A Look at the Most-Missed Items on the GED® Mathematical Reasoning Test

Trainer

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Algebraic Sugar Cane

10 factories produce sugar cane. The second produced twice as much as the first. The third and fourth each produced 80 more than the first. The fifth produced twice as much as the second. The sixth produced 40 more than the fifth. The seventh and eighth each produced 40 less than the fifth. The ninth produced 80 more than the second. The tenth produced nothing due to drought in Australia. If the sum of the production equaled 11,700, how much sugar cane did the first factory produce?

2014 GED® Test Analysis of Most Missed Items for Mathematical Reasoning Test

Content, Group 1: Quantitative Reasoning

Indicator	Description
Q.4.b	Compute the area and circumference of circles. Find the radius or diameter of a circle when given the area or circumference.
Q.4.c	Compute the perimeter and area of polygons. Find side lengths of a polygon when given the perimeter or area.
Q.4.d.	Compute the perimeter and area of two-dimensional composite shapes, which could include circles.

Content, Group 2: Algebraic Reasoning

Indicator	Description
A.5.a	Locate points in the coordinate plane.
A.5.b	Determine the slope of a line from a graph, equation, or table.
A.5.d	Graph two-variable linear equations.

Content, Group 3: Quantitative Reasoning

| Indicator	Description
Q.3.b	Use scale factors to determine the magnitude of a size change. Convert between actual drawings and scale drawings.
Q.3.d	Solve two-step, arithmetic, real world problems involving percents. Examples include but are not limited to: simple interest, tax, markups and markdowns, gratuities and commissions, percent increase and decrease.

Mathematical Practice and Content Interaction, Group 4: Search for and recognize entry points for solving a problem and Algebraic Reasoning

Indicator	Description
A.2.a	Solve one-variable linear equations, and formulas with multiple variables.
A.3.a	Solve linear inequalities in one variable.
A.4.a	Solve one-variable quadratic equations with real solutions, using any appropriate method.

Mathematical Practice and Content Interaction, Group 5: Create algebraic models that represent real-world situations and Algebraic Reasoning

| Indicator	Description
A.1.c	Create linear expressions as part of word-to-symbol translations or to represent situations you have been given.
A.2.c	Create one-or two-variable linear equations to represent situations you have been given.
A.3.d	Create one-variable linear inequalities to represent situations you have been given.

Tangrams
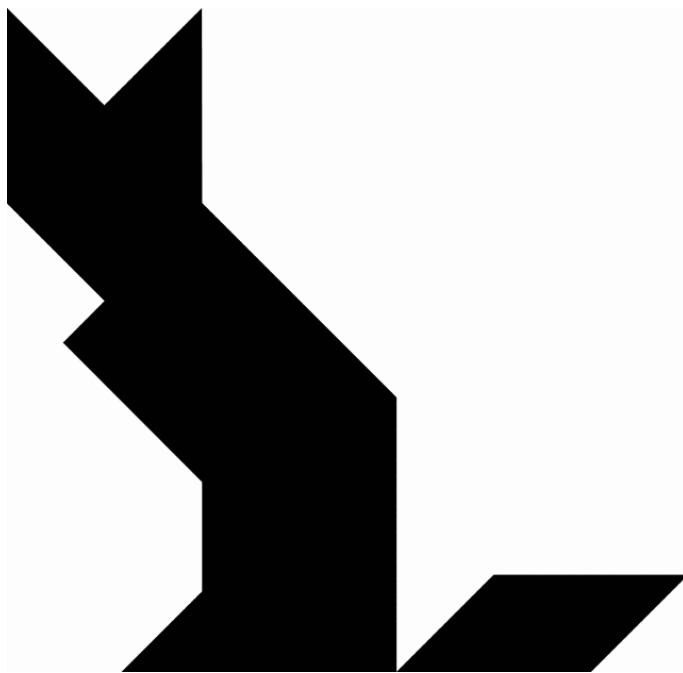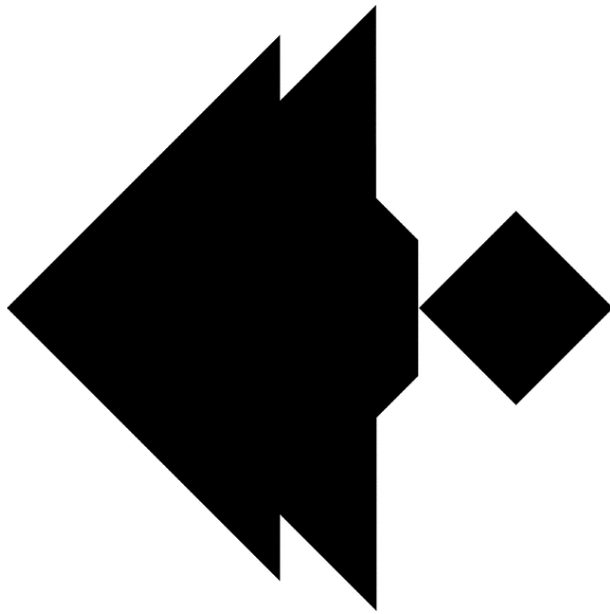
More Tangrams

