

GED Math Graphics: Illustrated Guide to Self-Confidence

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Unit 1

GED SKILLS

- Basic Concepts
- Decimals
- Fractions

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*** Typical GED Questions

To Solve Word Problems

1. The first key step is simply:

Read The Problem. (All of it!)

2. The next key step is to find out:

What's The Question?

3. Then and only then you are ready to:

Answer what is asked

Ignore the rest

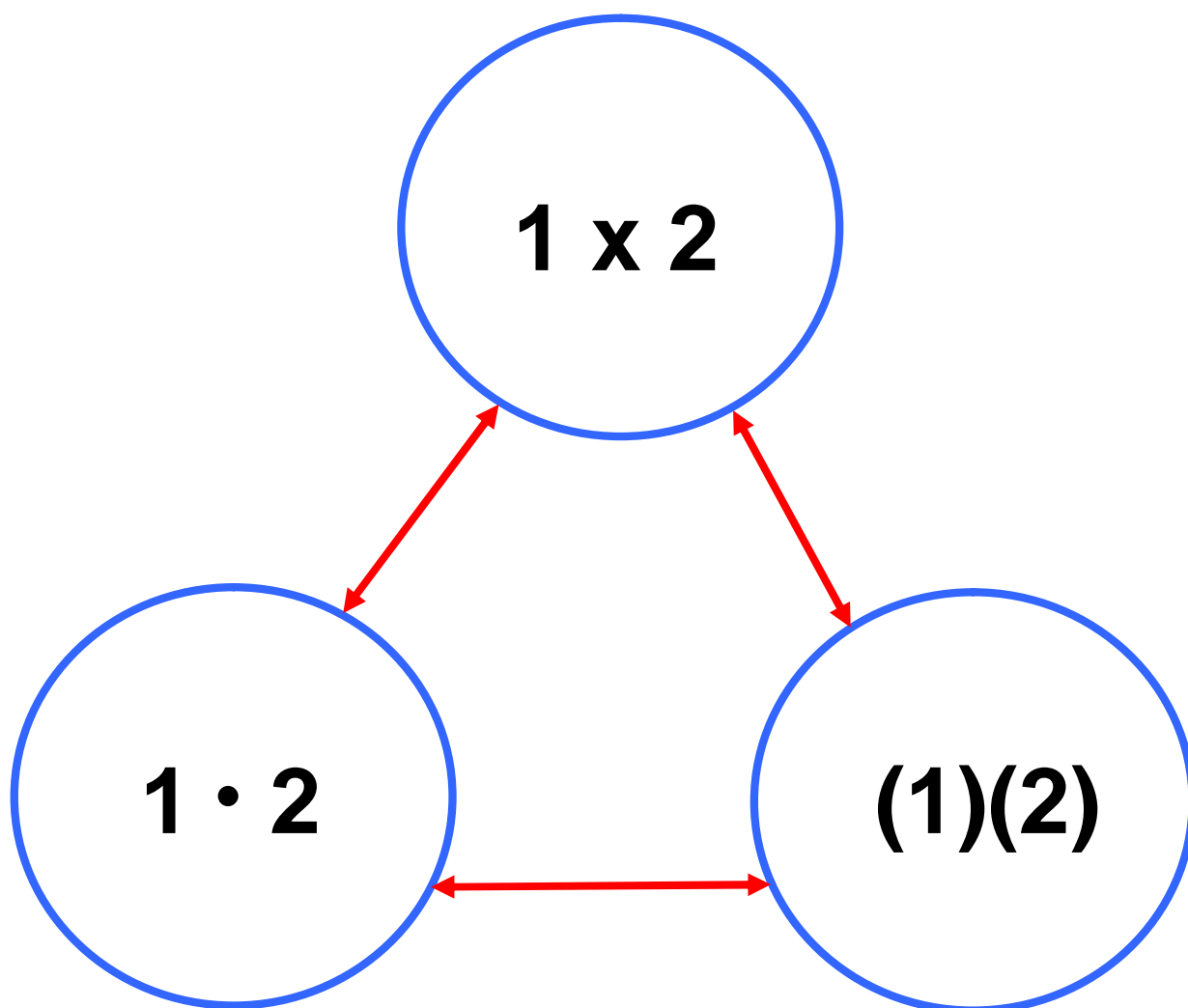
4. Don't forget to **check**:

Go back to be sure your answer makes sense.

To Multiply

Do you know three ways to write “one times two”?

