

Chapter 3 Part 1 Notes

STUDENT COPY

Final Mark: /8

Marks → Requirement ↓	2	1	0
Notes Present	All notes present	Most notes present	Less than half of notes present
Organization / Neatness	Notes in chronological order, name and date on everything	Almost all notes in chronological order, name and date on most pages	Mostly out of order, name and date often missing
Questions	Question column completed on all notes, higher level questions attempted	Most question columns complete, some higher level questions	Less than half of the question columns complete
Main Ideas and Reflections	All 'main ideas' and 'reflections' complete <u>with care</u> in notes	Most 'main ideas' and 'reflections' complete in notes	Less than half of the 'main ideas' and 'reflections' complete

*If your mark does not total up to at least 4 out of 8, your notes are INCOMPLETE and must be fixed up as soon as possible and re-evaluated.

TEACHER COPY

Final Mark: /8

Marks → Requirement ↓	2	1	0
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3.1 – Factors and Multiples

Name:

Date:

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

Toolkit:

- Division
- Multiplication
- Writing repeated multiplication using powers,
e.g. $2 \times 2 \times 2 \times 2 \times 2 =$

Main Ideas:

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

Finding the LCM
by writing the prime
factorization of each
number

What types of real-
world problems
involve GCFs and
LCMs?

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

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

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:
 $5^2 = 25$ and $\sqrt{25} = 5$
- The opposite operation of cubing is the cube root:
 $2^3 = 2 \times 2 \times 2 = 8$ 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: _____ \times _____, it can be represented as the area of a square.

The square root of 1296 is _____.

We write $\sqrt{1296} =$



Terminology: radical, radicand, index:

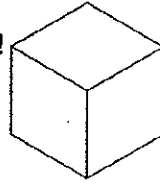
$$\sqrt{1296}$$

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).

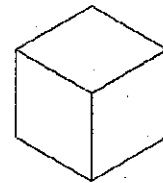
Step 3: Multiply out each "group" again to see what number it represents

Since 1728 can be written as the product of **THREE** equal factors: $\underline{\quad} \times \underline{\quad} \times \underline{\quad}$, it can be represented as the volume of a cube.

The cube root of 1728 is $\underline{\quad}$.

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

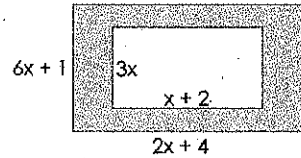
F O I L

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