Leading MATH Success

TIPS4RM Targeted Implementation and Planning Supports for Revised Mathematics

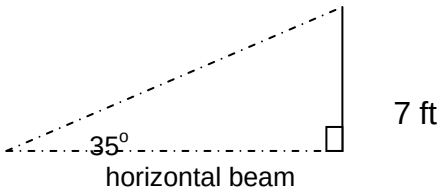
Grade 10 Applied

UNIT SUMMATIVE TASKS

August 2008

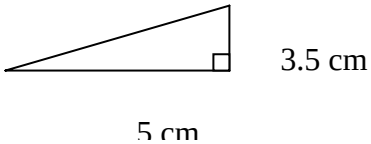
Unit 1/2 Summative Task: Architectural Accuracy

Currently, a builder knows the height of a cottage attic is 7 ft and he has determined the angle of elevation from the horizontal beam needs to be 35^{o}.



He refers to his original architectural drawing to check if his construction will meet the necessary specifications.

Architectural Drawing



A. Determine if the builder's calculations for the cottage match the specifications of the Architect's drawings. Support your answer using reliable mathematical evidence.

B. Determine the length of wood needed to build this triangular frame for the attic.

RUBRIC FOR GRADING UNIT 1/2 SUMMATIVE TASK: ARCHITECTURAL ACCURACY

Application					
Selecting Tools and Computational Strategies					
Criteria	**Below Level 1**	**Level 1**	**Level 2**	**Level 3**	**Level 4**
Select and use tools and strategies to solve a problem *(Question A & B)*	Selects and applies inappropriate tools and strategies	Selects and applies appropriate tools, with major errors, omissions, or incorrect sequencing	Selects and applies appropriate tools, with minor errors, omissions, or incorrect sequencing	Selects and applies appropriate tools accurately and in a logical sequence	Selects highly efficient tools; applies them accurately and logically to create mathematically elegant solutions

Thinking					
Reasoning and Proving					
Criteria	**Below Level 1**	**Level 1**	**Level 2**	**Level 3**	**Level 4**
Read and interpret mathematical language, charts, graphs, and diagrams *(Question A)*	Minimal evidence of correct interpretation of the information	Misinterprets a major part of the information, but carries on to make some otherwise reasonable statements	Misinterprets part of the information, but carries on to make some reasonable statements	Correctly interprets the information and makes reasonable statements	Correctly interprets the information and makes subtle or insightful statements

Unit 1 & 2 Summative Task (Continued)

Select an object in or around your school that is too high to measure using a measuring tape. You must use the same object for both methods in this task.

Method 1: Use one of the three methods for determining height from Unit 1 (shadow/mirror/ eye at ground level) to obtain the required measurements to find the height. Draw and label a diagram. Solve a proportion to obtain the height of the object.

Method 2: Use a clinometer to obtain the required measurements to find the height. Draw and label a diagram. Use trigonometric ratios to obtain the height of the object.

1. Did you obtain <u>exactly</u> the same height of the object using both methods? If not, explain why you think the answers are <u>not</u> the same.

2. Which method do you think is the most accurate to use when determining the height of an immeasurable object. Why?

RUBRIC FOR UNIT 1 & 2 SUMMATIVE TASK

Application					
Selecting Tools and Computational Strategies					
Criteria	**Below Level 1**	**Level 1**	**Level 2**	**Level 3**	**Level 4**
Select and use tools and strategies to solve a problem *(Method 1 & 2)*	Selects and applies inappropriate tools and strategies	Selects and applies appropriate tools, with major errors, omissions, or incorrect sequencing	Selects and applies appropriate tools, with minor errors, omissions or incorrect sequencing	Selects and applies appropriate tools accurately, and in a logical sequence	Selects and applies highly efficient tools accurately to create mathematically elegant solutions

Note: We suggest two possible criteria of the Thinking process to use when evaluating student work. Use only one.

