The GED Mathematics Test

Problem Solving

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#29

Passing the GED Math Test

> It isn't that they can't see the solution. It is that they can't see the problem.
> G. K. Chesterton (1874-1936)

Video 29 Focus: knowing how to solve problems is the most important part of math.

You Will Learn From Video 29:

- How to use your experience to solve problems.
- How to approach problems using a five-step method.
- How to use key words to help you attack a problem.
- The order of operations.
- That you can improve your ability to solve problems.

Words You Need to Know:

While viewing the video, put the letter of the meaning by the correct vocabulary word. Answers are on page 13.

_____1. key words	a. using thinking skills, experience, and algorithms to get answers
_____2. order of operations	b. one systematic way to solve problems
_____3. five-step method	c. the important words in a problem that will help you find the solution
_____4. problem solving	d. parentheses, exponents, x, ÷, +, -
_____5. experience	f. what you already know about life and math from the past.

Points to Remember:

- The GED Math Test tests show how well you can solve problems.
- It is important to use a systematic approach to the problems using good thinking skills.
- It is important to know the rules of math such as Order of Operations.
- Thinking skills count!

Problem Solving

Learning skills for solving problems is the most important thing that you will need in order to pass the GED Math Test. Think of yourself with a tool box that is filled with tools that you can use. Just as you cannot remove a screw with pliers, you will have skills that do not work for some problems but are just the right ones for other problems.

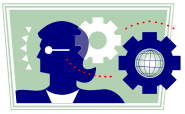
Each time you learn to solve a new type of problem, the tools for that solution can be added to the tool box. The most successful problem-solvers are those who have a variety of available skills**,** and who know which ones are needed for which problems.

In this workbook, you will practice using your problem-solving skills and learn others that you can place in your tool box. In each *Video Partner* workbook**,** the **STRATEGY SESSION** section will feature a problem-solving technique that is appropriate for use on the GED Math Test. Think of these techniques as ways to add tools to your tool box.

Some of the most important problem-solving skills are those that you learn and use in real life. Your own experience as an adult will add skills that will help you solve problems of many kinds.

Check the activities you have completed which require math problem-solving skills:

_____ opened a checking account	_____ purchased paint	_____ bought a car
_____ shared a bill at a restaurant	_____ bought flooring	_____ filed a tax return
_____ selected a cell phone plan	_____ doubled a recipe	_____ changed jobs
_____ rented an apartment	_____ built something	_____ sewed something



Now note some other activities that you have done that are not on the list above:

_____
_____
_____
_____

Solving everyday problems often requires good thinking skills and using mathematics. How you approach problems and learn systematic approaches to different kinds of problems will help you with life and with the GED Math Test. In this workbook you will have a chance to practice different ways to approach problems and find solutions. It is important to know that there is often more than one way to solve a problem. Evaluating your problem-solving methods will help you to find skills that can be used later to apply to new problems. The best problem-solvers have a whole menu of skills that can be used to find the solution to a problem.

About Math and Life

One of the important problem-solving tasks is comparative shopping. Advertisers are always trying new ways to "hook in" customers with specials and bonuses. You can put your math skills to good use by making sure that you select the best product to meet your needs for the least amount of money.

Try this example:

Mary Lou was taking a class at a vocational school that required that she use the Internet for the six months that the class was held. Her teacher posted assignments on his Web site and gave the students assignments using the Internet. Mary Lou did some comparative shopping to decide which provider to choose for the *six months* of her class. She wanted to choose the cheapest plan.

	Web Watch	**www.connect.com**	**Net News**
Installation	Free	$50.00	Free
Yearly Fee	$228.00	$180.00	$300.00
Bonuses	First month 1/2 price	None	ONLY $30.00 for the first two months
Disconnect Charge	$50.00	None	None
Mary Lou's Cost			

Which provider did she choose? _____

Answer is on page 13.

Five-Step Method for Solving Problems

It is a good idea to have a step-by-step approach to solving problems for the GED Math Test. You may not always use all of the steps**,** or you may add additional steps as needed. However, knowing a step-by-step method that you can rely on is very important. Let's review the steps of the method suggested in *GED Connection Video 29*:

1. Understand the Question
2. Find the Needed Information
3. Set Up the Problem
4. Work the Calculations
5. Check Your Answer

The following problem is an example of how to use these steps as a system to solve the kinds of problems that are on the GED Math Test. Think of the method as a mental checklist and go through each step in your mind as you follow the directions. Soon you will not have to have a written list of steps you will just know what to do!

