

Algebra 2 – Semester 1 Review

Name: Mikey Hour: _____

1. Evaluate the function $g(x) = -x^2 + 2x - 3$ for $g(-9)$.

$$g(-9) = -(-9)^2 + 2(-9) - 3$$
$$-81 - 18 - 3$$

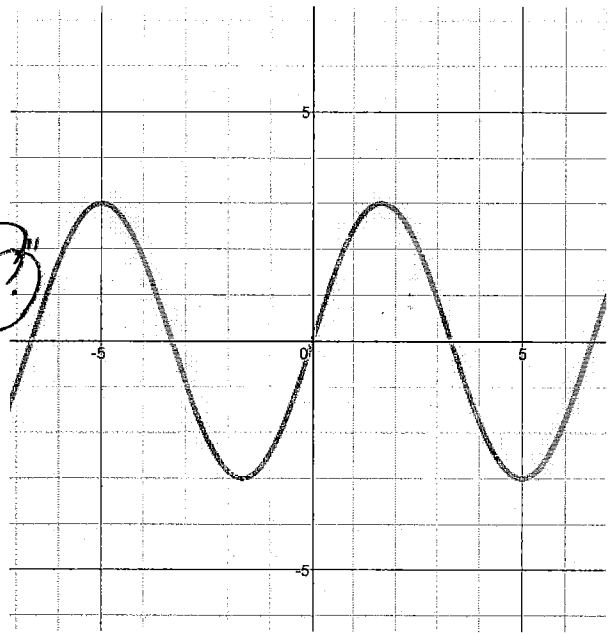
↑
plug in for x

$$g(-9) = -102$$

2. Evaluate the function graphed at right for $f(-5)$.

$$f(-5) = 3$$

↑
x = -5
"what is y when x = -5?"



3. Consider the function: $f(x) = (x + 4)^2$

What is the transformation made by this function from its parent function? What is the parent function?

parent function: $f(x) = x^2$ (quadratic)

transformation: moved left four units

4. Consider the function: $f(x) = -2x^3$

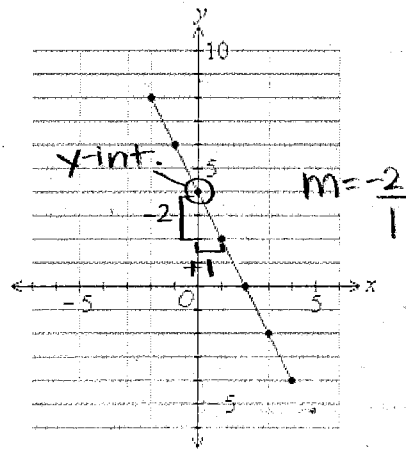
What is the transformation made by this function from its parent function? What is the parent function?

Parent function: $f(x) = x^3$ (cubic)

transformation: reflected over x-axis & stretched by a factor of 2.

5. Write the correct equation for the line graphed at right.

$$y = -2x + 4$$



2.4

6. Choose the correct slope-intercept form of the equation for the line that passes through the points $(-4, 3)$ and $(7, 8)$.

$$m = \frac{\text{rise}}{\text{run}} = \frac{5}{11}$$

2.4

$$y - 8 = \frac{5}{11}(x - 7)$$

$$y = \frac{5}{11}x + \frac{53}{11}$$

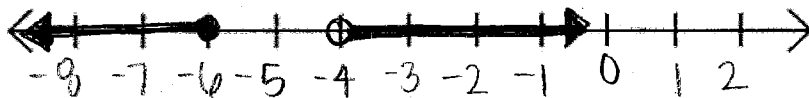
$$y = \frac{5}{11}x - \frac{35}{11} + \frac{88}{11}$$

For #7-9, find the correct solution and graph each inequality.

