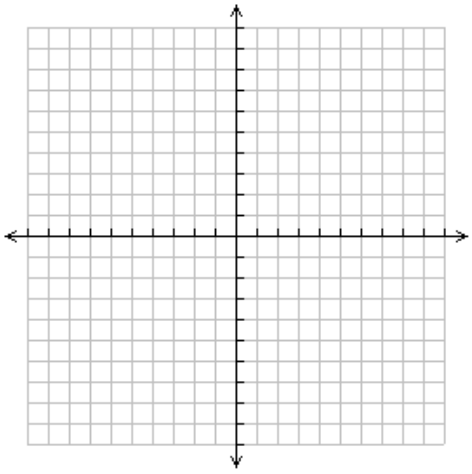
UNIT 4 – Polynomials JOURNAL

Big idea/Learning Goals

A quadratic in standard form is hard to plot without technology.

Ex. $y = x^2 + 6x + 9$

x	y
-2	
-1	
0	
1	
1	



You are going to learn how to manipulate polynomials so that you can convert standard form to factored form, since factored form will tell you more information required in sketching or interpreting quadratics.

Date	Topics	Finished the journal? Made corrections?	Did you do the HW? Checked if it was correct?	Tentative TEST date: _____ Questions to ask the teacher:
2days	**Expand polynomials** DAY 1 HW text pg218 #6,8,9,14,16 DAY 2 HW text pg225 #4,6,8,10,11			
4days	**Factor** DAY 3 HW text pg234 #4,6,8,9,13 DAY 4 HW text pg241 #5,7,8cd,9cd,12,13,14 DAY 5 HW text pg246 #4,6,12,13,15 DAY 6 HW text pg254 #5,6,7,10,14			
	Mix of Factoring & Solving DAY 7 HW Handouts – find online on mrsk.ca website under this unit and this topic			

Reflect – previous TEST mark _____, Overall mark now_____.

Calculate your potential final mark to see how averages work. Show your calculations here:

potential final mark = (overall mark now)(weight so far) + (future marks)(weight to come)

= ( )( ) + ( )( )

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Were you able to attain your set goal before? Looking back, what else can you improve upon? Be specific in your planning.

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DAY 1 – Multiply Polynomials

1. Expand

a) $3x(x + 3)$

b) $(2x + 1)(x + 3)$

picture method

FOIL method

c) $(k - 6)^2$

d) $(2p - 7q)(2p - 5q)$

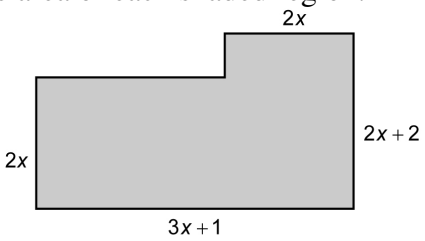
e) $(2 - 3s)^2$

f) $-(x - 4)(x - 1) + 5(3x - 1)(2x + 1)$

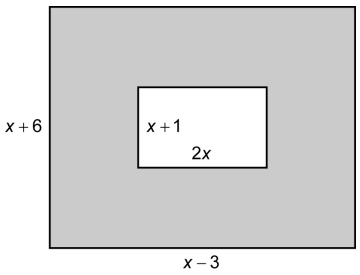
g) $(m - 2)^2 - (3m + 2)^2$

2. Write and simplify an expression to represent the area of each shaded region.

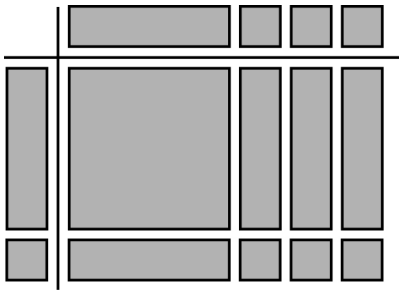
a)



b)



3. What binomial product does this model represent?



4. A rectangular prism has a width of x centimetres. Its length is 4 cm more than its width and its height is 5 cm more than its width.

a) Draw a diagram of the prism.

b) Write a simplified expression for the volume of the prism.

c) Write a simplified expression for the surface area of the prism.

DAY 2 – Special Products

1. Expand and simplify.
   a) $(8a - 1)^2$

   b) $(2u - 3v)^2$

   c) $(6p + 7)^2$

   d) $(5q - 8r)^2$

What is the pattern you notice in the questions above?

2. Expand and simplify.
   a) $(6g - 7h)(6g + 7h)$

   b) $(3x + y)(3x - y)$

   c) $(g - 9x)(g + 9x)$

   d) $(4x - 5y)(4x + 5y)$

What is the pattern you notice in the questions above?

