THE ERINDALE ACADEMY

COURSE NAME: MPM2D – Principles of Mathematics	
Accumulative Activities: 01 to 17 **AS Learning: Topics: (1.1 to 8.5)** **Teacher: Antonio Pietrangelo** **Time: Throughout Course** **Pages: 36**	**Student's Name:** **Student#:** **Due Date: Wednesday, February 28th, 2024 1:00 pm EST (Toronto Time)** **Mark: /100**

Categories	Knowledge/ Understanding	Thinking/Inquiry/ Problem Solving	Communication	Application
Symbol	K/U	T/I	C	A
Weight	25 %	25 %	25 %	25 %
Level				

THE ERINDALE ACADEMY

Overall Expectations:

Expectations as listed in the Ontario Curriculum course outline for your specific course.

Specific Expectations:

Unit 1 - Systems of Linear Equations

1.1 Representing Linear Relations
1.2 Solving Linear Equations
1.3 Graphically Solving Linear Systems
1.4 Solving Linear Systems: Substitution
1.5 Equivalent Linear Systems
1.6 Solving Linear Systems: Elimination
1.7 Exploring Linear Systems

Chapter 2: Analytic Geometry: Line Segments and Circles, and Advanced Shapes

2.1 Midpoint of a Line Segment
2.2 Length of a Line Segment
2.3 Equation of a Circle
2.4 Classifying Figures on a Coordinate Grid
2.5 Verifying Properties of Geometric Figures
2.6 Exploring Properties of Geometric Figures
2.7 Using Coordinates to Solve Problems

Chapter 3: Graphs of Quadratic

3.1 Exploring Quadratic Relations
3.2 Properties of Graphs of Quadratic Relations
3.3 Factored Form of a Quadratic Relation
3.4 Expanding Quadratic Expressions
3.5 Quadratic Models Using Factored Form
3.6 Exploring Quadratic and Exponential Graphs

Chapter 4: Factoring Algebraic

4.1 Common Factors in Polynomials
4.2 Exploring the Factorization of Trinomials
4.3 Factoring Quadratics: x^2 + bx + c
4.4 Factoring Quadratics: x^2 + bx + c
4.5 Factoring Quadratics: Special Cases
4.6 Reasoning about Factoring Polynomials

Chapter 5: Applying Quadratic

5.1 Stretching/Reflecting Quadratic Relations
5.2 Exploring Translations of Quadratic Relations
5.3 Graphing Quadratics in Vertex Form
5.4 Quadratic Models Using Vertex Form
5.5 Solving Problems Using Quadratic Relations
5.6 Connecting Standard and Vertex Forms

THE ERINDALE ACADEMY

Chapter 6: Quadratic Equations

6.1 Solving Quadratic Equations
6.2 Exploring the Creation of Perfect Squares
6.3 Completing the Square
6.4 The Quadratic Formula
6.5 Interpreting Quadratic Equation Roots
6.6 Solving Problems Using Quadratic Models

Chapter 7: Similar Triangles and Trigonometry

7.1 Congruence and Similarity in Triangles
7.2 Solving Similar Triangle Problems
7.3 Exploring Similar Right Triangles
7.4 The Primary Trigonometric Ratios
7.5 Solving Right Triangles
7.6 Solving Right Triangle Problems

Chapter 8: Acute Triangle Trigonometry

8.1 Exploring the Sine Law
8.2 Applying the Sine Law
8.3 Exploring the Cosine Law
8.4 Applying the Cosine Law
8.5 Solving Acute Triangle Problems

THE ERINDALE ACADEMY

Rubrics:

Category	Level R (0 – 49%)	Level 1 (50-59%)	Level 2 (60-69%)	Level 3 (70-79%)	Level 4 (80-100%)	Level/ Mark
Knowledge – Understanding of **(Specific Expectations: 1.1 to 8.5)**	**demonstrates insufficient understanding**	demonstrates limited understanding	demonstrates some understanding	demonstrates considerable understanding	demonstrates thorough understanding	
				Individual: Mark:		

Category	Level R (0 – 49%)	Level 1 (50-59%)	Level 2 (60-69%)	Level 3 (70-79%)	Level 4 (80-100%)	Level/ Mark
Thinking and Inquiry (What if scenarios) of: **(Specific Expectations: 1.1 to 8.5)**	demonstrates insufficient ability to apply different scenarios	demonstrates limited ability to apply different scenarios	demonstrates some ability to apply different scenarios	demonstrates considerable ability to apply different scenarios	demonstrates through ability to apply different scenarios	
				Individual: Mark:		

THE ERINDALE ACADEMY

Category	Level R (0 – 49%	Level 1 (50-59%)	Level 2 (60-69%)	Level 3 (70-79%)	Level 4 (80-100%)	Level/ Mark
Communication **Communicates effectively** **(Specific Expectations: 1.1 to 8.5)**	demonstrates **insufficient** ability to communicate effectively	demonstrates **limited** ability to communicate effectively	demonstrates **some** ability to communicate effectively	demonstrates **considerable** ability to communicate effectively	demonstrates **through** ability to communicate effectively	
				Individual: Mark:		

THE ERINDALE ACADEMY

Category	Level R (0 – 49%	Level 1 (50-59%)	Level 2 (60-69%)	Level 3 (70-79%)	Level 4 (80-100%)	Level/ Mark
Application: Demonstrates the ability to apply mathematical principles to real world situations. **(Specific Expectations) (A1.1 to A2.3)**	demonstrates **insufficient ability**	demonstrates **limited ability**	demonstrates **some ability**	demonstrates **considerable ability**	demonstrates **thorough ability**	
				Individual: Mark:		

TEA
THE ERINDALE ACADEMY

PART A: KNOWLEDGE AND UNDERSTANDING (K/U) – 25%
PART B: THINKING AND INQUIRY (T/I) - 25%
PART C: COMMUNICATION (C) – 25%
PART D: APPLICATION (A) – 25%

Each activity will be out of 10 marks, and can be an assessment of one or more of PART A through D.

