Name: _____ Date: _____ Period: _____
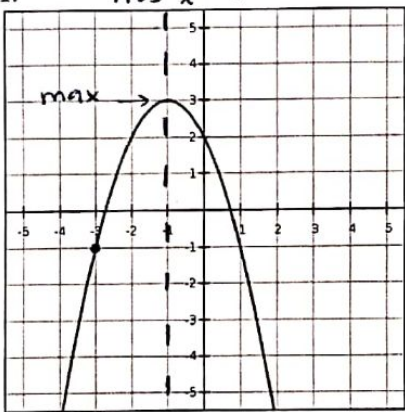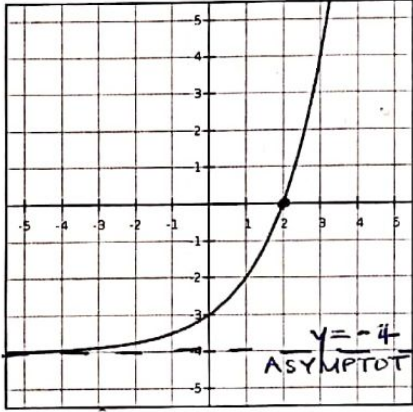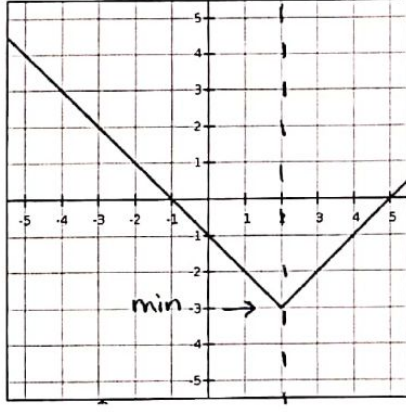
Unit 2 Review

What you must know how to do for the exam:

• Find the domain, range, intercepts, maximum, minimum, end behavior, asymptote, axis of symmetry of any function. • Calculate the average rate of change on any interval. • Identify the parent function given the graph. • Find the square root of a negative number. (Unit 1)	• Evaluate a function a given value of x or y. • Add, subtract, multiply and divide functions. • Perform a composition of functions. • Find the inverse of a function. • Multiply complex numbers. (Unit 1) • Solve an equation. (Unit 1) • Simplify a radical or exponential expression. (Unit 1)

Directions: Work the problems out in the space provided. Be sure to understand how to do **every problem** in this packet and make notes on your review sheet for things to remember.

For Questions 1-3, find the characteristics requested of the graphs below:

1. AOS $x = -1$

max →

2.

$y = -4$
ASYMPTOTE

3. AOS $x = 2$

min →

1.

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

b) Axis of symm: $x = -1$

c) Maximum value: 3

d) End Behavior:

As $x \to -\infty, y \to -\infty$

As $x \to \infty, y \to -\infty$

e) Average Rate of Change on the interval [-3, 0]

$$\overset{x_1}{\underset{\text{Point 1}}{(-3,-1)}} \qquad \overset{x_2}{\underset{\text{Point 2}}{(0,2)}}$$

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

2.

a) Range: $(-4, \infty)$

b) Asymptote: $y = -4$

c) x-intercept: $(2, 0)$

d) y-intercept: $(0, -3)$

e) Average Rate of Change on the interval [1, 3]

$$x_1 \quad x_2$$

$$\underset{\text{Point 1}}{(1,-2)} \qquad \underset{\text{Point 2}}{(3,4)}$$

$$m = \frac{4-(-2)}{3-1} = \frac{6}{2} = 3$$

3.

a) Range: $[-3, \infty)$

b) Axis of symm: $x = 2$

c) x-intercept: $(-1,0)$ & $(5,0)$

d) Minimum value: -3

e) End Behavior:

As $x \to -\infty, y \to \infty$

As $x \to \infty, y \to \infty$

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

4. Fill in the table with the transformations for each parameter, a, h, or k:

a	h	k
a is negative: **reflect** over x-axis "flip" $\|a\| > 1$: **Vertical stretch** $\|a\| < 1$: **Vertical shrink**	$x + h$: **shift left** $x - h$: **shift right**	$+ k$: **shift up** $- k$: **shift down**

For Questions 5-8, describe the transformations that map the parent function, f(x), to the transformed function, g(x).