3. Expand and simplify. Use the patterns as shortcuts when possible.
   a) $(4x^2 + 3y^2)^2$

   b) $(3x^2 + 2y^2)(3x^2 - 2y^2)$

   c) $(x - 3)^2 - (x + 3)(x - 3)$

d) $(3x^2 + 5x - 1)^2$

f) $(2x - 3)^3$

4. A cube has length, width, and height of x metres. Each dimension is increased by y metres.
   a) Write a simplified formula for the volume of the new cube.

   b) Write a simplified formula for the surface area of the new cube.

5. A parabola has equation $y = (x - 3)^2$.
   a) Identify the coordinates of the vertex.

   b) Expand and simplify the equation.

   c) Verify that the coordinates of the vertex satisfy your equation from part b).

6. The side length of a square is represented by x centimetres. The length of a rectangle is 3 cm greater than the side length of the square. The width of the rectangle is 3 cm less than the side length of the square. Which figure has the greater area and by how much?

DAY 3 – Common Factoring & Grouping

1. Factor fully.

a) $3x + 6y$

b) $17ac - 34ad$

c) $16x^2y^2 - 24xy$

d) $27x^3y^3 + 18x^2y^2 + 9xy$

e) $6n^2p^2 + 12np^2 + 36n^3p^3$

f) $33c^4d^3e^2 - 11c^2de$

g) $3g^2 + 6g + 9$

How to check your answer:

2. Factor fully.

a) $2x(x + 7) + 3(x + 7)$

b) $4s(r + u) - 3(r + u)$

c) $3x(6 - y) + 2(y - 6)$

d) $2y(x - 3) + 4z(3 - x)$

3. Factor by grouping.

a) $ax + ay + 3x + 3y$

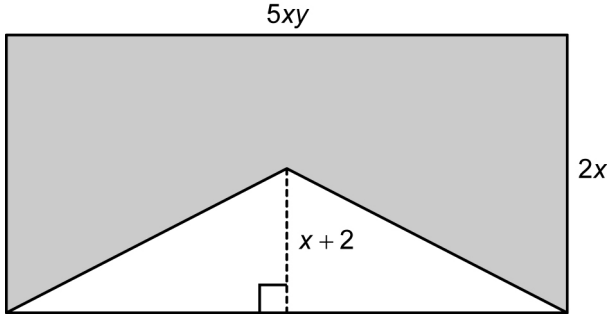
b) $4x^2 + 6xy + 12y + 8x$

c) $y^2 + 3y - ay - 3a$

d) $25x^2 - 5x - 15xy + 3y$

4. Write an expression in factored form for the area of each shaded region.

a)



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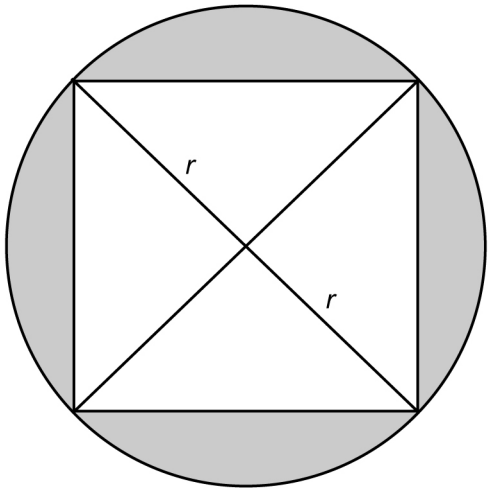


5. The formula for the surface area of a rectangular prism is $SA = 2lw + 2lh + 2wh$.

a) Write this formula in factored form.

b) If l is 10 cm, w is 5 cm, and h is 8 cm, find the surface area using both the original formula and the factored form. What do you notice? Explain why this is so.

DAY 4 – Simple Trinomials – Sum Product Factoring (form x^2+bx+c where a=1)

1. Find two integers with the given product and sum.
   a) product = 48 and sum = 14

   b) product = −15 and sum = 2

   c) product = −30 and sum = −1

   d) product = 2 and sum = −3

2. Factor, if possible.
   a) $x^2 + 8x + 12$

   b) $c^2 - 3c - 18$

   c) $d^2 - 12d + 35$

   d) $x^2 + x + 1$

   e) $c^2 + 13c - 30$

3. How can you check your answers?

4. Factor fully by first removing the greatest common factor (GCF).
   a) $3x^2 - 12x - 36$

   b) $-2x^2 + 2x + 4$

   c) $6x^2 - 42x + 72$

   d) $-3x^2 - 18x - 24$

   e) $x^3 + 7x^2 + 12x$

5. Determine two values of b so that each expression can be factored.

a) $x^2 + bx - 12$

b) $x^2 - bx + 18$

6. A parabola has equation $y = 3x^2 - 30x + 48$.

a) Factor the right side of the equation fully.

b) Identify the x-intercepts of the parabola.

