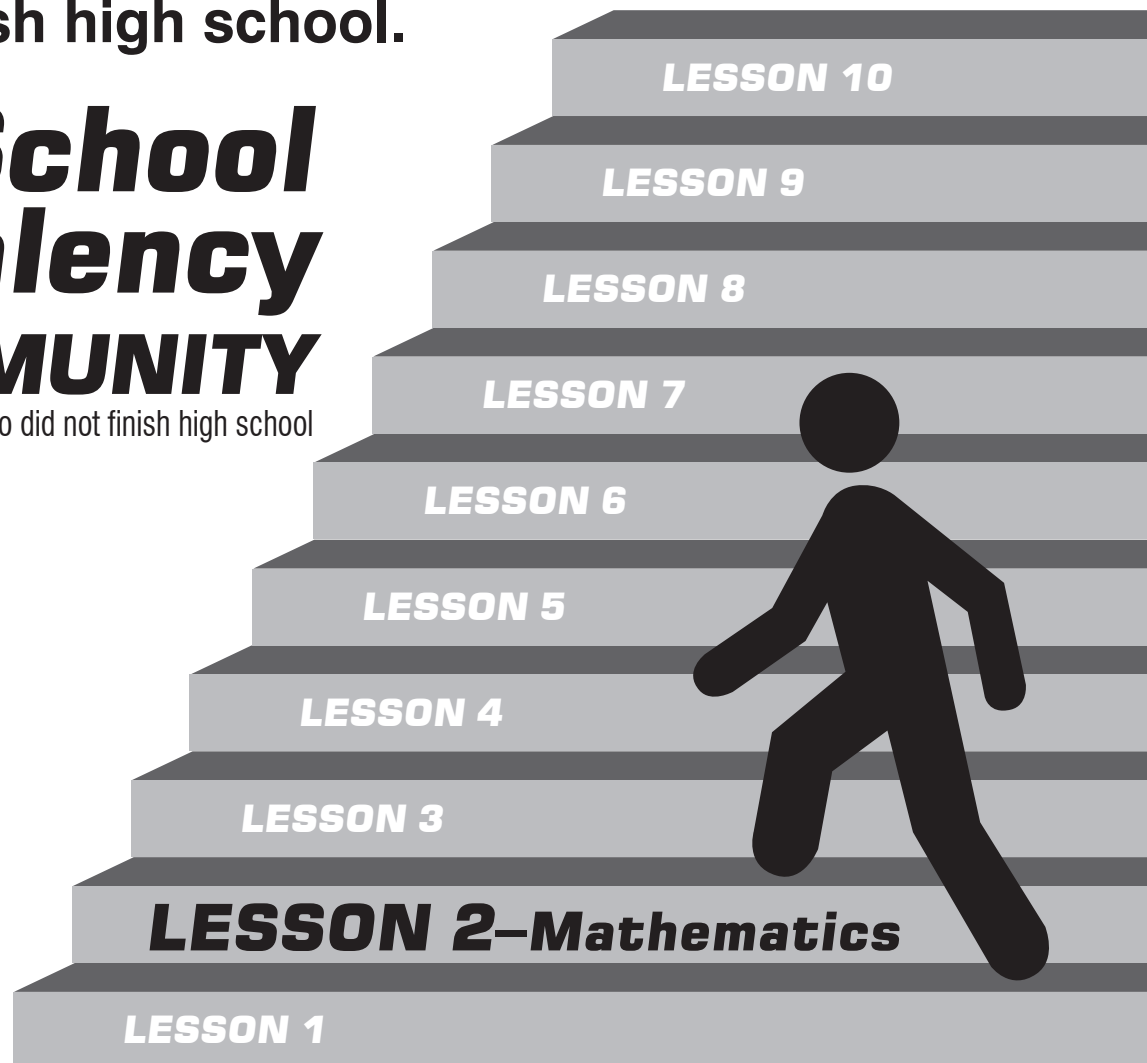# Steps to Success

There's never been a better time to finish high school.

High School Equivalency *in the* COMMUNITY
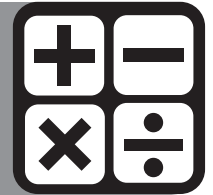
a 'Mail-In' program for adults who did not finish high school

LESSON 10

LESSON 9

LESSON 8

LESSON 7

LESSON 6

LESSON 5

LESSON 4

LESSON 3

LESSON 2–Mathematics

LESSON 1

Second Step
MAKE IT STRONG!

