Prime Factorization and Least Common Multiple

Factors

Prime Number

Composite Number

Prime Factorization

Factor Tree

Number	Factors	Prime or Composite?
2	1,2	Prime
3	1,3	Prime
4	1,2,4	Composite
5	1,5	Prime
6	1,2,3,6	Composite
7	1,7	Prime
8	1,2,4,8	Composite
9	1,3,9	Composite
10	1,2,5,10	Composite

Number	Factors	Prime or Composite?
11	1,11	Prime
12	1,2,3,4,6,12	Composite
13	1,13	Prime
14	1,2,7,14	Composite
15	1,3,5,15	Composite
16	1,2,4,8,16	Composite
17	1,17	Prime
18	1,2,3,6,9,18	Composite
19	1,19	Prime

Find the prime factorization of 80

Find the prime factorization of 63

Find the prime factorization of 252

$2 \cdot 2 \cdot 3 \cdot 3 \cdot 7$

$2^2 \cdot 3^2 \cdot 7$

252
2 126
2 63
3 21
7 3

Find the prime factorization of 126

	Find the prime factorization of 294. 294 2 147 3 49 7 7 $2 \cdot 3 \cdot 7 \cdot 7$ $2 \cdot 3 \cdot 7^2$
Common Multiple	Find the common multiples of 18 and 24. Find the LCM. 18 18 36 54 72 90 108 . . . 24 24 48 72 96 120 144 . . . LCM = 72
Least Common Multiple (LCM) Smallest number that is a multiple of both numbers.	Find the common multiples of 15 and 20. Find the LCM 15 15 30 45 60 75 90 105 120 . . . 20 20 40 60 80 100 120 140 160 . . . LCM = 60
Using prime factorization to find the LCM 12 4 3 2 2 18 2 9 3 3	Find the LCM of 12 and 18 using the prime factors method. 12 $2 \cdot 2 \cdot 3$ 18 $2 \cdot 3 \cdot 3$ $2 \cdot 2 \cdot 3 \cdot 3$ LCM = 36
24 8 3 2 4 2 2 36	Find the LCM of 24 and 36 using the prime factors method. 24 $2 \cdot 2 \cdot 2 \cdot 3$ 36 $2 \cdot 2 \cdot 3 \cdot 3$ $2 \cdot 2 \cdot 2 \cdot 3 \cdot 3$ LCM = 72

Summary	
	Carl purchased a new house. The cost of the house was $253,926. The bank wrote a check for the house. Write the purchase in words. Julia is building a workshop on her garage. The addition will cost her $15,532. Round the amount to the nearest thousand. Hamburger buns are sold in packeges of 10. Hambergures are sold in packages of 12. What is the smallest number of that makes the buns come out even?
10 12 5 2 2·2·3	$2 \cdot 5$ $2 \cdot 2 \cdot 3$ $2 \cdot 2 \cdot 3 \cdot 5$ LCM = 60

What you will learn about:
How to Use the Language of Algebra

Use of variables and algebraic symbols

Suppose this year Greg is 20 years old and Alex is 23. You know that Alex is 3 years older than Greg. When Greg was 12, Alex was 15. When Greg is 35, Alex will be 38. No matter what Greg's age is, Alex's age will always be 3 years more, right? In the language of algebra, we say that Greg's age and Alex's age are **variables** and the 3 is a **constant**. The ages change ("vary") but the 3 years between them always stays the same ("constant"). Since Greg's age and Alex's age will always differ by 3 years, 3 is the *constant*.

In algebra, we use letters of the alphabet to represent variables. So if we call Greg's age g, then we could use $g+3$ to represent Alex's age. See Table 1.2.

Greg's age	Alex's age
12	15
20	23
35	38
g	$g+3$

$a-3$ a

Variable

Constant

The four basic operations arithmetic operations: addition, subtraction, multiplicatioin, and division.

Operation	Notation	Say:	The result is...
Addition	$a+b$	a plus b	the sum of a and b
Subtraction	$a-b$	a minus b	the difference of a and b
Multiplication	$a \cdot b, ab, (a)(b), (a)b, a(b)$	a times b	the product of a and b
Division	$a \div b, a/b, \frac{a}{b}, b\overline{)a}$	a divided by b	the quotient of a and b, a is called the dividend, and b is called the divisor

Equality

EQUALITY SYMBOL

$a = b$ is read "a is equal to b"

The symbol "=" is called the **equal sign.**

Inequality

> greater than

< Less than

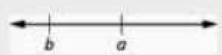
≠ Not equal

On the number line, the number gets larger as they go from left to right. The number line can be used to explain the symbols "<" and ">."

