

Unit4JOURNAL

August 26, 2016 1:11 PM

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Unit4JOURNAL

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UNIT 4 - Polynomials JOURNAL



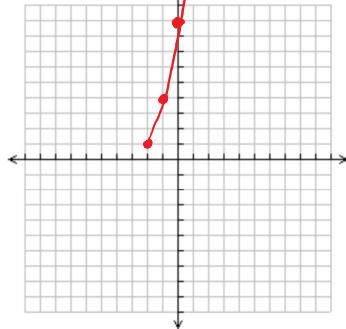
Big idea/Learning Goals

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

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

x	y
-2	$(-2)^2 + 6(-2) + 9 = 1 \therefore (-2, 1)$
-1	$(-1)^2 + 6(-1) + 9 = 4 \therefore (-1, 4)$
0	$0^2 + 6(0) + 9 = 9$
1	$1^2 + 6(1) + 9 = 16$
2	$2^2 + 6(2) + 9 = 25$

ensure vertex in the middle of the table to see the full "U"



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?	How many questions did you finish from HW? Total /223	Tentative TEST date: Fri. Nov. 25	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		/23 /19		
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		/19 /25 /16 /21		
	Mix of Factoring DAY 7 HW Handouts – find online on mrska.ca website under this unit and this topic	Review	/100		



Reflect – previous TEST mark _____, Overall mark now _____.

Calculate your potential final mark, show your calculations here:

potential final mark = (overall mark now)(0.30) + (future unit marks)(0.40) + (final exam marks)(0.30)

$$= (\quad)(0.30) + (\quad)(0.40) + (\quad)(0.30)$$

=

Looking back, what can you improve upon?

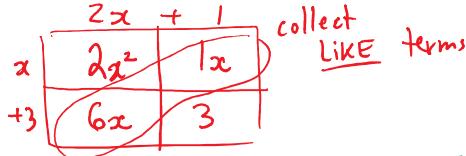
DAY 1 – Multiply Polynomials

1. Expand

a) $3x(x + 3)$

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

b) $(2x + 1)(x + 3) = A$
picture method



$\therefore A = 2x^2 + 7x + 3$

FOIL method

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

F O I L

$$= 2x^2 + \underline{6x + x} + 3$$

$$= 2x^2 + 7x + 3$$

F - first

O - outer

I - inner

L - last

e) $(2 - 3s)^2 = (2 - 3s)(2 - 3s)$ { $(2 - 3s)^2$ ok.

2	-3s
4	-6s
-6s	9s ²

$\therefore \text{ANS} = 9s^2 - 12s + 4$

f) $(x - 4)(x - 1) + 5(3x - 1)(2x + 1)$ { $5(6x^2 + 3x - 2x - 1)$

x	-x + 4
-1	x - 4

$\therefore = -x^2 + 5x - 4 + 30x^2 + 15x - 10x - 5$

$= 29x^2 + 10x - 9$

c) $(k - 6)^2$

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

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

Diagram illustrating the decomposition of a composite rectangular object into three regions:

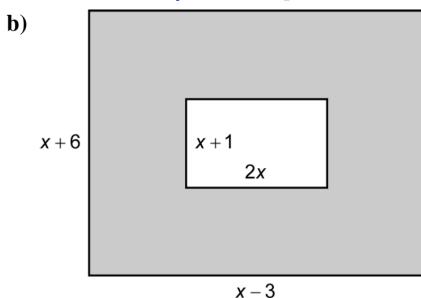
- Region A₃:** The top-left corner square of side length z .
- Region A₁:** The top-right rectangle of width z and height $2x$.
- Region A₂:** The bottom-left shaded rectangle of width $2x$ and height $2x$.

