Rational Number Operations

Venn Diagram of Real Numbers

Rational Numbers

Integers

Irrational Numbers

Natural Numbers (Counting)
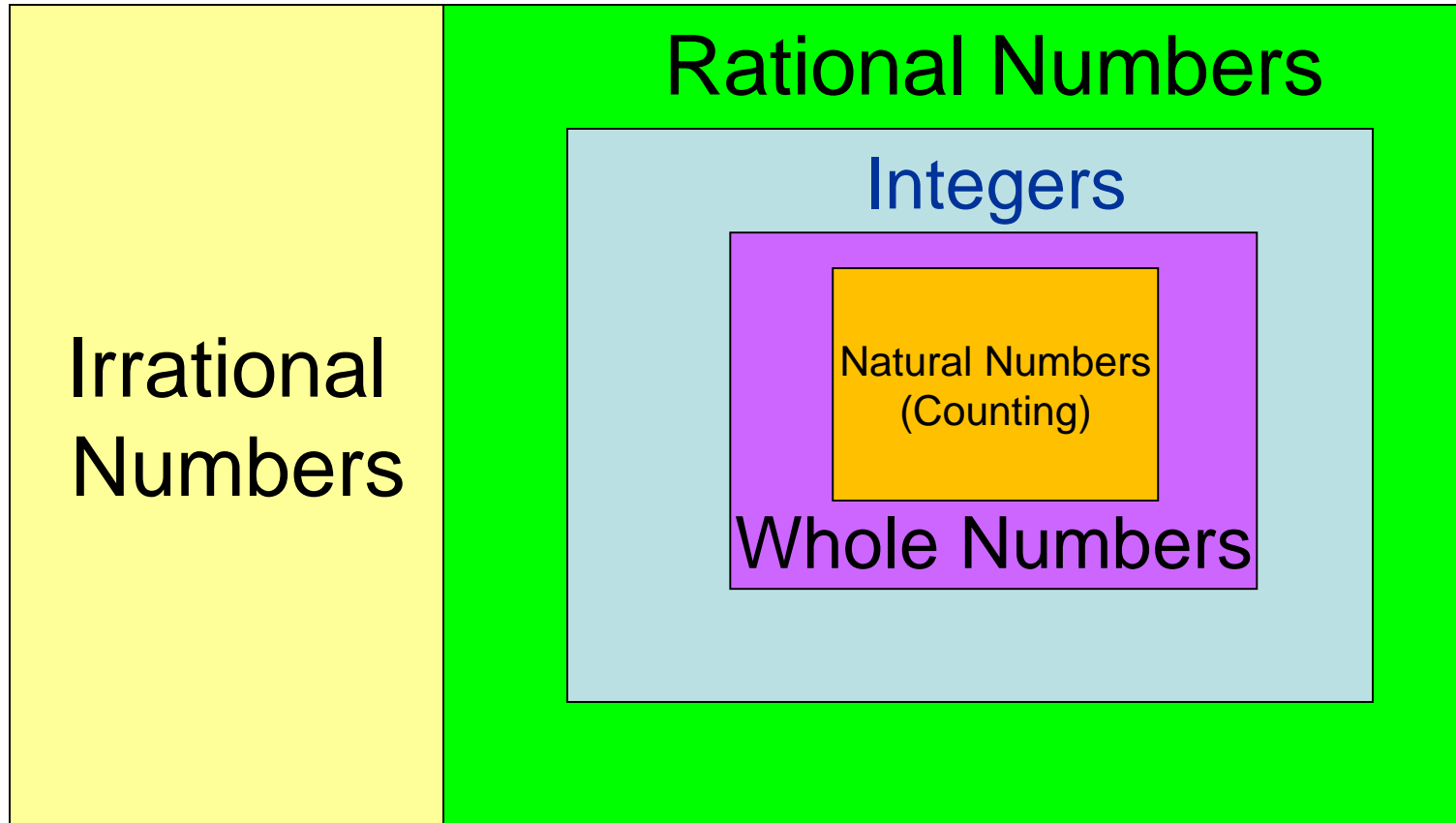
Whole Numbers

Integer Operations

- Integers are all the positive and negative numbers and zero.

  - In set notation: {. . . -2, -1, 0, 1, 2, . . .}

- Whole numbers are {0, 1, 2, . . .}

- Rational numbers are any numbers you can make into a fraction a/b where a and b are integers and b ≠ 0.

