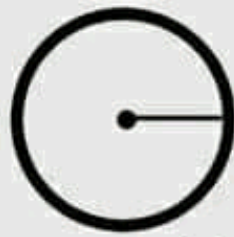


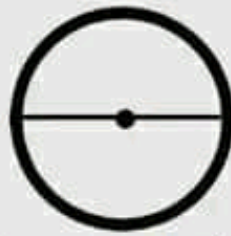
# Circumference of a Circle



center  
mid-point



radius (r)  
half of the  
distance  
across



diameter (d)  
the distance  
across



circumference (c)  
distance around

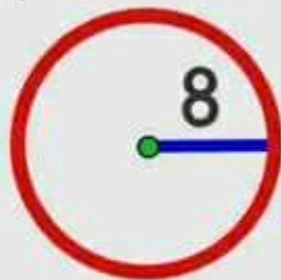
$$C = \pi \times d \quad ** \quad \pi d$$

$$C = 2 \times \pi \times r \quad ** \quad 2\pi r$$

$\pi$  is the symbol for "Pi"

$$\pi = 3.14$$

Example:



If the radius is  
8, then the  
diameter is  
16 (8x2)

$$C = \pi d$$

$$C = 3.14 \times 16$$

$$C = 50.24$$

$$C = 2\pi r$$

$$C = 2 \times 3.14 \times 8$$

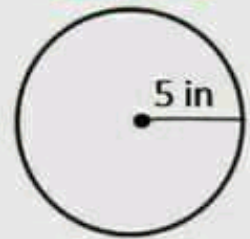
$$C = 50.24$$

# Area

## Circle

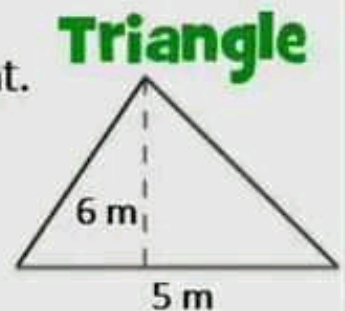
The area of a circle is calculated as  $\pi r^2$

$$A = 3.14 \times 5^2 \rightarrow A = 3.14 \times 25 \rightarrow A = 78.5 \text{ in}^2$$



The area of a triangle is calculated as  $\frac{1}{2}$  base x height.

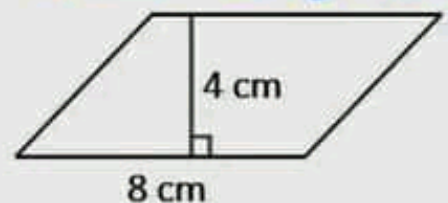
$$A = \frac{1}{2} \times 5 \times 6 \rightarrow A = \frac{1}{2} \times 30 \rightarrow A = 15 \text{ m}^2$$



The area of a parallelogram is calculated as base x height.

$$A = 8 \times 4 \rightarrow A = 32 \text{ cm}^2$$

## Parallelogram



The area of a trapezoid is calculated as  $\frac{1}{2} h (\text{base 1} + \text{base 2})$

$$A = \frac{1}{2} \times 4 (6 + 9) \rightarrow A = \frac{1}{2} \times 4 \times 15 \rightarrow A = 2 \times 15$$

$$A = 30 \text{ ft}^2$$

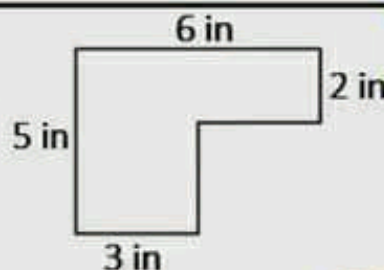
## Trapezoid



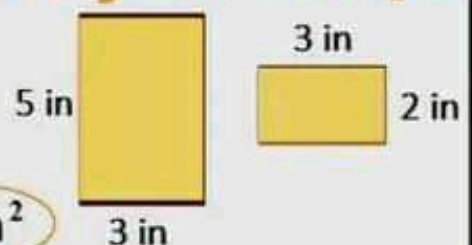
1. Divide the irregular shape into separate regular shapes (such as square, rectangle, or triangle).

