pg. 16 #2, 3, 4*, 5, 7 4cd

pg. 23 #3*, 4ad, 5, 7, 8, 10, 15 5e

See next page for Mr. Kennedy's full solution to p.23 #5f.

Worksheet #1-7 3, 5, 6

Today's Work: pg. 60 #1 to 8, 9bde

Correction: #3 the range should be $\{y \in \Re \mid y \geq -1\}$

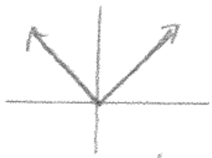
p. 23 **5.** For each function, determine $f(-x)$ and $-f(-x)$ and compare it with $f(x)$. Use this to decide whether each function is even, odd, or neither.

f) $f(x) = |2x + 3|$

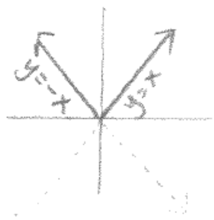
p23 #5f) Given: $f(x) = |2x+3|$

It is important to note that $|2(-x)+3|$ is <u>not</u> always $2x+3$ ...

For $y=|x|$, the graph is



Notice that it is the line $y=x$ as long as $x \geq 0$ and it is the line $y=-x$ as long as $x<0$



Thus, $|2x+3|$ is $2x+3$ for $x \geq -1.5$

and $|2x+3|$ is $-(2x+3)$ otherwise.

We examine its symmetry via two cases...

<u>$x \geq -1.5$</u>

$f(x) = |2x+3| = 2x+3$

Consider $f(-x) = 2(-x)+3$
$= -2x+3$
$\neq f(x)$ and
$\neq -f(x)$

Hence, for $x \geq -1.5$ it is neither even nor odd

<u>$x < -1.5$</u>

$f(x) = |2x+3| = -(2x+3)$

Consider $f(-x) = -[2(-x)+3]$
$= -(-2x+3)$
$= 2x-3$
$\neq f(x)$ and
$\neq -f(x)$

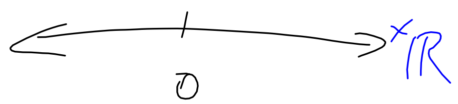
Hence, for $x<-1.5$ it is neither even nor odd

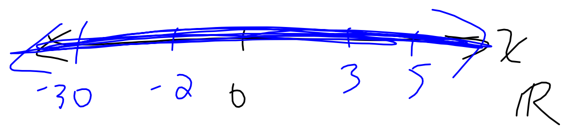
Hence, it is neither $\square$

p. 16

4. Graph on a number line.

a) $|x| < 8$ **b)** $|x| \geq 16$ **c)** $|x| \leq -4$ **d)** $|x| > -7$





pg. 16 #2, 3, 4*, 5, 7.

**Final Answer Corrections:*

4c: 

i.e. no solution (so no "shading")

4d: 

i.e. entire number line (entire line is "shaded")

p. 23 **5.** For each function, determine $f(-x)$ and $-f(-x)$ and compare it with $f(x)$. Use this to decide whether each function is even, odd, or neither.

a) $f(x) = x^2 - 4$

b) $f(x) = \sin x + x$

c) $f(x) = \frac{1}{x} - x$

d) $f(x) = 2x^3 + x$

e) $f(x) = 2x^2 - x$

f) $f(x) = |2x + 3|$

Consider $f(-x) = 2(-x)^2 - (-x)$

$= 2x^2 + x$

$= -(-2x^2 - x)$

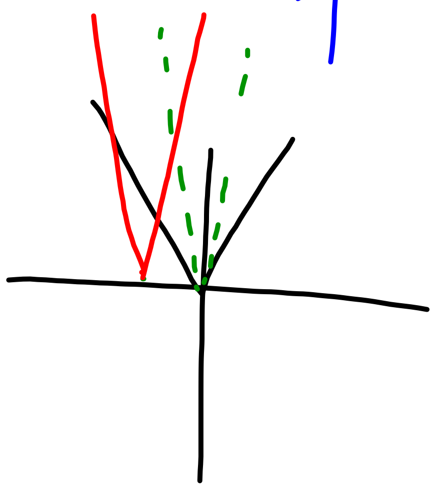
$\therefore f(-x) \neq f(x)$

$f(-x) \neq -f(x)$

$\therefore f(x)$ is neither even nor odd.

