

## CLASSIFYING NUMBERS

## ANSWERS



BASIC NUMBERS CAN BE CLASSIFIED INTO A SET CALLED **REAL NUMBERS**. REAL NUMBERS INCLUDE **RATIONAL** AND **IRRATIONAL NUMBERS**. LET'S TALK ABOUT RATIONAL NUMBERS FIRST.

BEFORE WE GET TOO COMPLEX, LET'S START WITH THE SMALLEST GROUP OF RATIONAL NUMBERS AND WORK OUR WAY UP.



THE FIRST SET OF RATIONAL NUMBERS IS CALLED **COUNTING** OR **NATURAL NUMBERS**. YOU USE THESE THE MOST, ESPECIALLY FOR COUNTING THINGS AND WHEN YOU PLAY GAMES LIKE HIDE AND GO SEEK. THIS SET INCLUDES: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, ... (THE SYMBOL ... MEANS THE NUMBERS GO ON FOREVER AND NEVER STOP.)

OK...1, 2, 3, 4, 5, 6, 7, 8, 9, 10. READY OR NOT HERE I COME!



Circle all the counting or natural numbers below.

- 4    9    0.25     $\frac{2}{3}$     78    140     $\frac{4}{2}$     - 23

DID YOU CIRCLE  $\frac{4}{2}$ ? THIS IS A COUNTING NUMBER BECAUSE IT CAN BE SIMPLIFIED TO 2.



THE NEXT SET IS CALLED **WHOLE NUMBERS**. THIS INCLUDES ALL THE COUNTING NUMBERS AND 0. 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, ...

Circle all the whole numbers below.

0.89    18    0     $\frac{4}{8}$     - 56    140    96    0.33    - 24     $\frac{7}{1}$

DID YOU CIRCLE  $\frac{7}{1}$ ? IT CAN BE SIMPLIFIED TO 7.



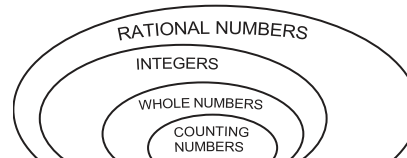
THEN COMES THE **INTEGERS** WHICH INCLUDES ZERO, ALL THE COUNTING NUMBERS, AND THE NEGATIVES OF ALL THE COUNTING NUMBERS. ... -6, -5, -4, -3, -2, -1, 0, 1, 2, 3, 4, 5, 6, ...

Circle all the integers below.

- 63    0.41     $\frac{3}{9}$     157    0    4.28    - 925     $\frac{6}{13}$     1    - 0.6    400    - 72    0.08

## CLASSIFYING NUMBERS CONTINUED

## ANSWERS



HAVE YOU NOTICED THAT THE SETS ARE INCLUDING MORE AND MORE NUMBERS AND THAT EACH NEW SET CONTAINS THE PREVIOUS SET WITHIN IT? THIS GRAPH MIGHT HELP YOU BETTER UNDERSTAND THE SETS.



AND FINALLY, WE HAVE THE OTHER **RATIONAL NUMBERS**. THIS SET INCLUDES ALL THE OTHER SETS MENTIONED BEFORE AND FRACTIONS THAT ARE MADE UP OF TWO INTEGERS. DON'T FORGET, ZERO CAN NEVER BE IN THE DENOMINATOR (ON THE BOTTOM)

$\frac{7}{15}$  ← INTEGER

$\frac{4}{9}$  ← INTEGER

$-\frac{5}{23}$  ← INTEGER



THESE OTHER RATIONAL NUMBERS CAN ALSO BE WRITTEN AS DECIMALS, BUT THEY ONLY INCLUDE ONES THAT TERMINATE (END), OR REPEAT.

EXAMPLES OF DECIMALS THAT TERMINATE OR END:

2.1    0.5    0.375    0.24

EXAMPLES OF DECIMALS THAT REPEAT:

0.3333...    0.2666...    0.142857142857...



RATIONAL MEANS SOMEONE OR SOMETHING WITH REASON OR LOGIC. DO YOU SEE HOW THESE NUMBERS LOOK LOGICAL AND YOU CAN SEE A PATTERN?

Circle all the rational numbers below.

456    0.333...    - 1,823     $\frac{9}{26}$     0.238    - 0.56    - 925     $-\frac{7}{38}$      $\frac{1}{2}$     0.1212..

THOSE ARE ALL THE RATIONAL NUMBERS WHICH LEAVES US WITH **IRRATIONAL NUMBERS**. IRRATIONAL NUMBERS ARE DECIMALS THAT DO NOT END OR REPEAT. IN OTHER WORDS, THEY HAVE NO PATTERN AND NEVER STOP. THEY ALSO CAN NOT BE WRITTEN AS A FRACTION USING TWO INTEGERS.



THE BEST WAY TO SEE IRRATIONAL NUMBERS IS TO USE A CALCULATOR. WHAT IS THE SQUARE ROOT OF 4 ( $\sqrt{4}$ )? I HOPE YOU GOT 2, WHICH IS A RATIONAL NUMBER. NOW TRY THE SQUARE ROOT OF 3 ( $\sqrt{3}$ ). YOU SHOULD GET SOMETHING LIKE 1.73205080756887... AS YOU CAN SEE IT NEVER STOPS AND DOES NOT REPEAT OR HAVE A PATTERN. IT IS IRRATIONAL.

EXAMPLES OF IRRATIONAL NUMBERS:

$\sqrt{5}$      $\sqrt{2}$      $\sqrt{20}$      $\pi$

NOW YOU KNOW REAL NUMBERS.