2. Find the area of each

separate shape.  $A = (5 \times 3) + (3 \times 2) \rightarrow A = 21 \text{ in}^2$



## Irregular Shape



# Exponents

A **power** is the product of multiplying a number by itself. It is represented as a **base number** and an **exponent**. The base number indicates what number is being multiplied, and the exponent indicates how many times the base number is to be multiplied.

$$3^2 = 3 \times 3 = 9$$
 ↑                      ↑  
 base                  factors

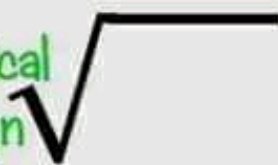
## Squares

|                         |                         |                             |
|-------------------------|-------------------------|-----------------------------|
| $1^2 = 1 \times 1 = 1$  | $5^2 = 5 \times 5 = 25$ | $9^2 = 9 \times 9 = 81$     |
| $2^2 = 2 \times 2 = 4$  | $6^2 = 6 \times 6 = 36$ | $10^2 = 10 \times 10 = 100$ |
| $3^2 = 3 \times 3 = 9$  | $7^2 = 7 \times 7 = 49$ | $11^2 = 11 \times 11 = 121$ |
| $4^2 = 4 \times 4 = 16$ | $8^2 = 8 \times 8 = 64$ | $12^2 = 12 \times 12 = 144$ |

|                                                  |                                    |                                                   |
|--------------------------------------------------|------------------------------------|---------------------------------------------------|
| Exponential Form<br>$5^3$                        | Word Form<br>five to the 3rd power | *Any number raised to the zero power is always 1* |
| Expanded (factors) Form<br>$5 \times 5 \times 5$ | Standard Form<br>125               |                                                   |

# Square Roots

Every positive number has 2 square roots. Finding the square root is the opposite or inverse operation of squaring a number. **The square root of a number is one of its two equal factors.** For example, 36 has two square roots, 6 & -6, because  $6 \times 6 = 36$  and  $-6 \times -6 = 36$ .

radical sign 

$$4^2 = 16$$

$$\sqrt{16} = 4$$

## Square Roots

|                     |                     |                       |
|---------------------|---------------------|-----------------------|
| $\sqrt{1} = \pm 1$  | $\sqrt{25} = \pm 5$ | $\sqrt{81} = \pm 9$   |
| $\sqrt{4} = \pm 2$  | $\sqrt{36} = \pm 6$ | $\sqrt{100} = \pm 10$ |
| $\sqrt{9} = \pm 3$  | $\sqrt{49} = \pm 7$ | $\sqrt{121} = \pm 11$ |
| $\sqrt{16} = \pm 4$ | $\sqrt{64} = \pm 8$ | $\sqrt{144} = \pm 12$ |

\*The square root of 25, is 5

$$\sqrt{25} = 5$$

\*The negative square root of 25, is -5

$$-\sqrt{25} = -5$$

# Fractions

## Parts of a Number

To find the fractional part of a number, use  $\div$  and  $\times$

1. Divide the whole number by the denominator
2. Multiply the quotient by the numerator

Example:  $\frac{2}{3}$  of 27

$$\times \frac{2}{3} \text{ of } 27 \div \quad 27 \div 3 = 9 \text{ and } 9 \times 2 = 18$$

so therefore,  $\frac{2}{3}$  of 27 = 18

---

## Improper & Mixed

\*To change an improper fraction to a mixed number, divide the numerator by the denominator

Example:  $\frac{7}{3}$

denominator  $\nearrow$

$$\begin{array}{r} 2 \leftarrow \text{whole \#} \\ 3 \overline{) 7} \\ \underline{-6} \\ 1 \leftarrow \text{remainder/numerator} \end{array}$$
$$\frac{7}{3} = 2 \frac{1}{3}$$

\*To change a mixed number to an improper fraction, multiply the denominator by the whole number and then add the numerator. Keep the same denominator

Example:  $2 \frac{1}{3}$

$$3 \times 2 = 6 \text{ and } 6 + 1 = 7$$

denominator  $\uparrow$  numerator  $\uparrow$

$$2 \frac{1}{3} = \frac{7}{3}$$

# Multiplying Fractions

**Rule #1** - When multiplying fractions, just multiply the numerators together and then multiply the denominators together. Reduce!