How many different lengths?

If the area is

4

4
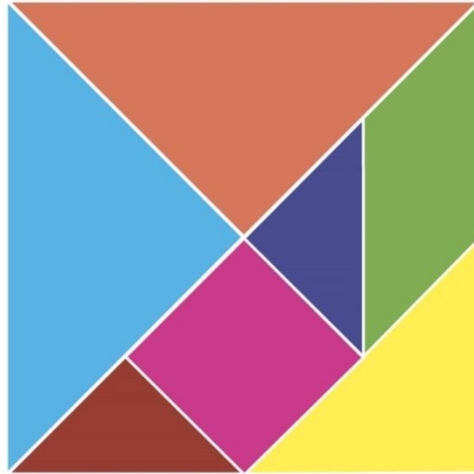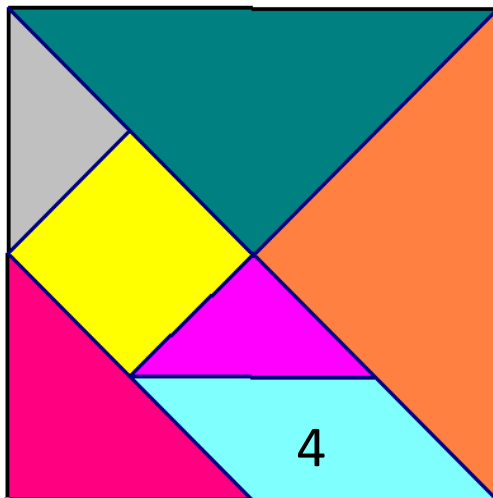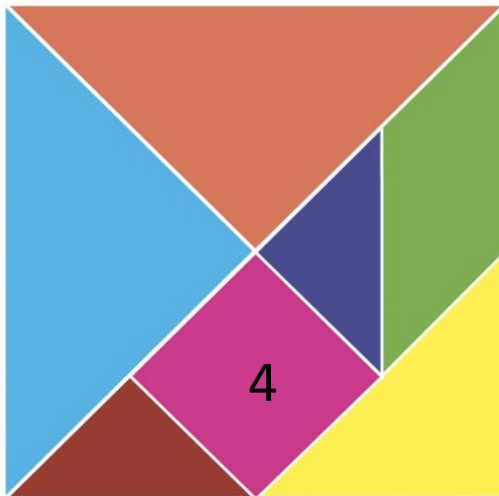
Math Translation Guide

The chart below gives you some of the terms that come up in a lot of word problems. Use them in order to translate or "set-up" word problems into equations.