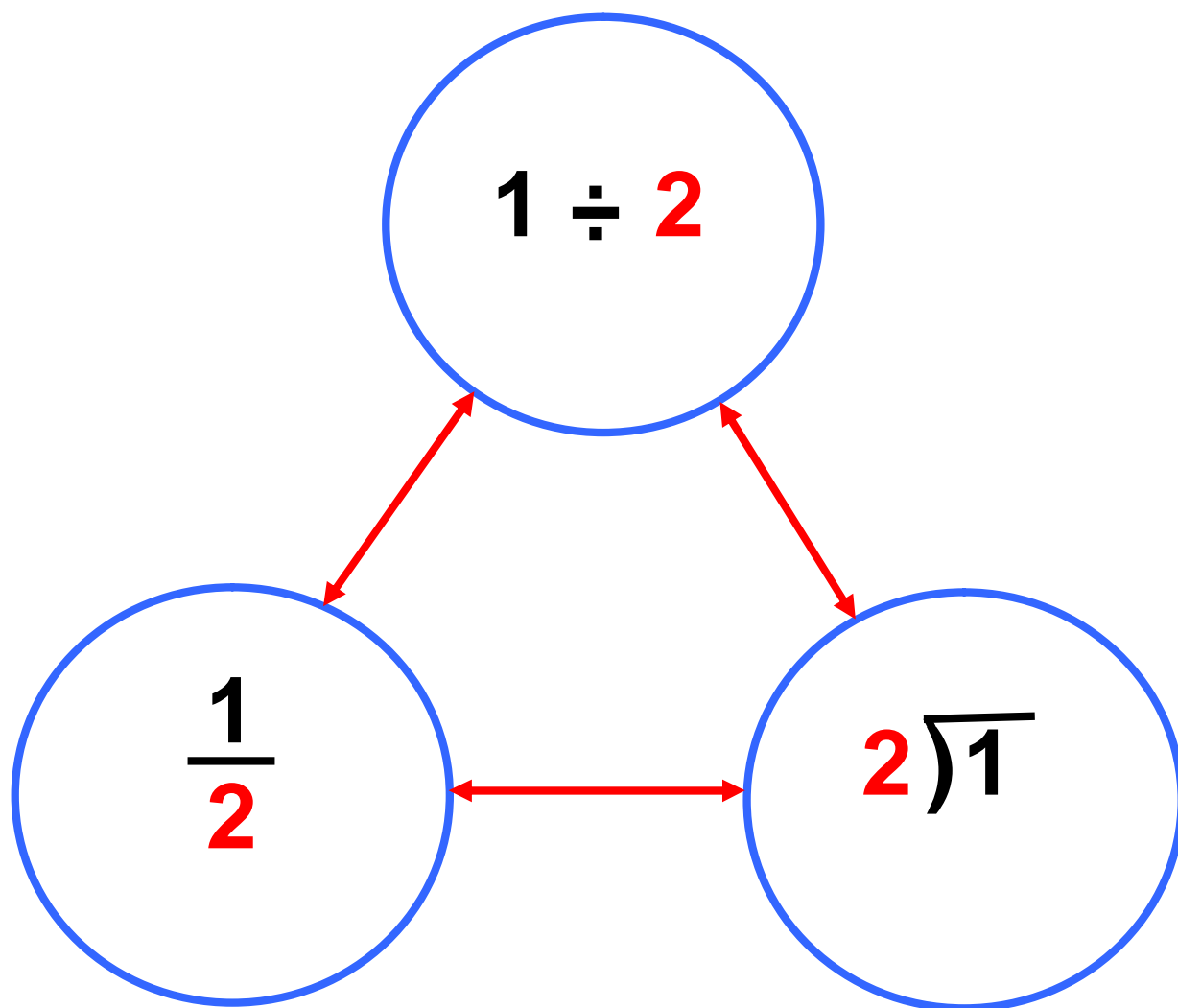
Be ready when you see them!



To Divide

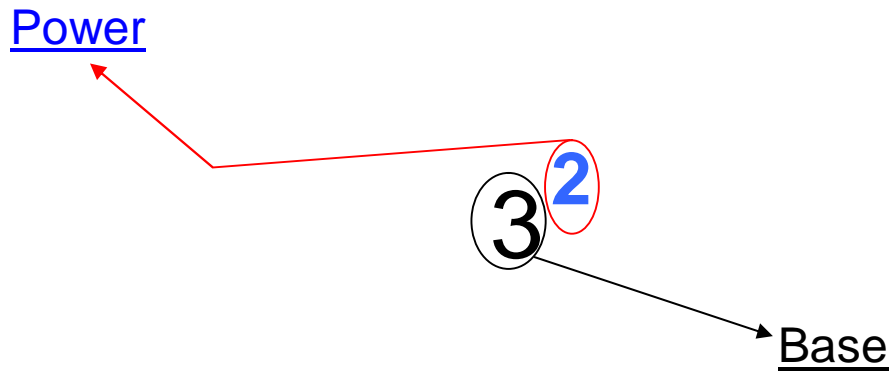
Here are three ways to write “one divided by two.”

Look now at the line in the fraction “one half.”
That line always means “divided by.”



Powers and Roots

Look at this pattern:



The Power tells how many times to multiply the Base by itself.

- $3^2 = 3 \times 3$, not 3×2 .

$\sqrt{\quad}$ means Square Root.

$\sqrt{9}$ means “the square root of 9”

It asks, “what number multiplied by itself equals 9?”

And that answer is 3.