$$\frac{4}{7} \times \frac{2}{5} = \frac{8}{35} \qquad \frac{2}{6} \times \frac{3}{4} = \frac{6}{24} = \frac{1}{4}$$

**Rule #2** - When multiplying fractions, you can also cross cancel to simplify *first* (especially when working with larger numbers), then multiply.  $\frac{3}{4} \times \frac{8}{15} =$

Instead of doing  $3 \times 8$  and  $4 \times 15$ , you can simplify 3&15, as well as 4&8 by finding the GCF and divide.

$$\overset{1}{\cancel{3}} \times \frac{\cancel{8}}{\cancel{15}_5} = \text{The GCF of 3 and 15 is 3} \qquad \overset{2}{\cancel{4}} \times \frac{\cancel{8}_2}{\cancel{15}_3} = \text{The GCF of 4 and 8 is 4}$$

so, the new equation is  $\frac{1}{1} \times \frac{2}{5} = \frac{2}{5}$  therefore,  $\frac{3}{4} \times \frac{8}{15} = \frac{2}{5}$

Check it -  $\frac{3}{4} \times \frac{8}{15} = \frac{24}{60} \div \frac{12}{12} = \frac{2}{5} \checkmark$

**Rule #3** - When multiplying fractions by whole numbers, rename the whole # as a fraction by placing it over 1, and then multiply the fractions.  $3 \times \frac{5}{8} =$

$$\frac{3}{1} \times \frac{5}{8} = \frac{15}{8} = 1\frac{7}{8} \text{ therefore, } 3 \times \frac{5}{8} = 1\frac{7}{8}$$

# Subtracting Mixed Numbers

Rule #1 - If the denominators are the same, then add the numerators and keep the denominator. Next, add the whole numbers. Reduce or convert to a mixed number if necessary.

$$4\frac{5}{8} - 2\frac{2}{8} = * 4\frac{5}{8} - 2\frac{2}{8} = \boxed{2\frac{3}{8}}$$

Rule #2 - If the denominators are different, find the LCD and change the fractions to show the same denominator. Then add the numerators and keep the denominator. Next, add the whole numbers. Reduce or rename if necessary.

$$5\frac{3}{5} - 3\frac{1}{10} = \text{(rewrite vertically)}$$

$$\begin{array}{r} 5\frac{3}{5} \\ - 3\frac{1}{10} \\ \hline \end{array} \quad \begin{array}{l} \text{The LCD of} \\ 5 \text{ and } 10 \text{ is } 10 \end{array} \quad \begin{array}{r} \frac{3}{5} \quad \frac{6}{10} \\ - \frac{1}{10} \quad \frac{1}{10} \\ \hline \end{array} \quad \begin{array}{r} 5\frac{6}{10} \\ - 3\frac{1}{10} \\ \hline 2\frac{5}{10} \end{array}$$

$$\text{reduce } 2\frac{5}{10} \rightarrow \frac{5}{10} \div 5 = \frac{1}{2} \rightarrow \boxed{2\frac{1}{2}}$$

Rule #3 - If subtracting a mixed number from a whole number, rename the whole # as a mixed number, so that the denominator is the same as that of the fraction. Subtract and reduce!

-Rename the whole number by regrouping

$$9 - 6\frac{3}{5} =$$

$$9 = 8 + 1$$

$$9 = 8 + \frac{5}{5}$$

-9 is now a mixed number, so subtract the new equation

$$8\frac{5}{5}$$

$$- 6\frac{3}{5}$$

$$\boxed{2\frac{2}{5}}$$

\*If the top # is less than the bottom #

$$8\frac{3}{7} \left\{ 8\frac{3}{7} \rightarrow 7\frac{3}{7} + \frac{7}{7} \right.$$

$$- 2\frac{5}{7} \left\{ 7\frac{10}{7} - 2\frac{5}{7} = \right.$$

$$\boxed{5\frac{5}{7}}$$

# Multiplying Mixed Numbers

Rule #1 - First, convert the mixed number to an improper fraction \* next, multiply the numerators together and then multiply the denominators together \* then, convert the answer back to a mixed number and reduce.

