

# Whole Numbers

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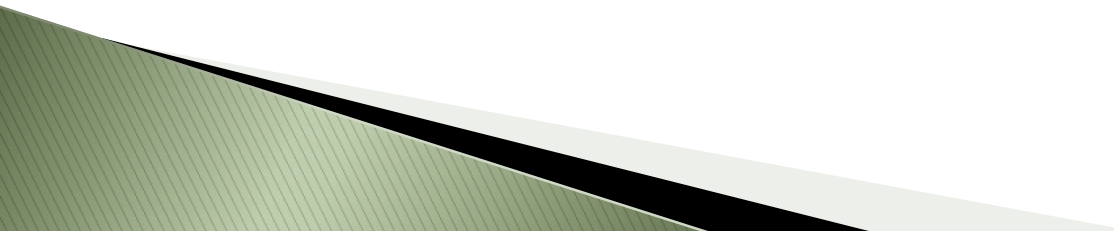
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- For answer keys and additional resources about this activity, go to [www.nwtc.edu/mathnsf](http://www.nwtc.edu/mathnsf) and submit the form for more information.



# Objectives

- ▶ Place values of whole numbers
  - ▶ Rounding/estimating
  - ▶ Addition
  - ▶ Subtraction
  - ▶ Multiplication
  - ▶ Division
  - ▶ Factors
  - ▶ Order of Operations
- 

# Discussion

- ▶ How do you think you'll use math in your job or in life? Or how do you already use it?

# Units

- ▶ We will begin using units of measurement frequently. Getting familiar with and converting units will come later but right away we need to understand some of the basics of measurement.
- ▶ One conversion we will use right away often is
$$12 \text{ inches} = 1 \text{ foot}$$
- ▶ For inches we will commonly use the shorthand “ symbol and for feet we will commonly use the ‘ symbol.



# Place Values of Whole Numbers

| Millions  
| Hundred Thousands  
| Ten Thousands  
| Thousands  
| Hundreds  
| Tens  
| Ones

Example: Write out 5,391,087

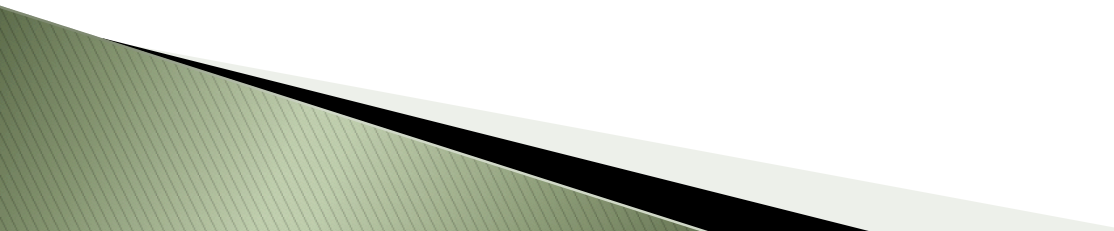
# Rounding

- ▶ Rounding to the nearest ...
  - If the number after the place you are rounding to is a 5 to 9 – round up
  - If the number after the place you are rounding to is a 0-4 – keep the digit that it currently is
- ▶ Example: Round 36,923 to the nearest...
  - ...ten:
  - ...hundred:
  - ...thousand:
  - ...ten thousand:

# Try Yourself

- ▶ Round 279,928 to the nearest...
  - ...ten:
  - ...hundred:
  - ...thousand:
  - ...ten thousand:
  - ...hundred thousand:

# Addition and Subtraction

- ▶ As we look at addition and subtraction, there are certain words that indicate we should use those operations.
  - ▶ Words that mean addition:
  
  - ▶ Words that mean subtraction:
- 

# Estimation

- ▶ Estimation can be used to see if a problem is approximately correct or if we don't need an exact calculation.
- ▶ Estimate an answer by rounding the numbers in a problem and performing whatever operation necessary with the rounded numbers.
- ▶ Example: You are welding together three parts. They are 7", 33", and 48". What will be the total after the pieces are welded together to the nearest ten inches?

