FACT SHEETS

for the

GED®

MATH TEST

Mometrix
TEST PREPARATION

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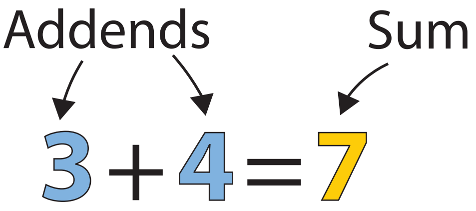
ADDITION AND SUBTRACTION

Addition takes two or more numbers and adds them together. The result you get is called the sum. Here's a simple example: 3+4=7.

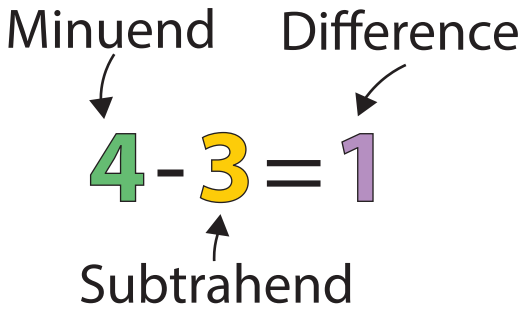


When adding more than two numbers, the order in which the numbers are added does not matter. For instance, the example above could also be written as 4+3=7. Likewise, the equation 1+7+3=11 could also be written as 3+1+7=11. The sum will remain the same either way.

When adding many numbers together, it's often easier to group some of the numbers together into smaller "equations," determine the sums of each group, and then add all the sums together.

1+6+2+7+5+4+8+1
(1+6) + (2+7) + (5+4) + (8+1)
(7+9) + (9+9)
16+18
34

Subtraction takes one quantity away from another. For instance, the expression 4-3 means that 3 must be taken away from 4, which results in 1. The result of subtracting numbers is called the difference.



Unlike addition, the order of the numbers does matter; the difference will be different depending on which number is the minuend and which is the subtrahend.

To help you remember the order of a subtraction problem, try memorizing the phrase "**M**e first. **S**ubtract me. **D**one with the problem."

37-17-7	93-10-12
20-7	83-12
13	71

To subtract a series of numbers, it is best to subtract them in order. This will ensure that the minuends and subtrahends do not accidentally switch places as you solve the problem.

ASSOCIATIVE PROPERTY

The **associative property** states that when you are adding or multiplying numbers, it does not matter how the numbers are group. This means that it doesn't matter where you place the parentheses.

This property can only be used for addition and multiplication.

Addition

$$a + (b + c) = (a + b) + c$$

Multiplication

$$a \cdot (b \cdot c) = (a \cdot b) \cdot c$$

EXAMPLE USING ADDITION:

When three or more numbers are added together, any two or more can be grouped together and the sum will be the same.

$$(14 + 6) + 7 = 14 + (6 + 7)$$
$$20 + 7 = 14 + 13$$
$$27 = 27$$

On the left, adding 14 + 6 gives us 20. Then adding 20 + 7 gives us 27. On the right, adding 6 + 7 gives us 3. Then adding 13 + 14 gives us 27.

EXAMPLE USING MULTIPLICATION:

When three or more numbers are multipied, any two or more can be grouped together and the sum will be the same.

$$(3 \cdot 5) \cdot 6 = 3 \cdot (5 \cdot 6)$$
$$15 \cdot 6 = 3 \cdot 30$$
$$90 = 90$$

On the left, multiplying 3 · 5 gives us 15. Then multiplying 15 · 6 gives us 30. On the right, multiplying 5 · 6 gives us 30. Then multiplying 3 · 30 gives us 90.

CLASSIFICATION OF NUMBERS

Just like so many things in our world, like animals, vehicles, and shapes, numbers can be classified according to their properties. Here are the most common classifications of numbers:

Natural Numbers

These are the numbers that we usually use to count with. If a natural number is divisible by 2, it is even. If not, it is odd.

1, 2, 3, 4, 5, 6...

Whole Numbers

These are all of the natural numers, including zero.

0, 1, 2, 3, 4, 5...

Integers

Integers are positive and negative whole numbers.

-3, -2, -1, 0, 1, 2, 3...

Rational Numbers

These are all the numbers that can be expressed as the division of integers.

2/1, 0.6, 3/10, 2.957

Irrational Numbers

These are numbers that cannot be written as a simple fraction or decimal.