$$6\frac{2}{4} \times \frac{3}{5} \longrightarrow 6\frac{2}{4} = \frac{26}{4} \longrightarrow \frac{26}{4} \times \frac{3}{5} =$$
$$\frac{26}{4} \times \frac{3}{5} = \frac{78}{20} \longrightarrow 3\frac{18}{20} \text{ reduce } \frac{18 \div 2}{20 \div 2} = \boxed{3\frac{9}{10}}$$

Rule #2 - To multiply a mixed number by a whole #,

1. Place the whole # over 1
2. Convert the mixed number to an improper fraction
3. Multiply the fractions and reduce or rename, if necessary

$$2\frac{4}{5} \times 8 \longrightarrow 2\frac{4}{5} \times \frac{8}{1} \longrightarrow 2\frac{4}{5} = \frac{14}{5}$$
$$\frac{14}{5} \times \frac{8}{1} = \frac{112}{5} \longrightarrow \boxed{22\frac{2}{5}}$$

# Adding Mixed Numbers

Rule #1 - If the denominators are the same, then add the numerators and keep the denominator. Next, add the whole numbers. Reduce or convert to a mixed number if necessary.

$$3\frac{2}{5} + 4\frac{1}{5} = * 3\frac{2}{5} + 4\frac{1}{5} = 7\frac{3}{5}$$

Rule #2 - If the denominators are different, find the LCD and change the fractions to show the same denominator. Then add the numerators and keep the denominator. Next, add the whole numbers. Reduce or rename if necessary.

$$6\frac{1}{2} + 2\frac{3}{4} = \text{(rewrite vertically)}$$

|                                                                         |                            |                                                                                                           |                                                                                                                    |                                                                                      |
|-------------------------------------------------------------------------|----------------------------|-----------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| $\begin{array}{r} 6\frac{1}{2} \\ + 2\frac{3}{4} \\ \hline \end{array}$ | The LCD of<br>2 and 4 is 4 | $\begin{array}{r} \frac{1}{2} \quad \frac{2}{4} \\ + \frac{3}{4} \quad \frac{3}{4} \\ \hline \end{array}$ | $\begin{array}{r} \frac{1}{2} \times 2 \quad \frac{2}{4} \\ + \frac{3}{4} \quad \frac{3}{4} \\ \hline \end{array}$ | $\begin{array}{r} 6\frac{2}{4} \\ + 2\frac{3}{4} \\ \hline 8\frac{5}{4} \end{array}$ |
|-------------------------------------------------------------------------|----------------------------|-----------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|

rename

$$8\frac{5}{4} \rightarrow \frac{5}{4} = 1\frac{1}{4} \rightarrow 8 + 1\frac{1}{4} = \boxed{9\frac{1}{4}}$$

# Dividing Fractions

Rule #1 - First, get the reciprocal of the second fraction (flip it) \* next, change the division sign to a multiplication sign \* then, multiply the fractions \* finally, reduce!

$$\frac{4}{5} \div \frac{2}{6} = \longrightarrow \frac{4}{5} \times \frac{6}{2} = \text{(reciprocal, multiply)}$$

$$\frac{4}{5} \times \frac{6}{2} = \frac{24}{10} = 2 \frac{4}{10} = 2 \frac{2}{5} \text{ therefore, } \frac{4}{5} \div \frac{2}{6} = 2 \frac{2}{5}$$

Rule #2 - To divide a fraction by a whole #,

1. Place the whole # over 1
2. Get the reciprocal of the second fraction
3. Change the division sign to a multiplication sign
4. Multiply the fractions and reduce

$$\frac{5}{8} \div 10 = \longrightarrow \frac{5}{8} \div \frac{10}{1} \longrightarrow \frac{5}{8} \times \frac{1}{10}$$

$$\overset{1}{\cancel{5}} \frac{\cancel{5}}{8} \times \frac{1}{\cancel{10}_2} \longrightarrow \frac{1}{8} \times \frac{1}{2} = \frac{1}{16}$$

Check it -  $\frac{5}{8} \times \frac{1}{10} = \frac{5}{80} \overset{\div 5}{=} \overset{\div 5}{\frac{1}{16}} \checkmark$

# Simplifying Mixed Numbers

Whenever adding, subtracting, multiplying or dividing fractions, always reduce the answer to its simplest form. When the answer is a mixed number, the fraction part is what needs to be reduced.

