

Math 100 Class Notes

The University of Arizona

Spring 2026

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Section I

Course Information

Math 100 Course Expectations

You will need to commit time and effort to be successful in Math 100 this semester. Working to meet the following course expectations will help you achieve your math goals. We are here to support you in that adventure.

Time commitment:

1. Attend class regularly!
2. Work outside of class time.
 - a. Math 100 is a 3-credit class so you should be working in ALEKS, watching assigned videos, and completing notes for at least 6 hours each week, in addition to the time you spend in class.
 - b. Over the semester **100 hours in ALEKS** is expected.
 - c. The University of Arizona “policy requires **at least** 45 hours by each student for each unit of credit.”¹

Credit	Time spent in class/classroom for the semester	Student work time outside of the classroom for the semester (minimum)	Student work time outside of the classroom each week (minimum)
1	15 hours	30 hours	2 hours/week
2	30 hours	60 hours	4 hours/week
3	45 hours	90 hours	6 hours/week

When in the Student Union Classroom:

1. Be ready to collaborate with others. Get to know the other students at your table.
2. Focus on math – put away distractions (cell phones, homework for other classes, etc.)
3. Ask questions! The TAs are here to help you.
4. Write your steps down and show your work. Math is meant to be written, read, engaged with, and writing things down will help you remember the process.

Outside the Student Union Classroom:

1. Check ALEKS and D2L regularly.
2. Work in ALEKS and complete assignments before the due dates.
3. Watch assigned videos and complete class notes.
4. Complete Knowledge Checks when prompted by ALEKS.
5. Take your tests on your assigned day! It can be easy to fall behind, but taking your tests will keep you moving forward.
6. Come to Office Hours/Tutoring for extra help.

¹Source: **U of A Catalog: Academic Policies, Credit Definitions:** <https://archive.catalog.arizona.edu/2020-21/policy/credit-definitions.html>

Tips for Being a Successful Math Student

Below are some suggestions to help you become a more successful math student.

1. Have the right mindset! Say “BRING IT ON!” when looking at a new concept, embrace the challenge and the growth that comes with it. Saying this, even if you don’t fully believe it, increases blood flow to the part of your brain that we need for problem solving.
2. Come to class!
3. Visit your instructor and attend office hours.
4. When working on problems:
 - a. Read the question carefully. Ask yourself: What is this problem asking me to find? Sometimes the task is to set up the problem, sometimes you need to solve for a value.
 - b. Identify what you know and what you need to know. Label and organize your information so you can answer the question.
 - c. Show your work! Show your steps and take up space. You need to be able to see what you are doing and if you ask for help, your instructor and tutor will be able to guide you through the concept if you show your process.
 - d. Think about if your answer makes sense in the context of the question. If you are asked to find the time it takes to drive to a city 180 miles away, which answer makes more sense: 3 hours or 300 hours?
 - e. Check your work. Take an extra minute or two to make sure the answer you got works.
5. Take breaks. If you are having trouble focusing or getting through a problem or topic, take a break and come back to it later.
6. Use your resources:
 - a. **Class Notes:** Your Math 100 Class Notes has the notetakers for the assigned videos, sample problems for each module, scratch paper, and a place to write down formulas and other useful information. This is a resource meant to be read, used, and written in.
 - b. **Calculator:** Your calculator can be used for simple calculations, graphing, and more. We will show you tips for using your calculator effectively so you can be confident using it.

Next Math Course Info

Based on your major, you may be trying to place into MATH 106, 107, 108, or 112 for next semester. This section will help you understand which course you need next, as well as what is needed to place and succeed in that course.

If you are still deciding on a major or interested in exploring different major options, **The A Center** on campus can provide information about the many different majors offered at the University. Visit them at theacenter.arizona.edu or BASC (Bartlett Academic Success Center).

As always, **your major advisor** is the best person to ask for specific information about which math course to take next.

Math 106: Exploring and Understanding Patterns, Functions, and Modeling for Elementary Teachers

This course is specifically designed for students who are pursuing a career in elementary education. This course cannot be used as a prerequisite for any other mathematics courses including Math 108 or Math 112 (except Math 302A for Elementary Education).

Majors: College of Education

Math 107: Exploring and Understanding Data

The main purpose of this course is to help students understand, interpret, and represent data in a useful way to prepare students for courses in statistics. This course cannot be used as a prerequisite for any other mathematics courses including Math 108 or Math 112.

Majors: College of Social & Behavioral Science, Psychology BA, and some other majors (ask your major advisor)

Math 108: Modeling with Algebraic and Trigonometric Functions

Using algebraic and trigonometric functions to model real-life situations. This course is designed for Architecture and Speech, Language, & Hearing Sciences majors only. Prerequisite to Math 113.

Majors: Architecture and Speech, Language & Hearing Science

Math 112: College Algebra Concepts and Applications

Properties of functions and graphs, linear and quadratic equations, polynomial functions, exponential and logarithmic functions with applications. **Students are expected to have a graphing calculator.** Prerequisite to Math 113, 116, 119A, 120R, 163 and other courses.

Majors: Most majors require Math 112, including Eller College of Management, College of Science, College of Engineering, College of Nursing

Section II

Core Content Video Notes

Lesson 1: Prime Numbers & Factoring

Objectives	Terms
<ul style="list-style-type: none">To understand prime numbers.To be able to determine if a number is prime, using divisibility rules.To be able to identify the factors and prime factors of numbers.To use factoring to find GCF and LCM.	<ul style="list-style-type: none">Prime NumbersFactorsFactoringPrime FactorizationGreatest Common FactorLeast Common Multiple

Think about this:

Scenario #1: You are having some friends come over and have a dozen (12) cans of soda to share. You quit drinking soda, so you don't want any soda left over and want to make sure that everyone gets the same number of cans of sodas.

- If 12 people come over, how many sodas will everyone get (excluding yourself)?

Fill in the table with your response.

- What if 1 person comes over?

Fill in the table with your response.

- Use the table to figure out how many different numbers of people you can have over and still evenly distribute soda.

Fill in the table with your response.

Number of People	Number of sodas each person gets
12 people	_____ can(s) each
1 person	_____ can(s) each

Scenario #2: You are having some friends come over, but now you only have 11 cans of soda to share. You quit drinking soda, so you don't want any soda left over and want to make sure that everyone gets the same number of cans of sodas.

- Use the table to figure out how many different numbers of people you can have over and still evenly distribute soda (excluding yourself).

Fill in the table with your response.

Number of People	Number of sodas each person gets

Think about this: What did you notice about the different ways you can divide 12 cans of soda evenly versus ways you can divide 11 cans of soda evenly?

Lesson 1: Prime Numbers & Factoring

Definitions

- **Prime Number:** Whole numbers that have exactly two factors: _____ and _____.
 - Is _____ a prime number?
- **Factors:** numbers that divide into other numbers evenly.
 - Factors are the values we multiply together when finding a product.
 - **Factoring:** Writing a number as a _____ of _____.
 - **Prime Factorization:** Writing a number as a _____ of its _____.

Which number is a prime number?	
11	12
List the factors of:	
11	12
Write the prime factorization of:	
11	12

Practice: Find the prime factorization of the given numbers.

12	15
4	7
20	24

Lesson 1: Prime Numbers & Factoring

Think about this: How can you determine if a number is a prime number?

We can identify prime numbers by using divisibility rules.

- **What are divisibility rules?**
 - Divisibility rules can help us identify the factors of different numbers.
- Consider the table below:
 - Cross out 1
 - Circle 2, then cross out all multiples of 2.
 - How did you know what to cross out?
 - Circle 3, then cross out all multiples of 3.
 - How did you know what to cross out?
 - What is the next number after 3 that is not crossed out? Circle it.
 - Cross out the multiples of this number.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

- **What numbers did you circle?**

Divisibility Rules

Basic Rules of Divisibility		Examples
By 2		
By 3		
By 5		
By 9		
By 10		

Lesson 1: Prime Numbers & Factoring

Think about: How can I use factoring and factors to determine relationships between numbers?

1. Write the factors and prime factorizations of the given numbers:

	12	15	20	24
Factors				
Prime Factors				

2. What prime factors do they have in common? Write your answer in the space provided.

12 and 15

12, 20, and 24

3. What prime factors do they NOT have in common? Write your answer in the space provided.

12 and 15

12, 20, and 24

4. What is the smallest value that is divisible by each number set? Write your answer in the space provided.

12 and 15

12, 20, and 24

Definitions

Greatest Common Factor: Also known as _____, this is the largest factor that a set of values have in common. All values have a factor of 1 in common.

Least Common Multiple: Also known as _____, this is the smallest value that a set of numbers and/or values can go into.

Greatest Common Factor
4 and 7:

4 and 24:

Least Common Multiple
4 and 7:

4 and 24:

Where will you see factoring in upcoming material?

What are the calculator skills you needed?

ⁱ Activity adapted from: Bassarear, Tom. Mathematics for Elementary School Teachers, 4th ed. 2008.

Lesson 2: Place Values & Rounding Rules

Objectives	Terms
<ul style="list-style-type: none">• To be able to identify a digit's value given its place value.• To be able to read and write numbers using place values.• To be able to round numbers to specific place values.• To be able to approximate values using rounded numbers.	<ul style="list-style-type: none">• Place Values• Numeral Translation• Expanded Form• Rounding• Estimating

Think about this:

Scenario #1: You win the lottery and are presented with a giant check. How would you write the numerical representation of how much you won if the check was written out for the following amounts?

*****Write the numbers in the space below each value.***

1. One million, five hundred thirty-five thousand, two hundred fifteen dollars and fifty cents.
2. One billion, two million, thirteen thousand, five hundred dollars.
3. Eight hundred thousand, nine hundred dollars and ninety-nine cents.