π, $\sqrt{2}$, e

Real Numbers

These are all the numbers that are on a number line (all of the numbers above).

π, 23, 5/7. -4, 3.76, $\sqrt{7}$

Imaginary Numbers

These numbers are expressed as the sum of a real part and an imaginary part (i).

i, $5i$, $12.38i$, $-i/2$, $3i/4$

CONVERTING PERCENTAGES

A **percentage** is any number or ratio expressed as a fraction of 100. The word *percent* comes from the Latin phrase *per centum*, which means "per one hundred."

For example, 45% represents 45 out of 100, or 45 per 100.

CONVERTING PERCENTS TO DECIMALS

1. Place a decimal at the end of the number
2. Move the decimal two places to the left ("two step")
3. Remove the percent sign (%)

- **60%** → 60.0% → "two step" → 0.60% → 0.60 → **0.6**
- **11%** → 11.0% → "two step" → 0.11% → **0.11**
- **0.5%** → "two step" → 0.005% → **0.005**

Remember: you can simplify a decimal by removing any zeroes that appear at the end.

CONVERTING PERCENTS TO FRACTIONS

1. Remove the percent sign (%)
2. Divide the number by 100
3. Simplify!

- **74%** → 74 → $\frac{74}{100}$ → $\mathbf{\frac{37}{50}}$
- **3%** → 3 → $\mathbf{\frac{3}{100}}$
- **124%** → 124 → $\frac{124}{100}$ → $\mathbf{\frac{31}{25}}$

There are several real-world uses for percents, decimals, and fractions. **Percents** are often used for test scores, leaving a tip at a restaurant, and calculating sales taxes. **Decimals** are often used when dealing with money, weight, and length. **Fractions** are generally used to divide a total amongst friends, follow a recipe, and tell time.

EXPONENTS

Exponents are used in math to signify repeated multiplication. They are written as superscript numbers to the right side of the base:

$$base^{exponent}$$

Multiplication	**Exponents**
$2 \cdot 3 = 2 + 2 + 2 = 6$ *The 3 specifies how many times to add 2 to itself.*	$2^3 = 2 \cdot 2 \cdot 2 = 8$ *The 3 specifies how many times to multiply 2 by itself.*

Bases that are **variables**, such as x or y, are treated the same way:

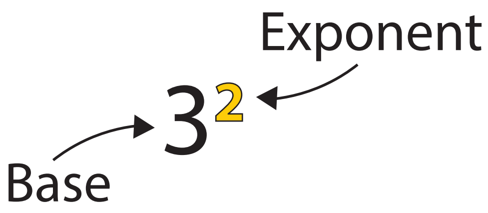
$$x \cdot x \cdot x \cdot x = x^4$$

In more complex equations, pay attention to how terms are **grouped**, because it will affect the outcome. The **order of operations** will also determine the outcome.

$7 + 3^3 = 7 + (3 \cdot 3 \cdot 3) = 7 + 27 = 34$ while $(7 + 3)^3 = 10^3 = 10 \cdot 10 \cdot 10 = 1{,}000$	- Exponents, then addition - Parentheses, then exponents
$-5^2 = -1 \cdot 5^2 = -1 \cdot 5 \cdot 5 = -25$ while $(-5)^2 = (-1 \cdot 5)^2 = (-1 \cdot 5) \cdot (-1 \cdot 5) = 25$	- Exponents, then multiplication - Parentheses, then exponents
$y - 4^2 = y - 16$ while $(y - 4)^2 = (y - 4) \cdot (y - 4) = y^2 - 8y + 16$	- Exponents, then subtraction - Parentheses, then exponents

EXPONENTS AND ROOTS

An **exponent** is a shorthand way to note how many times to multiply the base number by itself. It's written as a superscript number on the right-hand side of the base number:



Any number raised to the 1 is just the number itself. For instance, 3 raised to the 1 is just 3. On the left, we see 3 raised to the 2, which would be 3·3=9. Any real number raised to the 0 is equal to 1. It doesn't matter if it is a positive number or a negative number. Any real non-zero number raised to the power of 0 is equal to 1.

A number with an exponent of 2 is said to be "squared," and a number with an exponent of 3 is said to be "cubed."

