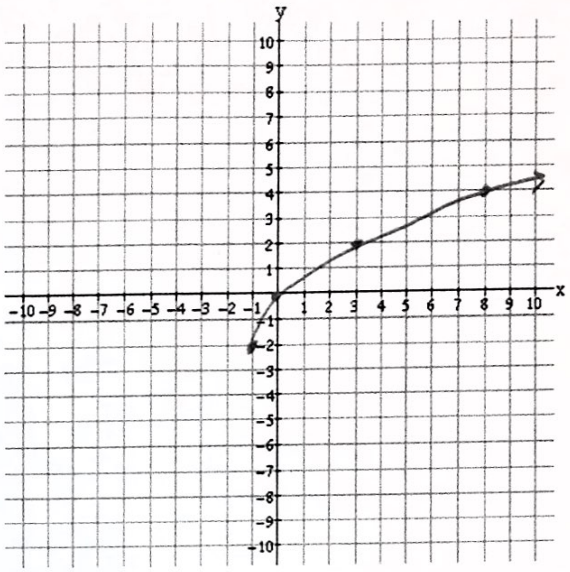
College Algebra
Unit 3 Review

Name Key
Date: _____ Period: _____

For #1 and 2, graph each function shown, and list all of the requested information.

1. $f(x) = 2\sqrt{x+1} - 2$



Relative Max: none

Relative Min: none

Increasing Interval: $(-1, \infty)$

Decreasing Interval: none

Domain: $[-1, \infty)$

Range: $[-2, \infty)$

End Behavior: $x \to \infty$ $f(x) \to \infty$
$x \to -\infty$ $f(x) \to$ N/A

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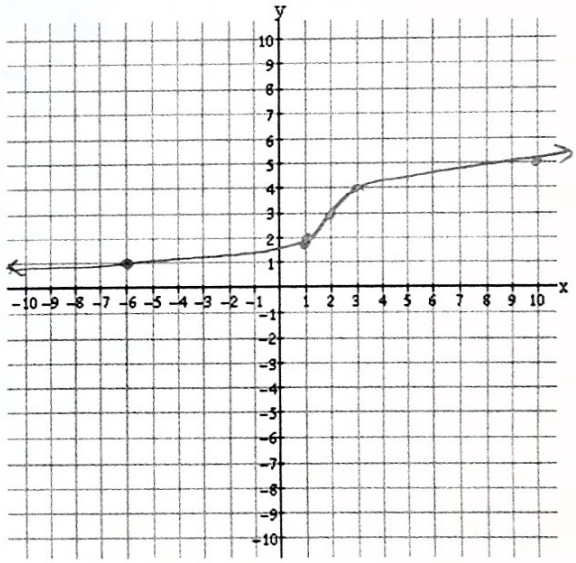
2. $f(x) = \sqrt[3]{x-2} + 3$



Relative Max: none

Relative Min: none

Increasing Interval: $(-\infty, \infty)$

Decreasing Interval: none

Domain: $(-\infty, \infty)$

Range: $(-\infty, \infty)$

End Behavior: $x \to \infty$ $f(x) \to \infty$
$x \to -\infty$ $f(x) \to -\infty$

Write the equations of each function described, using the transformations shown.

3. Parent Function: Absolute Value
flipped, shifts left 4 units and up 2 units

$f(x) =$ $-|x+4|+2$

4. Parent Function: rational
Stretch factor of 8 and shifted down 3 units

$f(x) =$ $\frac{8}{x} - 3$

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5. What is the maximum value of $f(x) = -3\sqrt{x+4} - 2$ on the interval $[-3, 2]$? -5

6. What is the maximum value of $g(x) = \frac{1}{x-9} + 4$ on the interval $[-3, 2]$? $3\frac{11}{12}$ or $\frac{47}{12}$

Write the parent function, transformation, domain, range, and end behavior for each equation.

7. $f(x) = -|x+4| - 3$

Parent Function: Absolute Value

Transformations: Flipped, shifted left 4, down 3

Domain: $(-\infty, \infty)$

Range: $(-\infty, -3]$

End Behavior: $x \to \infty \quad f(x) \to -\infty$
$x \to -\infty \quad f(x) \to -\infty$

8. $f(x) = \frac{1}{2}\sqrt{x-5}$

Parent Function: Square Root

Transformations: stretch factor ½, shifted right 5

Domain: $[5, \infty)$

Range: $[0, \infty)$

End Behavior: $x \to \infty \quad f(x) \to \infty$
$x \to -\infty \quad f(x) \to$ N/A

9. $f(x) = \frac{5}{x+1}$

Parent Function: Rational

Transformations: stretch factor 5, shifted left 1

Domain: $(-\infty, -1) \cup (-1, \infty)$

Range: $(-\infty, 0) \cup (0, \infty)$

End Behavior: $x \to \infty \quad f(x) \to 0$
$x \to -\infty \quad f(x) \to 0$

10. $f(x) = \sqrt[3]{x} - 3$

Parent Function: Cube Root

Transformations: shifted down 3

Domain: $(-\infty, \infty)$

Range: $(-\infty, \infty)$

End Behavior: $x \to \infty \quad f(x) \to \infty$
$x \to -\infty \quad f(x) \to -\infty$

Graph the following piecewise function. State the domain and range.