Example:

Susanne was shopping for hand lotion. Her favorite brand, Pillow Soft with Aloe, came in two sizes. The 12-ounce bottle cost $3.18 and contained a pump attachment. The 9-ounce bottle cost $1.79 and came with a regular cap. The unit price stickers on the shelf did not apply because the store was having a special on both sizes. Which size is the better buy for Susanne?

Pillow Soft

Understand the Question

What is being asked?	Which bottle is the better buy?
Is there other information that should be considered?	Pump attachment/regular cap

Find the Needed Information

What do you need to compare the prices?	The price per ounce for each bottle

Set Up the Problem

How do you find the price per ounce?	Divide the total by the number of ounces.

Work the Calculations

$3.18 ÷ 12 = about 27 cents/ounce	$1.79 ÷ 9 = about 20 cents/ounce

Check Your Answer

How do you check division?	Multiply: 12 x 27 = 3.24 9 x 20 = 1.80

Even though the larger size is usually the better buy, in this case it is the smaller bottle. Susanne should choose the smaller bottle unless she really wants the pump attachment and is willing to pay quite a bit more to get it.

Practice reading and solving some problems using this five-step method for problem solving. Answers are on page 13.

Problem	Steps
Mary paid for her chocolate candy bar at a convenience store and received 14 cents in change. If she received six coins for the change, what were the coins? Is there any other way she could have received the change? If yes, how many coins would that change be?	1. _____ _____ 2. _____ _____ 3. _____ _____ 4. _____ _____ 5. _____ _____

Problem

The cross country team practiced in the neighborhood before school. Marcia ran six miles. Kate ran half as far as Marcia and Lulu ran half as far as Kate. Nadia ran five miles. How far did the girls run altogether?

Steps

1. _____
2. _____
3. _____
4. _____
5. _____

Problem

The Johnson brothers, Syd and Phil, started a lawn business for the summer. They charged $12 for small lawns, $18 for large lawns, and $6 for edging. They named their business Grass 4 Less. The first weekend they mowed two large lawns and three small lawns. They also did three edges. How much did each brother make if they split the money?

Steps

1. _____
2. _____
3. _____
4. _____
5. _____

Problem

Carlos shopped for a new refrigerator with a 3-cubic-foot freezer. He decided to buy and Amana for $426.99. The appliance store allowed him to make three equal payments with no interest after putting $100.00 down. How much was each payment?

Check your answers on page 13 and 14.

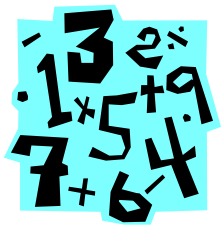
Steps

1. _____
2. _____
3. _____
4. _____
5. _____

As you practice solving problems using a systematic step-by-step method, you will soon find it comes naturally, and you won't have to keep checking the list to remember the steps. You will also add your experience with different problems to your set of skills. Also, you will naturally apply some of the test-taking strategies that you have practiced. All of these things together will give you the confidence to approach new problems.

Order of Operations

There are important rules to follow to be successful at mathematics and to get the correct answer. One such set of rules is Order of Operations. This rule tells us the order in which we are to complete operations and procedures in a given problem. The order of operations is:



Parentheses ( )
Exponents - powers and roots
Multiplication and division - in order from left to right
Addition and subtraction - in order from left to right

Always complete the expressions in parentheses first before you do anything else. In the problem 3 - (9 - 6) =, you will first evaluate the expression in parentheses (9 - 6).

3 - 3 = 0

Next you will evaluate any expressions with exponents and extract any roots. In the problem 3^2 + 6 =, you will first square 3 and then complete the problem.

9 + 6 = 15

You will then complete all multiplication and division from left to right. In the problem, (5 + 6) x 4 ÷ 2 = you will do the work in parentheses first, check for exponents (there are none), then multiply, then divide.

11 x 4
44 ÷ 2 = 22

In the problem, 3 + 2 x 7, there are no parentheses or exponents, so you will first multiply**.** Finally, you will complete any addition and subtraction in order from left to right.

3 + 14 = 17

Notice that, if you had just moved from left to right, the answer would not be the same.

3 + 2 x 7
5 x 7 = 35 35 is not the correct answer because the rules of order of operations were NOT followed.

