

Important Concepts . . .

# Preview Review



**Mathematics    Grade 9**  
**W1 - Review**

## Important Concepts of Grade 9 Mathematics

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## Materials Required

Pencil  
Paper  
Calculator

## No Textbook Required

**This is a stand-alone course.**

## Mathematics Grade 9

### Version 6

### Preview/Review W1 - Review

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# Preview/Review Concepts for Grade Nine Mathematics



***W1 – Review***



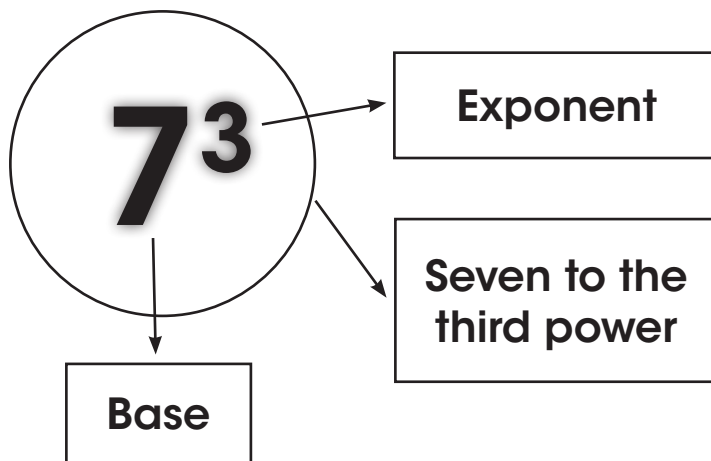
## W1 – Review

### Materials required:

- Paper, Pencil, and Calculator

### Part 1: Powers

Powers have two parts: a base and an exponent.



In this example, the repeated multiplication sentence is:

$$7^3 = 7 \times 7 \times 7$$

## Practice Questions

1. Complete the chart.

Power	Base	Exponent	Repeated Multiplication	Value
$7^4$				
			$3 \times 3 \times 3$	
	$(-5)$	6		
			$-(h \times h \times h \times h)$	
	4			64

2. Explain the following:

a.  $(-5) \times (-5) \times (-5) \times (-5) \neq -5^4$

b.  $-3^4 \neq 81$

\_\_\_\_\_

\_\_\_\_\_

## Part 2: Laws of Exponents

The **Product Law** can be written as:

$$x^a x^b = x^{a+b}$$

### Example

$$(5^4)(5^3) = 5^7$$

**Note:** The rules only work when multiplying powers of the same base.

Combining powers with different bases but the same exponent can be written as:

$$x^a y^a = (xy)^a$$

### Example

$$\begin{aligned}(4)^3(5)^3 &= (4 \times 5)^3 \\ &= 20^3\end{aligned}$$

The **Division Law** can be written as:

$$\frac{x^a}{x^b} = x^a x^{-b} = x^{a-b}$$

### Example

$$\frac{x^8}{x^6} = x^{8-6} = x^2$$

**Note:** The rule above works only when dividing powers of the same base.

Combining powers with different bases but the same exponent can be written as:

$$\frac{x^a}{y^a} = \left( \frac{x}{y} \right)^a$$

**Example**

$$\frac{x^5}{y^5} = \left( \frac{x}{y} \right)^5$$

The **Power of a Power Rule** can be written as:

$$\left( x^a \right)^b = x^{ab}$$

**Example**

$$\begin{aligned} &\text{Simplify } (-5^3)^2 \\ &= (-5^3) (-5^3) \text{ or } (-5)^{3 \times 2} \\ &= (-5)^6 \end{aligned}$$



**Practice Questions**

1. Evaluate each of the following.

a.  $3^4$

\_\_\_\_\_

b.  $(-2)^3$

\_\_\_\_\_

c.  $-5^2$

\_\_\_\_\_

d.  $10^5$

\_\_\_\_\_

2. Simplify each of the following.

a.  $(d^5)(f^5)$

\_\_\_\_\_

b.  $(8^4)(6^4)$

\_\_\_\_\_

c.  $(5^6)(3^6)$

\_\_\_\_\_

d.  $(6^4)(7^4)$

\_\_\_\_\_

3. Simplify each of the following.

a.  $(h^5) \div (k^5)$

\_\_\_\_\_

b.  $(3^4) \div (6^4)$

\_\_\_\_\_

4. Simplify the following.

a.  $\frac{(8^2)(8^5)(8^{-3})}{(8^3)}$

---

b.  $\frac{(6^7)(6^2)}{(6^2)}$

---

## Part 3: Rational Numbers

- A **rational number** is any number that can be written as a ratio of two integers.
- Every **integer** is a **rational number**. Example:  $5 = \frac{5}{1}$  and thus 5 is a rational number.
- All **terminating and repeating decimals** are **rational numbers**.  
Example: 0.75,  $0.\dot{3}$  or  $0.\overline{3}$

### Converting Fractions to Decimals

To calculate the decimal equivalent of a fraction, take the numerator and divide it by the denominator of a fraction.