English	Math	Example	Translation
What, a number	$x, n,$ etc.	Three more than a number is 8.	$n+ 3 = 8$
Equivalent, 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	x	Emma has **twice** as many books as Justin. Justin has **half** as many books as Emma.	$e = 2$ x j or $e = 2j$ $j = c$ x ½ 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 $s = d/2$ $d/s = 2/1$

Example
Jennifer has 10 fewer DVDs than Brad.
Step 1: j (has) = b (fewer) – 10
Remember, the word "has" is an equal sign and the word "fewer" is a minus sign, so: Step 2: $j = b – 10$

Common Misconceptions

Areas of Difficulty   **Examples of Misconceptions**

1. **The Meaning of Letters**

1.1 Ignoring completely the presence of letters.

> If I add 3 to x + 4 I get 7.

1.2 Not distinguishing between letters used as units of measure and as variables.

> 8 m and 8m are the same.

1.3 Treating letters as objects.

> Shirts cost s dollars each and pants cost p dollars a pair. If I buy 3 shirts and 2 pairs of pants, what does 3s + 2p represent?

> 3 shirts and 2 pairs of pants.

1.4 Believing there are rules used to determine which number a letter stands for.

> c = 3 because c is the 3rd letter of the alphabet. y = 4 because in the previous questions y was 4.

1.5 Thinking that letters always have one specific value.

> What can you say about p if p + q = 12 and p is a natural number greater than q?

> p = 7

1.6 Thinking that different letters always represent different numbers.

> a + b cannot equal a + c.

1.7 Thinking that letters can only stand for natural numbers.

> 6x = 13, then x = 2

More Misconceptions

Areas of Difficulty   **Examples of Misconceptions**

2. **Misconceptions about Notation**

    2.1 Combining letters and numbers incorrectly because they think that operation symbols cannot be part of an answer.

    $a + b = ab$

    $2x + 3 = 5x$

    2.2 Neglecting to use brackets when needed.

    The area of this rectangle is $3 \times x + 4$ or $x + 4 \times 3$.

    3

    $x + 4$

3. **Misconceptions about Generalizations**

    "$P = 2l + 2w$" describes a method for finding the perimeter of a rectangle with length, l, and width, w.

    3.1 Not understanding that a generalization is essentially a statement of a method.

    $2l + 2w$ can't be an answer because there is still addition to do.

    $x \div y = y \div x$ (It doesn't matter which way you write it because you always divide the larger number by the smaller number.)

    3.2 Inability to generalise because of a lack of understanding of arithmetic operations.

    3.3 Inability to generalize because the student is unable to define the methods s/he has used.

    $15 - 3x = 6$
    $3x = 6 + 15$
    $3x = 21$
    $x = 7$

4. **Misapplication of Rules**

    4.1 Disregarding signs when manipulating expressions.

    $-6x = 12$
    $x = \frac{12}{6}$
    $x = 2$

Best Practices Review

Instructional Element	Recommended Practices
Curriculum Design	- Ensure mathematics curriculum is based on challenging content - Ensure curriculum is standards based - Clearly identify skills, concepts and knowledge to be mastered - Ensure that the mathematics curriculum is vertically and horizontally articulated

Professional Development for Teachers	- Provide professional development which focuses on:
	    o Knowing/understanding standards
	    o Using standards as a basis for instructional planning
	    o Teaching using best practices
	    o Multiple approaches to assessment
	- Develop/provide instructional support materials such as curriculum maps and pacing guides and provide math coaches

Technology	- Provide professional development on the use of instructional technology tools - Provide student access to a variety of technology tools - Integrate the use of technology across all mathematics curricula
Manipulatives	- Use manipulatives to develop understanding of mathematical concepts - Use manipulatives to demonstrate word problems - Ensure use of manipulatives is aligned with underlying math concepts
Instructional Strategies	- Focus lessons on specific concept/skills that are standards based - Differentiate instruction through flexible grouping, individualizing lessons, compacting, using tiered assignments, and varying question levels - Ensure that instructional activities are learner-centered and emphasize inquiry/problem-solving - Use experience and prior knowledge as a basis for building new knowledge - Use cooperative learning strategies and make real life connections - Use scaffolding to make connections to concepts,

	procedures and understanding • Ask probing questions which require students to justify their responses • Emphasize the development of basic computational skills
Assessment	• Ensure assessment strategies are aligned with standards/concepts • Evaluate both student progress/performance and teacher effectiveness • Utilize student self-monitoring techniques • Provide guided practice with feedback • Conduct error analyses of student work • Utilize both traditional and alternative assessment strategies • Ensure the inclusion of diagnostic, formative and summative strategies • Increase use of open-ended assessment techniques