5f) $f(x) = |2x + 3|$

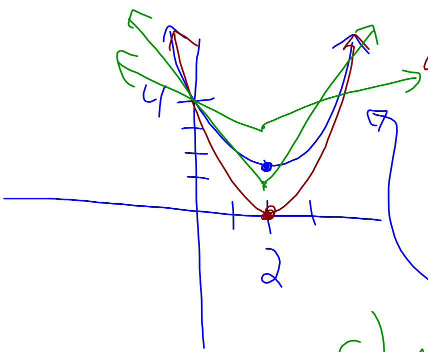
$= |2(x + \frac{3}{2})|$



p. 23 **10.** a) $f(x)$ is a quadratic function. The graph of $f(x)$ decreases on the interval $(-\infty, \; 2)$ and increases on the interval $(2, \infty)$. It has a y-intercept at $(0, 4)$. What is a possible equation for $f(x)$?

b) Is there only one quadratic function, $f(x)$, that has the characteristics given in part a)?

c) If $f(x)$ is an absolute value function that has the characteristics given in part a), is there only one such function? Explain.



a) $y=(x-2)^2$

$(-\infty,-2)$ to $(-\infty,2]$

positive 2

square bracket

b) No, see blue curve

c) No, there are an infinite number of solutions.

p. 23 **15.** Explain why it is not necessary to have $h(x) = \cos(x)$ defined as a parent function.

Explanation: $\cos x$ is a horizontal translation of $\sin x$.

LESSON 1.4 PRACTICE

1. State the parent function and describe the transformations: $f(x) = \sqrt{4x - 3}$

2. Using the parent function $y = f(x)$ state the new function under a horizontal stretch factor of 3, and a reflection in the y-axis

3. **Multiple Choice.** The point (3, 1) belongs to the function $y = f(x)$. Which of the following shows the correct order of transforming (3, 1) using $y = -3f(4x - 4) + 5$?

$= -3f(4(x-1)) + 5$

a) $(3, 1) \rightarrow (-9, \cancel{4}) \rightarrow (-8, 9)$

b) $(3, 1) \rightarrow \left(\frac{3}{4}, -3\right) \rightarrow \left(\frac{-1}{4}, 2\right)$

c) $(3, 1) \rightarrow \left(\frac{3}{4}, -3\right) \rightarrow \left(\frac{7}{4}, 2\right)$

$(x, y) \rightarrow \left(\frac{1}{4}x + 1, -3y + 5\right)$

d) $(3, 1) \rightarrow (12, \cancel{-9}) \rightarrow (13, -4)$

4. Determine the equation based on the described transformations:

a) The graph of $y = |x|$ is translated up 3 units.

b) The graph of $y = \sin x$ is reflected in the y-axis.

c) The graph of $y = x$ is stretched vertically by a factor of 7, compressed horizontally by a factor of $\frac{1}{4}$, and translated up 5 units.

d) The graph of $y = \frac{1}{x}$ is reflected in the x-axis.

e) The graph of $y = x^2$ is stretched vertically by a factor of 2 and translated up 4 units.

f) The graph of $y = \sqrt{x}$ is translated left 4 units and up 12 units.

5. Graph $y=\frac{1}{x}$, by including all key points.

By using MAPPING FORMULAS, graph $y=-\frac{1}{2x}$ and $y=-\frac{1}{2(x+3)}-7$.

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

(x, y)

