Unit 3 Test Review Worksheet

1. Tell whether each of the following satisfy a linear function. Explain.

a. {(0, 5), (-2, 3), (-4, 1), (-6, -1), (-8, -3)}

$\frac{3-5}{-2-0}$ $\frac{1-3}{-4--2}$ $\frac{-1-1}{-6--4}$ $\frac{-3--1}{-8--6}$

$\frac{-2}{-2}=1$ $\frac{-2}{-2}=1$ $\frac{-2}{-2}=1$ $\frac{-2}{-2}=1$

linear, constant slope

b. $2y = -3x^2$

$3x^2 + 2y = 0$

Not linear

x^2 term

c. $y = 4x - 7$

$-4x + y = -7$

$4x - y = 7$

Linear,

$Ax + By = C$

2. Write each equation in standard form and identify the values of A, B and C.

a. $\frac{1}{3}y = -1$

$3\left(0x + \frac{1}{3}y = -1\right)$

$0x + y = -3$

$A = 0 \quad B = 1 \quad C = -3$

b. $\frac{3}{4}x = y + 8$

$4\left(\frac{3}{4}x - y = 8\right)$

$3x - 4y = 32$

$A = 3 \quad B = -4 \quad C = 32$

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

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

$2x - 3y = 6$

$A = 2 \quad B = -3 \quad C = 6$

3. Naima has $40 to spend on refreshments for herself and her friends at the movie theater. The equation $5x + 2y = 40$ describes the number of large popcorns x and small drinks y she can buy. Graph this function and find its intercepts. What does each of them represent?

$5(0) + 2y = 40$

$2y = 40$

$y = 20$

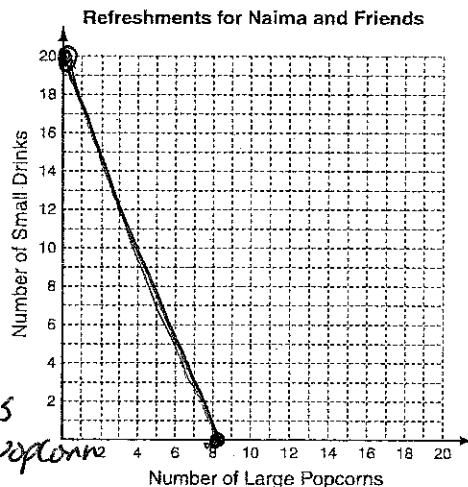$(0, 20)$

0 popcorn's ordered, 20 small drinks
max # drinks

$5x + 2(0) = 40$

$5x = 40$

$x = 8$

$(8, 0)$ 8 popcorn's ordered

0 sm drinks
max # popcorn

Refreshments for Naima and Friends

(graph: Number of Small Drinks vs Number of Large Popcorns)

4. Find the x- and y- intercepts.

a. $2y = x + 3$ $(-3, 0) x$ $(0, 3/2) y$

$2(0) = x + 3$

$0 = x + 3$

$-3 = x$

$2y = (0) + 3$

$2y = 3$

$y = 3/2$

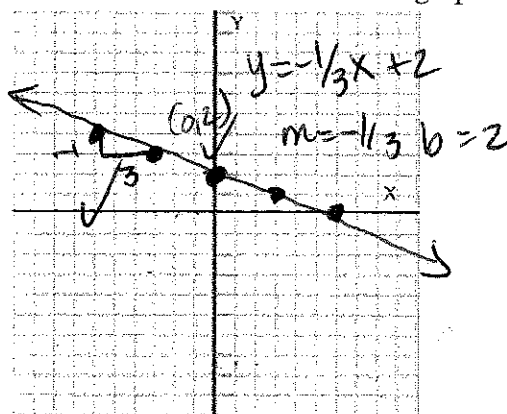**b.** $f(x) = -x - 5$ $(0, -5) y$ $(-5, 0) x$

$f(0) = -(0) - 5$

$f(0) = -5$

$0 = -x - 5$

$5 = -x$

$-5 = x$

5. Create a table of values then graph the function: $x + 3y = 6$ for the domain {-6, -3, 0, 3, 6}.

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

$(0, 2)$ $m = -\frac{1}{3} \quad b = 2$

X	F(x) $-\frac{1}{3}x + 2$	Y	(x,y)
-6	$-\frac{1}{3}(-6) + 2$	4	(-6, 4)
-3	$-\frac{1}{3}(-3) + 2$	3	(-3, 3)
0	$-\frac{1}{3}(0) + 2$	2	(0, 2)
3	$-\frac{1}{3}(3) + 2$	1	(3, 1)
6	$-\frac{1}{3}(6) + 2$	0	(6, 0)

$x + 3y = 6$ solve for $y = mx + b$

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

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

$$m = \Delta y / \Delta x$$

6. The table shows the average retail price of cherries from 1986 to 1991. Find the rate of change in cost for *each* time interval. Which time interval showed the greatest rate of change? Was the rate of change ever negative? If so, when?