To reduce (simplify) a fraction, you divide both the numerator and denominator by the same number.

1. Find the GCF of the top and bottom number
2. Divide the top and bottom numbers by the GCF

Example: Reduce  $4\frac{8}{18}$

$$8 \sim 1, \textcircled{2}, 4, 8 \quad 18 \sim 1, \textcircled{2}, 3, 6, 9, 18$$

The greatest number 8 and 18 have in common is 2; GCF = 2

$$\begin{array}{l} \frac{8}{18} \div 2 = \frac{4}{9} \end{array} \quad 4\frac{8}{18} \text{ reduces to } \boxed{4\frac{4}{9}}$$

A fraction is in *simplest form* when 1 is the only number that can divide both the numerator and denominator evenly.

The fraction part of a mixed number in simplest form, must be a fraction less than 1.

Fractions greater than 1 are called improper fractions, because the numerator is greater than the denominator. For example,  $\frac{7}{3}$

Example: Rename  $6\frac{5}{2}$

$$\frac{5}{2} = 2\frac{1}{2} \longrightarrow 6 + 2\frac{1}{2} = \boxed{8\frac{1}{2}}$$

# Ordering Fractions

**Rule #1** - If all of the denominators are the same, the fraction with the greatest numerator has the greatest value.

Example:

$$\frac{1}{7} \quad \frac{5}{7} \quad \frac{6}{7} \quad \frac{2}{7} \quad \frac{4}{7}$$



greatest to least

$$\frac{6}{7} \quad \frac{5}{7} \quad \frac{4}{7} \quad \frac{2}{7} \quad \frac{1}{7}$$

least to greatest

$$\frac{1}{7} \quad \frac{2}{7} \quad \frac{4}{7} \quad \frac{5}{7} \quad \frac{6}{7}$$

**Rule #2** - If all of the numerators are the same, the fraction with the smallest denominator has the greatest value.

Example:

$$\frac{3}{5} \quad \frac{3}{4} \quad \frac{3}{7} \quad \frac{3}{9} \quad \frac{3}{6}$$



greatest to least

$$\frac{3}{4} \quad \frac{3}{5} \quad \frac{3}{6} \quad \frac{3}{7} \quad \frac{3}{9}$$

least to greatest

$$\frac{3}{9} \quad \frac{3}{7} \quad \frac{3}{6} \quad \frac{3}{5} \quad \frac{3}{4}$$

**Rule #3** - If all the numerators and denominators are different, find the LCD and change the fractions to show the same denominators.

**\*\***The LCD of 4, 8, 2, 4, 8 is 8

$$\frac{1}{4} \quad \frac{3}{8} \quad \frac{1}{2} \quad \frac{3}{4} \quad \frac{7}{8}$$

$$\frac{1}{4} \rightarrow \frac{2}{8}, \quad \frac{3}{8} \rightarrow \frac{3}{8}, \quad \frac{1}{2} \rightarrow \frac{4}{8}, \quad \frac{3}{4} \rightarrow \frac{6}{8}, \quad \frac{7}{8} \rightarrow \frac{7}{8}$$

greatest to least

$$\frac{7}{8} \quad \frac{3}{4} \quad \frac{1}{2} \quad \frac{3}{8} \quad \frac{1}{4}$$

least to greatest

$$\frac{1}{4} \quad \frac{3}{8} \quad \frac{1}{2} \quad \frac{3}{4} \quad \frac{7}{8}$$

# Comparing Fractions

## Compare two or more fractions using the following symbols

**> Greater than      < Less than      = Equal**

**Rule #1** - If both denominators are the same, the fraction with the greatest numerator has the greatest value.

$\frac{3}{8} > \frac{2}{8}$  3 is greater than 2, so  $\frac{3}{8}$  is the greater than  $\frac{2}{8}$