Activity 01: - Exploring basic parabola: Parent Parabola: $y = x^2$

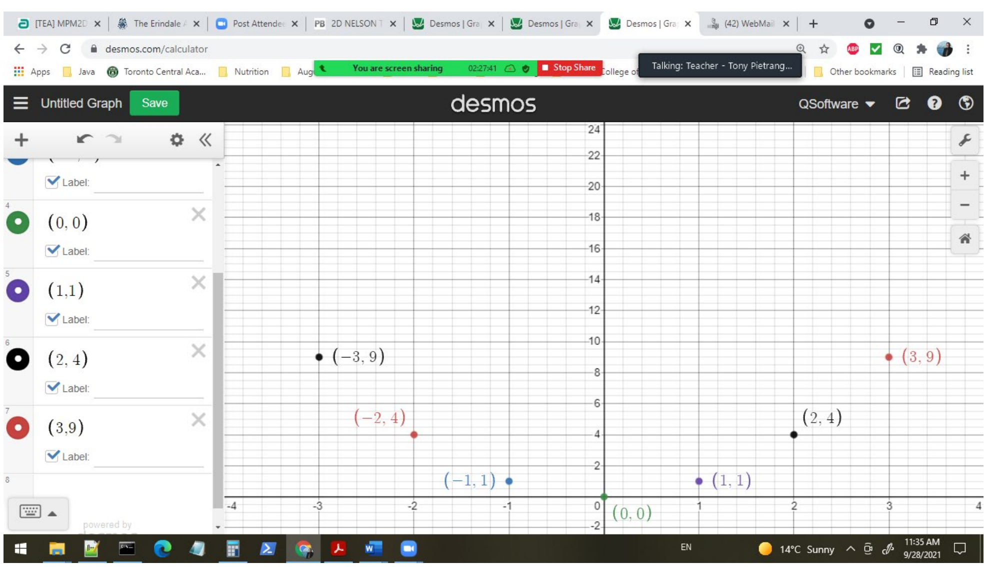
Activity:

Make a table of values from a domain of x integer values from -3 to +3 and then graph the points on a graph. Join the points trying to make a smooth curve as best as possible.

a) $y = x^2$

X value	$y = x^2$	Y Value	Point(x,y)
-3	$Y = (-3)^2$	9	(-3,9)
-2	$Y = (-2)^2$	4	(-2,4)
-1	$Y = (-1)^2$	1	(-1, 1)
0	$Y = (0)^2$	0	(0, 0)
1	$Y = (1)^2$	1	(1, 1)
2	$Y = (2)^2$	4	(2, 4)
3	$Y = (3)^2$	9	(3, 9)

Plot on a graph:



THE ERINDALE ACADEMY

Activity 02 – Exploring parabolas:

1. Make a table of values for the following equations:
2. Plot the points on the Desmos graphing software.

a) $y = x^2$ 🡐 done by instructor.

b) $y = 2x^2$

c) $y = -x^2$

d) $y = -\frac{1}{2}x^2$

e) $y = x^2 + 2x + 3$

Your work:

1. Show me a table of points from x integer values ($-5 \le x \le 5$) and get the values for y.
2. Plot these points on a graph by themselves first.
3. Plot the equation on the points above.
4. Take a screen snapshot and place into your document for that equation.
5. After all the individual points, and equations are plotted individually, place all the equations together on the same graph.

THE ERINDALE ACADEMY

Activity 02: - (Quadric Equations)

1. Create a table of points for the following equations (x values from -9 to 9)

- **a)** $y = -3x^2$
- **b)** $y = \frac{1}{4}x^2$
- **c)** $y = -(\frac{1}{4})x^2$

Graph the following equations

1. Create a table of points for the following equations (x values from -9 to 9)

- a. $Y = x^2$
- **b.** $Y = (x - 9)^2$
- **c.** $Y = (x + 2)^2$
- **d.** $Y = (x - 5)^2$

2. Create a table of points for the following equations (x values from -9 to 9)

- a. $Y = x^2 + 8$
- b. $Y = x^2 - 5$
- c. $Y = x^2 - 10$

THE ERINDALE ACADEMY

Activity 3: Set up Demos Graphing Software to handle all the 3 variables, a, h, k in formula:

Explain in English what are the effects of a, h, k to the formula. Take screen snap shots through our explanation to prove the effects the changing variables.

$y = a(x – h)^2$ $+ k$

If k > 0, the original graph is vertical shift upwards.

If k < 0, the original graph has vertical shift, but downwards.

if h > 0, the original graph has a horizonal shift to the right.

If h < 0, the original graph has a horizonal shift to the left.

