

## 6<sup>th</sup> Grade Common Core Unit #1: Expressions and Factors

Resources: Big Ideas Chapter 1

Common Core Standards: 6.EE.1; 6.EE.2b; 6.NS.4

Main Focus: Write and evaluate numerical expressions involving whole-number exponents.

Number	<b>Learning Targets</b>	Big Ideas Section
1	I can write expressions as powers and determine their answer.	1.2
2	I can evaluate numerical expressions with whole-number exponents.	1.3
3	I can determine the prime factorization of a number.	1.4
4	I can identify and find the greatest common factor of two numbers.	1.5
5	I can identify and find the least common multiple of two numbers.	1.6

### My Practice:

Number	Pre-test:	Exit slip scores	Day #2 Homework	Extra Targeted Practice	Post-test:
1	_____/4				_____/6
2	_____/4				_____/11
3	_____/3				_____/6
4	_____/5				_____/8
5	_____/3				_____/8

1.) After the post-test, I still need to focus on learning targets: \_\_\_\_\_

2.) My plan to master these learning targets will be: Circle all that apply

Reread my notes      Watch tutorials      Practice on Khan      Do extra menu items

Other: \_\_\_\_\_

3.) How will I know that I mastered these learning targets?



Name \_\_\_\_\_

Problem of the Day Common Core Unit One

Complete Problem the of the Day before the Lesson

1.2 Day One

Show your work

1.)  $7612 - 5420 =$  \_\_\_\_\_

2.)  $316$   
 $\times 24$

3.)  $986 + 1545 =$  \_\_\_\_\_

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Complete Problem the of the Day before the Lesson

1.2 Day Two

Write the Problem Using Exponents

1.)  $4 \cdot 4 \cdot 4 \cdot 4 \cdot 4 =$  \_\_\_\_\_

2.)  $3.5 \cdot 3.5 =$  \_\_\_\_\_

Expand the Following:

3.)  $9^3 =$  \_\_\_\_\_

Name \_\_\_\_\_

Problem of the Day Common Core Unit One

Complete Problem the of the Day before the Lesson

**1.3 Day One**

Is the expression a perfect square? Why or why not?

1.)  $5^3 =$  \_\_\_\_\_

2.)  $7^2 =$  \_\_\_\_\_

**1.3 Day Two**

Solve Using the Order of Operations and show your work

1.)  $18 - 9 \div 3 =$  \_\_\_\_\_

2.)  $4^2 - 2(8 - 3) =$  \_\_\_\_\_

3.)  $=$  \_\_\_\_\_

**1.4 Day One**

Solve Using the Order of Operations and show your work

1.)  $27 \div (5 + 2^2) \cdot 5 =$  \_\_\_\_\_

2.)  $2(5 - 3 + 4)^2 =$  \_\_\_\_\_

**1.4 Day Two**

1.) What are the factors of 18? \_\_\_\_\_

2.) What are the factors of 15? \_\_\_\_\_

3.) What is a composite number? \_\_\_\_\_

Name \_\_\_\_\_

Problem of the Day Common Core Unit One

**1.5 Day One**

1.) What is a prime number? \_\_\_\_\_

2.) What are the factors of 28? \_\_\_\_\_

**1.5 Day Two**

Show Your Work

1.) Find the Greatest Common Factor of 36 and 84 \_\_\_\_\_

\_\_\_\_\_

**1.6 Day One**

Show Your Work

1.) Find the Greatest Common Factor of 27 and 36 \_\_\_\_\_

\_\_\_\_\_

**1.6 Day Two**

Show Your Work

1.) Find the Least Common Multiple of 18, 24 \_\_\_\_\_

2.) Find the Least Common Multiple of 10,14 \_\_\_\_\_

4

## 1.2 Student Exponents Notes

### Vocabulary:

1. product - the result when two numbers are multiplied

$$6 \cdot 3 = 18$$

2. factors - the whole numbers multiplied together to make a product
3. exponent - tells you how many times a number (the base) is used as a factor

$$\begin{array}{c} 5^3 \leftarrow \text{exponent} \\ \uparrow \\ \text{base} \end{array}$$

