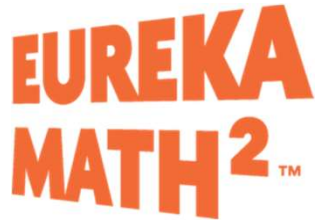


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## Lesson 3:

Use exponents to multiply and divide by powers of 10.

CCSS Standard –5.NBT.A.2



## Hand Signals

We will use hand signals in math class this year to respond to questions and to express our understanding of material.



Hand cupped around ear for “**Listen**”.



Finger to temple for “**Think**”.



Raise your hand to “**Answer or Ask**” questions.

**FLUENCY** (10-min)

**Whiteboard Exchange: Place Value**



Write the number in **STANDARD FORM** on your whiteboards.

1 thousand 9 hundreds 4 tens 3 ones = 1,943

Ready? Let's try some more! Get your whiteboards ready.  
Use your place value charts if it helps you.

<https://digital.greatminds.org/planning/teacher/guidance/1852>

**FLUENCY** (10-min)

**Whiteboard Exchange: Place Value**



Now we will practice **ROUNDING** three-digit numbers to the nearest hundred and nearest ten.

What is 192 when rounded to the nearest hundred?

$$100 \leftarrow 192 \approx \underline{200} \rightarrow 200$$

What is 192 when rounded to the nearest ten?

$$190 \leftarrow 192 \approx \underline{190} \rightarrow 200$$

**Ready? Let's try some more! Get your whiteboards ready.**

**LAUNCH** (10-min)

**Which One Doesn't Belong?**



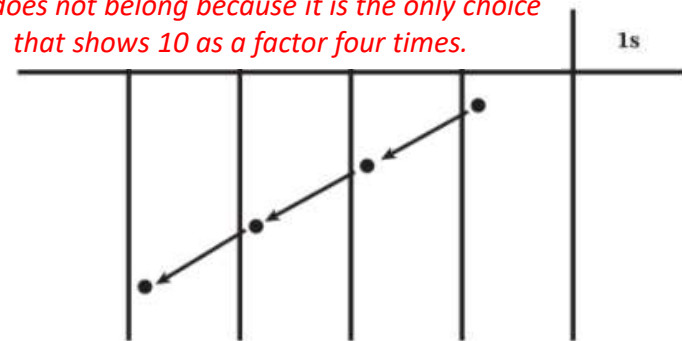
Which One Doesn't Belong? **There are no right or wrong answers**, but you must **justify your reasoning**. That means you have to explain why you picked the expression that you feel does not belong with the others.

*"A" does not belong because it is the only choice that shows 10 times as much as 1,000 in an equation*

**A**  $10 \times 1,000 = \underline{\hspace{2cm}}$

**B**

*"B" does not belong because it is the only choice that shows 10 as a factor four times.*

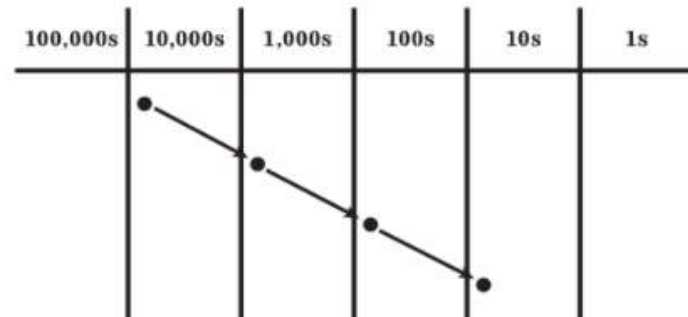


**LET'S DISCUSS...**

**C**  $100 \times 100 = \underline{\hspace{2cm}}$

**D**

*"C" does not belong because it is the only choice with 100 as a factor two times.*



*"D" does not belong because it is the only choice that shows division.*

**LAUNCH** (10-min)

## Which One Doesn't Belong?



*“How are A and B similar or different?”*

*Both show the product 10,000, but A shows it as 10 times as much as 1,000 and B shows it as  $10 \times 10 \times 10 \times 10$*

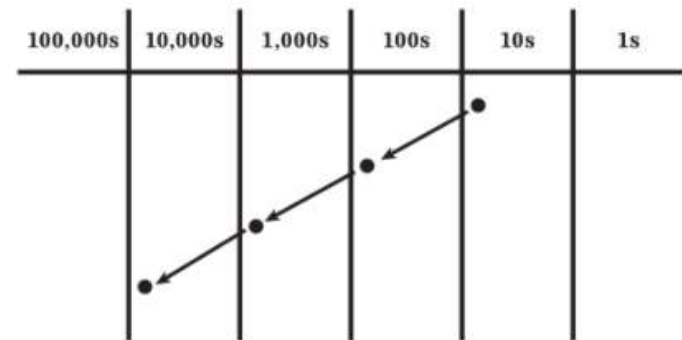
**A**  $10 \times 1,000 = \underline{\hspace{2cm}}$

