GED Knowledge & Skill Gaps Math—Session 1

A Tuesdays for Teachers Webinar
by the GED Testing Service®
October 26, 2021

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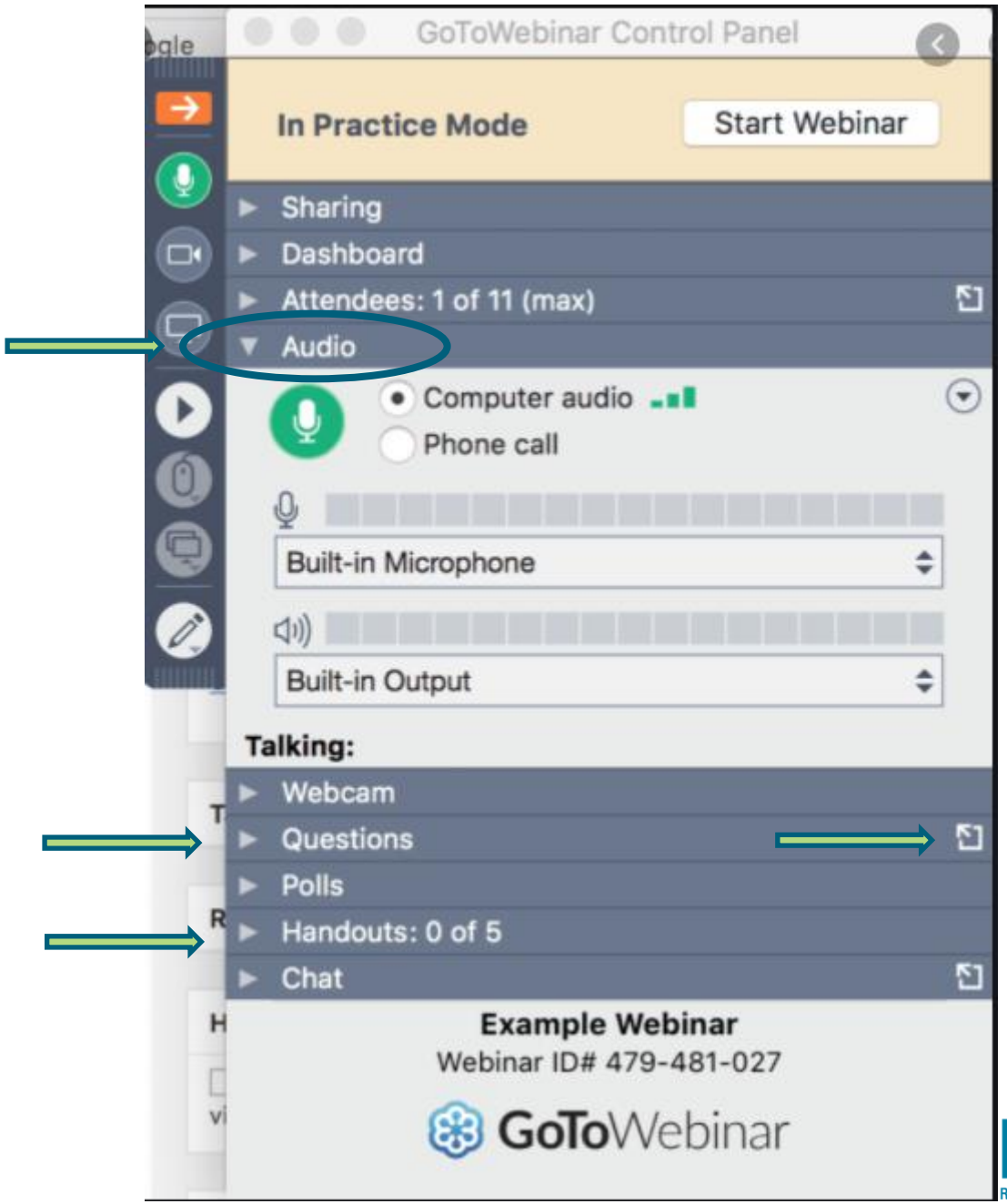
Before We Get Started



Welcome

Cheryl Klar-Trim,
GEDTS
Manager of Test
Development

Michael Bell, GEDTS
Senior Content
Specialist

Debi Faucette

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Susan Pittman,
Education Consultant

Today's Focus

Some test takers and students have gaps in the knowledge and skills that they need to succeed on the GED Mathematical Reasoning test. Test takers and students may need more coverage and practice in these areas during test preparation.

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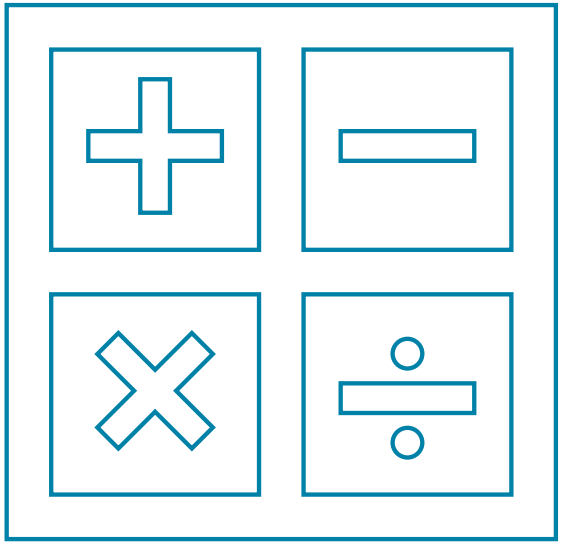
What we will be covering

- How items and tests are developed
- How skill/knowledge gaps are identified
- Specific skills and GED indicators where students and test takers have the *most* difficulty
- Possible reasons *why* students and test takers are having difficulty



What we won't be covering

Test takers tend to perform less well on some items simply because the concepts they assess are more difficult.

In other words, we *expect* the items to be hard because the concepts are hard (e.g., permutations and quadratic equations).

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Item development

Guiding principles for developing items include:

- One item, one construct
- No extraneous numbers
- Distractors reflect (most) common mistakes
- No trick questions
- No testing of solution *methods*

All items are reviewed by outside experts (i.e., people like you) before they go on a test

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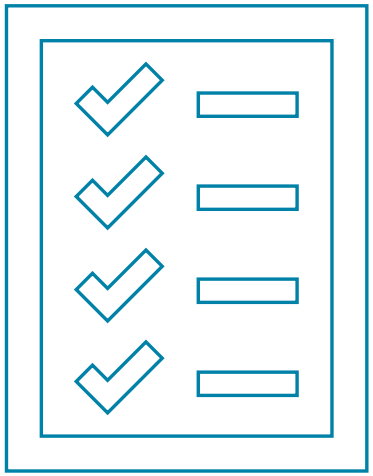
Field test construction



Once an item is perfect*, it is placed in a field test pool

Field test items are embedded in operational—i.e., ‘real’—tests

Once enough test takers have taken the FT items, the pool is swapped out for another one

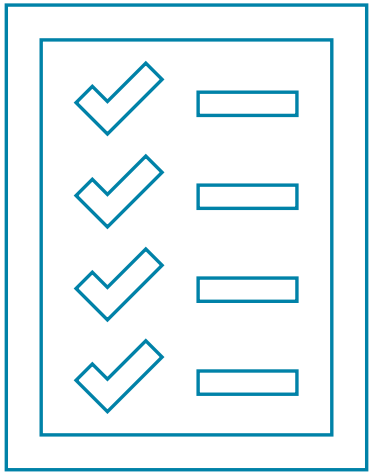
*explained next slide

Post-test analysis

Field test items are analyzed statistically, *and* for content issues, then are designated as:

- accepted
- rejected
- revised/re-field tested

This statistical analysis is where knowledge and skill gaps are identified.