The total area is labeled $A_1 + A_2$ and marked as "OK".

$$A_{\text{shaded}} = \overbrace{(2x)(2)}^{A_1} + \overbrace{(2x)(3x+1)}^{A_2}$$

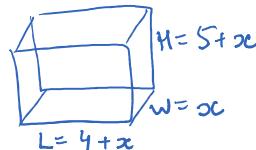
$$= 4x^2 + 6x^2 + 2x$$

$$= 6x^2 + 2x$$



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. Box



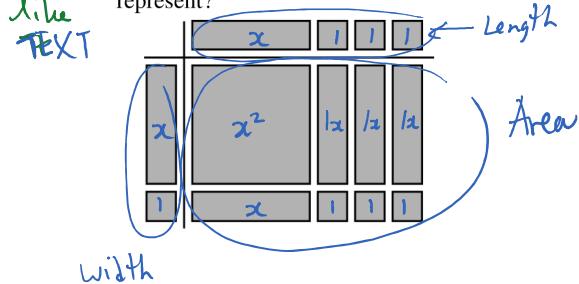
- b)** Write a simplified expression for the volume of the prism.

$$\begin{aligned}
 V &= LWH \\
 &= (4+x)(x)(5+x) \\
 &= x(4+x)(5+x) \\
 &= (4x+x^2)(5+x) \\
 &\quad \left. \begin{array}{l} \nearrow = 20x + 4x^2 + 5x^2 + x^3 \\ \searrow V = x^3 + 9x^2 + 20x \end{array} \right\}
 \end{aligned}$$

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

$$\begin{aligned}
 SA &= 2LW + 2WH + 2LM \\
 &= 2(x+4)(x) + 2(x)(x+5) + 2(x+4)(x+5) \\
 &= 2x(x+4) + 2x(x+5) + (2x+8)(x+5) \\
 &= \underline{2x^2 + 8x} + \underline{2x^2 + 10x} + \underline{2x^2 + 10x + 8x + 40} \\
 &= 6x^2 + 36x + 40
 \end{aligned}$$

- What binomial product does this model represent?



$$\therefore \text{This model represents } \text{Area} = (\text{length})(\text{width})$$

$$x^2 + 4x + 3 = (x+3)(x+1)$$

at Factor

Trinomial = $(\quad)(\quad)$
 2 binomials

DAY 2 – Special Products

1. Expand and simplify.

a) $(8a - 1)^2$

$$\checkmark = \cancel{(8a-1)}(8a-1)$$

$$= 64a^2 - 8a - 8a + 1$$

$$= 64a^2 - 16a + 1$$

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

$$\checkmark = (2u - 3v)(2u - 3v)$$

$$= 4u^2 - 6uv - 6uv + 9v^2$$

$$= 4u^2 - 12uv + 9v^2$$

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

$$= (6p + 7)(6p + 7)$$

$$= 36p^2 + 42p + 42p + 49$$

$$= 36p^2 + 84p + 49$$

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

$$\checkmark = (5q - 8r)(5q - 8r)$$

$$= 25q^2 - 40qr - 40qr + 64r^2$$

$$= 25q^2 - 80qr + 64r^2$$

What is the pattern you notice in the questions above? $(a+b)^2 = a^2 + 2ab + b^2$

\therefore square each term for 1st and last
multiply the terms, then double for middle

3. Expand and simplify. Use the patterns as shortcuts when possible.

a) $(4x^2 + 3y^2)^2$

$$= 16x^4 + 24x^2y^2 + 9y^4$$

or

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

$$= 9x^4 - 4y^4$$

OI cancels.

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

$$= (x^2 - 6x + 9) - 1(x^2 - x + 9)$$

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

\star don't lose the bracket unit when adjusting signs

$$= -6x + 18$$

2. Expand and simplify.

a) $(6g - 7h)(6g + 7h)$

$$= 36g^2 + 42gh - 42gh - 49h^2$$

$$\checkmark = 36g^2 + \cancel{0}gh - 49h^2 \text{ or } 36g^2 - 49h^2$$

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

$$= 9x^2 - 3xy + 3xy - y^2$$

$$\checkmark = 9x^2 - y^2$$

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

$$= g^2 + 9xg - 9xg - 81x^2$$

$$\checkmark = g^2 - 81x^2$$

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

$$= 16x^2 + 20xy - 20xy - 25y^2$$

$$\checkmark = 16x^2 - 25y^2$$

Difference of Squares.

What is the pattern you notice in the questions above?

$$(a-b)(a+b) = a^2 - b^2$$

- multiply the F and L of FOIL
- the OI cancel each other.