Please explain the effects of a under the conditions below:

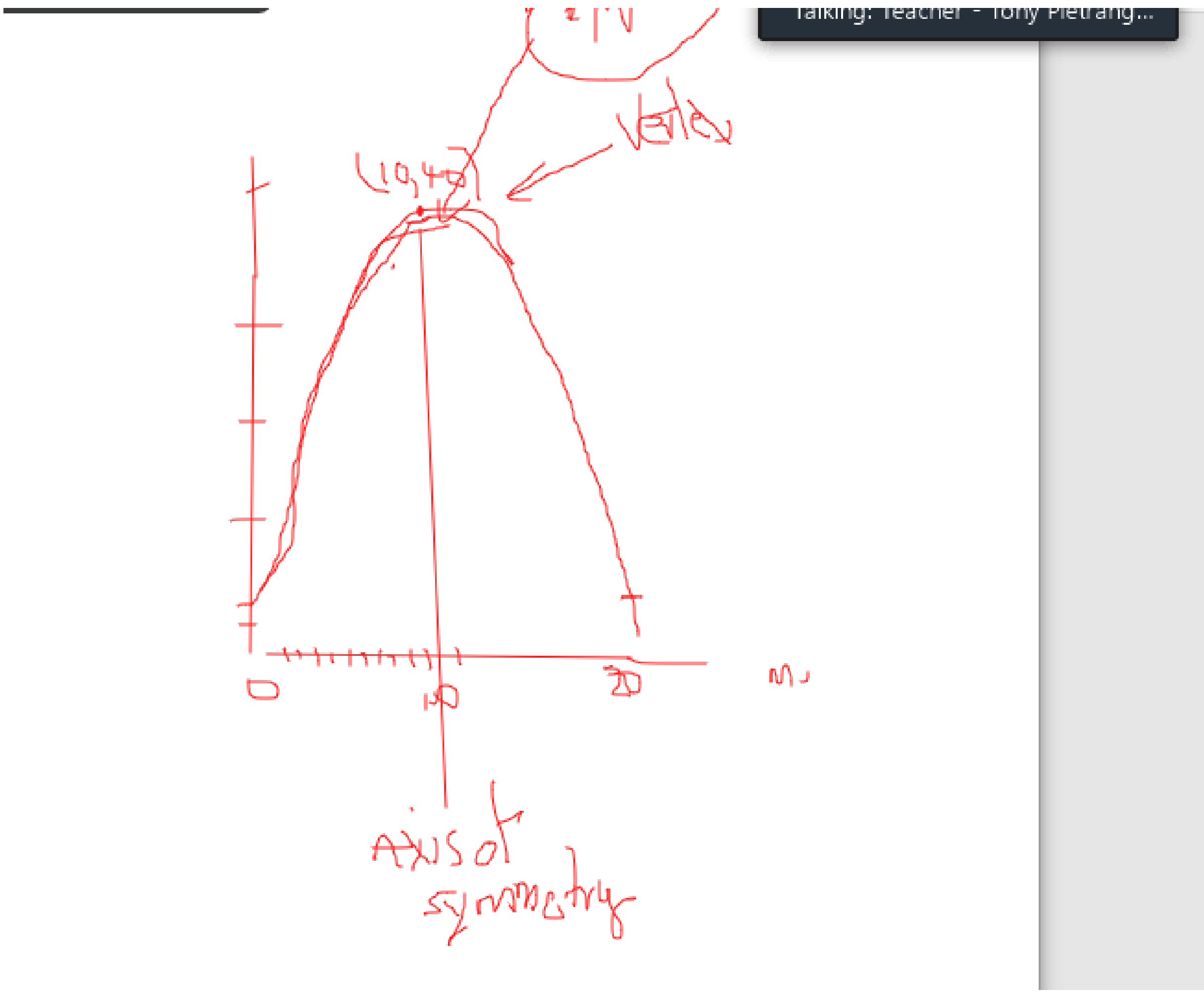
Type 1: when a >= 1
Type 2: when 0 < a < 1
Type 3: when a <= -1
Type f: when -1 < a < 0;

THE ERINDALE ACADEMY

Activity 04: Parabolas – axis of symmetry

1. Describe the properties of the parabola with the equation of: $y = 2(x - 4)^2 - 3$.
2. Word Problem:
   At a fireworks display, a firework was launched from a height of 2 meters above the ground and reaches a maximum height of 40 meters at a horizontal distance of 10 meters.
   a) Determine an equation to model the flight path of the firework.
   b) The firework continues to travel an additional 1-meter horizontality, after it reaches it maximum height, before it explodes. What is its height when it explodes?
   c) At what other horizontal distance is the firework at the same height as in part b).

See sketch below for a rough drawing:



THE ERINDALE ACADEMY

Activity 05:- Analyze the form of parabola:

y = a(x – r)(x – s)

Examples:

y = 2(x – 5)(x + 3) where x is a set of integers: -6 to +6.

X value	Y value y=2(x – 5)(x + 3)	Point (x, y)
-6	y=2(-6 – 5)(-6 + 3) y=2(-11)(-3) = 66	P_1 (-6, 66)
-5	y=2(-5 – 5)(-5 + 3) y=2(-10)(-2) = 40	P_2 (-5, 40)
-4	y=2(-4 – 5)(-4 + 3)	
-3		
-2		
-1		
0		
1		
2		
3		
4		
5		
6		

Create a table of points for the parabola below.