- $\sqrt{9} = 3$

To Multiply Powers – Add

$$\begin{array}{c} \mathbf{3^2} \quad \times \quad \mathbf{3^3} \quad = \quad \mathbf{3^5} \\ \downarrow \quad \quad \quad \swarrow \quad \quad \quad \downarrow \\ \mathbf{(3 \cdot 3)(3 \cdot 3 \cdot 3)} \quad = \quad \mathbf{(3 \cdot 3 \cdot 3 \cdot 3 \cdot 3)} \end{array}$$

$$\mathbf{3^{(2+3)}} \quad = \quad \mathbf{3^5}$$

$$\begin{array}{c} \mathbf{n^2} \quad \times \quad \mathbf{n^3} \quad = \quad \mathbf{n^5} \\ \downarrow \quad \quad \quad \swarrow \quad \quad \quad \downarrow \\ \mathbf{(n \cdot n)(n \cdot n \cdot n)} \quad = \quad \mathbf{(n \cdot n \cdot n \cdot n \cdot n)} \end{array}$$

$$\mathbf{n^{(2+3)}} \quad = \quad \mathbf{n^5}$$

To Divide Powers – Subtract

$$\frac{3^5}{3^2} = \frac{(3 \cdot 3 \cdot 3 \cdot \cancel{3} \cdot \cancel{3})}{(\cancel{3} \cdot \cancel{3})}$$

$$3^{(5-2)} = 3^3$$

$$\frac{n^5}{n^2} = \frac{(n \cdot n \cdot n \cdot \cancel{n} \cdot \cancel{n})}{(\cancel{n} \cdot \cancel{n})}$$

$$n^{(5-2)} = n^3$$

Place Values and Rounding #1

Example: Round 4,238 to the **tens** place.

<i>Thousands</i>	<i>Hundreds</i>	<i>Tens</i>	<i>Ones</i>
4	2	3	8

Solution:

1. Underline your rounding place for **tens**.

4,238

2. Look one place to the right. Is the 8 equal to 5 or more? –

In this case, yes, $8 > 5$. So:

- Add one to the rounding place, and
- Write all digits to the right of the rounding place as zero.

4,240

Place Values and Rounding #2

Example: Round 4,238 to the **hundreds** place.

<i>Thousands</i>	<i>Hundreds</i>	<i>Tens</i>	<i>Ones</i>
4	2	3	8

Solution:

- Underline your rounding place for **hundreds**.

↓
4,238

- Look one place to the right. Is the 3 equal to 5 or more?

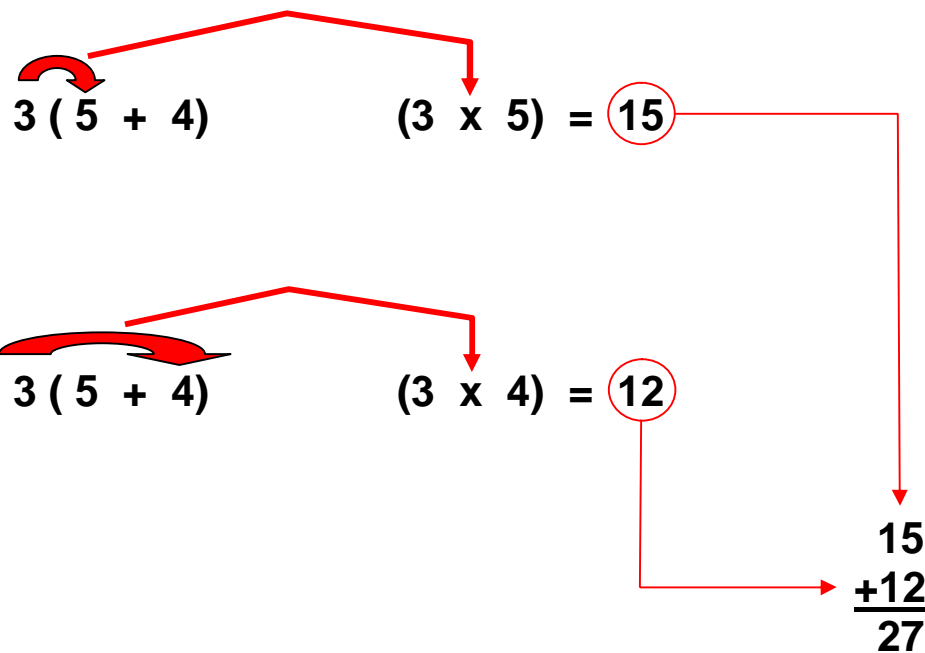
In this case, no, $3 < 5$. So:

- Do not change the rounding place, and
- Write all digits to the right of the rounding place as zero.