*“How are A and C similar or different?”*

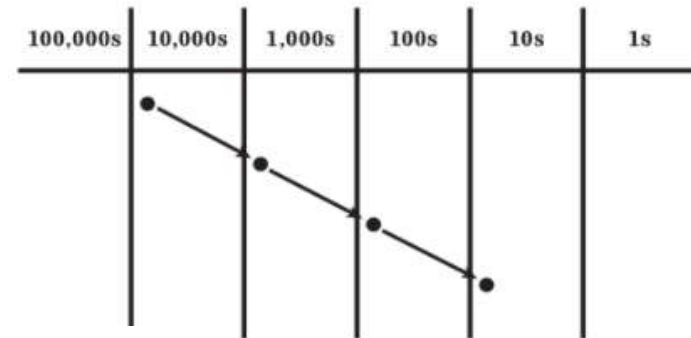
*Both have products of 10,000. Both have 10 as a factor four times. The only difference is how the 10s are grouped.*

**C**  $100 \times 100 = \underline{\hspace{2cm}}$

**B**



**D**



*“How are B and D similar or different?”*

*Both show the units in the 10's, 100's, 1,000's and 10,000's columns. B shows repeated multiplication. D shows repeated division.*

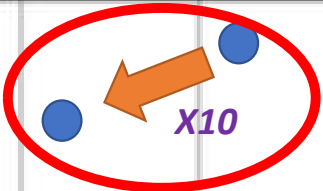
**LEARN** (30-min)

**Determine Patterns in Powers of 10**

Please complete this Powers of 10 Chart as we do it in class.

Our goal is to complete this chart by using only 10s as factors. Look at the first equation. How can we write a product that equals **100** by using only 10s?

Equation	Representation							Exponential Form
<p>100 = <u>10 x 10</u></p> <p>Let's represent 10 x 10 on the place value chart using dots.</p>	<p>millions (1,000,000)</p>	<p>hundred thousands (100,000)</p>	<p>ten thousands (10,000)</p>	<p>thousands (1,000)</p>	<p>hundreds (100)</p>	<p>tens (10)</p>	<p>ones (1)</p>	<p>We read this exponent as 10 to the 2<sup>nd</sup> power</p> <p><b>10<sup>2</sup></b></p> <p>We can use an EXPONENT to represent how many times we use 10 as a factor.</p> <p>Exponential Form helps us to write very large numbers quickly and in less space.</p>



How many 10's do you see being multiplied?

How many dots do you see?

**LEARN** (30-min)

**Determine Patterns in Powers of 10**

Please complete this Powers of 10 Chart as we do it in class.

Now, let's do **1,000** in exponential form.

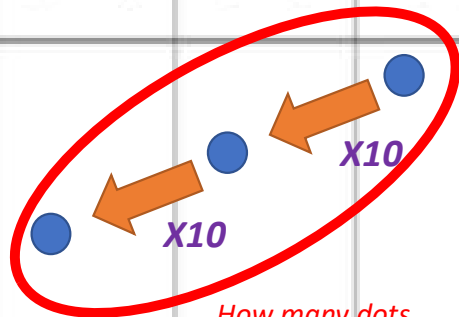
How can we write a product that equals 1,000 by using only 10s?.

$1,000 = 10 \times 10 \times 10$

Let's represent  $10 \times 10 \times 10$  on the place value chart using dots.

How many 10's do you see being multiplied?

millions (1,000,000)	hundred thousands (100,000)	ten thousands (10,000)	thousands (1,000)	hundreds (100)	tens (10)	ones (1)



How many dots do you see?

We read this exponent as 10 to the 3<sup>rd</sup> power

$10^3$

We can use an EXPONENT to represent how many times we use 10 as a factor.



**LEARN (30-min)**

**Determine Patters in Powers of 10**

Please complete this Powers of 10 Chart as we do it in class.

