Important Concepts . . .

Preview Review

Mathematics Grade 9

W1 - Review

V6-11

Important Concepts of Grade 9 Mathematics

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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Publisher: Alberta Distance Learning Centre
Written by: Lynee Fyfe
Reviewed by: Danielle Winter

Project Coordinator: Danielle Winter
Preview/Review Publishing Coordinating Team: Julie Reschke

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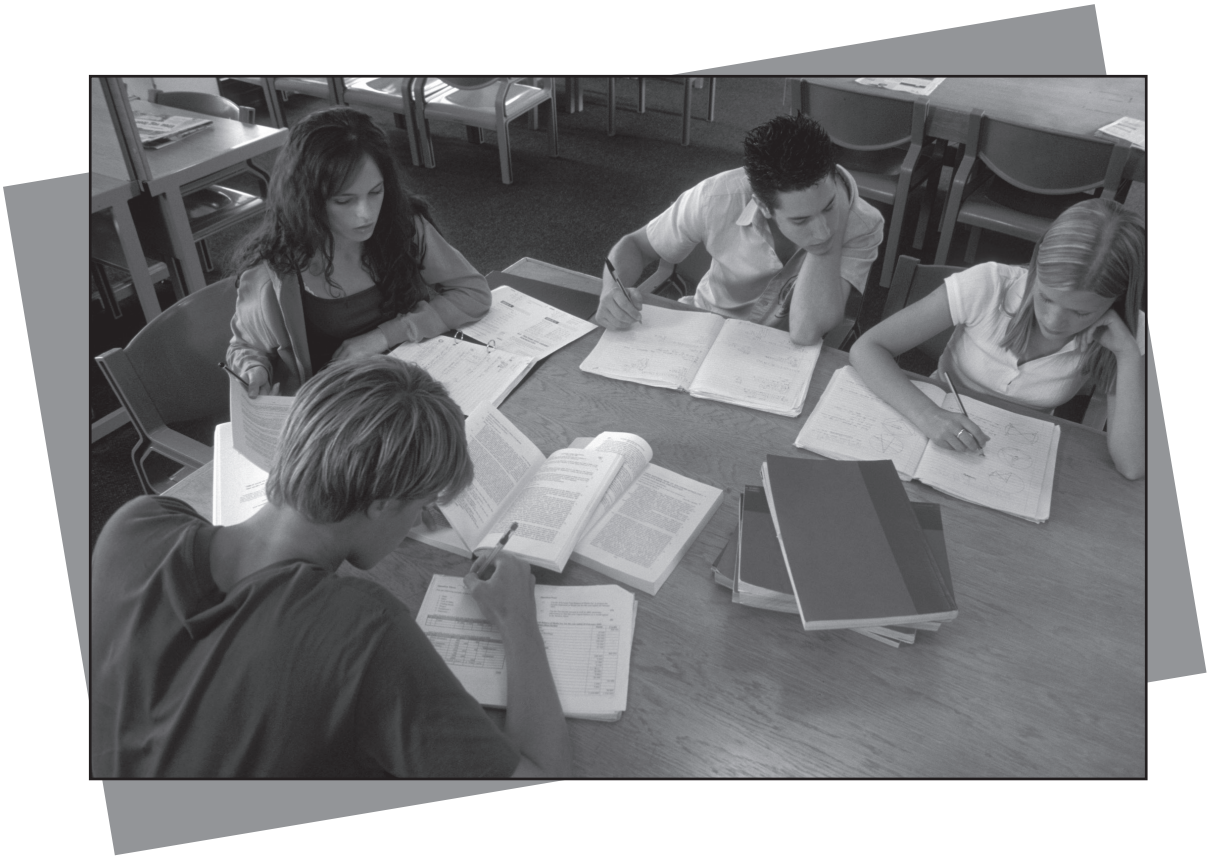
Preview/Review Concepts for Grade Nine Mathematics



W1 – Review

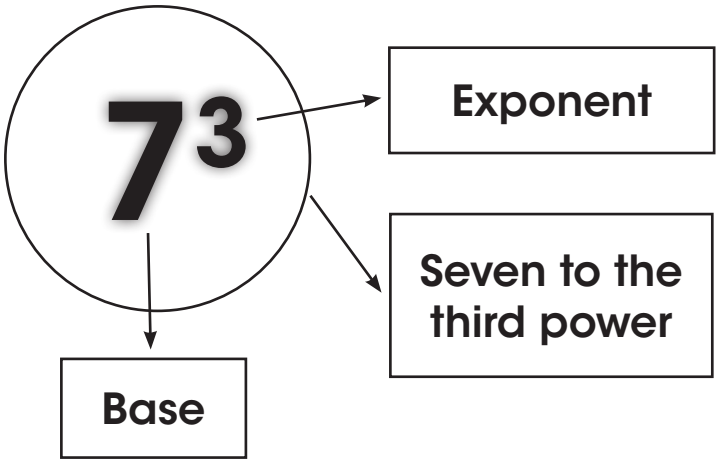
W1 – Review

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 Mulitplication	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

$(4)^3(5)^3 = (4\times5)^3$
$= 20^3$

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

Simplify $(-5^3)^2$
$= (-5^3)\,(-5^3)$ or $(-5)^{3\times 2}$
$= (-5)^6$

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

$\frac{1}{4}$ means $1 \mid 4 = 0.25$

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 means $\frac{25}{100}$

Then reduce to lowest terms $25 \div 25 = 1$

$100 \div 25 = 4$

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: $-0.333\ldots > -0.444\ldots$

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

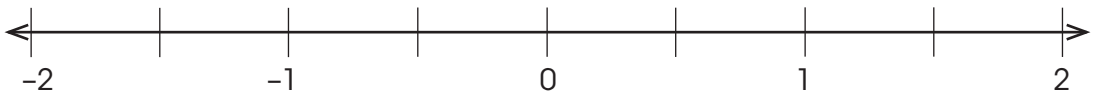
4. Convert each set of numbers to decimals. Then indicate which one is greater by using > or <.

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.

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



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

   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.

$\sqrt{\ }$ 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 $\sqrt{\ }$ 9.61

Note: Some calculators require the symbol to be entered after: 9.61 $\sqrt{\ }$

The screen will show an answer of 2.5709920 . . .

So $\sqrt{9.61} \doteq 2.57$

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

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