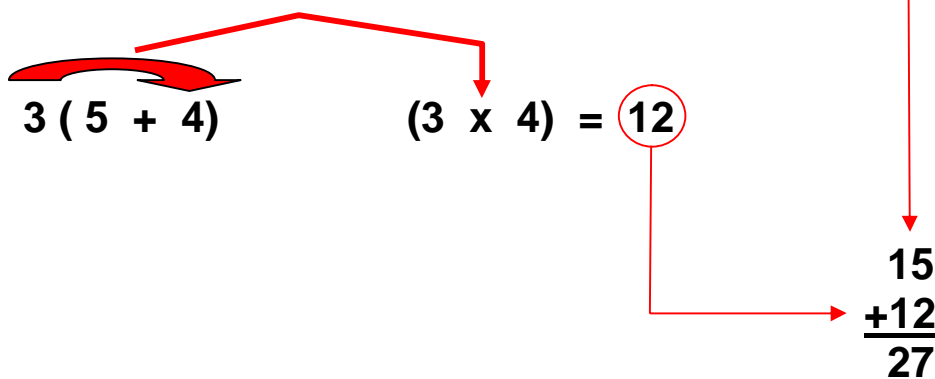
4,200

To Multiply Groups of Numbers

Step 1

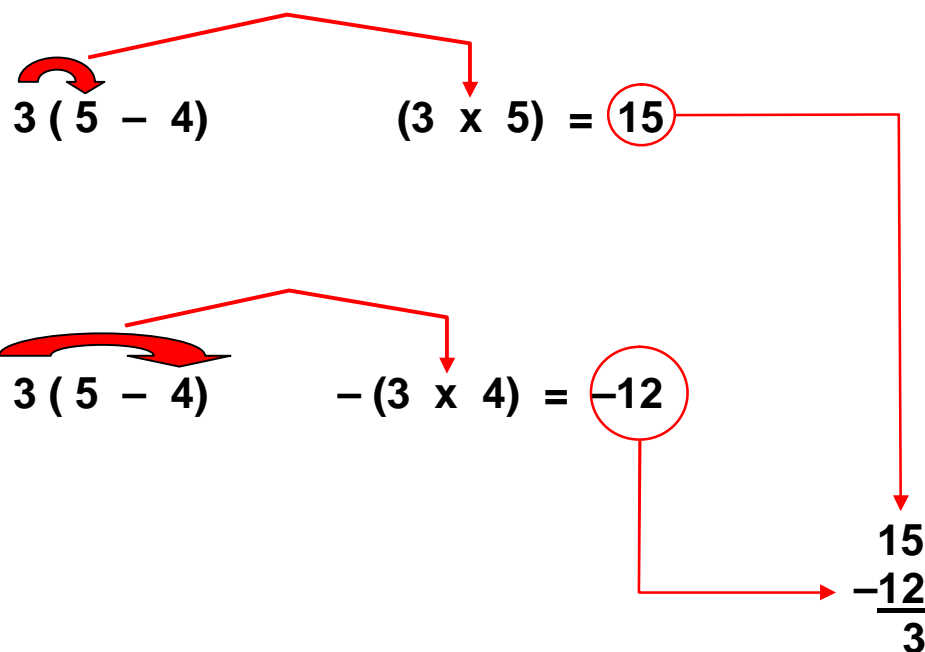


Step 2

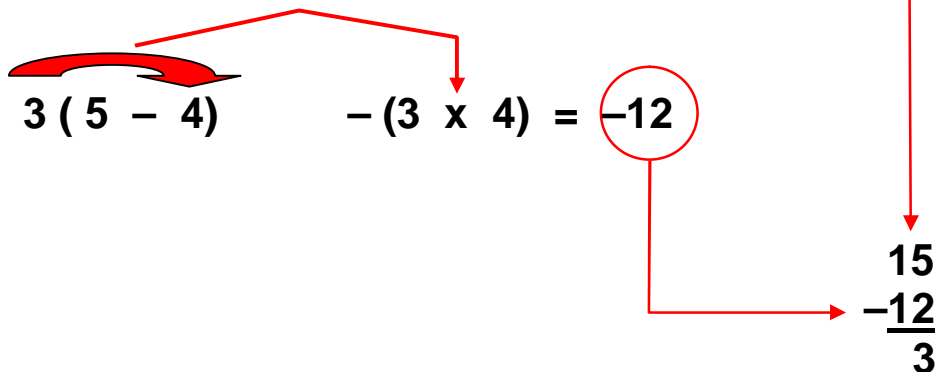


Step 3

Step 1



Step 2



Step 3

Order of Operations

Follow these steps:

For Example:

$$(3 - 1) + 5^2(7 - 3) - \frac{(6 - 2)}{2}$$

1. **Groups** first.

$$\underbrace{(3 - 1)} + 5^2 \underbrace{(7 - 3)} - \underbrace{\frac{(6 - 2)}{2}}$$

2. **Powers**, from left to right.

$$2 + 5^2 (4) - \frac{4}{2}$$

3. **X and ÷**, from left to right.

$$2 + 25 (4) - \frac{4}{2}$$

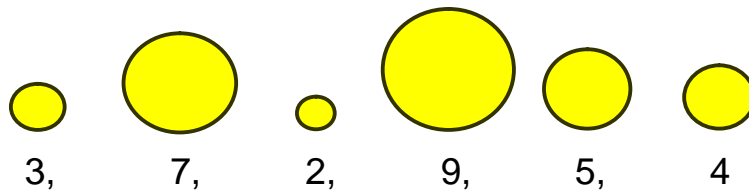
4. **+ and -**, from left to right.

