

# Meeting the Challenges to Finish Strong in Math

Corrections Mini-Conference

Session One

October 28, 2020



# Welcome!



**Debi Faucette**



**Mellissa Hultstrand**



# Session Objectives



- Discuss the testing and instructional landscape
- Discuss the challenges that multi-level students have in mathematics
- Share resources to address the instructional and student-driven challenges
- Answer your questions!

# Testing and Instructional Landscape



# Beginning 2020

## Corrections

## Public

**Classroom Instruction  
Computer-based testing**

[This Photo](#) by Unknown Author is licensed under [CC BY-SA](#)



# Finishing 2020: The Public Sector

**Virtual Classroom Instruction**  
**Minimal Classroom Instruction**



**Minimal OnSite CBT Testing**  
**Online Proctored GED® Test**



# Finishing 2020: Correctional Facilities



## Use of Paper Packets for Instruction

- Students in lockdown
- **Computer-based testing continues**
- Limited face to face instruction

# Finishing 2020 Strong

- **Adapt and overcome---solutions for:**
  - **virtual instruction**
  - **face to face instruction**
  - **distance packets for instruction**
- **Today's focus: MATHEMATICS**





# Reinforce the Basics



# What Skills Do They Need?

[https://ged.com/educators\\_admins/teaching/teaching\\_resources/plds](https://ged.com/educators_admins/teaching/teaching_resources/plds)



## GED® Test: Mathematical Reasoning Performance Level Descriptors What Your Score Means: Level 1 — Below Passing

Test-takers who score at this level typically have a **limited but developing** proficiency in demonstrating skills in the following categories: number sense and computation, geometric measurement, data analysis and statistics, and algebraic expressions and functions.

Test-takers at the Below Passing level typically demonstrate the following skills:

### Quantitative Problem Solving with Rational Numbers

- Apply number properties involving multiples and factors at a limited and inconsistent level
- Solve real-world problems using rational numbers at a limited and inconsistent level
- Compute unit rates at a limited and inconsistent level

### Quantitative Problem Solving in Measurement

- Compute the area and perimeter of triangles and rectangles at a limited and inconsistent level
- Determine side lengths of triangles and rectangles when given area or perimeter at a limited and inconsistent level
- Represent, display, and interpret categorical data in circle and bar graphs
- Represent, display, and interpret categorical data in tables and scatter plots

### Algebraic Problem Solving with Expressions and Equations

- Evaluate linear expressions
- Write linear expressions to represent context at a limited and inconsistent level
- Evaluate polynomial expressions at a limited and inconsistent level
- Write rational expressions to represent context at a limited and inconsistent level
- Solve real-world problems involving linear equations at a limited and inconsistent level
- Solve algebraic and real-world problems involving systems of equations

### Algebraic Problem Solving with Graphs and Functions

- Locate and plot points in the coordinate plane



## GED® Test: Mathematical Reasoning Performance Level Descriptors What Your Score Means: Level 2 — Pass/High School Equivalency

Test-takers who score at this level typically have a **satisfactory** proficiency in demonstrating skills in the following categories: number sense and computation, geometric measurement, data analysis and statistics, and algebraic expressions and functions.

Test-takers are generally able to demonstrate knowledge of and ability with the skills identified in the Below Passing level at a satisfactory level as well as the following skills:

### Quantitative Problem Solving with Rational Numbers

- Order fractions and decimals, including on a number line
- Apply number properties involving multiples and factors at a satisfactory level
- Simplify numerical expressions with rational exponents at a satisfactory level
- Identify absolute value of a rational number as its distance from 0 on the number line and determine the distance between two rational numbers on the number line, at a satisfactory level
- Perform computations with rational numbers
- Compute numerical expressions with squares and square roots of positive, rational numbers at a satisfactory level
- Compute numerical expressions with cubes and cube roots of positive, rational numbers
- Determine when a numerical expression is undefined at a satisfactory level
- Solve real-world problems using rational numbers at a satisfactory level
- Compute unit rates at a satisfactory level
- Use scale factors to determine the magnitude of a size change, and convert between actual drawings and scale drawings
- Solve arithmetic and real-world problems involving ratios and proportions at a satisfactory level
- Solve multi-step arithmetic and real-world problems involving percents

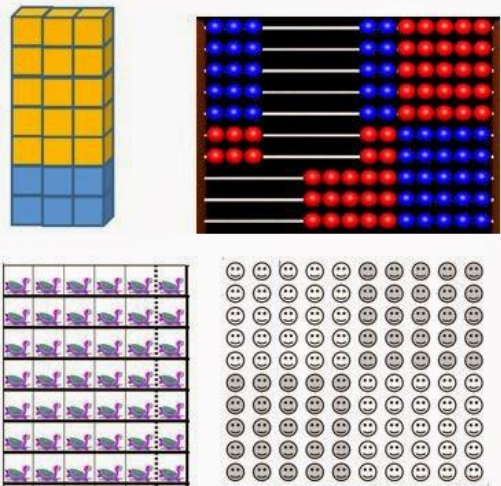
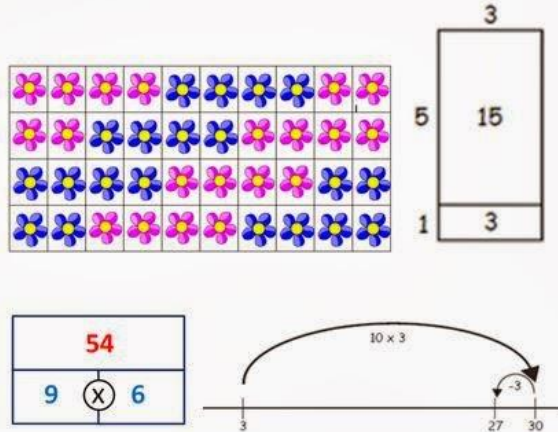
### Quantitative Problem Solving in Measurement

- Compute the area and perimeter of triangles and rectangles at a satisfactory level
- Determine side lengths of triangles and rectangles when given area or perimeter at a satisfactory level
- Compute the area and circumference of circles
- Determine the radius and diameter of circles when given area or circumference
- Compute the area and perimeter of polygons





# C-R-A – Essential for Understanding

Concrete	Representational	Abstract															
Students manipulate hands-on, concrete materials	Students draw and observe diagrams, or watch the teacher touching and moving hands-on materials	Numbers and mathematical symbols															
		<table><tr><th colspan="5">x 4 Patterns</th></tr><tr><td>4</td><td>8</td><td>12</td><td>16</td><td>20</td></tr><tr><td>24</td><td>28</td><td>32</td><td>36</td><td>40</td></tr></table> <div style="display: flex; justify-content: space-around;"><div><math>8 \times 5</math> <math>(4 \times 2) \times 5</math> <math>4 \times (2 \times 5)</math> <math>4 \times 10</math> <math>40</math></div><div><math>45 \div 5</math> <math>(50-5) \div 5</math> <math>(50 \div 5) - (5 \div 5)</math> <math>10-1</math> <math>9</math></div></div>	x 4 Patterns					4	8	12	16	20	24	28	32	36	40
x 4 Patterns																	
4	8	12	16	20													
24	28	32	36	40													

# GED Calculator-Prohibited Indicators



## TEST-TAKER RECOMMENDATIONS FOR CALCULATOR-PROHIBITED INDICATORS

The first several questions of the GED® Mathematical Reasoning test assess eight indicators covering various concepts in number sense and computation (Q.1.a through Q.1.d and Q.2.a through Q.2.d) that prohibit the use of the calculator. GED Testing Service has analyzed data on these calculator-prohibited items, resulting in the following comments and recommendations:

Indicator	Background	Recommendations for Test-takers
<b>Q.1.a</b> Order fractions and decimals, including on a number line.	<p>These questions may require</p> <ul style="list-style-type: none"> <li>• comparing or ordering positive numbers, or negative numbers, or both,</li> <li>• with or without a number line.</li> </ul> <p>Test takers generally do very well on this indicator, with the exception of questions that require test takers to compare or order a set consisting entirely of <b>negative</b> numbers.</p>	<ul style="list-style-type: none"> <li>• Leverage skills in comparing and ordering <b>positive</b> fractions and decimals toward similar skills comparing and ordering <b>negative</b> fractions and decimals.</li> <li>• Understand the difference in how negative numbers are compared and ordered: <ul style="list-style-type: none"> <li>◦ For instance, while 0.7 is greater than 0.2, -0.7 is actually <i>less than</i> -0.2.</li> <li>◦ Since positives and negatives are essentially opposites, the rules for ordering each type of number are applied in a similarly opposite manner.</li> </ul> </li> </ul>
<b>Q.1.b</b> Apply number properties involving multiples and factors, such as using the least common multiple, greatest common factor, or distributive property to rewrite numeric expressions.	<p>Test takers generally perform very well on this indicator, which includes questions that include both context or pure computation (no context) and which test factors of a number, multiples of a number, least common multiple, greatest common factor, etc.</p>	<p>No specific recommendations are provided, as the general population of GED® test takers performs well on this indicator.</p>

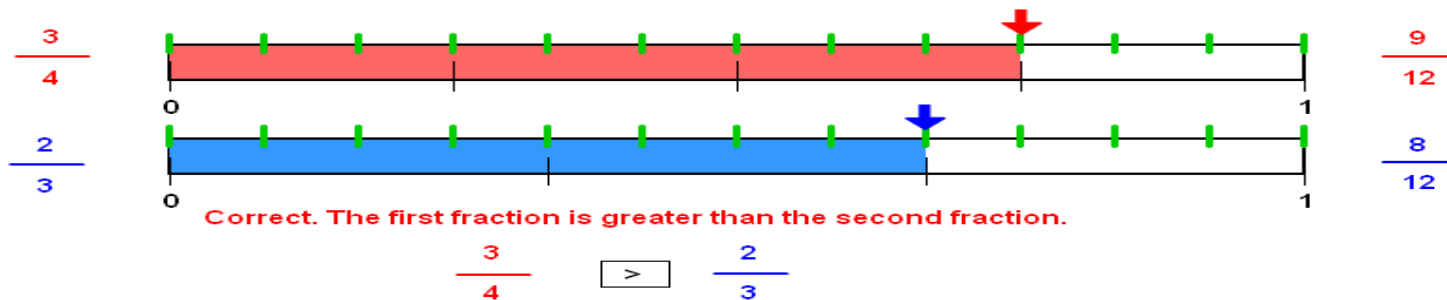
[GEDtestingservice.com](http://GEDtestingservice.com) • [GED.com](http://GED.com)

1

GED® and GED Testing Service® are registered trademarks of the American Council on Education. They may not be used or reproduced without the express written permission of ACE or GED Testing Service. The GED® and GED Testing Service® brands are administered by GED Testing Service LLC under license from the American Council on Education. Copyright © 2018 GED Testing Service LLC. All rights reserved.

# Make Sure Students Can Use a Number Line

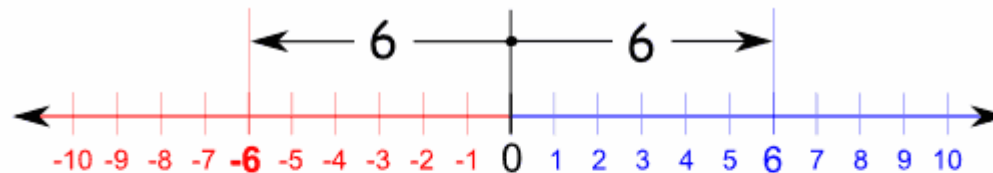
The fractions  $\frac{3}{4}$  and  $\frac{2}{3}$  are pictured with number lines below:



## Check Students Understanding of Absolute Value

Absolute Value indicates how far a number is from 0.