7. $\frac{-3p}{-3} < \frac{12}{-3}$ or $p + 5 \leq -1$
 $p > -4$ $p \leq -6$

○ = not included ($<$ or $>$)
 ● = included (\leq or \geq)

1.6



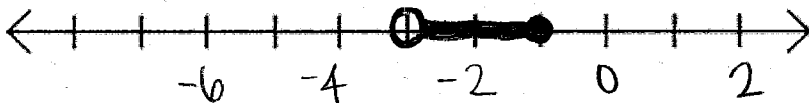
8. $a + 3 \leq 2$ and $-5a < 2a + 21$

$$a \leq -1$$

$$-7a < 21$$

$$a > -3$$

1.6



9. $|5m| \geq 30$

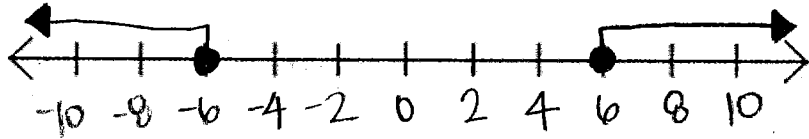
$5m \geq 30$

$5m \leq -30$

$m \geq 6$ OR $m \leq -6$

$|x| \geq a$ greater OR $x > a$ OR $x < -a$
 $|x| \leq a$ less than AND $x < a$ AND $x > -a$

1.6



For #10-12, solve each system of equations.

10. $-12x - 10y = -14$
 $2 \cdot (6x + 7y = -7)$

$$\begin{array}{r} -12x - 10y = -14 \\ 12x + 14y = -14 \\ \hline 4y = -28 \\ y = -7 \end{array}$$

$(7, -7)$

3.1

$6x + 7(-7) = -7$
 $6x - 49 = -7$
 $6x = 42$
 $x = 7$

11. $-2 = 8x + 10y$
 $-4x = 5y + 1$

3.1

rewrite to line up like terms
 \downarrow

$2 \cdot (-4x - 5y = 1)$
 $8x + 10y = -2$

$$\begin{array}{r} -8x - 10y = 2 \\ 8x + 10y = -2 \\ \hline 0 + 0 = 0 \end{array}$$

$0 = 0 \Rightarrow$ infinite solutions
 $0 = \# \Rightarrow$ no solutions

12. $(x - 10y = 10) \cdot 2$
 $-6x + 20y = -20$

3.1

$2x - 20y = 20$
 $-6x + 20y = -20$

$$\begin{array}{r} 0 - 10y = 10 \\ -10y = 10 \\ y = -1 \end{array}$$

$(0, -1)$

$-4x = 0$
 $x = 0$

Quadratic formula:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

13. Solve: $2x^2 - 5x - 8 = 4$

$$2x^2 - 5x - 12 = 0$$

(4.6) $a=2 \quad b=-5 \quad c=-12$

$$x = \frac{-(-5) \pm \sqrt{(-5)^2 - 4(2)(-12)}}{2(2)} \rightarrow x = \frac{5 \pm \sqrt{25 - (-96)}}{4} = \frac{5 \pm \sqrt{25 + 96}}{4} = \frac{5 \pm 11}{4}$$

14. Find the C-value that completes the square: $x^2 + 6x + \underline{9}$

(4.5) $\left(\frac{6}{2}\right)^2 = \left(\frac{6}{2}\right)^2 = (3)^2 = 9$

$$x = \frac{5 + 11}{4} = 4$$

$$x = \frac{5 - 11}{4} = -\frac{3}{2}$$

15. Solve: $6x^2 - 24x - 72 = 0$

$$6(x^2 - 4x - 12) = 0$$

$$x^2 - 4x - 12 = 0$$

(4.3) $(x-6)(x+2) = 0$

$$x-6=0$$

$$x+2=0$$

$x=6$

$x=-2$

16. The senior classes at Blue Valley Central and Olathe North Northeast planned separate trips to Worlds of Fun. Blue Valley Central filled 3 vans and 6 buses with a total of 264 students. Olathe North Northeast filled 2 vans and 7 buses with a total of 296 students. Every van had the same number of students in it, as did the buses. Find the number of students in each van and in each bus. $v = \#$ in van $b = \#$ in bus

$$3v + 6(40) = 264$$

$$3v = 24$$

$$v = 8$$

$$2 \cdot (3v + 6b) = 264$$

$$6v + 12b = 528$$

$$-3 \cdot (2v + 7b) = 296$$

$$-6v - 21b = -888$$

$$-9b = 360$$

$$b = 40$$

Vans hold 8 students and the buses hold 40 students.