Scenario #2: You are looking at buying a used car and test drive several cars. You are worried about high mileage, so you check the exact for each car. How would say (write) the following mileages?

*****Write the numbers as a text expression in the space below each value. For example: 10: ten.***

1. Car 1 mileage:

2. Car 2 mileage:

3. Car 3 mileage:

Discuss: How do you know where commas and zeros should go? What does the placement of a comma or a zero do for the value of the number? What do the zeros do in a number?

Lesson 2: Place Values & Rounding Rules

Definitions

Place value: Where a _____ is in a number determines its _____.

For example: _____ can be shown with the following place values:

Place	Thousands	Hundreds	Tens	Ones
Digit				
Place Value				

Practice: Use the table to write the digits and place values of a car with the mileage of _____

Place					
Digit					
Place Value					

Numerical Translation: Rewriting a text expression using numbers.

For example:

Text: Eight hundred thousand, nine hundred dollars and ninety-nine cents

Numbers: 800,900.99

Practice: Write the number for following in the space provided:

Practice 1: fifty-four thousand, nine hundred seventy

Practice 2: nine million, ten thousand, twenty-five

Scenario #3: You decide that you want to see the mileage when written as addition of each place value. What would each mileage look like if you wrote the mileages out as addition of the place values?

****Write each value as addition in the space provided. For example: 10: ten.**

1. Car 1 mileage: 14,608

2. Car 2 mileage: 126,001

Lesson 2: Place Values & Rounding Rules

Definition

Expanded form: when a number is written out as a _____ of its _____.

For example: write _____ in expanded form:

Place	Ten thousands	Thousands	Hundreds	Tens	Ones
Digit					
Place Value					

Expanded form: _____ =

Think about: How can I use place value and expanded form to help me translate word problems approximate values?

Scenario #1: You are having some friends over for a cookout. If there are eight hotdogs in a pack and you have _____ people over, how many packs of hotdogs do you need to buy to guarantee that everyone, including yourself, gets at least one hotdog? Use the space below to show your work.

Scenario #2: You go out to eat with _____ of your friends, and the total bill, tip included, comes out to \$176. How much do each of you owe if you round the bill to the tens place? Use the space below to show your work.

Definitions

Rounding: to _____ a value by looking at the digit to the _____ of the indicated place value. If that digit is _____ or greater, you round up (indicated digit increases by 1). If it is less than _____, you round down (keeping the value of the digit).

- Example: a car that has _____ miles can be rounded as follows:
 - o To the hundreds place: _____
 - o To the thousands place: _____
 - o To the ten thousand place: _____

Estimate: to approximate a value by rounding.

- Example: You win the lottery two times. Once for \$1,535,215.50 and the second time for \$800,900.99. How much is your combined winning to the nearest hundred thousand?
 - o \$1,535,215.50 rounds to \$_____
 - o \$800,900.99 rounds to \$_____
 - o Estimated combined winnings: _____

Lesson 2: Place Values & Rounding Rules

Practice Problem

Carlos needs one hundred seventy-eight programs for the school play on Thursday. How many boxes of programs will he need, given that each box contains forty-seven programs?

- Write each number in numerical form:

- One hundred seventy-eight:
- Forty-seven:

- Give the place value of each digit for:

Place			
One hundred seventy-eight			
Forty-seven			

- Round each number to the given place value:

- One hundred seventy-eight to the hundreds place:
- Forty-seven to the tens place:

- Use your rounded values to give an estimate of how many boxes Carlos needs to order.

Estimated number of boxes needed:

- **Discuss:** How can you check if your answer makes sense?

Where will you see these concepts in upcoming material?

What are the calculator skills you needed?

Lesson 3: Order of Operations and Exponents

Objectives	Terms
<ul style="list-style-type: none">To understand how to identify the correct order of operations.To simplify expressions using order of operations.To understand the three main properties of exponents.To define and use negative exponents.	<ul style="list-style-type: none">Order of OperationsSimplifyBasePowerProduct PropertyQuotient PropertyPower Property

Think about this:

What can you do with the following expressions?

1. $2 + 5 - 3 - 1 + 10$

2. $2 \times (5 - 3) \times 1 + 10$

3. $2 \times 5 - (3 \times 1) \times 10$

Answer these questions in the space provided:

1. What steps did you take to get to each value?
2. Did you get the same answers? Why or why not?
3. What does it mean to simplify?

Definitions:

Order of Operations: Tells us how to

_____ expressions that have more than one operation. Also known as _____.

Simplify: To apply _____ indicated in an expression to write in the most _____, concise form.

Use Order of Operations to simplify the expressions:

1. $(1 + 4) \times 3 -$ _____

2. _____ - $(28 \div 2) - 1$

Lesson 3: Order of Operations and Exponents

Think about this:

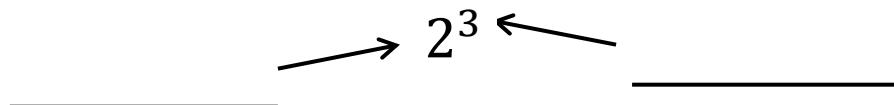
How do you simplify the following?

1. $2^3 + 3^2$

2. $(1 + 4)^2 \times 3 + \underline{\hspace{2cm}}$

3. $(1 + 4)^2 \times 3 - \underline{\hspace{2cm}}$

Label the Diagram:



Discuss: In this example, what does this format tell us to do?

- This tells us to: _____ the _____ of _____ by itself _____ times.
- We read it as: _____
- If there is no exponent stated: _____

Product Property

How do we simplify this expression?

<i>Original Expression</i>
<i>Write in _____ form</i>
<i>Write as a single exponential expression</i>

Definition:

Product Property of Exponents: When we multiply two exponential expressions with the same _____ we can _____ the exponents and keep the _____.

General Rule: $x^a \cdot x^b =$

Example: $m^2 \cdot m^3 =$

Practice: Simplify the expression by using the Product Property of Exponents.

$y^{15} \cdot y^4$

$2^2 \cdot 2^4$

Answer:

Answer:

Lesson 3: Order of Operations and Exponents

Practice: expand and simplify the expressions.

$$\frac{n^7}{n^3} =$$

Answer:

$$\frac{8^8}{8^5} =$$

Answer:

Quotient Property

How do we simplify this expression?

$\frac{x^5}{x^2}$	Original expression
	Write in expanded form
	Factor forms of one
	Write as a single exponential expression

Definition:

Quotient Property of Exponents: When we divide two exponential expressions with the same _____ we can _____ the exponents and keep the _____.

General Rule: $\frac{x^a}{x^b} =$

Example: $\frac{g^5}{g^2} =$

Practice: expand and simplify the expression by using the Power Property of Exponents.

$$(m^2n^3)^5$$

Answer:

$$(2m^6)^2$$

Answer:

Power Property

How do we simplify this expression?

$(x^4)^2$	Original expression
	Expand the outside exponent
	Expand each exponential expression
	Write as a single exponential expression

Definition:

Power Property of Exponents: When we have an exponential expression raised to another exponent, we can _____ the exponents and keep the _____.

General Rule: $(x^a)^b =$

Example: $(3z^3)^2 =$

Lesson 3: Order of Operations and Exponents

Negative Exponents: How do we define a negative exponent?

10^3	10^2	10^1	10^0	10^{-1}	10^{-2}	10^{-3}

How do we simplify this expression?

$$2^{-3}$$

Original Expression

Rewrite without negative exponents

Evaluate 2^{-3}

Definition:

Negative exponent: to rewrite an expression with a negative exponent to have a positive exponent, find the _____.

General Rule: $x^{-n} =$

Example: $x^{-2} =$

Practice: simplify the expression by using the Power Property of Exponents.

$$x^2 \cdot x^{-6}$$

$$\frac{1}{a^{-3}}$$

Answer:

Answer:

Discuss:

1. Where do exponents occur in PEMDAS?
2. If you aren't sure about a rule, what can you do to help simplify exponential expressions?
3. **Note:** Almost anything to the power of _____ is _____.

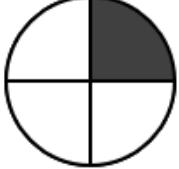
Where will you see these concepts in upcoming material?

What are the calculator skills you needed?

Lesson 4: Fractions and Number Lines

Objectives	Terms
<ul style="list-style-type: none"> • To understand the parts of a fraction. • To place fractions on a number line. • To perform operations using fractions. • Use the fraction rules to simplify expression and solve equations. 	<ul style="list-style-type: none"> • Numerator • Denominator • Form of one • Mixed Number • Least Common Multiple • Least Common Denominator • Reciprocal

Think about this: How can you express the following value numerically?

Figure	How many parts does the figure have?	How many of the parts are...	Write a fraction that represents...
1 circle 		Shaded?	The shaded part(s) of the circle.
1 6-pack of soda 		In the box?	The boxed part(s) of the 6-pack.

Definitions

Numerator: How many _____ of the unit you actually have.

****Note:** The numerator can be...

Denominator: If we had 1 unit of something, the _____ of parts of the unit is broken into.

... than the denominator.

Form of one: Any number or expression

What is the purpose of “Form of one”?

Examples: $\frac{5}{5}$ $\frac{x+2}{x+2}$ $\frac{\log(2x)}{\log(2x)}$

Lesson 4: Fractions and Number Lines

Plotting Fractions on a Number Line

- Plot _____ and _____ on the number line.
 - Count the number of parts between each whole number.
 - Convert fractions by using a form of one, if needed.
 - Plot each number at the appropriate tick mark.