$y = -(\frac{1}{2})(x + 2)(x - 6)$

1. Create a table of points for both parabolas
2. Plot all the points on a graph using Demos Graphing Software.
3. Add the equation of the line symmetry
4. State the vertex of each equation.

Activity 06: Sketch all 3 relations on the same graph.

Question 1: Sketch all 3 relations on the same graphs.

a) $y = (x + 3)(x - 1)$
b) $y = 2(x + 3)(x - 1)$
c) $y = -2(x + 3)(x - 1)$

Question 2: Sketch all three relations on the same set of axes.

Find the x-intercepts, axis of symmetry, for the following:

a) $y = (x - 4)(x - 8)$

b) $y = \frac{1}{2}(x - 4)(x - 8)$
c) $y = \frac{1}{4}(x - 4)(x - 8)$

Question 3: Sketch all four relations on the same set of axes and find the x-intercepts, axis of symmetry, for the following:

a) $y = (x - 6)(x - 2)$
b) $y = -(x + 3)(x + 7)$
c) $y = 2(x - 3)(x + 2)$
d) $y = 2(x - 4)(x + 2)$

TEA

THE ERINDALE ACADEMY

Activity 07: Evaluate expressions with powers below:

Question 1: Review each power with a positive exponent. a) 3^{-2} b) 5^{-1} c) 10^{-4} d) 7^{-3} e) $(-2)^{-4}$ f) $(-7)^{-1}$	**Question 2:** **Evaluate** a) 6^{-2} b) 9^{0} c) 7^{-1} d) 10^{-3} e) $(-9)^{-1}$ f) $(-12)^{-2}$ g) $(-3)^{0}$ h) 89^{0}
Question 3: Evaluate 1. $(\frac{1}{3})^{-2}$ 2. 0^{-5} 3. $-(\frac{1}{4})^{-1}$ 4. $(\frac{5}{6})^{-2}$ 5. $(-(\frac{3}{8}))^{-4}$ 6. $((\frac{9}{4})^{3})^{-4}$	**Question 4:** Evaluate a) $6^{0} + 6^{-2}$ b) $8 - 8^{-1}$ c) $(4 + 3)^{0}$ d) $4^{0} + 3^{0}$

THE ERINDALE ACADEMY

Activity 08: Classification of Polynomials.

Question 1: Classify each polynomial in terms and degrees.

Polynomial	Number of Terms	Degree of Polynomial
$-3y$	1	first-degree
$5 + 6a^3$	2	third-degree
$6x^2 + x - 1$	3	second-degree
$8a^4b^4 – 6a^3b^2 + 2ab^2$	3	eight-degree
$5d^3e – 7e$	2	fourth-degree
$9 + 5y^5 – 4y^2 + y$	4	fifth-degree
$8a^3b^2 + 9a^2b – 6a^4b^2$	3	Sixth-degree
$10x^7y^2 – 3x^3y^3 + 5x^4y^4$	3	ninth-degree
$6abc – 5a^2bc^2 – 7abc^2$	3	fifth-degree

Question 2: Add and Subtract Polynomials:

To add, remove the brackets and then collect like terms.
To subtract, add the opposite polynomial.

Polynomial	Answer
$(2x^2 + 3x – 5) + (7x^2 + 6x – 2)$ $= 2x^2 + 3x – 5 + 7x^2 + 6x – 2$ $= 2x^2 + 7x^2 + 3x + 6x - 2$ $= 9x^2 + 9x – 7.$	$9x^2 + 9x – 7.$
$(4a^2 + 5ab – 9b^2) – (7a^2 – 6ab + 2b^2)$ $= 4a^2 + 5ab – 9b^2 – 7a^2 + 6ab - 2b^2$ $= 4a^{2\,-}\,7a^2 + 5ab + 6ab - 2b^2$ $= -3a^2 + 11ab – 11b^2$	$-3a^2 + 11ab – 11b^2$
Simply the following:	
$(5x + 7) + (2x – 11)$ $= 5x + 2x + 7 – 11$ $= 7x - 4$	$7x - 4$
$(3b – 8) – (6b – 7)$ =	
$(5x^2 + 6x + 8) + (2x^2 + 5x – 9)$	
$(9y^3 – 7y^2 + 6) – (3y^3 – 5y^2 + 8)$	
$(7a^2 + 3a – 4) + (8a^2 – 2a – 15)$	
$(2c^2 – 3c + 1) – (-c^2- 3c – 5)$	
$(7x^2 + 3xy – 2y^2) + (8x^2 – xy – y^2)$	
$(4g^2 + gh – 7h^2) – (g^2 -2gh + 3h^2)$	
$(5ab^2 + 7a – b) + (3ab^2 – 5a + 6b)$	
$(3cd^2 + 2c + 9d) – (2cd^2 + 2c – d)$	
$(2x + 8) – (6x – 7) + (5x – 1)$	
$(5a2 – b) + (6b – 2a^2) – (b^2 + 7a^2)$	

TEA
THE ERINDALE ACADEMY

Review: Product of a Monomial and Polynomial using Distributive Property:

Distributive Property
$2(x + 3)$ $= 2(x) + 2(3)$ $= 2x + 6$
$-a(3a + 5)$ $= -a(3a) + (-a)(5)$ $= -3a^2 - 5a$
$2x(x + 1)$ $= 2x(x) + 2x(1)$ $= 2x^2 + 2x$
$3(x + 2)$ $= 3(x) + 3(2)$ $= 6x + 6$
$4(x + 2)$ $= 4(x) + 2(4)$ $= 4x + 8$
$x(x + 3)$ $= x(x) + 3x$ $= x^2 + 3x$
$4x(x + 4)$ $= 4x(x) + 4(4)$ $= 4x^2 + 16$

THE ERINDALE ACADEMY

Multiply these polynomials	Answer
(x + 1)(x + 2)	$X^2 + 3x + 2$
(x + 2)(x + 4)	
(x + 3)(2x + 1)	
(2x + 3)(x + 1)	
(x + 3)(x + 8)	
(2x + 5)(x + 4)	
(4x + 7)(3x + 1)	
(x + 2)(x + 5)	
(x – 2)(x + 4)	
(3x + 7)(x – 5)	
Expand and simply	
-2(4x – 5)(7x – 6)	
2(x + 7)(x – 3) – (4x + 3)(2x – 1)	
Use distributive Property to find the binomial product	
(k – 3)(k – 5)	
(y – 3)(y – 4)	
(x – 2)(x - 4)	
(q – 4)(q – 2)	
(j – 7)(j – 1)	
(p – 9)(p – 3)	
(z – 7x)(z – 8x)	
(b – 3c)(b – 11c)	

THE ERINDALE ACADEMY

Factoring: Determine the Greatest Common Factor (GCF)

12	1, 12, 6, 2, 3, 4	1, 2, 3, 4, 6, 12,
18	1, 18, 2, 9, 3, 6	1, 2, 3, 6, 18
Greatest Common Factor is: 6 for (12, 18)		
10		
24		
Greatest Common Factor is:		
16		
32		
Greatest Common Factor is:		
8		
14		
Greatest Common Factor is:		
28		
40		
Greatest Common Factor is:		
Find the Greatest Common Factors for: **6 and 9**		
25 and 15		
24 and 16		
20 and 28		
36 and 15		
32 and 40		

THE ERINDALE ACADEMY

Activity 09: Expand and Simply

	Expanded	Simplified
$(x + 3)^2$		
$(x + 2)^2$		
$(x – 6)^2$		
$(x – 4)^2$		
$(2x + 5)^2$		
$(3x – 1)^2$		
$(2x – 5y)^2$		
$(4x – y)^2$		
$(a + b)^2$		
$(a - b)^2$		
$(3a + 2)^2$		
$(5m – 3)^2$		
$(4 + 2b)^2$		
$(7 – 3z)^2$		
$(2x + 3y)^2$		

TEA

THE ERINDALE ACADEMY

Topic 2: Product of a Sum and a Difference of Two Terms:

Example: Expand and Simply

	Expanded	Simplified
$(x + 3)(x – 3)$	$X^2 - 3x + 3x - 9$	$x^2 - 9$
$(2y + 5)(2y – 5)$	$4y^2 – 10y + 10y - 25$	$4y^2 - 25$
$(x – 4)(x + 4)$	$X^2 + 4x – 4x - 16$	$X^2 - 16$
$(3k – 7)(3k + 7)$	$9k^2 + 21k – 21k - 49$	$9k^2 - 49$

In general:

$(a + b)(a – b)$

$= a^2 – ab + ba – b^2$

$= a^2 – b^2$

This is referred to difference of squares.

$a^2 – b^2 = (a + b)(a – b)$

Factor These terms below:

Difference of Squares	Factor the squares	Proof Expand the terms.
$x^2 - 4$	$x^2 – 2^2 = (x + 2)(x – 2)$	$x^2 + 2x – 2x – 4 = x^2 - 4$
$x^2 - 9$		
$4x^2 - 1$	$(2x)^2 - 1^2 = (2x + 1)(2x – 1)$	
$9x^2 - 16$		
$4x^2 – 9y^2$		
$9m^2 – 4n^2$		

THE ERINDALE ACADEMY

Topic 3: Perfect Square trinomials (3 terms)

Example: Expand and Simply

	Expanded	Simplified
$(x + 3)^2$	$(x + 3)(x + 3)$ $= x^2 + 3x + 3x + 9$ $= x^2 + 6x + 9$	
$(x + 2)^2$	$(x + 2)(x + 2)$ $= x^2 + 2x + 2x + 4$ $= x^2 + 4x + 4$	
$(x + 4)$		
Generic Form **$(a + b)^2$**	$(a + b)(a + b)$ $= a^2 + ab + ba + b^2$ $= a^2 + 2ab + b^2$	$= a^2 + (2)ab + b^2$ **$= a^2 + 2ab + b^2$**
$(x - 6)^2$	$(x - 6)(x - 6)$ $= x^2 - 6x - 6x + 36$ $= x^2 - (2)(6x) + 36$ $= x^2 - 12x + 36$	
$(2x - 4)^2$	$(2x - 4)(2x - 4)$ $=4x^2 - 8x - 8x + 16$ $=4x^2 - 16x + 16$ Quickly: $=(2x)^2 - (2)(2x)(4) + (-4)(-4)$ $=4x^2 - 16x + 16$	
Generic Form **$(a - b)^2$**	**$(a - b)(a - b)$** $= a^2 - ab - ba + b^2$ $= a^2 - 2ab + b^2$	**$= a^2 - (2)ab + b^2$** **$= a^2 - 2ab + b^2$**
In general: Perfect Squares (Trinomials) **$(a + b)^2$** **$= a^2 + 2ab + b^2$** **$(a - b)^2$** **$= a^2 - 2ab + b^2$**		