17. The Olathe Northwest Theatre Department paid the Math Club to write an equation to represent their profits on their upcoming musical based off of what their ticket price should be. The Math Club showed their Profits, P , based on their ticket price, t , could be represented by the function $P = -10t^2 + 300t + 450$. What ticket price should the Theatre Department charge in order to maximize their profits?

3.1

↓
vertex

x coord: $\frac{-b}{2a}$

y coord: plug in x coord into equation

$$t = \frac{-b}{2a} = \frac{-300}{2(-10)} = \frac{-300}{-20}$$

$t = \$15 \text{ for ticket price}$

18. A rectangular garden has length $x + 4$ and height $x - 1$. If you wish the area of your garden to be 24 ft², what should the length of your garden be? (Hint: The final answer is *not* your x-value.)

$$A = l \cdot h$$

$$24 = x^2 + 3x - 4$$

4.3

$$A = (x+4)(x-1) = x^2 - x + 4x - 4$$

$$0 = x^2 + 3x - 28$$

$$(x+7)(x-4) = 0$$

$$l = x + 4 = 4 + 4 = 8 \text{ ft}$$

$$A = x^2 + 3x - 4$$

~~$x = -7$~~ $x = 4$

↑
gives neg. side length

19. Write an expression that represents the phrase: "12 less than the quotient of a number and 7".

1.1

$$\frac{n}{7} - 12$$

20. Solve: $|3x - 15| = 12$

$$3x - 15 = 12$$

$$3x - 15 = -12$$

$$3x = 27$$

$$3x = 3$$

$x = 9$

$x = 1$

21. Solve: $|2v - 5| = -8$

$$|v - 5| = 4$$

1.4

$$v - 5 = 4$$

$v = 9$

$$v - 5 = -4$$

$v = 1$

22. Identify the property shown.

$\begin{cases} 2x(x-3)=4 \\ 2x^2-6x=4 \end{cases}$	E	A Commutative
$\begin{cases} (x-3)+4=9 \\ x+(-3+4)=9 \end{cases}$	C	B Identity
$\begin{cases} 4x+0=8 \\ 4x=8 \end{cases}$	B	C Associative
$\begin{cases} x \cdot 2x=9 \\ 2x \cdot x=9 \end{cases}$	A	D Inverse
$\begin{cases} 2x+9-9=10-9 \\ 2x=1 \end{cases}$	D	E Distributive

23. The cost of producing widgets at Cyberdine Systems is $C = 6x - 2y + 8$. The feasible region has the vertices listed below. Which vertex would minimize their costs?

a) (2, 8) $C = 6(2) - 2(8) + 8$
 $C = 12 - 16 + 8 = 4$

b) (1, 5) $C = 6(1) - 2(5) + 8$
 $C = 6 - 10 + 8 = 4$

~~X~~ (10, 2)

~~X~~ (5, 6)

$C = 6(10) - 2(2) + 8$

$C = 6(5) - 2(6) + 8$

$= 60 - 4 + 8$

$= 30 - 12 + 8$

$= 64$

$= 26$

25. Divide: $(8x^2 + 6x - 6) \div (x - 3)$

$$\begin{array}{r} 3 \overline{) 8 \ 6 \ -6} \\ \underline{ 24 \ 90} \\ 8 \ 30 \ 84 \end{array}$$

$$8x + 30 + \frac{84}{x-3}$$

$$\begin{array}{r} 8x + 30 + \frac{84}{x-3} \\ x-3 \overline{) 8x^2 + 6x - 6} \\ \underline{-(8x^2 - 24x)} \\ 30x - 6 \\ \underline{-(30x - 90)} \\ 84 \end{array}$$