**Rule #2** - If both numerators are the same, the fraction with the smallest denominator has the greatest value.

$\frac{4}{5} > \frac{4}{7}$  5 is less than 7  
so  $\frac{4}{5}$  is the  
greater than  $\frac{4}{7}$

**Rule #3** - If both the numerators and denominators are different, then cross multiply to find the greatest value.

~~$\frac{6}{7}$    $\frac{2}{3}$~~   $3 \times 6 = 18$  &  $7 \times 2 = 14$   $\frac{6}{7}$    $\frac{2}{3}$   
18 is greater than 14,  
so therefore  
6/7 is greater than 2/3

**Rule #4** - If both the numerators and denominators are different, you can also find the LCD and change both fractions to show the same denominator, then compare.

$$\frac{6}{7} \quad \square \quad \frac{2}{3}$$

$7 \sim 7, 14, 21, 28, 35, 42, 49$   
 $3 \sim 3, 6, 9, 12, 15, 18, 21, 24$

$\frac{6}{7} = \frac{6 \times 3}{7 \times 3} = \frac{18}{21}$   
 $\frac{2}{3} = \frac{2 \times 7}{3 \times 7} = \frac{14}{21}$

LCD = 21  
 $\frac{18}{21} > \frac{14}{21}$   
 18 is greater than 14, so  $\frac{6}{7}$  is greater than  $\frac{2}{3}$

# Factors

Two numbers you multiply together to get a **product**.

$$\begin{array}{r|l} 24 & \\ \hline 1 & \times 24 \\ 2 & \times 12 \\ 3 & \times 8 \\ 4 & \times 6 \end{array}$$

★ The #1 and the # you are working with are **always** the first set of factors!

*The GCF of 12 and 24 is **12**!*

$$\begin{array}{r|l} 12 & \\ \hline 1 & \times 12 \\ 2 & \times 6 \\ 3 & \times 4 \end{array}$$

# Multiples

to find the multiples, skip count by that number.

**8:** 8, 16, 24, 32, 40

**12:** 12, 24, 36, 48, 60

*The LCM of 8 and 12 is **24**!*

# Fractions

## Multiples

A multiple is the product of a specific number and another number.  
Or, a number which can be divided by another number without a remainder. To find the multiples of any number, just skip count.

|          |                                     |
|----------|-------------------------------------|
| <b>2</b> | 2 4 6 8 10 12 14 16 18 20 22 24     |
| <b>3</b> | 3 6 9 12 15 18 21 24 27 30 33 36    |
| <b>4</b> | 4 8 12 16 20 24 28 32 36 40 44 48   |
| <b>5</b> | 5 10 15 20 25 30 35 40 45 50 55 60  |
| <b>6</b> | 6 12 18 24 30 36 42 48 54 60 66 72  |
| <b>7</b> | 7 14 21 28 35 42 49 56 63 70 77 84  |
| <b>8</b> | 8 16 24 32 40 48 56 64 72 80 88 96  |
| <b>9</b> | 9 18 27 36 45 54 63 72 81 90 99 108 |

## Least Common Multiples (LCM)

The LCM is the smallest whole number that is a multiple of two or more given numbers.

**Example: LCM of 5 and 3**

5 ~ 5, 10, **15**, 20, 25, 30, 35

3 ~ 3, 6, 9, 12, **15**, 18, 21, 24

15 is the least (smallest) multiple that both 5 and 3 share- LCM=15

When working with fractions, the LCM is referred to as the LCD (lowest common denominator). LCD is the smallest multiple of two or more denominators.

**Example: LCD of  $\frac{2}{5}$  and  $\frac{2}{4}$**

5 ~ 5, 10, 15, **20**, 25, 30, 35 \* 4 ~ 4, 8, 12, 16, **20**, 24, 28, 32

20 is the least (smallest) multiple that both 5 and 4 share- LCD=20

$$(+)\times(+)=(+)$$

$$(-)\times(-)=(+)$$

$$(+)\times(-)=(-)$$

$$(-)\times(+)=(-)$$



# Multiplying Integers

When you multiply two or more numbers, the answer is called the product.