$$2 + 100 - 2$$

$$100$$

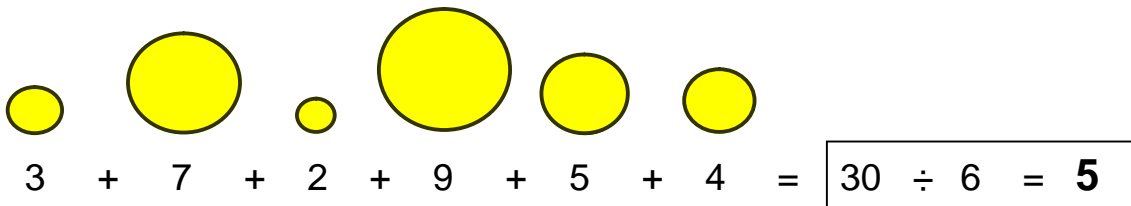
Typical GED Questions – Mean and Median

The question gives a group of numbers, pictured like this:



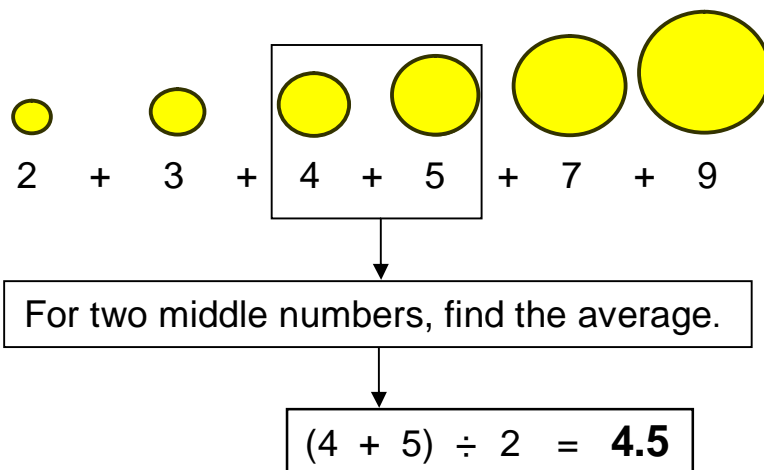
Find the mean (“average”)

Add, then divide the total by how many numbers there are.



Find the median (middle number)

Arrange in order by size, find the number in the middle.



Perfect Squares

n	$n \times n = n^2$	$\sqrt{n^2} = n$
1	$1 \times 1 = 1$	$\sqrt{1} = 1$
2	$2 \times 2 = 4$	$\sqrt{4} = 2$
3	$3 \times 3 = 9$	$\sqrt{9} = 3$
4	$4 \times 4 = 16$	$\sqrt{16} = 4$
5	$5 \times 5 = 25$	$\sqrt{25} = 5$
6	$6 \times 6 = 36$	$\sqrt{36} = 6$
7	$7 \times 7 = 49$	$\sqrt{49} = 7$
8	$8 \times 8 = 64$	$\sqrt{64} = 8$
9	$9 \times 9 = 81$	$\sqrt{81} = 9$
10	$10 \times 10 = 100$	$\sqrt{100} = 10$
11	$11 \times 11 = 121$	$\sqrt{121} = 11$
12	$12 \times 12 = 144$	$\sqrt{144} = 12$
13	$13 \times 13 = 169$	$\sqrt{169} = 13$
14	$14 \times 14 = 196$	$\sqrt{196} = 14$
15	$15 \times 15 = 225$	$\sqrt{225} = 15$

Typical GED Question

$$\sqrt{?^2} = ???$$

$$\sqrt{100} = 10$$

$$\sqrt{400} = 20$$

$$\sqrt{900} = 30$$

$$\sqrt{1,600} = 40$$

$$\sqrt{2,500} = 50$$

$$\sqrt{3,600} = 60$$

$$\sqrt{4,900} = 70$$

$$\sqrt{6,400} = 80$$

$$\sqrt{8,100} = 90$$

$$\sqrt{10,000} = 100$$

$$\sqrt{1.21} = 1.1$$

$$\sqrt{1.44} = 1.2^{***}$$

$$\sqrt{1.69} = 1.3$$

$$\sqrt{1.96} = 1.4$$

$$\sqrt{2.25} = 1.5^{***}$$

Look for one of these (especially THESE ***!) on your GED.

Line Up the Decimals

Example: $\$20 + \$200 + \$20.20 + \$2.02 + \$0.22$

	20.					
	200.					
	20.20					
	2.02					
	.22					
TOTAL	242.	44				

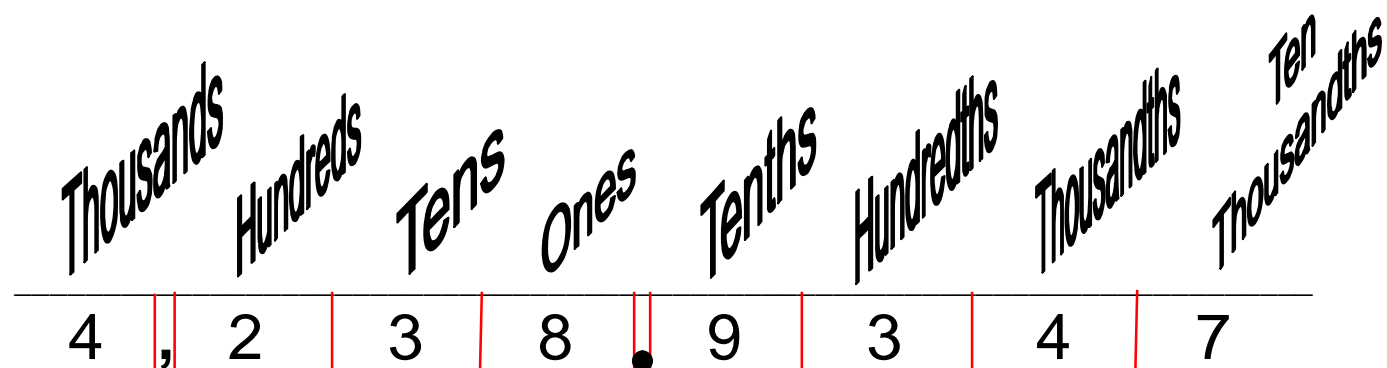
And know your PLACE VALUES.