$4^3 = 4\cdot4\cdot4 = 64$

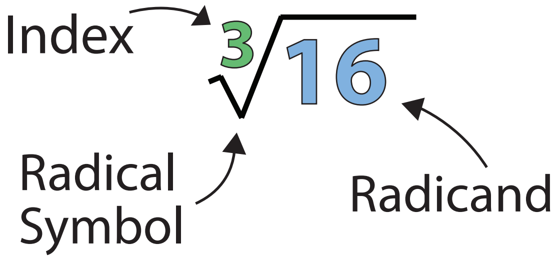
$3^5 = 3\cdot3\cdot3\cdot3\cdot3 = 243$

$7^2 = 7\cdot7 = 49$

$1^9 = 1\cdot1\cdot1\cdot1\cdot1\cdot1\cdot1\cdot1\cdot1 = 1$

A **root** is another way of writing a fractional exponent. It is the opposite operation of applying exponents. In other words, a root essentially "undoes" an exponent.

Instead of using an exponent, roots use a radical symbol to indicate the operation. A radical will have a number underneath the bar and may sometimes have a number in the upper left, called the index. If there is no index number written, it is assumed to be 2.



$\sqrt{16} = 4$

This is because 4^2=16.

$\sqrt{36} = 6$

This is because 6^2=36.

$\sqrt[3]{343} = 7$

This is because 7^3=343.

FACTORS

Factors are numbers that are multiplied to make another number. For example, when you multiply 6 by 7, you get 42, so 6 and 7 are both factors of 42.

Factors of a number are often visualized as factor pairs. A number can have more than one factor pair, like 24.

$1 \cdot 24 = 24$
$2 \cdot 12 = 24$
$3 \cdot 8 = 24$
$4 \cdot 6 = 24$

1, 2, 3, 4, 6, 8, 12, and 24 are all factors of 24.

Some numbers are **prime numbers** because their only factors are 1 and themselves. Other numbers, like 24, are called composite numbers because they have other factors as well.

Prime Numbers	**Composite Numbers**
2, 3, 5, 7, 11, 13...	4, 6, 8, 9, 10, 12...

Composite numbers are made up of prime numbers multiplied together. We can see all the prime factors by creating a prime factorization, which is unique

No matter how you slice it, the prime factorization of 24 is $2 \cdot 2 \cdot 2 \cdot 3$**.**

Some number share factors, called **common factors**. To determine the common factors between two numbers, we just need to look at the factors for each number and determine which are the same. The **greatest common factor (GCF)** will be the largest of the common factors.

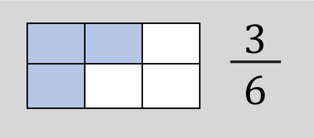
Factors of 24:
1, 2, 3, 4, 6, 12, 24

Factors of 60:
1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 30, 60

FRACTIONS

Fractions are numbers that specify a number of equal parts of a whole. For instance, if you split a pizza between your three friends, you each get 1/3 of the pizza.

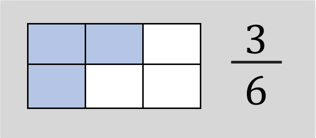
Three of the six equal-sized boxes are highlighted in the rectangle, so the fraction represented here is 3/6. The numerator is 3, which specifies “how many”, while 6 is the denominator and specifies “what kind.”



Fractions can be expressed in different ways:

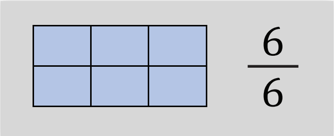
Proper Fraction

Our fraction above, 3/6, is called a proper fraction because the numerator is less than the denominator.



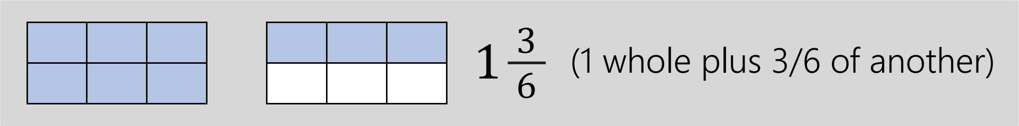
Improper Fraction

The fraction 6/6, which is 1 whole, is an improper fraction because the numerator is not less than the denominator.



