LEVEL 1:

<u>Unit Operations:</u> Add, Subtract Multiply and Divide, Freeze 2ND Digit to 1, Include Negatives, 10 questions. Students are introduced to operations in their simplest form.

<u>Unit Operations:</u> Add, Multiply, Divide, Freeze 2ND Digit to 10.

<u>Unit Operations:</u> Add, Multiply, Divide, Freeze 2ND Digit to 5.

<u>Unit Operations:</u> Add, Multiply, Divide, Freeze 2ND Digit to 9, 11.

LEVEL 2:

<u>Unit Operations:</u> Add, Subtract, Multiply and Divide, with all digits as students practice and learn multiples through 12s. Use the **Multiples Table** from **Counting** for study with each digit.

<u>Multi-Digit Operations</u>: **Add**, **Subtract**, **Multiply** and **Long Division**. Students <u>study examples</u> and <u>practice with tools</u>.

LEVEL 5:

<u>Exponents Squares Roots</u>: Review definition of square roots. Do Examples: **Periods of 10's**, **Power Cube**, **2N Activity**.

<u>Prime Factorization Tutorial</u>: **Examples of 96 & 97** and **How to Find Factors of 2, 3, 5**.

<u>Simplify Roots Tool</u>: Easy mode with **Perfect Squares** then Hard Mode with **Radicals** made from up to 5 prime numbers.

<u>Estimate Radical Values</u>: with radicands up to ten thousand.
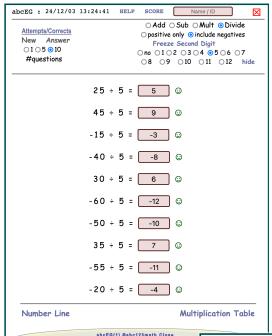
<u>Expressions</u>: Review **Order of Operations Graphic** and **Simplify Examples**.

<u>Make Expressions Activity</u>: is suitable for all ages. Instructors may <u>vary the difficulty</u>. See video for more details.

Arithmetic begins with **Unit Operations**. Students may select: Add, Subtract, Multiply or Divide, Choose to Include Negative Numbers, Freeze the Second Digit, Generate One, Five or Ten Questions at a time.

There are 104 Unique Modes and Online Scores track both Attempts and Correct Answers.

The Mode shown here is: Division, Include(-), Freeze Second Digit to 5; with a Score of 10 Attempts & 10 Correct.

An Activity Log may be printed from the Tool's Help matching the Online Scores to aid tracking student progress.

Number Lines may aid teaching, addition and subtraction.

A Multiplication Table shows patterns for each digit, supplementing the view presented in the Multiples Table from the Counting section.
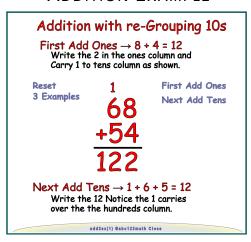
Multi-digit Operations

Multi-digit Operations contains 4 Tools and 4 Examples as shown here. Examples animate the same way every time to aid teaching and study. Tools generate practice problems with detailed solutions, operating in Easier and Harder Modes for practice and skills assessment.
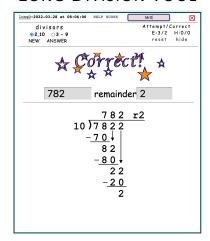
The Input Fields in the **Addition** and **Subtraction** tools move **Right to Left** so students may answer questions as they do them.

The Multiplication and Division tools require each problem to be solved first, then the answer entered normally.

Addition Example

Addition with re-Grouping 10s

First Add Ones → 8 + 4 = 12
Write the 2 in the ones column and
Carry 1 to tens column as shown.

Reset
3 Examples

First Add Ones
Next Add Tens

1
68
+54
122

Next Add Tens → 1 + 6 + 5 = 12
Write the 12 Notice the 1 carries
over the the hundreds column.