$\left(\frac{1}{2}, 2\right) \rightarrow$

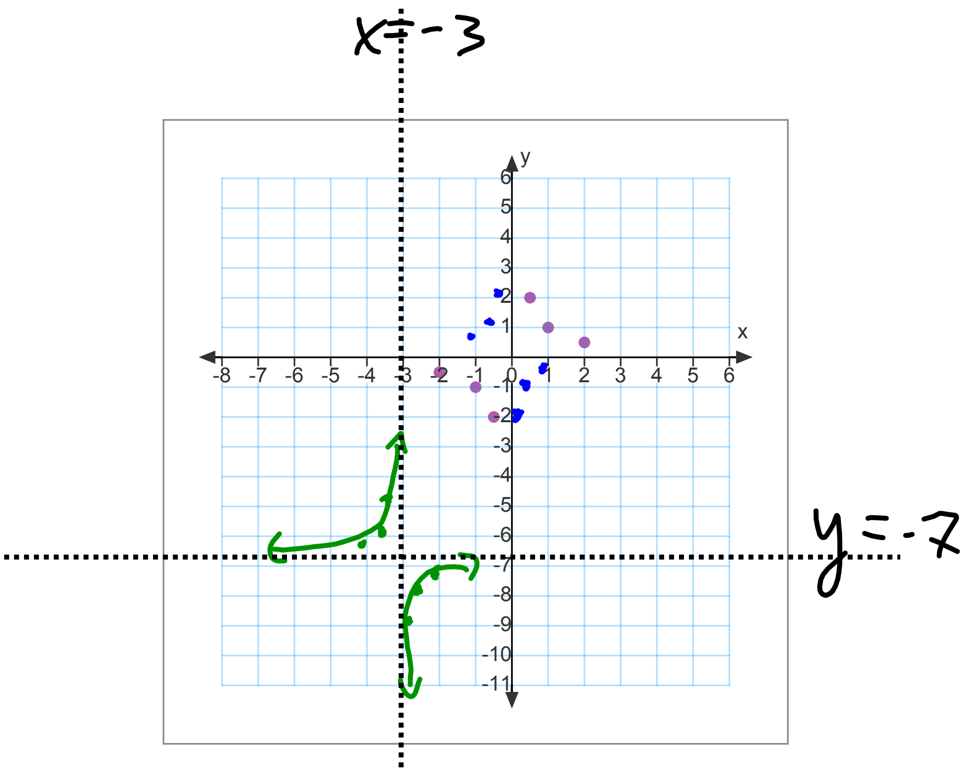
$(1, 1) \rightarrow$

$\left(2, \frac{1}{2}\right) \rightarrow$

$\left(-\frac{1}{2}, -2\right) \rightarrow$

$(-1, -1) \rightarrow$

$\left(-2, -\frac{1}{2}\right) \rightarrow$



5. Graph $y=\frac{1}{x}$, by including all key points.

By using MAPPING FORMULAS, graph $y=-\frac{1}{2x}$ and $y=-\frac{1}{2(x+3)}-7$.

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

$(x, y) \quad (\frac{1}{2}x, -y) \rightarrow (\frac{1}{2}x-3, -y-7)$

$(\frac{1}{2}, 2) \rightarrow (\frac{1}{4}, -2) \rightarrow (\frac{1}{4}-3, -9)$ $\quad -2\frac{3}{4}$

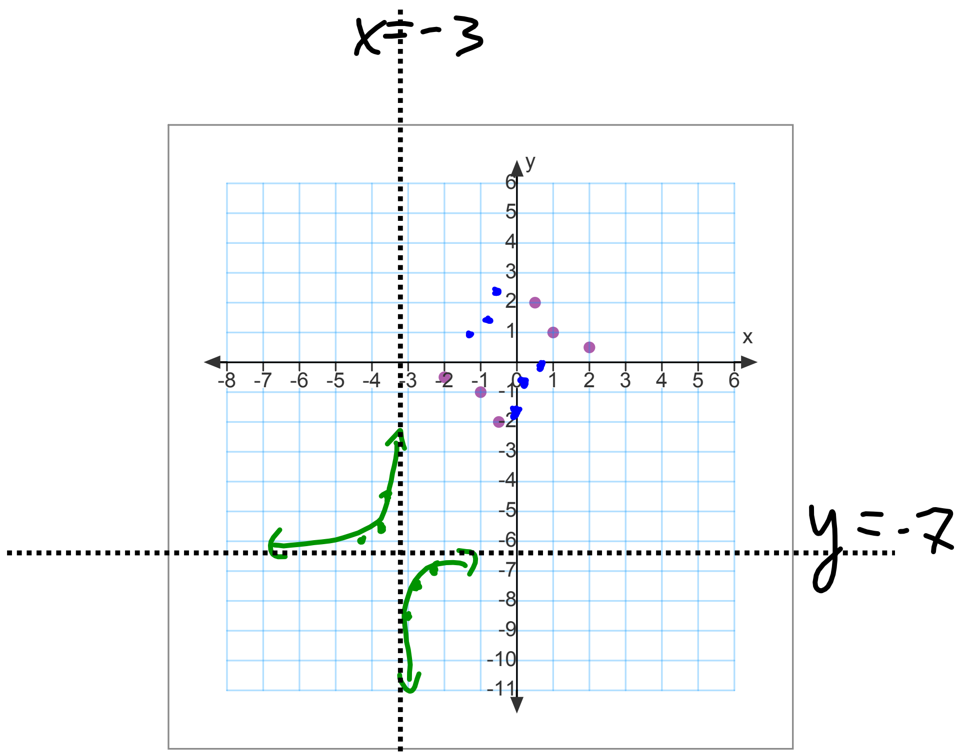
$(1, 1) \rightarrow (\frac{1}{2}, -1) \rightarrow (-2\frac{1}{2}, -8)$

