FOM10 Name______________________________

Chapter 3 Part 1 Notes

3.1 – Factors and Multiples

Name:
Date:

Goal: to determine prime factors, greatest common factors, and least common multiples of whole numbers

Toolkit:	**Main Ideas:**
• Division • Multiplication • Writing repeated multiplication using powers, e.g. 2×2×2×2×2×2=	

Definitions

Factor – a term which divides evenly into another term

Prime number – when a number has only 2 distinct factors (1 and itself). **Examples:**

Composite number – when a number has more than 2 factors. **Examples:**

Prime factorization – a term written as a product of prime factors

every composite number can be expressed as a product of prime factors

Greatest common factor (GCF) – the largest term which will divide evenly into a series of separate terms

Least (or Lowest) common multiple (LCM) – the smallest multiple which is common to series of separate terms

Prime Factorization	Ex1) Write the prime factorization for each of the **composite** numbers: a) 3 b) 6 c) 45 d) 47 e) 3300
Finding the GCF by listing all the factors of each number (the rainbow method)	Ex2) Determine the greatest common factor of 126 and 144 **Method 1** – list all the factors and find the largest one in common *(write small!)*
Finding the GCF by writing the prime factorization of each number	**Method 2** 1) write the prime factorization for each number 2) highlight the factors that they have in common 3) multiply all the common factors together go get the GCF

Finding the LCM by listing the first multiples of each number	Ex3) Find the least common multiple of 28, 42, and 63 **Method 1** – list the first few multiples of each number until you find (the first, lowest) one in common
Finding the LCM by writing the prime factorization of each number	**Method 2** 1) write the prime factors of each number 2) highlight the greatest power of each prime in ANY of the lists 3) multiply the greatest powers of each prime together to get the LCM
What types of real-world problems involve GCFs and LCMs?	Ex4) Beside each problem, write whether you would need the GCF or the LCM, then answer the question! a) A bathroom wall (the part above the bathtub) is a rectangle that measures 78" by 60". If you wanted to cover it exactly with square tiles, what is the largest possible square tile you could use? b) You have red bungee cords that are 18cm long and green bungee cords that are 14cm long. What is the shortest length of connected bungees you can make with each colour so that they make the same length?

Reflection: How can you remember the difference between a factor and a multiple? Write (or make) a memory trick to help you.

3.2 – Perfect Squares, Perfect Cubes, and their Roots

Name:
Date:

Goal: to identify perfect squares and perfect cubes, and to find square roots and cube roots

Toolkit:

- Prime factorization – no calculator!
- The opposite operation of squaring is the square root:

$$5^2 = 25 \text{ and } \sqrt{25} = 5$$

- The opposite operation of cubing is the cube root:

$$2^3 = 2 \times 2 \times 2 = 8 \text{ and } \sqrt[3]{8} = 2$$

Main Ideas:

What is a Perfect Square?

A **perfect square** is a number that can be written as the product of 2 equal factors.

This means you can represent it as the **AREA OF A SQUARE!** $A = b \times b = b^2$

Picture an actual square! The **square root** is the side length of the square

Determining a Square Root

Ex1) Determine the square root of 1296.
Step 1: Write 1296 as a product of its prime factors

Step 2: Re-order the prime factors into TWO identical groups. (If you can't, your number is NOT a perfect square).

Step 3: Multiply out each "group" again to see what number it represents

Since 1296 can be written as the product of TWO equal factors: ____ × ____, it can be represented as the area of a square.

The square root of 1296 is _____.

We write $\sqrt{1296} =$

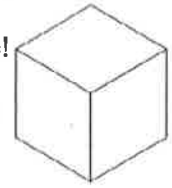
Terminology: radical, radicand, index:

$$\sqrt{1296}$$

What is a Perfect Cube?

A **perfect cube** is a number that can be written as the product of 3 equal factors.

This means you can represent it as the **VOLUME OF A CUBE!** $V = e \times e \times e = e^3$

Picture an actual cube!  The **cube root** is the edge length of the cube.

Determining a Cube Root

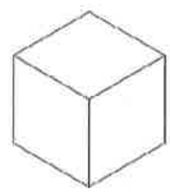
Ex2) Determine the cube root of 1728.
Step 1: Write 1728 as a product of its prime factors

Step 2: Re-order the prime factors into THREE identical groups. (If you can't, your number is NOT a perfect cube).

Step 3: Multiply out each "group" again to see what number it represents

Since 1728 can be written as the product of THREE equal factors: ____ × ____ × ____, it can be represented as the volume of a cube.

The cube root of 1728 is _____.



We write $\sqrt[3]{1728} =$

radical, radicand, index?

Extend your thinking:

Ex3) Determine the edge length of a cube with volume $64x^6$.

Reflection: How could you ESTIMATE the square root or cube root of a number? (Think back to math 9?)

3.7A – Multiplying Monomials & Binomials

Name:
Date:

Goal: to expand monomial and binomial products (multiply out!)

Toolkit:

- Adding, subtracting, multiplying polynomials
- Multiplying powers with the same base: add the exponents

  Ex: $(x^3)(x^4) =$
- Collecting like terms: same variable(s) with same exponents

  Ex: $2x^2 + 3x - x^2 + 2x + 1 =$

Main Ideas:

Definitions

Polynomial –

Monomial – Binomial – Trinomial –

Ex1) Expand and simplify → translates to:

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

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

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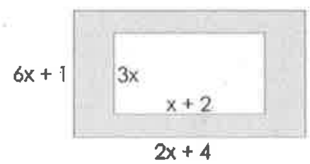
...Expand and simplify

c) $(2y + z)(3y - 2z)$

d) $(2a - 1)(2a + 3) + (a - 1)(a - 2)$

Ex2) Find the area of the shaded region (simplified!):



Reflection: Why can you only collect LIKE TERMS? You may wish to use an example to help you explain.

3.7B – Multiplying Polynomials

Name:
Date:

Goal: to expand and simplify polynomials with more than 2 terms

Toolkit:

- FOIL
- Adding, subtracting, multiplying polynomials
- Multiplying powers with the same base: add the exponents
- Collecting like terms: same variable(s) with same exponents

Main Ideas:

Ex1) Expand and simplify:

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

b) $(x + 2)^3$

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