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

5. A parabola has equation $y = (x - 3)^2$.

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

$$\begin{aligned}
 &= (3x^2 + 5x - 1)(3x^2 + 5x - 1) \\
 &= 9x^4 + 15x^3 - 3x^2 \\
 &\quad 15x^3 + 25x^2 - 5x \\
 &\quad -3x^2 - 5x + 1 \\
 &= 9x^4 + 30x^3 + 19x^2 - 10x + 1
 \end{aligned}$$

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

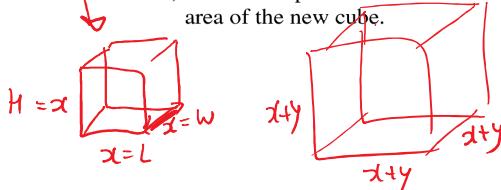
$$\begin{aligned}
 &= (2x - 3)(2x - 3)(2x - 3) \quad \text{short cut} \\
 &= (2x - 3)(4x^2 - 12x + 9) \\
 &= 8x^3 - 24x^2 + 18x \\
 &\quad -12x^2 + 36x - 27 \\
 &= 8x^3 - 36x^2 + 54x - 27
 \end{aligned}$$

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.

$$\begin{aligned}
 V &= LWH = (x+y)^3 \\
 &= (x+y)(x+y)(x+y) \\
 &= (x+y)(x^2 + 2xy + y^2) \\
 &= x^3 + 2x^2y + xy^2 + x^2y + 2xy^2 + y^3 \\
 &= x^3 + 3x^2y + 3xy^2 + y^3
 \end{aligned}$$

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



$$\begin{aligned}
 SA &= 2LW + 2LH + 2WH \\
 &= 6LW \\
 &= 6(x+y)(x+y) \\
 &= 6(x^2 + 2xy + y^2) \\
 &= 6x^2 + 12xy + 6y^2
 \end{aligned}$$

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?

$$\begin{array}{|c|c|} \hline x & A=x^2 \\ \hline x & \end{array}$$

$$\begin{array}{|c|c|} \hline x & 3x & x^2 \\ \hline -3 & -9 & -3x \\ \hline 3+x & & \end{array}$$

$$A_{\text{square}} = x^2 \quad A_{\text{rectangle}} = x^2 - 9$$

∴ The square has greater area by 9 cm^2

Z

$$\begin{array}{|c|c|} \hline 3x & x-3 \\ \hline \end{array}$$

DAY 3 – Common Factoring & Grouping

1. Factor fully.
 a) $3x + 6y$

2. Factor fully.
 a) $2x(x+7) + 3(x+7)$

$$\textcircled{b) } \frac{17ac - 34ad}{17a} = 17a(c - 2d)$$

$$\text{c) } 16x^2y^2 - 24xy$$

$$\text{d) } \frac{27x^3y^3 + 18x^2y^2 + 9xy}{9xy} = 9xy(3x^2y^2 + 2xy + 1)$$

$$\text{e) } 6n^2p^2 + 12np^2 + 36n^3p^3$$

$$\text{f) } 33c^4d^3e^2 - 11c^2de$$

$$\text{g) } 3g^2 + 6g + 9$$

$$\text{b) } \frac{4s(r+u) - 3(r+u)}{(r+u)} = (r+u)(4s - 3)$$

$$\text{c) } 3x(6-y) + 2(y-6) = 3x(-y+6) + 2(y-6)$$

$$\text{d) } 2y(x-3) + 4z(3-x) = (y-6)(-3x+2)$$

3. Factor by grouping.
 a) $ax + ay + 3x + 3y$

$$\text{b) } 4x^2 + 6xy + 12y + 8x = 2(2x^2 + 3xy + 6y + 4x) = 2[x(2x+3y) + 2(3y+2x)]$$

$$\text{c) } y^2 + 3y - ay - 3a$$

How to check your answer:

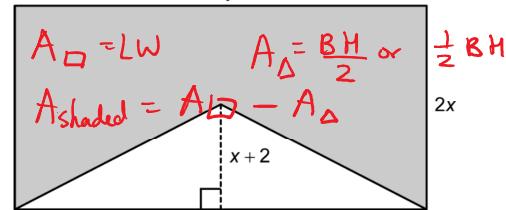
You can distribute and multiply back.

$$\text{d) } 25x^2 - 5x - 15xy + 3y = (5x-1)(5x-3y)$$

$$(5x-1)(5x-3y)$$

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

a)