4. perfect square - The square of a whole number  
25 is a perfect square because it equals  $5 \cdot 5$  and  $5^2$

Examples: Write using an exponent

1.) $3 \cdot 3 \cdot 3 \cdot 3 \cdot 3 =$	2.) $2.7 \cdot 2.7 \cdot 2.7 =$
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Examples: Expand each of the following

3.) $5^3 =$	4.) $2^4 =$
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Examples: Is the expression a perfect square? Why or why not?

5.) $3^2$	6.) $7^3 =$
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Examples: Is the number a perfect square? Why or why not?

7.) 64	8.) 20
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**1.2****Practice Homework Day 1**

For use after Lesson 1.2

Write the product as a power.

1.  $5 \times 5 \times 5$

2.  $13 \times 13$

3.  $8 \cdot 8 \cdot 8 \cdot 8 \cdot 8 \cdot 8$

4.  $12 \cdot 12 \cdot 12 \cdot 12 \cdot 12$

5.  $10 \cdot 10 \cdot 10 \cdot 10$

6.  $17 \times 17 \times 17$

Find the value of the power.

7.  $4^4$

8.  $9^3$

9.  $24^2$

Determine whether the number is a perfect square.

10. 47

11. 16

12. 121

13. You complete 3 centimeters of a necklace in an hour. Each hour after the first, you triple the length of the necklace. Write an expression using exponents for the length of the necklace after 3 hours. Then find the length.



# 1.2

## Practice A Homework Day 2

Write the product using exponents.

1.  $6 \times 6$                       2.  $8 \times 8 \times 8$                       3.  $3 \times 3 \times 3 \times 3$   
 4.  $12 \cdot 12$                       5.  $4 \times 4 \times 4 \times 4$                       6.  $10 \cdot 10 \cdot 10 \cdot 10 \cdot 10$   
 7. Describe and correct the error in writing the value of the product.

$\times \quad 2 \times 2 \times 2 \times 2 = 4^2$

Write the value of the expression.

8.  $9^2$                       9.  $3^4$                       10.  $7^3$   
 11. The amount of money in your savings account is  $4 \times 10^3$ . How much money is in your account?

Determine whether the number is a perfect square. (yes or no)

12. 9                      13. 12                      14. 50  
 15. 64                      16. 100                      17. 34  
 18. Write two perfect squares that each have a value greater than 100 and less than 200.

19. Copy and complete the table. Then describe how to write any power of 1 without multiplying.

<b>Power</b>	$1^1$	$1^2$	$1^3$	$1^4$	$1^5$
<b>Value</b>	1	1			

20. The following items are in the shape of a square. How many squares are in each row?  
 a. A waffle has 16 squares.  
 b. A magic square has 49 squares.  
 c. A tile game has 100 squares.



## 1.3 Order of Operations Student Notes

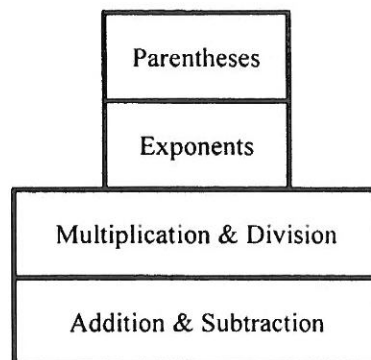
### Vocabulary:

1. expression - contains numbers and operation symbols (no \_\_\_\_\_ signs)
2. evaluate - find the value (\_\_\_\_\_)

### Steps on How to Solve Exponent Problems:

USE Order of Operations (PEMDAS)

- 1.) Do all operations within grouping symbols first.
- 2.) Then do exponents
- 3.) Multiply and divide in order from left to right.
- 4.) Add and subtract in order from left to right.



