

Multiplication and Division

Multiplication:

Multiplication by zero:

$$3 \cdot 0 = 0$$

$$x \cdot 0 = 0$$

$$0 \cdot 0 = 0$$

Signed multiplication:

(positive value) \times (negative value) = negative value

(negative value) \times (negative value) = positive value

(positive value) \times (positive value) = positive value

\times	+	-
+	+	-
-	-	+

*the table above can be applied to Division.

Reciprocals:

The reciprocal of $\frac{3}{4}$ is $\frac{4}{3}$

The reciprocal of $-\frac{2}{3}$ is $-\frac{3}{2}$

NOTE: Multiplying reciprocals always produces 1.

Example 1:

a) $\frac{3}{4} \cdot \frac{4}{3} =$

b) $-\frac{2}{3} \cdot -\frac{3}{2} =$

c) $3 \cdot \frac{1}{3} =$

Division:

Recall: $\frac{x}{y}$ means $x \div y$

Zero & Division:

Example 2:

a) $\frac{0}{2} = 0$ because $0 \cdot 2 = 0$

b) $\frac{2}{0}$ is **undefined** because there is no value that you can multiply by **0** to get **2**.

Signed Division:

(negative value) \div (positive value) = negative value

(positive value) \div (negative value) = negative value

(negative value) \div (negative value) = positive value

Example 3:

a) $8 \div 2 = 4$ because $4 \cdot 2 = 8$

b) $8 \div (-2) = -4$ because $\underline{\hspace{1cm}} \cdot (-2) = 8$

c) $-8 \div 2 = -4$ because $\underline{\hspace{1cm}} \cdot (2) = -8$

d) $-8 \div (-2) = \underline{\hspace{1cm}}$ because $\underline{\hspace{1cm}} \cdot (\) = (\)$

Recall: The word **product** always indicates **multiplication** and the symbol used for multiplication are (\cdot) and (\times) .
The words **quotient** always indicates **division** and the symbols used for division are (\div) and $(\frac{\quad}{\quad})$.

Example 4:

Write a numerical expression for each phrase, and simplify.

a) The product of **9** and **-2** added to **7**.

$$\begin{aligned} 7 + 9 \cdot (-2) \\ &= 7 + (-18) \\ &= 7 - 18 \\ &= \boxed{-11} \end{aligned}$$

b) the quotient of **-20** and **4** subtracted from **7**

$$\begin{aligned} 7 - (-20 \div 4) \\ &= 7 + (-5) \\ &= 7 + 5 \\ &= \boxed{12} \end{aligned}$$

1. The reciprocal of $-\frac{2}{5}$ is _____.

2. Evaluate the following:

a) $\frac{5}{3} \cdot \frac{3}{5} =$ _____

b) $\frac{0}{52} =$ _____

c) $\frac{52}{0} =$ _____

3. Write a numerical expression for each phrase and simplify:

a) The product of **-4** and **3** added to **-10**

b) The quotient of **42** and **-7** subtracted from **-3**