- Remove any negative sign and think of all numbers as positive  $|-5| = 5$
- Recognize symbol used to represent absolute value  $|7| = 7$



"6" is 6 away from zero,  
and "-6" is **also** 6 away from zero.

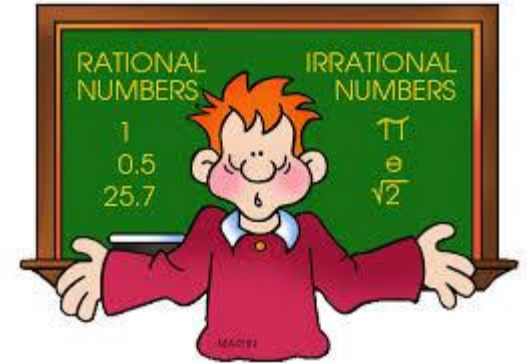
So the absolute value of 6 is **6**,  
and the absolute value of -6 is **also 6**



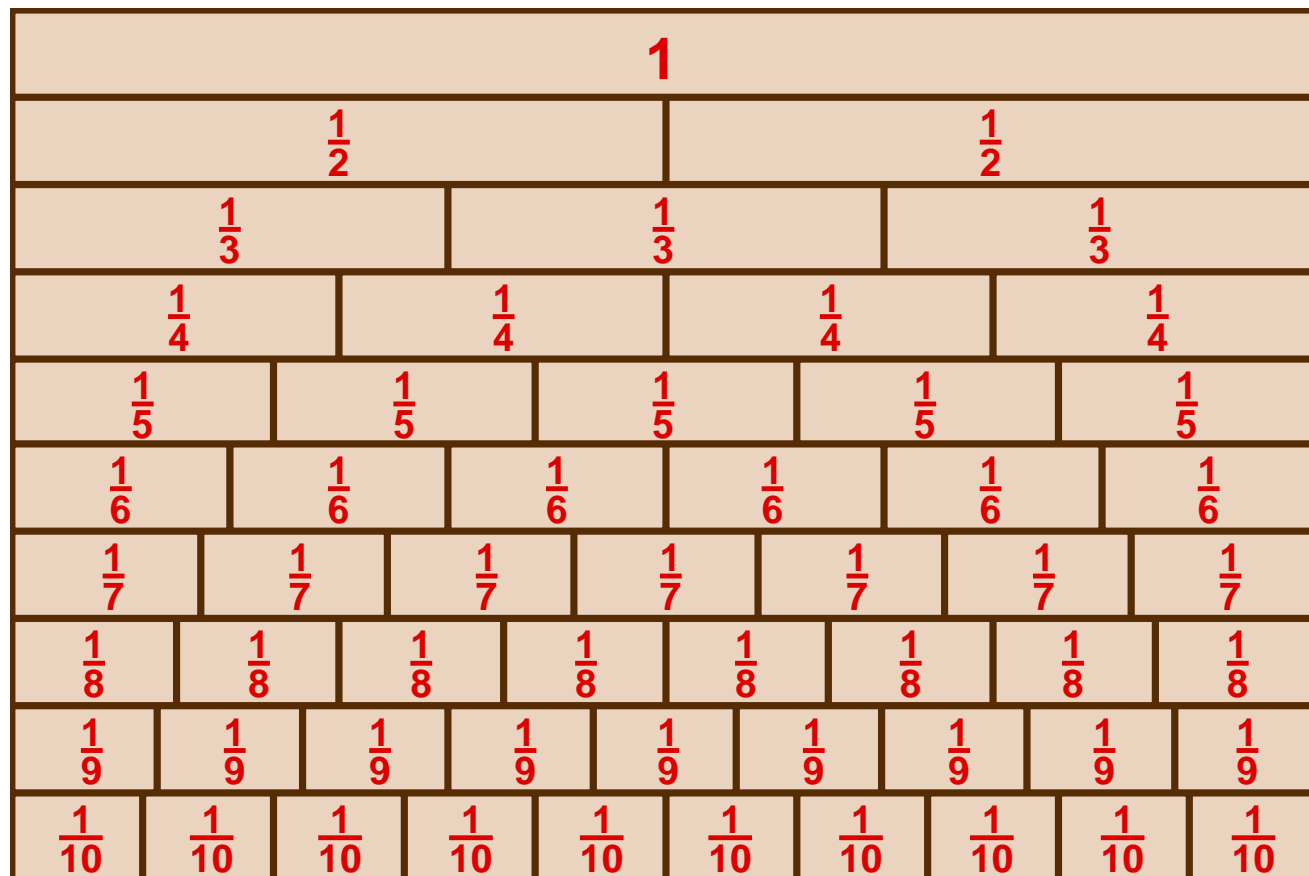
# Operations on Rational Numbers

## Recommendations for Test-Takers

- Be able to:
  - Multiply and divide with decimals
- Compute
  - With fractions, mixed numbers, and negative numbers
  - Using order of operations



# Fraction Tiles



NO PIZZA



A linear model gives an overview and shows relationships.

# Simplify Fractions

1	2	3	4	5	6	7	8	9	10
2	4	6	8	10	12	14	16	18	20
3	6	9	12	15	18	21	24	27	30
4	8	12	16	20	24	28	32	36	40
5	10	15	20	25	30	35	40	45	50
6	12	18	24	30	36	42	48	54	60
7	14	21	28	35	42	49	56	63	70
8	16	24	32	40	48	56	64	72	80
9	18	27	36	45	54	63	72	81	90
10	20	30	40	50	60	70	80	90	100

21

28

45

72

The fraction  $\frac{4}{8}$  can be reduced on the multiplication table as  $\frac{1}{2}$ .

# Rules of Exponents

	Rule	Example
1	$x^1 = x$	$5^1 = 5$
2	$x^0 = 1$	$5^0 = 1$
3	$x^{-1} = \frac{1}{x^1}$	$5^{-1} = \frac{1}{5}$
4	$(x^m)(x^n) = x^{m+n}$	$(x^2)(x^3) = x^{2+3} = x^5$
5	$\frac{x^m}{x^n} = x^{m-n}$	$\frac{x^3}{x^2} = x^{3-2} = x^1$
6	$(x^m)^n = x^{(m)(n)}$	$(x^3)^2 = x^{(3)(2)} = x^6$
7	$(xy)^n = x^ny^n$	$(xy)^3 = x^3y^3$
8	$\left(\frac{x}{y}\right)^n = \frac{x^n}{y^n}$	$\left(\frac{x}{y}\right)^3 = \frac{x^3}{y^3}$
9	$x^{-n} = \frac{1}{x^n}$	$x^{-2} = \frac{1}{x^2}$

1	2	3	4	5	6	7	8	9	10	11	12
2	4	6	8	10	12	<div>Squares &amp; Square Roots</div>					
3	6	9	12	15	18						
4	8	12	16	20	24						
5	10	15	20	25	30	35	40	45	50	55	60
6	12	18	24	30	36	42	48	54	60	66	72
7	14	21	28	35	42	49	56	63	70	77	84
8	16	24	32	40	48	56	64	72	80	88	96
9	18	27	36	45	54	63	72	81	90	99	108
10	20	30	40	50	60	70	80	90	100	110	120
11	22	33	44	55	66	77	88	99	110	121	132
12	24	36	48	60	72	84	96	108	120	132	144

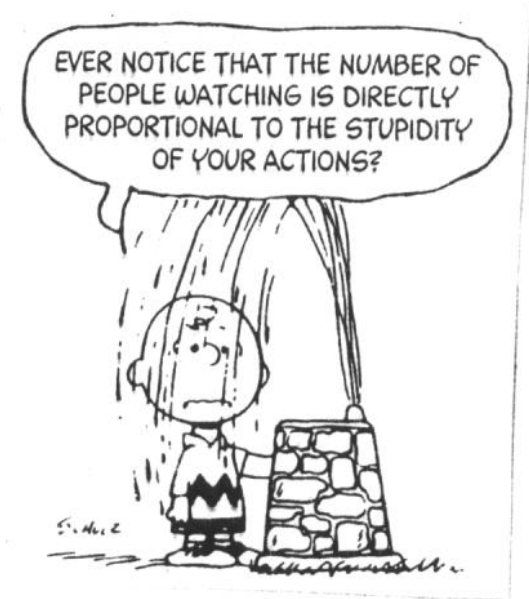
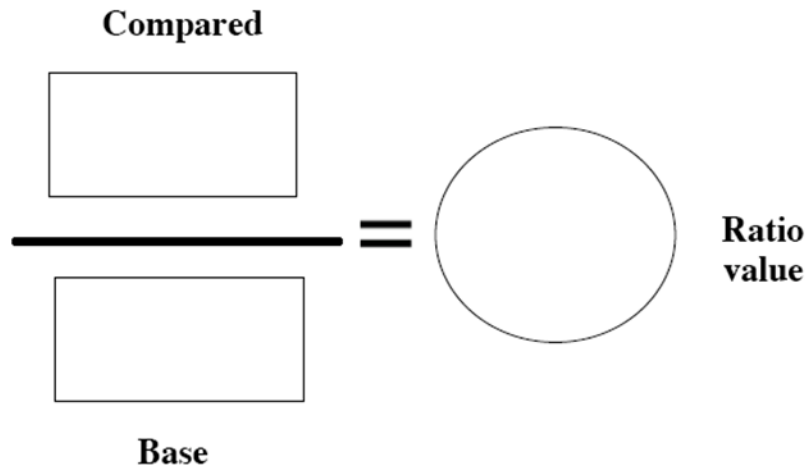


# Percents, Ratios, and Proportions – What's the Problem?

- Percent means “out of 100”
- Ratio describes the part to part relationship
- Proportion describes the part to whole relationship



## Ratio Problem



# Provide a “Concrete” Example

Ratios can have more than two numbers!

For example concrete is made by mixing cement, sand, stones and water.



A typical mix of cement, sand and stones is written as a ratio, such as  $1:2:6$ .

We can multiply all values by the same amount and still have the same ratio.

$10:20:60$  is the same as  $1:2:6$

So when we use 10 buckets of cement, we should use 20 of sand and 60 of stones.

<https://www.mathsisfun.com/algebra/proportions.html>

# Misconceptions about Order of Operations

Misconception 1 - All multiplication should happen before division.

Incorrect	Correct
$12 \div 3 \times 4$	$12 \div 3 \times 4$
$12 \div 12$	$4 \times 4$
1	16

Misconception 2 – All addition comes before subtraction.

