

T: Can you calculate the volume of this box?

S: um..[pause] .. no [has a puzzled look]

T: Do you know what volume is?

S: Yes, it is the button on the TV.

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Language in the Mathematics Classroom

Yulber Beronque

Daphne Hoard

Warren Morales

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GUSTAVE
FLAUBERT

Georges
Duhamel

GUERRE
DU
FEU

P. FRÉDÉ
—
CHASSES
AUX
MÉTÈRES

LECLERCO
—
—
ESCALADES
DANS
LES PYRÉNÉES

E. MULLER
—
UN FRANÇAIS
EN
SINAI

STANLEY
—
—
TÉNÉBRES
DE
L'AFRIQUE

Newspaper Article:

“Unemployment rate
increasing at a decreasing
rate”

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Mathematics is a universal language, and using conventional mathematical vocabulary allows learners to communicate mathematical concepts universally.

Chard, D. *Vocabulary Strategies for the Mathematics Classroom*.
Houghton Mifflin Math



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Teachers must find a way to bridge mathematics, its syntax and symbols with the ambiguity and multiple meanings of words in the English language.



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Make Math Tangible

- Avoid ambiguity
- Emphasize correct syntax and semantics
- Incorporate grade level appropriate mathematical vocabulary



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Borrow

\$8.35 - \$6.62



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Reduce

$$\frac{20}{50}$$

$$\frac{20}{50}$$



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The local hotel calculates charges for their conference room using the formula:

$$C = \frac{5N}{2} + 500$$

Where C is the charge in \$ and N is the number of guests.

Describe in words only, what this formula means.



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Which is larger?

5

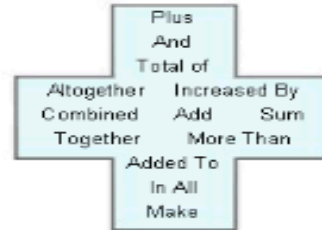
32

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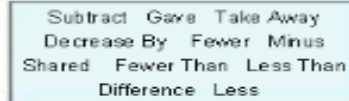
Ambiguity

Words and Phrases to Math Symbols

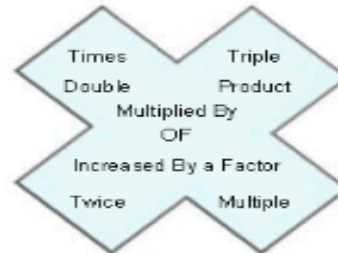
Addition



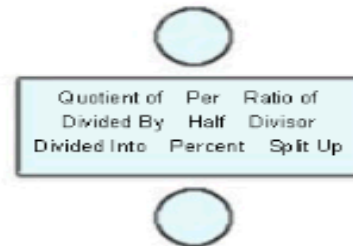
Subtraction



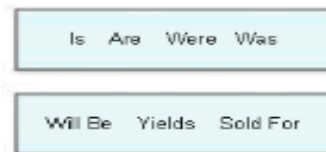
Multiplication



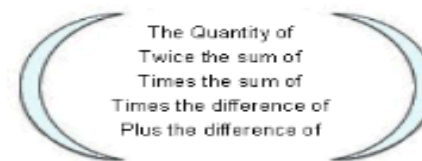
Division



Equals



Parenthesis Words



The function $y = 3.75 + 1.5(x - 1)$ can be used to determine the cost in dollars for a taxi ride of x miles. What is the rate of change of the cost in dollars with respect to the number of miles?

- F** \$1.50 per mile
- G** \$3.75 per mile
- H** \$4.25 per mile
- J** \$5.25 per mile



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Syntax

“The arrangement of words and phrases to create well-formed sentences in a language.”

Oxford Online Dictionary



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The Syntax of Mathematics

What does $(-5)^2$ mean?

What does -5^2 mean?

Are these equal?

