2018-2019 Semester 2 Study Guide A

1.) Write and sketch a graph that shows exponential growth.
Describe the domain of your graph.
Describe the range of your graph.
Describe the growth factor of your graph.

2.) Repeat the steps for #1 with a graph that shows exponential decay.

For each function below:

a) Make a table and graph to show the function.

b) As $x \rightarrow +\infty$, $f(x) \rightarrow$ _____ Domain: _____
As $x \rightarrow -\infty$, $f(x) \rightarrow$ _____ Range: _____

c) Does the function show growth or decay? What is the growth/decay factor?

d) What is the percent of growth or decay?

e) What is the initial value? The y-intercept?

3.) $y = 5(0.57)^x$ 4.) $y = 1.3^x$

5.) $y = 1.4(1.09)^x$ 6.) $y = 1.5(0.75)^x$ 7.) $y = 8(3)^x$

8.) Of #3 – 7, which shows the greatest growth? How do you know?

9.) The population in 2012 of a small Upper Peninsula town was approximately 2,500. The following equation can be used to model the change, g(t), over time, t, in years: $g(t) = 2500\ (1.15)^t$.

a.) what is the percent of growth or decay per year in this town?

b.) Is the population increasing or decreasing? Explain how you know.

c.) Where will the graph of the function cross the vertical axis: Explain how you know.

d.) What does the vertical intercept indicate in the context of the problem?

e.) How would an increase in the percentage rate of growth affect the graph of the function?

f.) What will be the predicted population in 2020?

10.) A stock is worth $42 at the beginning of the day. Every hour the stock does down by 5%.

a.) Can this information be represented by exponential growth or decay? Explain.

b.) What is the growth or decay factor for this information? Explain how you found it.

c.) Write an equation to model this information. Explain what each part means.

d.) How much will the stock be worth in 8 hours? Show work.

11.) A dust bunny gathers dust at a rate of 11% per week. The dust bunny originally weighs 0.7 oz.

a.) Write a function that represents the weight of the dust bunny at a given time. Use x for weeks and y for the weight of the dust bunny.

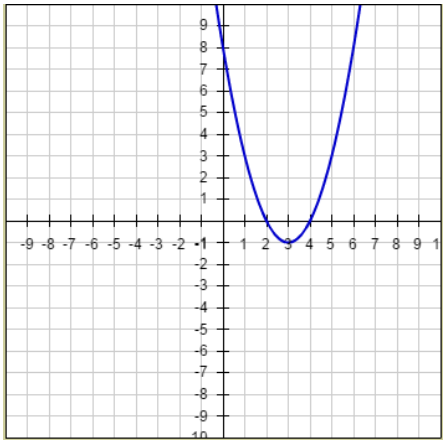
b.) Find the weight of the dust bunny after 7 weeks. Show work.

PART 2

Examine the quadratic functions below. Label the graph with parts a – g.

a.) Find the y-intercept
b.) What are the different names for the x-intercepts?
c.) Find the x-intercept(s)
d.) Identify the vertex
e.) Is the vertex a maximum or a minimum? Why?
f.) Write the equation of the axis of symmetry
g.) Write an equation for this quadratic function (a = 1 or a = -1)

1)



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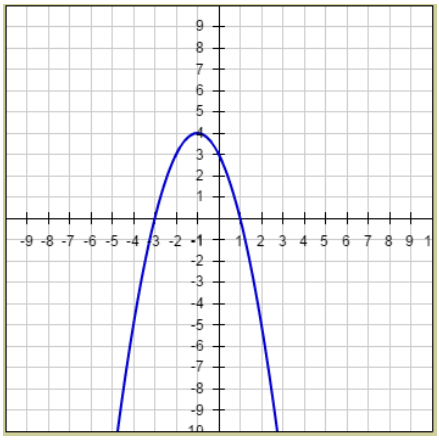

