PreCalculus UNIT A – part 1

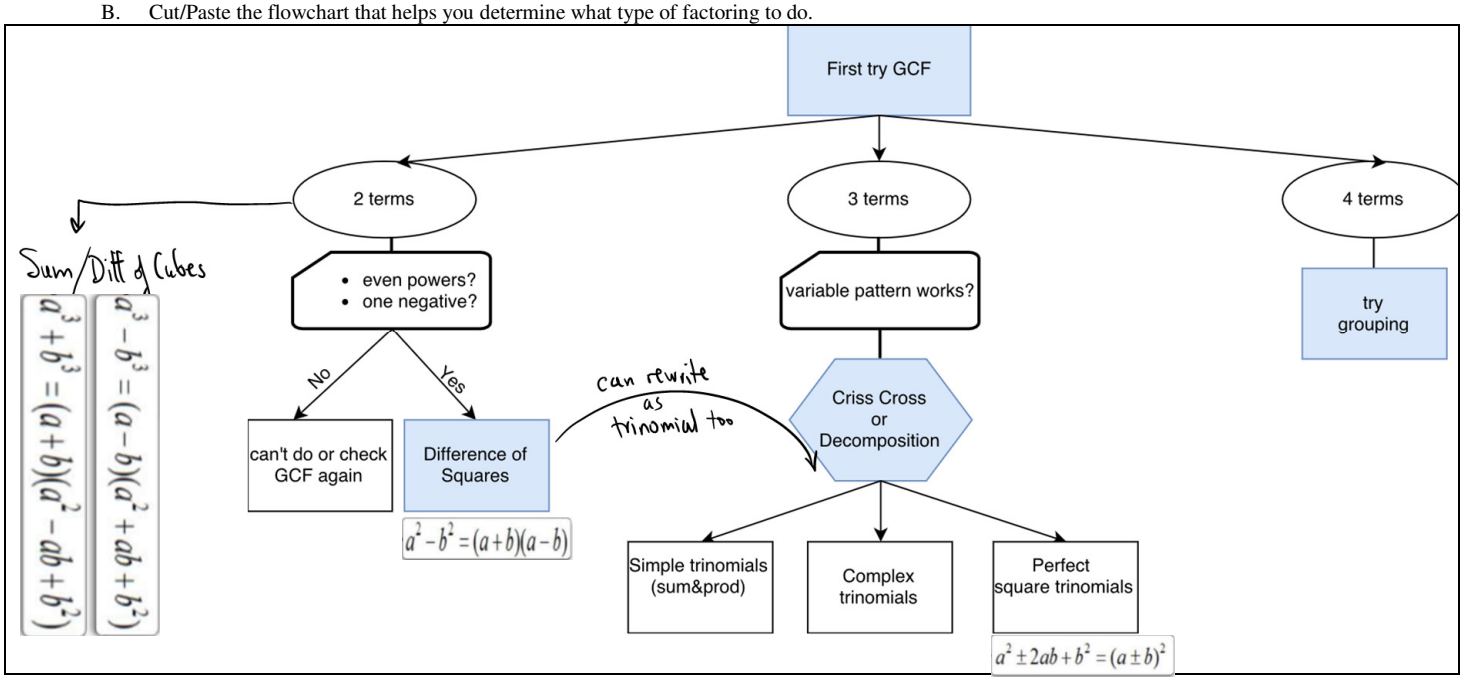
ALGEBRA – journal questions (MPM)

Summarize everything you need to know about these topics. Use examples and concise (not long – but with enough detail) explanations. Include definitions and diagrams if necessary

1. **EXPAND & SIMPLIFY POLYNOMIALS** Cut/Paste the following chart into your journal and fill it in.

Monomial with polynomial mult.	**TWO binomials multiplication**	**Any polynomial multiplication**	
a. $3x^2(2x-5x^2+4)$	b. $(2x-3)(5x+4)$	c. $(x^2+1)(x^3+2x^2-6)$	d. $3(4x-1)^2$
i. Show distributive algebra method ii. Show geometric representation of area diagram	i. Show distributive algebra method. Explain FOIL mnemonic. ii. Show geometric representation of area diagram	i. Show any method to expand and multiply. ii. Discuss why FOIL mnemonic doesn't help anymore	i. Explain why you cannot do exponent first. ii. Show TWO ways of dealing with coefficient 3

2. **FACTORING**
   - A. Describe the differences between **expanding** and **factoring**
   - B. Cut/Paste the flowchart that helps you determine what type of factoring to do.



Demonstrate how to factor by the following methods. Include examples and step by step explanations for ALL.

