ AND SOLVE FOR x .

$$7x - 2(0) - 14 = 0$$

$$7x - 14 = 0$$

$$\frac{7x}{7} = \frac{14}{7}$$

$$x = 2$$

TO FIND Y-INTERCEPT, MAKE $x = 0$ AND SOLVE FOR y .

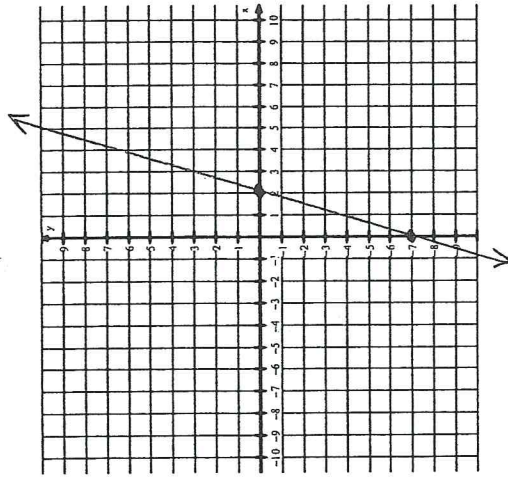
$$7(0) - 2y - 14 = 0$$

$$-2y - 14 = 0$$

$$-2y = 14$$

$$\frac{-2y}{-2} = \frac{14}{-2}$$

$$y = -7$$



12. Determine an equation that is parallel to the given line and an equation that is perpendicular to the given line.

Line	Parallel	Perpendicular
$y = -7x + 3$	$y = -7x + 9$ SAME SLOPE ↑ ANY INTERCEPT	$y = \frac{1}{7}x + 4$ ↑ ANY INTERCEPT NEGATIVE RECIPROCAL
$4x - 8y + 2 = 0$ $y = \frac{1}{2}x + \frac{1}{4}$	$y = \frac{1}{2}x + 6$	$y = -2x - 4$
$5y + 10 = 0$ $y = -2$	$y = 5$ ANY $x = \#$	$x = 4$ ANY $x = \#$

13. Determine the value of k if the lines defined by the equations $3x - 2y - 5 = 0$ and $kx - 6y + 1 = 0$ are parallel.

$$3x - 2y - 5 = 0$$

$$-\frac{6y}{-2} = \frac{-3x + 5}{-2}$$

$$y = \frac{3}{2}x - \frac{5}{2}$$

$$m_1 = \frac{3}{2} \therefore m_2 = \frac{3}{2}$$

$$kx - 6y + 1 = 0$$

$$-\frac{6y}{-6} = \frac{-kx - 1}{-6}$$

$$y = \frac{k}{6}x + \frac{1}{6}$$

$$m_2 = \frac{k}{6}$$

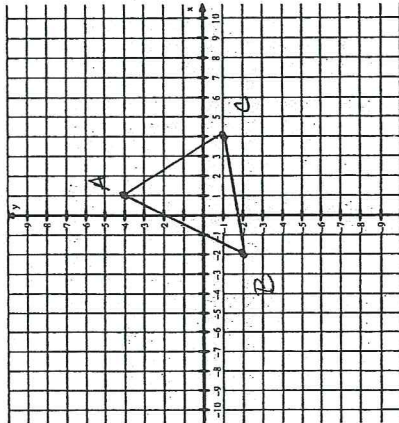
$$\frac{3}{2} = \frac{k}{6}$$

$$3(6) = 2k$$

$$18 = 2k$$

$$k = 9$$

14. The triangle ABC has vertices A(1, 4), B(-2, -2) and C(4, -1). Determine if the shape is a right triangle or not. Justify your answer. * IF THERE IS A RIGHT ANGLE, TWO OF THE THREE LINE SEGMENTS WILL BE PERPENDICULAR TO EACH OTHER.