Here is a worksheet for practice.

				•		
				•		
				•		
				•		
				•		
				•		
<i>Thousands</i>	<i>Hundreds</i>	<i>Tens</i>	<i>Ones</i>	<i>Tenths</i>	<i>Hundredths</i>	<i>Thousandths</i>

Place Values and Rounding #3

Example: Round 4,238.9347 to the **thousandths** place.



Solution:

1. Underline your rounding place for **thousandths**.

$$4,238.93\underline{4}7$$

2. Look one place to the right. Is the 7 equal to 5 or more?

In this case, yes, $7 > 5$. So:

- Add one to the rounding place, and
- Drop all digits to the right of the rounding place.

4,238.935

Place Values and Rounding #4

Example: Round 4,238.9347 to the **hundredths** place.

<i>Thousands</i>	<i>Hundreds</i>	<i>Tens</i>	<i>Ones</i>	<i>Tenths</i>	<i>Hundredths</i>	<i>Thousandths</i>	<i>Ten Thousandths</i>
4	2	3	8	9	3	4	7

Solution / Solución:

1. Underline your rounding place for **hundredths**.

4,238.9347

2. Look one place to the right. Is the 4 equal to 5 or more?

In this case, no, $4 < 5$. So:

- Do not change the rounding place, and
- Drop all digits to the right of the rounding place.

4,238.93


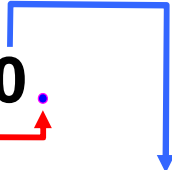
10, 100, 1000 . . .

Move point right, one place per zero.

To Multiply 

$$1\ 2.\ 3\ 4 \times 10 = 1\ 2.\ 3\ 4$$



$$1\ 2.\ 3\ 4 \times 100 = 1\ 2.\ 3\ 4$$


$$1\ 2.\ 3\ 4 \times 1000 = 1\ 2.\ 3\ 4\ 0$$




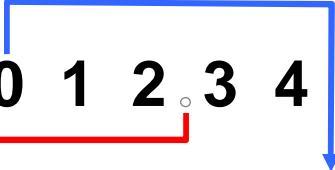
Zero "place holder."

Move point left, one place per zero.

To Divide 

$$1\ 2.\ 3\ 4 \div 10 = 1.\ 2\ 3\ 4$$


$$1\ 2.\ 3\ 4 \div 100 = 0.\ 1\ 2\ 3\ 4$$


$$1\ 2.\ 3\ 4 \div 1000 = 0.\ 0\ 1\ 2\ 3\ 4$$



Zero "place holder."

These easy shortcuts save precious time on the test! Do you use them?