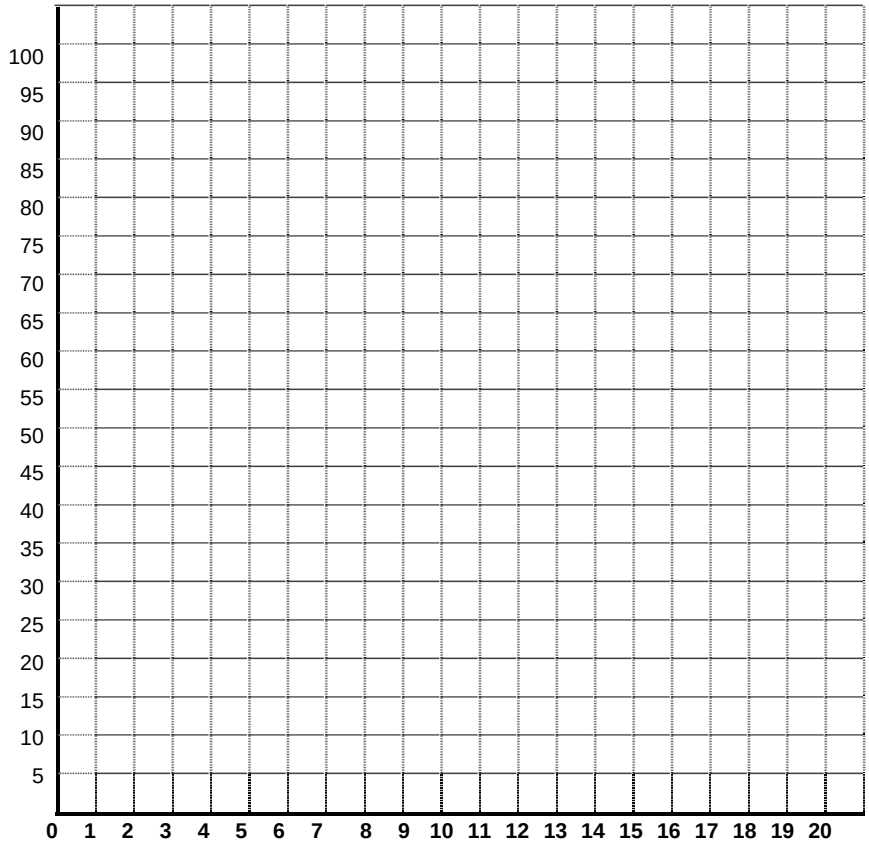
Thinking					
Reasoning and Proving					
Criteria	**Below Level 1**	**Level 1**	**Level 2**	**Level 3**	**Level 4**
Making inferences, conclusions and justifications *(Question 1 & 2)*		Justification of the answer presented has a limited connection to the problem solving process and models presented	Justification of the answer presented has some connection to the problem solving process and models presented	Justification of the answer presented has a direct connection to the problem solving process and models presented	Justification of the answer has a direct connection to the problem solving process and models presented, with evidence of reflection

Thinking					
Reasoning and Proving					
Criteria	**Below Level 1**	**Level 1**	**Level 2**	**Level 3**	**Level 4**
Formulation and defense of a conjecture *(Question 1 & 2)*	Forms no conjecture that connects to the problem	Forms and defends a conjecture that connects few aspects of the problem	Forms and defends a conjecture that connects some of the pertinent aspects of the problem	Forms and defends a conjecture that connects to pertinent aspects of the problem	Forms and defends a conjecture that connects aspects of the problem with a broad view of the problem

Unit 3 Summative Task: Fly Away With Me

A. Graphing and Analyzing Flight Paths

1. The equation y = 10x represents the flight of a *Snowbird* at the Hamilton Air Show. Graph the flight of the S*nowbird* on the grid below and label it S_1.



2. At the air show, another *Snowbird* flies along the path described by -5x + y = 10. Graph the flight of this aircraft on the grid above and label it S_2.

3. The path of another *Snowbird,* S_3, passes through the points (0, 5) and (6, 50). Determine the equation of its flight path.

