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Math Common Core 8Th Grade (Quick Study: Academic)

Math Common Core State Standards 8th Grade

The number system, exponents, radicals, functions, linear equations, transformations, geometry, statistics & more

THE NUMBER SYSTEM

Set of Rational Numbers

Rational number: Any number that can be written as a ratio of two integers, rational numbers include:

- Fractions: $\frac{3}{2}, \frac{3}{4}, \frac{7}{8}, -\frac{33}{3}, \frac{1}{17}$
- Decimals:
 - Terminating decimals: 3.5, 0.6, -7.3
 - Repeating decimals: 0.7, $1.\overline{333}$, $-2.\overline{75}$
- Natural numbers: All the counting numbers 1, 2, 3, 4, 5, ...
- Whole numbers: All the counting numbers plus 0 0, 1, 2, 3, 4, ...
- Integers: All whole numbers and their opposites -3, -2, -1, 0, 1, 2, 3, ...

Tip! Numbers that are not rational are called **irrational**.

Set of Irrational Numbers

Irrational numbers: Nonterminating and nonrepeating decimals, such as π ; irrational numbers cannot be written as the ratio of two integers. NOTE: An ellipsis (...) indicates that the number does not terminate.

$\sqrt{2} = 1.41421356...$
 $\sqrt{6} = 2.4494897...$

All non-perfect-square numbers have irrational square roots.
 $\sqrt{5} = 2.23606...$

Common Irrational Numbers

$\pi = 3.1415926...$
 $e = 2.718281...$
 $\phi = 1.618033...$
 $\sqrt{2} = 1.4142135...$

Tip! Real numbers = Set of rational numbers + Set of irrational numbers.

Converting Fractions & Decimals

Every number has a decimal expansion.

EX: Write $\frac{37}{100}$ as a fraction.

$\frac{37}{100} = \frac{37}{100}$

Write $\frac{11}{20}$ as a decimal.

$\frac{11}{20} = 0.55$

Write $\frac{-3}{25}$ as a decimal.

$\frac{-3}{25} = -0.12$

Tip! To convert a decimal to a fraction, the number after the decimal point is the numerator, and the place value of the decimal's last digit is the denominator.

EXPONENTS & POWERS

Exponent: The number of times the base is multiplied by itself; the number of times the base is a factor.

EX: $a^4 = 4 \cdot a \cdot a \cdot a \cdot a$

$$\frac{1}{a^3} = \frac{1}{a \cdot a \cdot a} = \frac{1}{a^3}$$

Degree of exponent: x and y are the same; that is, they are both first degree, $x^2 =$ second degree, etc.

Zero exponents: Any non-zero base to the 0 power always equals 1.
 $a^0 = 1$, if $a \neq 0$

EX: $4^0 = 1$
 $m^0 = 1$, when $m \neq 0$
 $(3xy)^0 = 1$, when $x \neq 0$ and $y \neq 0$

Negative exponents: Any base with a negative exponent, indicates a fraction value.

EX: $a^{-2} = \frac{1}{a^2}$, $a^{-3} = \frac{1}{a^3}$, $(3 + 2)^{-2} = \frac{1}{(3 + 2)^2}$

Adding and subtracting with exponents: Add or subtract coefficients of the terms with the same base and exponent.

EX: $2a^2 + 5a^2 = 7a^2$

Multiplying with exponents: Add exponents if the bases are the same; simplify any coefficients.

$a^m \cdot a^n = a^{m+n}$

EX: $(2a^2)(3a^3) = 12a^5$
 $6^2 \cdot 6^3 = 6^5$
 $\left(\frac{2}{3}\right)\left(\frac{3}{4}\right)\left(\frac{4}{5}\right) = \left(\frac{2}{5}\right)$

Power of a power: Multiply the exponents.

$(a^m)^n = a^{m \cdot n}$

EX: $(3^2)^3 = 3^6$
 $(2^3)^2 = 2^6$
 $(3xy)^2 = 9x^2y^2$

Dividing with exponents: Subtract exponents that have the same base.

$a^m \div a^n = a^{m-n}$

EX: $\frac{12a^5}{3a^2} = 4a^3$
 $\frac{-15a^4b^3}{-3a^2} = 5a^2b^3$

Tip! Power of a product: $(ab)^n = a^n b^n$
 Power of a quotient: $\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$, $b \neq 0$

Scientific Notation & Powers of 10

- Used to represent very large and very small numbers.
- Form of writing numbers using powers of 10.

EX: $2,000,000,000 = 2 \cdot 10^9$
 $100,000 = 10^5$
 $10,000 = 10^4$
 $1,000 = 10^3$

Scientific Notation for Large Numbers

For very large numbers, the power is positive.

EX: $2,000,000,000 = 2.000,000,000 \cdot 10^9$

- Move the decimal point to the left to get 2.00 (a number between 1 and 10).
- Count the number of places the decimal point moved.
- Use the power of 10 to represent the number $2.00 \cdot 10^9$.

Scientific Notation for Small Numbers

For very small numbers, the power is negative.

EX: 0.0000073

- Move the decimal point to the right to get 7.3 (a number between 1 and 10).
- Count the number of places the decimal point moved.
- Use the power of 10 to represent the number $7.3 \cdot 10^{-6}$.

Operations with Scientific Notation

Use properties of exponents to solve problems involving scientific notation.

EX: $(2.5 \cdot 10^3)(4.7 \cdot 10^{-5}) = 25.75 \cdot 10^{-2} = 2.575 \cdot 10^1$

$2.8 \cdot (5.2 \cdot 10^{-3}) = 12.46 \cdot 10^{-3} = 1.246 \cdot 10^{-2}$

$\frac{8.22 \cdot 10^5}{6.3 \cdot 10^2} = \frac{8.22}{6.3} \cdot \frac{10^5}{10^2} = 1.30 \cdot 10^3$

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Synopsis

The Common Core State Standards for mathematics are a set of expectations and skills that students need to master to succeed in college and the real world. The Math Common Core series aligns with those specific standards to help guide students through their classes. Each guide in the series features real-world problems and examples, illustrations, and tables to help students retain information. The Math Common Core Standards 8th Grade QuickStudy® guide focuses on the critical areas of the curriculum so that students can develop fluency and understanding.

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Customer Reviews

decent chart, but it really just makes the parent feel better knowing that it's there and the kid just ignores it.

I've always loved these quick study guides and this one doesn't disappoint. Nicely laid out with skills that are covered for each grade level.

Thank you for this! This has been really helpful to my kids at work for homework! Order was received quickly! Thanks!

This is a great HANDY little reference about the CC standards. It's much easier than referring to the Teacher's Editions of books which are always unwieldy.

Helps me as a parent with my 6th grader's advance math.

Informative

good

This is really helping my child especially without the class having a book or internet site to reference. Really is a good little study guide with basic descriptions and examples.

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