Typical GED Question – Scientific Notation

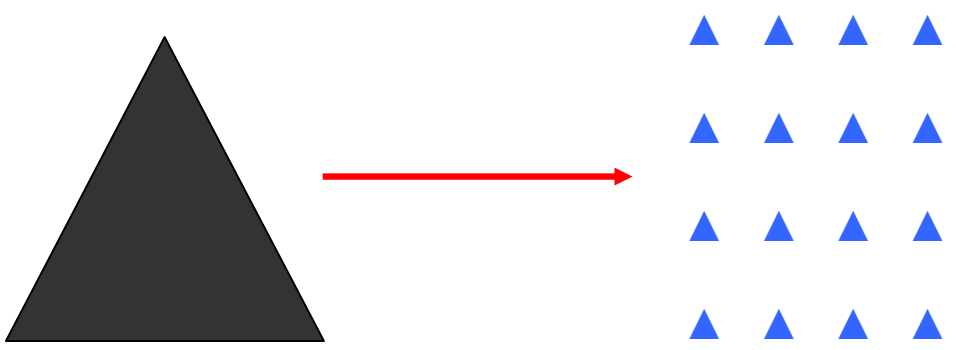
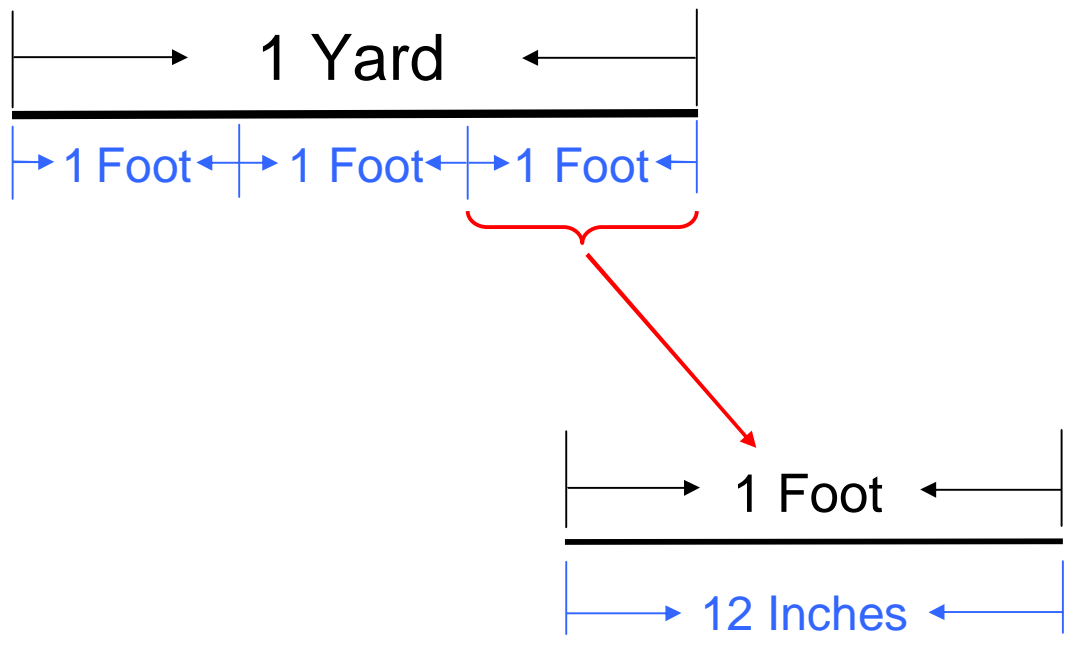
Do it like this

$$\begin{array}{l}
 1.0 \quad = \quad 1.0 \times 10^1 \\
 1.00 \quad = \quad 1.0 \times 10^2 \\
 1.000 \quad = \quad 1.0 \times 10^3 \\
 1.0000 \quad = \quad 1.0 \times 10^4 \\
 2.3500 \quad = \quad 2.35 \times 10^4
 \end{array}$$

How to do it

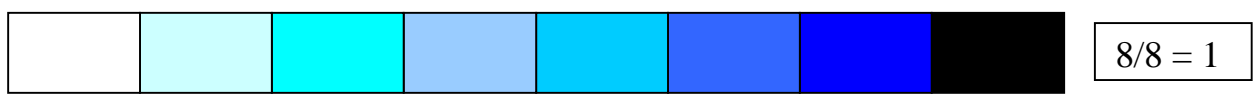
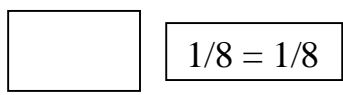
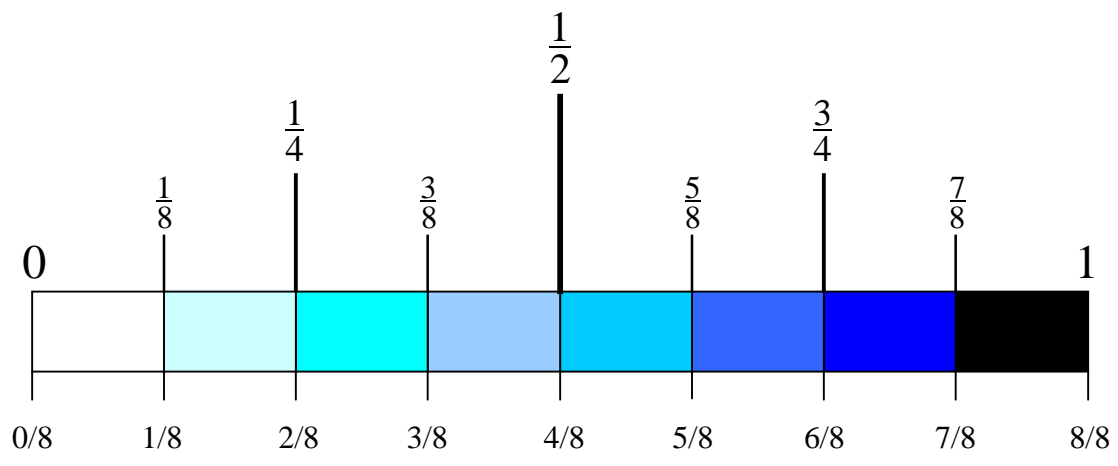
1. Write a decimal place after the first digit.
2. To the right of the point:
 - keep only the first zero (if any), and all non-zero digits.
3. Drop the other zeros.
4. Count how many places the point moved left. ???
5. That is the power of your 10.