Topic 4: Factoring Quadratic Expression in form of $x^2 + bx + c$, a = 1

Quadratic questions: (3 forms)

1. $y = a(x – h)^2 + k$
2. $y = a(x – r)(x – s)$
3. **$y = ax^2 + bx + c$** ← studying now, where a = 1

<table>
<tr><td></td><td>Expanded</td><td>Equate</td></tr>
<tr><td>General Form:
$y = ax^2 + bx + c$, a = 1
$y = x^2 + bx + c$</td><td></td><td></td></tr>
<tr><td>$y = a(x + r)(x + s)$, a = 1
$y = (x + r)(x + s)$</td><td>$= x^2 + rx + sx + rs$
$= x^2 + (r + s)x + rs$</td><td>$x^2 + bx + c$ = $x^2 + (r + s)x + rs$

b = (r + s)
c = (r x s)</td></tr>
<tr><td colspan="3">In general: Transition for the form 2 to 3 above.
$x^2 + bx + c$ = $x^2 + (r + s)x + rs$

b = (r + s)
c = (r x s)

Examples of factor r, s, where r, s are only integers.</td></tr>
<tr><td><u>Factor, if possible</u>

$x^2 + 7x + 12$</td><td>b = 7, c = 12

(x + r)(x + s)
= (x + 3)(x + 4)
$= x^2 + 4x + 3x + 12$
$= x^2 + 7x + 12$</td><td><table><tr><td>Factors (r, s)</td><td>Product c c= r x s</td><td>Sum b = r+s</td></tr><tr><td>1, 12</td><td>12</td><td>13</td></tr><tr><td>2, 6</td><td>12</td><td>8</td></tr><tr><td>3, 4</td><td>12</td><td>7</td></tr></table></td></tr>
<tr><td>$x^2 + 4x + 6$</td><td></td><td></td></tr>
<tr><td>$x^2 - 29x + 28$</td><td></td><td></td></tr>
<tr><td>$x^2 + 3x - 28$</td><td></td><td></td></tr>
</table>

$x^2 - 4x - 21$	b = -4, c = -21 r, s = (3, -7) b = (r + s) = (x + 3)(x – 7) = (x – 7) (x + 3) Proof: $= x^2 - 7x + 3x - 21$ $= x^2 - 4x - 21$	<table><tr><td>Factors (r, s)</td><td>Product (c) c= r x s</td><td>Sum (b) b = r+s</td></tr><tr><td>-1, 21</td><td>-21</td><td>20</td></tr><tr><td>-3, 7</td><td>-21</td><td>4</td></tr><tr><td>1, -21</td><td>-21</td><td>20</td></tr><tr><td>3, -7</td><td>-21</td><td>-4</td></tr></table>

THE ERINDALE ACADEMY

Activity 10: Factor these parabolic equations (if possible)

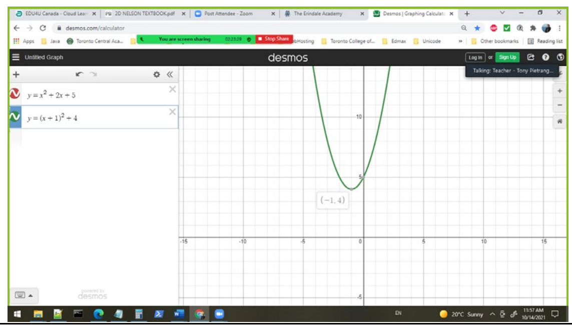
Factoring Quadratic Expression in form of $ax^2 + bx + c$, $a \neq 1$, but a, b, c are integers

$2x^2 + 5x + 3$		
$3x^2 + 7x + 4$		
$6x^2 + 5x + 1$		
$6x^2 + 11x + 1$		
$2x^2 + 7x + 5$		
$6y^2 + 19y + 8$		
$12q^2 + 17q + 6$		

TEA

THE ERINDALE ACADEMY

Activity 11: Completing the Squares, or Transforming Quadratic equation: $y = ax^2 + bx + c$ into vertex form $y = a(x - h)^2 + k$

Standard form $y = ax^2 + bx + c$	Vertex Form $y = a(x - h)^2 + k$
Question 1: Rewrite equations into the vertex form.	
$y = x^2 + 2x + 5$ Observation: a = 1 $y = x^2 + 2x + 5$ $y = x^2 + 2x + 1^2 - 1^2 + 5$ $y = (x^2 + 2x + 1^2) - 1^2 + 5$ $y = (x + 1)^2 + 5 - 1$ $y = (x + 1)^2 + 4$	$y = (x + 1)^2 + 4$ vertex(x, y) = (h, k) = (-1, 4) 
$y = x^2 + 4x + 7$	
$y = x^2 + 6x + 3$	
Question 2: Determine the value of c, to complete the square.	
$y = x^2 + 6x + c$	
$y = x^2 + 14x + c$	
$y = x^2 - 12x + c$	
$y = x^2 - 10x + c$	
$y = x^2 + 2x + c$	
$y = x^2 - 80x + c$	
Question 3: Rewrite the equations in the form of: $y=a(x - h)^2 + k$	
$y = x^2 + 6x - 1$	
$y = x^2 + 2x + 7$	
$y = x^2 + 10x + 20$	
$y = x^2 + 2x - 1$	