# Addition

- ▶ To add or subtract whole numbers, line up the corresponding place values vertically.
- ▶ Back to welding 7", 33", and 48". Let's find the exact answer.

# Addition

(First estimate the answer.)

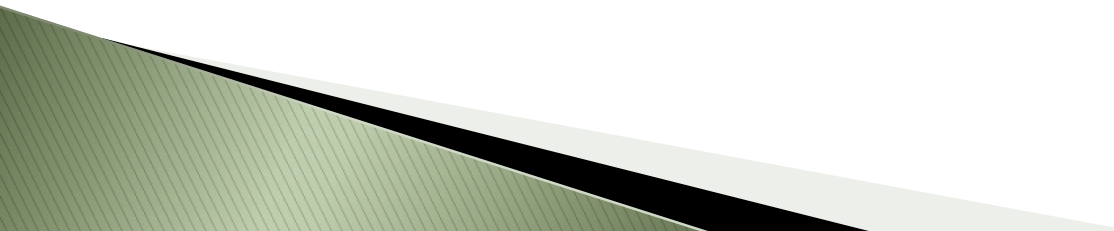
- ▶ Example:  $835 + 675$
  
  
  
  
  
  
  
  
  
  
- ▶ Try Yourself:  $1920 + 455 + 75$



# Subtraction using Estimation

- ▶ Out of a 48" length of metal you cut off 21". About how much of your original length is remaining to the nearest ten?

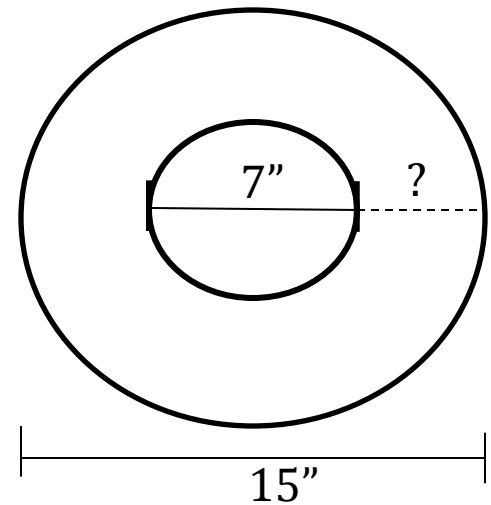
# Subtraction (contd.)

- ▶ Example:  $48'' - 21''$
  
  - ▶ Example:  $432 - 218$
  
  - ▶ Example:  $2400 - 1789$
- 

# Try Yourself

▶ 1)  $480 - 379$

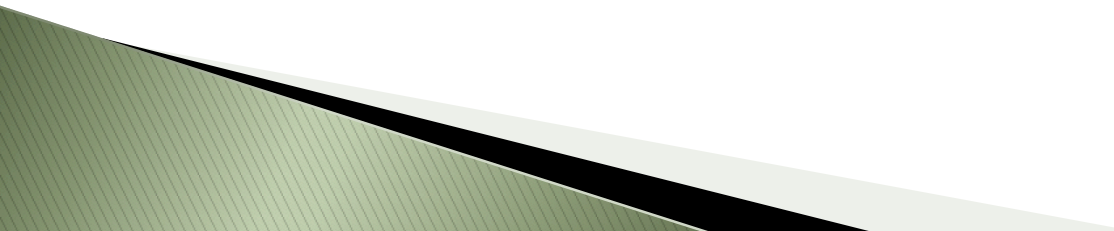
▶ 2) Find the missing dimension from the washer below:



# Multiplication

- ▶ A shorthand way of repeated addition
- ▶ Example: You have 5 parts that weigh 3 oz each. Instead of  $3+3+3+3+3$  we would write:
  - What is the weight of the parts altogether?