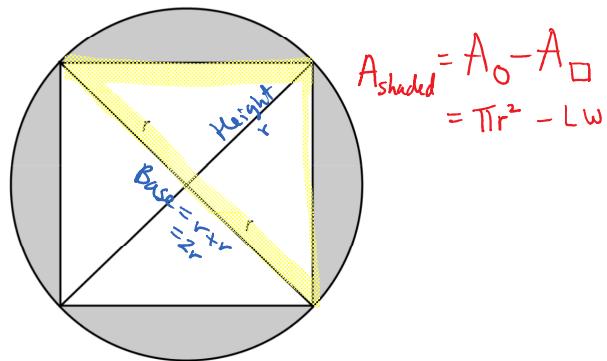


$$A = (2x)(5xy) - \frac{1}{2}(5xy)(x+2)$$

i) $= \cancel{10x^2y} - \cancel{5xy}(x+2)$

ii) Factor $= 5xy [2x - \frac{1}{2}(x+2)]$
 $= 5xy [\frac{2x}{2} - \frac{1x}{2} - 1] = 5xy [\frac{3x}{2} - 1]$

b)



$$A_{\text{shaded}} = A_{\text{square}} - A_{\text{circle}}$$

$$= 4r^2 - \pi r^2$$

OK

$$A_{\text{shaded}} = A_{\text{square}} - 2A_{\triangle}$$

$$= 4r^2 - 2(\frac{1}{2}BH)$$

$$= 4r^2 - (2r)(r)$$

i) $= 4r^2 - 2r^2$

ii) $= r^2(4 - 2)$

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 6 and 8

$$\begin{array}{r} 1 & 2 \\ 48 & 24 \\ \hline 16 & 12 \\ \hline 8 & \end{array}$$

b) product = -15 and sum = 2 -3 and 5

$$\begin{array}{r} 1 & 1 \\ 15 & -15 \\ \hline -5 & \end{array}$$

c) product = -30 and sum = -1

d) product = 2 and sum = -3

3. How can you check your answers?

Expand and multiply (FOIL)
 to check your answers

4. Factor fully by first removing the greatest common factor (GCF).

a) $3x^2 - 12x - 36$
 $= 3(x^2 - 4x - 12)$ $\begin{array}{r} -1 & -1 \\ 12 & -12 \\ \hline -6 & \end{array}$ -3 -3
 $= 3(x - 6)(x + 2)$

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

$= -2(x - 2)(x + 1)$

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

d) $-3x^2 - 18x - 24$
 $= -3(x^2 + 6x + 8)$

\downarrow
 $= -3(x + 2)(x + 4)$

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

$= x(x + 3)(x + 4)$

2. Factor, if possible.
 → divide and get brackets

a) $x^2 + 8x + 12$

b) $c^2 - 3c - 18$ Product.
 $\begin{array}{r} c & c \\ \hline -1 & -18 \\ \hline 18 & -18 \\ \hline 9 & -9 \\ \hline 6 & -6 \\ \hline 3 & -3 \\ \hline -6 & \end{array}$
 $= (c - 6)(c + 3)$

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

d) $x^2 + 1x + 1$ not 2, not -2
 $\begin{array}{r} x & x \\ \hline -1 & -1 \\ \hline 1 & -1 \\ \hline 0 & \end{array}$ ∵ impossible to factor
 $= (x + 1)(x + 1)$

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

$\begin{array}{r} -1 & 1 & -2 & 2 \\ 30 & -30 & 15 & -15 \\ \hline \dots & & & \end{array}$

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

a) $x^2 + bx - 12$

$$\begin{array}{r} 1 \\ -12 \end{array} \quad \begin{array}{r} -2 \\ 6 \end{array} \quad \begin{array}{r} 3 \\ -4 \end{array}$$

$\therefore b = -11 \text{ or } b = 4 \text{ or } b = -1$

b) $x^2 - bx + 18$

$$b = \pm 19, \pm 11, \pm 9$$

$b = -19, b = 11, b = -9, b = 9$

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

- a) Factor the right side of the equation fully.

$$y = 3(x^2 - 10x + 16)$$

Sum $\begin{array}{|c|c|} \hline 2 & 8 \\ \hline \end{array}$ Prod $\begin{array}{|c|c|} \hline -1 & -16 \\ \hline -8 & 4 \\ \hline \end{array}$

$$y = 3(x - 8)(x - 2)$$

- b) Identify the x -intercepts of the parabola.