  - Include repeating and terminating decimals.

- All of the rules that follow apply to integers, whole numbers, rational and irrational numbers.

Absolute Value

- The absolute value of a number is its distance from zero on the number line.
  - E.g. $|3| = 3$ because 3 is three units from zero on the number line.
  - E.g. $|-5| = 5$ because 5 is five units from zero on the number line.

Adding Integers

- <u>Same Sign</u> – Add absolute values. Keep the sign that they have.

- <u>Different Signs</u> – Subtract lesser absolute value from greater absolute value. Keep the sign of the number with the greater absolute value.

Subtracting Integers

- To subtract add the opposite.

  a – b = a + (-b)

  5 – 3 = 5 + (-3)

Adding & Subtracting Decimals

- Remember to rewrite the problem. Be sure to LINE UP the decimals.

- Use zeros as place holders.

- Add or subtract.

- Bring decimal straight down.

Examples…

1.   4.3 – 5.628 =

2.   -3.1 + -7.045 =

3.   1.65 – 8.968 =

4.   -9.3 - 7.045 =

5.   -49.225 – (-87) =

6.   -354.5 + -26.758 =

7. Find the sum of 256 and -435.

8. -26 + 45 – 77 + 38 =

Adding & Subtracting Fractions/Mixed Numbers

- Remember… you must have a Common Denominator.

- Always simplify your final answer & convert improper fractions to a mixed number.

Examples…

1. $\dfrac{1}{24} - \dfrac{3}{8} =$

2. $-\dfrac{1}{5} - \left(-\dfrac{1}{3}\right) =$

3. $-4\frac{1}{4} + \left(-2\frac{1}{2}\right) =$

4. $\frac{1}{7} - \frac{5}{6} =$

5. $-\dfrac{1}{2} + 3\dfrac{1}{9} =$

6. $-\dfrac{1}{3} + 9\dfrac{5}{7} =$

7. $-5\frac{1}{6} + \left(3\frac{5}{6}\right) =$

Multiplying Integers

- Negative x Negative = Positive
- Positive x Positive = Positive
- Negative x Positive = Negative
- Positive x Negative = Negative

When multiplying two numbers, if the signs are the same ➡ the answer is ➕

If the signs are different ➡ the answer is ➖

Dividing Integers
(same rules as multiplying)

- Positive ÷ Positive = Positive
- Negative ÷ Negative = Positive
- Negative ÷ Positive = Negative
- Positive ÷ Negative = Negative

When dividing two numbers, if the signs are the same ➡ the answer is +

If the signs are different ➡ the answer is −

Multiplying and Dividing with More Than Two Numbers

- If there is an **even** number of negative numbers then the answer is positive.

- If there is an **odd** number of negative numbers then the answer is negative.

Multiplying Decimals

- Rewrite the problem and line up the last digits.

- Multiply.

- Move decimal from right to left the number of total places.

Examples…

1. $-126 \times .5 =$

2. $-79.12 \times -4.8 =$

3. $-.314 \times -1.9 =$

4. $55 \times -6.04 =$

Dividing Decimals

- Remember, you CANNOT have a decimal in your divisor.

- Move the decimal as many places as needed to create a whole number.

- Move the decimal in the dividend the same number of places.

- Divide.

- Round to the nearest hundredth (unless otherwise stated).

Examples…

1. $-354 \; divided \; by \; .5$

2. $126 \div -1.3 =$

3. $-4.5 \div .008 =$

4. $\dfrac{-287}{1.6}$

Multiplying Fractions

- Multiply straight across.
- Numerator ✖ Numerator
- Denominator ✖ Denominator
- Always simplify your final answer & convert improper fractions to a mixed number.

Examples…

1. $\dfrac{2}{3} \cdot \dfrac{1}{8} =$

2. $5\left(\dfrac{1}{12}\right) =$

3. $\dfrac{6}{7} \cdot \dfrac{21}{30} =$

Dividing Fractions

- Multiply by the reciprocal.

- Follow rules for multiplication.

- Always simplify your final answer & convert improper fractions to a mixed number.

Examples…

1. $\dfrac{1}{6} \div \dfrac{2}{3} =$

2. $3\dfrac{1}{2} \div \dfrac{3}{4} =$

Word Problems