

Name: Answer key Per: _____ Date: _____
 Serafino • Algebra 2E

2-RE Unit 2 – Recap & Exploration

4 Part 4: Analyzing Functions & Solving Equations

Part 4: Analyzing Functions

- Evaluating and Solving linear Equations
 Find x, given y Find y, given x
- Solving Equations & Inequalities Equations when....
 setting equal to a constant (number) when setting equal to a function (linear or absolute value)
- Solving Systems by Graphing...
 setting equal to a constant (number) when setting equal to a function (linear or absolute value)
- Identifying Key Info from an Equation or Graph
 Domain / Range Vertex, Max/Min Axis of Symmetry y-intercept x-intercept(s)

Do all work on separate paper – there is not enough room and it's not worth getting frustrated.

I. LINEAR FUNCTIONS

1. $f(x) = 3x + 6$

Critical Information:

a. Domain?

$$x \in \mathbb{R}$$

b. Range?

$$y \in \mathbb{R}$$

c. x-intercept?

$$(-2, 0)$$

d. y-intercept?

$$(0, 6)$$

Evaluating:

e. $f(7) = 27$

f. $f(5/6) = -\frac{7}{2}$

g. $f(-40) = -114$

h. $f(-1/9) = \frac{17}{3}$

Solving Equations / Inequalities & Graphing:

Finding where a function equals/is less than/greater than a constant:

i. $f(x) = 10$

$$x = \frac{4}{3}$$

j. $f(x) = -180$

$$x = -62$$

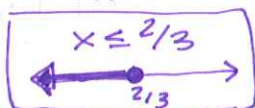
k. $f(x) = 7/2$

$$x = -\frac{5}{6}$$

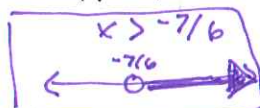
l. $f(x) = -1/4$

$$x = -\frac{25}{12}$$

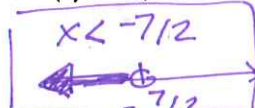
m. $f(x) \leq 8$



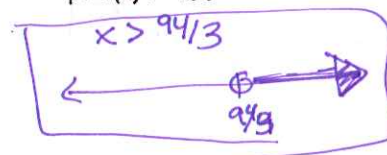
n. $f(x) > 5/2$



o. $f(x) < -9/2$



p. $f(x) > 100$



Finding where a function equals/is less than/greater than another function:

q. $f(x) = -2x + 6$

$$x = 0$$

r. $f(x) = \frac{1}{2}x - 4$

$$x = -4$$

s. $f(x) = 3x - 11$

No solution

t. $f(x) \leq 3x + 10$

$$x \in \mathbb{R}$$

u. $f(x) > 10x + 4$

$$x < \frac{2}{7}$$

v. $f(x) < 3x$

No solution

2. $f(x) = -\frac{3}{2}(x - 1) + 5$

Critical Information:

- a. Domain? $x \in \mathbb{R}$ b. Range? $y \in \mathbb{R}$ c. x-intercept? $(\frac{13}{3}, 0)$ d. y-intercept? $(0, 6.5)$

Evaluating:

- e. $f(7) = -4$ f. $f(5/6) = \frac{21}{4}$ g. $f(-40) = -53.5$ h. $f(-1/9) = \frac{20}{3}$

Solving Equations / Inequalities & Graphing:

Finding where a function equals/is less than/greater than a constant:

- i. $f(x) = 10$ $x = -7/3$ j. $f(x) = -180$ $x = \frac{373}{3}$ k. $f(x) = 7/2$ $x = 2$ l. $f(x) = -1/4$ $x = \frac{14}{3}$
- m. $f(x) \leq 8$ $x \geq -1$ n. $f(x) > 5/2$ $x < 8/3$ o. $f(x) < -9/2$ $x > 22/3$ p. $f(x) > 100$ $x < -187/3$

Finding where a function equals/is less than/greater than another function:

- q. $f(x) = -2x + 6$ $x = 9$ r. $f(x) = -3/2x + 6.5$ $x \in \mathbb{R}$ s. $f(x) > -3/2x$ $x \in \mathbb{R}$

3. $2x - 5y = 15$

Critical Information:

