Name: _____Date : _____

IM 3 UNIT TEST V1 – Transformations & Quadratic Functions
Teacher: Mr. Santowski and Mr. Smith

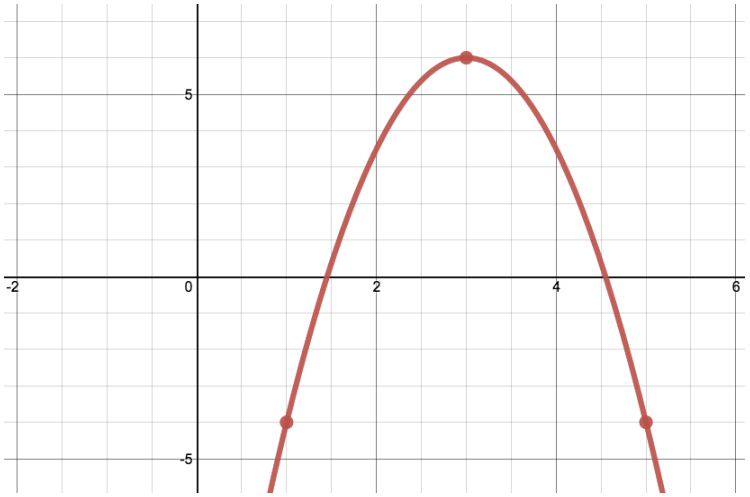
Score:_____

PART 2 - CALCULATOR INACTIVE QUESTIONS

SHOW ALL WORK AND WRITE ALL ANSWERS IN THE SPACES PROVIDED.

Maximum marks will be given for correct answers. Where an answer is wrong, some marks may be given for correct method, provided the answer is supported by written working.

1. The graph of the parabolic function, y = f(x) is shown. Use the graph to answer the following questions: (12 marks)



a. Write the equation of the axis of symmetry.

(1)

b. Write the coordinates of the maximum point.

(1)

c. Evaluate f(5).

(1)

d. Solve f(x) = -4.

(1)

e. Write the equation of the parabola in vertex form. Show/explain the key analysis that leads to your final solution.

(3)

f. List the transformations that were applied to the parent function, $y = x^2$.

(3)

g. Write the equation of the parabola in standard form.

(2)

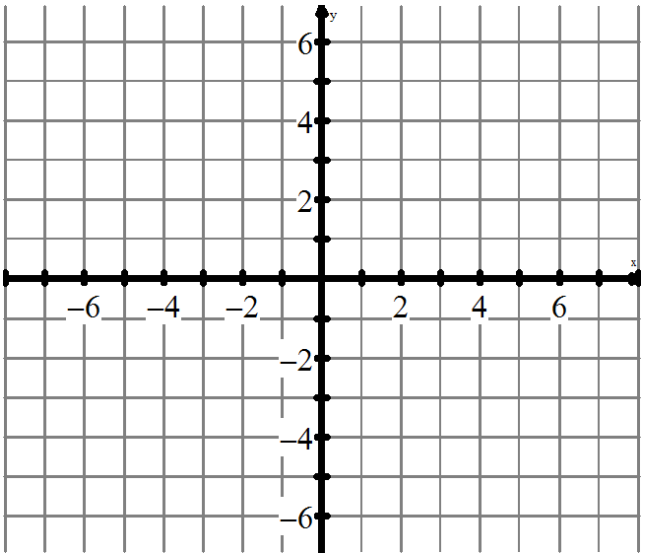
h. AP/HL: Sketch a graph of the function y = 2 - |f(x)|

2. In this question, you will work with the parent function, $f(x)=\frac{1}{x}$.

(14 marks)

a. On the grid provided, graph the parent function of $f(x)=\frac{1}{x}$. Label the asymptotes. Show the 2 key points on this parent function.

(3)



b. If $f(x)=\frac{1}{x}$, evaluate f(3).

(1)

c. Given the equation of $g(x)=\frac{2}{x-3}+4$, list the transformations that you are going to make to $f(x)=\frac{1}{x}$.