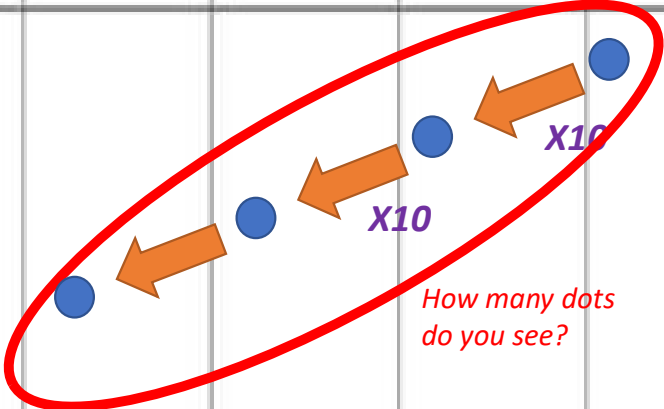
Now, let's do 10,000 in exponential form.

Equation	Representation							Exponential Form
<p>How can we write a product that equals 10,000 by using only 10s?</p> <p>10,000 = <u>10 x 10 x 10 x 10</u></p> <p>Let's represent 10 x 10 x 10 x 10 on the place value chart using dots.</p>	<p>millions (1,000,000)</p>	<p>hundred thousands (100,000)</p>	<p>ten thousands (10,000)</p>	<p>thousands (1,000)</p>	<p>hundreds (100)</p>	<p>tens (10)</p>	<p>ones (1)</p>	<p><i>We read this exponent as 10 to the 4<sup>th</sup> power</i></p> <p><b>10<sup>4</sup></b></p> <p><i>We can use an EXPONENT to represent how many times we use 10 as a factor.</i></p>

*We read this exponent as 10 to the 4<sup>th</sup> power*

**10<sup>4</sup>**

*How many 10's do you see being multiplied?*



*How many dots do you see?*

**LEARN (30-min)**

**Determine Patters in Powers of 10**

Please complete this Powers of 10 Chart as we do it in class.

Now, let's do 100,000 in exponential form.

How can we write a product that equals 100,000 by using only 10s?.

$100,000 = \frac{10 \times 10 \times 10}{\times 10 \times 10}$

Let's represent  $10 \times 10 \times 10 \times 10 \times 10$  on the place value chart using dots.

millions (1,000,000)	hundred thousands (100,000)	ten thousands (10,000)	thousands (1,000)	hundreds (100)	tens (10)	ones (1)

How many 10's do you see being multiplied?

How many dots do you see?

We read this exponent as 10 to the 5<sup>th</sup> power

$10^5$

We can use an EXPONENT to represent how many times we use 10 as a factor.

**LEARN (30-min)**

**Determine Patterns in Powers of 10**

Please complete this Powers of 10 Chart as we do it in class.

Now, let's do 1,000,000 in exponential form.

	millions (1,000,000)	hundred thousands (100,000)	ten thousands (10,000)	thousands (1,000)	hundreds (100)	tens (10)	ones (1)
<p>How can we write a product that equals 1,000,000 by using only 10s?</p> <p><math>1,000,000 = 10 \times 10 \times 10 \times 10 \times 10 \times 10</math></p> <p>Let's represent <math>10 \times 10 \times 10 \times 10 \times 10 \times 10</math> on the place value chart using dots.</p>							

*We read this exponent as 10 to the 6<sup>th</sup> power*

**10<sup>6</sup>**

*We can use an EXPONENT to represent how many times we use 10 as a factor.*

*How many 10's do you see being multiplied?*

*How many dots do you see?*

**LEARN** (30-min)

**Determine Patterns in Powers of 10**

Please complete this Powers of 10 Chart as we do it in class.

How can we write a product that equals 10 by using only 10s?

	millions (1,000,000)	hundred thousands (100,000)	ten thousands (10,000)	thousands (1,000)	hundreds (100)	tens (10)	ones (1)	
$10 =$ <u>10</u>						●		$10^1$

*Let's represent 10 on the place value chart using dots.*

*How many 10's do you see being multiplied?*

*How many dots do you see?*

*We read this exponent as 10 to the 1<sup>st</sup> power*

**LEARN** (30-min)



OK, let's practice your new knowledge of **exponential form**:

Write an equation that shows **each power of 10** equal to a multiplication expression

$$10^2 = 10 \times 10$$

$$10^1 = 10$$

$$10^3 = 10 \times 10 \times 10$$

$$10^5 = 10 \times 10 \times 10 \times 10 \times 10$$

$$10^6 = 10 \times 10 \times 10 \times 10 \times 10 \times 10$$

$$10^4 = 10 \times 10 \times 10 \times 10$$

**LEARN** (30-min)



Now, write an equation that shows each number in *exponential form*.

$$1,000 = 10^3$$

$$100,000 = 10^5$$

$$100 = 10^2$$

$$10,000 = 10^4$$

$$1,000,000 = 10^6$$

$$10 = 10^1$$

**LEARN** (30-min)



Let's apply our knowledge of **exponential form**.