### Examples: Simplify each of the following

1.) $20 - 5 + 2$	2.) $18 + 6 - 3$
3.) $5^2 - 5(10 - 5)$	4.) $(3 - 1 + 5) - 2^2$
5.) $30 \div (7 + 2^3) \cdot 6$	6.) $26 \div 2 + 53^2 - 3$



### 1.3 Exponents and Order of Operations Homework Day 1

Evaluate the expression.

1.)  $9 - 6 \div 3$

2.)  $36 - 7(2)$

3.)  $(5 + 1) \div 2$

4.)  $8 + (10 - 4) - 3^2$

5.)  $(3 + 5)^2 \div 4 + 19$

6.)  $12(3 + 3) \div 18$

7.)  $\frac{(2^2 + 1)}{5}$

8.)  $\frac{2(3 + 1)}{8}$

9.)  $\frac{10^2 \div 4}{3 + 2}$

10. You and three friends go to a restaurant for dinner. You share three appetizers that cost \$6 each. You also share two desserts that cost \$3 each. You split the total bill evenly. How much does each person pay?

# 1.3 Exponents & Order of Operations Practice

## A Homework Day 2

Simplify. (Solve)

1.) $(49 - 5^2) \div 2^3$	2.) $5 + (2 + 1)^3$	3.) $7^2 - 5(10 - 3^2)$
4.) $30 \div 6 \times 2$	5.) $4 + 6^2 \div 12$	6.) $13 - (28 - 4^2)$
7.) $\frac{54 \div 6 + 31}{4^2 + 4}$	8.) Use all four operations without parentheses to write an expression that has a value of 1.	9.) Evaluate each expression. Are the two expressions equal? Explain your answer. a. $(100 \div 5) \times 4$ b. $100 \div 5 \times 4$

10. Describe and correct the error in evaluating the expression.

$\times$ $56 \div 4 \times 2 = 56 \div 8 = 7$
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# 1.3 Exponents & Order of Operations Practice B

Name \_\_\_\_\_ Date \_\_\_\_\_

Simplify. Show your work.

1.) $60 - (-3^2 + 16)$	2.) $6 - 36 \div (-6) - 3$
3.) $-5^2 - 3^3 - 2$	4.) $(-3 - 4)^2 + (-1)^5$
5.) $-4^2 - 2^3 + (-3)^2$	6.) $-54 \div 6 \cdot (-4) - (-3) - (1 - 5)^2$
7.) $5 \cdot 2 \cdot 20 \div 4 - (-3)$	8.) $-42 \div (-6) + 3 \cdot 5 + (3^3 - 2^2)$
9.) Use all four operations without parentheses to write an expression that has a value of 1.	10.) Evaluate each expression. Are the two expressions equal? Explain your answer. a. $(100 \div 5) \times 4$ b. $100 \div 5 \times 4$

## 1.4 Prime, Composite & Factors Student Notes

### Vocabulary and Examples:

A factor is a whole number that \_\_\_\_\_ another whole number with a remainder of \_\_\_\_\_.

Examples:

A prime number is a whole number with exactly \_\_\_\_\_ factors, \_\_\_\_\_ and \_\_\_\_\_.

Examples:

A composite number is a whole number greater than one with more than \_\_\_\_\_ factors.

Examples:

### Finding Factors

Factors are smaller numbers – they fit inside of a larger number. Factors will always include at least two numbers: \_\_\_\_\_ and the number itself!

Example 1) Find the factors of 24.

There are two ways to show the factors of 24:

$$1 \times 24$$

$$2 \times \underline{\quad}$$

OR



Factors of 24: \_\_\_\_\_

12

Example 2) Find the factors of \_\_\_\_\_.

Factors of \_\_\_\_: \_\_\_\_\_

Example 3) Find the factors of \_\_\_\_\_.

Factors of \_\_\_\_: \_\_\_\_\_

### Determining Prime or Composite

If a number has even **one** factor other than 1 or itself, it is composite.

Example 4) Is \_\_\_\_ prime or composite? Explain.

