

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. $-\frac{2}{3} - \left(-\frac{3}{4}\right) = \left(-\frac{2}{3}\right) + \left(\frac{3}{4}\right) = \frac{-8}{12} + \frac{9}{12} = \frac{1}{12}$

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

$$\begin{array}{l} 2z - 5z + 8z \\ - 3z + 8z \end{array}$$

$$\textcircled{5z}$$

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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**.

$$\begin{array}{ccc} 3 & \cdot & 5 = 15 \\ \swarrow & & \searrow & & | \\ \text{factors} & & & & \text{product} \end{array}$$

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Definitions

- **Multiplicative Inverse/Reciprocal**

Can only be used for *nonzero* numbers.

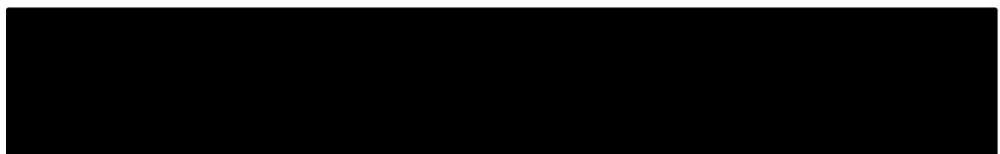
x
reciprocal is $\frac{1}{x}$

$5 = \frac{1}{5}$ reciprocal
 $-\frac{2}{3} = -\frac{3}{2}$

The product of a nonzero number and its reciprocal is

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

$$\frac{3}{4} \rightarrow \frac{4}{3} = \frac{12}{12} = 1$$



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

$$\begin{array}{r} 1.2 \\ \times 5 \\ \hline 6.0 \end{array}$$

$$6(-7) = -42$$

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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**.

$$\begin{array}{ccc} 20 & \div & 4 = 5 \\ | & | & | \\ \text{Dividend} & \text{Divisor} & \text{Quotient} \end{array}$$

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

$$\frac{12}{3} = 4$$

$$3 \cdot 4 = 12$$

$$\frac{5}{0} = \text{und}$$

$$0 \cdot 5 = 0$$

$$\frac{0}{5} = 0$$

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

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

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

4. $6 \div 0 \quad \frac{6}{0} \text{ undefined}$