Areas of interest

Session 1:

- non-calculator items
- exponents/roots
- three-dimensional shapes

Session 2:

- algebraic computation
- inequalities
- slope/graphing
- multiple correct answers

NOTE: there is overlap between some of these areas

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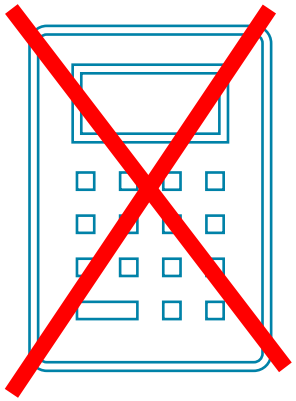
Gap 1: Non-calculator items

On many non-calculator items, there is little difference in performance among high-, middle-, and low-achieving groups. This *may* be due to over-reliance on calculators during instruction and practice. GED® students should have practice on the skills assessed by the non-calculator indicators ***without*** the use of a calculator.



Gap 1: Non-calculator items (indicators)

Non-calculator indicators:

- Q.1.a – Q.1.d (number sense—ordering fractions/decimals, factors, multiples, exponents, distance on number lines)
- Q.2.a – Q.2.d (arithmetic computation—four basic operations, order of operations, squares, cubes, roots, undefined expressions)
- **NOT** Q.2.e (arithmetic word problems; calculator allowed)

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Gap 1: Non-calculator items (examples)

Place 3/9, 4/11, and 3/7 in order from least to greatest.
(Q.1.a)

What is the least common multiple of 3, 8, and 10?
(Q.1.b)

Simplify $(-2)^6 \times [(-2)^3]^2$
(Q.1.c)

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Gap 1: Non-calculator items (examples)

Multiply 3/5 × 0.45
(Q.2.a)

Simplify -4 × 5 + (36 ÷ 3) ÷ 2
(Q.2.a)

Simplify $-3\sqrt[3]{64}$
(Q.2.c)

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Gap 2: Exponents/roots (indicators)

- Specific indicators: Q.1.c (laws of exponents); Q.2.c (cubes/cube roots)
- Related indicators: Q.4, Q.5 (measurement of 2-D and 3-D shapes); Q.4.a (Pythagorean theorem); A.1.d – A.1.f & A.1.i (computing with, factoring, and evaluating polynomials); A.7.c – A.7.d (quadratic functions)
- Q.2.b (squares/square roots): test takers are mostly fine with this, but struggle a bit with squaring negatives

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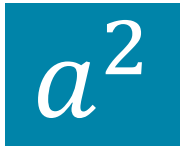
Gap 2: Exponents/roots (examples)

Simplify $(-2)^6(-2^3)^2$
(Q.1.c)

Simplify $-3\sqrt[3]{64}$
(Q.2.c)

Simplify -6^2 (answer: -36)
Simplify $(-6)^2$ (answer: 36)
(explanation next slide)
(Q.2.b)

Gap 2: Exponents/roots (examples)

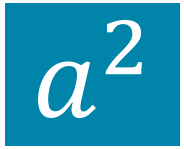


PEMDAS (Please Excuse My Dear Aunt Sally)
Parentheses, Exponents, Add/Subtract, Multiply/Divide

$(-6)^2$ = squaring of -6

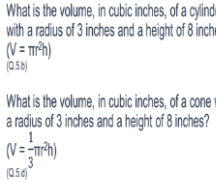
-6^2 = the negative of the square of 6
negative sign is equivalent to Subtract(ing)
Exponents first; 6^2 = 36; negative of 36 = -36

Gap 2: Exponents/roots (examples)



A right triangle has two legs measuring 6 inches and 8 inches. What is the length, in inches, of the hypotenuse of the right triangle?
(formula: $a^2 + b^2 = c^2$)
(Q.4.a)

Gap 2: Exponents/roots (examples)


What is the volume, in cubic inches, of a cylinder with a radius of 3 inches and a height of 8 inches? ($V = \pi r^2 h$) (Q.5.b)

What is the volume, in cubic inches, of a cone with a radius of 3 inches and a height of 8 inches? ($V = \frac{1}{3}\pi r^2 h$) (Q.5.d)

What is the volume, in cubic inches, of a cylinder with a radius of 3 inches and a height of 8 inches?

$(V = \pi r^2 h)$

(Q.5.b)

What is the volume, in cubic inches, of a cone with a radius of 3 inches and a height of 8 inches?

$(V = \frac{1}{3}\pi r^2 h)$

(Q.5.d)

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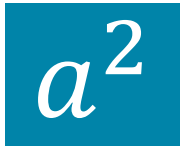
Gap 2: Exponents/roots (examples)



Add $(3x^2 – 4y^2) + (x^2 + 2y^2)$
(A.1.d)

What is the value of $3x^2 – 4y^2$ when $x = -3$ and $y = 2$?
(A.1.e)

Multiply $(3x^3 – 4y^3)(x^3 + 2y^3)$
(A.1.d)

Completely factor $6x^8 – 12x^4 + 9x^2$
(A.1.f)

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Gap 3: Three-dimensional shapes (indicators)

Skills assessed (Q.5):

- calculate surface area
- calculate volume
- determine dimensions (e.g., length, height, radius)

Figures: prisms, pyramids, cones, cylinders, spheres, composite figures

Formulas for surface area and volume of all figures assessed are provided on the GED Formula Sheet.

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Gap 3: Three-dimensional shapes (examples)

A sphere has a diameter of 12 inches. What is the surface area, in square inches, of the sphere?

($SA = 4\pi r^2$)

(Q.5.d)

A cylinder has a radius of 2 inches and a height of 8 inches. What is the volume, in cubic inches, of the cylinder?

($V = \pi r^2 h$)

(Q.5.b)

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Gap 3: Three-dimensional shapes (examples)

A sphere has a surface area of 200.96 square inches. What is the radius, in inches, of the sphere?

($SA = 4\pi r^2$)

(Q.5.d)

A cylinder has a volume of 401.92 cubic inches and a height of 8 inches. What is the radius, in inches, of the cylinder?

($V = \pi r^2 h$)

(Q.5.b)