$(2, \frac{1}{2}) \rightarrow (1, -\frac{1}{2}) \rightarrow (-2, -7\frac{1}{2})$

$(-\frac{1}{2}, -2) \rightarrow (-\frac{1}{4}, 2) \rightarrow (-3\frac{1}{4}, -5)$

$(-1, -1) \rightarrow (-\frac{1}{2}, 1) \rightarrow (-3\frac{1}{2}, -6)$

$(-2, -\frac{1}{2}) \rightarrow (-1, \frac{1}{2}) \rightarrow (-4, -6\frac{1}{2})$

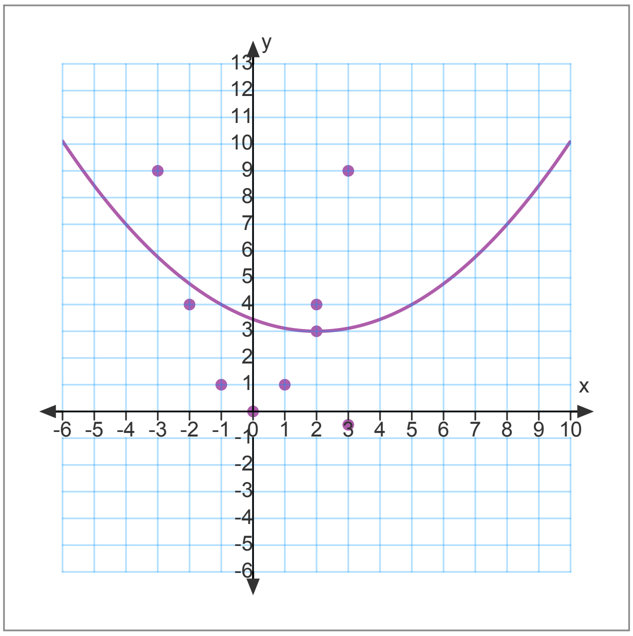


6. Graph $f(x)=x^2$, by including all key points. **Without using a mapping formula** graph $y=f(-\frac{1}{3}x+\frac{2}{3})+3$.

$$=f\left(-\tfrac{1}{3}(x-2)\right)+3$$

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

$$=\left(-\tfrac{1}{3}(x-2)\right)^2+3$$



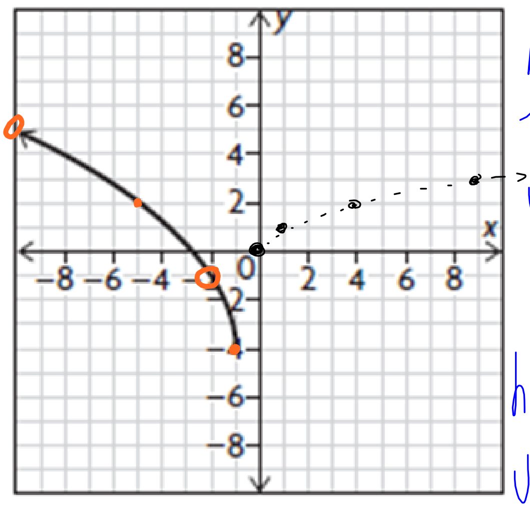
7. Describe the transformations applied, in order, to $f(x)=\sqrt{x}$, to create the graph below:

parent function: $y=\sqrt{x}$

ref! in y-axis

$k<0$

$d=-1$ $c=-4$



Order:

reflection in the y-axis

V.S. by a factor of 3

h.t. 1 unit left

v.t. 4 units down

$$\therefore y=3\sqrt{-(x+1)}-4$$