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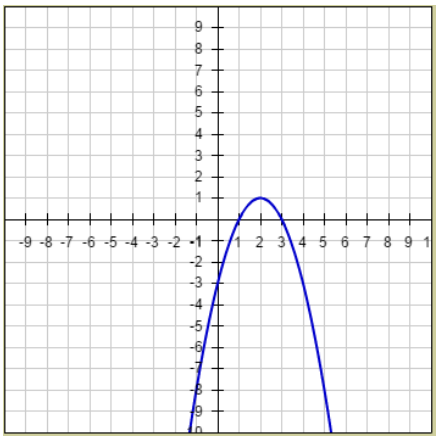

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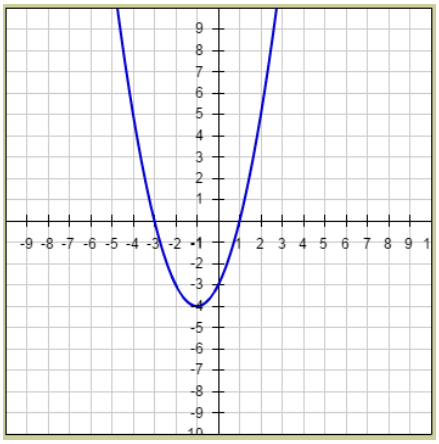


Factor each expression for 5 – 8.

5.) $6x^5 + 3x^4 - 9x^2$

6.) $49r^2 - 144$

7.) $2y^2 - 2y - 112$

8.) $12d^2 - 8d + 1$

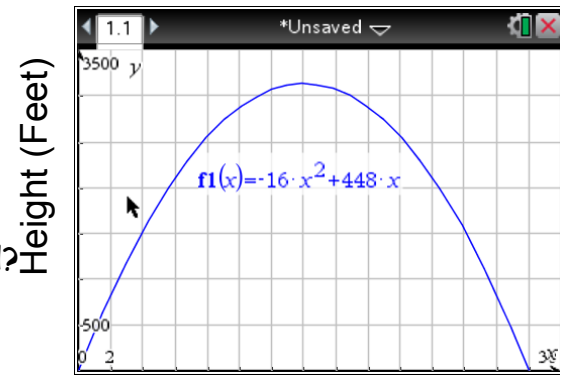
9.) Explain what can be determined by looking at each form of a quadratic function.

a.) Standard form $y = ax^2 + bx + c$

b.) Factored form $y = a(x - p)(x - q)$

c.) Vertex form $y = a(x - h)^2 + k$

The following is a graph of the path of a rocket after it is launched.



10.) Explain the real world meaning of the following points.

a.) Vertex b.) x-intercept(s)

11.) What does the x represent in the function?

12a.) How long does it take for the rocket to reach the ground?

12b.) What is the fall time of the rocket?

Examine the function to the right.

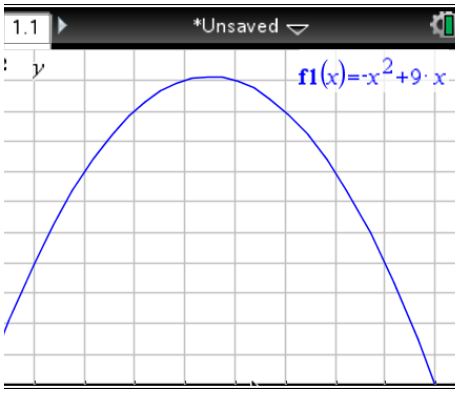
13.) What point is missing from the table?

14a.) How can you find the vertex of this graph?

14b.) Find the vertex. Show your work.

15.) Explain why you could not see the vertex in the table.

x	y
0	0
1	8
2	14
3	18
4	20
5	20
6	18
7	14
8	8
9	0



For each of the following, graph the function. Be sure to:

- Plot the parabola correctly.
- Label the coordinates of the vertex on the graph.
  - If necessary, use the formula.
- Label the coordinates of the y-intercept on the graph.
- Show the Axis of Symmetry
- Write the equation of the Axis of Symmetry.
- Label the zeros on the graph.
  - If necessary, use the quadratic formula.