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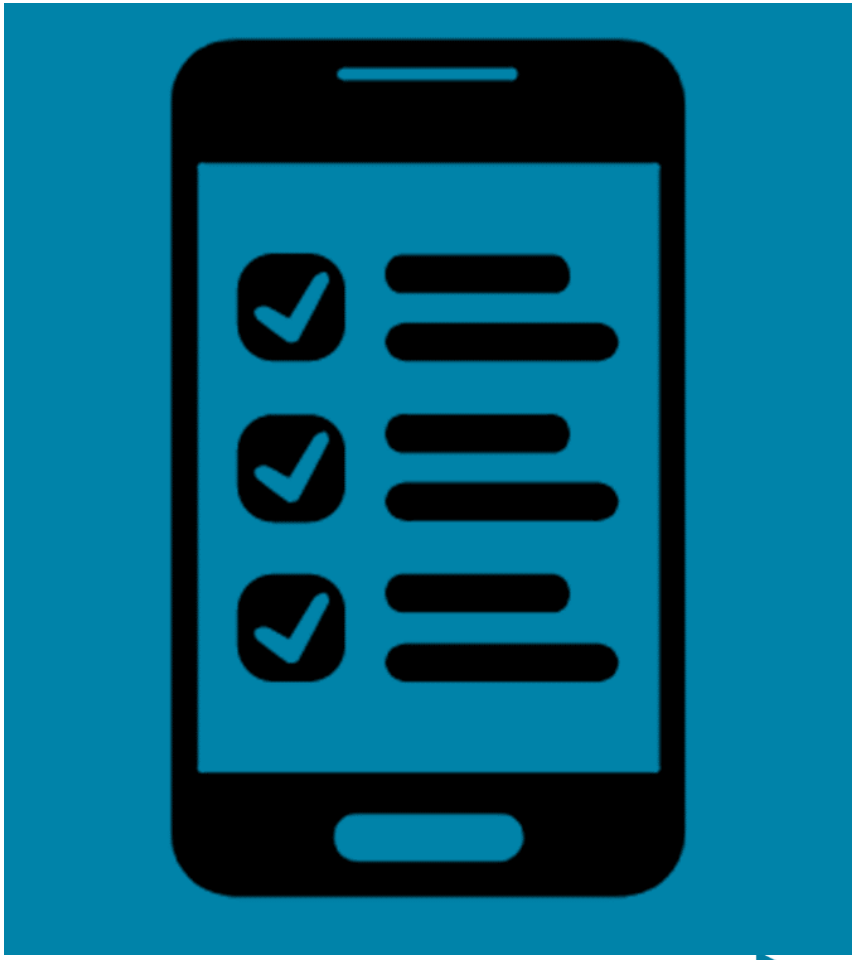
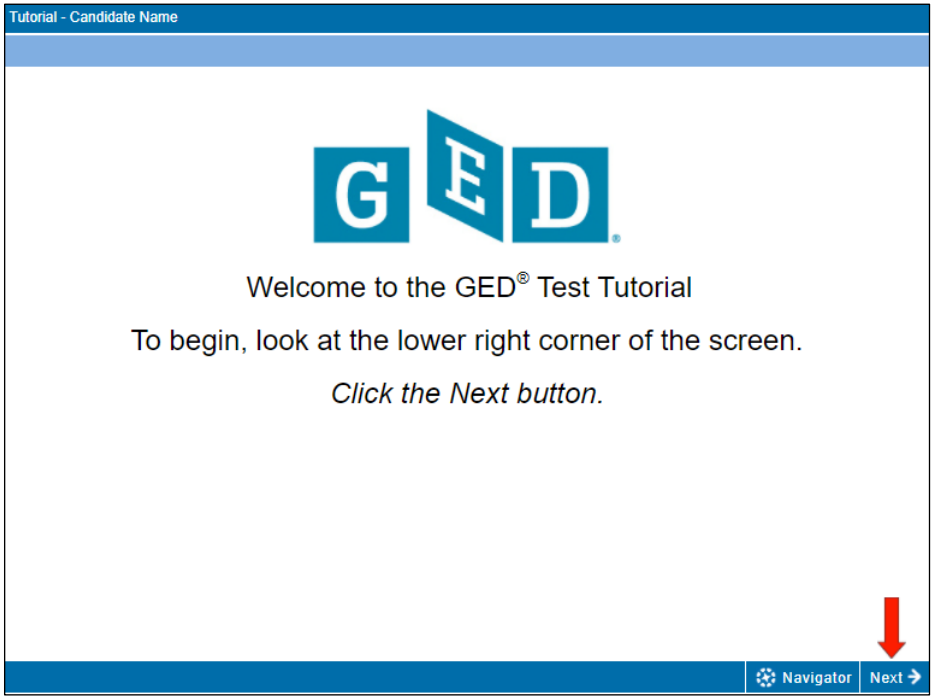
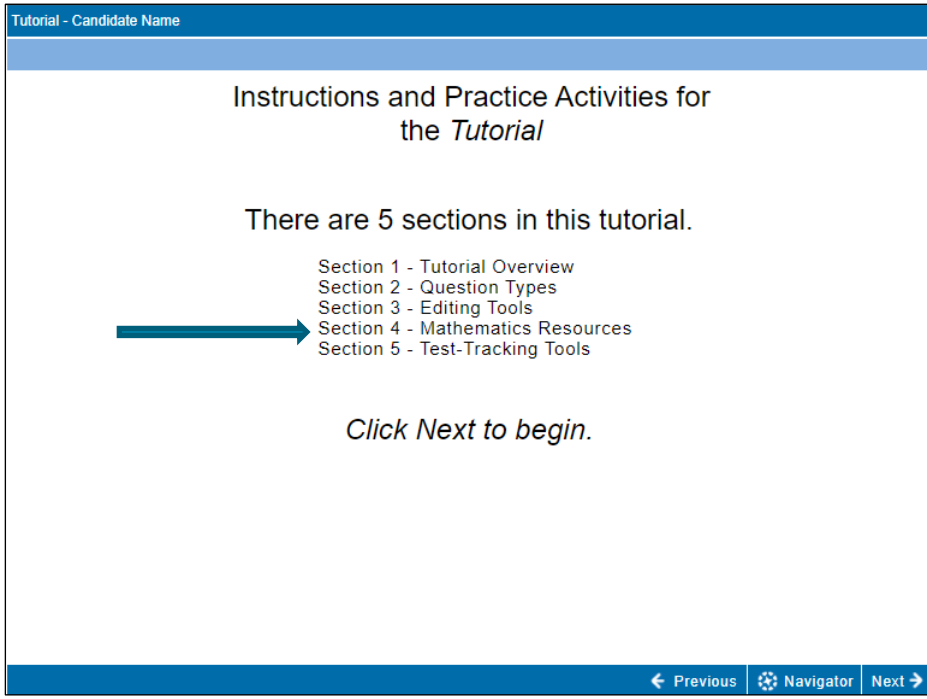
Resources on GED.com

- Computer Tutorial
- Calculator Tutorial
- Calculator Reference Sheet
- Formula Sheet
- Math Study Guide
- Calculator-Prohibited Indicators



Computer Tutorial





Calculator

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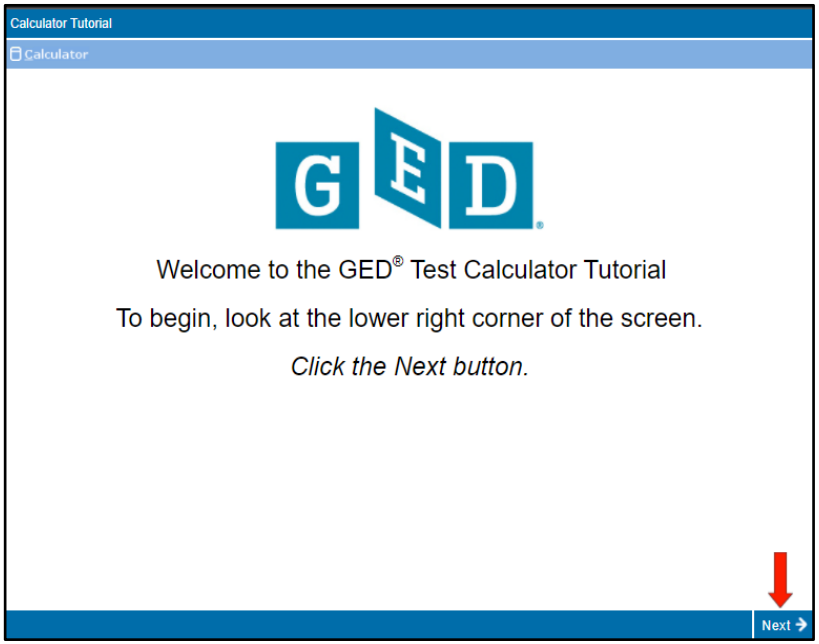