Following the rules of Order of Operations is very important. It will be especially useful when you are studying algebra and solving equations in later workbooks. Once you know

what to do first, second, third, and fourth, you will be able to get the correct answer. So you won't forget the order, you can memorize this sentence:

Parentheses ( )
Exponents - powers and roots
Multiplication and **d**ivision - in order from left to right
Addition and **s**ubtraction - in order from left to right

Please **ex**cuse **m**y **d**ear **A**unt **S**ally.

Follow the Order of Operations to evaluate the following expressions.
Answers are on page 14.

3 + 8 x 6 = 8 - 6 ÷ 3 = 1 + 1 x 1 = 56 ÷ 7 x 2 - 4 = 7 + 6 -3 x 10 ÷ 6 =

Remember: multiplication and division come before addition and subtraction!
Answers are on page 14.

(100 - 75) + 6 x 1 = 15 + (6 x 8) - 4 = 100 + 200 - (200 - 100) =

15/5 + 3 x 6 = (6 + 18 - 12) x 2 x 9 = 53 - 20 x 2 + (6 x 5) =

(2 + 12) x (7 - 5) = (3 x 8) - (14 - 12) = (7 x 8) + 10 x 2 + 12 =

3^2 x 9 - 5 = $\sqrt{16}$ + 3 x 2 = 8^2 - 4^2 x 3 =

Remember the Order of Operations by remembering the simple sentence: **P**lease **ex**cuse **m**y **d**ear **A**unt **S**ally. You will always be prepared to follow the proper order when performing operations.

Measure Up

For each of the amounts below, estimate the amount that is closest to them.

Answers are on page 14.

Write **cup, pint or quart** after each amount to show the closest measurement.

7 tablespoons _____ 2 cups _____ 3 1/2 cups _____

25 tablespoons _____ 2 3/4 cups _____ 50 tablespoons _____

1/2 gallon _____ 42 teaspoons _____ 2 1/2 pints _____

10 ounces _____ 18 ounces _____ 6 ounces _____

Strategy Session

Using good test-taking strategies on the GED Math Test will help you to choose the correct answer or record the correct answer on the alternate format grids. In each *Video Partners* workbook**,** you will be able to review a strategy that will be helpful on the GED Math Test. If you are not sure how to go about setting up a problem to get the correct answer**,** or if you have to make an educated guess, use the strategies that you have practiced in your workbooks as well as your common sense and your number sense. Read each question carefully and then think about what you should do and what operation(s) you need to use to select the correct answer.

Make a Chart or a Table to Understand the Question and Find the Answer

Some problems from this workbook are good examples of the kinds of problems that will become clearer if you make a chart or a table to understand the question better. Making a table helps to eliminate confusion and to **not** use information or numbers that are **not needed** to find the solution. Test makers purposefully place extra information in the problem to make sure that the student really knows what the necessary information is.

Look at these examples from page 5:

The cross country team practiced in the neighborhood before school. Marcia ran six miles. Kate ran half as far as Marcia**,** and Lulu ran half as far as Kate. Nadia ran five miles. How far did the girls run **altogether**?

Set up the important information on a chart or a table.

Marcia	Kate	Lulu	Nadia
Six miles	Half of Marcia	Half of Kate	Five miles

Now put the correct numbers with the organized information.

Marcia	Kate	Lulu	Nadia
Six miles	Half of Marcia	Half of Kate	Five miles
6	3	1 1/2	5

The key word **altogether** tells us to add all of the miles together to find the total. So now all that is left is to add the numbers**:** 6 + 3 + 1 1/2 + 5 = 15 1/2 miles.

The Johnson brothers, Syd and Phil, started a lawn business for the summer. They charged $12 for small lawns, $18 for large lawns, and $6 for edging. They named their business Grass 4 Less. The first weekend they mowed two large lawns and three small lawns. They also did three edges. How much did **each brother** make if they **split** the money?

Set up the details on a chart or a table.

Small Lawns	Large Lawns	Edging
3 @ 12	2 @ 18	3 @ 6

Now put the correct numbers with the organized information.

Small Lawns	Large Lawns	Edging
3 @ 12	2 @ 18	3 @ 6
36	36	18

The key words **each brother** and **split** tell us to add the total money and then divide by two to find out how much Syd and Phil each made.

36 + 36 + 18 = 90 $\quad$ 90 ÷ 2 = 45 $\quad$ Syd and Phil each made $45.00.

Use a chart or a table to find the answers to the following questions:

Answers are on page 14.

1. Karen spent all of her babysitting money to buy school clothes. She had earned $41.00. Brianne earned three times as much as Karen and spent half of it on school clothes. Sadie earned half as much as Brianne and spent half of hers on a new lunch box and other school supplies. How much did the three girls spend to get ready for school?