4. Compare the flights for S_1, S_2, and S_3. Assume *x represents time* and *y represents distance*.

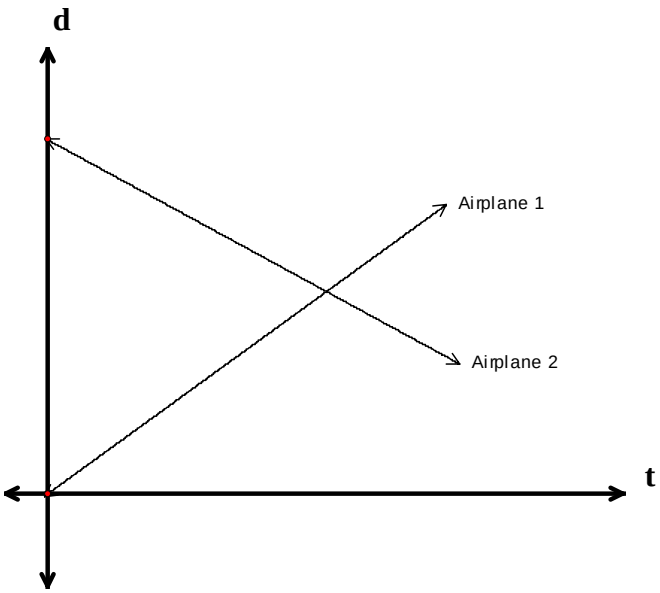
Unit 3 Summative Task: Fly Away With Me (Continued)

B. Creating Flight Paths

The radar station at Pearson Airport is tracking the position of two airplanes.
Their distance-time graphs are given below.
Distance represents distance from the radar station.

Create possible equations which would represent the flight paths for the two airplanes represented in each graph.

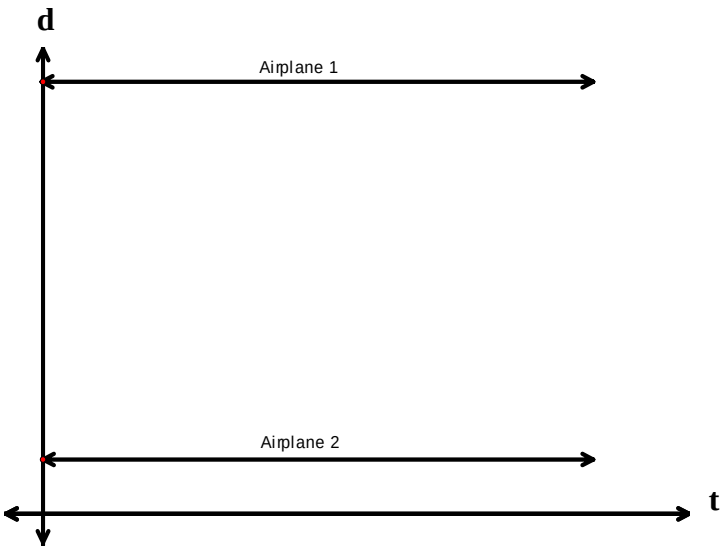
Graph 1



Equation for Airplane 1:

Equation for Airplane 2:

Graph 2



Equation for Airplane 1:

Equation for Airplane 2:

RUBRIC FOR GRADING UNIT 3 SUMMATIVE TASK: FLY AWAY WITH ME

Knowledge and Understanding					
Criteria	**Below Level 1**	**Level 1**	**Level 2**	**Level 3**	**Level 4**
Knowledge of Linear Relations: graphing, determining equations *(Part A #1,2,3)*	Demonstrates less than adequate knowledge of linear relations	Demonstrates limited knowledge of graphing and linear equations	Demonstrates some knowledge of graphing and linear equations	Demonstrates considerable knowledge of graphing and linear equations	Demonstrates thorough knowledge of graphing and linear equations