- a. Domain? $x \in \mathbb{R}$ b. Range? $y \in \mathbb{R}$ c. x-intercept? $(7.5, 0)$ d. y-intercept? $(0, -3)$

Evaluating:

- e. $f(7) = -\frac{1}{5}$ f. $f(5/6) = -\frac{8}{3}$ g. $f(-40) = -19$ h. $f(-1/9) = -\frac{137}{45}$

Solving Equations / Inequalities & Graphing:

Finding where a function equals/is less than/greater than a constant:

- i. $f(x) = 10$ $x = 32.5$ j. $f(x) = -180$ $x = -442.5$ k. $f(x) = 7/2$ $x = 16.25$ l. $f(x) = -1/4$ $x = 55/8$
- m. ~~$f(x) \leq 8$~~ n. ~~$f(x) > 5/2$~~ o. ~~$f(x) < -9/2$~~ p. ~~$f(x) > 100$~~
- ← Don't bother →

II. ABSOLUTE VALUE FUNCTION

1. $f(x) = 2|x - 1| - 6$

Critical Information:

a. Domain? $x \in \mathbb{R}$

b. Range? $y \geq -6$

c. AOS? $x = 1$

d. Vertex? $(1, 6)$

e. y-intercept? $(0, -4)$

f. x-intercept(s)? $(-2, 0) (4, 0)$

Evaluating:

g. $f(-4) = 76$

h. $f(5/2) = -3$

i. $f(6) = 4$

Solving Equations / Inequalities & Graphing:

Finding where a function equals/is less than/greater than a constant:

i. $f(x) = 10$
 $x \in \{-7, 9\}$

j. $f(x) = -180$
No solution

k. $f(x) = 7/2$
 $x = 5.75$ or $x = -3.75$

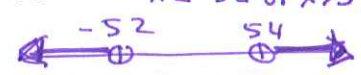
l. $f(x) = -1/4$
 $x = \frac{31}{8}$ or $\frac{-15}{8}$

m. $f(x) \leq 8$
 $-6 \leq x \leq 8$

n. $f(x) > 5/2$
 $x < -3.25$ or $x > 5.25$

o. $f(x) < -9/2$
 $0.25 < x < 1.75$

p. $f(x) > 100$
 $x < -52$ or $x > 54$



Finding where a function equals another function:

q. $f(x) = x$
 $x = -4/3, x = 8$

r. $f(x) = 6x$
 $x = -1/2$

s. $f(x) = -6x$
 $x = 1$

t. $f(x) = x - 1$
 $x \in \{-1, 7\}$

u. $f(x) = 2/3x - 2$
 $x \in \{-3/4, 9/2\}$

v. $f(x) = 1/2x - 10$
No solution

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

Critical Information:

a. Domain? $x \in \mathbb{R}$

b. Range? $y \leq -2$

c. AOS? $x = 0$

d. Vertex? $(0, -2)$

e. y-intercept? $(0, -2)$

f. x-intercept(s)? none

Evaluating:

g. $f(-4) = -14$

h. $f(5/2) = -9.5$

i. $f(6) = -20$

Solving Equations / Inequalities & Graphing:

Finding where a function equals/is less than/greater than a constant:

i. $f(x) = -11$
 $x = 3$ or -3

j. $f(x) = -7/2$
 $x = -1/2$ or $1/2$

k. $f(x) > -20$
 $-6 < x < 6$

l. $f(x) \leq -1$
 $x \in \mathbb{R}$

3. $f(x) = 3|5x - 7| - 2$

a. Domain? $x \in \mathbb{R}$

b. Range? $y \geq -2$

c. AOS? $x = \frac{7}{5}$

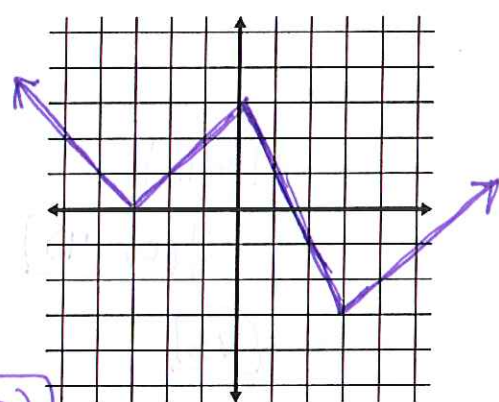
d. Vertex? $(\frac{7}{5}, -2)$

e. y-intercept? $(0, 19)$

f. x-intercept(s)? $(\frac{23}{15}, 0) (\frac{19}{15}, 0)$

III. PIECEWISE FUNCTIONS

$$1. f(x) = \begin{cases} -x - 3 & \text{if } x \leq -3 \\ x + 3 & \text{if } -3 < x < 0 \\ -2x + 3 & \text{if } 0 \leq x < 3 \\ x - 6 & \text{if } x \geq 3 \end{cases}$$



a. Domain $x \in \mathbb{R}$

b. Range? $y \geq -3$

c. y-intercept? $(0, 3)$

d. x-intercept(s)? $(-3, 0), (3/2, 0), (6, 0)$

e. Where is $f(x)$ increasing? $x \in (-3, 0) \cup (3, \infty)$

f. Where is $f(x)$ decreasing? $x \in (-\infty, -3) \cup (0, 3)$

g. $f(-1) = 2$

h. $f(1/2) = 2$

i. $f(-200) = 197$

j. $f(200) = 194$

k. $f(x) = 1$
 $x \in \{-4, -2, 1, 7\}$

l. $f(x) = -1?$
 $x \in \{2, 5\}$

m. $f(x) = -3$
 $x = 3$

n. $f(x) = 27$
 $x \in \{-30, 33\}$

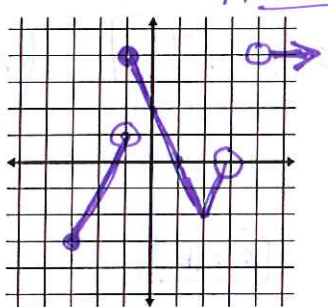
o. $f(x) < 2$
 $x \in (-5, -1) \cup (2, 8)$

p. $f(x) \geq -5$
 $x \in \mathbb{R}$

q. $f(x) \leq 3$
 $x \in (-6, 9)$

r. $f(x) > -5$
 $x \in \mathbb{R}$ oops :)

$$2. f(x) = \begin{cases} 2x + 3, & -3 \leq x < -1 \\ 2|x - 2| - 2, & -1 \leq x < 3 \\ 4, & x > 4 \end{cases}$$



k. Domain $x \in [-3, 3) \cup (4, \infty)$

b. Range? $y \in [-3, 4]$

c. y-intercept? $(0, 2)$

d. x-intercept(s)? $(-1.5, 0), (1, 0)$

e. $f(-1) = 4$

f. $f(100) = 4$

g. $f(3/8) = 5/4$

h. $f(7/2) = \text{undefined}$

i. $f(x) = -3$
 $x = -3$

i. $f(x) = -2?$
 $x \in \{-5/2, 2\}$

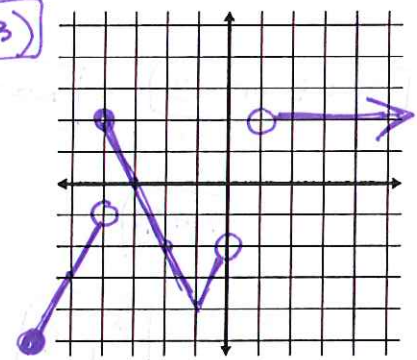
j. $f(x) = 4$
 $x \in \{-1\} \cup (4, \infty)$

k. $f(x) = 1$
 $x = 1/2$

l. $f(x) < 2$
 $x \in [-3, 0) \cup (0, 3)$

m. $f(x) \geq -5$
 $x \in \mathbb{R}$

o. $f(x) < 3$
 $x \in [-3, -1) \cup (1/2, 3)$



p. The piecewise function is being transformed to $g(x) = f(x + 3) - 2$. Describe the transformations, write the function of $g(x)$ and graph $g(x)$.

Shift 3 left, 2 down

$$g(x) = \begin{cases} 2x + 7, & -6 \leq x < -4 \\ 2|x + 1| - 4, & -4 \leq x < 0 \\ 2, & x > 1 \end{cases}$$