# Multiplication

- ▶ Words that mean multiply:
  
  
  
  
  
  
  
  
  
  
  - ▶ Symbols that mean multiply:
- 

# Multiplication

- ▶ Multiplying a number by 1 always results in:
- ▶ Multiplying a number by 0 always results in:

# Multiplication

- ▶ Example: First estimate, then find the exact answer,  
 $39 \times 8$



# Multiplication

- ▶ Example:  $480 \times 24$

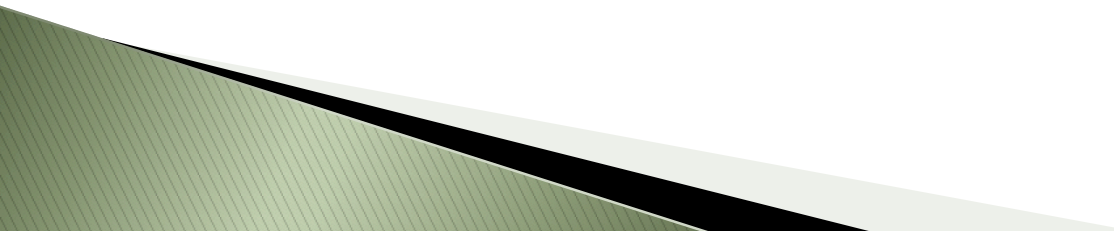


# Try Yourself

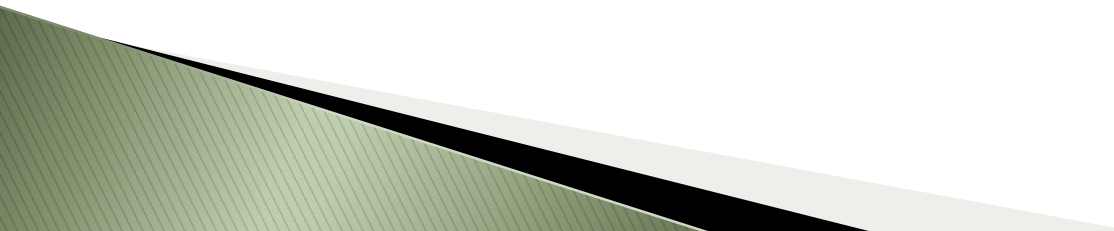
- ▶ 1)  $120 \times 72$
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
- ▶ 2) You need to determine the wire feed speed of your welder before starting. You run the wire for 6 seconds and you measure 18 inches of wire. What is the wire feed speed in inches/minute? (Hint: There are 60 seconds in a minute.)



# Division

- ▶ Reverse of multiplication
  - ▶ Breaking a number into equal parts
  - ▶ Words that mean divide:
  
  - ▶ Symbols that mean divide:
- 

# Division

- ▶ Dividing a number by 1 always results in:
  - ▶ Dividing a number by 0 always results in:
  - ▶ 0 divided by a number always results in:
- 

# Division

- ▶ Example: You are starting with a 72" rod and need 8" pieces, how many pieces will you get out of the original rod? What is your exact calculated answer and what is the logical answer?
  
- ▶ Example:  $496 \div 8$



# Division

- ▶ Example:  $1360 \div 16$

# Try Yourself

- ▶ 1)  $9072 \div 12$

# Try Yourself

- ▶ 2) A set of set of flat bar steel comes into your shop. The invoice shows that it cost \$840 and there were 120 feet delivered. What is the cost per foot of the material?