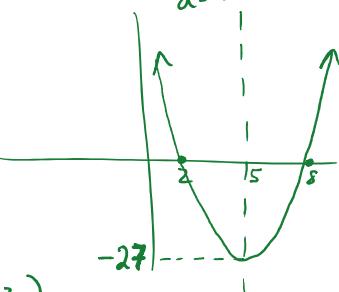
x -int are 8 AND 2

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

$$\text{eq of s} = \frac{2+8}{2}$$

$$= \frac{10}{2}$$

$$\boxed{x = 5}$$



$$y = 3(5 - 8)(5 - 2)$$

$$= 3(-3)(3)$$

$$= -27 \rightarrow \text{optimal value}$$

$\min y = -27$

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

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

Sum Product

$$2+2 \rightarrow \text{product } c = 4$$

$$1+3 \rightarrow \text{product } c = 3$$

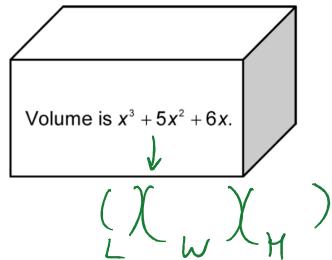
$-6+10 \rightarrow \text{product } c = -60$ ∞ many!

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

$$-18+9 \rightarrow \text{product } c = -81$$

$$-10+1 \rightarrow \text{product } c = -10$$

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



DAY 5 – Complex Trinomial Factoring Methods (form ax^2+bx+c where $a \neq 1$)

1. Factor

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

Criss-cross method



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

Decomposition method

$$\begin{aligned} & 2x^2 + 7x + 3 \\ & = 2x^2 + 1x + 6x + 3 \\ & = x(2x+1) + 3(2x+1) \end{aligned}$$

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

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

Criss-cross method

$$\begin{array}{r} 1x \quad 2 \quad 4 \quad (-7) \\ 56x \quad 28 \quad 14 \quad 8 \\ \hline 1 \quad (-2) \end{array}$$

$$= (-7x - 2)(8x + 1)$$

Decomposition method

$$\begin{aligned} & 56x^2 - 9x - 2 \\ & = 56x^2 - 16x + 7x - 2 \\ & = 8x(-7x - 2) + 1(-7x - 2) \end{aligned}$$

$$= (-7x - 2)(8x + 1)$$

2. Factor using your favourite method

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

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

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

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

Sum	Prod	ax^2+bx+c
b	(a)(c)	
7	6	
add	mult.	
1, 6		

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

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

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

$$\begin{array}{r} 10 \quad 5 \quad 1x^2 \quad (-2) \\ 1 \quad 2 \quad 10x^2 \quad 5 \\ \hline 1 \quad (-3) \end{array}$$

$$= (2x^2 - 3)(5x^2 + 6)$$

$$\begin{array}{r} 20 \quad 10 \quad 5 \quad 1x^3 \quad 2 \quad 4 \\ 1 \quad 2 \quad 4 \quad 20x^3 \quad 10 \quad 5 \\ \hline -1 \quad -2 \quad -3 \quad (-6y^2) \\ -40 \quad -20 \quad -14 \quad -7y^2 \end{array}$$