3.3

5.2

26. Divide: $(p^4 + 4p^3 - 6p + 36) \div (p - 2)$

$\swarrow OP^2$

$$\begin{array}{r|rrrrr} 2 & 1 & 4 & 0 & -6 & 36 \\ & \downarrow & 2 & 12 & 24 & 36 \\ \hline & 1 & 6 & 12 & 18 & 72 \end{array}$$

5.2

$$\boxed{p^3 + 6p^2 + 12p + 18 + \frac{72}{p-2}}$$

27. Write the simplest polynomial function that has the following zeros: 8 and -1

$x=8$ $x=-1$

4.3 $x-8=0$ $x+1=0$

$$(x-8)(x+1)=0$$

$$x^2 + x - 8x - 8 = 0$$

$$\boxed{x^2 - 7x - 8 = 0}$$

28. Classify the polynomial regarding its degree and number of terms: $4x^3 + 2x^2$

degree
 $\underbrace{\hspace{2cm}}$
 2 terms

5.1

Cubic binomial

29. Use the graph at right.

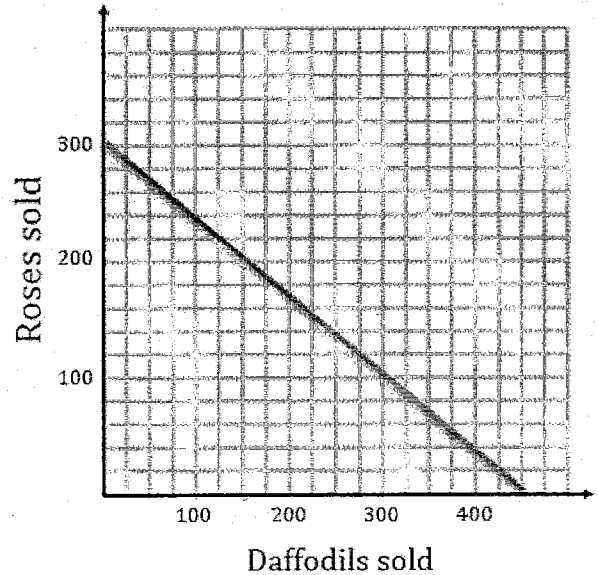
a) Explain in real world terms what the y-intercept and the x-intercept represent. (Be specific: include units and numbers.)

x-intercept: if no roses are sold, 450 daffodils are sold.

y-intercept: if no daffodils are sold, 300 roses are sold.

b) If 150 daffodils were sold, how many roses were sold?

200 roses were sold.



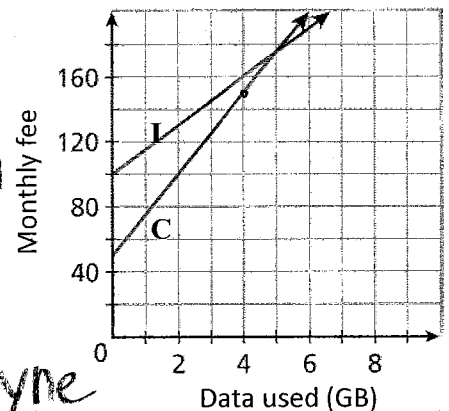
30. Two website hosting companies, Initech (I) and Cyberdyne (C), charge their clients different rates, depending on how much data is used.

On the graph, $I(3) = 144$. Describe what this means in the situation.

If you use 3GB of data with Initech your monthly fee would be \$144.

On the graph, $C(3) = 122$. Describe what this means in the situation.

If you use 3GB of data with Cyberdyne your monthly fee would be \$122.



If you use 4 GB each month, which company should you use? **Explain** your reasoning.

Cyberdyne - because the monthly fee would be lower.