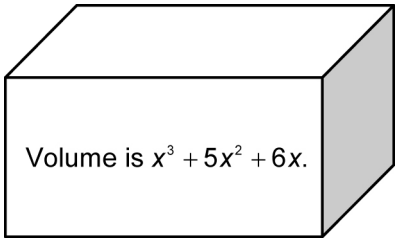
c) Find the equation of the axis of symmetry, find the vertex, and draw a graph of the parabola.

7. Determine two values of c so that each expression can be factored.

a) $x^2 + 4x + c$

b) $x^2 - 9x + c$

8. Determine expressions to represent the dimensions of this rectangular prism.



DAY 5 – Complex Trinomial Factoring Methods (form ax^2+bx+c where $a\neq1$)

1. Factor

a) $2x^2 + 7x + 3$

Criss-cross method

Decomposition method

b) $56x^2 - 9x - 2$

Criss-cross method

Decomposition method

2. Factor using your favourite method

a) $6x^2 + 10x - 4$

b) $12c^2 - 26c - 16$

c) $6x^2 - 5xy - 4y^2$

d) $12r^2 + 7rs - 10s^2$

e) $10x^4 - 3x^2 - 18$

f) $20x^6 - 59x^3y^2 + 42y^4$

3. Find two values of k so that each trinomial can be factored over the integers.
   a) $6x^2 + kx + 10$

   b) $4x^2 - 12x + k$

4. The height, h, in metres, of a baseball above the ground relative to the horizontal distance, d, in metres, from the batter is given by $h = -0.005d^2 + 0.49d + 1$.
   a) Write the right side of the equation in factored form. Hint: First divide each term by the common factor, -0.005.

   b) At what horizontal distance from the batter will the baseball hit the ground if it is not caught by an outfielder?

5. The area of a rectangular parking lot is represented by $A = 6x^2 - 19x - 7$.
   a) Factor the expression to find expressions for the length and width.

   b) If x represents 15 m, what are the length and width of the parking lot?

6. Sydney Harbour Bridge in Australia is unusually wide for a long-span bridge. It carries two rail lines, eight road lanes, a cycle lane, and a walkway.
   a) Factor the expression $10x^2 - 7x - 3$ to find binomials that represent the length and the width of the bridge.

   b) If x represents 50 m, what are the length and the width of the bridge, in metres?