16.) $f(x) = 3x^2 - 2x - 5$

17.) $f(x) = -x^2 + 4$

18.) $f(x) = x^2 + 4x - 5$

PART 3

1.) Show all your work to find the x-intercept(s)/zero(s)/solution(s) of:

a.) $f(x) = (x + 7)(x - 3)$

b.) $f(x) = 2x^2 + 5x - 3$

c.) $f(x) = x(2x + 5)$

d.) $f(x) = 6x^2 + 7x - 20$

e.) $f(x) = x^2 - x - 12$

f.) $f(x) = 3(4x - 3)(x - 1)$

2.) Find the vertex of each function. Identify if the vertex is a maximum or a minimum.

a.) $f(x) = -5(x + 3)^2 - 4$

b.) $f(x) = 2x^2 - 4x + 1$

c.) $f(x) = 3x^2 + 6x - 5$

d.) $f(x) = -(x - 3)^2$

e.) $f(x) = x^2 - 1$

f.) $f(x) = (x - 5)^2 + 3$

3.) Find the x-intercept(s) and y-intercept of each function.

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

b.) $f(x) = x^2 + 6x - 16$

c.) $f(x) = x^2 - 2x - 24$

4.) What is the vertex of $g(x) = (x - 3)^2 + 2$?

Vertex: _____

Which of the following has the **same vertex** as g(x)? Identify/show work for the vertex for each function.

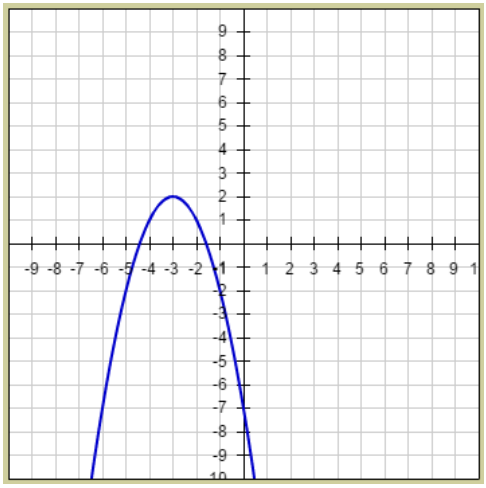
a.) $h(x) = -2(x - 3)^2 - 2$

b.) $f(x) = (x + 3)^2 + 2$

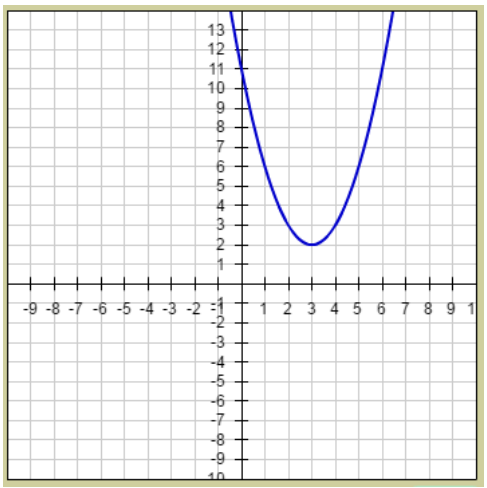
c.) $p(x) = x^2 - 6x + 11$

d.) $q(x) = (x - 3)(x + 2)$

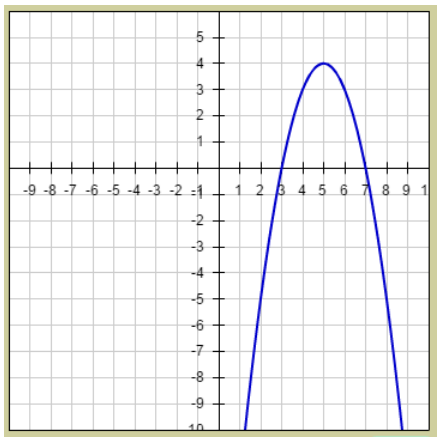
e.)