Application					
Connecting					
Criteria	**Below Level 1**	**Level 1**	**Level 2**	**Level 3**	**Level 4**
Make connections among mathematical concepts *(Part A #4)*	No connections between mathematical concepts evident	Makes weak connections between mathematical concepts	Makes simple connections between mathematical concepts	Makes appropriate connections between mathematical concepts	Makes strong connections between mathematical concepts

Communication					
Representing					
Criteria	**Below Level 1**	**Level 1**	**Level 2**	**Level 3**	**Level 4**
Creation of a model to represent the problem *(Part B)*	Creates inappropriate models that do not represent the flight paths	Creates models that represent the flight paths with limited effectiveness	Creates models that represent the flight paths with some effectiveness	Creates models that represent the flight paths with considerable effectiveness	Creates models that represent the flight paths with a high degree of effectiveness

Unit 4 Performance Assessment: Using a Portfolio

The portfolio focuses on the student's best and most representative work. Over the course of this unit, samples of solving linear systems will be collected which reflect the student's best efforts and talent for using the three methods.

The advantage of using a portfolio is two-fold - during the collection process it is an *assessment for learning* tool and at the end of the process it can now be used as *assessment of learning*.

This portfolio could be:

- Student Selected: In this portfolio the student selects what he or she thinks is representative work. Selections are made over time and placed in the portfolio. Student work will be graded after consultation with the teacher discussing why each piece was chosen (strengths/weaknesses) and how each piece illustrates their growth in using each method.

- Teacher-Student Selected: This is an interactive portfolio that aids in communication between teacher and student. The teacher and student conference to add or delete the contents of the portfolio. All the items in the portfolio could be scored, rated, or ranked. Final evaluation of the portfolio would be based on the growth of the student's work.

Evaluation Tips:

- To ensure ownership of the portfolio by student, evaluation of a portfolio should be made by the student and the teacher.
- Students can use a personal reflection approach, evaluating their personal strengths and weaknesses; identifying their progress.
- Teachers could focus on the samples chosen – whether they reflect just a random selection by the student or whether the selections show concept/content knowledge and whether they show progress over the unit.

RUBRIC FOR EVALUATING TEACHER-STUDENT PORTFOLIO

Knowledge and Understanding					
Criteria	**Level 4**	**Level 3**	**Level 2**	**Level 1**	**Below Level 1**
Knowledge of Solving Linear Systems	Samples show student progress and knowledge of solving Linear Systems	Samples show student progress and some knowledge of solving Linear Systems	Samples show some student progress and some knowledge of solving Linear Systems	Random selection of samples. Limited knowledge of solving Linear Systems with minimal progress displayed.	Inadequate samples. Limited knowledge of solving Linear Systems with no progress displayed.

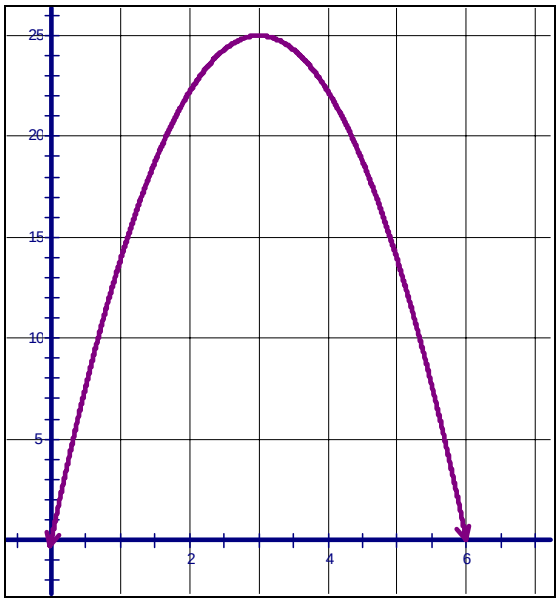
Note: This rubric should be used multiple times throughout the unit, as teacher and student conference about portfolio contents. Most recent evaluation should be used at end of the unit.