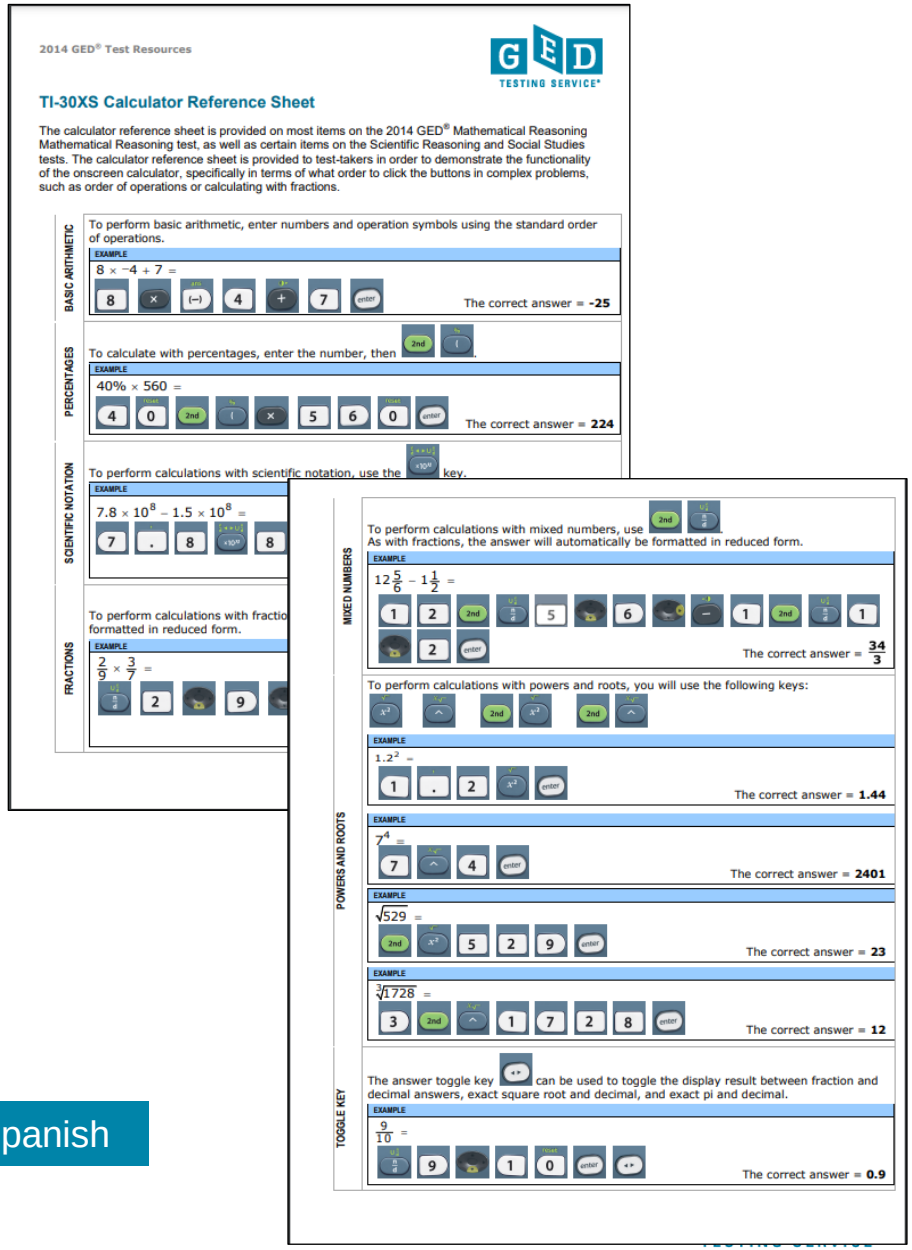

https://ged.com/practice-test/en/calculator/

Available in English and Spanish

Formulas

https://ged.com/wp-content/uploads/math_formula_sheet.pdf

Available in English and Spanish

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Mathematics Formula Sheet & Explanation

The 2014 GED® Mathematical Reasoning test contains a formula sheet, which displays formulas relating to geometric measurement and certain algebra concepts. Formulas are provided to test-takers so that they may focus on *application*, rather than the *memorization*, of formulas.

Area of a:

square	$A = s^2$
rectangle	$A = lw$
parallelogram	$A = bh$
triangle	$A = \frac{1}{2}bh$
trapezoid	$A = \frac{1}{2}h(b_1 + b_2)$
circle	$A = \pi r^2$

Perimeter of a:

square	$P = 4s$
rectangle	$P = 2l + 2w$
triangle	$P = s_1 + s_2 + s_3$
Circumference of a circle	$C = 2\pi r$ OR $C = \pi d$; $\pi \approx 3.14$

Surface area and volume of a:

rectangular prism	$SA = 2lw + 2lh + 2wh$	$V = lwh$
right prism	$SA = ph + 2B$	$V = Bh$
cylinder	$SA = 2\pi rh + 2\pi r^2$	$V = \pi r^2 h$
pyramid	$SA = \frac{1}{2}ps + B$	$V = \frac{1}{3}Bh$
cone	$SA = \pi rs + \pi r^2$	$V = \frac{1}{3}\pi r^2 h$
sphere	$SA = 4\pi r^2$	$V = \frac{4}{3}\pi r^3$
	(p = perimeter of base with area B; $\pi \approx 3.14$)	

Data

mean	mean is equal to the total of the values of a data set, divided by the number of elements in the data set
median	median is the middle value in an odd number of ordered values of a data set, or the mean of the two middle values in an even number of ordered values in a data set

Algebra

slope of a line	$m = \frac{y_2 - y_1}{x_2 - x_1}$
slope-intercept form of the equation of a line	$y = mx + b$
point-slope form of the equation of a line	$y - y_1 = m(x - x_1)$
standard form of a quadratic equation	$y = ax^2 + bx + c$
quadratic formula	$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
Pythagorean theorem	$a^2 + b^2 = c^2$
simple interest	$I = Prt$ (I = interest, P = principal, r = rate, t = time)
distance formula	$d = rt$
total cost	total cost = (number of units) × (price per unit)

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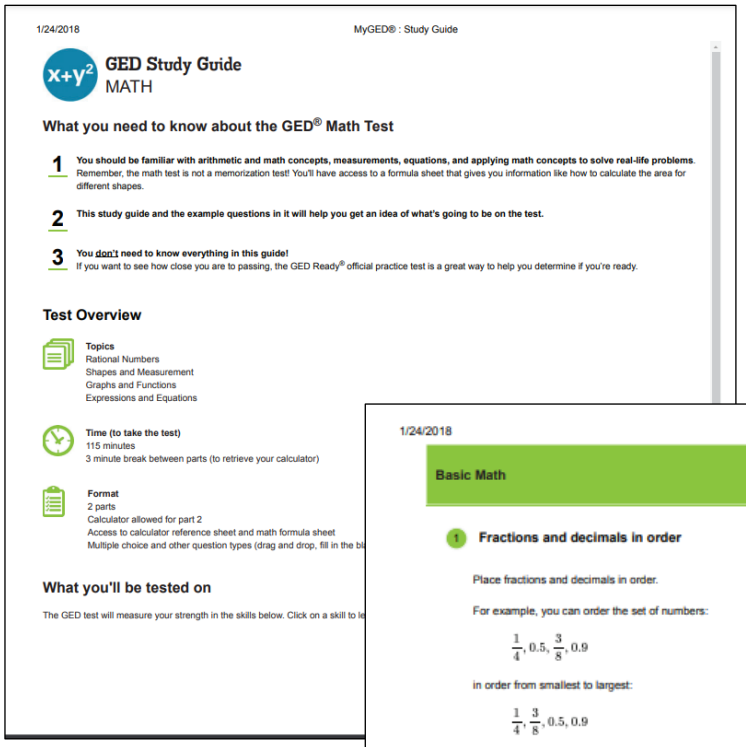
Math Study Guide


1/24/2018 MyGED® : Study Guide

GED Study Guide
MATH

What you need to know about the GED® Math Test

1 **You should be familiar with arithmetic and math concepts, measurements, equations, and applying math concepts to solve real-life problems.** Remember, the math test is not a memorization test! You'll have access to a formula sheet that gives you information like how to calculate the area for different shapes.

