

Mathematical Definitions

1) Natural Number- Also known as Counting #s. They are whole and positive

{ 1, 2, 3, ... } ← means set (list of #'s)

2) Whole Number- The natural #s and 0

{ 0, 1, 2, 3, ... }

on TH #1:
0 is even,
neutral and
a perfect square

3) Integer- The set of whole #s and their inverses (opposites)

{ ... -3, -2, -1, 0, 1, 2, 3, ... }

4) Perfect Square- The product of a number squared. (When you multiply a number by itself)

ex $3 \cdot 3 = 3^2 = 9 \rightarrow P.S.$

x^2 → button on calc

{ 0, 1, 4, 9, 16, 25, 36, 49, 64, 81, 100, 121, 144, 169, 196, 225, ... }

↑
 0^2 1^2 2^2 3^2

5) Square Root- Symbol: $\sqrt{\quad}$ (radical) One of the two equal factors of a number. (The number you multiply by itself to get the perfect square)

ex $\sqrt{100} = 10$, $\sqrt{36} = 6$

$\sqrt{\quad}$ Calc
 x^2 → button on calc

6) Rational Number -

Regents → Numbers that can be written as the ratio of two integers where the denominator isn't 0

- Decimals that terminate or repeat ex .25, .777
- Integers and whole #'s ex 5, -3
- perfect square roots ex $\sqrt{25}$, $\sqrt{100}$

7) Irrational Number-

Regents → Numbers that can't be written as the ratio of two integers where the denominator isn't 0

- non-terminating and non-repeating decimals. ex .17284...
- non-perfect square roots ex $\sqrt{17}$, $\sqrt{21}$
- π { 3.1415926... }

8) Real Number- rational, irrational, 0, positive, negative, fractions, + Decimals

9) Not real Number-

① Dividing by 0 or $\frac{0}{0}$ (undefined)

$\sqrt{25} = 5.5$
 ~~$\sqrt{-25} = -5.5$~~

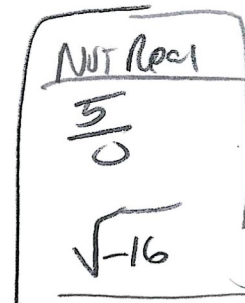
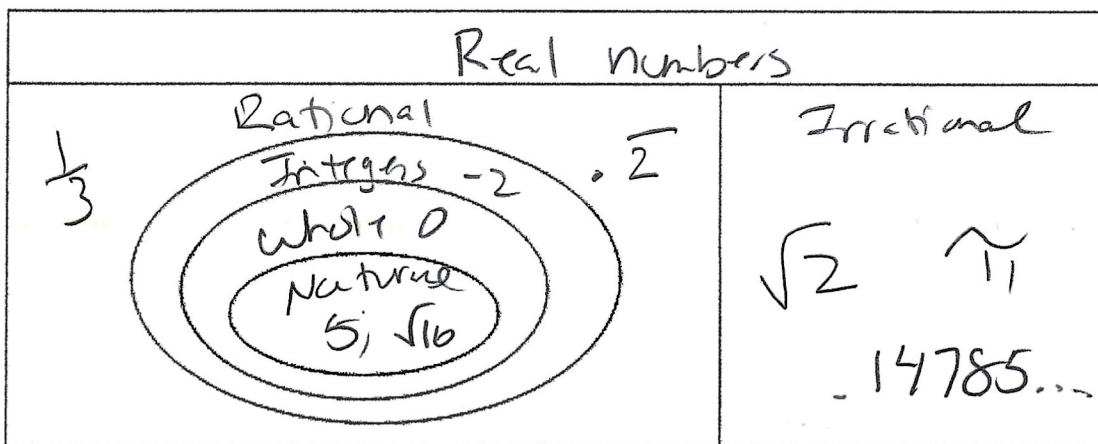
② Negative square roots ex $\sqrt{-25}$, $\sqrt{-17}$ (imaginary)

Practice Examples

NO Negative radicands

→ # under $\sqrt{\quad}$

A) Fill in the diagram using the 6 number sets from above.



B) Matching:

1. Rational Numbers E

~~A~~ {1, 2, 3, ...}

2. Integers B

~~A~~ {... -3, -2, -1, 0, 1, 2, 3...}

3. Whole Numbers D

~~C~~ {Union of Rational & Irrational #'s}

4. Irrational Numbers F

~~B~~ {0, 1, 2, 3 ...}

5. Natural Numbers A

E. {The quotient of two integers} Frac

6. Real Numbers C

~~D~~ {Non-terminating, non-repeating decimals}

C) State whether the following are rational or irrational. Why?