Incorrect	Correct
$4 + 10 - 5 + 8$	$4 + 10 - 5 + 8$
$14 - 13$	$14 - 5 + 8$
1	$9 + 8$
	17

**G**ROUPINGS ( ) { } [ ]

**E**XPONENTS  $N^2$

**M**ULTIPLY/DIVIDE  $\div / \times$   
(LEFT TO RIGHT)

**S**UBTRACT/ADD  $+ / -$   
(LEFT TO RIGHT)

**P**arenthesis

**E**xponents

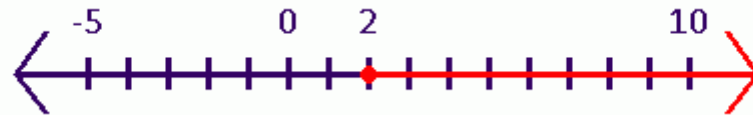
**M**ultiply / **D**ivide

**A**dd + **S**ubtract

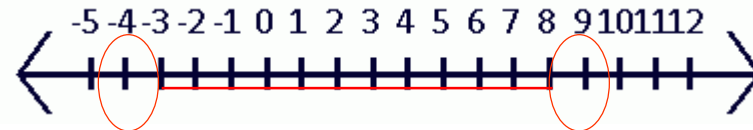
# Inequalities

An inequality is a math statement that defines a range of values.

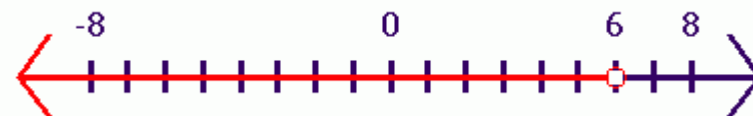
Jeffrey runs at least two miles every day.



On November 28, the temperature in North Pole, Alaska is expected to be greater than  $-4^{\circ}$  and less than  $9^{\circ}$



$$T < 6$$



<https://www.gedtestingservice.com/educators/exploring-the-2014-ged-test-webinar-archive>


# The Challenge

- Increase instruction on problem-solving strategies
- Incorporate close-reading strategies into the math classroom
- Increase emphasis on geometric and algebraic thinking
- Provide instruction in higher-order mathematics
- Shift focus from “rules or processes” of mathematics to deeper understanding of “why”





# Free Math Worksheets



The screenshot shows the Math-Drills.com website. At the top, there is a large 'M' logo and the text 'Free Math Worksheets'. A search bar on the right contains the text 'Search for math worksheets.' and a magnifying glass icon. Below the header, there is a navigation bar with icons for 'Math Worksheets', 'News', and social media links. The main content area is a grid of math worksheet categories, each with an icon and a label. The categories are: Home, Division Worksheets, Addition Worksheets, Mixed Operations Worksheets, Subtraction Worksheets, Large Print Math Worksheets, Multiplication Facts Worksheets, Long Multiplication Worksheets, Algebra Worksheets, Base Ten Blocks Worksheets, Decimals Worksheets, Fact Families Worksheets, Fractions Worksheets, Geometry Worksheets, Graph Paper, Integers Worksheets, Measurement Worksheets, Money Math Worksheets, Number Lines Worksheets, Number Sense Worksheets, Order of Operations Worksheets, Patterning Worksheets, Percents Worksheets, Place Value Worksheets, Powers of Ten Worksheets, Statistics Worksheets, Time Math Worksheets, and Math Word Problems Worksheets. A 'More Information' link is also present in the top right corner of the grid.

Free Math Worksheets				
Math Worksheets	News	Search for math worksheets.		
Home	Addition Worksheets	Subtraction Worksheets	Multiplication Facts Worksheets	Long Multiplication Worksheets
Division Worksheets	Mixed Operations Worksheets	Large Print Math Worksheets		
Algebra Worksheets	Base Ten Blocks Worksheets	Decimals Worksheets	Fact Families Worksheets	Fractions Worksheets
Geometry Worksheets	Graph Paper	Integers Worksheets	Measurement Worksheets	Money Math Worksheets
Number Lines Worksheets	Number Sense Worksheets	Order of Operations Worksheets	Patterning Worksheets	Percents Worksheets
Place Value Worksheets	Powers of Ten Worksheets	Statistics Worksheets	Time Math Worksheets	Math Word Problems Worksheets

**Math-Drills.com includes over 58 thousand free math worksheets** that may be used to help students learn math. The PDF math worksheets are available on a broad range of topics including number sense, arithmetic, pre-algebra, geometry, measurement, money concepts and much more. Worksheets and answer keys can be downloaded and printed.

# Math is Fun Worksheets

The screenshot shows the homepage of the Math is Fun Worksheets website. At the top, there is a navigation bar with links to Home, Algebra, Data, Geometry, Measure, Numbers, Dictionary, Games, Puzzles, and Worksheets. A search bar is prominently displayed in the center, with a magnifying glass icon. To the right of the search bar, there are social media icons for Facebook, Twitter, Pinterest, LinkedIn, and Email. Below the navigation bar, the text 'Math Worksheets' is displayed in a large, stylized font. A paragraph of text encourages users to test their math skills and view/print worksheets. A section titled 'Choose your Subject!' lists various math topics with links to their respective worksheets. The topics include Addition, Subtraction, Multiplication, Division, Long Multiplication, Long Division, Kindergarten, Decimals, Decimal Fractions, Fractions, Percents, Order of Operations, Algebra, and Time Worksheets. Each topic is accompanied by a brief description or example.

Home Algebra Data Geometry Measure Numbers Dictionary Games Puzzles Worksheets [Hide Ads](#) [About Ads](#)

Search

Math Worksheets

Test your math skills! Ace that test! See how far you can get!  
You can view them on-screen, and then print them, with or without answers.

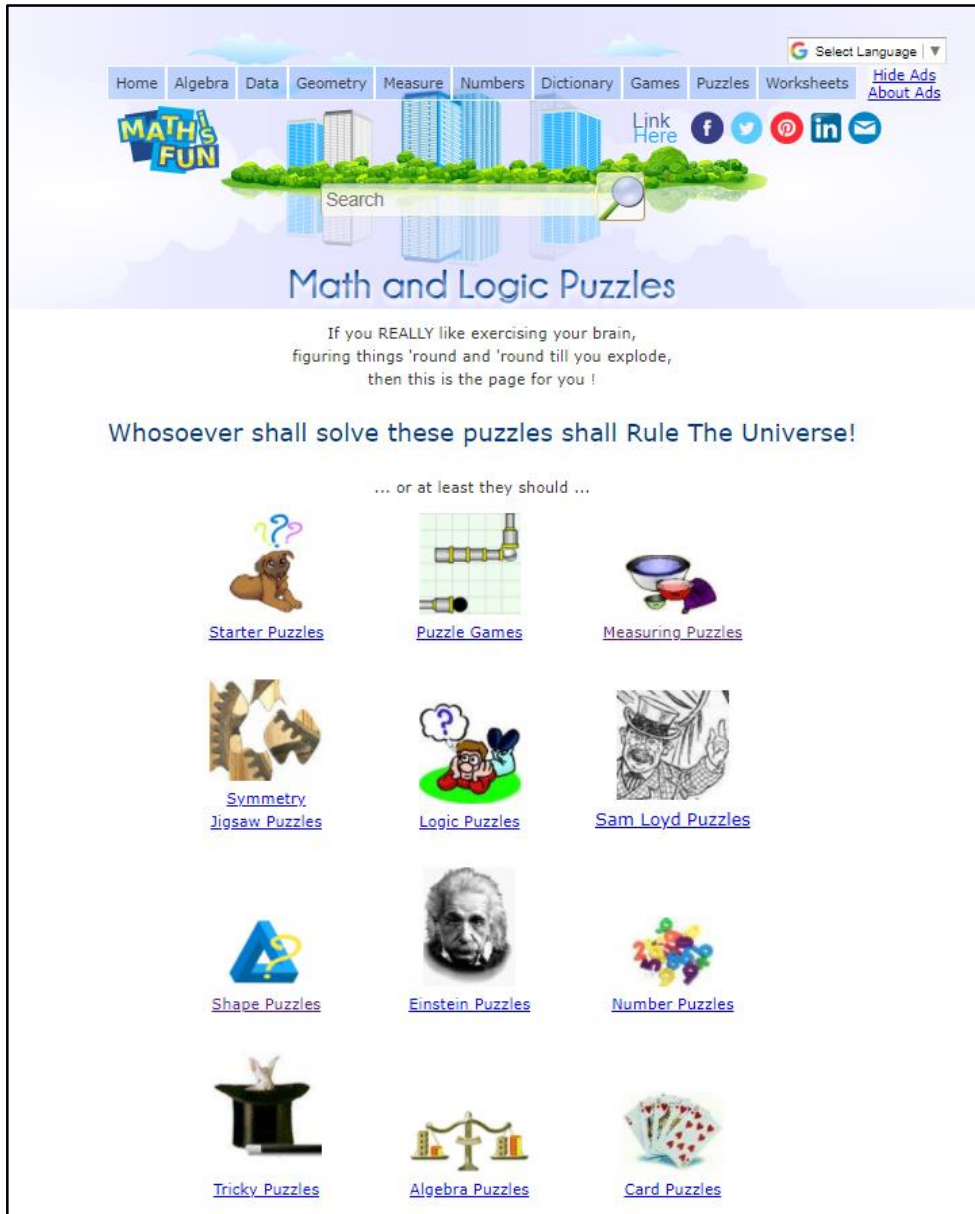
Every worksheet has **thousands** of variations,  
so you need never run out of practice material.

**Choose your Subject !**

+	<a href="#">Addition</a>	
-	<a href="#">Subtraction</a>	
×	<a href="#">Multiplication</a>	<a href="#">Long Multiplication</a>
÷	<a href="#">Division</a>	<a href="#">Long Division</a> (includes the correct spaces to help you get it right)
123	<a href="#">Kindergarten</a>	My Daughter loves these!
0.1	<a href="#">Decimals</a>	+ - × ÷, and conversion from fractions
$\frac{1}{10}, \frac{1}{100}$	<a href="#">Decimal Fractions</a>	+ - × ÷, and conversion
$\frac{1}{2}, \frac{3}{5}$	<a href="#">Fractions</a>	+ - × ÷, and conversion
	<a href="#">Percents</a>	
	<a href="#">Order of Operations</a>	Example: $12 + 8 \times (5 - 4)$
	<a href="#">Algebra</a>	Example: $2x + 8 = 16$
3:30	<a href="#">Time Worksheets</a>	"Tell the time" and "Draw the hands"

- Every worksheet has **thousands** of variations, so won't run out of practice material.
- You can print with or without answer key.

# Math is Fun Puzzles



- There are hundreds of puzzles in different categories.
- You can use a puzzle as a brainteaser or opening group activity.
- Print the puzzle and the answer key separately.