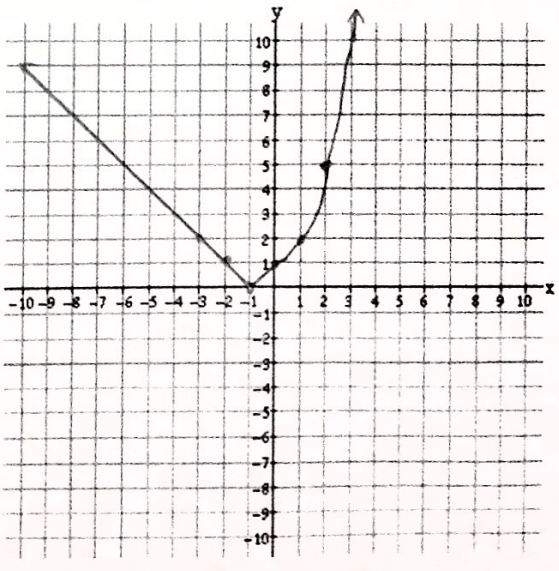
11. $f(x) = \begin{cases} |x+1|, & x \le 0 \\ x^2 + 1, & x > 0 \end{cases}$

$|x+1|$

x	f(x)
0	1
-1	0
-2	1

x^2+1

x	f(x)
0	1
1	2
2	5
3	10



Domain: $(-\infty, \infty)$

Range: $[0, \infty)$

Graph the following piecewise function. Evaluate each of the following and state the domain and range.

12. $g(x) = \begin{cases} \sqrt{x+6} & x \le -2 \\ (x-1)^3 & -1 < x \le 3 \\ 10 & x > 3 \end{cases}$

g(-6) = 0

g(-1) = undefined

g(3) = 8

$\sqrt{x+6}$

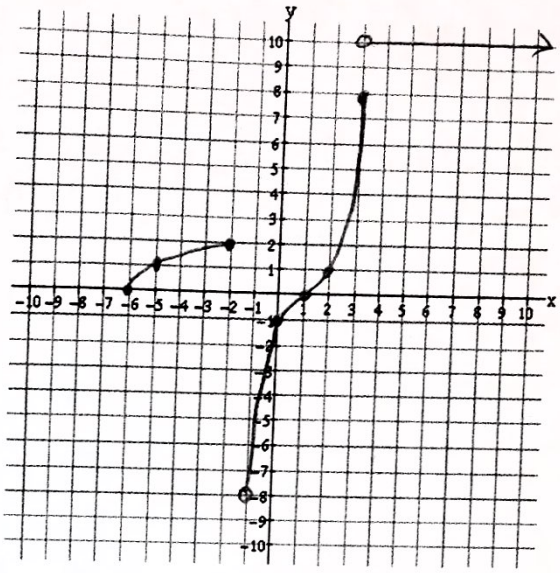
x	g(x)
-2	2
-5	1
-6	0

$(x-1)^3$

x	g(x)
-1	-8
0	-1
1	0
2	1
3	8

10

x	g(x)
3	10
4	10



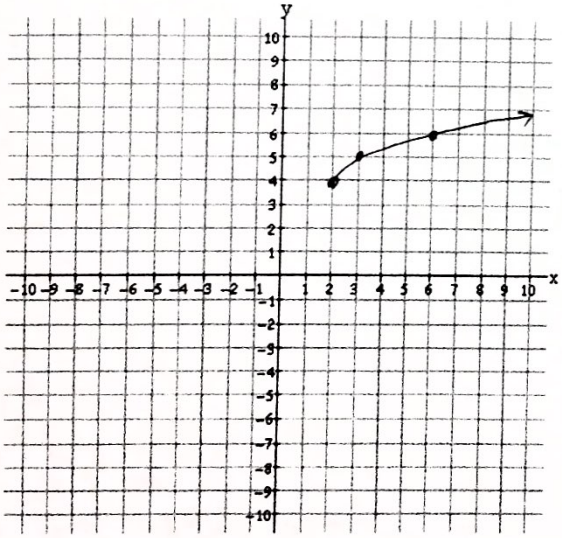
Domain: $[-6, -2] \cup (-1, \infty)$

Range: $(-8, 8] \cup [10]$

For 13-16, use the descriptions to graph the function and write the equation of the function.