5.
$f(x) = \sqrt{x}$
$g(x) = -3\sqrt{x} - 5$

$a = -3$
• reflect over x-axis
• Vertical stretch of 3
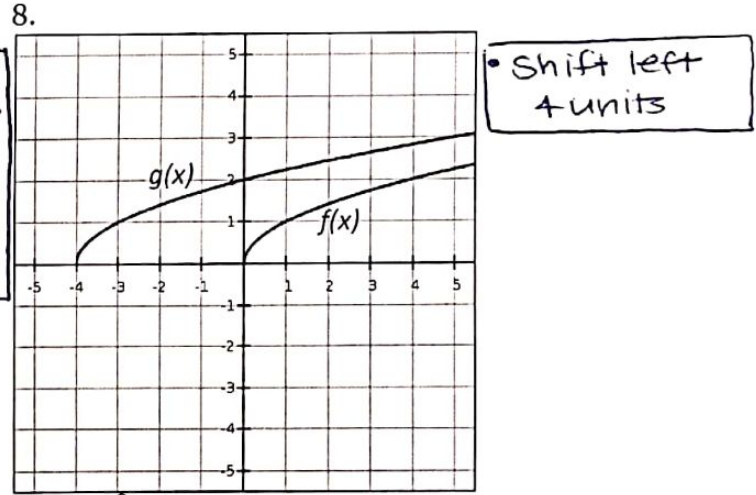$h = -5$
• shift right 5
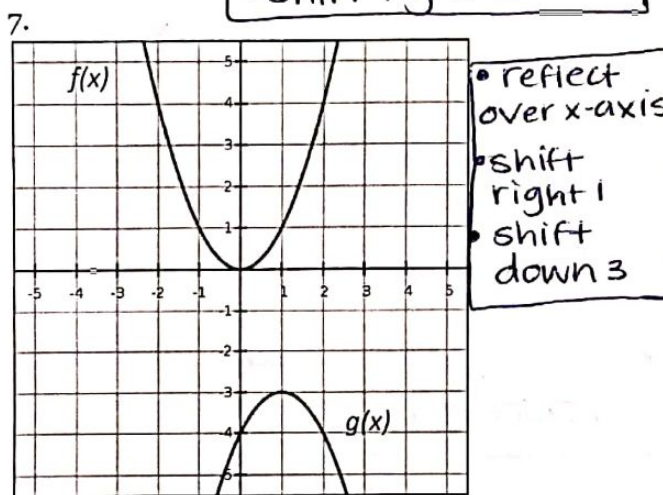
6.
$f(x) = x^3$
$g(x) = \frac{1}{2}x^3 - 2$

$a = \frac{1}{2}$
• vertical shrink of $\frac{1}{2}$
$k = -2$
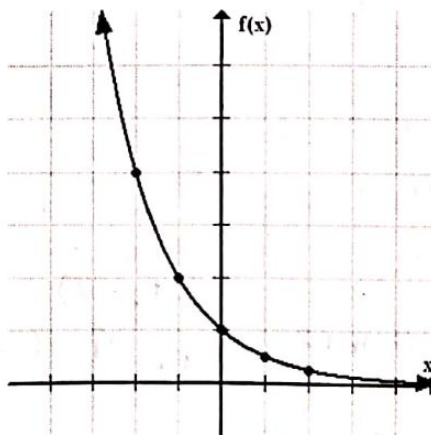• shift down 2

7.

• reflect over x-axis
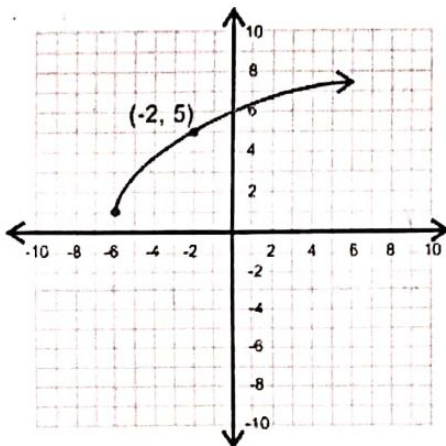• shift right 1
• shift down 3

8.

• Shift left 4 units

For Questions 9-10, give the name of the parent function graphed below.

9. **square root function**

(-2, 5)

10. **exponential function**

f(x)

For Questions 11-18, find the operations indicated. Simplify all expressions. Use the following functions:

$f(x) = -x + 2$ $\qquad$ $g(x) = 5x^2$ $\qquad$ $h(x) = \dfrac{8}{x}$ $\qquad$ $p(x) = x^2 + 4x$

11. $(g + p)(x)$	12. $p(x) - f(x)$	13. $(g \cdot h)(x)$	14. $\left(\dfrac{f}{g}\right)(x)$ $\dfrac{f(x)}{g(x)}$
$g(x) + p(x)$	$(x^2 + 4x) - (-x + 2)$	$g(x) \cdot h(x)$	
$5x^2 + x^2 + 4x$	$x^2 + 4x + x - 2$	$5x^2 \cdot \dfrac{8}{x}$	$\boxed{\dfrac{-x+2}{5x^2}}$
$\boxed{6x^2 + 4x}$	$\boxed{x^2 + 5x - 2}$	$\dfrac{40x^2}{x} = \boxed{40x}$	