LESSON 2
Mathematical Reasoning

The math portion of the GED test focuses on using mathematical computation and reasoning skills in real-life, workplace, and academic contexts.

Vocabulary to Know

Look at the words and their definitions. These are words that may be used on the GED test. Make yourself familiar with them in case they pop up in a question.

Operations–One of the mathematical processes; addition, subtraction, multiplication, or division

Exponent–the number that indicates how many times to multiply the base in a power
Example: 4^3 4 is the base and 3 is the exponent $= 4 \times 4 \times 4 = 64$

Grouping Symbols–something that groups numbers and variables together
Example: parentheses, brackets, fraction bars, and radical signs

Expression–numbers, variables, and operation symbols grouped together to show value
Example: $2x + 4y$

Variable–a symbol that stands for an unknown number or value
Example: x or y

ASSIGNMENT 1

Order of Operations–the order in which operations should be performed.

The order in which the operations are performed is important! Changing the order of the operations will change your answer. The order of operations is used in all mathematical problem solving.
Example:

$2 \times 3 + 4$		$2 \times 3 + 4$
$6 + 4$		2×7
10		14

Which one is correct? In mathematics, there is a way to write and to read expressions so that the order in which you perform the operation is clear. Using the order of operations, you can tell that $2 \times 3 + 4 = 10$.

When you evaluate an expression, do the operations in this order:

1. **Parentheses**
2. **Exponents**
3. **Multiplication and Division (left to right)**
4. **Addition and Subtraction (left to right)**

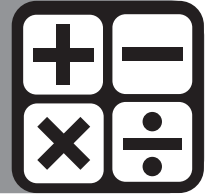*Don't forget the left to right on steps 3 and 4!*

Example: Simplify this expression

$$(9 \times 4)^3 + 12$$

1.	**Parentheses**	$(9 \times 4)^3 + 12$
		$(36)^3 + 12$
2.	**Exponents**	$(36)^3 + 12$
		$46{,}656 + 12$
3.	**Addition**	$46{,}656 + 12 = 46{,}668$

DIRECTIONS

Find the Value of Each Expression: **Refer back to the examples to help you solve the expressions. Write your answer in the space provided. Show all your work on a separate sheet of paper.**

1. $3 + 2 \times 8 - 4 \times 2$

    Answer _____

2. $(3 \cdot 4)^2 \cdot 2 - 5(9 - 7)^2 + 1$

    Answer _____

3. $105 \times 4 + (9 - 6) - 3^3$

    Answer _____

4. $[(2 \cdot 3) + 4]^2 - 5$

    Answer _____

5. $12 \div 4 + 3 \cdot 6$

    Answer _____

6. $(2 + 13) \div 5 - 2$

    Answer _____

DIRECTIONS

Fill in the Blanks: **Use the spaces below to write your answer.**

1. **According to the _____ of _____, which phrase describes the expression 3 x 4 + 5? The phrase "5 more than 3 times 4" or "3 times the sum of 4 and 5"?**

2. **Fill in the operation that begins with each letter**

    P _____

    E _____

    M _____

    D _____

    A _____

    S _____

3. **You perform addition and subtraction, as well as multiplication and division, from _____ to _____ so you won't mix up the operations.**

4. **Name two grouping symbols.**

    _____

5. **Lilia scores 15 points fewer than Bob, who scores 35 points. Carol scores half as many points as Lilia. How many points does Carol score? Write an expression and evaluate it.**

    _____

6. **Which expression can be used to solve the problem below?**

    On a recent math test, Jill scored 3 points for each of the 18 multiple choice questions she answered correctly and 5 points for each of the 6 short response questions she answered correctly. What was her total score on the test?
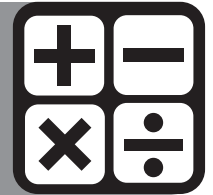
    A. $3 + 5 \cdot 18 + 6$

    B. $3 + 18 \cdot 5 + 6$

    C. $3 \cdot 5 + 18 \cdot 6$

    D. $3 \cdot 18 + 5 \cdot 6$

LESSON 2
Mathematical Reasoning

ITEM	COST
1/2 Pound Cheeseburger	$3.50
Grilled Chicken Sandwich	$4.00
Combo Meal (with fries)	$5.25
Soda	$2.00
Iced Tea	$2.25
Milkshake (Strawberry, Chocolate, or Vanilla)	$3.75
Brownie a la mode	$4.25

7. **The King family went out to eat. They ordered three combo meals, two sodas, and once iced tea. Write an expression representing their bill. Then determine the cost of the dinner for the entire family.**

DIRECTIONS

Think It Through: **Use your knowledge and reasoning skills to complete the following. Use a separate sheet of paper to answer the following questions.**

Write your thoughts down as you go. Think on paper! There is really not a right or wrong–just think it through *using what you know*.