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The Syntax of Mathematics

Choose the correct answer:

$$7 + 7 \div 7 + 7 \times 7 - 7$$

- a. 0
- b. 8
- c. 50
- d. 56



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The Syntax of Mathematics

1. What does $1/x + 1$ mean?
2. What does $(1/x) + 1$ mean?
3. What does $1/(x + 1)$ mean?

Which expressions equal?



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The Syntax of Mathematics

1. What does $\sin^2 x$ mean?
2. What does $[\sin(x)]^2$ mean?
3. What does $\sin x^2$ mean?

Which two expressions are equal?

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The Syntax of Mathematics

Rewrite the following sentence as a conditional statement:

A circle is not a square.

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Semantics

3 less 5

3 less than 5

3 is less than 5

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Evaluate

- $\frac{x-y}{6}$ when $x = 30$ and $y = 6a$
- $a^2 + 2b - 5$ when $a = -2$ and $b = 6$
- $A = \frac{1}{2}bh$ when $b = 4$ and $h = 5$



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Simplify

- $\frac{30}{40}$
- $4(3a - 2b) + b - 8a + 10$
- $\sqrt{12}$
- $(27)^{\frac{2}{3}}$

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Solve each of the following:

- $x + 5 = -7$
- $$\begin{cases} x - y = 1 \\ 3x + 2y = 8 \end{cases}$$
- Solve a triangle with sides
 $a = 5$, $b = 3$, and $c = 7$
- $2y - 3 \geq 5$

The background features a light gray and white geometric design with a red and white diagonal stripe. At the bottom, there is a dark red horizontal band containing several red books of varying sizes. The word "education" is written in a large, light green, sans-serif font across the bottom of the page.

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Semantics

Cancel Out

a. $\frac{(2 * 3)}{3}$

b. $\frac{3}{(2+3)}$

c. $\frac{(2 + 3)}{3}$

d. $x + 3 = 5$
 -3 -3



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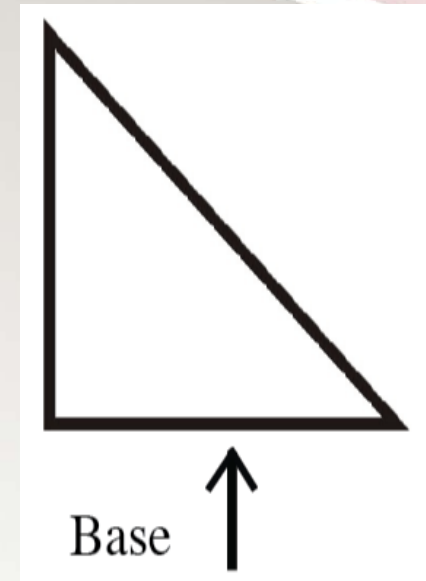
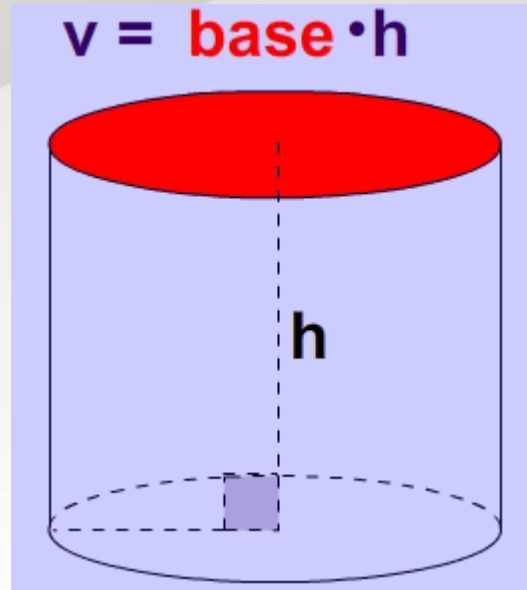
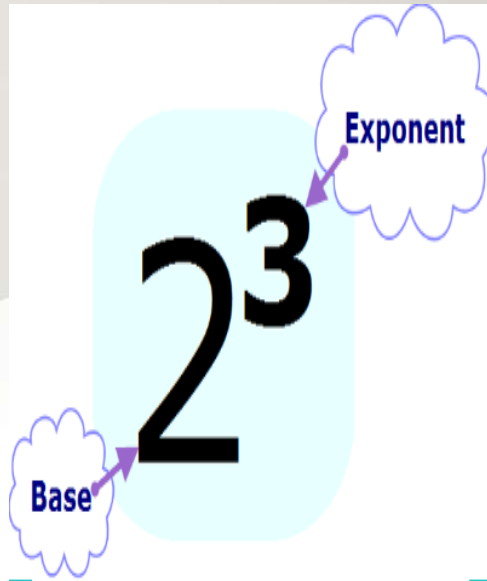
Misuse