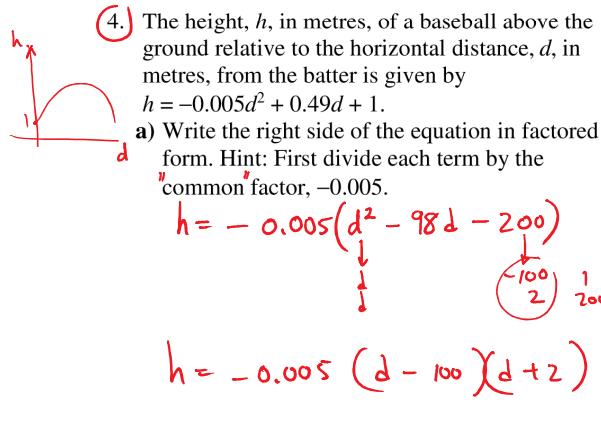
$$= (5x^3 - 6y^2)(4x^3 - 7y^2)$$

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

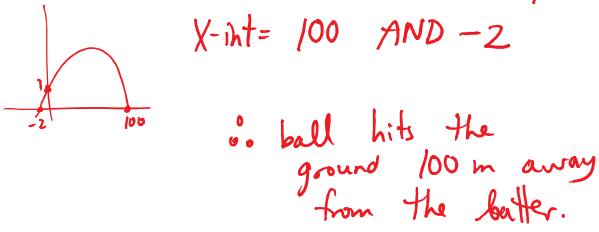
5. The area of a rectangular parking lot is represented by $A = 6x^2 - 19x - 7$.
- a) Factor the expression to find expressions for the length and width.

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

$$\begin{array}{c} \textcircled{b} \quad 4x^2 - 12x + k \\ (\cancel{4x})(\cancel{2x}) > \begin{matrix} \textcircled{2} & \textcircled{1} \\ \textcircled{2} & \textcircled{x} \end{matrix} \\ \therefore k=8 \quad \therefore k=9 \end{array}$$



- b) At what horizontal distance from the batter will the baseball hit the ground if it is not caught by an outfielder? \rightarrow zeros / x-int



- 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.

$$\begin{array}{c} 10x^2 - 7x - 3 \\ \downarrow \quad \downarrow \\ (10) \textcircled{2} \quad (-1) \textcircled{3} \end{array} \quad \text{one neg.}$$

$$(x - 1)(10x + 3)$$

$$\therefore L = 10x + 3 \quad W = x - 1$$

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

$$L = 10(50) + 3 = 503 \text{ m}$$

$$W = 50 - 1 = 49 \text{ m}$$

Note if asked Area = 503×49

OR

$$\begin{array}{l} \text{Sub 50 into } A = 10x^2 - 7x - 3 \\ A = (x-1)(10x+3) \end{array}$$

$$a^2 - b^2 = (a+b)(a-b)$$

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$$a^2 \pm 2ab + b^2 = (a \pm b)^2$$

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DAY 6 – Difference of Squares & Perfect Square Trinomials

1. Factor these binomials

a) $4x^2 - 25$

rewriting as a trinomial

$$\begin{array}{r} 4x^2 + 0x - 25 \\ \downarrow \\ 2x \quad 2x \\ \downarrow \quad \downarrow \\ -5 \quad 5 \end{array}$$

$$= (2x+5)(2x-5)$$

formula

$$\begin{array}{r} 4x^2 - 25 \\ \downarrow \quad \downarrow \\ = (2x+5)(2x-5) \end{array}$$

- ① two terms
- ② one neg.
- ③ even powers, can $\sqrt{}$

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

$$= (11x-3y)(11x+3y)$$

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

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

$$\begin{array}{r} 3 \ 1 \ 5 \ ? \\ 7 \ 9 \ 5 \ ? \\ \hline \therefore b=25 \quad \therefore b=9 \quad \therefore b=21 \quad \text{or many} \end{array}$$

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

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

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

$$y = 4(x^2 + 8x + 16)$$

$$y = 4(x+4)^2$$

$$y = 4((x+4)(x+4))$$

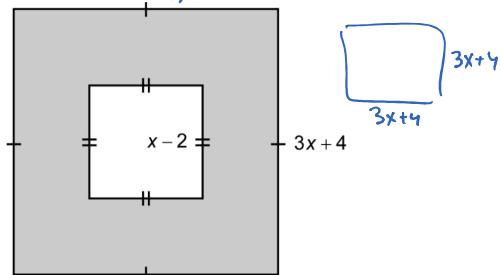
if different
to vertex
x-int/zeros?
a.of's?
opt.val.