1. "**P**lease **E**xcuse **M**y **D**ear **A**unt **S**ally" is one phrase people use to remember the order of operations. Think of your own, and share it with someone else. (*You can share yours with your teacher.*)

2. **Create and solve two problems that require using the order of operations.** (*You can do this.*)

3. If you don't work left to right while performing a set of addition and subtraction operations, what kinds of errors might you make? How can you avoid these errors? What about multiplication and division? Are there any different errors that you might make? What are some different ways to avoid them? **Think about these questions and answer at least three of them.**

Vocabulary to Know

Place Value–tens, ones, tenths, hundredths, thousandths

Digit–the ten number symbols (0, 1, 2, 3, 4, 5, 6, 7, 8, 9)

Value–how much a digit represents

Decimal–a number that is based on a whole being split into ten equal parts one or more times

Decimal point–a period that separates whole numbers from decimal numbers
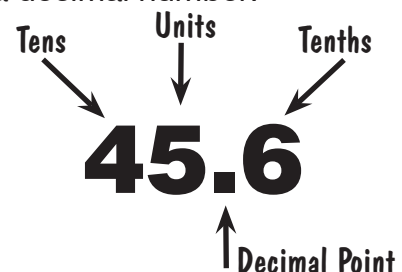
<   a symbol that represents "less than"
     Example: 2 < 5

>   a symbol that represents "greater than"
     Example: 9 > 6

Decimals

A **Decimal Number** (based on the number 10) contains a Decimal Point
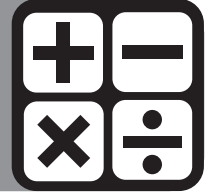
First, let's have an example:

Here is the number *"forty-five and six-tenths"* written as a decimal number:

Tens   Units   Tenths

45.6

Decimal Point

The decimal point goes between units and tenths.

LESSON 2
Mathematical Reasoning

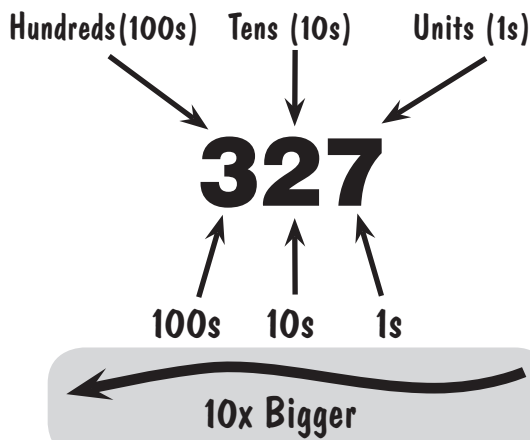## Place Value

It is all about **Place Value**! When we write numbers, the *position* (or "*place*") of each digit is important.
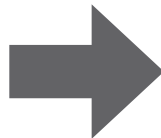
In the number **327**:
- the "7" is in the **Units** position, meaning just 7 (or 7 "1"s),
- the "2" is in the **Tens** position meaning 2 tens (or twenty),
- and the "3" is in the **Hundreds** position, meaning 3 hundreds.

Hundreds(100s)   Tens (10s)   Units (1s)

327

100s   10s   1s

10x Bigger

"three hundred twenty seven"

As we move right, each position is 10 times *smaller*.
From **Hundreds**, to **Tens**, to **Units**

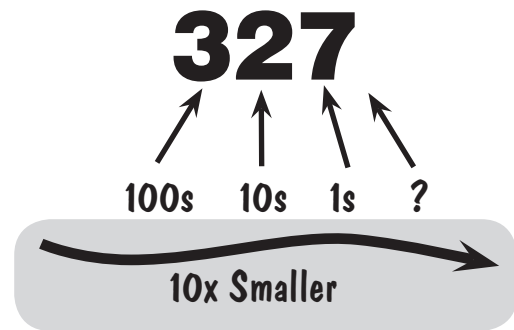As we move left, each position is 10 times *bigger*!