Example 5) Is \_\_\_\_ prime or composite? Explain.

Example 6) Is \_\_\_\_ prime or composite? Explain.

**1.4****Practice Homework Day 1**

For use after Lesson 1.4

**List the factor pairs of the number.**

1. 6

2. 7

3. 10

4. 16

5. 35

6. 55

**Write the prime factorization of the number.**

7. 9

8. 24

9. 40

10. 44

11. 50

12. 65

13. A fitness instructor arranges 30 people into rows. Each row has the same number of people.

a. Can the instructor arrange the people into rows of 6?

b. Can the instructor arrange the people into rows of 9?



**1.4 Practice A Homework Day 2**

List the factor pairs of the number.

1. 14

2. 26

3. 51

4. 18

5. 36

6. 47

Write the prime factorization of the number.

7. 9

8. 49

9. 28

10. 50

11. 66

12. 38

Find the number represented by the prime factorization.

13.  $2^2 \cdot 5^2 \cdot 7$

14.  $2^2 \cdot 3^2 \cdot 11$

Identify if the number is prime or composite and explain why.

15. 27

16. 29

23. The glee club has 120 cupcakes to sell. They have decided to arrange the cupcakes in the shape of a rectangle, such that the rows have an even number of cupcakes and the columns have an odd number of cupcakes. How many arrangements of cupcakes can they create? Explain.

## 1.5 Greatest Common Factor (GCF) Student Notes

Ex. 1) List all of the factors of 12 and 20:

12:

20:

What does GCF mean??? Define:

Greatest -

Common -

Factor -

We can break down numbers using the same division ladder that we used to find the LCM to help us find the GCF of a pair of numbers!

Ex. 2) Find the GCF of 24 and 45

24	45
----	----

Ex. 3) Find the GCF of 36 and 84

36	84
----	----

Ex. 4) Find the GCF of 11 and 23

11	23
----	----

Ex. 5) Find the GCF of 54 and 84

32	60
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**1.5**

**Practice Homework Day 1**

For use after Lesson 1.5

Find the GCF of the numbers using lists of factors.

1. 9, 15

2. 11, 19

3. 8, 28

4. 60, 70

5. 40, 56

6. 35, 72

Find the GCF of the numbers using a division ladder.

7. 4, 10

8. 5, 11

9. 6, 8

10. 14, 42

11. 45, 63

12. 60, 90

13. You are making identical gift bags using 24 candles and 36 bottles of lotion.  
What is the greatest number of gift bags you can make with no items left over?



**1.5****Practice A Homework Day 2**

Find the GCF of the numbers using lists of factors.

1. 8, 12

2. 22, 121

3. 50, 90

Find the GCF of the numbers using a division ladder.

4. 36, 60

5. 45, 75

6. 54, 126

7. A high school swim team has 12 new female swimmers and 30 returning female swimmers. Each practice team must have the same number of new and returning female swimmers.
- What is the greatest number of practice teams the coach can make using every swimmer?
  - How many new and returning female students will be on each practice team?

Tell whether the statement is *always*, *sometimes*, or *never* true.

- The GCF of two numbers is a composite number.
- The GCF of two numbers is equal to the lesser of the numbers.
- You have three numbers.
  - Two of the numbers are 24 and 42. What is the GCF of these two numbers?
  - The third number is greater than 42 and does not change the GCF. What is one possibility for the third number?

## Multiples and Least Common Multiple (LCM) Student Notes

### Definition and Examples

A multiple of a number is the \_\_\_\_\_ of the number and any non-zero whole number.

Examples:

### Finding Multiples

To find the multiples of a number, take the number and multiply it by any non-zero whole number.

Example 1) List the first four multiples of 7.

Example 2) List the first four multiples of 22.

Example 3) List the first four multiples of 15.

Example 4) Which number(s) are multiple(s) of 8?

30                  40                  50                  60

Example 5) Which number(s) are multiple(s) of 12?