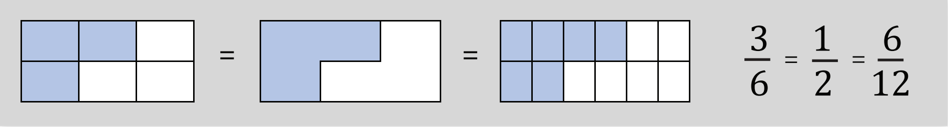
Mixed Number

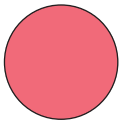
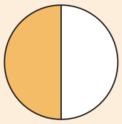
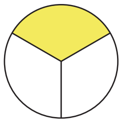
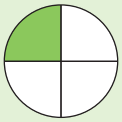
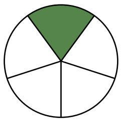
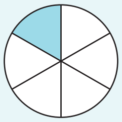
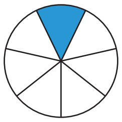
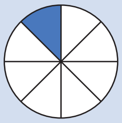
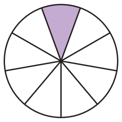
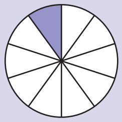
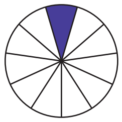
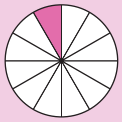
When you have more than 1 whole split into equal divisions, this is known as a mixed number.



Equivalent Fraction

Equal quantities can be represented with equivalent fractions.



FRACTION		EQUIVALENT FRACTIONS	DECIMAL	PERCENT
$\frac{1}{1}$ (ONE WHOLE)		$\frac{2}{2}$ $\frac{3}{3}$ $\frac{4}{4}$ $\frac{5}{5}$ $\frac{6}{6}$ $\frac{7}{7}$ $\frac{8}{8}$ $\frac{9}{9}$ $\frac{10}{10}$ $\frac{20}{20}$ $\frac{30}{30}$ $\frac{40}{40}$ $\frac{50}{50}$ $\frac{100}{100}$	1.0	100%
$\frac{1}{2}$ (ONE HALF)		$\frac{2}{4}$ $\frac{3}{6}$ $\frac{4}{8}$ $\frac{5}{10}$ $\frac{6}{12}$ $\frac{7}{14}$ $\frac{8}{16}$ $\frac{9}{18}$ $\frac{10}{20}$ $\frac{20}{40}$ $\frac{40}{80}$ $\frac{50}{100}$ $\frac{100}{200}$	0.50	50%
$\frac{1}{3}$ (ONE THIRD)		$\frac{2}{6}$ $\frac{3}{9}$ $\frac{4}{12}$ $\frac{5}{15}$ $\frac{6}{18}$ $\frac{7}{21}$ $\frac{8}{24}$ $\frac{9}{27}$ $\frac{10}{30}$ $\frac{20}{60}$ $\frac{30}{90}$ $\frac{40}{120}$ $\frac{50}{150}$	$0.\overline{3}$	$33.\overline{3}\%$
$\frac{1}{4}$ (ONE FOURTH)		$\frac{2}{8}$ $\frac{3}{12}$ $\frac{4}{16}$ $\frac{5}{20}$ $\frac{6}{24}$ $\frac{7}{28}$ $\frac{8}{32}$ $\frac{9}{36}$ $\frac{10}{40}$ $\frac{20}{80}$ $\frac{30}{120}$ $\frac{40}{160}$ $\frac{50}{200}$	0.25	25%
$\frac{1}{5}$ (ONE FIFTH)		$\frac{2}{10}$ $\frac{3}{15}$ $\frac{4}{20}$ $\frac{5}{25}$ $\frac{6}{30}$ $\frac{7}{35}$ $\frac{8}{40}$ $\frac{9}{45}$ $\frac{10}{50}$ $\frac{20}{100}$ $\frac{30}{150}$ $\frac{40}{200}$ $\frac{50}{250}$	0.20	20%
$\frac{1}{6}$ (ONE SIXTH)		$\frac{2}{12}$ $\frac{3}{18}$ $\frac{4}{24}$ $\frac{5}{30}$ $\frac{6}{36}$ $\frac{7}{42}$ $\frac{8}{48}$ $\frac{9}{54}$ $\frac{10}{60}$ $\frac{20}{120}$ $\frac{30}{180}$ $\frac{40}{240}$ $\frac{50}{300}$	$0.1\overline{6}$	$16.\overline{6}\%$
$\frac{1}{7}$ (ONE SEVENTH)		$\frac{2}{14}$ $\frac{3}{21}$ $\frac{4}{28}$ $\frac{5}{35}$ $\frac{6}{42}$ $\frac{7}{49}$ $\frac{8}{56}$ $\frac{9}{63}$ $\frac{10}{70}$ $\frac{20}{140}$ $\frac{30}{210}$ $\frac{40}{280}$ $\frac{50}{350}$	0.143	14.3%
$\frac{1}{8}$ (ONE EIGHTH)		$\frac{2}{16}$ $\frac{3}{24}$ $\frac{4}{32}$ $\frac{5}{40}$ $\frac{6}{48}$ $\frac{7}{56}$ $\frac{8}{64}$ $\frac{9}{72}$ $\frac{10}{80}$ $\frac{20}{160}$ $\frac{30}{240}$ $\frac{40}{320}$ $\frac{50}{400}$	0.125	12.5%
$\frac{1}{9}$ (ONE NINTH)		$\frac{2}{18}$ $\frac{3}{27}$ $\frac{4}{36}$ $\frac{5}{45}$ $\frac{6}{54}$ $\frac{7}{63}$ $\frac{8}{72}$ $\frac{9}{81}$ $\frac{10}{90}$ $\frac{20}{180}$ $\frac{30}{270}$ $\frac{40}{360}$ $\frac{50}{450}$	$0.\overline{1}$	$11.\overline{1}\%$
$\frac{1}{10}$ (ONE TENTH)		$\frac{2}{20}$ $\frac{3}{30}$ $\frac{4}{40}$ $\frac{5}{50}$ $\frac{6}{60}$ $\frac{7}{70}$ $\frac{8}{80}$ $\frac{9}{90}$ $\frac{10}{100}$ $\frac{40}{400}$ $\frac{80}{800}$ $\frac{100}{1,000}$	0.10	10%
$\frac{1}{11}$ (ONE ELEVENTH)		$\frac{2}{22}$ $\frac{3}{33}$ $\frac{4}{44}$ $\frac{5}{55}$ $\frac{6}{66}$ $\frac{7}{77}$ $\frac{8}{88}$ $\frac{9}{99}$ $\frac{10}{110}$ $\frac{40}{440}$ $\frac{80}{880}$ $\frac{100}{1,100}$	0.0909	9.09%
$\frac{1}{12}$ (ONE TWELFTH)		$\frac{2}{24}$ $\frac{3}{36}$ $\frac{4}{48}$ $\frac{5}{60}$ $\frac{6}{72}$ $\frac{7}{84}$ $\frac{8}{96}$ $\frac{9}{108}$ $\frac{10}{120}$ $\frac{40}{480}$ $\frac{80}{960}$ $\frac{100}{1,200}$	$0.8\overline{3}$	$8.\overline{3}\%$