2. Mario spent 54 cents at the five and dime store. He gave the clerk a dollar bill and received his change in coins. The clerk gave Mario five coins back. What coins were in Mario's change?

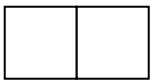
Challenge: Name three other groups of coins that Mario may have received.

Make a Chart or a Table to Understand the Question and Find the Answer

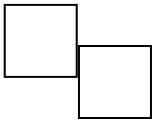
Out into Space

A domino is a plane figure made up of two squares joined together to form a common side from end to end. Sometimes dominoes have white dots that stand for numbers and are part of a popular game.

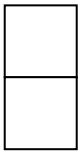
In this exercise we will use dominoes and other plane figures to practice our spatial skills.



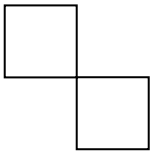
domino



not a domino (common side is not end to end)

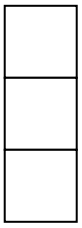


domino

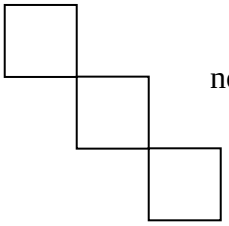


not a domino (no common side)

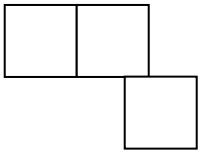
Triominoes are figures that are made of three squares each joined to at least one other square with a common side from end to end.



triominoes



not triominoes



Flips and rotations are the same figure.
These are rotations or flips of one another.

See if you can draw all of the possible triominoes. Hint: One is shown here for you. Before you start, guess how many there are. Remember that flips and rotations do not count as a different figure.

Guess: _____ is the number of triominoes. Draw all of the possibilities here:

Answers are on page 15.

Whole Numbers - Review

Answers are on page 15.

36 + 95 + 22 =	456 x 21 =	660 ÷ 20 =	3,489 - 999 =
$45.89 + .66	38 x 49 =	400 - 164 =	561 ÷ 33 =
$ 3.54 19.11 + 1.09	76 - 19 =		4000/20 =

Order of Operations - More Practice

Review the rules for Order of Operation and practice following the rules while solving these problems. Remember the helpful reminder: **P**lease **ex**cuse **m**y **d**ear **A**unt **S**ally.
Answers are on page 15.

(67-25) x 3 =	67 - 20 x 3 =	16 + 200 ÷ 10 =	67 + (18 - 9) =
$5 + 4^2$ =	$3^2 + 5 \times 4$ =	$(4^2 - 1)3$ =	$5^2 + 3^2 \times 2^2$ =
15 + 80 x 3 - 2 =	(15 + 80) x 3 - 2 =	15 + 80 x (3 - 2) =	30 + 4 - 6 x 5 =

More Problem Solving

Surgit wanted to place an ad in the newspaper to sell her mother's used patio furniture. The Sun Times sells ads for $10.00 for 30 words and 7 cents a word after that. The ad will run for three days. The Gazette sell**s** ads for $7.00 for 25 words and 10 cents a word after that. Surgit compared the two newspapers and decided to go for the cheaper rate. If her ad had 49 words, which newspaper did she choose? _____
Answers are on page 15.

Pints of gourmet ice cream are on sale for two for $6.00. Normally each pint costs $3.98. Anna decided to splurge on her favorite flavors, pistachio and cherry chip, so she bought two of each. How much did she save on ***each pint*** by taking advantage of the sale? _____

Omar decided to pour a gallon of spring water into smaller plastic containers to take to a picnic. How many 10-ounce bottles did he need to use the whole gallon of spring water?

GED Exercise

1. Teresa went to the sale at her favorite store, Value Village. She got two blouses at $9.99 each, a skirt for $14.99, and a blazer for $22.99. There was no tax during the sale. How much did Teresa spend?

   1.) $77.97
   2.) $57.96
   3.) $58.96
   4.) $47.97
   5.) $85.96

2. 13 + 4 x 2 =

   1.) 15
   2.) 19
   3.) 21
   4.) 34
   5.) 104

3. Ben bought three six-foot lengths of lumber and 10 nine-foot lengths of pipe. Lumber sold for $1.35/board foot, and the pipe was $3.25 a *yard*. What was Ben's bill before the tax was added?