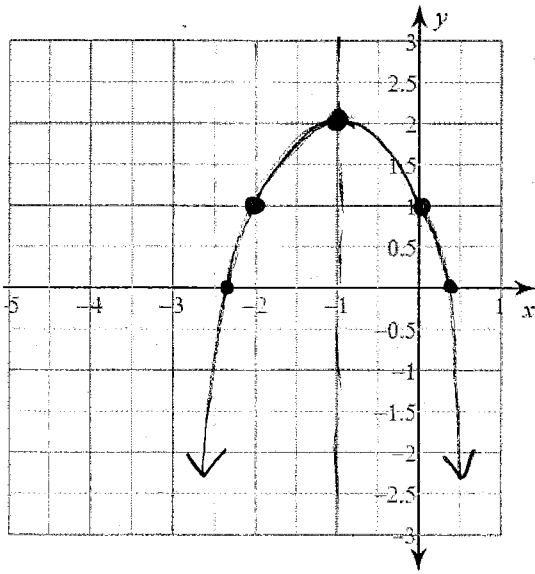
31. Write down 5 irrational numbers and 5 rational numbers.

irrational: $\sqrt{2}, \pi, \sqrt{7}, \sqrt{113}, \sqrt{14}$

rational: $2, 7, -\frac{2}{5}, 1.8, -1943, .3\bar{3}$

32. $f(x) = -x^2 - 2x + 1$

4.1



a) Direction the graph opens: down

b) Axis of symmetry: $X = -1$
 $x = \frac{-b}{2a} = \frac{-(-2)}{2(-1)} = \frac{2}{-2} = -1$

c) Vertex: $(-1, 2)$
 $f(-1) = -(-1)^2 - 2(-1) + 1 = -1 + 2 + 1 = 2$

d) y-intercept: $(0, 1)$

e) domain: \mathbb{R}

f) range: $y \leq 2$

g) x-intercepts: $(-2.41, 0)$ $(0.41, 0)$] Find on calculator.

h) Sketch the graph.

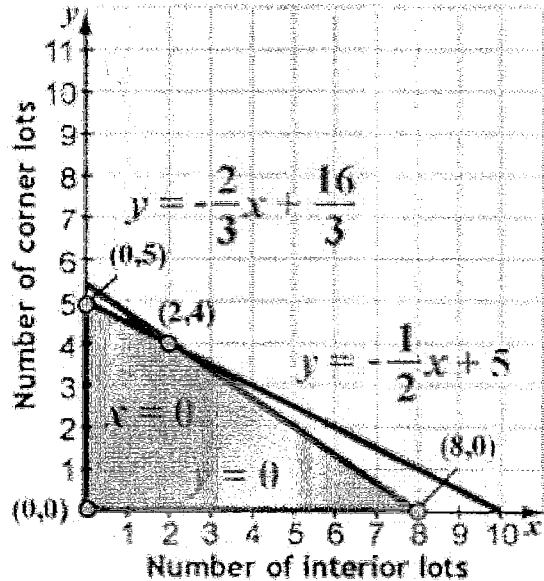
33. The graph on the right shows the feasible region for Mr. Rodden's Lawn Service. For each interior lot, he earns \$70 profit. For each corner lot, he earns \$85. Write a function for the profit:

3.3

$P = 70I + 85C$

Which of the vertices maximizes profit? What is the maximum profit?

Lawn Service



		P
$(0, 5)$	$70(0) + 85(5)$	$\$425$
$(2, 4)$	$70(2) + 85(4)$	$\$480$
$(8, 0)$	$70(8) + 85(0)$	$\$560$
$(0, 0)$	$70(0) + 85(0)$	0

Maximum profit is \$560

8 interior lawns & No corner lots

34. Identify all of the information below for the function $f(x) = x^4 - 3x^2 - 2x - 3$. Then graph it.

5.3

Name the function (2 words)	Quartic polynomial
# of turning points	3
Local Max (x, y)	(-0.37, -2.65)
Local Min (x, y)	(-1, -3) (1.37, -7.85)
Intervals Increase	(-1, -0.37) (1.37, ∞)
Intervals Decrease	($-\infty$, -1) (-0.37, 1.37)
End Behavior	As $x \rightarrow +\infty$ $f(x) \rightarrow \infty$
End Behavior	As $x \rightarrow -\infty$ $f(x) \rightarrow \infty$
Find the zeros	(-1.69, 0) (2.14, 0)