# Texas Instruments

[https://education.ti.com/en/guidebook/details/en/50BE24C84836434485BD2E8D49374AF7/30x\\_mv](https://education.ti.com/en/guidebook/details/en/50BE24C84836434485BD2E8D49374AF7/30x_mv)

Advanced

## Subjects

All Subjects

Math

Science

Other Subjects

## Devices

☐ TI-Nspire™ CX/CX II

☐ TI-Nspire™ CX CAS/CX II CAS

☐ TI-Nspire™ CX II

☐ TI-Nspire™ CX II CAS

☐ TI-84 Plus CE

☐ TI-84 Plus C Silver Edition

☐ TI-84 Plus Silver Edition

☐ TI-84 Plus

☐ TI-Nspire™ Apps for iPad®

☐ TI-Nspire™ Navigator™

☐ TI-Nspire™

☐ TI-Nspire™ CAS

☐ TI-92 Plus / Voyage™ 200

☐ TI-89 / TI-89 Titanium

☐ TI-86

☐ TI-83 Plus Family

☐ TI-83

☐ TI-73 Explorer™

☐ TI-34 MultiView™

☐ TI-34 II Explorer Plus™

☐ TI-30Xa

☒ TI-30XS MultiView™













☐ TI-30X IIS

Displaying: ☒ TI-30XS MultiView™

Viewing 1 - 15 of 15 results Page: 1

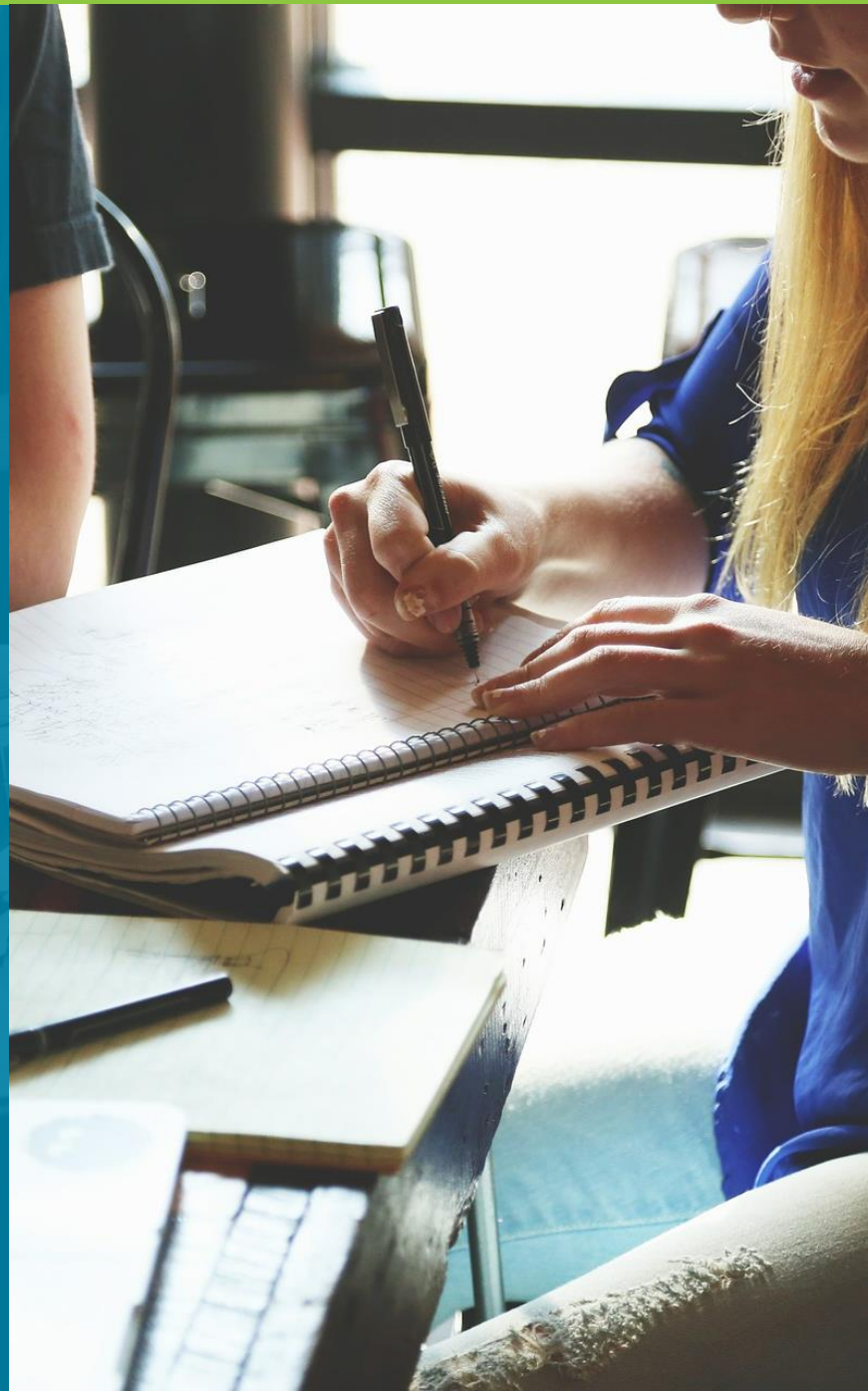
Most Recent

15 | Page

Classroom Activities	Author	Level	Technology		
<b>What's So Special about 11?</b> Students will compute multiples of numbers in search of patterns. As a class, they'll discover patterns in multiples of 9; then they'll do the same with patterns in multiples of 11. They will then practice writing the rule for 11, both verbally and algebraically, to summarize the discovered pattern. <b>Alignment:</b> <a href="#">Standards</a> <a href="#">Textbook</a>	 Texas Instruments	6-8	TI-30XS MultiView™	 441	 4
<b>What's Your Mileage?</b> Students use linear equations to model and solve real-world problems. Students also see the correlation between the graph of an equation and its calculated slope by plotting graphs by hand and then calculating slopes with the calculator and comparing. <b>Alignment:</b> <a href="#">Standards</a> <a href="#">Textbook</a>	 Texas Instruments	6-8	TI-30XS MultiView™	 492	 2
<b>The Best Cell Phone Plan</b> Students will compare two cell phone plans and determine which plan is better for a specific situation. They will utilize both tables and graphs to make their decisions. Students need prior experience writing linear models for this activity. <b>Alignment:</b> <a href="#">Standards</a> <a href="#">Textbook</a>	 Texas Instruments	6-8	TI-30XS MultiView™	 539	 3
<b>The Antics of Statistics</b> Students learn/review some of the different measures of statistics and see how to use	 Texas Instruments	6-8	TI-30XS MultiView™	 464	 2

# Reading and Reasoning in Mathematics

*Steps to Success*





# Reading and Reasoning Process

First Read: Read for Understanding

Second Read: Identify a Problem-Solving Process

Third Read: Solve the Problem and Check for Reasonableness

# First Read: Read for Understanding

- Read through the problem aloud – noting your reactions to what you're reading.
- What vocabulary do you not know?
- What's the real-world context of the problem?
- Is there a picture that can help you visualize the problem?
- What questions are being asked?

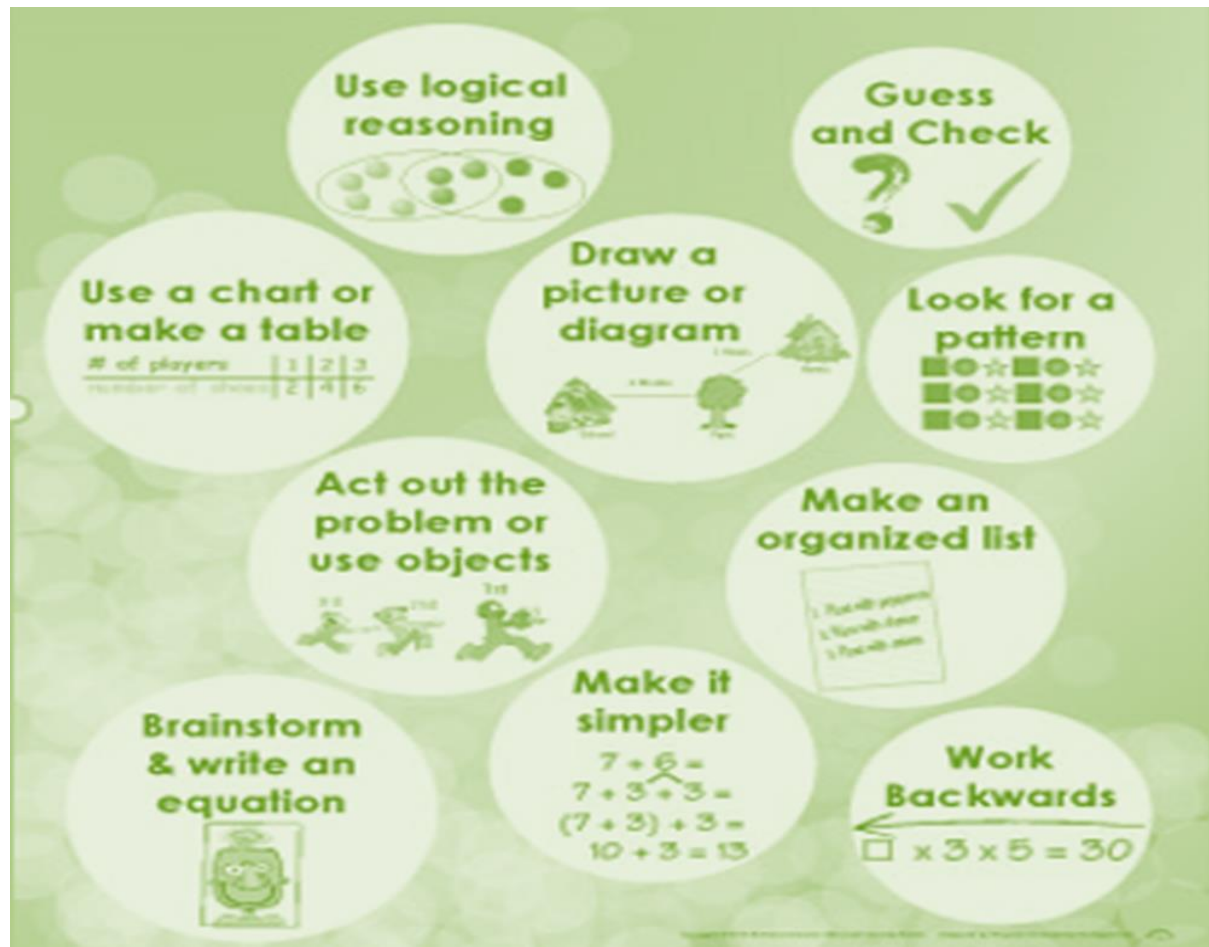
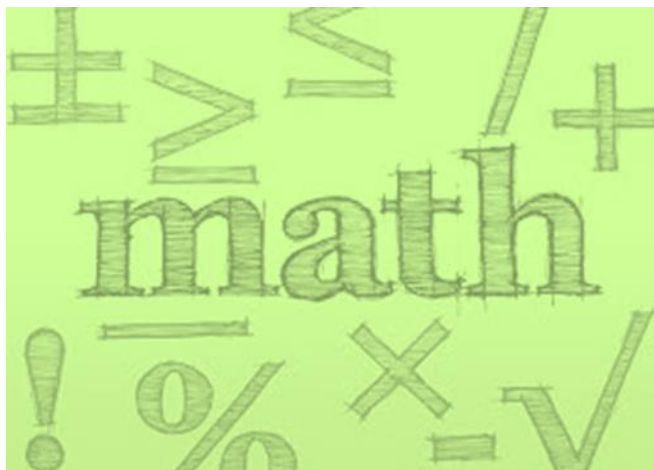
Miller, P. and Koesling, D. "Mathematics Teaching for Understanding: Reasoning, Reading, and Formative Assessment." Danvers, MA

## Second Read: Identify a Problem-Solving Process

- What is the pertinent information in this problem?
- What problem-solving strategies could I use?
- Which of those problem-solving strategies is best suited for this problem?
- How will I represent the problem in the symbolic language of mathematics?
- What mathematical details will I select as I reason and solve this problem?