RUBRIC FOR EVALUATING STUDENT-SELECTED PORTFOLIO

Thinking					
Reflection by Student					
Criteria	**Level 4**	**Level 3**	**Level 2**	**Level 1**	**Below Level 1**
Student reflects on how well portfolio demonstrates their skills, abilities, and knowledge	The portfolio demonstrates well my skills, abilities, and knowledge of solving linear systems	The portfolio demonstrates my considerable skills, abilities, and knowledge of solving linear systems.	The portfolio demonstrates I have some skills, abilities, and knowledge of solving linear systems.	The portfolio demonstrates my limited skills, abilities, and knowledge of solving linear systems	The portfolio reflects I have not adequately acquired the knowledge and skills for solving linear systems
Application					
Selecting Tools and Computational Strategies					
Criteria	**Level 4**	**Level 3**	**Level 2**	**Level 1**	**Below Level 1**
Teacher evaluates student's ability to select and use tools and strategies to solve linear systems	Selects and applies highly efficient tools accurately to create mathematically elegant solutions	Selects and applies appropriate tools accurately and logically	Selects and applies appropriate tools, with minor errors, omissions or incorrect sequencing	Selects and applies appropriate tools, with major errors & omissions	Selects and applies tools and strategies inappropriately
Oral Communication					
Criteria	**Level 4**	**Level 3**	**Level 2**	**Level 1**	**Below Level 1**
Teacher evaluates student's ability to recognize and express their strengths, weaknesses, and growth	Expresses and organizes mathematical thinking with a high degree of effectiveness	Expresses and organizes mathematical thinking with considerable effectiveness	Expresses and organizes mathematical thinking with some effectiveness	Expresses and organizes mathematical thinking with limited effectiveness	No expression of mathematical thinking evident

Unit 5 Summative Task:
Understanding and Interpreting Quadratic Relations

Scenario 1 – Rocket Launch



Beth is measuring the height of a rocket that she is trying to launch into the air. She is comparing the time to the height of the rocket. The graph represents the data that Beth collected.

Identify the key features of the graph:

Vertex: (___, ___) Zeros: _____ or _____

y-intercept: _____

Interpret the key features of the graph:

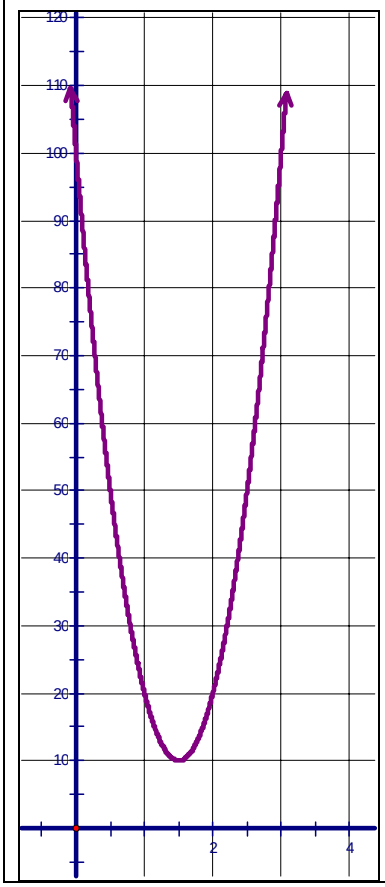
What is the highest point that the rocket reaches? _____

How long does it take the rocket to reach its maximum height?

_____

After how long does the rocket land? _____

Scenario 2 – Yo-Yo Master



Tom is playing with a yo-yo while his brother John is measuring the height of the yo-yo. The graph represents the data that John collected comparing the time after Tom threw the yo-yo to the height of the yo-yo.

