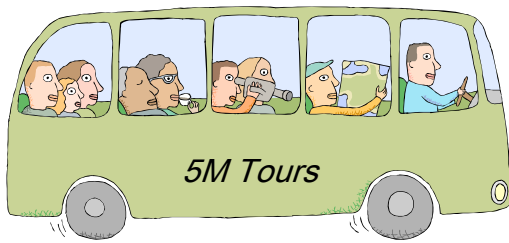


# Quadratic Functions Take-Home Assessment

## Integrated Math 2

Name: \_\_\_\_\_

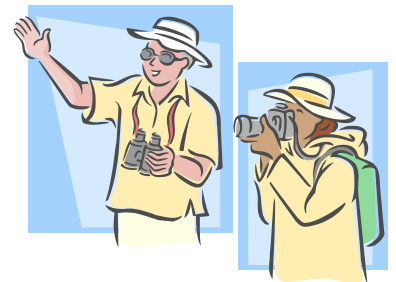
Block: \_\_\_\_\_



Mr. Math's Magical Mathematical Mystery Tours (5M for short) offers 5-day tours of Ottawa for groups of students. Some of the company's costs go down as the number of students increases. Other costs go up because of room rentals, meals, numbers of vans/buses needed, etc.

To determine the **profit per student** ( $P$ ), the company uses the quadratic relation  $P = -0.6n^2 + 36n - 405$ , where  $n$  represents the number of students taking the tour. You will perform the following mathematical analysis and then write a report to the company on the basis of your findings:

- Determine the least and greatest number of students that should be accepted in order for the company to make a profit.
- Determine the number of students that will give the maximum profit.
- Determine the maximum profit per student.
- Determine the least and greatest number of students that should be accepted in order for the company to make a profit of at least \$96.60 per student.
- The company re-organizes and make some changes. The profits are now modeled by the equation:  $P = -0.275n^2 + 15.95n - 132$ . Explain (with algebraic & graphic evidence) whether or not the re-organization makes the company more profitable.



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You will perform the analysis in four ways:

- To help get answers for Questions (a) and (d), solve the quadratic equation by factoring. Show your work. (HINT: Factor out -0.6 as your first step.)
- Go online and find a "magical formula" called the quadratic formula. Verify your solutions from Part (i) by using this "quadratic formula". Show all work.
- Recall how you can use algebra to find the optimal value of a quadratic model.
- Use technology to generate and print a copy of the quadratic equation graph. You may use either a graphing calculator or another graphing program of your choice. Label the axes and all of the key points (intercepts, vertex) on your printed graph. Also include a title on your printed graph. Make sure to indicate what program you used (cite your source).

When you are done, you will have the following pieces of work to submit as a complete assignment:

- your algebra work, including factoring
- your work with the quadratic formula
- technology-generated graph
- your one-paragraph report
- include this page with your submitted work so that I can give you feedback

This assessment is due at the beginning of class on \_\_\_\_\_.

	<b>5</b>	<b>4</b>	<b>3</b>	<b>2</b>	<b>0</b>
<b>Table of Values (knowledge)</b>	All values are correct and table is neatly presented	One value is incorrect or table is unclear	Two or three values are incorrect	Many values are incorrect	Not attempted
<b>Hand-Drawn Graph (application)</b>	All points are correct and graph is neatly presented with appropriate labels/title	One or two points are incorrect or title is missing or labels are missing or are unclear	Graph has several problems, but parabola is mostly correct	Graph is mostly incorrect	Not attempted
<b>Technology-Generated Graph (comm./tech.)</b>	Graph is correct, labeled, has title, graphing program is cited, key points on graph are labeled	One or two mistakes or missing requirements	Graph is incorrect but is consistent with hand-drawn graph or graph has several mistakes or missing requirements	Graph is mostly incorrect	Not attempted
<b>Factoring Work (knowledge)</b>	All factoring is correct and is clearly presented	All factoring is correct but is unclear, or small mistakes are made	Has several mistakes but student shows some understanding of the process	Very little understanding is shown	Not attempted
<b>Quadratic Formula Work (knowledge)</b>	All work is correct and is clearly presented	All work is correct but is unclear, or small mistakes are made	Has several mistakes but student shows some understanding of the process	Very little understanding is shown	Not attempted
<b>Report of Findings (application)</b>	All numerical findings are correct; Report is consistent with all other work	Small mistakes in findings, but report is consistent with all other work	Several mistakes or large mistakes in findings, or report is not consistent with the other work presented	Large mistakes in findings and report is not consistent with the other work presented	Not attempted
<b>Report of Findings (communication)</b>	Grammar and written communication is close to perfect	Some errors in grammar, spelling, structure, etc.	Many errors in grammar, spelling, structure, etc.	Grammar and written comm. needs significant improvement	Not attempted
<b>Report of Findings (thinking)</b>	Student shows insight and depth of conceptual understanding	Student shows a satisfactory conceptual understanding	Student shows little conceptual understanding, but does provide some insight	Student shows little to no conceptual understanding	Not attempted

Totals:

Application:	/10	Communication/Technology:	/10
Knowledge:	/15	Critical Thinking:	/5