



# Math Literacy News

## GED MATHEMATICS TEST

### History, Format, Content, Areas of Difficulty, Classroom Suggestions

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The contents of this newsletter were collected from the Information Bulletin on the Tests of General Education Development, as well as other educational sources. The information compiled and presented in this newsletter is important for instructors who are preparing students for the GED Mathematics Test.

#### History of the GED Test

The latest of the four generations of GED tests, was released in 2002. The academic content areas have not changed: however, the priorities and assumptions to show proficiency have evolved. The GED test assesses academic skills and knowledge typically learned in high school, making it a reactive rather than proactive test. The tests must continue to change as secondary education changes.

#### Format of the Test: What is on the Math Test

The math test is divided into two equally weighted parts, each containing 25 questions. On Part I of the test, students can use a calculator (Casio fx-260), which is provided at the testing site, to compute answers. Because estimation and mental math are crucial skills, Part II does not allow calculator use. A math formula page is provided for reference during the test.

There are four major areas assessed on the Mathematics Test:

- Number operations and number sense (20-30%)
- Measurement and geometry (20-30%)
- Data analysis, statistics, and probability (20-30%)
- Algebra, functions, and patterns (20-30%)

There are three types of questions within each of these content areas:

- Procedural questions (20%)
- Conceptual questions (30%)
- Application/Modeling/Problem Solving (50%)

Although 80% of the questions are multiple choice, 20% require an exact answer recorded on either standard or coordinate grids. Both parts of the test have multiple choice, standard grid, and coordinate plane grid questions. (Information Bulletin 12)

#### What is NOT on the test and how does this affect my ABE classroom?

There is always dissonance about how to best meet the needs and goals of the ABE student. Do we teach to the test, or do we apply life skills in the classroom? The teacher can meet both of these needs when structuring his/her ABE classroom.

**There are no computation sections on the test. Every process is embedded into a word problem.**

Using pages and pages of practice for computation is unproductive. Computation of intricate problems is not required on the test, and spending class time on them is not suggested. Instead, spend time on estimation of the correct answer, mental math to improve number sense, and use of a calculator whenever the student feels the need. This will help students focus on the problem solving needed to pass the test and to learn the skills needed to use math in real life.

**There are no sections of types of problems on the Test. All problems are mixed up with no identifiers.**

As teachers, we often want to help our students experience success in math. This is a noble cause but, it may not always help our students pass the test nor apply math in real life. Neither, the GED math test nor the

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math used in daily life are in labeled sections of math concepts. There are no conceptual or procedural parts of the test; in addition, the test does not get harder as it progresses. Students must practice the skill of deciding what the question is asking and what procedure is needed to solve it. We have all had students who do an excellent job when in the “ratios and proportions chapter” but cannot identify that a problem can be solved using that skill in other contexts.

Identifying the correct procedure is often difficult for test takers. Multiple-choice answers on the test will include partial steps and wrong procedures. The Pythagorean Theorem is one problem that seems to be found on and missed on every test. Although many teachers teach this theorem to the class, according to the research from the GED institute, this problem is missed by everyone—those who pass the test and those who don't. Where does this disconnect come from? We are teaching it, the students understand it in class, and yet almost everyone misses it on the test. One thought is that students do not recognize it on the test. It is a right triangle procedure, yet it may be embedded in a diagonal of a rectangle. Students need to be reminded right before they take the test that there will be one problem utilizing the Pythagorean Theorem and that identifying it is the challenge (GED Institute).

***There are no measurement conversions, either from metric to metric or metric to customary units.***

Most units seem to be metric: however the type of unit is used is not critical to the answer. Although metric units are on the test, metric is not used in most of our students' lives. Learning to use a ruler is a life skill that many of our students do not have. This is a labor-intensive skill best learned in small groups, with students helping other students, or volunteer tutors being employed. Finding benchmarks for customary measurement and learning the difference between length, area and volume units is most useful.

There will be no tricky questions, such as interchanged length and interchanged area units. One helpful, yet often overlooked, aspect of the test is the shading of area problems: If the problem requires the area of a figure, there is shading to indicate that in addition to the words in the problem.