1) .36 Rational
(Term Decimal)

2) $\frac{1}{2} = .5$ Rational
(Fraction: Denom $\neq 0$)

3) .182640462... Irrational
(NON-term and NON-rep. decimal)

4) $\sqrt{17}$ Irrat

5) .5555... Rational

6) $\sqrt{64}$ Rational

(NON-term and NON-rep. decimal)

(Repeating decimal)

(Whole #: Fraction Denom $\neq 0$)

D) Classify each number as real or not real, natural, whole, integer, rational or irrational.

1) $\sqrt{9} = 3$ Natural, whole, integer, rational, real

2) -35.9 Rational, real

3) $\sqrt{-7}$ NOT Real (imaginary)

4) $\sqrt{23} = 4.795831572...$ Irrational, Real

5) $\frac{9}{0}$ NOT-Real (undefined)

6) $\frac{0}{9} = 0$ whole, integer, rational, real
More Definitions

10) Operation- A process such as adding, subtracting, multiplying & dividing performed in a specific sequences (order of operations)

sum \rightarrow add

difference \rightarrow subtract

product \rightarrow multiply

quotient \rightarrow division

1) Factor- A number that is Multiplied by another number to get a certain product.

ex $2 \cdot 5$ are factors of 10 since $2 \cdot 5 = 10$

12) Multiple - When 2 or more factors are multiplied, the product is a multiple.

ex: a multiple of 10 is 50 ($10 \cdot 5 = 50$)

13) Ratio - A comparison of two numbers. (usually written as a fraction)

ex: $3:4$, $\frac{3}{4}$, 3 to 4

14) Inverse - The opposite (sign or operation)

ex: The inverse of 5 is -5.
The inverse of + is -.

* Additive inverse: opposite of a number, where the sum of the two numbers is 0.

↳ Rule: Change the sign ex $5 \rightarrow -5$

15) Reciprocal - (aka multiplicative inverse) one of two numbers whose product is 1.

↳ Rule: Flip the fraction, keep the sign ex $\frac{2}{3} \rightarrow \frac{3}{2}$
 $-\frac{2}{5} \rightarrow -\frac{5}{2}$

↑
multiplicative
identity element

Adaptive identity element
* Inverses produce identity elements

16) Variable - a letter or symbol used to represent another number.

ex: x or n

~~***~~ Need a legend when doing word problems

17) Expression - A mathematical phrase that contains operations, numerals, & variables (no = sign)

* Numerical: contains only numbers and operations ex: $2+6$ } can be

* Algebraic: contains at least one variable. ex $3x+2$ } simplified

18) Equation - A mathematical sentence which state that two expressions are equal.

ex: $3x+6=12$ } can be solved

19) Term - Is a part of an expression that is added or subtracted

ex: In $2x^2 - 16x + 32 \rightarrow 2x^2, -16x + 32$ are all terms

* 32 is referred to as a constant term b/c it has no variables attached to it.

20) Coefficient- (of a term) is the numerical factor of the term.

Ex: In $2x^2 - 16x + 32 \rightarrow 2$ is the coeff. of x^2 , and -16 is the coeff. of $-16x$ (32 is not a coefficient B/C it doesn't have a variable, it is a constant)

21) Simplify- Means to evaluate or answer or reduce the question. Answers must be in simplest form always! (reduced, combined, factored)

22) Absolute Value- The distance of a number from 0 on a number line.

Symbol: $|x|$ ex ① $|-5| = 5$ ② $|6| = 6$ ③

Calc: $\boxed{\text{MATH}} \rightarrow \boxed{1: \text{abs}}$

More Practice Examples

$-|7| =$
 $-1 \cdot |7|$
 $-1 \cdot 7 = -7$

Fill Ins:

1. Another name for the set of natural number is: Counting #'s

2. If zero is added to the set of natural numbers it becomes the set of whole #'s.

3. The set of whole numbers combines with their opposites are called: Integers.

4. A ratio is a fancy name for a: fraction

5. What are the factors of 20: $\{1, 2, 4, 5, 10, 20\}$

6. List the first 16 perfect squares $\{0, 1, 4, 9, 16, 25, 36, 49, 64, 81, 100, 121, 144, 169, 196, 225\}$

7. The opposite of squaring a number is called taking the square root.

$\boxed{\text{ALPHA}}$ $\xrightarrow{\text{Calc}}$ $\boxed{y=}$ $\boxed{1: N/D}$

how to type in a fraction

$\boxed{\text{ALPHA}}$ $\boxed{y=}$ $\xrightarrow{\text{Calc}}$ $\boxed{4: F \leftrightarrow D}$

how to change a decimal to and from a Fraction