Miller, P. and Koesling, D. "Mathematics Teaching for Understanding: Reasoning, Reading, and Formative Assessment." Danvers, MA

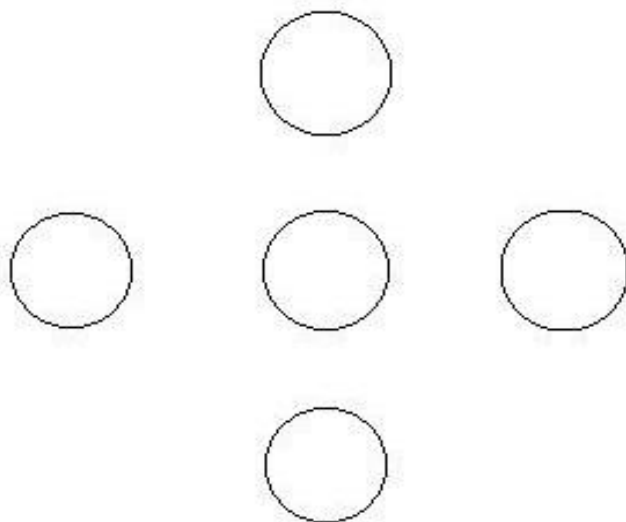
# Second Read: Identify a Problem-Solving Process



Miller, P. and Koesling, D. "Mathematics Teaching for Understanding: Reasoning, Reading, and Formative Assessment." Danvers, MA

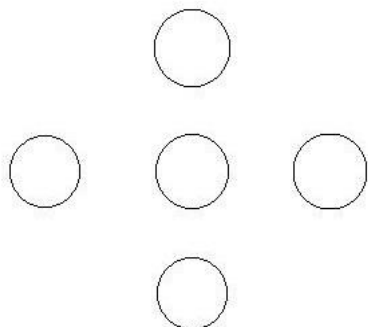
# Strategy – Guess and Check

Copy the figure below and place the digits 1, 2, 3, 4, and 5 in the circles so that sums across (horizontally) and down (vertically) are the same.



# Guess and Check

Copy the figure below and place the digits 1, 2, 3, 4, and 5 in the circles so that sums across (horizontally) and down (vertically) are the same.



Possible solutions:

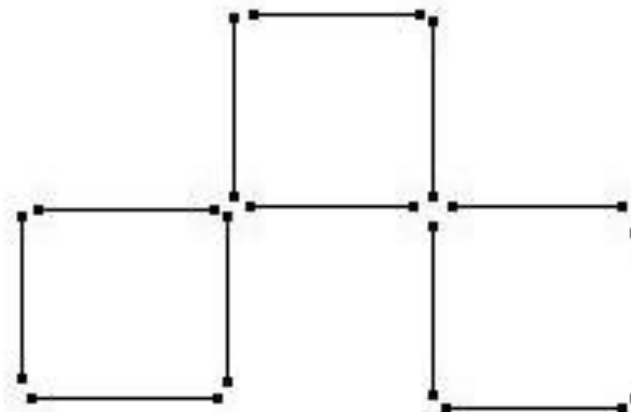
	2	
1	3	5
	4	

	3	
2	1	5
	4	

	2	
1	5	4
	3	

# Strategy – Act It Out or Use Objects

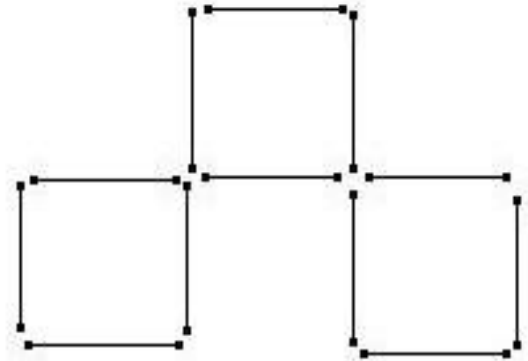
The figure shows twelve toothpicks arranged to form three squares. How can you form five squares by moving only three toothpicks?



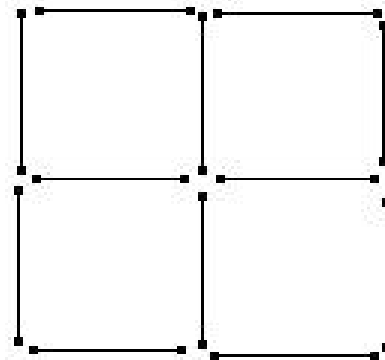


# Act It Out or Use Objects

The figure shows twelve toothpicks arranged to form three squares. How can you form five squares by moving only three toothpicks?



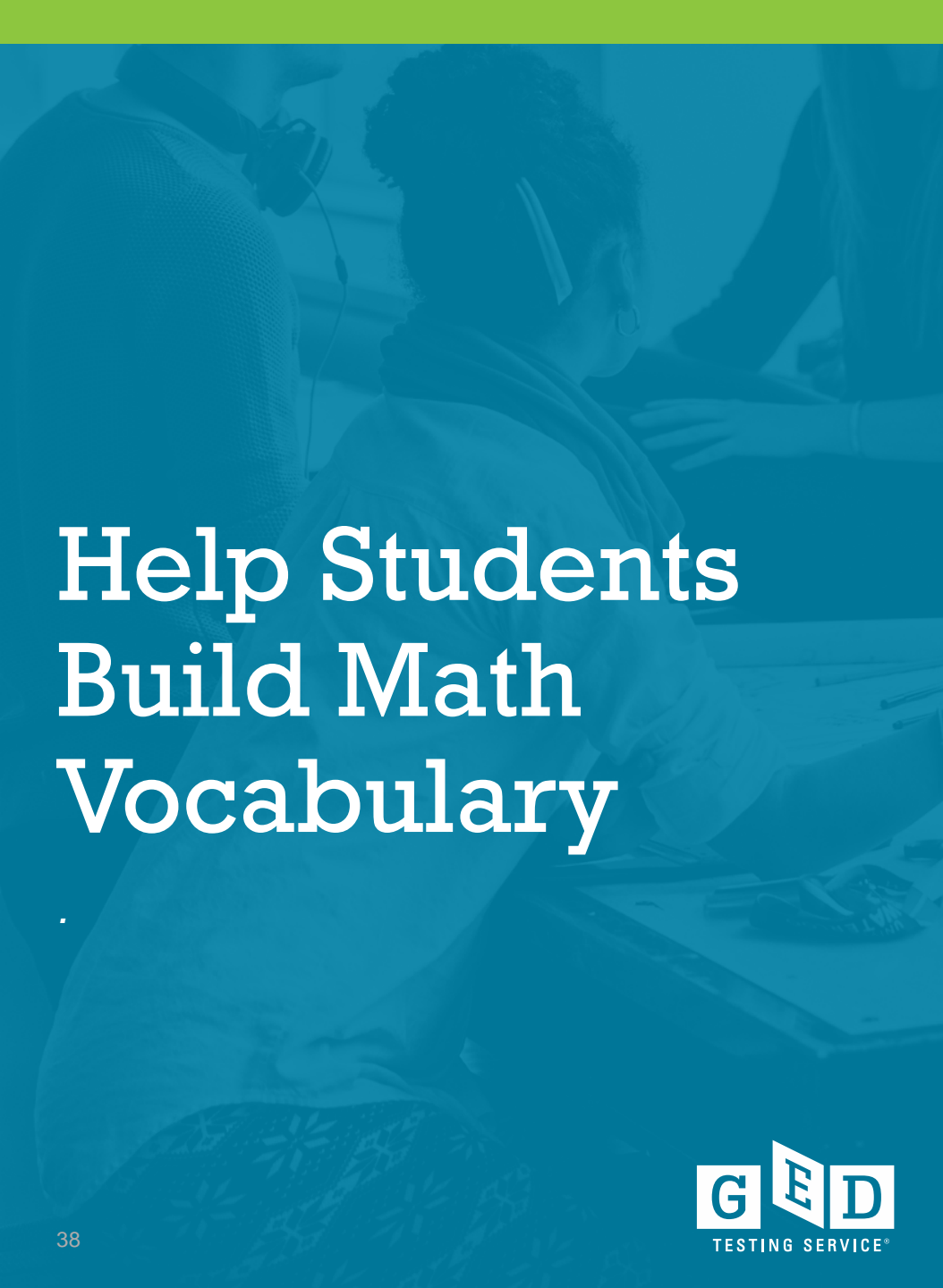
Answer: One of the squares is formed by the outer boundary of the arrangement. There was no requirement that each of the five squares must be congruent to each of the others.



## Third Read: Solve the Problem and Check for Reasonableness

- Now that I understand the problem's content, how can I best use my math skills to solve the problem?
- Am I answering the right question?
- How should the answer to the question be expressed?





# Help Students Build Math Vocabulary

38

**GED**  
TESTING SERVICE®



# Do Your Students Know These Words?

## Tier 2 Vocabulary Words for Math

Analyze	Compare	Contrast
Demonstrate	Describe	Argument
Conclusions	Evidence	Determine
Develop	Evaluate	Explain
Identify	Infer	Draw
Distinguish	Suggest	Interpret
Organize	Illustrations	Predict

<http://soltreemrls3.s3-website-us-west-2.amazonaws.com/marzanoresearch.com/media/documents/reproducibles/vocab-common-core/sourcelistforpartIIandIIIterms.pdf>

# How About These Words?

## Tier 3 Vocabulary Words for Math

Absolute value	Additive inverse	Algorithm
Attribute	Constant	Distance formula
Exponent	Function	Dependent variable
Independent variable	Linear	Numerical expression
Profit	Property	Proportional gain
Rate of change	Strategy	Value

<http://soltreemrls3.s3-website-us-west-2.amazonaws.com/marzanoresearch.com/media/documents/reproducibles/vocab-common-core/sourcelistforpartIIandIIIterms.pdf>



## Worksheets

[Graphic Organizers](#)

[Language Arts](#)

[Math Worksheets](#)

[Science](#)

[Social Studies](#)

[Holidays](#)

[Critical Thinking](#)

[Elementary](#)

[Research Skills](#)

[Countries and Continents](#)

[Teacher Templates](#)

[Theme Worksheets](#)

## Email Newsletter

Receive free lesson plans, printables, and worksheets by email:



## Math Worksheets Listed By Specific Topic and Skill Area

We feature over 2,000 free math printables that range in skill from grades K-12. Many teachers are looking for [common core aligned math work](#). Please use all of our printables to make your day easier. Great for students, teachers, parents, and tutors. We feature well over 12,000 printable sheets. This includes all major subject areas, templates, teacher timesavers, and forms. For a complete teacher curriculum resource please check out our [math subject center](#).

1. [Addition](#) - One, two, and three digit practice sheets.
2. [Algebra](#) - Equations involving addition, division, multiplication, and subtraction.
3. [Area and Perimeter](#) - Area and perimeter of a rectangle.
4. [Basic Arithmetic](#) - Over 200 Addition, Counting, Division, Multiplication, and Subtraction Sheets.
5. [Counting Worksheets](#) - Through coloring, drawing, fill ins, and money.
6. [Decimals](#) - Addition, Counting, Division, Multiplication, and Subtraction Sheets.
7. [Division](#) - One, two, and three digit practice sheets.
8. [Do Now! \(Grade Specific\)](#) - Over 240 warm-up worksheets. Great for starting of classes.
9. [Estimation](#) - Estimate a wide variety of variables.
10. [Even And Odd Numbers](#) - Students identify even and odd numbers.
11. [Exponents](#) - Exponent conversion and order of operations with exponents.
12. [Fractions](#) - Greatest common factors and least common multiple worksheets.
13. [Geometry](#) - Practice sheet include identifying congruent shapes and intersecting lines.
14. [Graphing](#) - Exercises in Making Bar, Line, and Pie Graphs.
15. [Greater Than, Less Than, Or Equal](#) - Comparisons of integers, decimals, visuals, and objects.
16. [Grid \(Graph\) Paper](#) - Printable grid paper in all sizes. A great idea is to laminate these pages.