   1.) $ 97.50
   2.) $100.00
   3.) $121.80
   4.) $292.50
   5.) $316.80

4. Tamara got a loan of $12,600 for college. It is interest-free if she pays it off in the first 24 months. She has decided to make the 24 equal payments. How much will her payments be for the first five months?
   1.) $1050.00
   2.) $2625.00
   3.) $ 525.00
   4.) $2100.00
   5.) $1575.00

5. The Campfire Boys and Girls did well in their annual candy sales. Bobby was the group champion selling 160 boxes. Sean sold half as many as Bobby, and Susan sold half as many as Sean. Marisol was second in sales with three times as many as Susan. How many boxes did the group sell in all?

   1.) 400 boxes
   2.) 500 boxes
   3.) 480 boxes
   4.) 250 boxes
   5.) 510 boxes

6. The state Campfire organization gives a special award for any group that sells 500 or more boxes of candy. If the deadline has not come, how many more boxes does the group have to sell?

   1.) 125 boxes
   2.) no more boxes
   3.) 250 boxes
   4.) 20 boxes
   5.) 100 boxes

7. (9 + 18) - 3 x 8 =

   1.) 0
   2.) 3
   3.) 100
   4.) 192
   5.) 5

Answers and Explanations

Matching page 1

1. c.
2. d.
3. b.
4. a.
5. f.

Problem Solving page 2

Answers will vary.

Mary Lou's Cost page 3

Web Watch	www.connect.com	Net News
$154.50	$140.00	$130.00

Mary Lou subscribed to Net News.

Steps page 4

1. What were the six coins Mary received?
2. The coins add up to 14 cents.
3.

Dimes	Nickels	Pennies
	2	4

4. The only way to get six coins would be with 2 nickels and 4 pennies.
5. 5 + 5 + 4 = 14

Answers will vary:
Example of three possible ways.

Dimes	Nickels	Pennies
		14
1		4
	1	9

Problem Solving Steps page 5

1. How far did all four girls run together?
2. All information is needed?
3. List each girl and miles run:

Marcia	Kate	Lulu	Nadia
6	3	1.5	5

4. 6 + 3+ 1.5 + 5 = 15.5 miles
5. Check addition.

1. How much did each brother make?
2. Need: information about prices
   Not needed: business name
3. $\frac{(2 \times 18) + (3 \times 12) + (3 \times 6)}{2}$
4. 36 + 36 + 18 = 90/2 = $45.00
5. Check your multiplication, addition, and division.

1. How much is each payment?
2. Need: total cost and cost of down payment
   Not needed: size of unit
3. $\frac{(426.99 - 100.00)}{3}$
4. $109.00
5. Check your subtraction and division.

Order of Operations page 7

51	6	2	12	8
31	59	200		
21	216	43		
28	22	88		
76	10	16		

Measure Up page 7

cup	pint	quart
pint	pint	quart
quart	pint	quart
cup	pint	cup

Strategy Session page 9

1.

	Karen	Brianne	Sadie
Earned	$41.00	$123.00	$61.50
Spent	41.00	61.50	30.75

Total $133.25

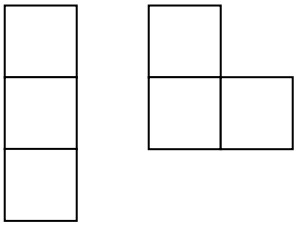
2. $1.00
   - .54
   .46 change

Quarters	Dimes	Nickels	Pennies
1	**1**	**2**	**1**
1		4	1
1	1	1	6
	4	1	1
	3	2	6

The top row is the solution with five coins.
There are other possible solutions.

Triominoes page 10

There are two triominoes.



Whole Numbers Review page 11

153	9,576	33	2,490
$46.55	1,862	236	17
$23.74	57		200

Order of Operations page 11

126	7	36	76
29	21	45	61
253	283	95	4

More Problem Solving page 11

Sun Times - 10.00/ 30 words; extra words 7 cents	Gazette - 7.00/25 words; extra words 10 cents
10.00 + 1.33 (19 extra words) = $11.33	7.00 + 2.40 (24 extra words) = $9.40

Surgit chose the Gazette.

4 x 3.98 = 15.92 sale price
2 @ 6.00 = 12.00 regular price
3.92 savings

3.92/4 = .98

The savings on ***each pint*** was 98 cents.

1 gallon = 128 ounces

$\frac{128}{10}$ = 12 R 8

Omar needed 13 bottles to transfer all of the spring water. The 13th bottle would not be full.

1. 2)
2. 3)
3. 3)
4. 2)
5. 1)
6. 5)
7. 2)