Example: **Hundreds** are 10 times bigger than **Tens**

But what if we continue past Units?

What is *10 times smaller* than Units?
1/10ths (tenths) are.
... and ... *that* is a Decimal Number!
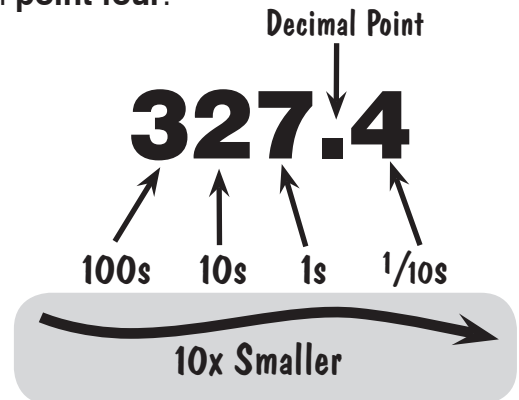
327

100s   10s   1s   ?

10x Smaller

Adding and Subtracting Decimals

Adding decimals is easy if you keep your work neat. But we must first write a **decimal point**, so we know exactly where the Units position is:

"three hundred twenty-seven and four tenths"

but we usually just say, "three hundred twenty-seven **point four**."

Decimal Point

327.4

100s   10s   1s $^1/_{10}$s

10x Smaller

To add decimals, follow these steps:
- Write down the numbers, one under the other, with the decimal points lined up
- Put in zeros so the numbers have the same length
- Then add using column addition, remembering to put the decimal point in the answer

LESSON 2
Mathematical Reasoning
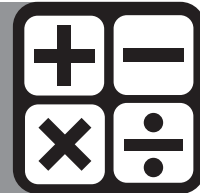
Example: Add 1.452 to 1.3

Line the decimals up:
```
   1.452
+  1.3
```

"Pad" with zeros:
```
   1.452
+  1.300
```

Add:
```
   1.452
+  1.300
   2.752
```

ASSIGNMENT 2

2A. DIRECTIONS
Find the sum or the difference. Rewrite the problems so that the decimals are lined up.

1. 563 + 8.03 _____
2. 29 – 0.25 _____
3. 7.5 – 1.004 _____
4. 0.23 + 1.006 + 80 _____

2B. DIRECTIONS
Compare each pair of numbers. Use the symbols <, >, or =.
Hint: *Write the numbers like you did in the example above; make sure the decimals are lined up. Think of comparing money.*

1. 7.5 ☐ 2.19

2. 9.88 ☐ 19.1

3. 3.1 ☐ 0.85

4. 17.9 ☐ 17.90

ASSIGNMENT 3

Multiply Decimals

Just follow these steps:
- Multiply normally, ignoring the decimal points.
- **Then** put the decimal point in the answer—it will have as many decimal places as the two original numbers combined.

In other words, just count up how many numbers are after the decimal point in *both* numbers you are multiplying, then the answer should have that many numbers after *its* decimal point.

Example: Multiply 0.03 by 1.1

start with: **0.03 × 1.1**

multiply without decimal points: **3 × 11 = 33**

0.03 has **2 decimal places**,
and 1.1 has 1 **decimal place**,
so the answer has
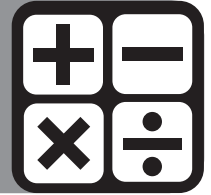**3 decimal places**: **0.033**

DIRECTIONS
Find the product.

1. 17.3 x 5.92 _____
2. 42.556 x 6.293 _____
3. 3.89 • 1.4 _____
4. 3.18 • 92 _____

ASSIGNMENT 4

Dividing Decimals

Quick method: use Long Division without the decimal point, and then re-insert the decimal point in the answer.

Dividing a Decimal Number by a Whole Number

To divide a decimal number by a whole number:

- Use division or long division (ignoring the decimal point)
- Then put the decimal point in the same spot as the dividend (the number being divided)

Example: Divide 9.1 by 7

Ignore the decimal point and use Long Division:

```
     1 3
   ┌──────
 7 ) 9.1
    -7
   ─────
    21
   -21
   ─────
     0
```

Put the decimal point in the answer directly above the decimal point in the dividend:

The answer is: 1.3

```
     1.3
   ┌──────
 7 ) 9.1
```

Dividing by a Decimal Number

But what if you want to divide **by** a Decimal Number?