Consider this: What is a mixed number? How can you convert fractions from mixed numbers to fraction form?

Example: How many cans of soda do you have in each pack?

Write the value as a fraction.



There are two ways to write this value:

Mixed Number

Fraction

Think about: What does the denominator mean for each of these fractions?

- What does it mean when the denominator = _____?
- What does it mean when the denominator = _____?

Lesson 4: Fractions and Number Lines

Definition:

- **Mixed Number:** when a number is expressed as a _____ and a _____.

Example:

- **Proper Fraction:** When the numerator of a fraction is _____ the denominator.

Example:

- **Improper Fraction:** When the numerator of a fraction is _____ or _____ to the denominator.

Example:

- **Simplified Fraction:** When the numerator and denominator of a fraction have a common factor that has been factored out and simplified.

Example:

Converting between Mixed Numbers and Fractions

Mixed Number to Fraction:	
Multiply the whole number by the denominator	
Add the product to the numerator	
Write the total over the denominator	
Simplify the fraction if needed.	

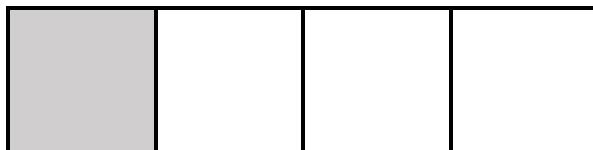
Fraction to Mixed Number:	
Divide the numerator by the denominator. Do not write a decimal!	
The quotient is the whole number	
The remainder is the numerator	
Write as a mixed number. Simplify the fraction if needed.	

Lesson 4: Fractions and Number Lines

Think about this: What needs to be true to add two fractions?

Example: Fred eats one slice of a flatbread pizza that was cut into four pieces and George eats one slice of a flatbread pizza that was cut into three pieces. How much pizza did Fred and George eat total?

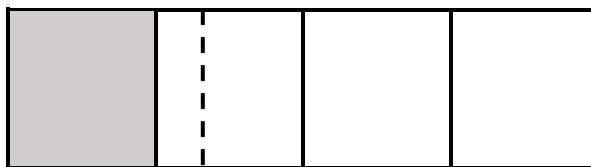
Fred's Original Pizza



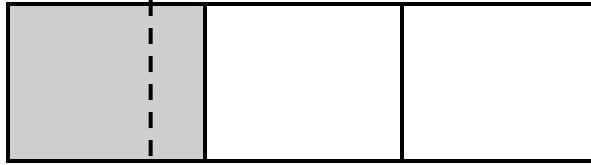
George's Original Pizza



Fred's Pizza: Where should you add cuts?



George's Pizza: Where should you add cuts?



Answer each question in the space below.

If each of them is eating one slice from their pizza, are they eating the same amount of pizza?

How can we cut each pizza so that all slices are the same size?

What is this called, in math terms?

- **Translation:** Translate each part of the word problem into a mathematical expression.

Word Problem	Expression
Fred eats one slice of a pizza that was cut into four pieces.	
George eats one slice of a pizza that was cut into three pieces.	
Once we cut the pizza into the same size slices, how much pizza did Fred and George eat total?	

Lesson 4: Fractions and Number Lines

Rules for Fraction Addition & Subtraction: What did we do to add the two fractions?

$$\frac{1}{4} + \frac{1}{3} = \frac{3}{12} + \frac{4}{12} = \frac{7}{12}$$

- Determine the common denominator.
- Multiply each fraction by a _____ (if needed).
- Add the numerators.
- Keep the denominator the same.

What did we multiply the following by:

$$\frac{1}{4} \quad \text{and} \quad \frac{1}{3}$$

Definitions

- **Remember: Least Common Multiple (LCM)** is the smallest value that a set of number and/or values can go into.

LCM of 4 and 7 is _____

LCM of 4 and 24 is _____

- **Common Denominator or Least Common Denominator:** to add or subtract fractions, they need to have a common denominator, typically the Least Common Denominator (LCD). This is the smallest multiple that the denominators have in common (their Least Common Multiple).
 - When adding or subtracting fractions, you need to find the Least Common Denominator.
 - The LCD of $\frac{1}{4}$ and $\frac{1}{3}$ is:

Practice

1. Use the expression to complete the following:
 - a. What is a common denominator?
 - b. Multiply each fraction by a form of one to rewrite with a common denominator.
 - c. Simplify the expression by adding the fractions.

$$\frac{1}{2} + \frac{3}{7}$$

Answer:

Lesson 4: Fractions and Number Lines

2. Simplify the expression.

a. What is a common denominator?

b. Multiply each fraction by a form of one to rewrite with a common denominator.

c. Simplify the expression by adding/subtracting the fractions, then simplifying forms of one.

$$\frac{12}{13} - \frac{1}{3}$$

Answer:

3. Translate the scenario into an expression or equation and answer the question.

a. Felipe made a shirt using $\frac{1}{4}$ meters of red fabric and $\frac{4}{5}$ meters of yellow fabric.

How many more meters of yellow fabric did Felipe use?

How would you do the following?

Practice:

1. Simplify the expression.

a. Simplify the expressions by multiplying the fractions.

b. Factor each term in the numerator and denominator.

c. Identify forms of one.

d. Simplify forms of one to one and write your final answer.

$$1) \frac{7}{25} \cdot \frac{3}{35}$$

Answer:

$$2) \frac{12}{77} \cdot \frac{10}{21}$$

Answer:

Lesson 4: Fractions and Number Lines

Simplify the expression.

- a. Simplify the expression by multiplying by the reciprocal.
- b. Factor each term in the numerator and denominator, if possible.
- c. Identify forms of one.
- d. Simplify forms of one to one and write your final answer.

$$1) \frac{14}{9} \div \frac{16}{15}$$

Answer:

$$2) \frac{81}{64} \div \frac{36}{16}$$

Answer:

Definition

- **Reciprocal:** When you _____ a fraction by interchanging the _____ and the _____.
 - The reciprocal of a whole number:
 - A whole number can be rewritten as an improper fraction, with a denominator of _____.
 - Example:
 - When you divide one fraction by another, you:
 - Convert to a multiplication problem.
 - Take the _____ of the second fraction.
 - Change the division to _____.
 - Follow the rules developed for fraction multiplication.

Where will you see this in upcoming material?

What are the calculator skills you needed?

Lesson 4: Fractions and Number Lines

This page is left blank on purpose.

Lesson 5: Ratios and Percentages

Objectives	Terms
<ul style="list-style-type: none"> To understand what a ratio is and the different forms to express one. To understand the relationship between ratios, fractions, decimals, percents and proportions. To use tape diagrams to solve real-world scenarios using ratios. 	<ul style="list-style-type: none"> Fractions Decimals <ul style="list-style-type: none"> Place Values Ratio Percent Tape Diagram Proportion

Using Fractions & Decimals to Compare Values

Fractions compare the value of the _____ to the value of the _____, which represents the whole unit.

Fraction	How we read it	What it means
$\frac{1}{10}$	One-tenth	1 part out of 10
$\frac{1}{100}$	One- _____	1 part out of _____
$\frac{1}{1000}$	One- _____	1 part out of _____

Decimals are fractions with denominators of _____.

Decimal	How we read it	Equivalent Fraction
0.1	One-tenth	
0.01	One- _____	
0.001	One- _____	

- **Place Values:** Where a digit is in a number determines its value.
- **Decimal Place:** The position of a digit in a decimal number. Place value is its value based on its decimal place.
 - o **Example:** _____

Place	Thousands	Hundreds	Tens	Ones	decimal	Tenths	Hundredths	Thousandths
Digit					•			
Expanded form					•			
Equivalent Fraction	X	X	X	X	X	X	X	X

Lesson 5: Ratios and Percentages

Practice: Fill in the table with the indicated values.

Question	Answer
How many pennies are in a dollar?	
Identify the digit in the thousands place: \$1,425.37	
Identify the digit in the hundreds place: \$1,425.37	
Identify the digit in the tens place: \$1,425.37	
Identify the digit in the ones place: \$1,425.37	
Identify the digit in the tenths place: \$1,425.37	
Identify the digit in the hundredths place: \$1,425.37	
There are 2.5813 grams of sugar in a piece of candy. Identify the digit in the thousandths place.	

Using Fractions & Decimals to Write Percentages

Percents are comparisons out of _____. Percent mean “_____”.

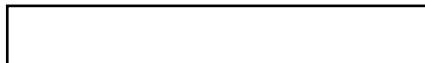
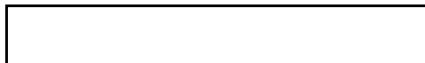
Percentages are values compared to 100.

Whole = denominator (100 parts)	Part = numerator	Parts out of 100	Fraction	Decimal	Percentage
\$1.00 = 100 cents	\$0.25	25 cents out of 100	$\frac{25}{100}$	0.25	25% of a dollar
1 meter = 100 centimeters	8.36 meters	836 centimeters out of 100	$\frac{836}{100}$	8.36	836% of a meter
1 century = 100 years	30 years	30 years out of 100	$\frac{30}{100}$	0.30	30% of a century

Ratio: A comparison of any _____.

Ways to express ratios: _____

How can you write the following relationship: A recipe calls for 2 cups of sugar for every 3 cups of flour.

Words	Tape Diagram	
	Fraction	Decimal
Symbols	Decimal	
	Percentage	

Lesson 5: Ratios and Percentages

Tape Diagrams are one way you can express ratios, fractions, decimals, and percentages visually.

Practice Problem

From 125 yards away, a marksman hit 9 out of 10 of the targets last year.

