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

WORLD'S OF ACADEMIC QUESTIONS  
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## Math Common Core State Standards 8th Grade

The number system, equations, 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:  $\frac{1}{2}, \frac{3}{4}, \frac{7}{8}, -\frac{35}{5}, \frac{1}{5}, \frac{12}{17}$
- Decimals:
  - Terminating decimals: 3.5, 0.6, -7.3
  - Repeating decimals: 0.7, 1.333..., -2.777...
- 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  $\pi$ ; irrational numbers cannot be written as the ratio of two integers; NOTE: An ellipsis (...) indicates that the number does not terminate.

$\sqrt{3} = 1.7320508...$   
 $56.7845375...$

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  $\frac{15}{100}$  as a fraction.  
 $\frac{15}{100} = \frac{3}{20}$

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:  $4^3 = 4 \times 4 \times 4 = 64$

$$\frac{1}{2^3} = \frac{1}{2 \times 2 \times 2} = \frac{1}{8}$$

**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:  $6^0 = 1$   
 $m^0 = 1$ , when  $m \neq 0$   
(Any) $^0 = 1$ , when  $x \neq 0$  and  $y \neq 0$

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

EX:  $4^{-3} = \frac{1}{4^3}, a^{-2} = \frac{1}{a^2}, (x+y)^{-1} = \frac{1}{(x+y)}$

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

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

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

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

EX:  $(2x^2)(3x^2) = 12x^4$   
 $6^3 \times 6^1 = 6^4$   
 $(\frac{2}{4})^3 (\frac{3}{4})^3 = (\frac{6}{4})^3$

**Power of a power:** Multiply the exponents.  
 $(a^m)^n = a^{m \times n}$

EX:  $(6^2)^3 = 6^6$   
 $6^2 \times 6^3 = 6^5$   
 $(3y^2)^3 = 3^3 y^6$

**Dividing with exponents:** Subtract exponents that have the same base.  
 $a^m \div a^n = a^{m-n}$

EX:  $\frac{12a^8}{3a^3} = 4a^5$   
 $\frac{-4a^5 a^6}{-2a^3} = 2a^8$

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

**Scientific Notation & Powers of 10**  
Use to represent very large and very small numbers.  
Form of writing numbers using powers of 10.  
EX:  $1,000,000,000 = 10^9$   
 $100,000 = 10^5$   
 $10,000 = 10^4$   
 $1,000 = 10^3$

**Scientific Notation for Large Numbers**  
For very large numbers, the power is positive.  
EX:  $2,000,000,000 = 2,000,000,000 \times 10^0$   
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:  $2.00 \times 10^9$

**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:  $7.3 \times 10^{-6}$

**Operations with Scientific Notation**  
Use properties of exponents to solve problems involving scientific notation.  
EX:  $(2.5 \times 10^3)(4.7 \times 10^{-1}) = 21.75 \times 10^2 = 2,175 \times 10^0$   
 $2.8 \times (5.2 \times 10^{-5}) = 12.48 \times 10^{-5} = 1,248 \times 10^{-6}$   
 $\frac{8.22 \times 10^7}{6.3 \times 10^3} = \frac{8.22}{6.3} \times \frac{10^7}{10^3} = 1.30 \times 10^4$

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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. BarCharts™ 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.

## Book Information

Series: Quick Study: Academic

Paperback: 6 pages

Publisher: QuickStudy; Lam Chrt edition (May 31, 2012)

Language: English

ISBN-10: 1423217705

ISBN-13: 978-1423217701

Product Dimensions: 8.5 x 11 x 0.1 inches

Shipping Weight: 3.2 ounces (View shipping rates and policies)

Average Customer Review: 4.5 out of 5 stars See all reviews (23 customer reviews)

Best Sellers Rank: #15,751 in Books (See Top 100 in Books) #41 in Books > Science & Math > Mathematics > Study & Teaching #4894 in Books > Reference

## Customer Reviews

i was misled to believe this was at least a thin book. it is nothing more than a pamphlet. the type is very small. not worth the money at all

Not only is this useful for students, but as an organizer for teachers ticking off the components to the common core curriculum.

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

This is perfect math reference for my 8th grade students. My only concern is the shipping: the product arrived in a large, bubble envelope without cardboard backing, so consequently the chart

was creased and looked used. The seller should have enough sense to know that our postal system mishandles items most of the time with no remorse.

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.

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.

Very comprehensive list and general overview of the Common Core 8th Grade Math Standards.

Nice concise guide on the state standards.

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