***There are no fraction computation problems. There will be at most one or two fraction answers on the test, all in context.***

Fraction concepts are important. What do fractions really mean? How are fractions related to division? What is the whole? How are fractions, decimals, and percents related? These are all concepts that should be stressed in class.

However, the computation presented in many of our books is not critical. Addition and subtraction of frac-

tions should focus on those benchmark fractions on a ruler: halves, fourths, eighths, sixteenths. When learning multiplication of fractions, a discussion of why fraction multiplication results in a smaller number is important. Why does  $\frac{3}{4}$  of something use multiplication and not division?

Vocabulary is also critical when understanding fractions. What is the difference between taking one-half of a number and dividing by one-half? How can dividing by two be the same as multiplying by one half? Spending time on these concepts will help develop number sense and problem solving.

There are very few reasons to divide fractions. While students will often give cooking as an example of this, we are really dividing by two or three, not dividing by a fraction. Problems on the test will not require complicated fraction computation. (The answer may be  $6\frac{1}{2}$  for hours required for a bike trip.) Again, there will only be one or two fraction problems on the 50-problem test, and those will probably require understanding rather than computation.

**What else does research show is a difficult area on the test?**

***Reading and interpreting graphs*** are often missed on the test.

***What does the y-intercept mean?***

What is the change on the graph if I have a base pay that changes, if I start on my bike farther from home, or if the beginning level of water of a reservoir is changed?

***How does changing the problem change the slope of the line?***

How will the steepness change if my commission is a higher percentage, if I ride my bike faster, or if water is drained from a reservoir more quickly?

***What do the parts of the slope/intercept form ( $y = mx + b$ ) of a line mean?***

What equations would show a parallel line (using **m**)? How does a change in the constant (**b**) change the graph?

**Suggestions for the Classroom**

●Start the class with a problem to discuss and solve a mathematical application or a problem that will be the focus of the week, or a mental math skill. Some useful mental math skills are: multiplying by 10 and 100 by hooking on zeroes, multiplying by four by doubling and doubling again, dividing by four by taking half and half again, multiplying by 25 by relating it to quarters, dividing by 10 and 100 by moving the decimal point, multiplying by using factors, multiplying by taking half of one number and doubling the other, etc. Ten or fifteen minutes spent on these activities help bring a group

together; this also allows for latecomers, a common problem in many classrooms.

- When beginning a topic, discuss it with the students before working with any numbers. Ask the students what they already know about the new topic. Students often introduce applications from life at this time. Some basic misconceptions may be uncovered and can be corrected.
- Use non-paper-and-pencil math to explore concepts. When introducing percents, spend a large span of time exploring what percent means as well as learning mental percents such as 10%, 50%, 15%, 25% etc. Common fraction, decimal, and percent relationships can be explored. These activities help students solidify the concepts and develop number sense.
- Use group work to foster understanding. Group work on diverse word problems allows students to gain confidence and understanding of many mathematical skills. Because the problems and concepts on the GED test are randomly placed, it is imperative that we allow our students to practice varied problems. Not only will this help with the GED, but it is how mathematics is presented in real life! A random page of problems can be found on old practice tests not in use and/or in every GED book. Don't be afraid to group students with different math levels. You'd be surprised at how a multilevel group can work together to solve a multitude of problems.
- Spend time in social studies and science to work through the mathematics related to these areas of study. These are applications and connections that will help students become proficient in the skills needed to pass the GED and to be successful in other endeavors. Life is not compartmentalized into narrow, academic disciplines.
- Allow calculators in the classroom; students can judge when to use them. It is important that students learn to use a calculator as a tool to foster understanding and help with problem solving. It is both a GED and a life skill. Use manipulatives to help foster understanding. We may be able see concepts related to abstract math, but students often cannot. Manipulatives can help students understand what is really happening.



## References

*The American Council on Education* <http://www.acenet.edu>

*Most missed questions data from the GED Institute, held in Washington DC, August 2006, sponsored by the Federal Department of Education*

*Information Bulletin on the Tests of General Education Development. General Educational Development Testing Service, American Council on Education; 2002; publication No. 12. <http://www.acenet.edu/bookstore/pdf/ged-info-bulletin.pdf>.*