# AAAKnow (Free Resource)

AAAKnow.COM

Ad closed by Google

Grades K-8

Math Topics

Contact

Sister Sites

NEW!! [Click Here to translate these Math lessons to over 100 languages.](#)



Geometric Figures



Geometric Calculations



Perimeter and Circumference



Area



Surface Area



Volume



Integers



Expressions, Equations and Inequalities



Statistics



Exponents



Scientific Notation

## EQUATIONS: LEARN

An *inequality* is very similar to an equation, but the answers form a range of numbers that could work to make the equation true.

For example, the inequality  $x > 4$  would be true for all  $x$  values which are larger than 4, such as 4.1, 5, 10000, and so on.

Solving an inequality is just like solving an equation, except there is one extra rule to remember: if you multiply or divide by a negative number, switch the direction of the inequality.

Here is an example that shows how inequalities can be solved just like equations.

$$\begin{array}{rcl} 8x - 2 & > & 14 \\ +2 & +2 & \\ \hline 8x & > & 16 \\ +8 & +8 & \\ \hline x & > & 2 \end{array}$$

And here is an example regarding the extra rule about switching the direction of the inequality when you multiply/divide by a negative.

$$\begin{array}{rcl} -8x - 2 & > & 14 \\ +2 & +2 & \\ \hline -8x & > & 16 \\ \div (-8) & \div (-8) & \\ \hline x & < & 2 \end{array}$$

## EQUATIONS: PRACTICE

Solve for x.

Start 00:29

Note: click the inequality button to toggle the direction of the inequality.

$$\text{If } -4x + 9 < 25,$$

then x

0	1	2	3	4	5	6	7	8	9
\$	.	:	+	-	*	/	Clear	Close	

Correct!

You have 1 correct and 0 incorrect.



# Florida IPDAE

<https://www.floridaipdae.org/index.cfm?fuseaction=resources.abe>

The screenshot shows the Florida IPDAE website. The header includes the IPDAE logo (Institute for the Professional Development of Adult Educators) and a navigation menu with links to RESOURCES, E-TRAININGS, EVENT CALENDAR, AE-TOOLBOX, FAQs, ABOUT, and CONTACT. A PORTAL LOGIN button is also visible. The main content area is titled "ABE - ADULT BASIC EDUCATION" and includes a breadcrumb trail: Home > Resources > ABE. Below this, a paragraph states: "The Adult Basic Education programs are designed for adults and out-of-school youth ages 16 years or older who are currently functioning below the eighth grade standards." A sub-header reads: "The adult basic education resources will assist programs in preparing students to improve their skills, so they can move ahead in their jobs, transition to further education and to improve their daily lives. We are in the process of adding more resources to this section." Five resource categories are displayed with icons and descriptions: Lessons (Free lesson plans designed for Reading, Writing Language, Speaking and Listening, and Mathematics), Links (Helpful Links to provide additional ABE information), Videos (Helpful Videos for ABE instructors), Webinars (View our recorded webinars that provide information and training on various topics), and Workshops (Workshop resources for ABE information). A footer note states: "The resources contained in this website may be reproduced, retransmitted, and distributed in any form for educational purposes."

- IPDAE (Institute for the Professional Development of Adult Educators) is a resource center that offers information, training, and professional development resources for adult educators.
- Lesson plans are available for ABE, GED, and ESL classes.
- Lesson plans include all supporting materials, including student handouts and answer keys.
- All materials are free and can be reproduced as needed.

# Math Dude

<https://www.montgomeryschoolsmd.org/departments/itv/MathDude/watch-online.aspx>

## WATCH ONLINE



### UNIT 1.1: GRAPHIC REPRESENTATIONS

The Math Dude steps up and graphs real-world situations.

Length: 4:48

#### Download:

To download a file to your computer simply right-click on the link below and select Save Target As... from the menu. In the dialog box that appears, navigate to where you would like to save the file and click the Save button.

[Download \(21.5 MB\)](#)

All videos can be downloaded for viewing later.

#### UNIT 1

- [Unit 1.1. Graphic Representations \(21.5 MB\)](#)
- [Unit 1.2. Solving One-Step Equations \(43.0 MB\)](#)
- [Unit 1.3. Solving Multi-Step Equations \(25.4 MB\)](#)
- [Unit 1.4. Solving Inequalities \(32.9 MB\)](#)
- [Unit 1.5. Absolute Value \(45.3 MB\)](#)

#### UNIT 2

- [Unit 2.1. Relations \(24.4 MB\)](#)
- [Unit 2.2. Linear Equations \(30.2 MB\)](#)
- [Unit 2.3. Properties Of Functions \(37.0 MB\)](#)

#### UNIT 3

- [Unit 3.1. Slope Of A Line \(16.9 MB\)](#)
- [Unit 3.2. Slope And Direct Variation \(27.4 MB\)](#)
- [Unit 3.3. Slope-Intercept Form \(32.5 MB\)](#)
- [Unit 3.4. Writing Equations Of Lines \(40.7 MB\)](#)
- [Unit 3.5. Point-Slope Form \(47.2 MB\)](#)

#### UNIT 4

- [Unit 4.1. Solving Systems of Equations \(27.3 MB\)](#)
- [Unit 4.2. Solving Systems By Substitution \(24.4 MB\)](#)
- [Unit 4.3. Solving By Linear Combinations \(32.9 MB\)](#)

#### UNIT 5

- [Unit 5.1. Matrices \(16.7 MB\)](#)
- [Unit 5.2. The Mean \(19.2 MB\)](#)
- [Unit 5.3. The Median and Box & Whiskers \(32.5 MB\)](#)
- [Unit 5.4. Probability \(19.5 MB\)](#)
- [Unit 5.5. Sample Spaces \(23.9 MB\)](#)

#### UNIT 6

- [Unit 6.1. Laws Of Exponents \(21.9 MB\)](#)
- [Unit 6.2. Dividing Monomials \(27.5 MB\)](#)
- [Unit 6.3. Polynomial Operations \(28.3 MB\)](#)
- [Unit 6.4. Multiplying Polynomials \(23.9 MB\)](#)
- [Unit 6.5. Factoring \(51.2 MB\)](#)
- [Unit 6.6. Solving Equations By Factoring \(30.9 MB\)](#)

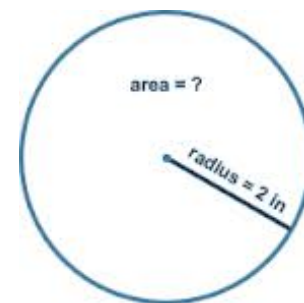
# Getting Down to Basics with Geometric Reasoning



# Geometry Challenges

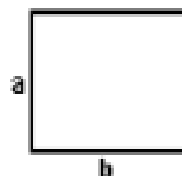
## Quantitative Reasoning

- Compute area/circumference of circles ( $c = \pi d$ )
  - Find radius or diameter when give area or circumference
- Compute perimeter/area of polygons
  - Find side length when given perimeter or area
- Visualization of Shapes
  - See shapes in different orientations
  - Explain relationship between shapes and their properties



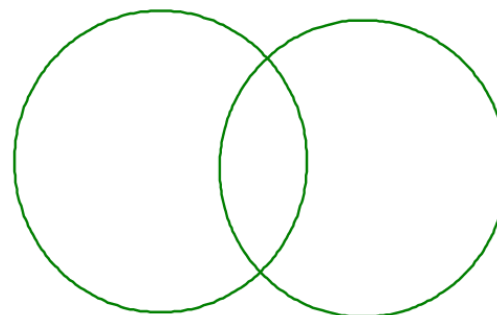
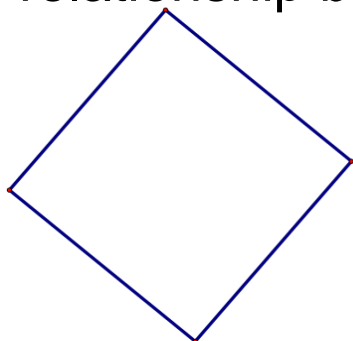
### Rectangle

A Rectangle is a quadrilateral with four equal angles at  $90^\circ$ .



$$\text{Area} = ab$$

$$\text{Perimeter} = 2(a + b)$$





# Getting Down to Basics with Algebraic Reasoning












# 5 Basics of Number Knowledge Essential for Algebra Learning

- Understanding equality
- Recognizing the operations
- Using a wide range of numbers
- Understanding important properties of numbers
- Describing patterns and functions



Find the value of each object in the puzzle by looking for mathematical relationships.  
The numbers represent the sum of the objects in each row or column.

# Algebra Puzzle

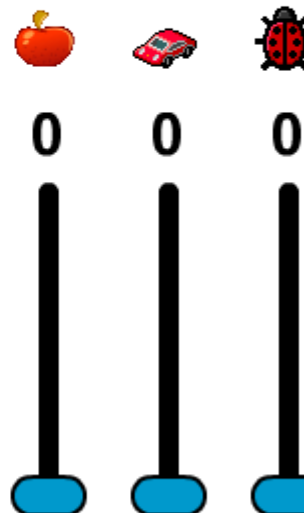
			15
			16
			8
9	23	7	

New Puzzle

Check It

MAIN

## Feedback



MathPlayground.com

# Why Use Magic Tricks or Puzzles?

- They are
  - Fun
  - Non-threatening
  - Motivational
  - Engaging
- Students begin to use algebraic thinking without knowing that is what they are doing.

# Practice Translating

- A computer repair company charges \$50 for a service call plus \$25 for each hour of work. Write an equation that represents the relationship between the bill,  $b$ , for a service call, and the number of hours spent on the call,  $h$ .
- **Step 1:** Some questions include a situation where there is more than one cost. One of them is fixed and one is variable. First identify the sum of the fixed and variable costs so  $b$  equals the total.
- **Step 2:** Next, identify the fixed cost of 50 and the variable cost of  $25h$  ( $25 \times$  the number of hours).
- **Step 3:** The equation then becomes  $50 + 25h = b$ .