1. What would the number of targets hit be as a fraction?

- What does the “whole” represent?

- What does the “part” represent?

- How can you represent the number of targets hit as a fraction?

2. What would the number of targets hit be as a percentage?

- What does the “whole” represent?

- What does the “part” represent?

- How can you represent the number of targets hit as a percentage?

- You can use tape diagrams to find percentage of values that are not powers of ten.

Example: An item is regularly priced at \$85. It is on sale or 60% off the regular price. Use the space and the tape diagram below to answer the following questions.

- a. How much (in dollars) is discounted from the regular price?
- b. What is the new price of the item (in dollars)?

Lesson 5: Ratios and Percentages

- **Proportions** compare parts to a whole and compare two ratios.
- You can use tape diagrams to help solve proportion problems.

Practice 1: Each marble bag sold by Lamar's Marble Company contains 5 blue marbles for every 6 red marbles. If a bag has 30 red marbles, how many blue marbles does it contain?

a. What is the ratio of blue marbles to red marbles?

How many blue marbles will the bag contain?

b. What other information are we given?

c. Draw a tape diagram in the space below to model this ratio.

Practice 2: A saleswoman earns 7% commission on all the merchandise that she sells. Last month she sold \$4000 worth of merchandise. How much commission (in dollars) did she earn last month?

a. What information are we given?

How much commission did the saleswoman earn last month?

b. Draw a tape diagram in the space below to model this ratio.

Practice 3: In a recent year, 31.9% of all registered doctors were female. If there were 49,300 female registered doctors that year, what was the total number of registered doctors? Round your answer to the nearest whole number.

a. What information are we given?

What was the total number of registered doctors?

b. Draw a tape diagram in the space below to model this ratio.

Where will you see this in upcoming material?

What are the calculator skills you needed?

Lesson 6: Data Analysis: Measures of Center and Range

Objectives	Terms
<ul style="list-style-type: none">To be able to calculate the mean, median, mode, and range of a data set.To understand how changing a value affects mean and median.To identify which measure of center best describes a data set.To define and calculate weighted mean.	<ul style="list-style-type: none">Data SetModeRangeMeanAverageMedianOutlierWeighted mean

Think about this: How can you identify the mode and the range of a data set?

Example: Keisha is recording the number of points she misses on each math quiz. Her results are listed in the box to the right. Find the mode and the range for the data.

- What does the mode tell you about this data?
- What does the range tell you about this data?

Points missed on last eight quizzes:

7, 7, 6, 7, 4, 7, 5, and _____

Mode: _____ Range: _____

Definitions:

- Data:** information about people or things.
 - Data set:** _____ of data (number, figures, facts, etc).
- Mode:** an item or number that _____ in a list. There can be _____, _____, or _____ modes in a data set.
- Range:** In a data set, range is the _____ between the _____ and _____ values.

Practice: Nine people were asked, "How many times have you been on an airplane?" Their responses are listed in the box to the right. Find the mode and range for the data.

- What does the mode tell you about this data?
- What does the range tell you about this data?

Number of times each person has been on a plane:

2, 2, 5, 9, 4, 2, 2, 9, and _____

Mode: _____ Range: _____

Lesson 6: Data Analysis: Measures of Center and Range

What about this: Find the average of each set of numbers.

140 and _____	_____ and 93	7, 7, 6, 7, 4, 7, 5, and _____
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Definitions:

- **Mean:** In a data set, mean is when you _____ all the values together and _____ by the number of values in the set. It is also sometimes called the _____.
- **Median:** When data is ordered from _____ to _____, the median value is the _____ in the list. If there are an even number of values, then the median is the _____ numbers.

Practice: On a survey, 5 students reported how many minutes it takes them to travel to school. Their responses are listed in the box to the right. Find the mean and median travel time for these students. If necessary, round your answer to the nearest tenth.

- What does the mean tell you about this data?
- What does the median tell you about this data?

Travel time for students:

16, 5, 7, 12, and _____

Mean: _____ minutes

Median: _____ minutes

Practice: Each of the 7 cats in a pet store was weighed. Their weights (in pounds) are listed in the box to the right. Find the mean and median weights of these cats. If necessary, round your answer to the nearest tenth.

- What does the mean tell you about this data?
- What does the median tell you about this data?
- What does the mode tell you about this data?

Weight of each cat:

12, 5, 7, 16, 11, 16, and _____

Mean: _____ pounds

Median: _____ pounds

Mode: _____ pounds

Lesson 6: Data Analysis: Measures of Center and Range

Think about this: How can you choose the best measure to describe data?

- When choosing the best measure, you should look for:
 - Context of the data: What is the data describing?
 - Are there any outliers in the data?
 - **Outlier:** a value in the set that is much _____ or _____ than the rest of the data.

Answer the following questions:

(a) The following number of people attended the last 9 screenings of a movie:

195, 203, 204, 205, 206, 207, 208, 211, 296.

Which measure should be used to summarize the data?

Mean

Median

Mode

(b) At a certain company, the 10 employees have the following weekly salaries:

\$800, \$810, \$820, \$850, \$870, \$910, \$920, \$950, \$970, \$980.

Which measure should be used to summarize the data?

Mean

Median

Mode

(c) Ravi has recorded his golf score for each round he's played this year.

Which measure gives the score he shot the most often?

Mean

Median

Mode

What is weighted mean?

Definition:

- **Weighted mean:** In a data set, when the same value appears _____.
 - Multiply: _____
 - Add: _____
 - Divide: _____

Example: The table to the right summarizes the number of fiction books read last summer by a sample of 38 students.

What is the mean number of books read? Round your answer to the nearest tenth.

Steps:

1. Multiply the number of students by the number of books read.
2. Find the overall mean:

Number of students	Number of books read per student
6	2
7	3
15	4
10	5

Lesson 6: Data Analysis: Measures of Center and Range

What happens if we change a value in the data set?

Example: The weekly salaries (in dollars) for 10 employees of a small business are given below. (Note that these are already ordered from least to greatest.)

682, 708, 720, 786, 812, 820, 862, 873, 889, 898

Suppose that the \$898 salary changes to \$_____. Answer the questions in the box to the right.

Use the space below to show your work.

What happens to the median?	<input type="checkbox"/> It decreases by: <input type="checkbox"/> It increases by: <input type="checkbox"/> It stays the same.
What happens to the mean?	<input type="checkbox"/> It decreases by: <input type="checkbox"/> It increases by: <input type="checkbox"/> It stays the same.

- **Note:** When we change a value in a data set the mean and/or the median may change, depending on where the value is in the ordered set.

Practice: The monthly rents (in dollars) paid by 8 people are given below. (Note that these are already ordered from least to greatest.).

895, 985, 1000, 1020, 1035, 1075, 1110, 1120

Suppose that one of the people moves. His rent changes from \$1120 to \$_____. Answer the questions in the box to the right.

Use the space below to show your work.

What happens to the median?	<input type="checkbox"/> It decreases by: <input type="checkbox"/> It increases by: <input type="checkbox"/> It stays the same.
What happens to the mean?	<input type="checkbox"/> It decreases by: <input type="checkbox"/> It increases by: <input type="checkbox"/> It stays the same.

Where will you see this in upcoming material?

What are the calculator skills you needed?

Lesson 7: Expressions and Equivalency

Objectives

- To define what expression means, mathematically.
- To identify and write equivalent expressions.
- To simplify expressions.
- To check your work by using a test value.
- To justify your steps.

Terms

- Expression
- Variable
- Equivalent Expression
- Simplify
- Combine like terms
- Distribute
- Factoring
- Substitute
- Justify

Think about this:

Michelle buys two bags of Skittles and puts them into two piles. We can neither increase nor decrease the amount of Skittles she has.

For each scenario, determine if equivalency is maintained (circle yes or no). Then write out the number of bags of Skittles she has using mathematical symbols for each scenario. Use x to represent each bag of Skittles.

Scenario #1: How can you write out the number of bags of Skittles Michelle has mathematically?

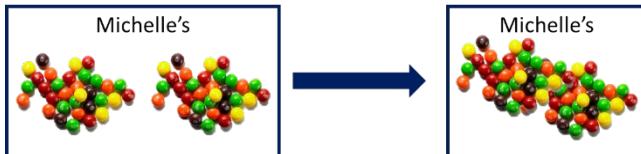


Mathematical Representation

Scenario #1

Scenario #2: If Michelle combines her piles together, does she maintain equivalency?

YES/NO



Scenario #2

Scenario #3: If Michelle buys enough Skittles to double her pile, but then gives half of her pile to a friend, does she maintain equivalency?

YES/NO



Scenario #3

Lesson 7: Expressions and Equivalency

Definitions

Expressions: _____ or _____ joined by a math operation.

- Variable: is a _____ or a _____ that represents a number.
- Math Operations include:

Examples of Expressions:

$$2x + x + 5$$

$$\frac{6(3x + 1)}{2}$$

What can we do with an Expression?

- We can _____ an expression to find an equivalent expression by:
 - **Combining like terms:**
 - **Distributing:**
 - **Factoring:**
- Recall: _____ is when you apply mathematical operations to write an expression in the simplest terms.
- We can check our work by:
 - **Substituting** the _____ value into both expressions (ex. $x = 5$)
 - If we get the same result, then the original expression and the simplified expression are likely _____.
 - When we use $x = 5$ in each of the expressions on the right, we get the same outcome each time.