The trick is to convert the number you are dividing by to a whole number first, by **shifting the decimal point of both numbers** to the right:

$$6.625 \div 0.53 \longrightarrow 662.5 \div 53$$

Now you are **dividing by a whole number**, and can continue as normal.

It is safe to do this if you remember to shift the decimal point of both numbers the same number of places.

Example: Divide 6.4 by 0.4

You are *not* dividing by a whole number, so you need to move the decimal point so that you are dividing by a whole number:

move 1
$$6.4 \longrightarrow 64$$
$$0.4 \longrightarrow 4$$
move 1

6.4/0.4 is exactly the same as 64/4, as you moved the decimal point of *both numbers*.

And the answer is: 64/4 = 16
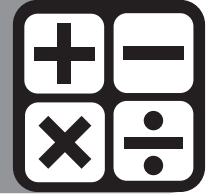
Example: Divide 5.39 by 1.1

Move the decimal point so that you are dividing by a whole number:

move 1
$$5.39 \longrightarrow 53.9$$
$$1.1 \longrightarrow 11$$
move 1

You are now dividing by a whole number, so you can proceed:

LESSON 2
Mathematical Reasoning

Ignore the decimal point and use Long Division:

```
     049              04.9
11 ) 539          11 ) 53.9
     5
     0
     ---
     53
     44
     ---
     99
     44
     ---
      0
```

Put the decimal point in the answer directly above the decimal point in the dividend:

The answer is: 4.9

DIRECTIONS
Divide/find the quotient. Show your work on a separate sheet of paper.

1. .72 ÷ 8 _____

2. 42 ÷ .7 _____

3. 1.44 ÷ 0.3 _____

4. 57.5 ÷ 2.5 _____

5. 1.6/48 _____

6. 1.6/1.44 _____

7. 0.9/$5.4 _____

8. 6 ÷ $4.80 _____

Now put it all together.

DIRECTIONS
Choose the correct answer.

1. **Simplify the expression 8 x 5 + 16 − 8.**
   A. -104
   B. -32
   C. -24
   D. 48

2. **Simplify the expression 3 + 9 × 4 ÷ 2.**
   A. 24
   B. 21
   C. 16
   D. 19

3. **Select the list that shows the numbers in order from least to greatest.**
   A. 0.37, 0.508, 0.717, 0.33
   B. 0.508, 0.717, 0.37, 0.33
   C. 0.33, 0.37, 0.508, 0.717
   D. 0.508, 0.37, 0.717, 0.33

4. **Compare these numbers. Choose the correct comparison statement.**
   A. 0.345 = 0.354
   B. 0.345 > 0.354
   C. 0.345 < 0.354

5. **Chauncey's birthday is in January. For his last birthday, the low temperature for the day was 9°F. It was only 12 degrees above the all-time record low for Dallas, Texas. What is the all-time record low for Dallas? Write your equation and the answer.**

   _____

   _____

   _____

   _____
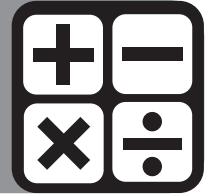
6. **Read the following word problems in the table. Then choose an equation from A–F below to fill in the blank. (You are choosing the best equation and answer to solve the word problem.)**

   A. $18.9 \times 6.3 = 119.07$

   B. $18.9 \div 6.3 = 3$

   C. $18.9 + 6.3 = 25.2$

   D. $6.3 - 18.9 = 12.6$

   E. $6.3 \div 18.9 = 0.33$

   F. $18.9 - 6.3 = 12.6$

Situations

- Raylene brought a roll of tape with a length of 18.9 feet. If she has used 6.3 feet, how much tape is left? _____

- Oliver is building a rectangular dog pen with an area of 18.9 square feet. If the length of the dog pen is 6.3 feet, what is the width? _____

- Valerie's little brother weighs 18.9 pounds. If Valerie weighs 6.3 times what her little brother weighs, how much does Valerie weigh? _____

- Frank bought three magazines for $18.90 and six candy bars for $6.30. How much did he spend? _____

---

7. **During each of the 8 days Josh was camping, it rained. If the total rainfall was 5.44 inches, what was the average daily rainfall in inches?**

   A. 0.068

   B. 0.68

   C. 1.47

   D. 6.8

References

www.mathisfun.com