$$\frac{1}{4} \longrightarrow 1 \div 4 \longrightarrow 0.25 \longrightarrow 0\,25. \longrightarrow 25\%$$

Divide the numerator by the denominator.

Move the decimal point two places to the right.

Mometrix TEST PREPARATION **FACT SHEET**

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GREATEST COMMON FACTOR

Common factors are numbers that you can multiply to produce another number. The numbers should divide exactly into two or more numbers.

Common Factors Example

The factors of 6 are 2 and 3: $\mathbf{2 \cdot 3 = 6}$

The factors of 12 are 2, 3, 4, and 6: $\mathbf{3 \cdot 4 = 12}$
$\mathbf{2 \cdot 6 = 12}$

The **greatest common factor** (GCF) is the largest number that is a factor of two or more numbers.

GCF Example

Factors of 15: 1, 3, 5, 15 **Factors of 35:** 1, 5, 7, 35

Because 5 is the largest factor of both 15 and 35, 5 is the GCF.

There are two steps to follow in order to find the GCF of two numbers:

Step 1

List the factors of each number.

15: 1, 3, 5, 15
30: 1, 2, 3, 5, 6, 10, 15, 30

Step 2

Mark all common factors.

15: 1, 3, 5, 15
30: 1, 2, 3, 5, 6, 10, 15, 30

The largest factor that 15 and 30 share is 15, which makes 15 the GCF in this case.

LEAST COMMON MULTIPLE

The least common multiple is the smallest value divisible by two or more numbers. There are two common strategies for finding the LCM.

Strategy #1

List the multiples of two numbers until you see a multiple appear in both lists. This shared multiple will be your LCM.

EXAMPLE 1: Find the LCM of 18 and 30.

18: 18, 36, 54, 72, 90, 108, 126…

30: 30, 60, 90, 120, 150…

The lowest multiple they have in common is 90, so the LCM = 90.

EXAMPLE 2: Find the LCM of 32 and 40.