Mathematical Representation

Scenario #1

Expression: _____

substitute $x = 5$

Scenario #2

Combining like terms:
_____ is equivalent to $2x$

substitute $x = 5$

Scenario #3a

Distributing:

$2(2x - 5)$ is equivalent to _____

substitute $x = 5$

Scenario #3b

Factoring:

$2x$ is equivalent to $\frac{2x \cdot 2}{2}$ (or _____)

substitute $x = 5$

$$\frac{2x \cdot 2}{2}:$$

Lesson 7: Expressions and Equivalency

Practice

1. Use the space below to simplify the expression.

$$5x + 3 - 2x + 6$$

answer: _____

- We can _____ like terms in an expression because it **maintains equivalency**.
 - Check your work by using the given test value.
 - Show your steps.
 - Are the expressions equivalent?
 - Yes or no?

Substitute: $x = \underline{\hspace{2cm}}$ into $5x + 3 - 2x + 6$
& your new expression

2. Use the space below to simplify the expression.

$$\underline{\hspace{2cm}}$$

answer: _____

- Check your work by using the given test value.
 - Show your steps.
 - Are the expressions equivalent?
 - Yes or no?
- We can use the _____ property of multiplication because it **maintains equivalency**.

Substitute: $x = 2$ into $\underline{\hspace{2cm}}$
& your new expression

- Think about this: What does it mean to factor?**
- You can think of factoring as _____ distribution.
 - Fill in the arrows to show how you get from one step to the next.

Distributing

$$5(x^2 + 3)$$

$$5x^2 + 15$$

Factoring

$$5x^2 + 15$$

$$5(x^2 + 3)$$

Lesson 7: Expressions and Equivalency

Practice

3. Factor the expression.

answer: _____

- Select a test value to check your work.
 - Show your steps.
 - Are the expressions equivalent?
 - Yes or no?

Substitute: $x =$ _____

Think about this: What does it mean to justify your steps?

Example: Simplify the expression. Make sure to justify each step.

Fill in the mathematical step described.

We can **justify** our steps by _____ what mathematical _____ we completed to simplify given expressions.

Steps	Justification
	Given
	Distribute
	Combine like terms: constants
	Combine like terms: variables

Practice: Simplify the expression.

$$\frac{(6x - 18)}{6}$$

- Make sure to justify each step.
- Use a test value to check your answer.

Where will you see this in upcoming material?

What are the calculator skills you needed?

Lesson 8: Equations

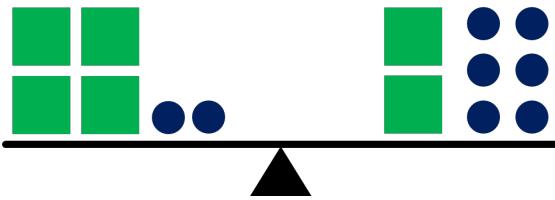
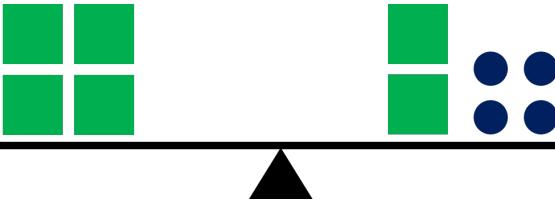
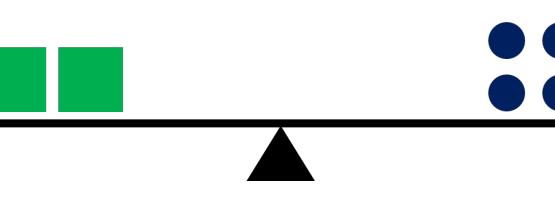
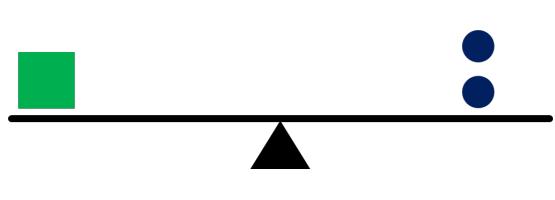
Objectives

- To distinguish between expressions and equations.
- To set up and solve equations while maintain equivalency.
- To determine if equivalency is maintained by checking your work.

Terms

- Expression
- Equation
- Equivalent Equation
- Simplify
- Transform

Think about this: What can we determine about the shapes based on the diagrams?

A		What can we do to determine the relationship between the shapes?
B		What did we do to get from A to B?
C		What did we do to get from B to C?
D		What did we do to get from C to D?
What is the relationship between the shapes in the diagrams?		Write an equation that represents this scenario:

Lesson 8: Equations

Definitions:

- **Equation:** Two expressions joined by an _____.

- **Remember:** An _____ is numbers or variables joined by an _____.

Examples of Equations:

$$x^2 = 3x$$

$$\frac{2x + 5}{x} = \frac{25x}{3}$$

Practice

For each of the following, **circle** if it is an expression, an equation, or neither.

1. $\frac{x+7}{x} = 49$ Expression Equation Neither

2. $\frac{x^2-25}{x+5} =$ Expression Equation Neither

3. $x + 3$ Expression Equation Neither

Think about this: What does “equivalent equations” mean? How can we transform equations and maintain equivalency?

Equation	Equivalent Equation	What did we do?
$\frac{x+7}{x} = 49$		
$\frac{x^2-25}{x+5} = 1$		
$x + 3 = 10$		

Lesson 8: Equations

Equations

- **What can we do with equations?**

- Solve for a variable by _____ into an equivalent equation.
 - _____ is making the same changes to both expressions, on each side of the equation.
- **Equivalent Equations:** _____ equations that have the same values and solutions.
 - **Remember:** In an equation, you can _____ expressions on each side of the equal sign by using _____ and **simplifications** to rewrite the expressions and create equivalent equations.
 - **Simplifications include:**
 - Combining like terms
 - Distribution
 - Factoring

Practice

1. Solve the equation for x.

- Show your work and justify each step.

$$6x - 12 = 36$$

Check your work.

How can we check our work?

- The answer will be in the form of an equation with a variable on one side of the equal sign and a number on the other side. For example: $x = 7$.
- Substitute the final answer into the _____.
- If we get a true statement, then our answer is correct.
 - If $x + 3 = 10$ and $x = 7$: $7 + 3 = 10$ is true

Lesson 8: Equations

2. Solve the equation for x. Show your work and justify each step.

$$1 + 2x + 4 = \underline{\hspace{2cm}}$$

Check your work.

3. Solve the equation for x. Show your work and justify each step.

$$3(2x - 1) - x = \underline{\hspace{2cm}}$$

Check your work.

Summary of Equations

- We solved for the variable by transforming into an equivalent equation. This was done by:
 - the expressions within the equation.
 - Transform by Adding/Subtracting/Multiplying/Dividing the same number or expression on both sides of the equal sign.
- We checked our work by:
 - the final answer into the original equation.
 - A statement meant that our answer was correct.

Where will you see these concepts in upcoming material?

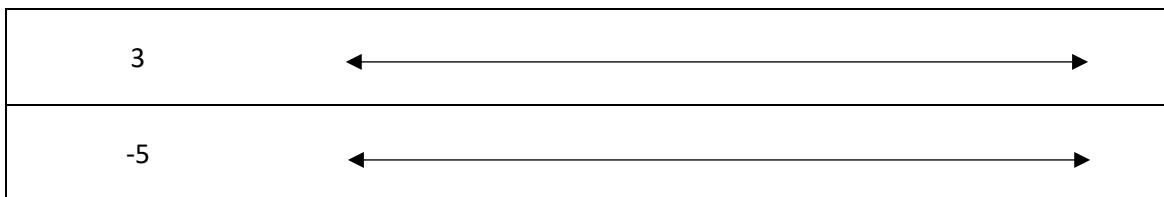
What are the calculator skills are needed?

Lesson 9: Integers and Non-integers

Objectives	Terms
<ul style="list-style-type: none">To plot positive and negative values on a number line.To apply Order of Operations to expressions and equations using negative values.To write and solve equations representing real-world scenarios using positive and negative numbers.	<ul style="list-style-type: none">PositiveNegativeIntegersCounting NumbersNon-IntegerEvaluateRational NumberIrrational NumberTerminating DecimalRepeating DecimalLike Terms

Consider this: How would you plot the following values on a number line?

Plot the given numbers on the number line. Label your points.



Discuss: What does a negative sign represent?

Definitions:

- Positive Numbers:** numbers that are _____ zero. When plotted on a number line, they are to the _____ of zero.
- Negative Numbers:** numbers that are _____ zero. When plotted on a number line, they are to the _____ of zero.
- Integers** can be defined as:
 - Counting Numbers (whole numbers), their opposites, and zero.
 - Counting Numbers: _____
 - Opposites: _____
 - Zero: 0
 - Numerical expressions that can be simplified to a counting number, its opposite, or zero.
- Non-integers:** Numbers that cannot be simplified to an integer.

Circle the numbers below that are either an integer or can be simplified to an integer.

Given								
Can we Simplify?								

Lesson 9: Integers and Non-integers

Think about this: How does Order of Operations work with integers?

$$3 - (-5)$$



There are two ways to think about negative numbers and Order of Operations:

- When you have a negative number, this indicates a **change in sign**. You move in the _____ direction. If you have two negatives, you reverse direction _____.
- You can also think about it like this:
Positive: Face in the _____ direction.
Negative: Face in the _____ direction.
Addition: Move _____ on the number line.
Subtraction: Move _____ on the number line.

Example:

Use the space provided to evaluate the expression using Order of Operations:

a. $2 - (-3)^2$

b. $2 - (-3)^2 \times \underline{\hspace{2cm}}$

Definition: Evaluate: coming to a _____ number. _____ is also used.