# Use Vertical Multiplication of Polynomials

$$(3g - 3)(2g^2 + 4g - 4)$$

becomes

$$\begin{array}{r}
 (2g^2 + 4g - 4) \\
 \times \quad (3g - 3) \\
 \hline
 -6g^2 - 12g + 12 \\
 6g^3 + 12g^2 - 12g \\
 \hline
 6g^3 + 6g^2 - 24g + 12
 \end{array}$$

# Use a Math Translation Guide

English	Math	Example	Translation
What, a number	$x, n, \text{etc.}$	Three more than a number is 8.	$n + 3 = 8$
Equals, is, was, has, costs	$=$	Danny is 16 years old. A CD costs 15 dollars.	$d = 16$ $c = 15$
Is greater than Is less than At least, minimum At most, maximum	$>$ $<$ $\geq$ $\leq$	Jenny has more money than Ben. Ashley's age is less than Nick's. There are at least 30 questions on the test. Sam can invite a maximum of 15 people to his party.	$j > b$ $a < n$ $t \geq 30$ $s \leq 15$
More, more than, greater, than, added to, total, sum, increased by, together	$+$	Kecia has 2 more video games than John. Kecia and John have a total of 11 video games.	$k = j + 2$ $k + j = 11$
Less than, smaller than, decreased by, difference, fewer	$-$	Jason has 3 fewer CDs than Carson. The difference between Jenny's and Ben's savings is \$75.	$j = c - 3$ $j - b = 75$
Of, times, product of, twice, double, triple, half of, quarter of	$\times$	Emma has twice as many books as Justin. Justin has half as many books as Emma.	$e = 2 \times j$ or $e = 2j$ $j = c \times \frac{1}{2}$ or $j = e/2$
Divided by, per, for, out of, ratio of ___ to ___	$\div$	Sophia has \$1 for every \$2 Daniel has. The ratio of Daniel's savings to Sophia's savings is 2 to 1.	$s = d \div 2$ or $s = d/2$ $d/s = 2/1$

# Math Antics

- Free math instructional videos
- \$20/year subscription gets teachers access to exercises and worksheets
- Resource comes highly recommended from several of our providers

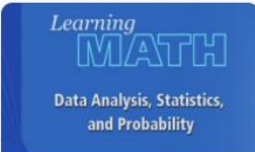
The screenshot shows the Math Antics website. At the top, the logo "math Antics" is in a colorful font, followed by the text "Basic Math Videos and Worksheets". Below this is a video player showing a man in a "math Antics" t-shirt standing in front of a chalkboard that says "Is math Antics right for you?". To the right of the video player, there is a text box that says "Please watch the video..." followed by instructions to visit the "Information" page and check out "Samples" of printable materials. Below this is a yellow "Sign up \$20 for a full year!" button and a blue "Log in" button. A navigation bar below the video player contains links for "HOME", "INFORMATION", "SUPPORT", and "ABOUT US". Below the navigation bar is a section titled "Math Antics has a brand new look!" with a "Find out why:" button. Below this is a section titled "↓ Scroll down to check out our Video Lessons. They're all free to watch! ↓". This section is divided into two columns. The left column is titled "Numeracy" and features an image of a basket of apples. The right column lists topics: "Place Value", "Decimal Place Value", and "Rounding". Below this is another section titled "Arithmetic" featuring an image of a person in a space helmet holding a sign with math problems:  $2+3=5$ ,  $5-2=3$ , and  $5-3=2$ . The right column lists topics: "What is Arithmetic?", "Order of Operations", "The Distributive Property in Arithmetic", "Factoring", and "Prime Factorization".

<https://mathantics.com/>

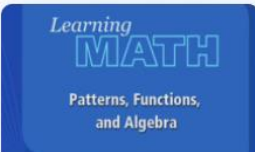


# Annenberg Learner

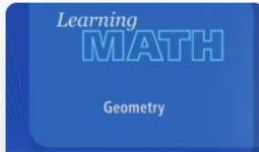
- Annenberg provides extensive lesson plans across all domains of math.
- Videos are available online, if internet is available. Videos are not essential to using the lessons. *However, they can be very useful in reviewing specific skills/concepts prior to teaching the lesson.*
- Select **Support Materials** for each session. Download the lesson for use in class.



MATHEMATICS  
K-2, 3-5, 6-8  
Learning Math: Data Analysis, Statistics, and Probability  
Practical examples highlight the basic concepts of data analysis and statistics in this video- and web-based course for K-8 math teachers.  
GO >



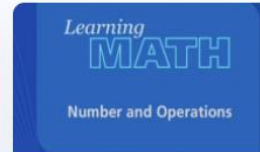
MATHEMATICS  
K-2, 3-5, 6-8  
Learning Math: Patterns, Functions, and Algebra  
Explore the big ideas in algebra - patterns, functions, and linearity - in this video- and Web-based course for K-8 teachers.



MATHEMATICS  
K-2, 3-5, 6-8  
Learning Math: Geometry  
Discover how geometric reasoning can be used as a method of problem solving in this video- and teachers.  
GO >



MATHEMATICS  
K-2, 3-5, 6-8  
Learning Math: Measurement  
Examine some of the major ideas in measurement and their practical applications



MATHEMATICS  
K-2, 3-5, 6-8  
Learning Math: Number and Operations  
This video- and web-based course for K-8

## Part B: Decimals to Fractions (30 min.)

In Part A of this session, you learned that the decimal representation for every rational number was either a terminating or a repeating decimal. You also learned how to find the decimal representation for any rational number. Is the converse of that statement true? That is, is every terminating or repeating decimal a rational number? The answer is yes. And any non-terminating, non-repeating decimal cannot be a rational number. So, for instance,  $\pi$  is an irrational number, as is  $\sqrt{2}$ .

So how do we find the fractional representation of a decimal? [See Note 2] If the decimal is terminating, it's already a fraction; you just can't see the denominator. For example, 0.25 means 25/100, which reduces to 1/4. However, if the fraction is repeating, the process isn't quite so simple. To find the fractional representation for 0.232323..., for example, here's what you need to do.

First, choose a letter to represent the fraction you are looking for; let's say,  $F$ . This fraction,  $F$ , represents your repeating decimal; that is,  $F = 0.232323...$ . Now we need to think of a way to get rid of those repeating parts. To do this, multiply  $F$  by  $10^2$ , where  $n$  equals the size of the period. In this case, the period is two, so multiply  $F$  by  $10^2$ , or 100. Finally, subtract  $F$ . The problem looks like this:

$$\begin{array}{r} 100F = 23.232323... \\ - F = 0.232323... \\ \hline 99F = 23 \end{array}$$

Since  $99F = 23$ ,  $F = 23/99$ .

This worked out nicely, didn't it? But it does raise some questions:

- Why can we do this? We can do this because we subtracted equal quantities from both sides of an equation.
- How did we know to multiply by 100? The period of this decimal is two, so if we multiply by  $10^2$ , the repeating part will "move over" two places and the repeating parts then "line up" under each other. In other words, if the period is  $p$ , we can multiply by  $10^p$ .
- What if the decimal doesn't repeat right away? Then we need to modify the process. Let's look at another decimal number, 0.45545454.... We know that  $F$  represents the repeating decimal number; that is,  $F = 0.45545454...$ . Once again, we need to think of a way to get rid of those repeating parts. To do this, we again find 100 times  $F$  (because the repeating part has a period of two) and then subtract  $F$ :

$$\begin{array}{r} 100F = 45.545454... \\ - F = 0.455454... \\ \hline 99F = 45.09 \end{array}$$

So, since  $99F = 45.09$ ,  $F = 45.09/99$ .

Notice that, unlike in the previous example, the first couple of digits didn't "line up," which resulted in having a terminating decimal number in the numerator. To simplify this fraction that contains a decimal point, multiply both top and bottom by 100, which gives us  $F = 4,509/9,900 = 501/1,100$ .

### Problem B1.

- Find the fraction equivalent for 0.125.
- Find the fraction equivalent for 0.125125125....

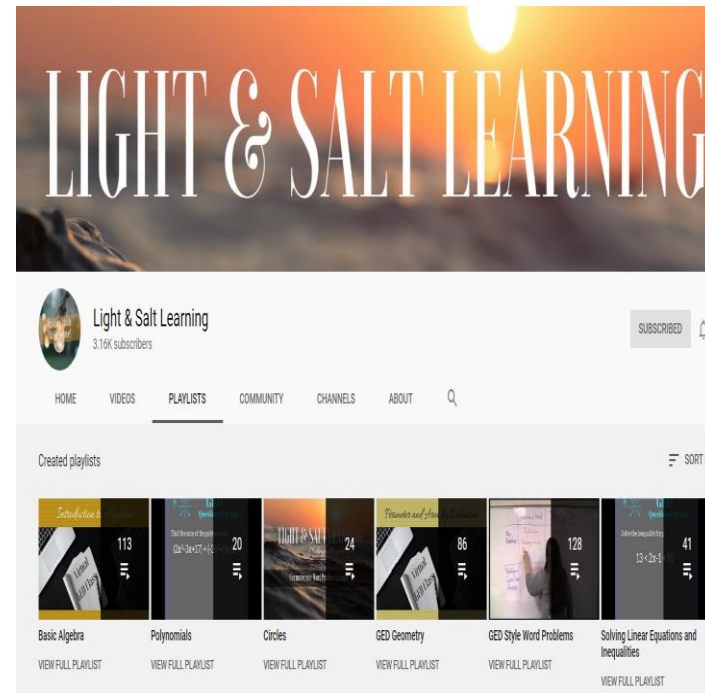
# Light & Salt Learning (YouTube Channel)

GED(R) Dedicated Learning Site with Playlists

URL can be found [here](https://www.youtube.com/channel/UCKcmzCt3l2pcEa58_YY3sPg/playlists)

Contains hundreds of useful videos

Although the site is primarily math content, it also contains science and RLA videos



This site was developed by Kate Redmon, an adult education teacher in Arizona. She continues to provide excellent resources through the site.

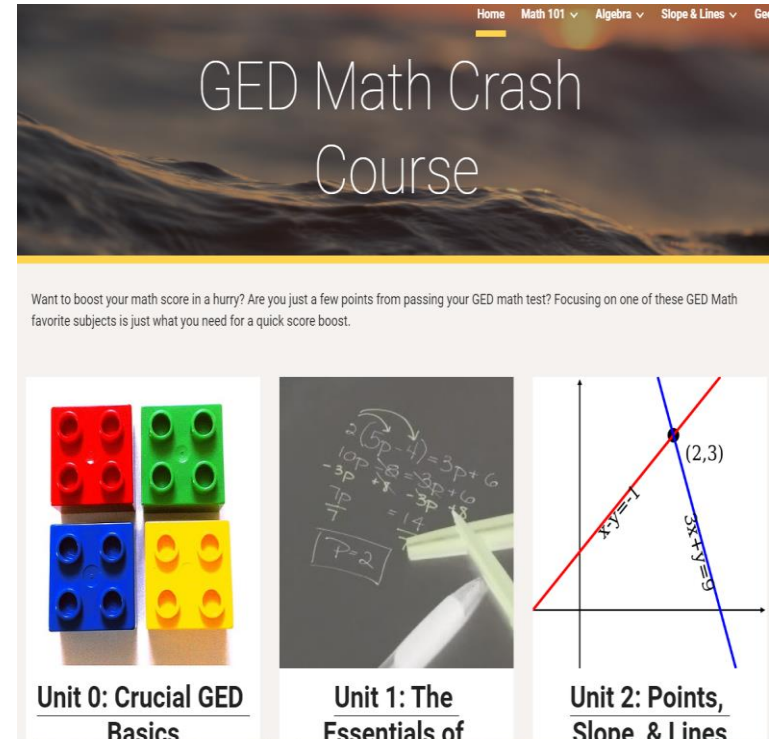
[https://www.youtube.com/channel/UCKcmzCt3l2pcEa58\\_YY3sPg/playlists](https://www.youtube.com/channel/UCKcmzCt3l2pcEa58_YY3sPg/playlists)

# GED Math Crash Course

This site contains videos, notes, and practice problems for GED(R) prep students

Website can be found [here](https://sites.google.com/view/ged-mathcrashcourse/algebra?authuser=0)

Resources can be incorporated into a Google Classroom



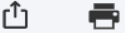
<https://sites.google.com/view/ged-mathcrashcourse/algebra?authuser=0>

# Utilizing the GED Ready® Score Report for Student Success



# GED Ready Score Report

## GED Ready® - Mathematical Reasoning



152

**My Score: 152**

**LIKELY TO PASS**

Test Date : 01/02/2014

[Share my scores/Find GED® Classes](#)



## Link Your Study Material

We've identified the exact skills you need to work on, based off your GED Ready results. Link a book or online program to see the exact pages/sections for each skill you need to study in the checklist to the left.