2 **This study guide and the example questions in it will help you get an idea of what's going to be on the test.**

3 **You don't need to know everything in this guide!** If you want to see how close you are to passing, the GED Ready® official practice test is a great way to help you determine if you're ready.

Test Overview

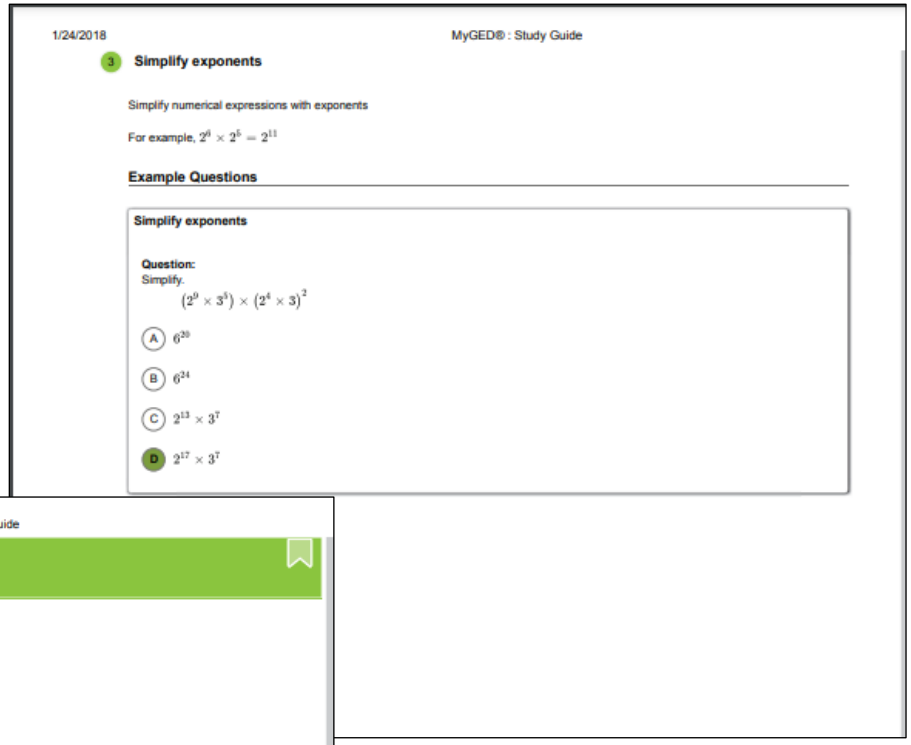
Topics
Rational Numbers
Shapes and Measurement
Graphs and Functions
Expressions and Equations

Time (to take the test)
115 minutes
3 minute break between parts (to retrieve your calculator)

Format
2 parts
Calculator allowed for part 2
Access to calculator reference sheet and math formula sheet
Multiple choice and other question types (drag and drop, fill in the bl

What you'll be tested on

The GED test will measure your strength in the skills below. Click on a skill to le


1/24/2018 MyGED® : Study Guide

3 Simplify exponents

Simplify numerical expressions with exponents

For example, $2^a \times 2^b = 2^{11}$

Example Questions

Simplify exponents

Question:
Simplify.

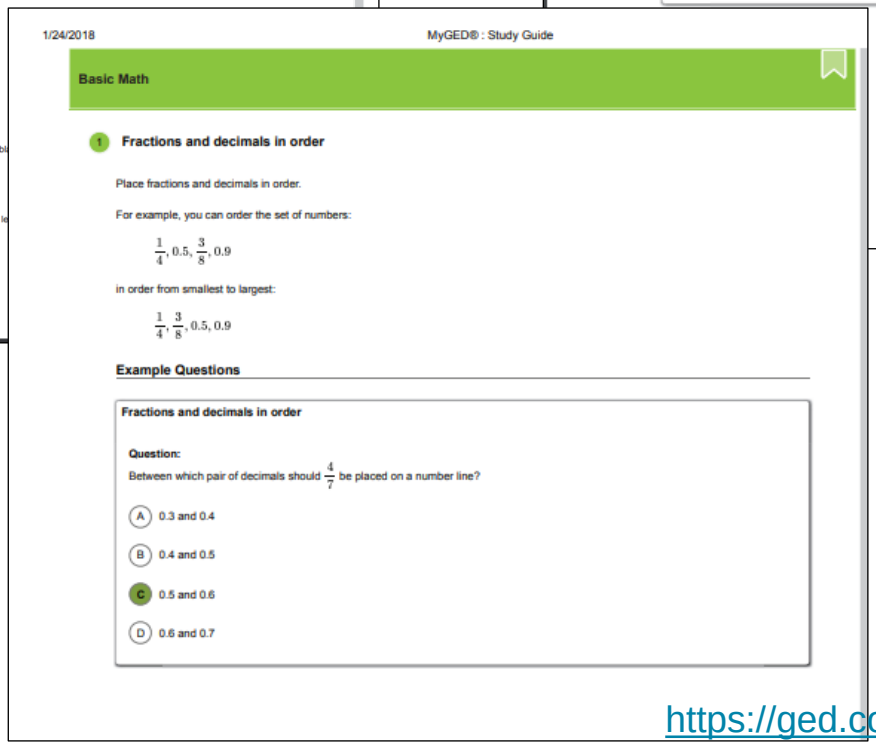
$$(2^9 \times 3^5) \times (2^4 \times 3)^2$$

A 6^{20}

B 6^{24}

C $2^{13} \times 3^7$

D $2^{17} \times 3^7$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Basic Math

1 Fractions and decimals in order

Place fractions and decimals in order.

For example, you can order the set of numbers:

$$\frac{1}{4}, 0.5, \frac{3}{8}, 0.9$$

in order from smallest to largest:

$$\frac{1}{4}, \frac{3}{8}, 0.5, 0.9$$

Example Questions

Fractions and decimals in order

Question:
Between which pair of decimals should $\frac{4}{7}$ be placed on a number line?

A 0.3 and 0.4

B 0.4 and 0.5

C 0.5 and 0.6

D 0.6 and 0.7

https://ged.com/wp-content/uploads/GED_Study-Guide_Math.pdf

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
Q.1.a Order fractions and decimals, including on a number line.	These questions may require • comparing or ordering positive numbers, or negative numbers, or both, • with or without a number line. 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 ***negative*** numbers.	• Leverage skills in comparing and ordering ***positive*** fractions and decimals toward similar skills comparing and ordering ***negative*** fractions and decimals. • Understand the difference in how negative numbers are compared and ordered: ○ For instance, while 0.7 is greater than 0.2, -0.7 is actually *less than* -0.2. ○ Since positives and negatives are essentially opposites, the rules for ordering each type of number are applied in a similarly opposite manner.
Q.1.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.	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.	No specific recommendations are provided, as the general population of GED® test takers performs well on this indicator.