Practice: Evaluate the expressions.

a. $2 - (-4)^2 + \underline{\hspace{2cm}}$

b. $\frac{1 - (-2)^3 - (-1)}{\underline{\hspace{2cm}}}$

Lesson 9: Integers and Non-integers

Think about this: How does Order of Operations work with non-integers?

Sort the numbers into the appropriate box.

$$-\frac{1}{11}$$

$$\sqrt{64}$$

$$-20\pi$$

$$4.\overline{14}$$

$$-\sqrt{2}$$

$$1.75$$

Rational	Irrational

Definitions:

- **Rational Numbers:** Numbers that can be written as a _____.
 - This included terminating decimals and repeating decimals.
 - **Terminating Decimals:** decimals that have a finite number of _____ after the decimal point.
 - **Repeating Decimals:** decimals that have a _____ that repeat. Written as decimal with a _____ above the _____.
 - Examples:
- **Irrational Numbers:** Numbers that cannot be written as a rational number.
 - Examples:

Practice Problems: Simplify the following expressions. Show your steps.

Definition: Like Terms: Terms where the variable or the _____ is the same.

Use the word problem to complete the following.

In the year 2000, a city had a population of 21,750 people. In 2005, the population grew by 1,800 people, but in 2010 it dropped by 750 people. The population decreased again in 2015 by 430 people.

- a. Write an equation that represents this situation. Use **p** for population.
- b. What was the population of the city by 2015?
- c. What is the total population change from 2000 to 2015?

Lesson 9: Integers and Non-integers

Practice: Evaluating a linear expression. Use the space provided to show your work.

- Evaluate the expression when $a = -4$ and $y = \underline{\hspace{2cm}}$.

Expression: $y - 4a$

- Evaluate the expression when $a = \frac{4}{5}$ and $c = \underline{\hspace{2cm}}$.

Expression: $-3c + a$

- Evaluate the expression when $c = -7.3$ and $d = \underline{\hspace{2cm}}$.

Expression: $-3d + c$

- Evaluate the expression when $n = \underline{\hspace{2cm}}$.

Expression: $n^2 + 9n - 6$

Properties of Exponents		
Property	Definition	Example
Product Property:	When multiplying exponents with the same base:	
Quotient Property:	When dividing exponents with the same base:	
Power Property:	When raising a power to a power:	
Negative Exponent:	To rewrite as a positive exponent:	
Zero Exponent:	Almost anything to the power of 0 is:	

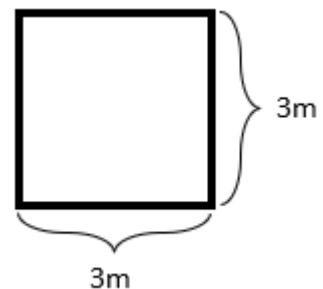
Where will you see this in upcoming material?	What are the calculator skills you needed?
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Lesson 10: Radicals and Rational Exponents

Objectives	Terms
<ul style="list-style-type: none">To be able to identify the parts of a radical expression.To be able to translate expressions between radical and exponential form.To simplify square roots and higher order radical expressions.	<ul style="list-style-type: none">IndexRootRadicalRadicandEquivalent ExpressionsRational ExponentSimplify

Think about this: What does Area have to do with Radical Expressions?

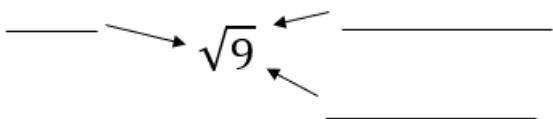
- When finding the area of a square, we square the length of the side:
 - $\text{Area} = \underline{\hspace{2cm}}$
- Radical expressions** allow us to _____ this process.
 - How can you find the side length of a square given the area?
 - $\sqrt{\text{Area}} = \underline{\hspace{2cm}}$



Definitions

- Index:** The _____ you are trying to find.
 - If there is no index or root indicated, you are finding the second or _____ root.
- Radical:** The symbol used to indicate finding the root of a number
- Radicand:** The value _____ the radical symbol.

Label the Diagram



This tells us that we are finding:
the _____ root of _____

How does this relate to Area and Side Length?

- What does the radicand of a square root represent?
 - $\circ \underline{\hspace{2cm}}$
- What does the simplified square root expression represent?
 - $\circ \underline{\hspace{2cm}}$
- When simplifying this expression, we can ask ourselves:
 - What number, when multiplied by itself _____ gives us 9?
 - The answer to this question is the simplified radical expression.

$$\sqrt{9} = \sqrt{3^2} = 3$$

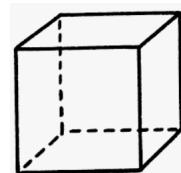
Lesson 10: Radicals and Rational Exponents

How does this relate to Volume and Side Length?

- When finding the volume of a cube, we “cube” the length of the side:

- $Volume = \underline{\hspace{2cm}}$

- $\sqrt[3]{Volume} = \underline{\hspace{2cm}}$



- What does the radicand of a cube root represent?

- $\underline{\hspace{2cm}}$

$$\sqrt[3]{8} = \underline{\hspace{2cm}}$$

- What does the simplified square root expression represent?

- $\underline{\hspace{2cm}}$

- When simplifying this expression, we can ask ourselves:

- What number, when multiplied by itself $\underline{\hspace{2cm}}$ gives us 8?
 - The answer to this question is the simplified radical expression.

Evaluate the following expressions:

1. $\sqrt[3]{\underline{\hspace{2cm}}}$

2. $\sqrt{\underline{\hspace{2cm}}}$

3. $\sqrt[5]{\underline{\hspace{2cm}}}$

4. $\sqrt[4]{\underline{\hspace{2cm}}}$

****You cannot take the $\underline{\hspace{2cm}}$ root of a $\underline{\hspace{2cm}}$ number.

Think about this: How can we determine if radical expressions are equivalent?

Remember, to determine if two expressions are equivalent:

- Collect evidence by testing values in both expressions.
 - If each expression returns a different value, then they are not equivalent.
- Justify why the expressions are equivalent.

Which expressions are equivalent?
Check with the value $x = \underline{\hspace{2cm}}$.

$x + 2x$

$4x - 1$

$3x$

What can we do to maintain equivalent radical expressions?

We can show some properties of radicals by using the properties of equivalency.

1. Are these expressions equivalent?

- a. Are they equivalent? Yes or No

- b. Write a statement showing your conclusion:

Use $a = \underline{\hspace{2cm}}$ and $b = \underline{\hspace{2cm}}$ to determine if the expressions are equivalent.

$$\sqrt{a+b} = \sqrt{a} + \sqrt{b}$$

Lesson 10: Radicals and Rational Exponents

2. Are these expressions equivalent?

a. Are they equivalent? Yes or No

b. Write a statement showing your conclusion:

Use $a = \underline{\hspace{2cm}}$ and $b = \underline{\hspace{2cm}}$ to determine if the expressions are equivalent.

$$\sqrt{a \cdot b} = \sqrt{a} \cdot \sqrt{b}$$

3. Are these expressions equivalent?

a. Are they equivalent? Yes or No

b. Write a statement showing your conclusion:

Use $a = \underline{\hspace{2cm}}$ and $b = \underline{\hspace{2cm}}$ to determine if the expressions are equivalent.

$$\sqrt{\frac{a}{b}} = \frac{\sqrt{a}}{\sqrt{b}}$$

**The properties from #2 and #3 also apply to higher order radical expressions (root >2).

Extra Practice: Use $x = \underline{\hspace{2cm}}$ to determine if the following expressions are equivalent.

$$\sqrt{x+2}$$

$$\sqrt{x} + 2$$

$$\sqrt{x} + \sqrt{2}$$

$$\sqrt{\frac{x}{4}}$$

$$\frac{\sqrt{x}}{\sqrt{4}}$$

Try this: Use your calculator to determine if the following expressions are equivalent.

$$\sqrt[3]{8}$$

and

$$\text{and } 27^{2/3}$$

$$\sqrt{4^2}$$

and

Definition:

- **Rational Exponent:** exponents that are .
 - **Numerator:** .
 - **Denominator:** .
 - **Base:**
- **Translate:** You can translate between radical expressions and expressions with rational exponents.
 - The expressions are to each other.
 - Index or root is the .

Lesson 10: Radicals and Rational Exponents

Practice: Translate each expression into either a radical expression or a rational exponent.

Given	$50^{1/2}$	$\sqrt[3]{392x^5}$	$256^{1/4}$	$\sqrt[5]{32y^6}$
Equivalent Expression				

Think about this: What does it mean to simplify and evaluate radical expressions? How does factoring help us simplify radical expressions?

Example

- Simplify the expression: $\sqrt{50}$
 - Identify the root: _____
 - What are the factors of 50?
 - What factors are perfect squares?
 - Rewrite the radical as a product of radicals.
 - ex. $\sqrt{a \cdot b} = \sqrt{a} \cdot \sqrt{b}$
 - What is the simplified form of $\sqrt{50}$?
- Simplify the expression: $(392)^{1/3}$
 - Rewrite as a radical expression.
 - Identify the root: _____
 - Factor 392 using a factor tree and rewrite the radical in factored form.
 - Simplify the expression.

$$\sqrt{50}$$

$$392^{1/3}$$

Practice: Simplify the following radical expressions. Leave your answer in radical form.

$\sqrt[3]{270}$	$\sqrt{48}$	$96^{1/5}$
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Where will you see this in upcoming material?

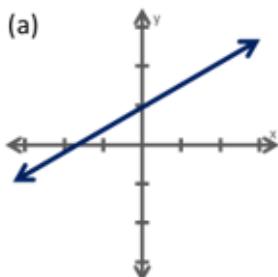
What are the calculator skills you needed?