**Multiply.**

*How many 0's do you see in 10,000? How many in 100? How many is that altogether?*

$$1. \quad 10,000 \times 100 = \underline{1,000,000} \text{ or } 10^6$$

$$2. \quad 1,000 \times 10^3 = \underline{1,000,000} \text{ or } 10^6$$

*How many 0's do you see in 1,000? What does  $10^3$  mean?  
How many is that altogether?*

**LEARN** (30-min)



Let's apply our knowledge of **exponential form**.

**Multiply.**

*What does  $10^2$  mean? How many is that?*

$$3. \quad 7 \times 10^2 = \underline{7 \times 100 = 700}$$

$$4. \quad 300 \times 10^3 = \underline{300 \times 1,000 = 300,000}$$

*What does  $10^3$  mean? How many 0's is that altogether?*



**LEARN** (30-min)



Let's apply our knowledge of **exponential form**.

Divide.

*What does  $10^2$  mean? Now we are dividing, so the number becomes smaller. How many places are we going to shift right?*

$$5. \quad 10,000 \div 10^2 = \underline{10,000 \div 100 = 100 \text{ or } 10^2}$$

*What does  $10^3$  mean? Now we are dividing, so the number becomes smaller. How many places are we going to shift right?*

$$6. \quad 1,000,000 \div 10^3 = \underline{1,000,000 \div 1,000 = 1,000 \text{ or } 10^3}$$

**LEARN** (30-min)



Let's apply our knowledge of **exponential form**.

Divide.

*What does  $10^3$  mean? Now we are dividing, so the number becomes smaller. How many places are we going to shift right?*

$$7. \quad 9,000 \div 10^3 = \underline{9,000 \div 1,000} = 9$$

$$8. \quad 360,000 \div 10^4 = \underline{360,000 \div 10,000} = 36$$

*What does  $10^4$  mean? Now we are dividing, so the number becomes smaller. How many places are we going to shift right?*

**LAND** (10-min)

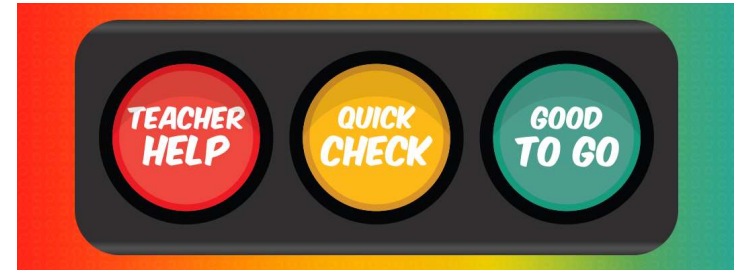
Debrief

Complete the table to represent each number in three different forms. The first one is done for you.

	<b>Standard Form</b>	<b>Multiplication Expression Using Only 10 as a Factor</b>	<b>Exponential Form</b>
1.	100	$10 \times 10$	$10^2$
2.	1,000	<i><math>10 \times 10 \times 10</math></i>	$10^3$
3.	10,000	<i><math>10 \times 10 \times 10 \times 10</math></i>	<i><math>10^4</math></i>
4.	<i><math>100,000</math></i>	$10 \times 10 \times 10 \times 10 \times 10$	<i><math>10^5</math></i>
5.	<i><math>1,000,000</math></i>	<i><math>10 \times 10 \times 10 \times 10 \times 10 \times 10</math></i>	$10^6$

**LAND** (10-min)

## Exit Ticket



 3

After Exit Ticket:

Work on pages 31 & 32  
in workbook.

### **Small Group Time:**

Review exit ticket  
Finish workbook pages

Multiply or divide. Then write each product or quotient in exponential form.

1.  $10 \times 10 \times 10 \times 10 =$  \_\_\_\_\_

2.  $10 \times 1,000 =$  \_\_\_\_\_

3.  $100 \times 10^4 =$  \_\_\_\_\_

4.  $100,000 \div 10^2 =$  \_\_\_\_\_

Multiply or divide. Then write each product or quotient in standard form.

5.  $4 \times 10^5 =$  \_\_\_\_\_

6.  $200 \times 10^4 =$  \_\_\_\_\_

7.  $70,000 \div 10^4 =$  \_\_\_\_\_

8.  $340,000 \div 10^3 =$  \_\_\_\_\_