AB

$$m_1 = \frac{y_2 - y_1}{x_2 - x_1} = \frac{4 - (-2)}{-2 - 1} = \frac{-6}{-3} = 2$$

BC

$$m_2 = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-1 - (-2)}{4 - (-2)} = \frac{-2}{6} = -\frac{1}{3}$$

CA

$$m_3 = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-1 - 4}{4 - 1} = \frac{-5}{3} = -\frac{5}{3}$$

THESE ARE NO NEGATIVE RECIPROCALLS
 \therefore THIS IS NOT A RIGHT TRIANGLE.

7. Determine the equation of the line with slope $m = \frac{2}{3}$ passing through the point $(0, 4)$.

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

$$y - 4 = \frac{2}{3}(x - 0)$$

$$y - 4 = \frac{2}{3}x$$

$$y = \frac{2}{3}x + 4$$

8. Determine the equation of the line passing through the point $(2, -6)$ with a slope of $m = -1$.

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

$$y - (-6) = -1(x - 2)$$

$$y + 6 = -x + 2$$

$$y = -x + 2 - 6$$

$$y = -x - 4$$

9. Determine the equation of the line passing through the points $(-2, 7)$ and $(-1, 4)$.

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{4 - 7}{-1 - (-2)} = \frac{-3}{-1} = 3$$

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

$$y - 7 = 3(x - (-2))$$

$$y - 7 = 3(x + 2)$$

$$y - 7 = 3x + 6$$

$$y = 3x + 6 + 7$$

$$y = 3x + 13$$

10. Determine the equation in standard form of the line whose x-intercept is 2 and whose y-intercept is -4. $(0, -4)$ $(2, 0)$

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{0 - (-4)}{2 - 0} = \frac{4}{2} = 2$$

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

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

$$y = 2x - 4$$

$$0 = 2x - y - 4$$

11. Determine the equation of a line perpendicular to the line $3x + 2y - 4 = 0$ passing through the point $(2, 3)$.

$$3x + 2y - 4 = 0$$

$$2y = -3x + 4$$

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

$$m_1 = -\frac{3}{2} \therefore m_2 = \frac{2}{3}$$

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

$$y - 3 = \frac{2}{3}(x - 2)$$

$$y - 3 = \frac{2}{3}x - \frac{4}{3}$$

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

$$y = \frac{2}{3}x - \frac{4}{3} + \frac{9}{3}$$

$$y = \frac{2}{3}x + \frac{5}{3}$$

15. The White family is returning home by car. They are using their speedometer: their speed is thus constant. After 3 hours on the road, they are 350 km from home. After 5 hours, they are 130 km from home. $(3, 350)$ $(5, 130)$

a) What is the independent variable? What is the dependent variable?
 THE INDEPENDENT VARIABLE IS TIME, THE DEPENDENT VARIABLE IS DISTANCE.

b) Write an equation for the line passing through the two points.

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

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

$$y - 350 = -110(x - 3)$$

$$y - 350 = -110x + 330$$

$$y = -110x + 680$$

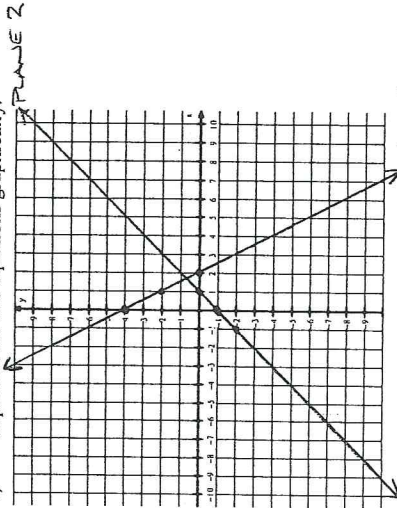
$$m = \frac{130 - 350}{5 - 3}$$

$$m = -110$$

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$$y = x - 1$$

a) Represent the two equations graphically.



b) Determine if the two planes can continue their approach as scheduled. Explain your answer.

NO, THEY WILL CRASH! THIS WILL HAPPEN AT THE POINT OF INTERSECTION.