Year	1986	1988	1989	1991
Cost per lb ($)	1.27	1.63	1.15	2.26

$$M_1 = \frac{1.63 - 1.27}{1988 - 1986} = \frac{.36}{2} = .18$$

$$M_2 = \frac{1.15 - 1.63}{1989 - 1988} = \frac{-.48}{1} = -.48$$

$$M_3 = \frac{2.26 - 1.15}{1991 - 1989} = \frac{1.11}{2} = .555$$

① 1989-1991 greatest rate of change ② yes from 1988-1989 $-.48 per pound

7. Find the slope of each of the following:

a.

x	y	Δy
4	−5	) +2
8	−3	) +2
12	−1	) +2
16	1	

+4 down left side

$m = \frac{1}{2}$

$$\frac{\Delta y}{\Delta x} = \frac{2}{4} = \frac{1}{2}$$

b. $(-3, -1)$ and $(2, -1)$

P1   P2

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

$$m = \frac{-1 - -1}{2 - -3} = \frac{0}{5}$$

$m = 0$

c. $(-3, 2)$ and $(-3, -1)$

$$m = \frac{-1 - 2}{-3 - -3}$$

$$m = \frac{-3}{0}$$

undefined

8. Find the value of r so that the line passes through each pair of points has the given slope.

a. $(12, 10)$ and $(-2, r)$, $m = -4$

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

$$-4 = \frac{r - 10}{-2 - 12}$$

$$\frac{-4}{1} = \frac{r - 10}{-14}$$

cross o $56 = r - 10$

$66 = r$

b. $(3, 5)$ and $(-3, r)$, $m = \frac{3}{4}$

$$\frac{r - 5}{-3 - 3} = \frac{3}{4}$$

$$\frac{r - 5}{-6} = \frac{3}{4}$$

cross o

$-18 = 4r - 20$

$2 = 4r$

$r = \frac{1}{2}$

9. Tell whether each equation is a direct variation. If so, identify the constant of variation.

a. $8y = 3x + 1$

$$\frac{8y}{8} = \frac{3x}{8} + \frac{1}{8}$$

$$y = 3/8 x + 1/8$$

Not direct variation

Not $(0,0)$

b. $5x - 9y = 0$

yes, $y = k \cdot x$

$$5x - 9y = 0$$
$$-5x \qquad -5x$$
$$\frac{-9y}{-9} = \frac{-5x}{-9}$$

$$y = \frac{5}{9} x$$

$k = 5/9$

10. The value of y varies directly with x, and $y = -14$ when $x = \frac{1}{2}$. Find y when $x = -1$.

$y = kx$, $k = y/x$

$$K = \frac{-14}{1/2}$$

$K = -28$

$$y = -28x$$

$$y = -28(-1)$$

$y = 28$

varies directly means linear proportional

so P1 $(0,0)$

P2 $(1/2, -14)$

$$m = \frac{-14 - 0}{1/2 - 0}$$

or $\frac{-14}{1/2}$

$$\frac{21}{8} - \frac{1}{8} = \frac{20}{8} = \boxed{5/4}$$ $$\frac{7}{4} - \frac{1}{8} = \frac{10}{8} - \frac{1}{8} = \boxed{\frac{7}{8}}$$ $$\frac{7}{0} - \frac{1}{8} = \frac{6}{8} = \boxed{\frac{3}{4}}$$

11. Determine whether the sequence is arithmetic. If so, find the common difference and the next three terms.

a. $3, \frac{23}{8}, \frac{11}{4}, \frac{21}{8}, \ldots$ yes, constant difference

b. $\frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \frac{1}{16}, \ldots$

$$\frac{23}{8} - 3 \qquad \frac{11}{4} - \frac{23}{8} \qquad \frac{21}{8} - \frac{11}{4}$$

$$\frac{23}{8} - \frac{24}{8} \qquad \frac{22}{8} - \frac{23}{8} \qquad \frac{21}{8} - \frac{22}{8}$$