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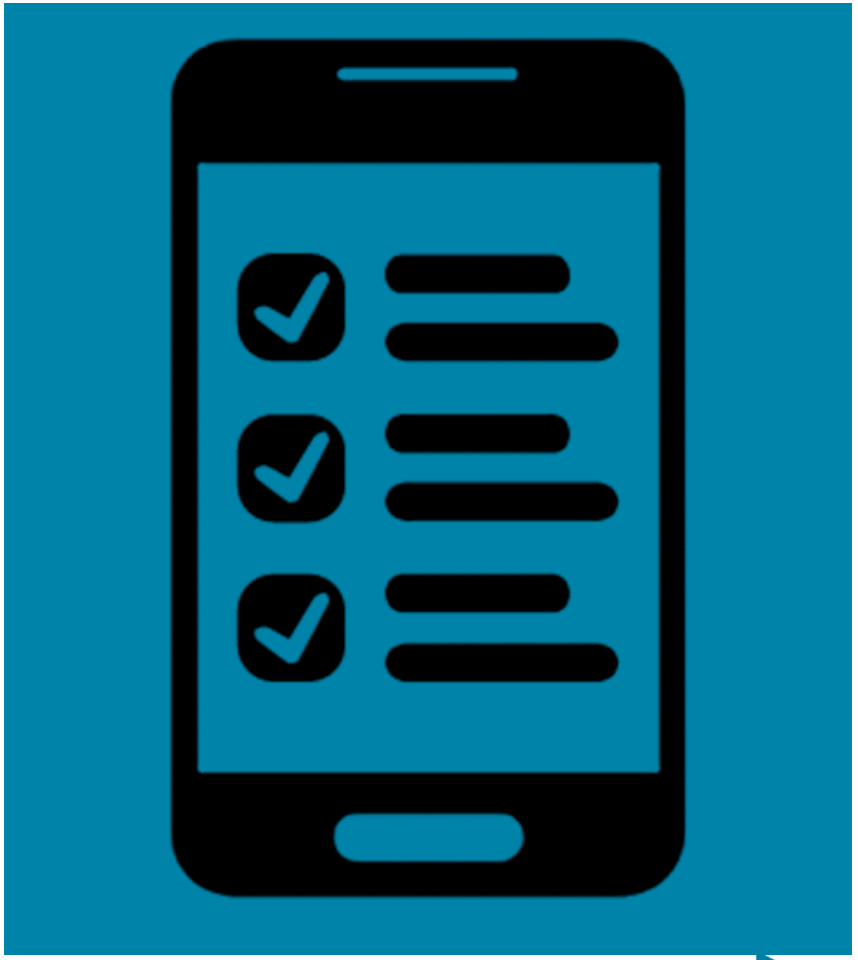
Instructional Resources

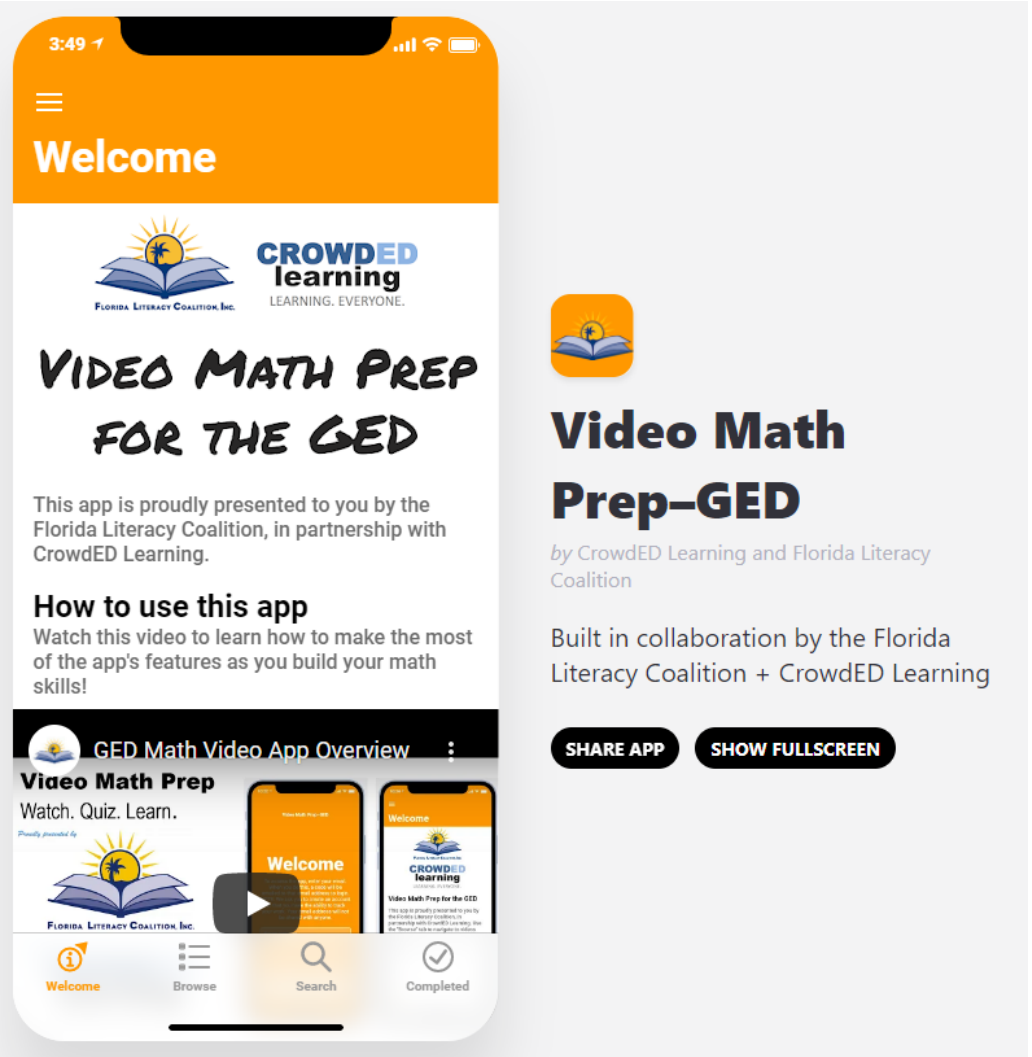
- Florida Literacy Math App
- Effortless Math
- IXL Learning
- GED Math Crash Course
- Math is Fun



Florida Literacy Math App

Scan with camera
to access app

https://floridaliteracy.org/mathvideos.html



FL Literacy Math App Tracking Sheet

https://gedmath.glideapp.io/

Florida Literacy Coalition, Inc.

FLC Math Tracking Sheet

This tracking sheet may help you as you explore all the video mini-lessons for the GED Math test. You can download/print this form and check the boxes next to the videos that you've watched.

It may be best if you watch the videos in order as they have been arranged with increasing difficulty and the skills will build as you go along.

As you explore the website you will notice that the videos are organized into 6 sections:

Foundations
Basic Math
Basic Algebra
Graphs and Functions
Geometry
Calculator/Reference Sheet

These sections are shown below. When you open each section you will find the videos organized into subsections shown here in blue.

Limited on time? If you're looking for the most important videos you may want to focus on the Basic Algebra and Graphs and Functions sections.

FOUNDATIONS

Place Value and Rounding

- ☐ Finding a number's place value
- ☐ Rounding whole numbers example 1
- ☐ Rounding whole numbers example 2
- ☐ Rounding to estimate difference
- ☐ Rounding decimals to the nearest tenth

Fraction Basics

- ☐ Numerator and denominator of a fraction
- ☐ Identifying fraction parts
- ☐ Proper and improper fractions
- ☐ Converting mixed numbers to improper fractions
- ☐ Mixed numbers: changing from an improper fraction
- ☐ Fractions in lowest terms
- ☐ Reciprocal of a mixed number
- ☐ Finding Common denominators

Decimal Basics

- ☐ Decimal place value
- ☐ Decimal to simplified fraction
- ☐ Fraction to decimal
- ☐ Converting percent to decimal and fraction

Identification

- ☐ Recognizing prime and composite numbers
- ☐ Identifying Rational Numbers
- ☐ Identifying parallel and perpendicular lines

Properties and Laws

- ☐ Properties of whole numbers
- ☐ Commutative property for addition
- ☐ Commutative law of addition
- ☐ Associative law of addition
- ☐ Associative property for multiplication
- ☐ Associative law of multiplication
- ☐ Commutative law of multiplication
- ☐ Ways to represent multiplication
- ☐ Identity Property
- ☐ Distributive Property 3
- ☐ Distributive law of multiplication
- ☐ Expressing division in multiple ways

BASIC MATH

Comparing Numbers

- ☐ Comparing whole numbers, place value
- ☐ Comparing decimals
- ☐ Comparing fractions
- ☐ Comparing fractions with different