GCF:

make a notes on:
- what GCF stands for
- how GCF is found (discuss that you must look for **highest** common divisor of coefficients and **smallest** power on common base)
- if negative is 1st, you must pull it out
- proper way to record rough work (if you show division, must also multiply or question is changed)

C. $\frac{2}{3}a^3-\frac{1}{3}ab$

D. $-2x^3y^3+10x^2y^5-6x^6y^4$

Grouping:

make notes about
- how many terms this method is for
- group 2 terms and do GCF separately for each group
- the resulting brackets must be the same AND still have +/- between them
- last step will have the common bracket written once as GCF in front of the leftovers
- if you show division, you must also multiply
- explain why the repeating factor is not squared at the end

E. $5y(x-1)+2(1-x)$

F. $36n^3-27n^2-8n+6$

Simple Trinomial (SumProduct):

make a notes on:
- the variable pattern that makes this method doable
- the steps to follow
- how do you know if you are to use two positives, two negatives, or one of each (be specific that the Product number is KEY in deciding signs)

G. $x^2-12x+27$

H. x^2-x-72

Complex Trinomials:

make a note on:
- the steps to follow
- talk about reversing order of the list you make
- trial steps versus recording steps

I. $3x^2-10x-8$

J. $8x^2-22xy-21y^2$

Perfect Square Trinomials:

make a note on:
- the reason for the name "perfect square"
- record the formula one can follow
- what combination of factors should one start with to check if it is a perfect square

K. $16m^2b^2-40mb+25$

L. discuss how to find *b* so that the following factors over integers.

$9n^2+bnp+49p^2$

Difference of Squares:

make a note on:
- the reason for the name "difference of squares"
- record the formula one can follow

M. $36y^2-25x^4$

show how one can apply complex trinomial rules if you rewrite the question as a trinomial

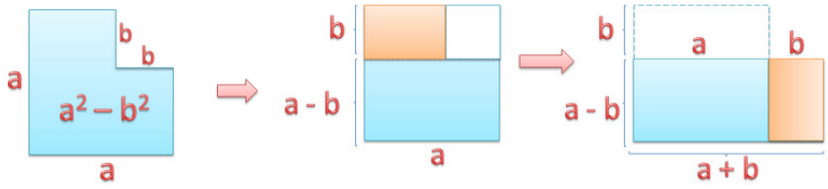
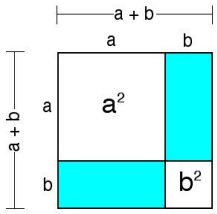
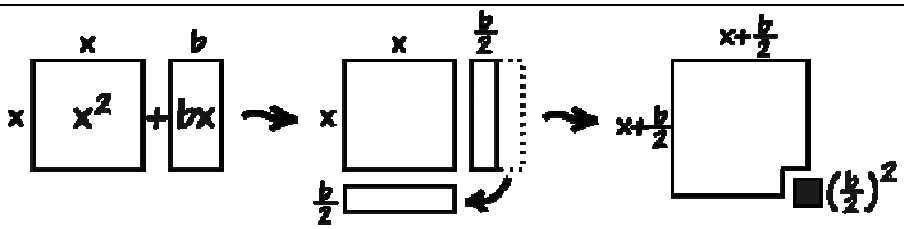
N. x^2-3

make a note how for this question, factoring over integers is impossible but over real numbers it is

O. $225-(x+5)^2$

explain steps of how to factor this without expanding first

3. Cut and paste the following diagrams and explain how they show the formulas visually

Not all expressions can be factored over the integers. Explain why the following will not factor.	**A.** x^2+x+1 Discuss combinations not working **B.** x^3+2x+1 Discuss variable patterns not working	
C. Difference of Squares Explain each operation in the formula below (why squared, why +/-, why multiplied in brackets) using the visuals provided $a^2-b^2=(a+b)(a-b)$		**For C. & D. you must include:** Shapes you see - squares - rectangles Words to use - area - dimensions - length - width How the area formula A=LW relates to formulas given
D. Perfect Square Trinomials Explain each operation in the formula below using the visuals provided $a^2\pm2ab+b^2=(a\pm b)^2$		
E. Completing the Square Explain how any rectangle can be reformed to be an 'almost square' using the visuals provided. Discuss what area should be added to make the 'almost square' a 'true square'. Be sure to include where (b/2)^2 comes from		

4. **COMPLETING THE SQUARE**

Describe the process of completing the square using the following examples

No Fractions Example	With Fractions Example
a. $2x^2+16x-8$	b. $-3x^2+9x-1$

c. Copy and paste the following. Read and fill in missing info.

EXPRESSION	**EQUATION**
• Has no equals in the original question • EX. Simplify $\frac{2}{5}+\frac{1}{3}$	• Has an equals sign • Solve $\frac{2}{5}x+\frac{1}{3}=10$
• Place an equals sign in front only, don't think there's anything on the other side (not even a zero, since it is not an equation that has both sides) • To maintain an equivalent expression, apply both the operation and its inverse to the whole expression. o multiply and divide by the same number = multiplying by ONE, o add and subtract the same number = adding ZERO • EX. Factor $24x^2+4x$	• Place an equals sign just ONCE per line (never in front) • To maintain an equivalent equation, apply same operation to EACH side (as a whole, not term by term – since some things can't distribute) o Multiplying and dividing distributes over +/- o Powers and roots can't be distributed over +/- • EX. Solve $\sqrt{x^2+5}=3+x$

d. Discuss how the completing the square process allows you to solve non linear equations like $2x^2+5x-3=0$. Show the solution. (Later we will learn quadratic formula to make our lives easier, but for now you need to know what's going on mathematically before short-cuts are introduced)