32: 32, 64, 128, 160, 192, 224…

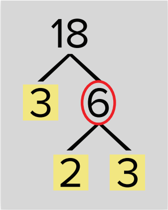
40: 40, 80, 120, 160, 200, 240…

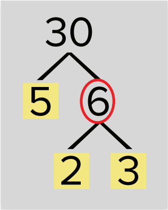
The lowest multiple they have in common is 160, so the LCM = 160.

Strategy #2

Use the GCF to find your LCM. First, factor both numbers. Then, find the product of the GCF and the remaining factors.

EXAMPLE: Find the LCM of 18 and 30.





18: Prime factorization = $2\cdot3\cdot3$
30: Prime factorization = $2\cdot3\cdot5$
Greatest Common Factor (GCF) = 6

$6\cdot3\cdot5 = 90$, which means the LCM of 18 and 30 is 90.

MULTIPLES

A **multiple** is a number obtained by multiplying other numbers together. For example, the numbers 0, 3, 6, 9, and 12 are all multiples of 3.

$3\cdot0=\mathbf{0},\ 3\cdot1=\mathbf{3},\ 3\cdot2=\mathbf{6},\ 3\cdot3=\mathbf{9},\ 3\cdot4=\mathbf{12}$

Some numbers are multiples of many numbers.

$\mathbf{1\cdot12}=12$	12 is a multiple of 1 and a multiple of 12...
$\mathbf{2\cdot6}=12$	a multiple of 2 and a multiple of 6...
$\mathbf{3\cdot4}=12$	a multiple of 3 and a multiple of 4.

FACT: Zero is a multiple of all numbers!

Some numbers are only multiples of themselves and 1. We call this a **prime number**.

$\mathbf{1\cdot13}=13$	13 is a multiple of 1 and 3 only.

FACT: Every number is a multiple of 1!

In order to find the common multiple that has the lowest value (**least common multiple**), multiply the highest powers of all the prime factors together.

The LCM of any sized group of numbers can be found.

$12 = 2\cdot2\cdot3 = 2^2\cdot3$
$33 = 3\cdot11$
$81 = 3\cdot3\cdot3\cdot3 = 3^4$

The LCM of 12, 33 and 81 is 2^2 (the highest power of the prime factor 2) times 3^4 (the highest power of the prime factor 3) times 11^1 (the highest power of the prime factor 11).

$$2^2\cdot3^4\cdot11= 4\cdot81\cdot11 = \mathbf{3{,}564}$$

ORDER OF OPERATIONS

The **order of operations** is the order in which a mathematical expression is to be simplified. Often called “PEMDAS,” the order of operations is as follows:

Parentheses
Exponents
Multiplication
Division
Addition
Subtraction

Let’s take a look at an example to see how this works.

$$(15 - 7) \div 4 \cdot 1$$
$$(8) \div 4 \cdot 1$$
$$8 \div 4 \cdot 1$$

The **p**arentheses indicate what operations must be completed first. After subtracting 7 from 15, continue following the order of operations. There are no **e**xponents, so move on to multiplication. **M**ultiply 4 by 1 to get 4. Then, **d**ivide 8 by 4 to get the correct answer of 2.

Here’s one more example:

$$2^2 \cdot (3 - 1) \div 2 + 3 - 6$$

Parentheses: $2^2 \cdot 2 \div 2 + 3 - 6$
Exponents: $4 \cdot 2 \div 2 + 3 - 6$
Multiplication: $8 \div 2 + 3 - 6$

Division: $4 + 3 - 6$
Addition: $7 - 6$
Subtraction: 1

PLACE VALUE

Place value is the value of a digit in a number. The value is determined by what position the digit is in within the whole number.

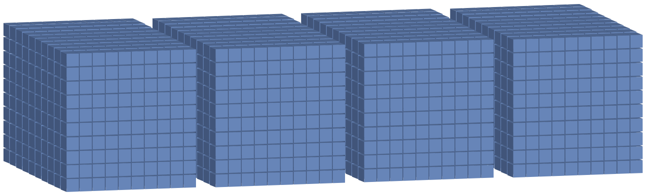
Millions	Hundred Thousands	Ten Thousands	Thousands	Hundreds	Tens	Ones		Tenths	Hundredths	Thousandths
3 ,	7	1	4 ,	9	2	6	.	5	8	3

↑ (Decimal point)

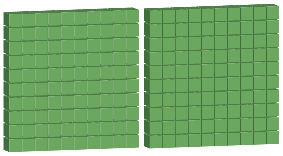
The place value of a digit increases by ten times as you move to the left on the chart. As you move to the right, the place value decreases by ten times. This means we can write out our number in its expanded form, like this:

$$3{,}000{,}000 + 700{,}000 + 10{,}000 + 4{,}000 + 900 + 20 + 6 + 0.5 + 0.08 + 0.003$$

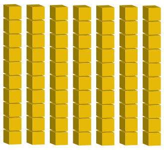
Another way to visualize place value is by using blocks. The blocks below represent the number 4,275.