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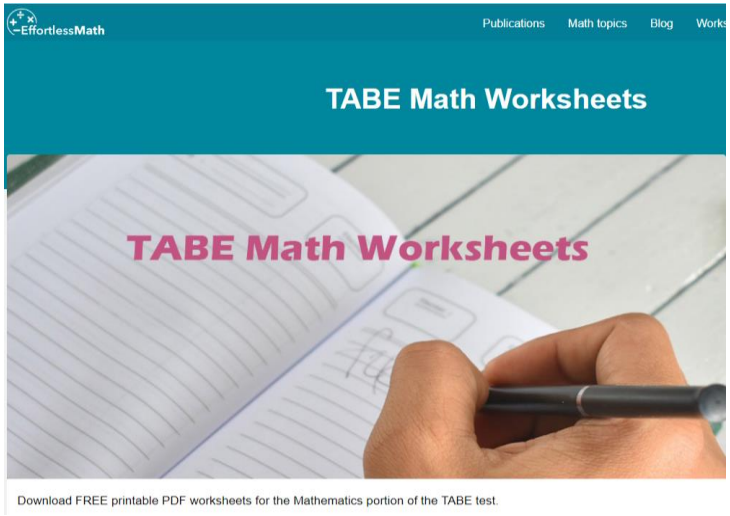
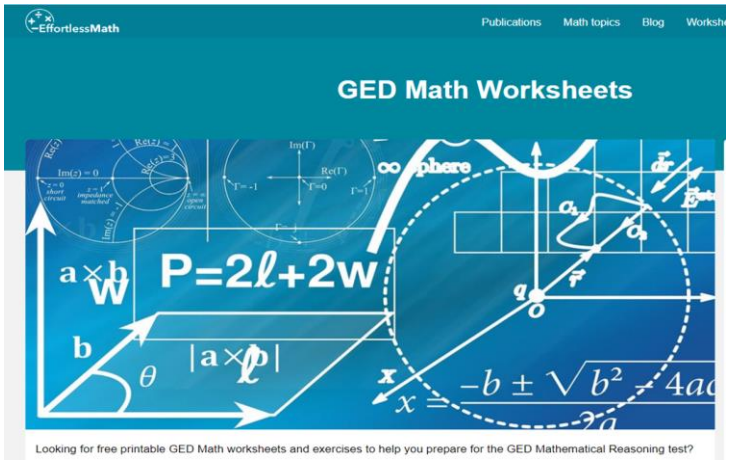
Effortless Math

This site contains free pdf worksheets for TABE and GED skills practice.

All worksheets contain answer keys so that students can self-check their work.





IXL Learning

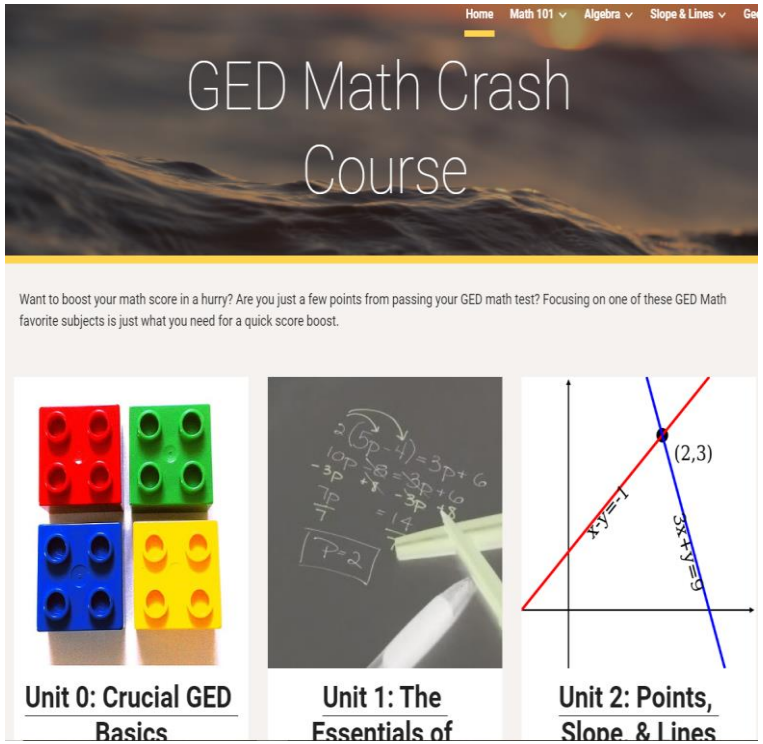
Contains content for math (K-12), RLA (K-12), science (K-8), and social studies (K-8)