Identify the key features of the graph:

Vertex: _____ Zeros: _____ y-intercept: _____

Interpret the key features of the graph:

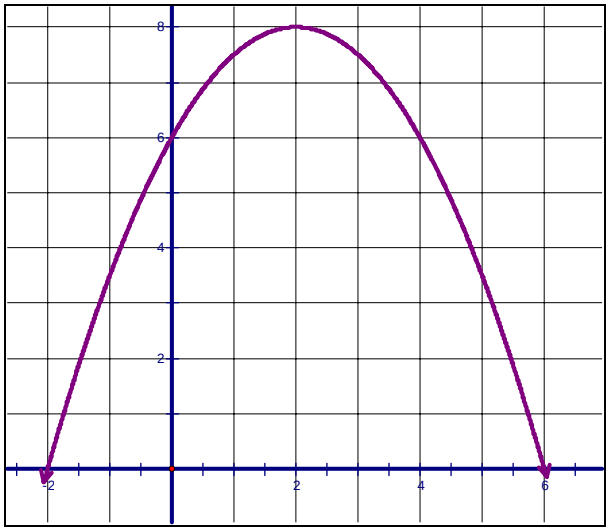
What does the vertex represent in the context of this problem?

What does the y-intercept represent in the context of this problem?

Explain why this parabola has no x-intercepts.

Unit 5 Summative Task:
Understanding and Interpreting Quadratic Relations (Continued)

Scenario 3 – You Decide!



Create a scenario that could be represented by the data in the graph.

Describe how the key features of the graph are represented in your scenario.

Understanding Properties of Quadratics.

X	*y*

Create a Table of Values

Select any one of the graphs from the first three scenarios, then complete a table of values based on the graph.

Which graph did you select? _____

Verify a Quadratic Relation

Describe how you can use your table of values to prove that the graph you selected is quadratic.

RUBRIC FOR GRADING UNIT 5 QUADRATIC SUMMATIVE TASK: UNDERSTANDING AND INTERPRETING QUADRATIC RELATIONS

Thinking

Reasoning and Proving

Criteria	Below Level 1	Level 1	Level 2	Level 3	Level 4
Read and interpret mathematical language, charts, graphs, and diagrams *(Scenario 1 & 2 – Interpret sections)*	Minimal evidence of correct interpretation of the information	Misinterprets a major part of the information, but carries on to make some otherwise reasonable statements	Misinterprets part of the information, but carries on to make some reasonable statements	Correctly interprets the information and makes reasonable statements	Correctly interprets the information and makes subtle or insightful statements

Knowledge and Understanding

Criteria	Below Level 1	Level 1	Level 2	Level 3	Level 4
Knowledge of content; understanding of concepts *(Scenario 1 & 2 – Identify key features; Understanding Properties)*	Demonstrates knowledge and understanding of quadratic relations is not adequate	Demonstrates limited knowledge and understanding of quadratic relations	Demonstrates some knowledge and understanding of quadratic relations	Demonstrates considerable knowledge and understanding of quadratic relations	Demonstrates thorough Knowledge and understanding of quadratic relations

Application

Connecting

Criteria	Below Level 1	Level 1	Level 2	Level 3	Level 4
Relate mathematical ideas to situations drawn from other contexts *(Scenario 3)*	No evidence of transferring of concepts to other contexts or connections	Transfers ideas to other contexts and makes limited connections	Transfers ideas to other contexts and makes simple connections	Transfers ideas to other contexts and makes appropriate connections	Transfers ideas to other contexts and makes unique, original or insightful connections

Unit 6 Quadratic Relations Summative Task

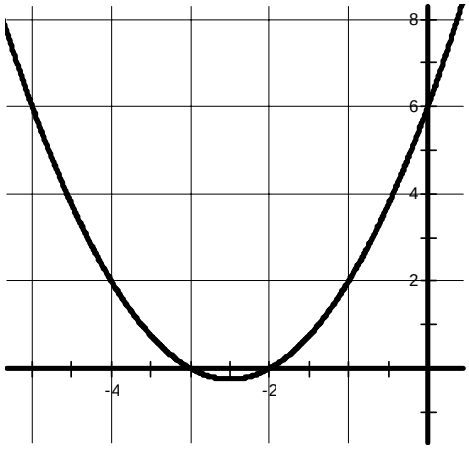
(**Note**: Use of Algebra Tiles and Tile template permitted)

1. Match information in Column A with information in Column B.
   Write the number for each item in Column A on the line provided beside items in Column B.