30                  40                  50                  60

## Least Common Multiple (LCM) Notes

Ex. 1) List the first ten multiples of 6 and 4:

6:

4:

What does LCM mean??? Define:

Least -

Common -

Multiple -

We can break down numbers using a division ladder to help us find the LCM of a pair of numbers.

Ex. 2) Find the LCM of 18 and 21



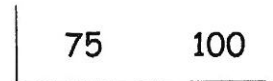
Ex. 3) Find the LCM of 12 and 16



Ex. 4) Find the LCM of 7 and 16



Ex. 5) Find the LCM of 75 and 100



**1.6****Practice Homework Day 1**

For use after Lesson 1.6

Find the LCM of the numbers using lists of multiples.

1. 3, 8

2. 8, 14

3. 7, 21

4. 5, 11

5. 8, 20

6. 14, 20

Find the LCM of the numbers using a division ladder.

7. 12, 36

8. 5, 12

9. 3, 17

10. 10, 12

11. 20, 30

12. 32, 40

13. A music store gives every 20th customer a \$5 gift card. Every 50th customer gets a \$10 gift card. Which customer will be the first to receive both types of gift cards?



**1.6 Practice A Homework Day 2**

Find the LCM of the numbers using lists of multiples.

1. 3, 5

2. 7, 8

3. 4, 6

Find the LCM of the numbers using a division ladder.

4. 10, 12

5. 18, 30

6. 26, 39

7. You have piano lessons every 7 days and tuba lessons every 3 days. Today you have both lessons.

a. In how many days will you have both lessons on the same day again?

b. Not counting today or the day when you have the same lesson again, how many piano lessons will you have in between? How many tuba lessons will you have in between?

Find the LCM of the numbers.

8. 3, 5, 7

9. 2, 3, 11

10. 6, 8, 12

11. The snooze button on your alarm clock activates the alarm every 5 minutes. The snooze button on your cell phone activates the alarm every 7 minutes. Both alarms activate at 7:00 A.M. You hit each snooze button as each alarm activates. At what time are both alarms activated again?



# Numerical Expressions and Factors Study Guide

Write the problem using exponents.

1.)  $6 \cdot 6 \cdot 6$

2.)  $6.3 \cdot 6.3 \cdot 6.3 \cdot 6.3$

Decide whether each number is a perfect square. Explain why or why not.

3.) 81

Is it a perfect square?

Circle One: Yes or No

Explain:

4.) 30

Is it a perfect square?

Circle One: Yes or No

Explain:

Solve using order of operations.

5.)  $36 \div 6 \cdot 2 - (6 - 4)$

6.)  $18 + 2(6 + 4) - 6$

7.)  $4(8 - 4 + 2)$

Is the problem below correct? Explain why the student is right or wrong.

$$\begin{array}{l} 8.) \quad \underline{20 - 6} \div 2 \cdot 3 + 4 \\ \quad \quad \underline{14 \div 2} \cdot 3 + 4 \\ \quad \quad \quad \underline{7 \cdot 3} + 4 \\ \quad \quad \quad \quad \underline{21 + 4} \\ \quad \quad \quad \quad \quad = 25 \end{array}$$

List ALL of the factors.

9.) 56

Write the prime factorization of the number.

10.) 32

11.) 12

Find the GCF of the numbers.

12.) 12, 20

13.) 32, 60

24



**Find the LCM of the numbers.**

14.) 4, 6

15.) 10, 25

16.) Eddie is a PE teacher and has to make equipment bags for the other teachers. Each bag has the same number of each sports item in it. Eddie has 84 frisbees and 36 kickballs.

16a.) What is the greatest number of equipment bags Eddie can make? Show your work.

Circle One: GCF LCM

16a.) \_\_\_\_\_

16b.) How many frisbees are in each bag?

16c.) How many kickballs are in each bag?

17.) You have soccer practice every 4 days and you have football practice every 5 days. Today you have both practices.

How many days will pass before you have both practices together again?

Circle One: GCF LCM

17.) \_\_\_\_\_

25