GED Math Crash Course

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

Website can be found here

Resources can be incorporated into a Google Classroom

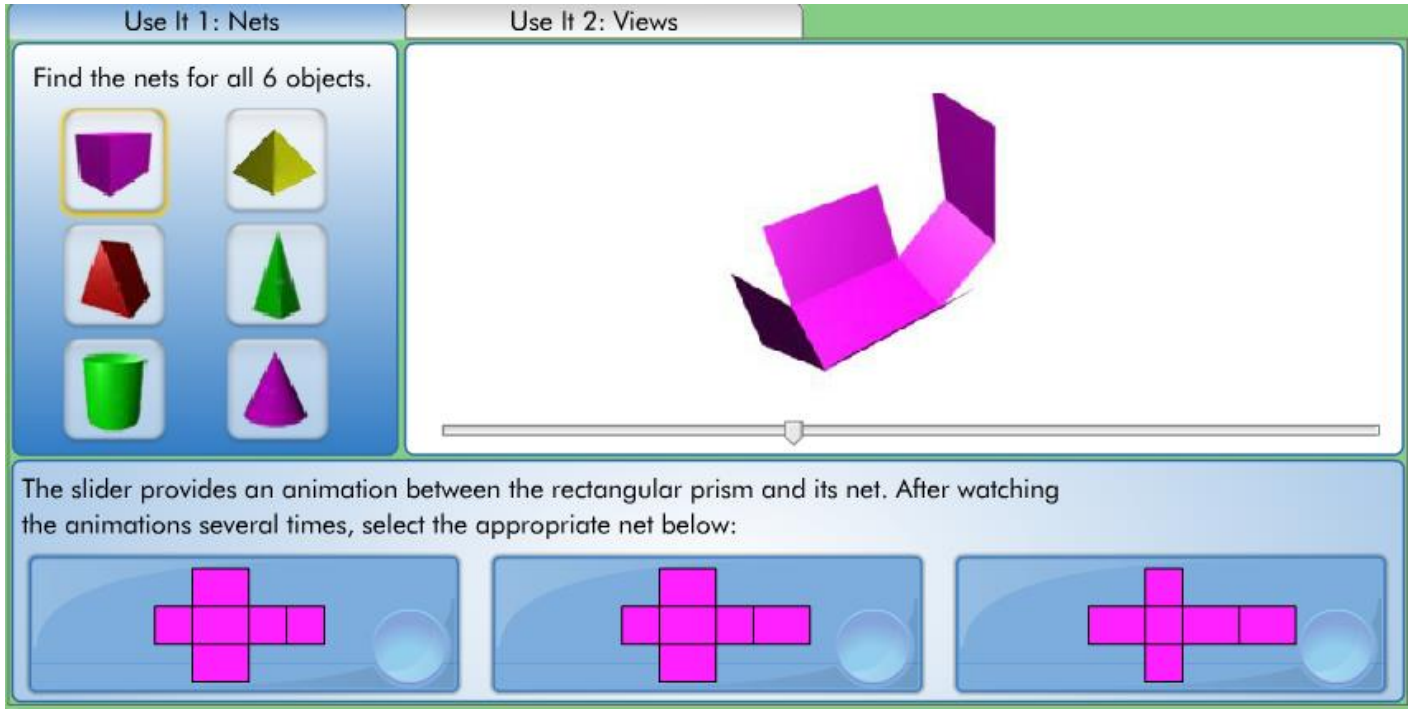


Math is Fun

https://www.mathsisfun.com/geometry/

Using Nets to Find Surface Areas

Math Interactives



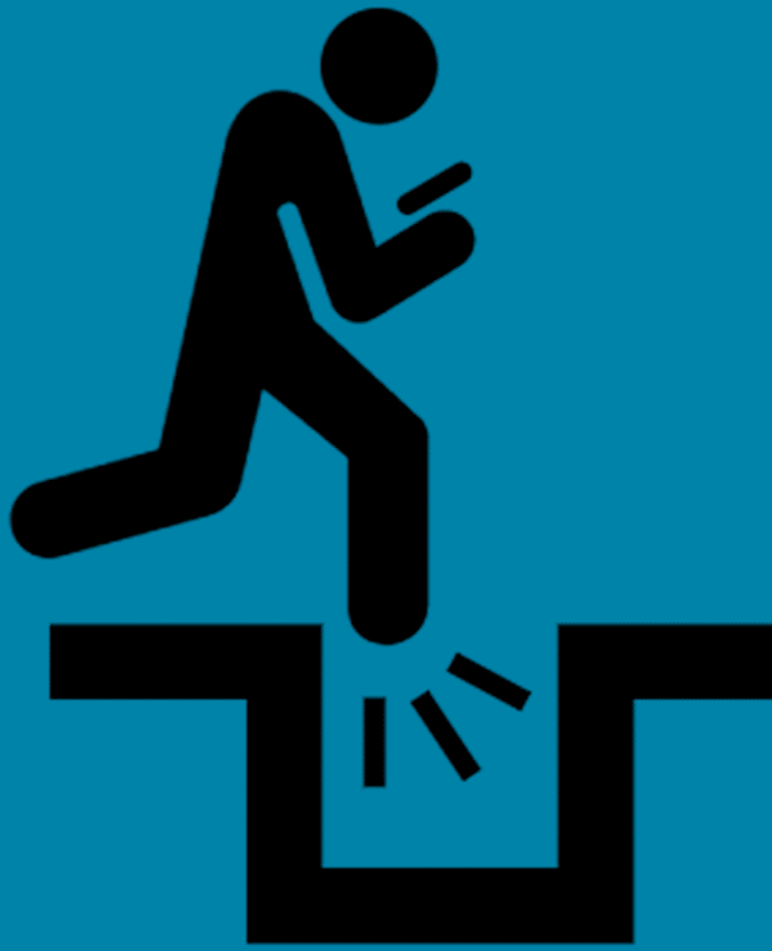
http://www.learnalberta.ca/content/mejhm/index.html?l=0&ID1=AB.MATH.JR.SHAP&ID2=AB.MATH.JR.SHAP.SURF&lesson=html/object_interactives/surfaceArea/use_it.html

GED TESTING SERVICE®

Tuesdays for Teachers
(coming this fall)

Trends in Students' Knowledge & Skill Gaps

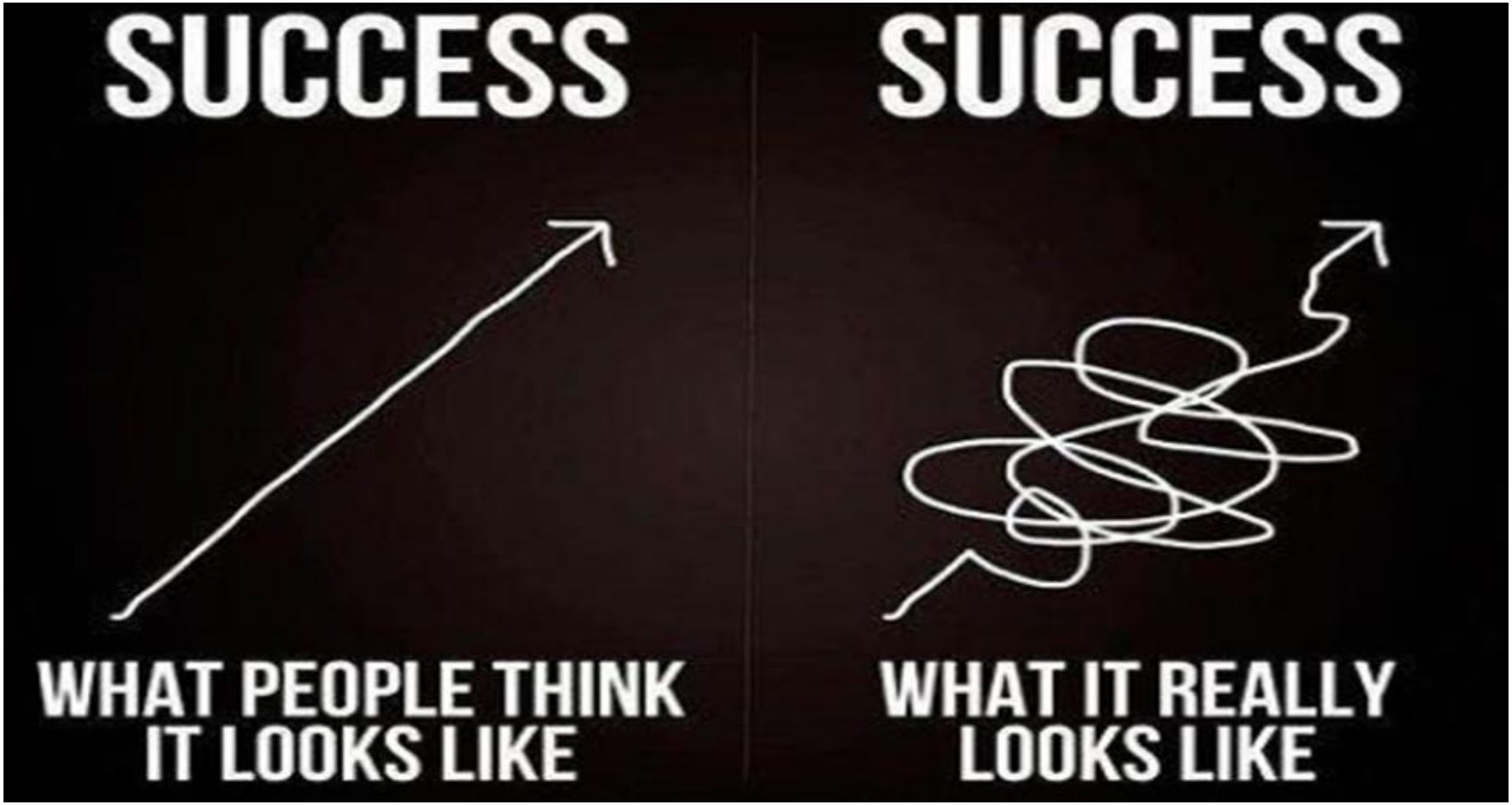
Co-presenters:
GEDTS Content Area Specialists
Test Development Division



GED TESTING SERVICE®

Tuesdays for Teachers
12:30-2:00 PDT/3:30-5:00 EDT

November 16, 2021	Mathematical Reasoning, Part Two
December 7, 2021	Reasoning Through Language Arts, Part One
January 25, 2022	Reasoning Through Language Arts, Part Two
February—March	• Social Studies • Science
May 2022	• Individual “Hot Topic Sessions” based upon Educator and Administrator interest and GEDTS observations of student and educator trends


SUCCESS
WHAT PEOPLE THINK IT LOOKS LIKE
SUCCESS
WHAT IT REALLY LOOKS LIKE

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about

Thank you!

Communicate with GED Testing Service®
help@ged.com

Debi Faucette – Debi.Faucette@ged.com
Susan Pittman – skptvs@gmail.com

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