4 thousands
(4,000)



2 hundreds
(200)



7 tens
(70)

5 ones
(5)

PROPORTIONS

A proportion states that two ratios are equal. In other words, their fraction forms are equivalent.

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

The ratio of 1 to 2, is proportional to the ratio of 2 to 4. Their fraction forms are equivalent, therefore they are proportional.

If Rectangle A has a length of 4 units and a width of 3 units, and Rectangle B has a length of 8 units and a width of 3 units, the rectangles are not proportional, because the ratios of their length and width are not equivalent.

$$\frac{4}{3} \neq \frac{8}{3}$$

Constant of Proportionality

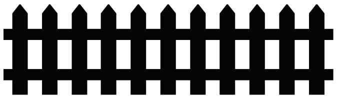
When both variables increase or decrease at the same rate, they are directly proportional.

EXAMPLE: *If you drive your car 75 miles per hour for 300 miles, your distance traveled and hours spent driving increase at the same rate.*

Distance increase = Time increase

Inverse Proportionality

When one variable increases and the other variable decreases, the variables are inversely proportional.



Number of friends =↑

Time spent = ↓

EXAMPLE: *You are painting a fence, but want to get the job done more quickly, so you invite a few friends to come help you. As more people join, the less time it takes to finish painting. The time it takes to finish the job and the amount of friends you invite to help are inversely proportional.*

Percents as Proportions

Percents can be treated as portions of a whole. The ratio of a percent is always the same "part over whole."

EXAMPLE: *Your restaurant bill comes to $33.75. You received exceptional service, so you want to leave a 20 percent tip. How much do you tip?*

$$\frac{\$33.75}{100\%} = \frac{\text{tip}}{20\%}$$

$$\frac{\$33.75 \div 5}{100\% \div 5} = \frac{\$6.75}{20\%}$$

$6.75 = tip

RATES AND UNIT RATES

A **rate** is a ratio of values that represents different units of measure.

EXAMPLE: An 8-pack of 20 oz. sodas for $5.98

A **unit rate** describes how many units of the first quantity corresponds to ONE unit of the second quantity (per one).

EXAMPLE: An 8-pack of 20 oz. sodas ÷ $5.98 = $0.74, or about 75 cents per one bottle

---

Unit rates are used frequently in our daily lives. For example, we use unit rates to make price comparisons at the grocery store to find the best deals.

To find a unit rate when given a rate, identify what two values are being compared and then use division.

Unit Rate Examples

Miles per hour
Meters per second
Dollars per gallon
Dollars per hour

EXAMPLE 1: 300 miles traveled in 4 hours

This is a rate comparing miles to hours. To find the unit rate, calculate "miles per hour."

$$300 \text{ miles} \div 4 \text{ hours} = \frac{75 \text{ miles}}{1 \text{ hour}}$$

EXAMPLE 2: 750 words spoken in 5 minutes

This rate is comparing words to minutes. To find the unit rate, calculate "words per minute."

$$750 \text{ words} \div 5 \text{ minutes} = \frac{150 \text{ words}}{1 \text{ minute}}$$

RATIOS

A **ratio** is a pair of numbers that compares two quantities.

EXAMPLE:

The ratio of the number of girls to the number of boys is 3 to 2.

The description of the ratio reveals the order in which the numbers must appear in the ratio. In this case, the number of girls (3) must appear before the number of boys (2).

The meaning of the ratio is determined by the order in which it is written. Switching the **antecedent** (first value) and the **consequent** (second value) changes the relationship.

Ratios can be expressed in the following ways: 3 to 2, 3:2, and $\frac{3}{2}$.

Ratios can be **simplified** by dividing both values by a common factor. Doing so does not change the meaning of the ratio. For example, the ratio 9:12 can be simplified to 3:4 because 9 and 12 have a common factor of 3. Dividing 9 and 12 by 3 results in 3 and 4, respectively.