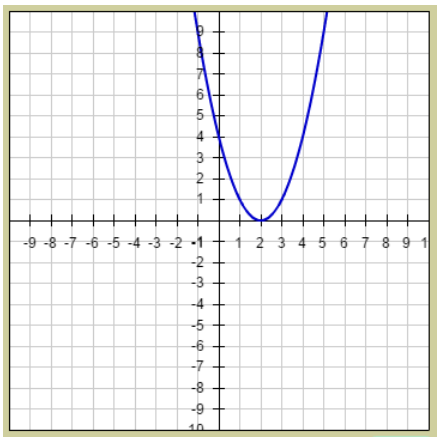


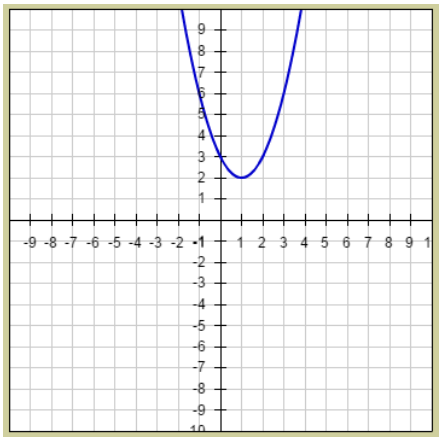
f.)



Determine the number of <u>real number</u> solutions for the following quadratic function. Show the solutions on the graph. Explain how you know the number of real number solutions.

5.) 

6.) 

7.) 

Show all work. Round answers to the nearest hundredth if necessary.

8.) Find the roots of $4x^2 - 15 = 9$

9.) Find the zeros of $z^2 + 6z - 27 = 0$

10.) Solve the equation: $c^2 - 3c = 0$

11.) Solve: $10x^2 - 7x = 33$

12.) Find all the zeros of: $2x^2 + 15x + 28 = 0$

13.) Find the roots of: $2x^2 - 7x - 13 = 0$

14.) Solve: $6x^2 + 13x + 6 = 0$

PART 4

Directions: Find the sum, difference or product of each for #1 – 12.

1.) $(4x^2 - 5x) - 2x(2x^2 - 3x + 3)$

2.) $(3p - 7)(3p + 4)$

3.) $(6 - 3x^2) + (x^2 - x + 5)$

4.) $-2n^3\,(n^2 - 3n + 4)$

5.) $(2a^2 + 4c^3)^2$

6.) $(n^4 + 2n - 1) + (5n - n^4 - 4)$

7.) $(4x + 3)(2x + 1)$

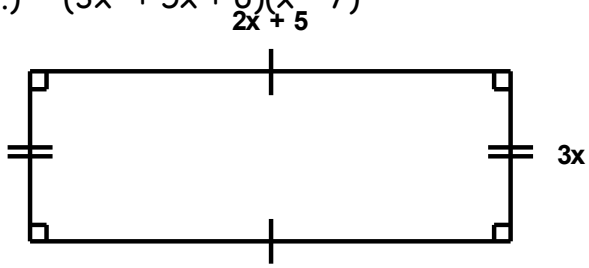
8.) $(4h^2 - 5)(5h^2 - 6)$

9.) $(2x^3 + 4x^2 + 1)(x - 4)$

10.) $(-4x^2 + 5x - 8) + (-x^2 + 3x + 6)$

11.) $(2x^2 - 3x - 3) - (-6x^2 + 3x + 8)$

12.) $(3x^2 + 5x + 6)(x - 7)$



13a.) Write an expression for the perimeter of the figure.

13b.) Write an expression for the area of the figure.

14.) A 65 inch television is named by the length of the diagonal of the television. Since the angles of the television are right angles, the Pythagorean Theorem can be used to compare the dimensions to the diagonal: $a^2 + b^2 = c^2$. You want to know if your new television will fit in your existing cabinet. Rearrange the formula to solve for height (a).

15.) In accounting, a company's gross profit rate measures how well the company controls cost of goods sold to maximize gross profit. The gross profit rate, P, is calculated using the formula: $P = \frac{S-C}{S}$, where S is the net sales and C is the cost of goods sold. Rearrange the formula to solve for the cost of goods sold (C).

16.) The surface area, S, of a right circular cylinder is calculated using the formula: $S = 2\pi r^2 + 2\pi rh$, where r is the radius of the cylinder and h is the height of the cylinder. Rearrange the formula to solve for height (h).

17.) If F denotes a temperature in degrees Fahrenheit and C is the same temperature measured in degrees Celsius, then F and C are related by the equation: $F = \frac{9}{5}C + 32$. Rewrite this equation to solve for C in terms of F.