Column A

Column B

1.



_____ y intercept of 16

_____ zeros are (4, 0) and (-4, 0)

_____ $y = x^2 - 6x + 9$

2. $y = x^2 - 16$

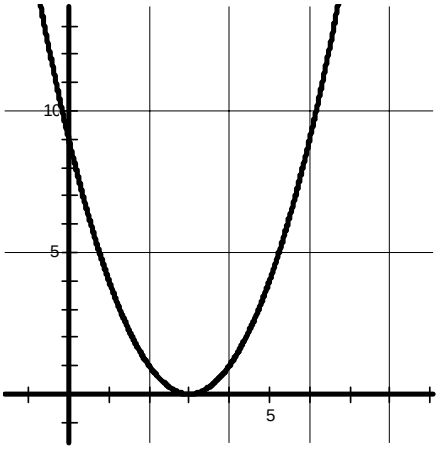
_____ y intercept of 6 and no zeros

3. $y = 2x^2 + 6$

4. $y = (x + 2)(x + 8)$

_____ $y = x^2 + 5x + 6$

5.



Unit 6 Quadratic Relations: Summative Task (Continued)

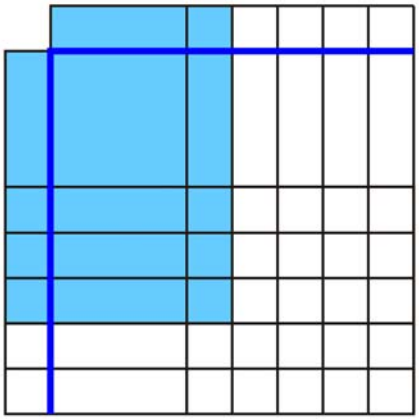
Note: Explanations can be given orally and can include words, diagrams, or use of models.

2. Explain why x-intercepts are referred to as *'zeros'*.

3. Explain or illustrate how $y = (x - 1)(x + 2)$ is the same quadratic as $y = (x + 2)(x - 1)$.

4. Key features of any parabola are the vertex, the zeros, and the y-intercept.
   Explain what happens to some key features of the graph for the equation $y = (x + 2)^2$.

5. a) What information does this tile template give you?



   b) Give another representation for this relationship.