Equivalent ratios are different ratios that have the same value. They can be found by multiplying or dividing both values in the ratio by the same number.

EXAMPLES:

The ratio 5:10 is equal to 1:2 because 5 and 10 are both divisible by 5.

The ratio 3:5 is equal to 30:50 when 3 and 5 are multiplied by 10.

The ratio 84:36 is equal to 7:3 because 84 and 36 are both divisible by 12.

SCIENTIFIC NOTATION

Scientific notation is simply a more efficient way to write numbers that are very large or very small. It's efficient because it shows magnitude very easily and usually eliminates a lot of zeroes.

Standard Form → Scientific Notation

EXAMPLE: 5,878,600,000,000

Step 1

Change the number to a decimal between 1 and 10.

5,878,600,000,000
becomes
5.878600000000

Step 2

Because the decimal was moved to the left 12 times, multiply the new number by 10 to the power of 12.

5.878600000000
becomes
$5.8786 \cdot 10^{12}$

These steps can also be applied when working with a small number. If you want to change 0.00000055 to scientific notation, change the number to be between 1 and 10 (5.5). Then, because the decimal was moved 7 places to the right, we multiply by 10^{-7} to get $5.5 \cdot 10^{-7}$.

Scientific Notation → Standard Form

EXAMPLE 1: $7.38 \cdot 10^{9}$

Because the exponent is **positive**, move the decimal **to the right** the same number of times as the exponent (9 times in this case).

7.38
becomes
7,380,000,000

EXAMPLE 2: $5.76 \cdot 10^{-8}$

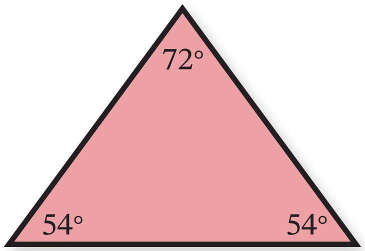
Because the exponent is **negative**, move the decimal **to the left** the same number of times as the exponent (8 times in this case).

5.76
becomes
0.0000000576

TYPES OF TRIANGLES

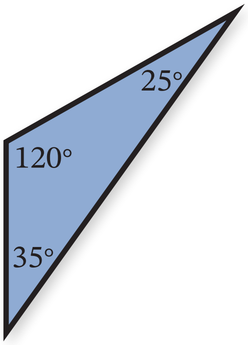
A triangle has three straight sides that connect. The length of the sides can vary, but the length of the largest side can't be greater than or equal to the sum of the other two sides.

In addition, a triangle has three interior angles, and the sum of those three angles is always 180°.



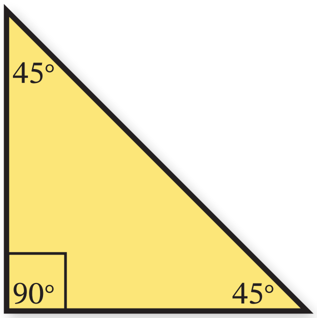
Acute Triangle

All three angles of an acute triangle measure less than 90°.



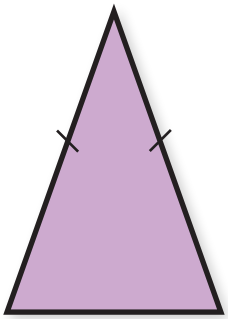
Obtuse Triangle

One angle of an obtuse triangle measures more than 90°.



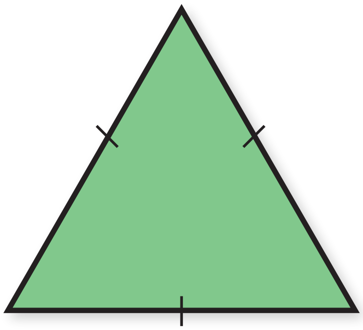
Right Triangle

One angle of a right triangle measures 90°.



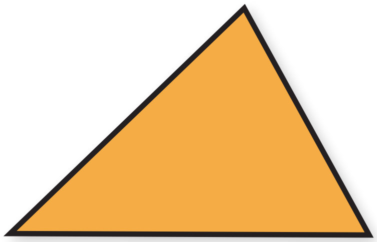
Isosceles Triangle

Two sides of an isosceles triangle have the same length.



Equilateral Triangle

All three sides of an equilateral triangle have the same length.



Scalene Triangle

No sides of a scalene triangle are the same length.

Mometrix TEST PREPARATION **FACT SHEET**

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