- Flip
- FOIL
- Bottom Number - Top Number
- Criss Cross Applesauce

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Multiple Meanings



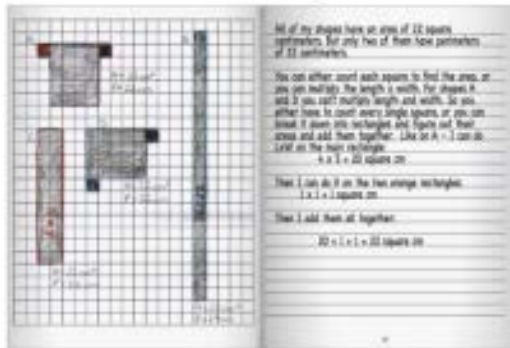
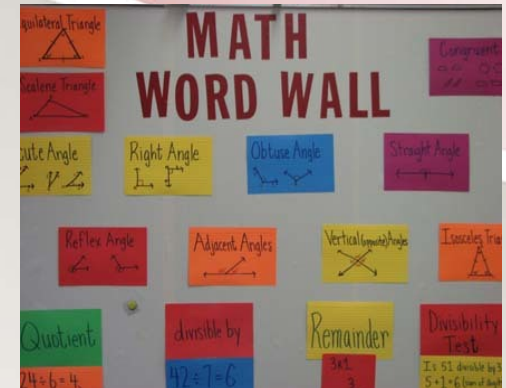
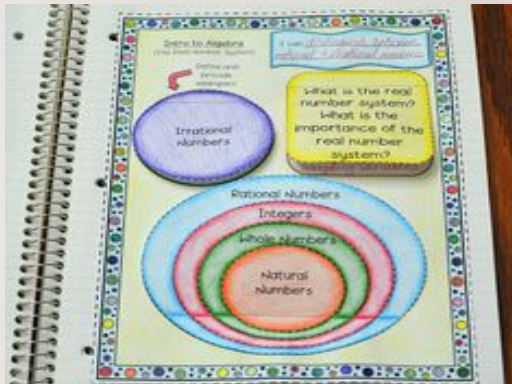
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Strategies

- Portfolios
- Graphic Organizers
- Interactive Notebooks
- Notetaking
- Literacy Groups
- Parent Involvement
- Writing Exercises
 1. Journals
 2. Compose Letters
 3. Create Stories from a Graph
 4. Generate Questions

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Strategies



Definition	Characteristics
A whole number with exactly two divisors (factors)	<ul style="list-style-type: none"> • 2 is the only even prime number • 0 and 1 are not prime • Every whole number can be written as a product of primes
Examples 2, 3, 5, 7, 11, 13, 17, ...	Non-Examples 1, 4, 6, 8, 9, 10, ...

Prime



Strategies

Create a word problem based on the image below. Use correct vocabulary and complete sentences.



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Door Decoration

In AP Calculus, students are asked to decorate the door of any classroom demonstrating how math is used in the subject taught by that teacher. This activity can be done with any level math!



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Closing Remarks

Love and Math

By Edward Frenkel



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