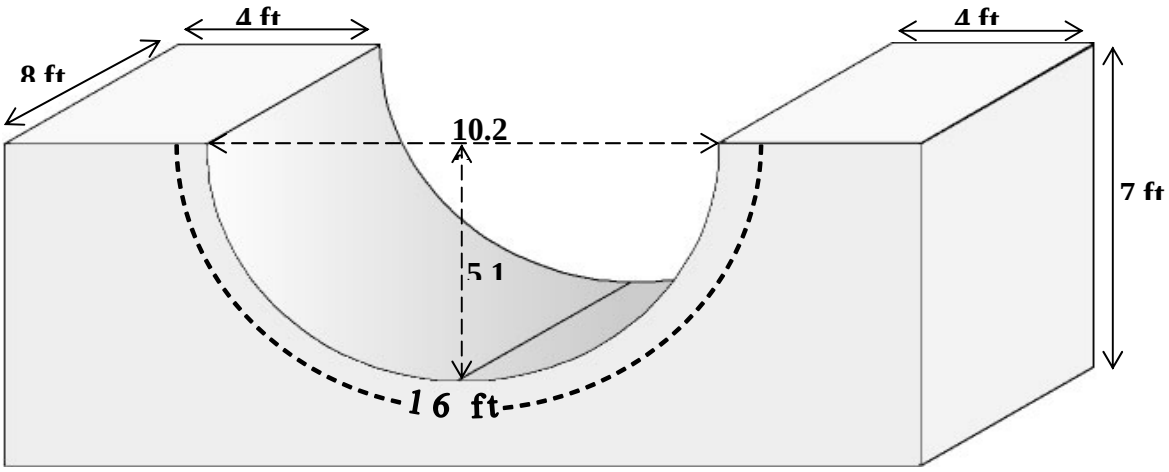
RUBRIC FOR GRADING UNIT 6 QUADRATIC RELATIONS SUMMATIVE TASK

Knowledge and Understanding					
Criteria	**Below Level 1**	**Level 1**	**Level 2**	**Level 3**	**Level 4**
Knowledge of content; understanding of concepts *(#1, #5a)*	Demonstrates knowledge and understanding of quadratic relations is not adequate	Demonstrates limited knowledge and understanding of quadratic relations	Demonstrates some knowledge and understanding of quadratic relations	Demonstrates considerable knowledge and understanding of quadratic relations	Demonstrates thorough Knowledge and understanding of quadratic relations
Communication					
Representing					
Criteria	**Below Level 1**	**Level 1**	**Level 2**	**Level 3**	**Level 4**
Creation of a model to represent the problem *(#5b)*	Creates inappropriate model that does not represent the relationship	Creates a model that represents the relationship with limited effectiveness	Creates a model that represents the relationship with some effectiveness	Creates a model that represents the relationship with considerable effectiveness	Creates a model that represents the relationship with a high degree of effectiveness
Communicating					
Criteria	**Below Level 1**	**Level 1**	**Level 2**	**Level 3**	**Level 4**
Degree of clarity in explanations and justifications in reporting *(#2, 3, 4)*	Explanations and justifications are not understandable at all	Explanations and justifications are partially understandable	Explanations and justifications need further details	Explanations and justifications are clear	Explanations and justifications are clear for a range of audiences

Unit 7 Summative Task: Ramping up to Measurement

Tito is building a skate board ramp using plywood. The ramp will be a half-pipe (the curved part will be a half-cylinder). Tito is planning on constructing each side of the structure and then assembling it.

Here is a diagram of the structure that Tito is planning:



The length of the curved part of the ramp is 16

1. Planning the construction:
Before building the skateboard ramp, Tito will need to know how much wood is required. Draw a sketch of each side of the structure. Label all known measurements.

2. Find the total surface area of the ramp structure:

Unit 7 Summative Task: Ramping up to Measurement (Continued)

Note: You will be supplied with sheets of construction paper 4cm x 8cm for this question.

3. If plywood is sold in 4'x 8' sheets, determine the number of sheets of plywood Tito should buy to construct the skateboard structure. Show details of the strategy you used.

4. Another plan

Tito's cousin, Maria, is planning on building a ramp of the same dimensions, but using poured concrete. If concrete costs $160/$m^3$ determine how much the concrete for Maria's ramp will cost.

RUBRIC FOR GRADING UNIT 7 SUMMATIVE TASK: RAMPNG UP TO MEASUREMENT

Communication					
Representing					
Criteria	**Below Level 1**	**Level 1**	**Level 2**	**Level 3**	**Level 4**
Creation of a model to represent the problem *(#1)*	Creates inappropriate model that does not represent the skateboard ramp	Creates a model that represents the skateboard ramp with limited effectiveness	Creates a model that represents the skateboard ramp with some effectiveness	Creates a model that represents the skateboard ramp with considerable effectiveness	Creates a model that represents the skateboard ramp with a high degree of effectiveness
Application					
Selecting Tools and Computational Strategies					
Criteria	**Below Level 1**	**Level 1**	**Level 2**	**Level 3**	**Level 4**
Select and use tools and strategies to solve a problem *(#2, 3, 4)*	Selects and applies inappropriate tools and strategies	Selects and applies appropriate tools, with major errors, omissions, or incorrectly sequenced	Selects and applies appropriate tools, with minor errors, omissions or illogical sequencing	Selects and applies appropriate tools, accurately, and in a logical sequence	Selects and applies highly appropriate or efficient tools accurately, to create mathematically elegant solutions