**Rule # 1** When multiplying two integers with the **same** sign, the product is always **positive**  
 $(-3)\times(-3)=9$

**Rule # 2** When multiplying two integers with **different** signs, the product is always **negative**  
 $8\times(-5)=-40$

# Dividing Integers



$$(+)\div(+)=(+)$$

$$(-)\div(-)=(+)$$

$$(+)\div(-)=(-)$$

$$(-)\div(+)=(-)$$

When you divide two numbers, the answer is called the quotient.

**Rule # 1** When dividing two integers with the **same** sign, the quotient is always **positive**  
 $(-16)\div(-8)=2$

**Rule # 2** When dividing two integers with **different** signs, the quotient is always **negative**  
 $27\div(-3)=-9$

# Order of Operations

1. **Parentheses** ( ) -Perform operations within parentheses and other grouping symbols

$$5 \times 2^3 + (14 - 7) =$$

2. **Exponents**  $b^a$  -Find the value of all exponential expressions

$$5 \times 2^3 + (14 - 7) =$$

3. **Multiplication**  $\times$  & **Division**  $\div$  -Perform all multiplication and division in order from left to right

$$5 \times 2^3 + (14 - 7) =$$

4. **Addition**  $+$  & **Subtraction**  $-$  -Perform all addition and subtraction in order from left to right

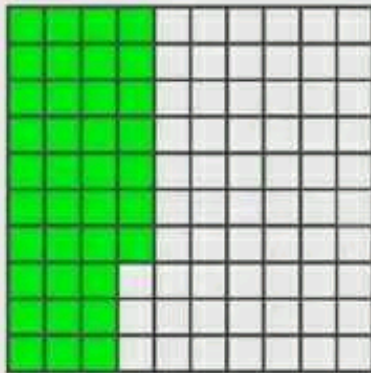
$$5 \times 2^3 + (14 - 7) =$$

  
\***P**lease **E**xclude **m**y **D**ear **A**unt **S**ally\*

# Percentages

A *percent* is another way to name a fraction or a decimal. The word means "out of a hundred", as it names the part of a whole. The symbol for percent is %.

37% is 37 out of 100



$$\frac{37}{100} = 0.37 = 37 \text{ hundredths}$$

---

## Percent of a Whole #

### Method #1

Use a decimal:

Multiply the decimal equivalent of the percent with the whole number.

15% of 65

$$15\% = .15$$

$$.15$$

$$\begin{array}{r} \times 65 \\ \hline \end{array}$$

$$9.75$$

$$15\% \text{ of } 65 = 9.75$$

### Method #2

Use a fraction

Multiply the fraction equivalent of the percent with the whole number (over 1).

15% of 65

$$15\% = \frac{15}{100}$$

$$\frac{15}{100} \times \frac{65}{1} = \frac{975}{100} =$$

$$15\% \text{ of } 65 = 9.75$$

# Ratios: Fractions, Percent & Decimals

3:5

3 out of 5  
3 to 5

$\frac{3}{5}$

60%

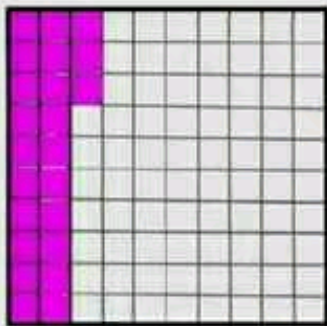
0.6

## Ratio to Percent:

- Turn the ratio into a fraction
- Find the equivalent fraction, over 100
- Change the fraction into a percent

$$3:5 = \frac{3}{5} \rightarrow \frac{3}{5} = \frac{\quad}{100} \rightarrow \frac{3 \times 20}{5 \times 20} = \frac{60}{100}$$

$$\frac{60}{100} = 0.60 = 60\%$$



$$23:100 = \frac{23}{100} = .23 = 23\%$$

# Ratios

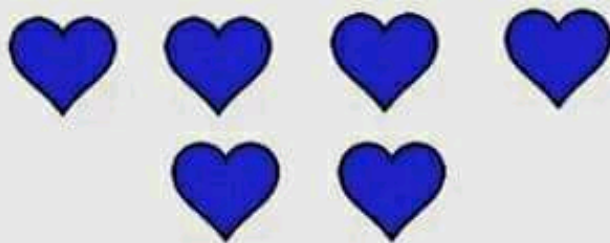
A ratio is a comparison of two quantities.

