

## Rational Numbers Grade 9

### Learning Outcomes

A3: Compare and order rational numbers (fraction and decimals) and solve problems with decimals and fractions

A 4: Understand order of operations

A5: Find the square root of positive perfect squares

A6: Find the square root of non - perfect squares

Concept	Explanation	Example
<b>Rational numbers</b>	Any positive or negative number that can be written as a fraction. This includes repeating decimals, decimals, mixed numbers, positive and negative fractions, integers, percent	
<b>Equivalent Fractions</b>	Fractions of equal value. They represent the same rational number.	$\frac{1}{2} = 0.5$
<b>Opposite Rational Numbers</b>	Opposite rational numbers are equal distance from zero	6 & - 6 are opposites
<b>Change a fraction to a decimal</b>	Divide the numerator by the denominator To compare fractions to decimal fractions it is easiest to make all the numbers decimals. Do not forget to look at the signs.	$\frac{7}{8}$ Can be written as a decimal by $7 \div 8 = 0.875$
<b>Brackets</b> When brackets are next to each other you multiply	1. $(4)(6) = 24$ 2. $(3 + 5)(7 - 2) =$ $(8)(5) = 40$ 3. $-\left(\frac{5}{10}\right)$ means $-1 \times \frac{5}{10}$	
<b>Multiplying &amp; Dividing Integers</b>	Same signs the answer is positive  Different signs the answer is negative	$(-8)(-7) = +56$ $(-8)(7) = -56$ $56 \div (-7) = (-8)$
<b>Adding &amp; Subtracting Integers</b>	If the signs are the same add the numbers If the signs are different subtract the smaller number from the larger number. The sign from the larger number determines the sign in the answer. To subtract change the question to an addition question by adding the opposite and then follow the rules for addition	$(-4) + (-8) = (-12)$ $(-4) + (7) = 3$  $6 - 7$ becomes $6 + (-7)$ $-6 - 5$ becomes $-6 + (-5)$ $-6 - (-9)$ becomes $-6 + (+9)$
<b>Adding &amp; Subtracting Fractions</b>	To add or subtract fractions there must be a common denominator. (Hint: change all mixed numbers to improper fractions before adding and subtracting)	All answers must be in lowest terms and no improper fractions
<b>Multiplying Fractions</b>	Multiply across by multiplying the numerators and then the denominators. (Hint: change all mixed numbers to improper fractions)	All answers must be in lowest terms and no improper fractions

<b>Dividing Fractions</b>	To divide fractions invert (flip) the divisor (second fraction) and then multiply (Hint: change all mixed numbers to improper fractions)	All answers must be in lowest terms and no improper fractions
<b>BEDMAS - Order of Operations</b>	Brackets Exponents Division and multiplication in order when it comes from left to right Addition and subtraction in order when it comes from left to right	$\frac{3}{4} + \frac{1}{2} \times \frac{2}{6} =$
<b>Squaring a number</b>	Multiplying a number by itself. Example: $5 \times 5$ ( $5^2 = 25$ )	The area of a square is $s^2$ To find the area - square the side length
<b>Square root</b>	The <u>factor</u> which multiplies by itself to make the given number. The square root of $\sqrt{64}$ is 8 or -8	To find the side length of a square find the square root of the area
<b>A perfect square</b>	The product of two equal rational numbers. 0.25 is a perfect square because $0.5 \times 0.5 = 0.25$ . The fraction $9/16$ is a perfect square because $\frac{3}{4} \times \frac{3}{4} = 9/16$	Perfect squares are 1,4,9,16,25,36,49,64,81,100,121,144,etc
<b>Mean (average)</b>	Average = Total of the scores $\div$ the number of scores $A = \frac{TS}{NS}$	
<b>Median</b>	The middle score. Half the scores are higher and half the scores are lower To find the median place scores in order from least to greatest and find the middle .	
<b>Range</b>	The difference between the highest score and the lowest score.	To find the range subtract the lowest score from the highest score.
<b>Pythagoras Theory</b> $A^2 + b^2 = c^2$	Substitute Square Add or subtract Square root to find the value of a, b or c	Side c is always the hypotenuse which is across from the right angle
<b>Decimals</b>	To add and subtract decimals line up the decimal points. $8.75 + .096 =$  Multiply like normal multiplication and then use logic by estimating the answer or count decimal places. $1.2 \times .004 =$  To divide make sure there are no decimals in the divisor. Multiply the divisor by a power of ten and do the same to the dividend. $34.2 \div .03 =$	