Math Websites

Annenberg Learner. Courses of study in such areas as algebra, geometry, and real-world mathematics. The Annenberg Foundation provides numerous professional development activities or just the opportunity to review information in specific areas of study. http://www.learner.org/index.html

Common Core Conversation. Links to math sites for use with all levels of mathematical standards. http://www.commoncoreconversation.com/math-resources.html#sthash.Dznxgkbn.dpbs

Free Resources for Educational Excellence. Teaching and learning resources from a variety of federal agencies. This portal provides access to free resources. http://free.ed.gov/index.cfm

Get the Math. How algebra is used in real-world situations. http://www.thirteen.org/get-the-math/

Illuminations. Great lesson plans for all areas of mathematics at all levels from the National Council of Teachers of Mathematics (NCTM). http://illuminations.nctm.org

Inside Mathematics. A professional resource for educators, including classroom examples of innovative teaching methods and insights into student learning. http://insidemathematics.org/index.php/home

Key Elements to Algebra Success 46 lessons, homework assignments, and videos. http://ntnmath.keasmath.com/

Khan Academy. A library of over 2,600 videos covering everything from arithmetic to physics, finance, and history and 211 practice exercises. http://www.khanacademy.org/

The Math Dude. A full video curriculum for the basics of algebra. http://www.montgomeryschoolsmd.org/departments/itv/MathDude/MD_Downloads.shtm

Math in the News. Media4Math. This site provides you with information/articles of how math is used in the real world. http://www.media4math.com/MathInTheNews.asp

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Math Planet. Math Planet is a dedicated web site to the advancement of mathematics. http://library.thinkquest.org/16284/index_s.htm

Geometry Center. (University of Minnesota). This site is filled with information and activities for different levels of geometry. http://www.geom.uiuc.edu/

Online Resources for Teaching and Strengthening Fundamental, Quantitative, Mathematical, and Statistical Skills. NICHE. A wide array of resources for the different types of mathematical skills.
http://serc.carleton.edu/NICHE/teaching_materials_qr.html#partone

National Library of Virtual Manipulatives for Math - All types of virtual manipulatives or can be purchased as a dvd. This is a great site for students who need to see the "why" of math. http://nlvm.usu.edu/en/nav/index.html

PBS Teacher Source. Lesson plans and lots of activities are included in the teacher section of PBS. http://www.pbs.org/teachers

Real-World Math. Ideas for how math is used in today's world. http://www.realworldmath.org/

Teacher Guide for the TI-30XS MultiView™ Calculator – A guide to assist you in using the new calculator, along with a variety of lesson plans for the classroom.
http://education.ti.com/en/us/guidebook/details/en/62522EB25D284112819FDB8A46F90740/30x_mv_tg

http://education.ti.com/calculators/downloads/US/Activities/Search/Subject?s=5022&d=1009

TES. With more than 2.3 million registered online users in over 270 countries and territories, TES provides a wealth of free resources in all academic areas. http://www.tes.co.uk/

Working with Algebra Tiles. An online workshop that provides the basics of using algebra tiles in the classroom.
http://mathbits.com/MathBits/AlgebraTiles/AlgebraTiles.htm

Stay in Touch!

- Florida IPDAE – http://floridaipdae.org/

- Florida GED® 2014 Preparation Program Frameworks – http://www.fldoe.org/workforce/dwdframe/ad_frame.asp

- GED Testing Service® – www.GEDtestingservice.com