Part : Part

Stars to Hearts

5:6 \* 5 to 6 \*  $\frac{5}{6}$

For every 5 stars,  
there are 6 hearts



Part : Whole

Hearts to Total #

6:11 \* 6 to 11 \*  $\frac{6}{11}$

For every 6 hearts,  
there are 11 shapes total

Ratios can be written 3 ways:

4:7 - colon

$\frac{4}{7}$  - fraction

4 to 7 - word "to"

# Rounding Rules

1. Find the place value and circle the digit.

(Example: If you are rounding to the nearest tens, circle the tens place)

1257

2. Move to the right of the circled number and underline that digit.

1257



3. Zero to four, the circled digit stays the same. But, five to nine adding 1 is the game.

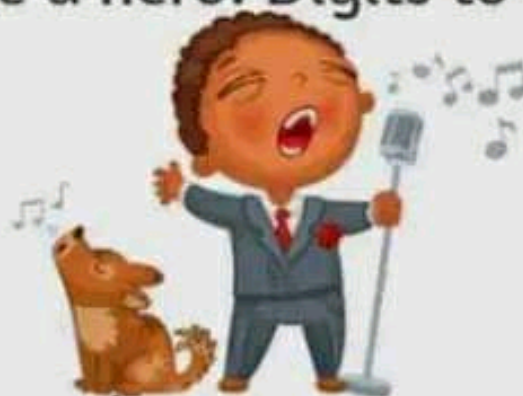
(In the example, the underlined number is between 5 and 9. So, we need to add 1 to the circled number )

1267



4. Now flex your muscles just like a hero. Digits to the right, change to the zero.

1260



5. All the other numbers, they stay the same. Yahoo!! you are a winner at the rounding game.

# Comparing & Ordering Numbers

All numbers have value. You can compare the value of two whole numbers by using the following symbols:

| Greater Than                                                                      | Less Than                                                                         | Equal To                                                                            |
|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|  |  |  |

Follow these steps to compare two numbers.

**Step 1: Line up the numbers according to place value.**

4,712

4,761

**Step 2: Compare the numbers in each place starting with the largest.**

Start here

4 = 4

7 = 7

1 is less than 6

So.....

4,712 is less than 4,761



4,712  
4,761

**Step 3: Use the symbols to show the relationship between the two numbers.**

4,712 < 4,761

4,712 is less than 4,761

# Compatible Numbers

You can use compatible numbers or rounding to help you estimate solutions.

## Compatible Numbers

Compatible numbers are sometimes called friendly numbers. These are numbers that are easy to put together.

|                                                 |                                      |
|-------------------------------------------------|--------------------------------------|
| Numbers that end in 0<br>10, 100, 1000          | Numbers that end in 5<br>5, 15, 105  |
| Doubles Facts<br>$8 + 8 = 16$<br>$20 + 20 = 40$ | Numbers that Make 10<br>$1 + 9 = 10$ |

## Rounding

Rounding helps you estimate numbers to the nearest group of 10. There are specific rules to rounding.  
Rules to Rounding:

**4 or less, let it rest**  
(stay the same)

**5 or more, add 1 more**  
(add 1 to the place you are rounding)

## Estimating to Find Solutions

When you estimate to find a solution you always want to estimate first. The goal is not to estimate the actual answer, but to estimate to help you find a number close to the answer. You can use **Compatible Numbers** or **Rounding** to help you find the solution.

| Compatible Numbers                                      | Actual Numbers                                          | Rounding                                                |
|---------------------------------------------------------|---------------------------------------------------------|---------------------------------------------------------|
| $\begin{array}{r} 75 \\ + 65 \\ \hline 140 \end{array}$ | $\begin{array}{r} 76 \\ + 66 \\ \hline 142 \end{array}$ | $\begin{array}{r} 80 \\ + 70 \\ \hline 150 \end{array}$ |

For this set of numbers, which estimation strategy worked the best? Why?