Since same factor, you get vertex form

$$y = 4(x+4)^2 + 0$$

$\therefore \text{vertex } (-4, 0)$

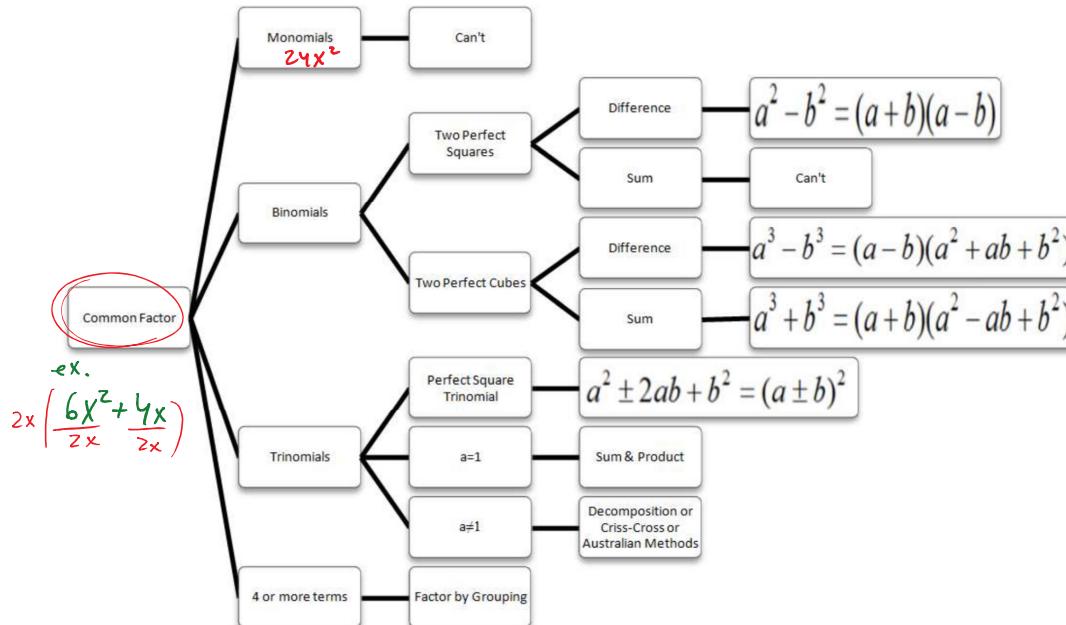
- 6.a) Find an algebraic expression for the area of the shaded region in factored form.



a) $A_{\text{shaded}} = (3x+4)^2 - (x-2)^2$

b) $= ((3x+4) + (x-2))((3x+4) - (x-2))$
 $= (3x+4 + x-2)(3x+4 - x+2)$
 $= (4x + 2)(2x + 6)$
 $= 4(2x+1)(x+3)$

DAY 7 – Mix of Factoring



Factor.

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

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

$$\begin{aligned}
 & 2. \quad 2 \left(\frac{12c^{10} - 26c^5 d^3 - 16d^6}{2} \right) \\
 & = 2(6c^{10} - 13c^5 d^3 - 8d^6) \quad \text{one neg.} \\
 & \downarrow \quad \begin{matrix} 1 \\ 6 \\ 6 \end{matrix} \quad \begin{matrix} (2) \\ (3) \end{matrix} \quad \begin{matrix} 8 & 4 \\ 1 & 2 \\ 8 & 4 \end{matrix} \quad \begin{matrix} (1) \\ 2 \\ 8 \end{matrix} \\
 & = 2(2c^5 + 1d^3)(3c^5 - 8d^3) \\
 & 3. \quad 25x^2 - 5x - 15xy + 3y
 \end{aligned}$$

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

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

$$(x^4 + 16y^4)(x^4 - 16y^4)$$

can't

$$(x^4 + 16y^4)(x^2 + 4y^2)(x^2 - 4y^2)$$

no neg ←

$$(x^4 + 16y^4)(x^2 + 4y^2)(x+2y)(x-2y)$$

can't
no even power
to split

Solve by factoring.