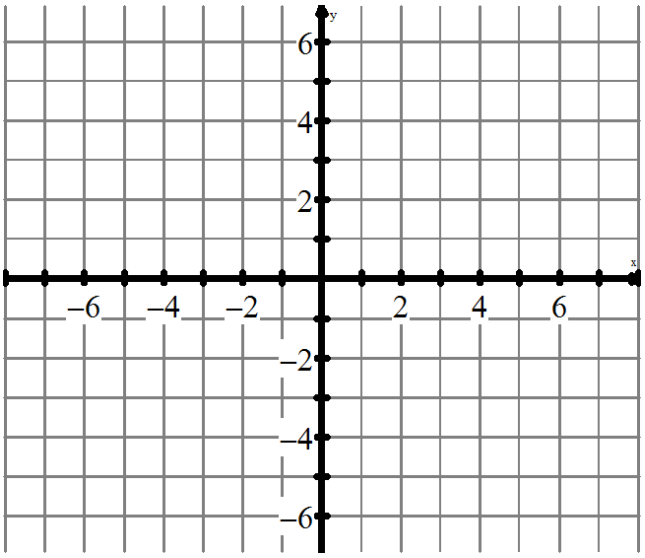
(3)

d. Write the equations of asymptotes of the transformed function.

(2)

e. Sketch the transformed function, given the details you've just worked in Q2c & Q2d.

(3)



f. Give the new coordinates of the original points (1,1) and (-1,-1)

(2)

3. The following questions deal with analyzing an equation of a quadratic function in order to answer questions about the quadratic function & its features. Use any algebraic strategy in your solutions.

(8 marks)

a. Determine the x-intercepts of the quadratic function $f(x) = -2(x - 4)(x + 7)$

(2)

b. Determine the coordinates of the vertex of $y = -\frac{1}{2}x^2 + 2x + 4$

(2)

c. Determine the equation of the axis of symmetry of $f(x) = -2x(x + 7) - 1$.

(2)

d. Does the parabola $f(x) = 3(x + 2)^2 + 1$ have any x-intercepts? Explain why/why not.

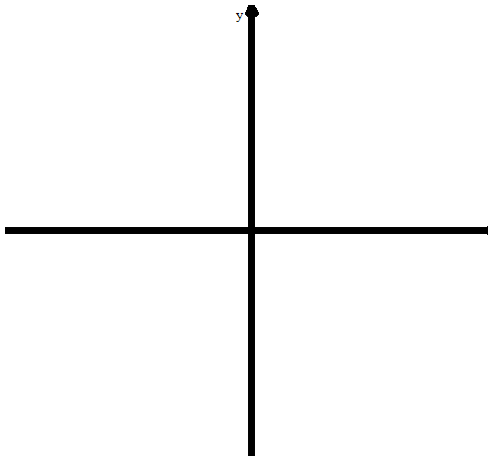
(2)

4. A parabola has x-intercepts at $x = 5$ and $x = -9$ and goes through the point (6,5).

(5 marks)

a. Provide a sketch of the parabola, given the details provided.

(2)



b. Write the equation of this parabola in vertex form, showing the key steps in your solution.

(3)

5. An object is thrown off the top of an 18 m tall building. The object reaches a maximum height of 50 meters 4 seconds after it was thrown.

(5 marks)

a. Determine an equation that can be used to model the height of the ball, ***h*** in meters above the ground, as a function to time, ***t***, in seconds since the object was thrown. Use the variables ***h*** and ***t*** in your equation.

(3)

b. How much time does the ball take before it hits the ground?

(2)

6. Is the point (-3,2) on the parabola $y = 2(x + 1)^2 - 6$? Show the analysis that leads to your conclusion.

(2 marks)

Name: _____Date : _____

IM 3 UNIT TEST – Transformations & Quadratic Functions
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PART 1 - CALCULATOR ACTIVE QUESTIONS

SHOW ALL WORK AND WRITE ALL ANSWERS IN THE SPACES PROVIDED.

Maximum marks will be given for correct answers. Where an answer is wrong, some marks may be given for correct method, provided the answer is supported by written working. Solutions found from a graphic display calculator should be supported by suitable working, e.g. if graphs are used to find a solution, you should sketch these as part of your answer.