Measurements

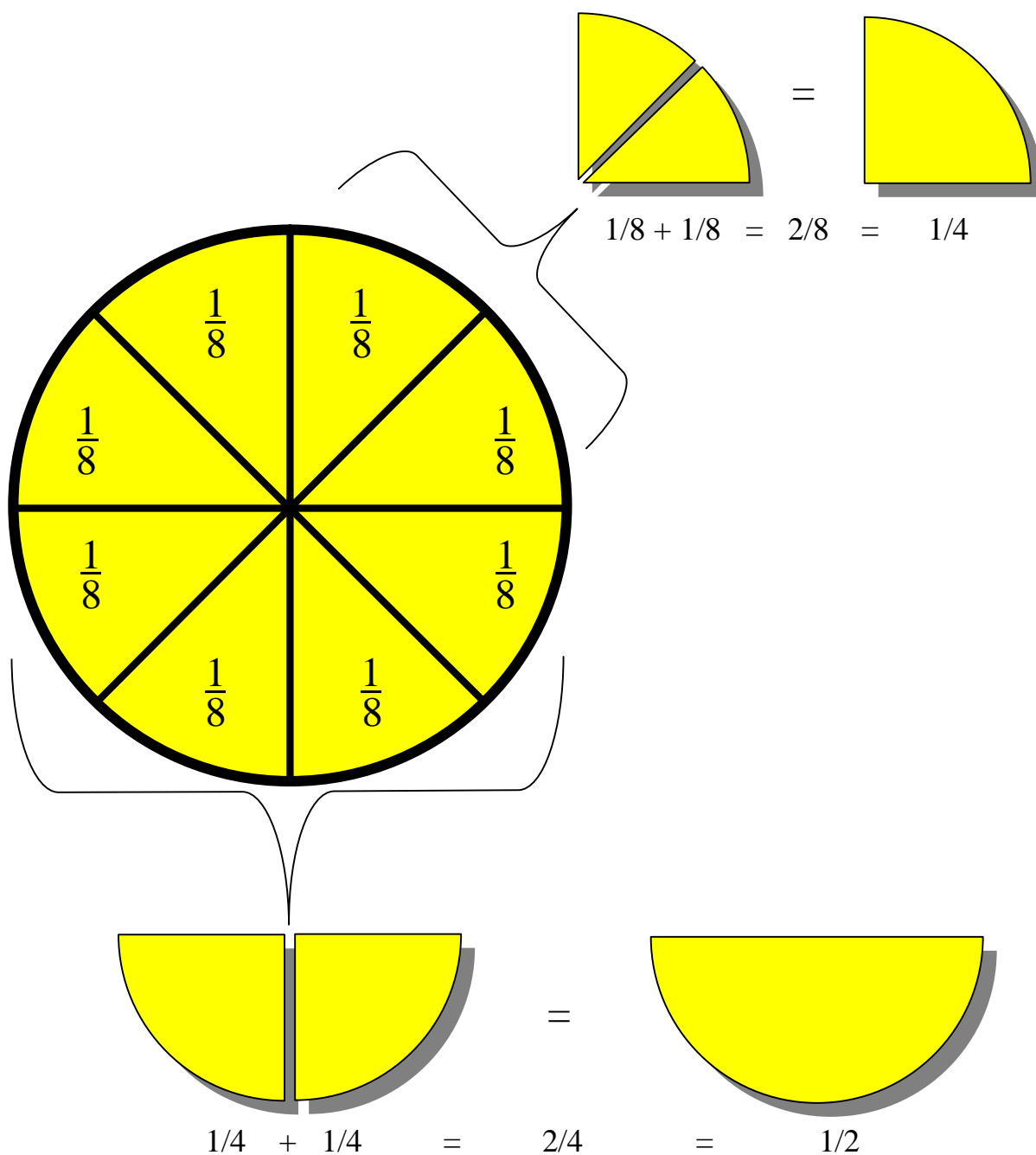


1 Pound = 16 Ounces

Ruler Fractions



Pizza Fractions



Two eighths make one fourth, and two fourths make one half.

Study the picture until you are sure you understand it. It's really important!

To Add or Subtract Fractions

1. Work only with the top numbers.
2. Bottom numbers must be equal.
3. If not—find a common denominator.

$$\frac{1}{5} + \frac{2}{5} = \frac{3}{5}$$

$$\frac{4}{5} - \frac{1}{5} = \frac{3}{5}$$

$$\frac{1}{4} + \frac{1}{2} \longrightarrow \text{NO}$$

$$\frac{1}{4} + \frac{2}{4} = \frac{3}{4}$$

To Multiply Fractions

1. Top times top, bottom times bottom.
2. Cancel where possible.

$$\frac{1}{2} \times \frac{1}{3} = \frac{1}{6}$$

$$\frac{\cancel{1}}{\cancel{2}} \times \frac{\overset{\cancel{2} \times \cancel{2}}{4}}{5} = \frac{2}{5}$$

$$\frac{\cancel{2}}{\cancel{3}} \times \frac{\overset{\cancel{3} \times \cancel{3}}{9}}{\underset{\cancel{5} \times \cancel{2}}{10}} = \frac{3}{5}$$

To Divide Fractions

1. Invert the divisor, and multiply.
2. Cancel where possible.

$$\frac{1}{3} \div \frac{1}{2} =$$

$$\frac{1}{3} \times \frac{2}{1} = \frac{2}{3}$$

$$\frac{2}{5} \div \frac{2}{3} =$$

$$\frac{\cancel{2}}{5} \times \frac{3}{\cancel{2}} = \frac{3}{5}$$