

$$\begin{array}{l} -(x-y) \\ -x+y \end{array} \quad \begin{array}{l} -|-8| \\ -(8) = -8 \\ x-y \end{array}$$

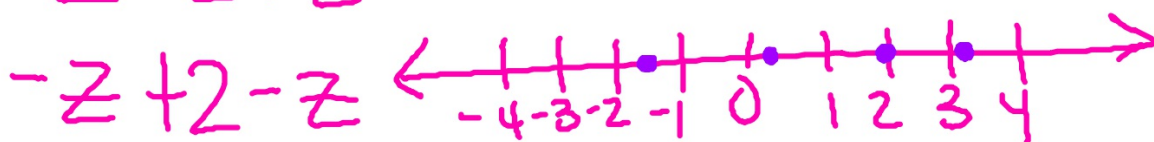
$$\begin{array}{l} -\frac{3}{4} - (-\frac{1}{4}) \\ -\frac{3}{4} + \frac{1}{4} \end{array}$$

$$z - (2 - z)$$

$$z - 2 + z$$

$$\begin{array}{l} -\frac{3}{2}, \pi, \frac{1}{3}, 2 \\ -1.5, 3.14, .33, 2 \end{array}$$

$$-\frac{2^{\div 2}}{4^{\frac{1}{2}}} = -\frac{1}{2}$$



Content and Language Objective:

Students will evaluate a variety of problems involving multiplication and division and be able to explain what the various terms that are related to multiplication and division in their own words.

Warm-Up

Evaluate each expression

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

2. $2z - 5z - (- 8z)$

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Terms:

- **Factors/Product**
- **Multiplicative Inverse**
- **Reciprocal**
- **Dividend/Divisor**
- **Quotient**
- **Not Equal To**

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Definitions

- **Factors/Product**

In a multiplication problem, the two numbers multiplied are called **FACTORS**, and the answer is called the **PRODUCT**.

$$\begin{array}{c} 3 \cdot 5 = 15 \\ \swarrow \quad \searrow \quad \quad \quad \swarrow \quad \searrow \\ \text{Factors} \quad \quad \quad \text{Product} \end{array}$$

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Definitions

- **Multiplicative Inverse/Reciprocal**

Can only be used for *nonzero* numbers.

$$\begin{array}{l} -5 = -\frac{1}{5} \quad \leftarrow \text{reciprocal} \\ \frac{1}{3} = \frac{3}{1} = 3 \quad \leftarrow \text{reciprocal} \\ \frac{2}{3} = \frac{3}{2} \quad \leftarrow \text{reciprocal} \end{array}$$

The product of a nonzero number and its reciprocal is

$$a \bullet \frac{1}{a} = 1$$

$$\frac{-5}{1} \cdot \frac{1}{5}$$

$$\frac{5}{3} \cdot \frac{3}{5} = 1$$

$$\frac{-5}{1} \cdot \frac{1}{5}$$

$$\frac{-5}{1} \cdot \frac{1}{5} = -1$$

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Practice:

Evaluate each expression.

1. $-11 \bullet 8$

-88

2. $\frac{3}{5} \bullet \frac{4}{7}$ $\frac{12}{35}$

3. $-1.2(-10)$

12

4. $(1.2)(5)(-7)$

$6(-7) = -42$

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Definitions

- **Dividend/Divisor/Quotient**

In the division problem, $20 \div 4 = 5$, the number **20** is the **DIVIDEND**, **4** is the **DIVISOR**, and **5** is the **QUOTIENT**.

$$\begin{array}{c} 20 \div 4 = 5 \\ \uparrow \quad \uparrow \quad \swarrow \\ \text{Dividend} \quad \text{Divisor} \quad \text{Quotient} \end{array}$$

The division problem $20 \div 4 = 5$, can also be written as $\frac{20}{4} = 5$

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Important Facts

Rules of the Signs

A negative times a negative is a positive!

A negative divided by a negative is a positive!

$$\begin{array}{ll} (-)(-) = (+) & \frac{(-)}{(-)} = (+) \end{array}$$

A negative times a positive is a negative!

A negative divided by a positive is a negative!

$$\begin{array}{ll} (-)(+) = (-) & \frac{(-)}{(+)} = (-) \end{array}$$

A positive times a positive is a positive!

A positive divided by a positive is a positive!

$$\begin{array}{ll} (+)(+) = (+) & \frac{(+)}{(+)} = (+) \end{array}$$

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Important Facts

$$\cancel{\frac{12}{0}} = 5 \cdot 0$$
$$12 = 5 \cdot 0$$
$$12 \neq 0$$

WHY WE NEVER DIVIDE BY 0!!!!

The expression $b \neq 0$ is read " b not equal to 0."
Division by 0 is ALWAYS *undefined*.

For example, suppose we try to define $12 \div 0$ to be equal to some number k . Then $\frac{12}{0} = k$ and k must satisfy $0 \bullet k = 12$ because a division problem can be checked by using multiplication.

But the product of 0 and any number k is 0, not 12. So there is no reasonable value for k , so division by 0 is undefined.

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Practice:

Evaluate each expression.

1. $-12 \div \frac{1}{2} = -\frac{12}{1} \cdot \frac{2}{1} = -\frac{24}{1} = \boxed{-24}$

2. $\frac{\frac{2}{3}}{-7} = \frac{2}{3} \div -7 = \frac{2}{3} \cdot -\frac{1}{7} = \boxed{\frac{-2}{21}}$

3. $\frac{-4}{-24} = \frac{-4 \div 4}{-24 \div 4} = \frac{-1}{-6} = \frac{1}{6}$

4. $6 \div 0 = \frac{6}{0} = \text{und.}$