1. Given the quadratic equation $y = -0.2x^2 + 2.75x + 1.25$,

(10 marks)

a. Does the parabola have a maximum or a minimum point? (1)

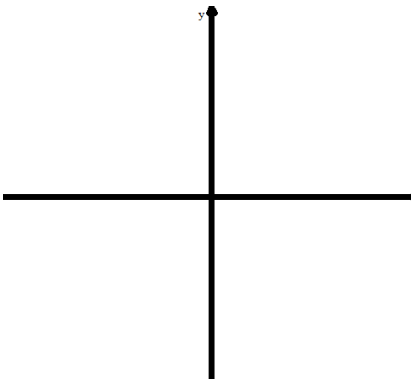
b. What is the max/min value? (1)

c. Write the equation in vertex form. (3)

d. State the zeroes of the parabola. (1)

e. Write the equation in factored form. (2)

f. Include a sketch from your GDC. (2)



2. You are given the quadratic equation $y = -2x^2 + Mx + N$.

(4 marks)

a. Determine the value of M if the axis of symmetry is at x = -3. Show/explain the analysis that leads to your conclusion.

(2)

b. Now that you know the value of M, determine the value of N if the optimal value of y is 10. Show/explain the analysis that leads to your conclusion.

(2)

3. Mr. Smith's & Mr. Santowski's classes are holding an egg launching contest on the football field. Teams of students have built catapults that will throw an egg down the field. They have various tools and ideas for measuring each launch and how to determine which team wins.

(11 marks)

Mr. Smith's team used their catapult and threw an egg down the football field. Students used a motion detector to collect data while the egg was in the air. They came up with the table of data below.

Distance from goal line (in feet)	7	12	14	19	21	24
Height (in feet)	19	90	101	90	55	0

The egg from Mr. Santowski's team flew through the air and landed down the field. The students tracking the path of the egg determined that the equation $\mathbf{y = -0.8x^2 + 19x - 40}$ represents the path the egg took through the air, where x is the distance from the goal line and y is the height of the egg from the ground. (Both measures are in feet.)

Mr. Smith & Mr. Santowski want to award 2 prizes. We will award a prize to the team whose egg reached the highest point and we will award a prize to the team whose egg travelled the furthest distance forward.

QUESTION: Which team won which prize?

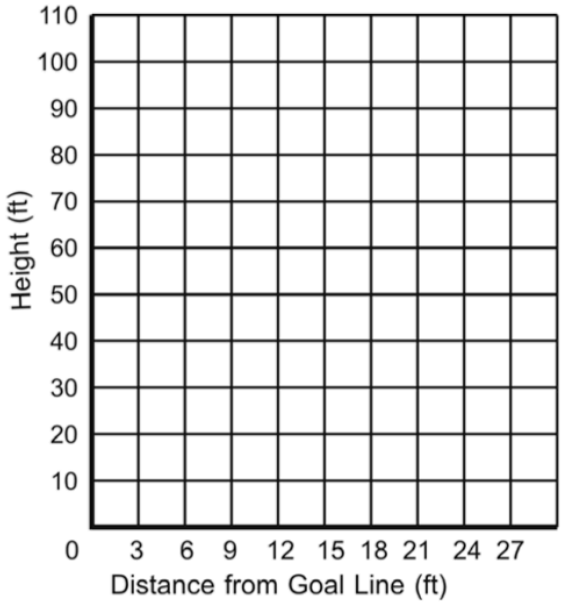
CONTINUED: Mr. Smith's & Mr. Santowski's classes are holding an egg launching contest on the football field. Teams of students have built catapults that will throw an egg down the field. They have various tools and ideas for measuring each launch and how to determine which team wins. **QUESTION: Which team won which prize?**

To guide your analysis to help you decide who won, record your calculations/observations on the table below:

Mr. Smith's Team

Equation:

Sketch:



ANSWER: Which team won the HEIGHT contest?
(1)

JUSTIFICATION:
(2)

ANSWER: Which team won the DISTANCE contest?
(1)

JUSTIFICATION:
(2)

Mr. Santowski's Team

Equation:
(1)

Sketch:
(4)