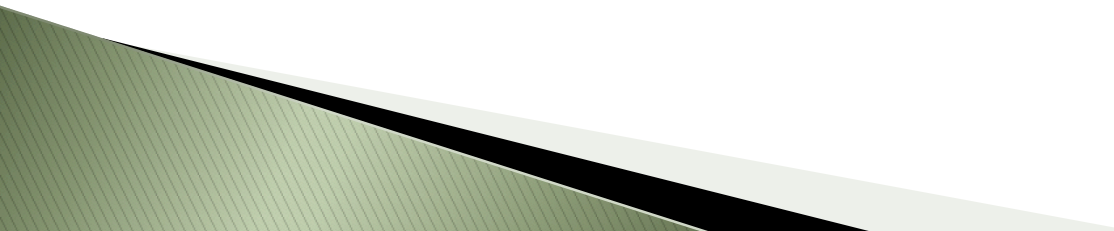
# Factors

- ▶ Understanding what a factor is and how to break numbers into factors will help with understanding and working with fractions.
- ▶ A factor of a whole number is a number that can be divided by that number and leave no remainder
- ▶ Example: What are the factors of 8?
  - $8 \div 1 = 8$ , so 1 is a factor of 8
  - $8 \div 2 = 4$ , so 2 is a factor of 8
  - $8 \div 3 = 2.666\dots$ , 3 is not a factor of 8
  - $8 \div 4 = 2$ , so 4 is a factor of 8
  - $8 \div 5 = 1.6$ , so 5 is not a factor of 8
  - $8 \div 6 = 1.333\dots$ , so 6 is not a factor of 8
  - $8 \div 7 = 1.142857$ , so 7 is not a factor of 8
  - $8 \div 8 = 1$ , so 8 is a factor of 8
  - So, the factors of 8 are 1, 2, 4, and 8.

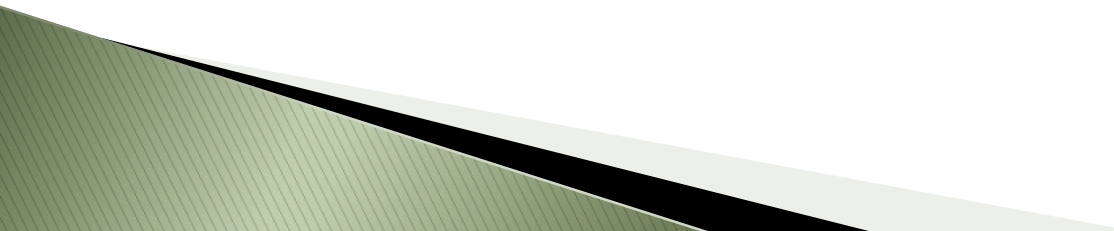
# Factors

- ▶ What are the factors of 24?
  
  
  
  
  
  
  
  
  
  
- ▶ Try Yourself: What are the factors of 16?

# Prime Numbers

- ▶ A number whose only factors are 1 and itself
  - ▶ Basically, the number cannot be broken down anymore
  - ▶ What are the first 10 prime numbers?
- 

# Prime factors

- ▶ Listing all of the prime numbers that are multiplied to get a whole number
  - ▶ Use a factor-tree to break down a number to its prime factors
  - ▶ Example: Find the product of prime factors of 12.
- 



# Prime factors

- ▶ Example: Find the product of prime factors of 2520

# Try Yourself

- ▶ Find the product of prime factors of 315

# Finding Prime Factors

- ▶ What are some tricks for breaking a number down into its prime factors?

# Order of Operations

- ▶ 1. **Parentheses** – perform any calculations possible in the parentheses
- ▶ 2. **Multiply/divide** from left to right
- ▶ 3. **Add/Subtract** from left to right

# Order of Operations

▶ Example:  $2 + 3 * 8 - 1$

▶ Example:  $5 + 12 \div 2 - 4 + 3 \times 6$

# Order of Operations

▶ Example:  $\frac{16 - 8 \cdot 2 + 1 \cdot 10}{30 - 5 \cdot 5}$

# Order of Operations

- ▶ You have to end up with 4 pieces of piping that are 15 in each, 3 pieces that are 4 in each and 5 pieces that are 10 in each. What is the total inches of piping that you will have?
  
  
  
  
  
  
  
  
  
  
  
  
  
  
- ▶ If you need to cut these parts from an original long piece of piping, realistically about how much piping should you start with?

# Try Yourself

▶ 1)  $12 - (2 \times 3 + 5)$

▶ 2)  $\frac{48}{2 \times 3 + 6}$



# Try Yourself

- ▶ 3) You make \$12/hour and work 23 hours one week. \$3 is taken out of your paycheck for each hour worked for taxes, etc. What is your take-home pay for the week. Show how the problem is set up.