#### Example

$$\frac{1}{4} \text{ means } 1 \div 4 = 0.25$$

### Converting Decimals to Fractions

To calculate the fractional equivalent of a decimal, place the decimal over 10, 100, or 1000 . . . etc. Then reduce to lowest terms:

#### Example

$$0.25 \text{ means } \frac{25}{100}$$

$$\begin{aligned} \text{Then reduce to lowest terms } 25 \div 25 &= 1 \\ 100 \div 25 &= 4 \end{aligned}$$

## Comparing Rational Numbers

To compare fractions, express them as equivalent fractions with a common denominator.

### Example

$$-\frac{1}{3} \xrightarrow[\times 6]{\times 6} -\frac{6}{18}$$

Using decimals to compare rational numbers is also possible.

### Example

Compare:  $-\frac{1}{3}$  and  $-\frac{8}{18}$

Convert to decimals:  $-0.333 \dots > -0.444 \dots$

Therefore:  $-\frac{1}{3}$  is the greater fraction.

Using a number line is a strategy to identify a rational number between two given rational numbers.

## Comparing and Ordering Rational Numbers

Step 1: Convert all fractions to decimals to compare.

Step 2: Order the decimals.

Step 3: Use the converted decimals to place the dots on a number line.

Step 4: Put the converted decimals back to fractional form.

Step 5: Use the original numbers given to label the dots on a number line.

**Practice Questions**

1. Write each decimal as a fraction. Express each answer in reduced form.

a. 0.68

b.  $-0.\overline{6}$

2. Write each fraction as a decimal.

a.  $-\frac{8}{18}$

b.  $2\frac{2}{5}$

3. Convert each set of numbers to equivalent fractions. Then indicate which one is greater by using  $>$  or  $<$ .

a.  $-\frac{8}{18}$        $-\frac{3}{9}$

b.  $\frac{3}{4}$        $\frac{2}{3}$

4. Convert each set of numbers to decimals. Then indicate which one is greater by using  $>$  or  $<$ .

a.  $2\frac{2}{5}$        $2\frac{3}{8}$

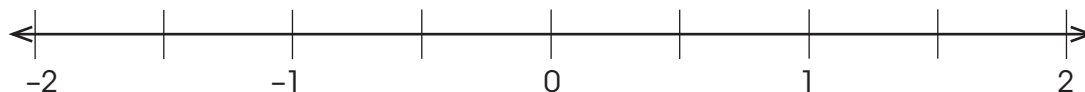
b.  $-1\frac{2}{7}$        $-1\frac{3}{8}$

\_\_\_\_\_

\_\_\_\_\_

5. Order each set from least to greatest and place them on a number line.

$0.9, \frac{1}{5}, -0.\bar{7}, 1\frac{1}{7}, \frac{7}{10}, -\frac{3}{8}$



6. Identify a decimal number between each pair of rational numbers.

a.  $\frac{21}{30}$        $\frac{95}{98}$

b.  $-\frac{5}{11}$        $-\frac{2}{7}$

7. Identify a fraction between each pair of rational numbers.

a. 0.79 and 0.99

b. 0.232 and 0.4

## Part 4: Order of Operations

### Adding and Subtracting Integers

- Look for pairs of opposite integers that can cancel each other out.
- Try rearranging the question so the positive and negative integers are together.

### Adding and Subtracting Fractions

- First find a common denominator.

### Adding and Subtracting Decimals

- Stack up the decimals, then find the sum or difference.

### Multiplying and Dividing Fractions

- When multiplying fractions, multiply the numerators first, then multiply the denominators. Convert any mixed numbers to improper fractions.
- When dividing fractions, multiply the first term by the reciprocal of the second term. Convert any mixed numbers to improper fractions.

### Order of Operations

- Operations must be completed in a particular order: BEDMAS.

1. Evaluate the following.

a.  $-2.3 + [1.5 - (-4.3)] \div (-0.4)$

b.  $\frac{3}{4} + \frac{5}{8} \times \left(-\frac{1}{2}\right)^3$

c.  $3 + \left[\frac{5}{8} - \frac{1}{2}\right]^2 \div \frac{2}{8}$

## Part 5: Square Roots of Rational Numbers



A square root is the number being multiplied by itself that results in a specific number.



$\sqrt{\quad}$  is the symbol that represents a square root.

Only perfect squares will have square roots that are whole numbers.

### Example

What is  $\sqrt{9.61}$ ?

On a calculator, type  

Note: Some calculators require the symbol to be entered after:  

The screen will show an answer of 2.5709920 . . .

So  $\sqrt{9.61} \div 2.57$



**Practice Questions**

1. Determine the square roots of the following numbers using a calculator. Round your answer to the nearest hundredth when necessary.

a.  $\sqrt{4.5} \doteq$  \_\_\_\_\_

b.  $\sqrt{18.25} \doteq$  \_\_\_\_\_

c.  $\sqrt{\frac{36}{81}} =$  \_\_\_\_\_

d.  $\sqrt{\frac{49}{100}} =$  \_\_\_\_\_

2. Solve the following.

a.  $\sqrt{900} - 2^4 \times (6^2 \div 4)^2$

b.  $\sqrt{m} + 2p$ , if  $m = 144$  and  $p = -2$