DAY 6 – Difference of Squares & Perfect Square Trinomials

1. Factor these binomials

a) $4x^2 - 25$

rewriting as a trinomial

formula

b) $121x^2 - 9y^2$

c) $100r^2 + 81s^2$

2. Factor these trinomials.

a) $4x^2 - 12xy + 9y^2$

usual trinomial method

formula

b) $100 - 20x + x^2$

c) $49x^2 + 70xy + 16y^2$

3. Factor fully, if possible.

a) $25x^2 - 16y$

b) $20x^2 + 20xy + 5y^2$

c) $(5c + 3)^2 - (2c + 1)^2$

d) $100 - (x - 3)^2$

e) $25x^2y^2 - 150xyab + 225a^2b^2$

4. Determine the value(s) of b so that each expression factors.

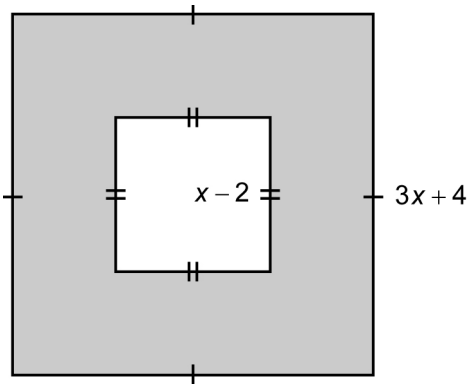
a) $bx^2 + 10xy + y^2$

b) $36x^2 - bxy + 49y^2$

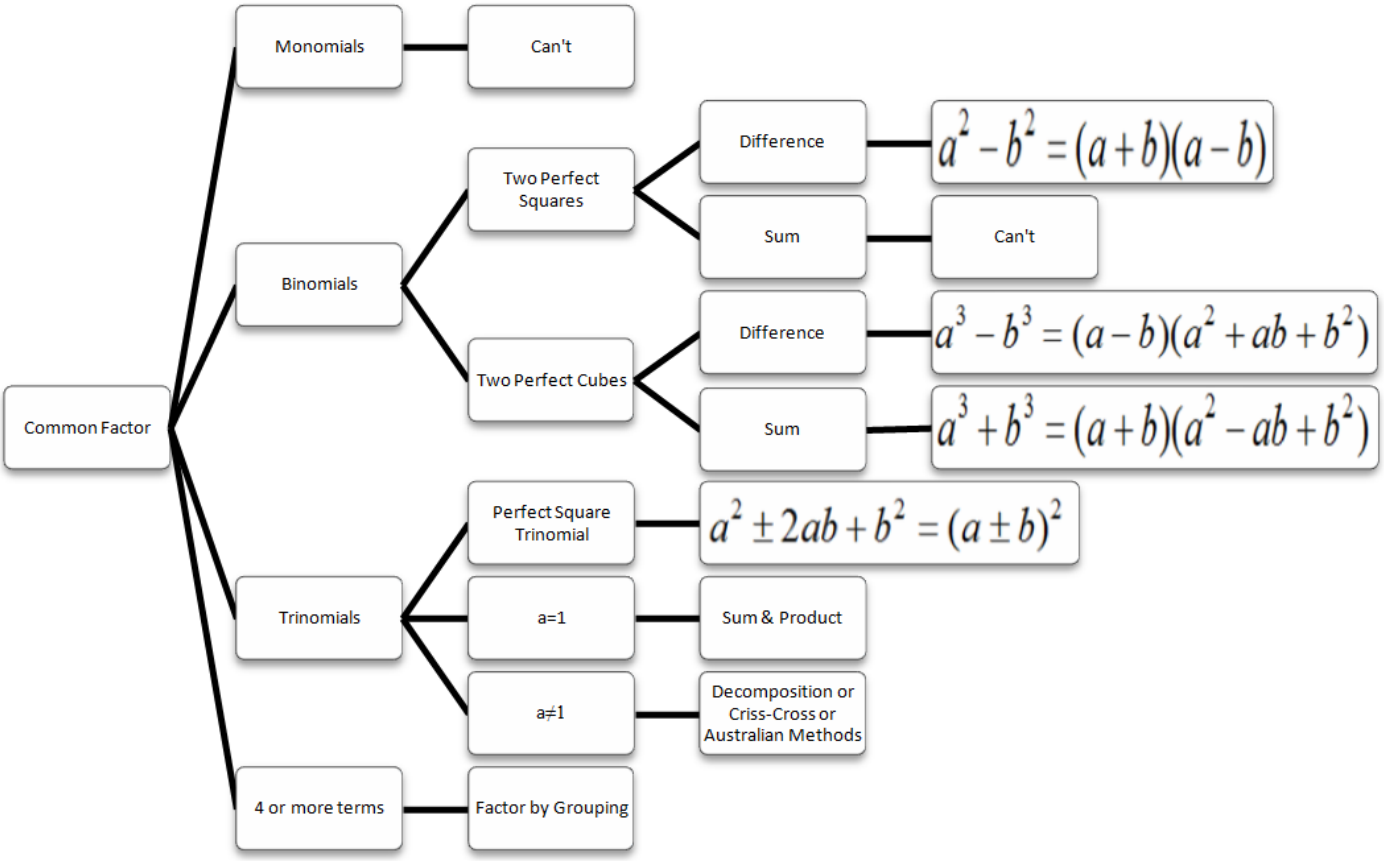
a) $25x^2 - by^2$

5. A parabola has equation $y = 4x^2 + 32x + 64$. Rewrite the equation in factored form to find the coordinates of the vertex.

6. Find an algebraic expression for the area of the shaded region in factored form.



DAY 7 – Mix of Factoring



Factor.

1. $4s(r+u) - 3(r+u)$

2. $12c^{10} - 26c^5 d^3 - 16d^6$

3. $25x^2 - 5x - 15xy + 3y$

4. $9x^3y - 16xy^3$

5. $25x^2 + 70xy + 49y^2$

6. $x^8 - 256y^8$

Solve by factoring.

NOTES:

7. $4x^2 - 1 = 0$

8. $x^2 = 3x + 18$

9. $9x^2 - 30x - 24 = 0$

10. $6s^4 - 29s^2 + 35 = 0$

11. $3x^5 - 12\,x^2 = 0$

12. $18x^2 - 9x - 2 = 0$

13. $5x^2 + 70x = 225$

14. $2x^2 + 6x + 56 = 0$

15. $2a^2 + 12a + 18 = 0$

16. $25x^2 - 1 = 0$

17. $25 - 250x - x^2 + 10x^3 = 0$

18. $x^2 + 27 = -12x$

19. $2x^2 + 7x + 3 = 0$