Key

Factors and Products

Key Ideas:

1. **Prime Factorization / GCF / LCM / Perfect Squares / Perfect Cubes**

   - **GCF (find the prime factors common in each number)**
   - **LCM (find the greatest power of each prime factor in any number)**
   - **perfect squares (divide prime factors into 2 equal groups)**
   - **perfect cubes (divide prime factors into 3 equal groups)**
   - **word problems (look for key words: greatest (GCF), smallest (LCM), etc.)**

2. **Multiplying Polynomials**

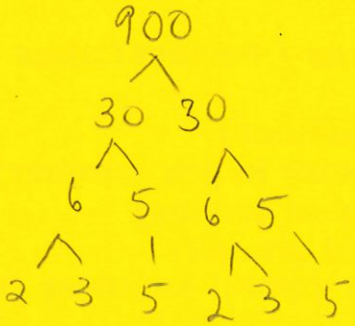
3. **Factoring**

   - **Common Factors**
   - **PSF – easy** $(a = 1)$
   - **PSF – hard** $(a \neq 1)$**, use shortcut:**
     - **Do PSF as normal**
     - **Find GCF of each factor and "a" term**
     - **Divide the factor by the GCF**
     - **Criss-cross**
   - **Difference of Squares**

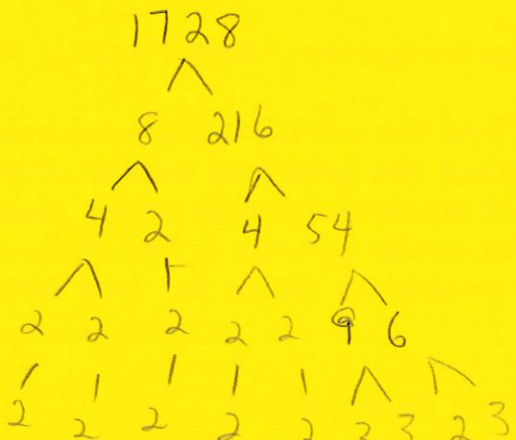
***Note: Watch your positive and negative signs!! Always simplify!**

Factors/Multiples/Perfect Squares/Perfect Cubes

1. Write the ***prime factorization*** for the numbers 900 and 1728.



$2^2 \cdot 3^2 \cdot 5^2$



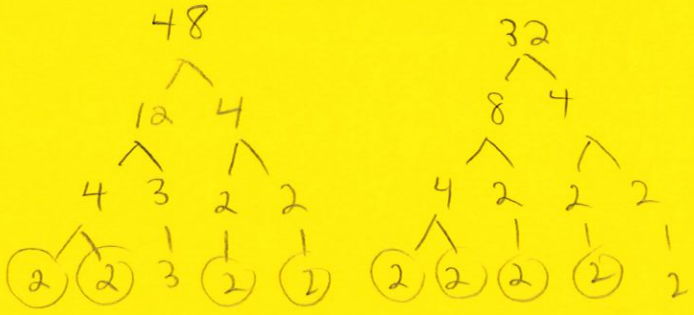
$2^6 \cdot 3^3$

a) Are these numbers ***perfect squares or cubes***?

900 is a perfect square since $(2 \cdot 3 \cdot 5)(2 \cdot 3 \cdot 5)$ are identical factors

1728 is a perfect cube since $(2 \cdot 2 \cdot 3)(2 \cdot 2 \cdot 3)(2 \cdot 2 \cdot 3)$ are identical factors

2. Two ropes are 48 m and 32 m long. Each rope is to be cut into equal pieces and all pieces must have the same length that is a whole number of metres. What is the greatest possible length of each piece?



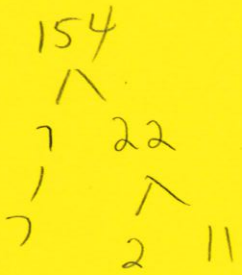
GCF $2^4 = 16$

3. Hamburger patties come in packages of 8. Buns come in packages of 6. What is the least number of hamburgers that can be made with no patties or buns left over?

LCM $2^3 \cdot 3 = 24$

4. Determine the ***Greatest Common Factor*** and ***Least Common Multiple*** for each set of numbers.

a) 84, 154



GCF $2 \cdot 7 = 14$

LCM $2^2 \cdot 3 \cdot 7 \cdot 11 = 924$

b) 63, 90, 150

GCF 3

LCM $2 \cdot 3^2 \cdot 5^2 \cdot 7 = 3150$

Multiplying Polynomials

5. ***Expand*** each of the following:

a) $(2x+5)(7x-3)$

$14x^2 - 6x + 35x - 15$

$14x^2 + 29x - 15$

b) $(x-8)^2$

$(x-8)(x-8)$

$x^2 - 8x - 8x + 64$

$x^2 - 16x + 64$

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

$2x^4 - 4x^3 + 2x^2 - 3x^3 + 6x^2 - 3x + 5x^2 - 10x + 5$

$2x^4 - 7x^3 + 13x^2 - 13x + 5$

d) $(2x-1)(x+4)-(x-8)(3x+2)$

$2x^2 + 8x - x - 4 - (3x^2 + 2x - 24x - 16)$

$2x^2 + 7x - 4 - (3x^2 - 22x - 16)$

$2x^2 + 7x - 4 - 3x^2 + 22x + 16$

$-x^2 + 29x + 12$

e) $(3x-4)^2 + (x-4)(2x+1)$

$(3x-4)(3x-4)$

$9x^2 - 12x - 12x + 16 + 2x^2 + x - 8x - 4$

$9x^2 - 24x + 16 + 2x^2 - 7x - 4$

$11x^2 - 31x + 12$

Factoring Polynomials

6. Factor: $3x^2y^5 - 12x^3y^3$

$3x^2y^3(y^2 - 4x)$

7. Factor: $x^2 + 5x - 24$

P -24
S 5
F 8, -3

$(x - 3)(x + 8)$

8. Factor: $6x^2 + 13x - 5$

P -30
S 13
F 15, -2
3 2

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

9. Factor: $100x^2 - 4y^4$

$(10x - 2y^2)(10x + 2y^2)$

10. Factor: $6x^2 - 22x + 12$

$2(3x^2 - 11x + 6)$

P 18
S -11
F -9, -2
3 1

$2(3x - 2)(x - 3)$

11. Factor: $2x^4 - 14x^2 + 20$

$2(x^4 - 7x^2 + 10)$

P 10
S -7
F -5, -2

$2(x^2 - 2)(x^2 - 5)$