13. *Parent Function*: Square Root
Range: $[4, \infty)$
Increasing interval: $(2, \infty)$
Goes through the point: (3, 5)

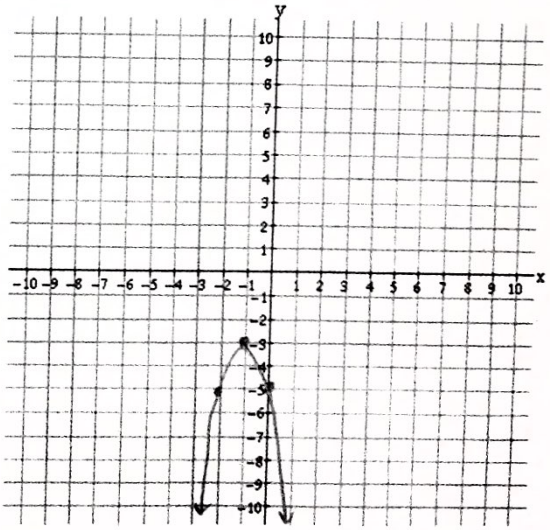
vertex: (2, 4)



$f(x) = \sqrt{x-2} + 4$

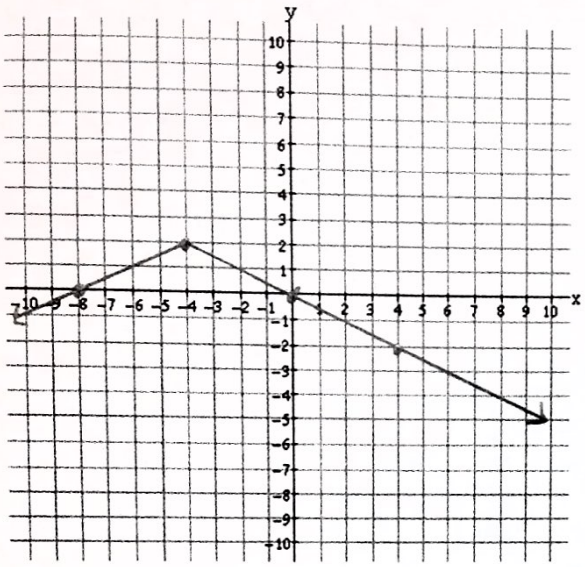
14. *Parent Function*: Quadratic
Range: $(-\infty, -3]$
Decreasing interval: $(-1, \infty)$
y-intercept: (0, -5)

vertex: (-1, -3)



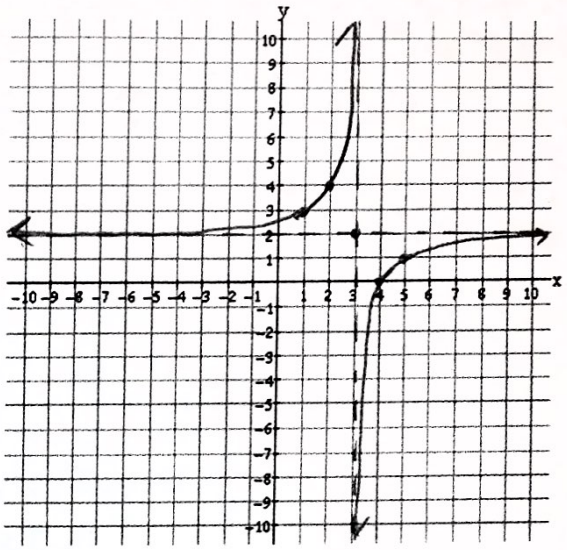
$g(x) = -2(x+1)^2 - 3$

15. *Parent Function*: Absolute Value
Range: $(-\infty, 2)$
Increasing interval: $(-\infty, -4)$ vertex: $(-4, 2)$
x-intercept at (0, 0) and (-8, 0)



$h(x) = -\frac{1}{2}|x+4|+2$

16. *Parent Function*: Rational
Asymptotes meet at (3, 2)
Increasing interval: $(-\infty, 3) \cup (3, \infty)$
Stretch factor: 2



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

Use the given functions *f(x)* and *g(x)* to answer the following questions.

17.

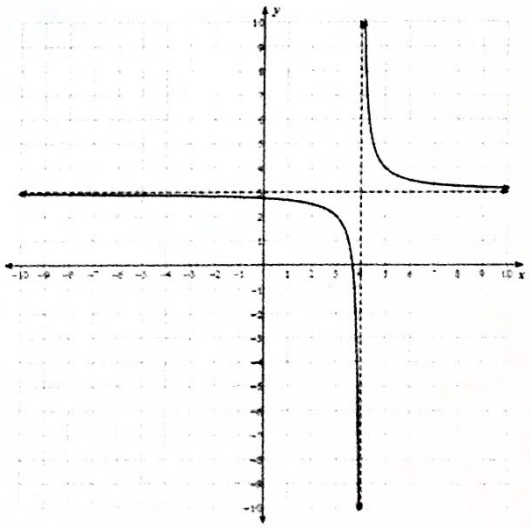
$$f(x) = 2\sqrt[3]{x+4} - 3$$

Domain: $(-\infty, \infty)$

Range: $(-\infty, \infty)$

$f(-3) =$ -1

18. ***g(x)***



Domain: $(-\infty, 4) \cup (4, \infty)$

Range: $(-\infty, 3) \cup (3, \infty)$

$g(3) =$ 2