

## Lesson 1.7 – Multiplying a Single Digit by a Power of 10 (- exponents)

**Recall that** in the last lesson we explored the powers of ten that are on the left side of the decimal. Let's compare powers of ten that are on the left side of the decimal with their counterparts that are found on the right side.

Ten vs. Tenth		Hundred vs. Hundredth		Thousand vs. Thousandth		Ten-Thousand vs. Ten-Thousandth	

Hundred-Thousand vs. Hundred-Thousandth		Million vs. Millionth	

Discuss how the powers and their counter parts are alike. How are they different?

### Multiplying a Single Digit by a Power of 10 (negative exponents)

$$4 \times 10^{-8}$$

A single digit being multiplied by a power of 10 containing a negative exponent.

When dealing with small numbers it can be helpful to express them using a power of ten. In order to do so, we will focus on powers of ten that contain a negative exponent. Place values that are associated with these powers of ten are found on the right side of the decimal. We will complete an activity that just focuses on these digits.

**Activity 1** - Express each number on the left as a power of ten and a decimal. You may use the “Answer Bank” for help.

Fraction	Decimal	=	Power	<b>Answer Bank</b>		
$\frac{1}{10} =$		=		$10^{-3}$	0.00001	
$\frac{1}{100,000} =$		=		$10^{-4}$	0.001	$10^{-5}$
$\frac{1}{100} =$		=		0.0001		$10^{-1}$
$\frac{1}{10,000} =$		=		0.1	$10^{-2}$	0.01
$\frac{1}{1,000} =$		=				

**Activity 2** - Calculate the following, then express your answer as a whole number multiplied to a power of 10.

$\begin{array}{r} 0.0001 \\ \times \quad 9 \\ \hline \end{array}$	$\begin{array}{r} 0.01 \\ \times \quad 4 \\ \hline \end{array}$
$\begin{array}{r} 0.000001 \\ \times \quad 7 \\ \hline \end{array}$	$\begin{array}{r} 0.00000001 \\ \times \quad 5 \\ \hline \end{array}$

**Activity 3** – Determine the value for the “?” that would make the statement true.

$3 \times 10^? = 0.0003$	$5 \times 10^? = 0.005$	$8 \times 10^? = 0.8$	$6 \times 10^? = 0.00006$	$2 \times 10^? = 0.0000002$
--------------------------	-------------------------	-----------------------	---------------------------	-----------------------------

Explain how you determined each “?” in Activity 3.

**Class Notes** – Simplify each of the following.

LP#1 $7 \times 10^{-4} =$	$5 \times 10^{-6} =$	$8 \times 10^{-2} =$
LP#2 $3 \times 10^{-10} =$	$6 \times 10^{-1} =$	$2 \times 10^{-8} =$
LP#3 $4 \times 10^0 =$	$9 \times 10^{-3} =$	$1 \times 10^{-5} =$

**Class Notes** – Write each number as a product of a whole number and a power of 10.

LP#4 0.00002	0.6	0.009
LP#5 0.0007	0.00005	0.00000003
LP#6 0.04	0.000008	0.002

**Review** – In the **left column** simplify each expression. In the **right column** write each number as a product of a whole number and a power of 10.

R#1 $7 \times 10^{-9} =$  $4 \times 10^{-1} =$	0.002  0.0000005
R#2 $9 \times 10^{-11} =$  $2 \times 10^{-4} =$	0.9  0.0000000007
R#3 $6 \times 10^{-7} =$  $3 \times 10^{-3} =$	0.0003  0.00008