$$-\frac{1}{8} \qquad\qquad -\frac{1}{8} \qquad\qquad -\frac{1}{8}$$

$$\frac{1}{4} - \frac{1}{2} = \frac{1}{2}$$

$$\frac{1}{8} - \frac{1}{4} = \frac{1}{4}$$

Not common difference
Not arithmetic

Next three terms $5/4, 7/8, 3/4$

12. Write an equation for the *n*th term of each arithmetic sequence then find the 50th term.

a. 15, 13, 11, 9, …

$$d = -2 \quad a_1 = 15$$
$$a_n = a_1 + (n-1)d$$
$$a_n = 15 + (n-1)(-2)$$
$$a_n = 15 - 2n + 2$$
$$\boxed{a_n = -2n + 17}$$
$$a_{50} = -2(50) + 17$$
$$a_{50} = -83$$

b. −1, −0.5, 0, 0.5, …

$$d = 0.5 \quad a_1 = -1$$
$$a_n = a_1 + (n-1)d$$
$$a_n = -1 + (n-1)0.5$$
$$a_n = -1 + 0.5n - 0.5$$
$$\boxed{a_n = 0.5n - 1.5}$$
$$a_{50} = 0.5(50) - 1.5$$
$$a_{50} = 23.5$$

13. For each table of values. Then determine if the function is proportional or non-proportional and explain.

a. Not proportional linear

X	0	23	35	40	45
Y	0	46	70	80	95

$$\frac{46}{23} \stackrel{?}{=} \frac{70}{35} \stackrel{?}{=} \frac{80}{40} \stackrel{?}{=} \frac{95}{45}$$
$$2 = 2 = 2 \neq 2.1$$

b.

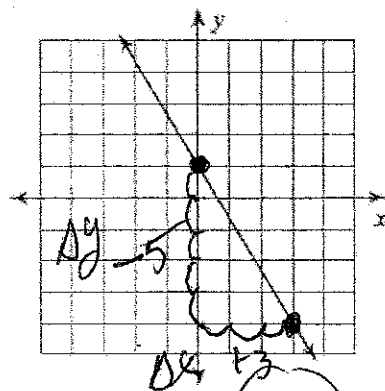| X	0	17	35	40	45
Y	0	8.5	17.5	20	22.5

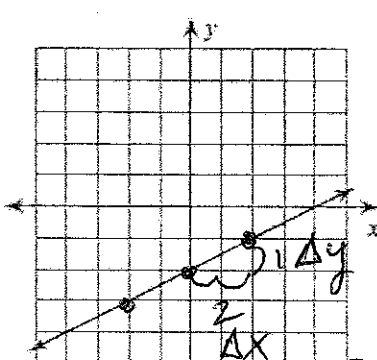$$\frac{8.5}{17} = \frac{17.5}{35} = \frac{20}{40} = \frac{22.5}{45}$$
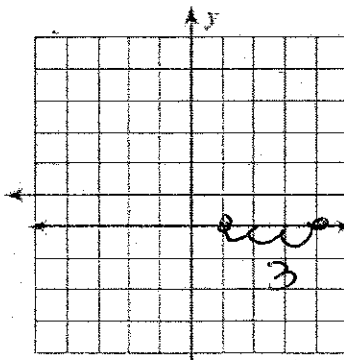$$0.5 = 0.5 = 0.5 = 0.5$$