15. $(f - h)(2)$	16. $g(-1) \cdot f(-1)$	17. $\dfrac{p(1)}{f(1)}$	18. $g(3) + p(3)$
$f(2) - h(2)$	$5 \cdot 3$	$\dfrac{5}{1}$	$45 + 21$
$0 - 4$	$\boxed{15}$	$\boxed{5}$	$\boxed{66}$
$\boxed{-4}$			

Side work for 15:
$\cdot f(2) = -2 + 2 = 0$
$h(2) = \dfrac{8}{2} = 4$

Side work for 16:
$g(-1) = 5(-1)^2 = 5$
$f(-1) = -(-1) + 2 = 3$

Side work for 17:
$P(1) = (1)^2 + 4(1) = 5$
$f(1) = -1 + 2 = 1$

Side work for 18:
$g(3) = 5(3)^2 = 45$
$P(3) = 3^2 + 4(3) = 21$

For Questions 19-22, find the compositions indicated. Use the following functions:

$f(x) = -2x^2$ $\qquad$ $g(x) = x + 5$ $\qquad$ $h(x) = \sqrt{x}$

19. $g(f(x))$	20. $g(h(9))$
$g(-2x^2) = \boxed{-2x^2 + 5}$	$h(9) = \sqrt{9} = 3$
	$g(3) = 3 + 5 = \boxed{8}$

21. $(f \circ g)(x)$	22. $(h \circ g)(20)$
$f(g(x)) = f(x + 5)$	$h(g(20))$
$= -2(x+5)^2$	$g(20) = 20 + 5 = 25$
$= -2(x^2 + 5x + 5x + 25)$	$h(25) = \sqrt{25} = \boxed{5}$
$= -2(x^2 + 10x + 25)$	
$= \boxed{-2x^2 - 20x - 50}$	

For Questions 23-26, find the inverse of the function given below.

23. $f(x) = 6x - 1$	24. $f(x) = \dfrac{x+5}{3}$
$y = 6x - 1$	$y = \dfrac{x+5}{3}$
$x = 6y - 1$	$3 \cdot x = \dfrac{y+5}{3} \cdot 3$
$\dfrac{x + 1}{6} = \dfrac{6y}{6}$	$3x = y + 5$
$y = \dfrac{x+1}{6}$	$y = 3x - 5$
$\boxed{f^{-1}(x) = \dfrac{x+1}{6}}$	$\boxed{f^{-1}(x) = 3x - 5}$

25. $f(x) = \frac{1}{x+6} - 3$

$y = \frac{1}{x+6} - 3$

$x = \frac{1}{y+6} - 3$

$+3 \qquad +3$

$x+3 = \frac{1}{y+6}$

$y+6 = \frac{1}{x+3}$

$-6 \qquad -6$

$y = \frac{1}{x+3} - 6$

$$\boxed{f^{-1}(x) = \frac{1}{x+3} - 6}$$

26. $f(x) = 7 + x^2$

$y = 7 + x^2$

$x = 7 + y^2$

$-7 \quad -7$

$x - 7 = y^2$

$\sqrt{x-7} = \sqrt{y^2}$

$y = \sqrt{x-7}$

$$\boxed{f^{-1}(x) = \sqrt{x-7}}$$

Questions 27-31 are Unit 1 Review questions.

27. Multiply $(5 - 2i)(-3 + i)$

$-15 + 5i + 6i - 2i^2$

$-15 + 5i + 6i - 2(-1)$

$-15 + 5i + 6i + 2$

$$\boxed{-13 + 11i}$$

28. Solve for x: $9 - 3x = 2(4 + 5x)$

$9 - 3x = 8 + 10x$

$-8 \qquad\quad -8$

$1 - 3x = \quad 10x$

$+3x \qquad\quad +3x$

$\dfrac{1}{13} = \dfrac{13x}{13}$

$$\boxed{x = \frac{1}{13}}$$

29. Simplify. $(2x^2 y)^3$

$2^3 x^6 y^3$

$$\boxed{8x^6 y^3}$$

30. Simplify. $\sqrt{-32}$

$\sqrt{-1} \cdot \sqrt{32}$

$i \cdot 2 \cdot 2\sqrt{2}$

$$\boxed{4i\sqrt{2}}$$

32
8 4
2 4 2 2
2 2

31. Simplify. $\sqrt{24xy^4}$

$\sqrt{2 \cdot 2} \cdot 2 \cdot 3 \cdot x \cdot y \cdot y \cdot y \cdot y$

$$\boxed{2y^2 \sqrt{6x}}$$

24
6 4
3 2 2 2

For Questions 32-33, use the function, $f(x) = 5x + 9$

32. Find $f(-4)$

$f(-4) = 5(-4) + 9$

$= -20 + 9$

$$\boxed{f(-4) = -11}$$

33. Find the value of x when $f(x) = 36$.

$36 = 5x + 9$

$-9 \qquad -9$

$\dfrac{27}{5} = \dfrac{5x}{5}$

$$\boxed{x = \frac{27}{5}}$$

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