Lesson 11: Graphing Lines

Objectives	Terms
<ul style="list-style-type: none">To identify the slope and y-intercept of a line.To graph a line using different forms of a linear function.To use a graph of a line to write the equation of a line.To write and graph a linear function based on real-world situations.	<ul style="list-style-type: none">Linear functionSlope<ul style="list-style-type: none">Types of SlopeY-interceptX-interceptStandard formSlope-intercept formPoint-slope form

Think about this: What makes an equation linear?

Which of the following examples represents a linear relationship? Circle all that apply.



(b)

x	y
0	3
1	5
2	7
3	9

(c) $y = \frac{1}{2}(x + 4) - 3$

(d) $y = 4x - 2$

Think about: What do your selections have in common?

Definitions:

- Linear Function:** Linear functions have a constant _____ and a line that doesn't change _____ when graphed in a coordinate plane.

- Y-intercept:**

- Where the graph crosses the _____.
- As a coordinate point, it is: _____

- X-intercept:**

- Where the graph crosses the _____.
- As a coordinate point, it is: _____

- Slope:** the change of the _____ over the change of the _____. Slope is the behavior of the line.

- Some other ways to write slope are below.

- Formula:

- Words:

- Symbols:

- Rate of Change:

Lesson 11: Graphing Lines

Practice: Use the coordinate points to calculate slope.

--	--	--	--

Types of Slopes: When finding the slope of a linear function, there are 4 possibilities:

Positive Slope	Negative Slope
Zero Slope	Undefined Slope

Think about this: How can we use the graph of a line to write the equation of a line?

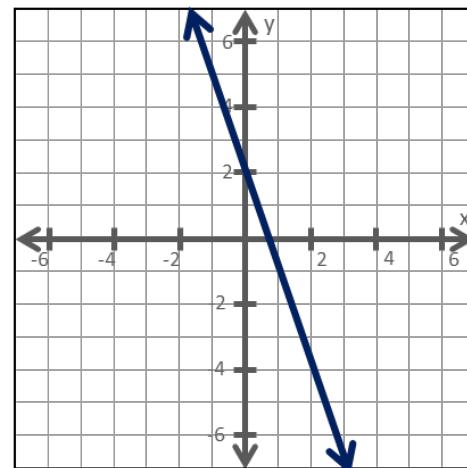
Practice: Use the graph to answer each question.

1. What is the x-intercept of the graph?

2. What is the y-intercept of the graph?

3. What is the slope of the line?

4. What does the slope mean?



Lesson 11: Graphing Lines

Equations of Linear Functions

There are three equations we can use to represent a linear function.

- All forms have: x (input) and y (output).

- **Standard Form**

- Equation: _____

- Can use the x-intercept and the y-intercept to graph.

- **Slope-intercept form**

- Equation: _____

- Gives the slope and the y-intercept of the graph.

- **Point-slope form**

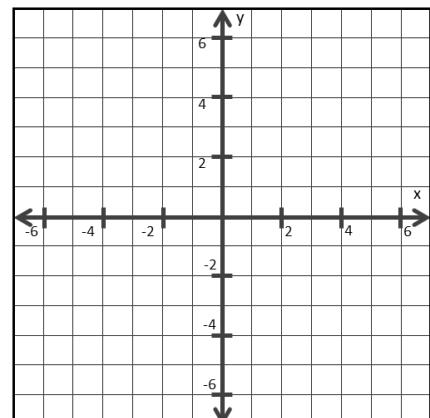
- Equation: _____

- Gives the slope and a coordinate point of the graph.

Practice: For each of the following, use the equation to answer each question and to graph the line.

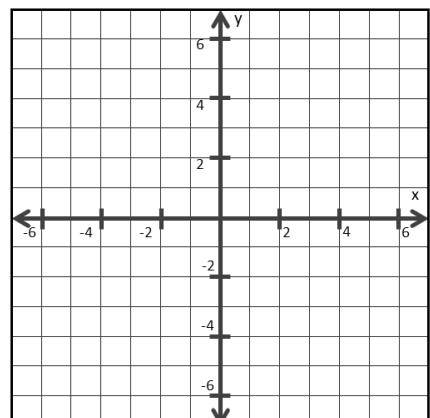
1. Equation: $y = \frac{3}{2}x - 6$

Type of equation:	
Slope of the line:	
x-intercept of the line:	
y-intercept of the line:	



2. Equation: $y - 2 = \frac{1}{2}(x - 6)$

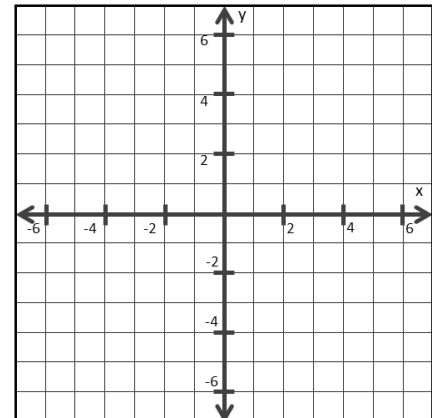
Type of equation:	
Slope of the line:	
x-intercept of the line:	
y-intercept of the line:	



Lesson 11: Graphing Lines

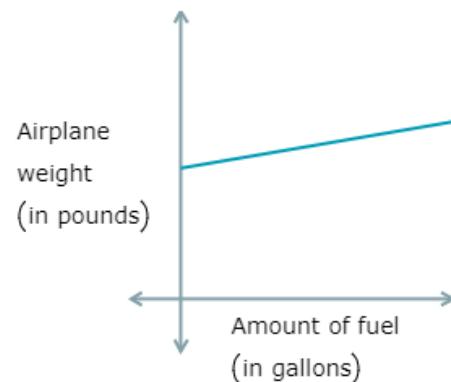
3. Equation: $-2x + y = -4$

Type of equation:	
Slope of the line:	
x-intercept of the line:	
y-intercept of the line:	



4. Suppose that the weight (in pounds) of an airplane is a linear function of the amount of fuel (in gallons) in its tank. When carrying 12 gallons of fuel, the airplane weighs 1978 pounds. When carrying 40 gallons of fuel, it weighs 2160 pounds.

a. What is the slope of this function?



b. What does the slope mean in this context?

c. How much does the airplane weigh if it is carrying 46 gallons of fuel?

Where will you see this in upcoming material?

What are the calculator skills you needed?

Lesson 12: Lines: Word Problems and T-tables

Objectives

- To use t-tables to write the equation of a linear function.
- To use a linear function to complete a t-table.
- To write linear functions based on real-world scenarios.

Terms

- T-table
- Function Notation
- System of Equations
 - Elimination
 - Substitution
 - Graphing

Think about this: What do we know about linear functions?

• **Linear Functions:**

- Have a graph that is a line that does not change direction.
- Have a constant rate of change (the slope).

▪ **Slope Formula:**

- Can be represented in several forms.

▪ **Standard Form:** _____

▪ **Slope-intercept Form:** _____

▪ **Point-slope Form:** _____

- **Function Notation:** Written as _____ and read as _____
 - Input: _____
 - Output: _____
- Can have points organized as a _____ (also known as an _____)

Example

1. How can we use the given table to write the equation of a line?

a. Find the slope of the line.

b. Find the y-intercept of the line.

c. Write the equation of the function.

d. What is the x-intercept of the line?

x	y
-2	
-1	
0	
1	

Lesson 12: Lines: Word Problems and T-tables

Practice

2. Use the given function to complete the following.

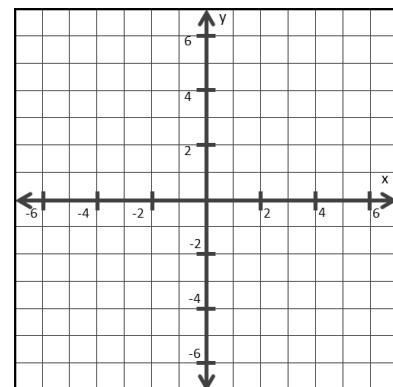
Function: $y = \underline{\hspace{2cm}}$

- a. Identify the slope of the line.

- b. Identify the y-intercept of the line.

- c. Complete the table and graph the function.

x	y
-3	
0	
3	
6	
	0



- d. What is the x-intercept of the line?

Consider this: How can linear functions represent real-world scenarios?

Scenario #1: A printing service charges a set-up fee of \$_____ for each order and _____ cents more for each copy.

- Complete the t-table provided. (Label your input/output and use the space below as needed)
- What value would be the y-intercept in this scenario? What does the y-intercept mean?
- What value would be the slope in this scenario and what units would it have?
- What does the slope mean?
- Write the function that would represent the total cost (C) for an order of x copies.

Input	Evaluate	Output
Copies	Find cost	Total cost
x	$C(x)$	total
0		
1		
2		
3		
4		
10		
20		
x		

Lesson 12: Lines: Word Problems and T-tables

Practice #1: You are saving money for a new phone. You have \$_____ to start and add \$____ each week.

- Complete the t-table. (Label your input/output and use the space below as needed)
- What value would be the y-intercept in this scenario? What does the y-intercept mean?
- What value would be the slope in this scenario?
- What does the slope mean?
- Write the function that would represent the total amount saved (S) for w number of weeks.

w	$S(w)$	total
0		
1		
2		
5		
10		
20		
w		

Scenario #2: A plant is already 10.00 meters tall, and it will grow 10 centimeters every month. The plant's height, H (in meters), after x months is given by the following function.

$$H(x) =$$

- What value would be the y-intercept in this scenario? What does the y-intercept mean?
- What value would be the slope in this scenario? What does the slope mean?
- What is the plant's height after 6 months?
- What is the plant's height after 2 years?