NOTES:

- Solve means find value for x (ANS: $x = \#$)
- Factor means to divide/split into brackets.
- If x appears once, you can find x by SAM DEB. (undo operations)
- If you see x^2 and x then ① get a \emptyset on one side
 ② Factor
 ③ solve using property of zero.

$$\text{7.) } 4x^2 - 1 = 0 \quad \begin{matrix} +1 \\ 4x^2 = 1 \\ \frac{4}{4} \\ x^2 = \frac{1}{4} \end{matrix} \quad \begin{matrix} \sqrt{x^2} = \pm \sqrt{\frac{1}{4}} \\ x = \pm \frac{1}{2} \end{matrix}$$

$$\text{8.) } x^2 = 3x + 18$$

$$\begin{matrix} 1 & -1 \\ -18 & 18 \end{matrix} \quad \begin{matrix} x^2 - 3x - 18 = 0 \\ \text{Sum} \quad \text{Prod} \end{matrix}$$

$$\begin{matrix} -2 & 2 \\ 9 & -9 \end{matrix} \quad (x-6)(x+3) = 0 \quad \text{prop. of zero}$$

$$\begin{matrix} 3 & -3 \\ -6 & 6 \end{matrix} \quad \begin{matrix} x-6=0 \\ x=6 \end{matrix} \quad \text{or} \quad \begin{matrix} x+3=0 \\ x=-3 \end{matrix}$$

$$\text{10.) } 6s^4 - 29s^2 + 35 = 0$$

$$\begin{matrix} 6 & 3 \\ 1 & 2 \end{matrix} \quad \begin{matrix} 1 & 2 \\ 6 & 3 \end{matrix} \quad \begin{matrix} -1 & -5 \\ -35 & -7 \end{matrix}$$

$$(2s^2 - 5)(3s^2 - 7) = 0$$

$$2s^2 - 5 = 0 \quad 3s^2 - 7 = 0$$

$$2s^2 = 5 \quad 3s^2 = 7$$

$$s^2 = \frac{5}{2} \quad s^2 = \frac{7}{3}$$

$$\therefore s = \pm \sqrt{\frac{5}{2}}$$

$$\text{12.) } 18x^2 - 9x - 2 = 0$$

$$\text{9.) } 3\left(\frac{9x^2}{3} - 30x - \frac{24}{3}\right) = 0$$

$$\begin{matrix} 3(3x^2 - 10x - 8) = 0 \\ 3 \quad \begin{matrix} 1 & 3 \\ 3 & 1 \end{matrix} \quad \begin{matrix} -10 & -8 \\ 1 & 1 \end{matrix} \end{matrix}$$

$$\text{one neg}$$

$$3(3x+2)(x-4) = 0$$

$$3 \neq 0 \quad 3x+2=0 \quad x-4=0$$

$$3x+2 \quad \begin{matrix} x=-\frac{2}{3} \\ x=4 \end{matrix}$$

$$\text{11.) } 3x^5 - 12x^2 = 0$$

$$(3x^2)(x^3 - 4) = 0 \quad \text{prop. of zero}$$

$$\begin{matrix} 3x^2 = 0 \\ x=0 \end{matrix} \quad \begin{matrix} x^3 - 4 = 0 \\ x^3 = 4 \\ x = \sqrt[3]{4} \end{matrix}$$

$$\text{13.) } 5x^2 + 70x = 225$$

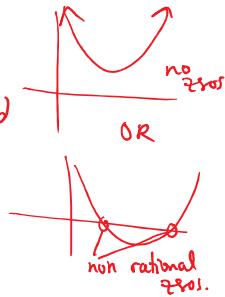
$$(14) 2\left(\frac{2x^2 + 6x + 56}{2}\right) = 0$$

$$2(x^2 + 3x + 28) = 0$$

$$\begin{array}{r} -4 \\ 7 \end{array}$$

we are stuck
for now need

**Quadratic
Formula**



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

$$15. 2\left(\frac{2a^2 + 12a + 18}{2}\right) = 0$$

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

$$\begin{array}{r} 3 \\ 3 \end{array}$$

$$2(a+3)^2 = 0$$

$$\begin{array}{r} a+3=0 \\ a=-3 \end{array}$$

$$(17) \frac{25 - 250x - x^2 + 10x^3}{25} = 0$$

$$25(1 - 10x) - x^2(1 - 10x) = 0$$

$$(25 - x^2)(1 - 10x) = 0$$

$$(5+x)(5-x)(1-10x) = 0$$

$$25 - x^2 = 0$$

$$\pm \sqrt{25} = \pm x^2$$

$$\pm 5 = x^2$$

$$\begin{array}{l} 5 = x^2 \\ -5 = x^2 \end{array}$$

$$\begin{array}{l} 1 - 10x = 0 \\ 1 = 10x \\ \frac{1}{10} = x \end{array}$$

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

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