Activity 12: Solve using Quadratic equation:

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

Example 1: Find the real roots of an equation.

a) $2x^2 + 9x + 6 = 0$

a = 2
b = 9
c = 6

Substitute into formula:

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

x = $\frac{-9 \pm\sqrt{9^2-4(2)(6)}}{2(2)}$

a) $2x^2 + 9x + 6 = 0$ a = 2 b = 9 c = 6 Solve for x:	**Activity 12:** b) $4x^2 – 12x = -9$ rewrite into the form: $ax^2 + bx + c = 0$ $4x^2 – 12x + 9 = -9 + 9$ $4x^2 – 12x + 9 = 0$ Solve for x:
x = $\frac{-b \pm\sqrt{b^2-4ac}}{2a}$	
x = $\frac{-9 \pm\sqrt{9^2-4(2)(6)}}{2(2)}$ x = $\frac{-9 \pm\sqrt{81-48}}{4}$ x = $\frac{-9 \pm\sqrt{33}}{4}$ The exact roots are:	

root 1: x = $\frac{-9+\sqrt{33}}{4} \cong$ -0.81 root 2: x = $\frac{-9-\sqrt{33}}{4} \cong$ -3.69	

TEA THE ERINDALE ACADEMY

Activity 13: Identify all the 6 trigonometric identities.

1.

Standard Trig. Functions	Abbreviation		
SOH CAH TOA			
Reciprocal Functions			

TEA

THE ERINDALE ACADEMY

ACTIVITY 14: - Three Primary Trigonometric Identities and their inverse.

Complete the table sin(θ), cos(θ), tan(θ) of the angles in table below for angles provided.

Complete the table $\sin^{-1}(x)$, $\cos^{-1}(x)$, $\tan^{-1}(x)$ for the ratios below.

Trigonometric Function	Abbreviation	Specific Angles θ	Value	Inverse Function		
sine	sin(θ)	θ = 0° θ = 30° θ = 45° θ = 60° θ = 90° add 90° to above θ = 120° θ = 135° θ = 150° θ = 180° add 90° to above θ = 210° θ = 225° θ = 240° θ = 270° add 90° to above θ = 300° θ = 315° θ = 330° θ = 360°	0 0.5 0.7071 0.8660 1 0.8660 0.7071 0.50 0 -0.50 -0.7071 -0.8660 -1 -0.8660 -0.7071 -0.50 0	acrsine	$\sin^{-1}(0)$ $\sin^{-1}(0.5)$ $\sin^{-1}(0.7071)$ $\sin^{-1}(0.8660)$ $\sin^{-1}(1)$	0° 30° 45° 59.997 1

Trigonometric Function	Abbreviation	Specific Angles θ	Value	Inverse Function		
cosine	$\cos(\theta)$	$\theta = 0°$ $\theta = 30°$ $\theta = 45°$ $\theta = 60°$ $\theta = 90°$ add 90° to above $\theta = 120°$ $\theta = 135°$ $\theta = 150°$ $\theta = 180°$ add 90° to above $\theta = 210°$ $\theta = 225°$ $\theta = 240°$ $\theta = 270°$ add 90° to above $\theta = 300°$ $\theta = 315°$ $\theta = 330°$ $\theta = 360°$	1 0.8660 0.7071 0.50 0 -0.50 -0.7071 -0.8666 -1.0 0 1.0	acrcosine	$\cos^{-1}(1)$	0°

Trigonometric Function	Abbreviation	Specific Angles θ	Value	Inverse Function		
tangent	tan(θ)	θ = 0° θ = 30° θ = 45° θ = 60° θ = 90° add 90° to above θ = 120° θ = 135° θ = 150° θ = 180° add 90° to above θ = 210° θ = 225° θ = 240° θ = 270° add 90° to above θ = 300° θ = 315° θ = 330° θ = 360°	0 0.57735 1 1.73205 unknown	acrtan	$\tan^{-1}(0)$	0°

THE ERINDALE ACADEMY

Activity 15: Find the distance between two people from the based of a flag pole.

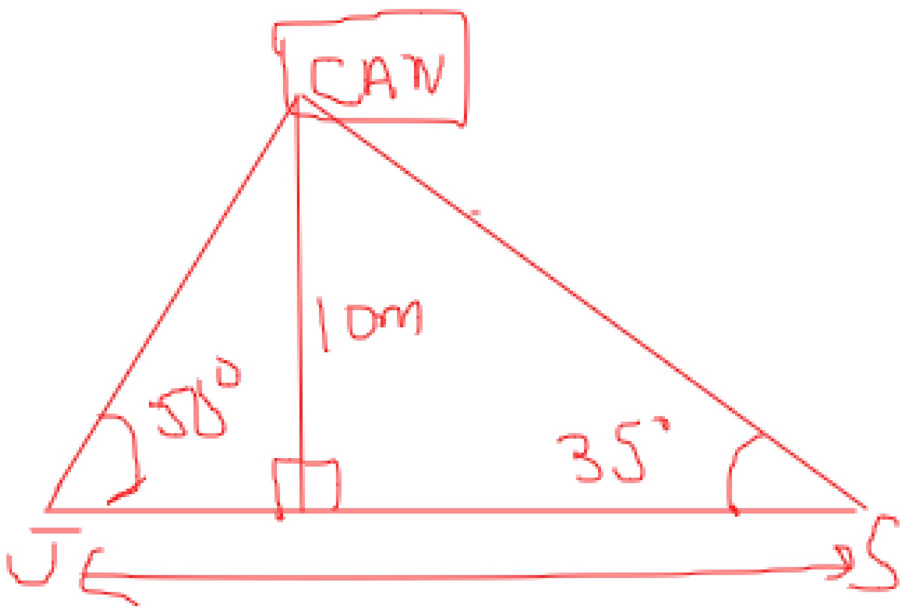
Word Problem:

Jack and Sangita are facing each other on the opposite sides of a 10-metre flagpole.

From Jack's point of view, the top of the flagpole is at an angle of elevation of 40°.

From Sangita's point of view, the top of the flagpole is at an angle of elevation of 35°.

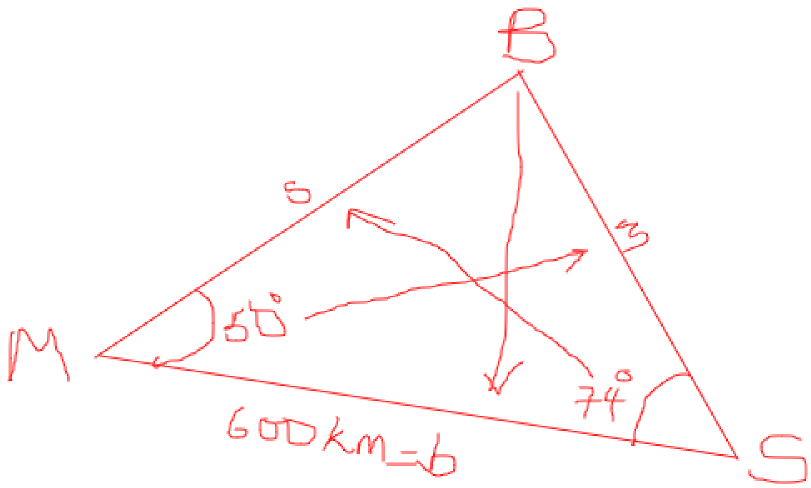
Question: How far apart are the Jack and Sangita?



Find the distance between Jack and Sangita?

<u>**Activity 16: Using the Sine Law – Find the Perimeter Length of the Bermuda Triangle:**</u>

Use the information given on the diagram to determine the perimeter of the Bermuda Triangle, to the nearest kilometer.



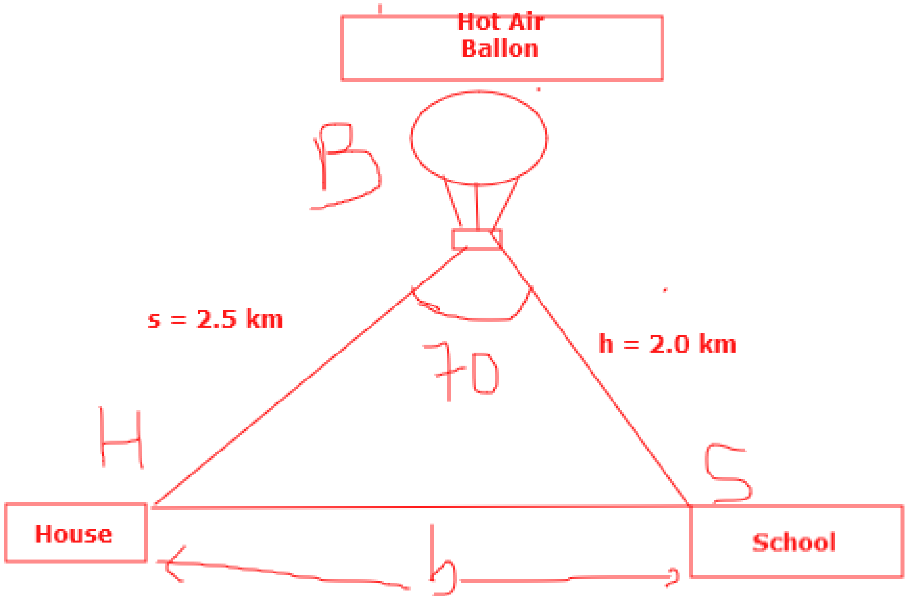
M is the label for the city of Miami.
B is the label for Bermuda.
S is the label for the city of San Juan of Portico Rico.

Let s is the length of distance between Miami and Bermuda.
Let m is the length in km distance between San Juan and Bermuda.

Find the Total length (Perimeter) to the nearest km.

<u>**Hint: Use the Sine Law.**</u>

Activity 17: Use the Cosine Law to find the distance between two objects:



Chandra is riding in a hot-air balloon and spots her house and her school. She estimates how far away they are from her, and the angle separating their lines of sight, as shown in above.

1. How far apart is Chandra's house and school, that is, solve for b.

THE ERINDALE ACADEMY

THE END

OF

COURSE: MPM2D

THANK YOU!!!