proportional linear

14. Find the slope of the given functions. Write the equation in slope-intercept form.

$$m = \frac{\Delta y}{\Delta x} = \boxed{\frac{-5}{3}}$$

$$m = \frac{\Delta y}{\Delta x} = \boxed{\frac{1}{2}}$$
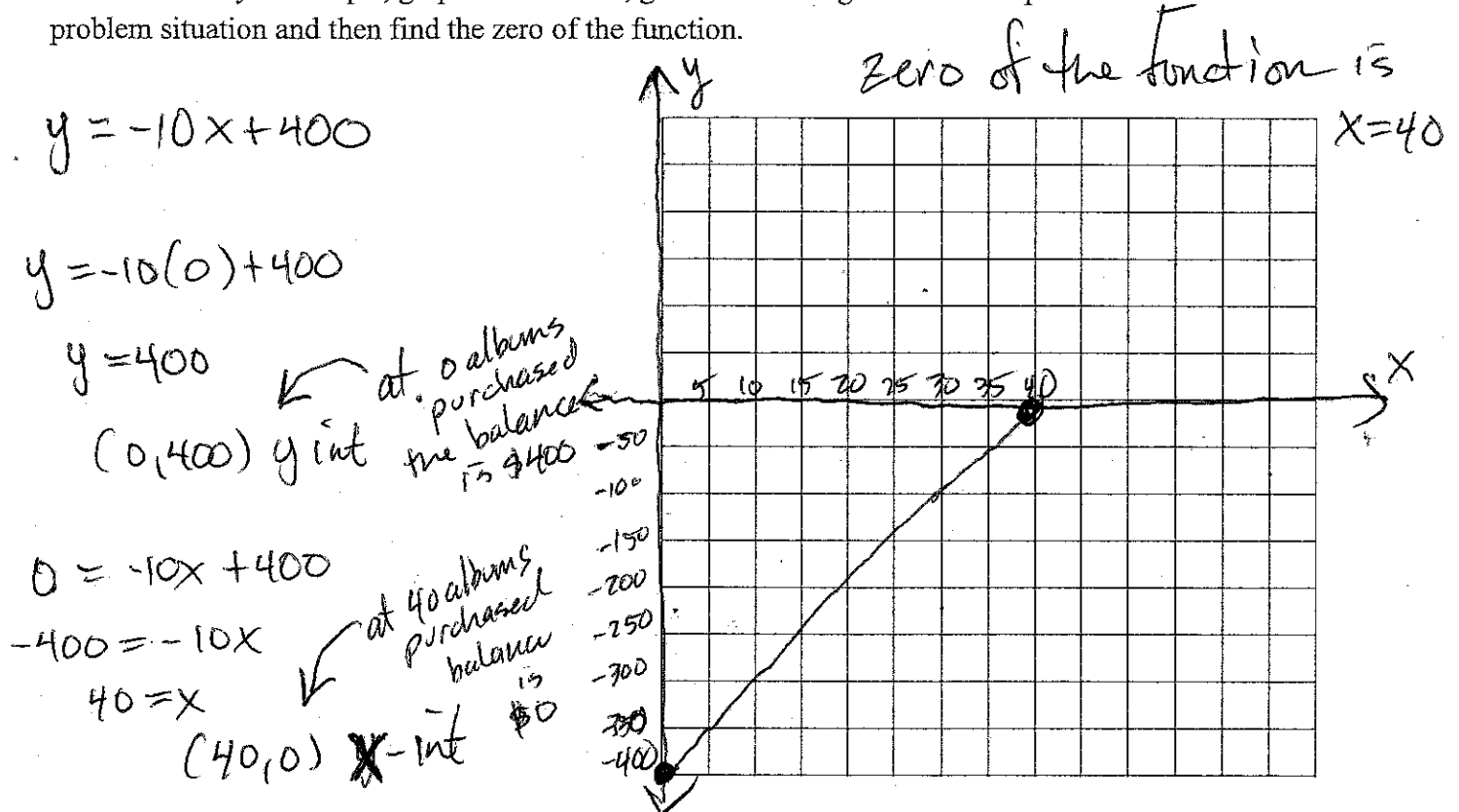
$$\Delta y = 0$$
$$\Delta x = 3$$
$$\frac{0}{3} = 0$$
$$\boxed{m = 0}$$

15. Given the function g(x) = -10x + 400 represents the balance on an A-tunes gift card where g(x) represents the balance on the card in dollars and x represents the number of albums purchased.

Find the x and y-intercepts, graph the function, give the meaning of the intercepts in the context of the problem situation and then find the zero of the function.

zero of the function is
X=40

$y = -10x + 400$

$y = -10(0) + 400$

$y = 400$

(0,400) y int ← at 0 albums purchased the balance is $400

$0 = -10x + 400$

$-400 = -10x$

$40 = x$

← at 40 albums purchased balance is $0

(40,0) X-int

16. The exchange rate from one currency to another varies every day. Recently the exchange rate from U.S. dollars to British pound sterling (£) was $1.58 to £1. Write and solve a direct variation equation to determine how many pounds sterling you would receive in exchange for $90 of U.S. currency.

US Dollars : British pounds sterling
  y   x

$K = \frac{1.58}{1}$

$K = 1.58$

$y = 1.58x$

$90 = 1.58x$

$x = \frac{90}{1.58}$

$x \approx 56.962$

£ = 56.96

17. Ricardo is buying computer cables from an online store. If he buys 4 cables, the total cost will be $24. If he buys 5 cables, the total cost will be $29. If the total cost can be represented by a linear function, will the function be *proportional* or *nonproportional*? Explain.

Not proportional

X	Y
4	24
5	29

(0,4) y-int

$y = 5x + 4$

cost : # cables
  y   x

$K_1 = \frac{24}{4} = 6$ $y = 6x$

$K_2 = \frac{29}{5} = 5.8$ $y = 5.8x$

Not proportional

$\frac{24}{4} \neq \frac{29}{5}$

there must be a fee of some sort