Long Division Tool

divisors
●2,10 ○3 - 9
NEW   ANSWER

Attempt/Correct
E:3/2 H:0/0
reset   hide

☆ *Correct!* ☆

782   remainder 2

$$782 \ r2$$
$$10)\overline{7822}$$
$$\underline{-70}\downarrow$$
$$82$$
$$\underline{-80}\downarrow$$
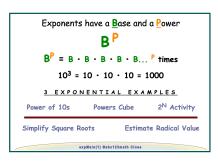$$22$$
$$\underline{-20}$$
$$2$$

Multi-Digit Operations use a combination of Online Tools and Interactive Examples to aid teaching, study, practice, learning.
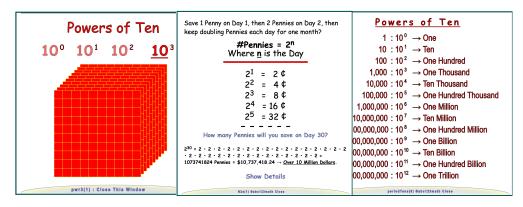
Exponents Squares Roots

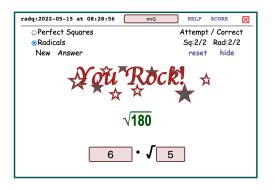Exponents begins with a Graphic Defining Base and Power.

Examples illustrate exponential growth, numerically, visually and graphically.

Exponents have a **B**ase and a **P**ower

$$B^P$$

$$B^P = B \cdot B \cdot B \cdot B \cdot B \ldots \ P \ times$$

$$10^3 = 10 \cdot 10 \cdot 10 = 1000$$

3 EXPONENTIAL EXAMPLES

Power of 10s   Powers Cube 2^N Activity

Simplify Square Roots   Estimate Radical Value

Exponents Squares Roots Examples

Powers of Ten

$10^0 \quad 10^1 \quad 10^2 \quad \underline{10^3}$

Save 1 Penny on Day 1, then 2 Pennies on Day 2, then keep doubling Pennies each day for one month?

#Pennies = 2^n
Where **n** is the Day

$$2^1 = 2 \ ¢$$
$$2^2 = 4 \ ¢$$
$$2^3 = 8 \ ¢$$
$$2^4 = 16 \ ¢$$
$$2^5 = 32 \ ¢$$
- - - - - - - -
How many Pennies will you save on Day 30?

$2^{30} = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2$ $\cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 =$
1073741824 Pennies = $10,737,418.24 = Over 10 Million Dollars.

Show Details

Powers of Ten

1	: 10^0	→ One
10	: 10^1	→ Ten
100	: 10^2	→ One Hundred
1,000	: 10^3	→ One Thousand
10,000	: 10^4	→ Ten Thousand
100,000	: 10^5	→ One Hundred Thousand
1,000,000	: 10^6	→ One Million
10,000,000	: 10^7	→ Ten Million
00,000,000	: 10^8	→ One Hundred Million
00,000,000	: 10^9	→ One Billion
00,000,000	: 10^{10}	→ Ten Billion
00,000,000	: 10^{11}	→ One Hundred Billion
00,000,000	: 10^{12}	→ One Trillion

The Simplify Square Roots tool generates perfect squares in Easy Mode and Radicals in Hard Mode shown below. A Tutorial details How-to-Simplify using Prime Factorization.

○Perfect Squares
●Radicals
New   Answer

Attempt / Correct
Sq:2/2 Rad:2/2
reset   hide

You Rock! ☆

$$\sqrt{180}$$

$$6 \cdot \sqrt{5}$$

○Easy ●Hard
New Answer

Attempt / Correct
E:0/0 H:1/1
reset   hide

☆ *!Super!* ☆

450

33552

Prime Factors
$$450 \to 5$$
$$90 \to 3$$
$$30 \to 2$$
$$15 \to 5$$
$$3 \to 3$$

Expressions section begins with an Order Of Operations graphic, and 4 Expressions to simplify.

Distribution Examples show side-by-side comparisons of parenthesis with multiplication and addition.

The **Make Expressions** activity has students combine digits with operations to create expressions equal to target numbers. Online Help, offers more Insights and details.

Order of Operations

First: **( )** Parenthesis

Second: **²** Exponent

Third: **x** Multiplication **/** Division

Last: **+** Addition **−** Subtraction

Equal Operations go from Left to Right
Click below to Simplify

$$(4 + (8 \cdot 2^2)) / ((2^3 - 2) \cdot 6)$$
$$(4 + (8 \cdot 4)) / ((8 - 2) \cdot 6)$$
$$(4 + 32) / (6 \cdot 6)$$
$$36 / 36$$
$$1$$
reset

3 More Expressions   Make Expressions