**Your linked study Material:**

Aztec Software GED® Learning Series

[Change >](#)



# Linking the Study Tool via a Pop-up



Your linked study Material:

Az  
Ch

## Your Skills

☒ Link your study

See exactly wh

☐ Unit - Algebrai

Recognize a fu

☐ Unit - Algebrai

Compare funct

☐ Unit - Algebraic Problem Solving with Expressions and Equations, Lesson - Graphing on the Coordinate Plane, Screens 38-43, 49

Select your existing online program or book.

Q Search by title or publisher...



Apex Learning  
GED®  
Mathematical  
Reasoning



Aztec Software  
GED® Learning  
Series



Edgenuity  
GED® Test  
Preparation



FastForward:  
Your Study  
Guide for the  
GED® Test



GED Academy™



CONTINUE

1/11 completed



# New Format for the Skills List

## Your Skills to Improve Checklist

1/11 c

☒ **Link your study material above**

~~See exactly what pages/sections you need to study, below.~~

☐ **Study pages 60-61**

☐ **Unit - Algebraic Problem Solving with Expressions and Equations, Lesson - Functions, Screens 4-8, 11-12**

Recognize a function in a table or graph by determining whether or not there is only one output value for each input value

☐ **Unit - Algebraic Problem Solving with Expressions and Equations, Lesson - Functions, Screens 32-33**

Compare functions that are shown in different ways such as tables, graphs, descriptions, equations

☐ **Unit - Algebraic Problem Solving with Expressions and Equations, Lesson - Graphing on the Coordinate Plane, Screens 38-43, 49**

Use the slope-intercept formula:  $y = mx + b$

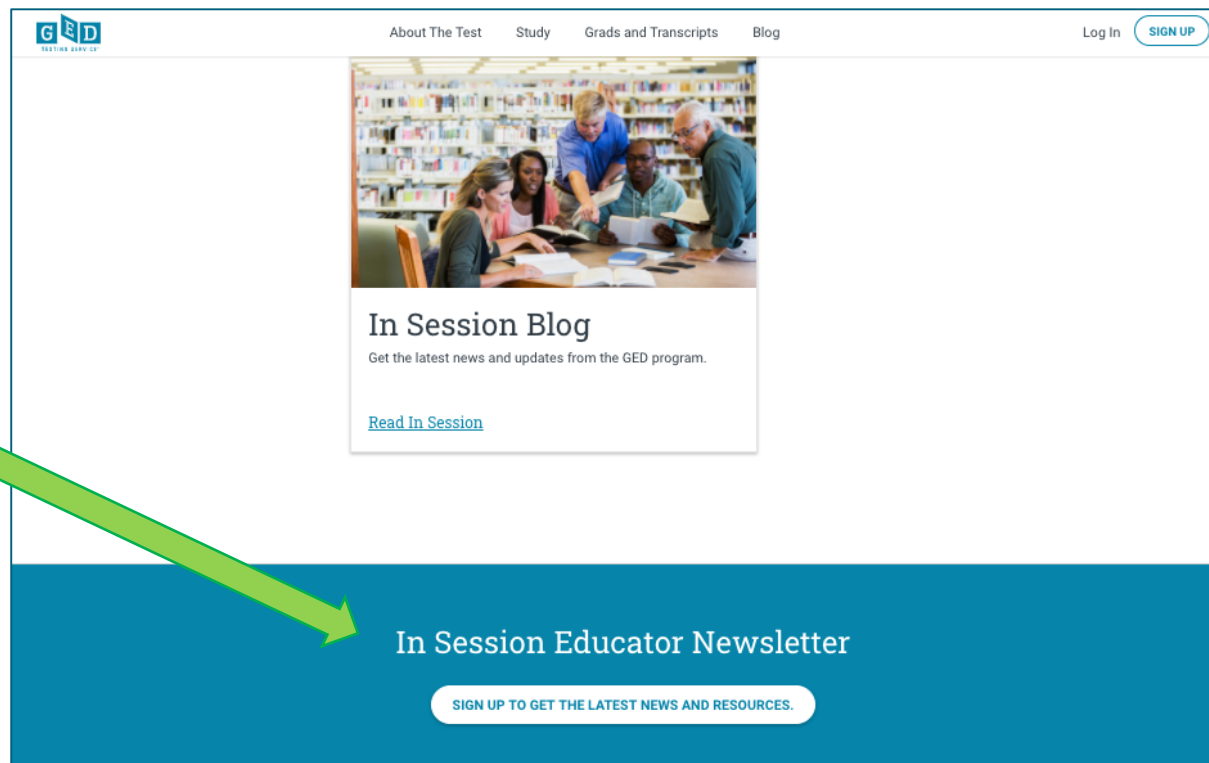
☐ **Unit - Algebraic Problem Solving with Expressions and Equations, Lesson - Linear Equations, Screens 3-24**

Solve linear equations and real-world problems that involve them (Example: calculate the fuel efficiency of a car at different speeds)

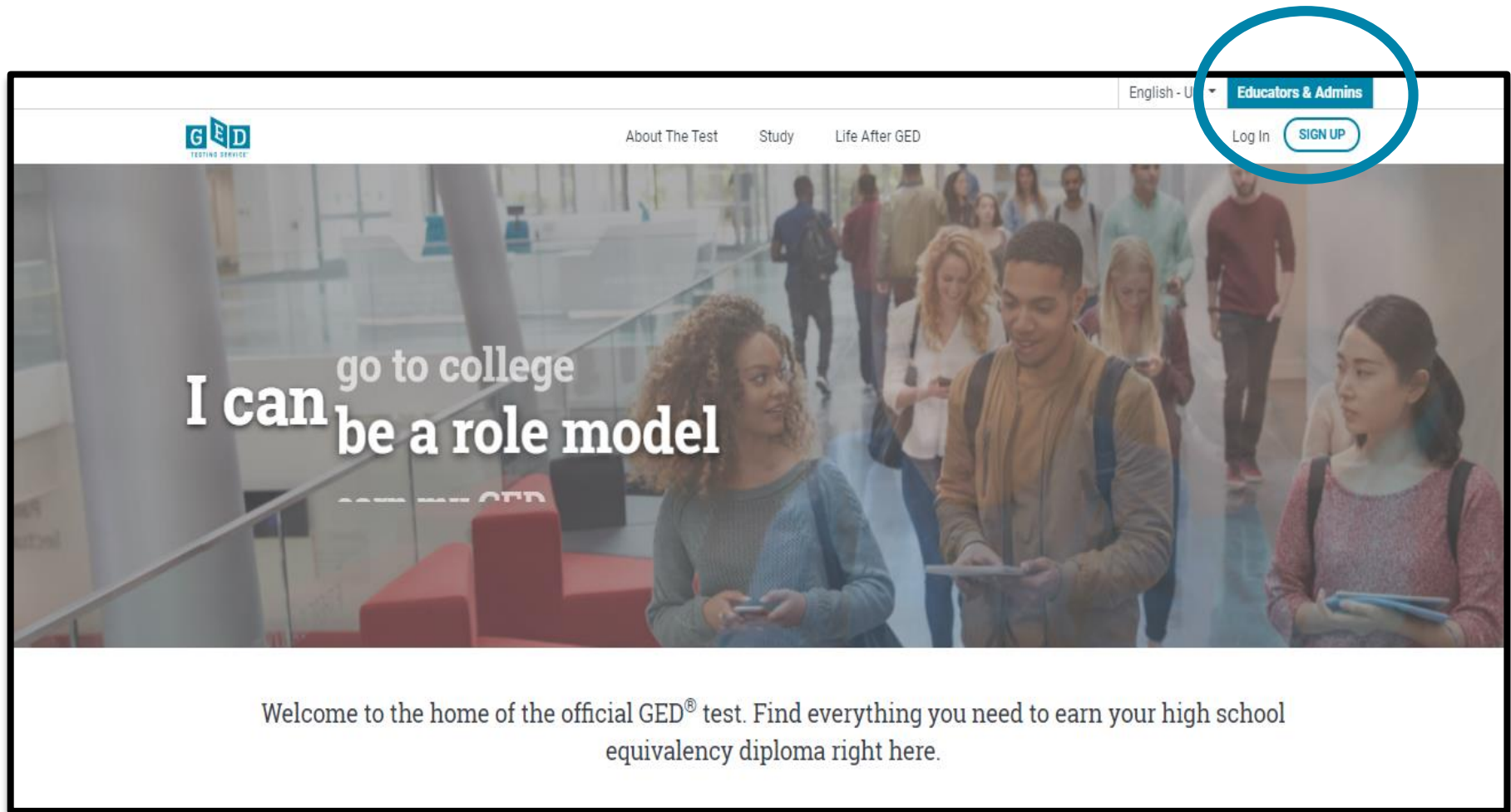


# In Session – The Best Way to Get Information Quickly/Reliably Delivered to You

Sign-up link  
located at the  
bottom/footer of  
every  
“Educator & Admins”  
page on GED.com



# Home for All Things GED®

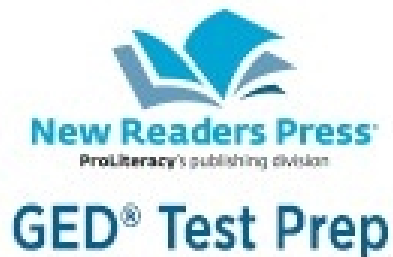


<https://ged.com/>

# Identify Resources



***i-Pathways***



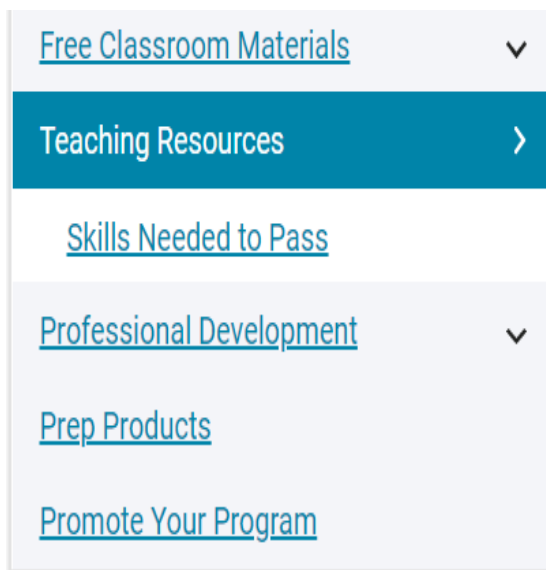
# Professional Development: Everything Old is New Again!



Stay in the know from GED® experts.



- Tuesdays for Teachers
- On Demand specific webinars/discussions



- Think SMALL and call on us
  - Staff meetings for a Q and A
  - Discussion with staff new to adult education
  - Deep dive in a particular strategy or content area
  - Use of the website



# Questions?



# Thank you!

**Debi.Faucette@GED.com**

**help@ged.com**

**202.302.6658**