INEQUALITY

$a < b$ is read "a is less than b"
a is to the left of b on the number line

$a > b$ is read "a is greater than b"
a is to the right of b on the number line



Inequality Symbols	Words
$a \neq b$	*a is not equal to b*
$a < b$	*a is less than b*
$a \leq b$	*a is less than or equal to b*
$a > b$	*a is greater than b*
$a \geq b$	*a is greater than or equal to b*

Grouping Symbols	Tanslate from algebra to English
	$17 \leq 26$ Seventeen is less or equal to twenty-six $8 \neq 17 - 3$ Eight is not equal to seventeen minus 3 $12 > 27 \div 3$ $y + 7 < 19$
Grouping Symbols ( ) $\lvert x \rvert$ [ ] { }	Typles of Grouping Symbols • Parenthesis • Brackets • Braces • Absolute value • Fraction Bar
Expression Number, variable or Combination of numbers and variables using operation symbols	(see table below) $3x+5+2x+7$ $5x+12$
Equation Two expressions connected by equals sign.	(see table below)

Expression	Words	English Phrase
$3+5$	3 plus 5	the sum of three and five
$n-1$	n minus one	the difference of n and one
$6 \cdot 7$	6 times 7	the product of six and seven
$\frac{x}{y}$	x divided by y	the quotient of x and y

Equation	English Sentence
$3+5=8$	The sum of three and five is equal to eight.
$n-1=14$	n minus one equals fourteen.
$6 \cdot 7 = 42$	The product of six and seven is equal to forty-two.
$x=53$	x is equal to fifty-three.
$y+9=2y-3$	y plus nine is equal to two y minus three.

	Determine if each is an expression or and equation.
	$2(x+3)=10$ equation $4(y-1)+1$ Expression
	$x \div 25$ Expression $y+8=40$ Equation
Exponential Expression	a^n a - base n - exponent $a^3 = a \cdot a \cdot a$ $b^5 = b \cdot b \cdot b \cdot b \cdot b$
Order of Operations P P M D A S	PEMDAS Parenthesis Exponents Mult } Left → Right Div Add } Left → Right Subtr GEMDAS Grouping Simplify: $12-5\cdot 2$ $12-10$ 2 $(12-5)\cdot 2$ $(7)\cdot 2$ 14

15 86 Evaluate an Expression	Simplify: 13, 16, 31, 85, -5 $18 \div 6 + 4(5-2)$ $18 \div 6 + 4(3)$ $3 + 12$ 15 $5 + 2^3 + 3[6 - 3(4-2)]$ $5+2^3+3[6-3(2)]$ $5+2^3+3[6-6]$ $5+2^3+3(0)$ $5+8+0$ 13 1, -1 $9 + 5^3 - [4(9+3)]$ $9+5^3-[4(12)]$ $9+5^3-48$ $9+125-48$ 86 $7^2 - 2[4(5+1)]$ $7^2-2[4(6)]$ $7^2-2(24)$ $49-2(24)$ $49-48$ 1 Evaluate $7x - 4$ When $x = 5$ $7(5)-4$ 31 When $x = 1$ $7(1)-4$ 3 Evaluate x^2 and 3^x, when $x = 4$. $(4)^2 = 16$ $3^4 = 81$ $3^4 = 3^2 \cdot 3^2$ Evaluate $2x^2 + 3x + 8$ when x = 4 $2(4)^2+3(4)+8$ $2(16)+12+8$

$32+12+8$

$44+8$

52

Term – Constant or product of a constant and one or more variables	5 $6x$ $12x^2y^8z^7$
Coefficient	1 $3x+5$ 2 terms Identify the coeffiecent of each term a) 14y b) $15x^2$ c) a 14 15 1
Like Terms Same exact variable parts	Identify the like terms $y^3, \boxed{7x^2}, 14, 23, 4y^3, 9x, \boxed{5x^2}$ $9, 2x^3, y^2, 8x^3, 15, 9y, 11y^2$ Idenify the terms in each expression $4x^2 + 5x + 17$ $5x + 2y$