Lesson 12: Lines: Word Problems and T-tables

- **Systems of Equations:** A system of equations is when there are _____ in the same _____. (typically (x, y))
 - **Solution:** Point where both equations are true. (they have the same _____ values in common)
 - **You can solve a system of equations by:**
 - Elimination
 - Substitution
 - Graphing

Use the space provided to solve the following systems.

$$1. \begin{aligned} 5x + 4y &= 22 \\ x - 3y &= -7 \end{aligned}$$

$$2. \begin{aligned} -7x - 6y &= 7 \\ 5x + 3y &= 4 \end{aligned}$$

$$3. \begin{aligned} -2x + y &= 6 \\ y &= \frac{1}{4}x - 1 \end{aligned}$$

Where will you see this in upcoming material?

What are the calculator skills you needed?

Lesson 13: Rational Expressions

Objectives	Terms
<ul style="list-style-type: none">To understand the parts of a fraction.To place fractions on a number line.To perform operations using fractions.Use the fraction rules to simplify expression and solve equations.	<ul style="list-style-type: none">NumeratorDenominatorForm of oneRational ExpressionsReciprocal

Recall: Parts of a Fraction and Form of One

Numerator: How many _____ of the unit you actually have. <hr/>	Form of one: Any number or expression <hr/>
Denominator: If we had 1 unit of something, the _____ of parts of the unit is broken into.	Examples: $\frac{5}{5}$ $\frac{x+2}{x+2}$ $\frac{\log(2x)}{\log(2x)}$

- Rational Expressions:** A fraction with polynomials in the numerator and/or denominator.
- Common Denominator or Least Common Denominator (LCD)**
 - The smallest value that the denominators of fractions have in common.
 - Needed for adding/subtracting fractions.
 - Can be numbers, variables, or a combination of the two.

Examples

1. Use the expression to complete the following:
 - What is a common denominator?
 - Multiply each fraction by a form of one to rewrite with a common denominator.
 - Simplify the expression by adding the fractions.

$$\frac{y}{2} + \frac{3}{x}$$

Lesson 13: Rational Expressions

2. Simplify the expression.

a. What is a common denominator?

$$\frac{12}{(x-1)x} - \frac{4}{x-1}$$

b. Multiply each fraction by a form of one to rewrite with a common denominator.

c. Simplify the expression by adding/subtracting the fractions, then simplifying forms of one.

3. Simplify the expression.

a. Simplify the expressions by multiplying the fractions.

$$\frac{3}{2x-10} \cdot \frac{5x-25}{12}$$

b. Factor each term in the numerator and denominator.

c. Identify forms of one.

d. Simplify forms of one to one and write your final answer.

Lesson 13: Rational Expressions

Dividing Rational Expressions

- **Reciprocal:** When you rewrite a fraction by interchanging the numerator and the denominator.
 - When you divide one fraction by another, you:
 - Convert to a multiplication problem.
 - Take the reciprocal of the second fraction.
 - Change the division to multiplication.
 - Follow the rules developed for fraction multiplication.

4. Simplify the expression.

a. Simplify the expression by multiplying by the reciprocal.

$$\frac{3x}{2x - 8} \div \frac{3x}{5x - 20}$$

b. Factor each term in the numerator and denominator, if possible.

c. Identify forms of one.

d. Simplify forms of one to one and write your final answer.

Lesson 13: Rational Expressions

Practice: Complete the indicated operations. Use the space provided to show your work.

$$1. \frac{3x+9}{x-2} \cdot \frac{4x-8}{9x+18}$$

$$2. \frac{5}{6a} - \frac{9}{8a}$$

$$3. \frac{3}{x-6} + \frac{4}{x+5}$$

$$4. \frac{5x+35}{6} \div \frac{x+7}{3x}$$

Where will you see this in upcoming material?

What are the calculator skills you needed?

Lesson 14: Types of Equations and Functions

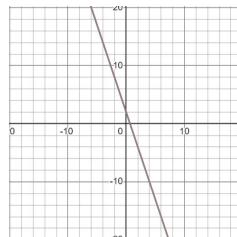
Objectives	Terms
<ul style="list-style-type: none">To identify and classify equations and functions.To be able to determine if a graph represents a function.To evaluate different functions at given inputs.To understand the basic form and graphs of various function types.To identify and write the domain and range of different functions.	<ul style="list-style-type: none">FunctionVertical Line TestFunction FamilyParent Function<ul style="list-style-type: none">LinearQuadraticCubicExponentialRadicalDomain and Range<ul style="list-style-type: none">Interval notation

Think about this:

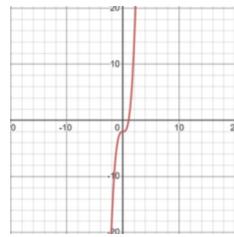
Match each equation to a graph.

$y = -3(2)^x$
Graph _____

A.

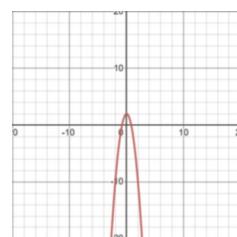


B.

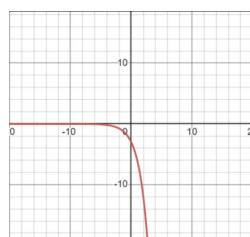


$y = -3x + 2$
Graph _____

C.

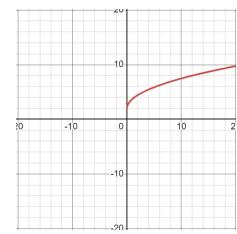


D.



$y = \sqrt{3x} + 2$
Graph _____

E.



$y = 2x^3 - 2$
Graph _____

$y = -3x^2 + 2$
Graph _____

Discuss:

- How accurate were you in your matching?
- What characteristics did you look for that helped you match the equations to the graphs?

Lesson 14: Types of Equations and Functions

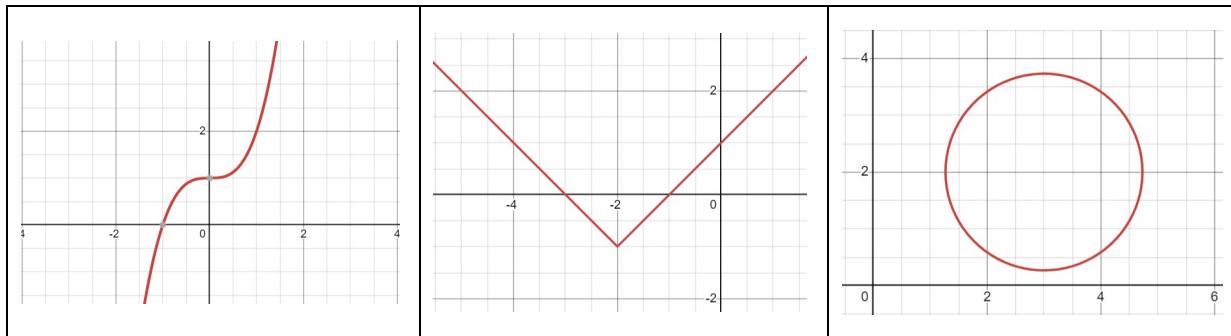
Definitions:

- **Function:** A function is a relation in which each _____ has a unique _____.
 - Functions can be expressed as:
 - Equations
 - Table of Values (also known as a t-table)
 - Ordered Pairs
 - Graphs

Example: $y = -3x + 2$

Equation	Table of Values		Ordered Pairs	Graph
	x	y		
$y = -3x + 2$	-2	8	(-2, 8)	
	0	2	(0, 2)	
	2	-4	(2, -4)	
	3	-7	(3, -7)	

- **Vertical Line Test:** A graph is a function if a vertical line intersects _____ for each point of the graph.



- **Function Family:** groups of functions that share basic _____.
- **Parent Function:** The most basic _____ of a function
 - Domain: _____ values, where a function is _____.
 - Range: _____ values.
 - Interval Notation: A way to state domain and range.
 - Symbols used:
 - Example:

Lesson 14: Types of Equations and Functions

Examples of Function Families		
Linear: $y = x$	Quadratic: $y = x^2$	Cubic: $y = x^3$
Exponential: $y = 2^x$	Radical: $y = \sqrt{x}$	Absolute Value: $y = x $

Finding ordered pairs: To find an ordered pair, also known as a _____ point, select an x-value to act as input and simplify the equation to find the y-value (output).

- **Graphing:** once you have ordered pairs, you can plot them in a coordinate plane and create a graph of the function.

- **Example:** $y = \underline{\hspace{2cm}}$

- Identify the function family of the equation.
- Choose 4 x-values (inputs) and create a t-table. Write the input/output values as ordered pairs. (Use the space below to show your work)
- Plot the points on a coordinate plane.
- Sketch the graph of the function.

Sketch your graph here.

Lesson 14: Types of Equations and Functions

For each function, sketch the graph and identify the function family, the parent function, the domain, and the range.

1. $y = \underline{\hspace{2cm}}$

Function Family	
Parent Function	
Domain	
Range	

1. Sketch your graph here.

2. $y = \underline{\hspace{2cm}}$

Function Family	
Parent Function	
Domain	
Range	

2. Sketch your graph here.

3. $y = \underline{\hspace{2cm}}$

Function Family	
Parent Function	
Domain	
Range	

3. Sketch your graph here.

4. $y = \underline{\hspace{2cm}}$

Function Family	
Parent Function	
Domain	
Range	

4. Sketch your graph here.

Where will you see this in upcoming material?

What are the calculator skills you needed?

Lesson 15: Factoring Quadratics

Objectives	Terms
<ul style="list-style-type: none">To identify standard and factored form of quadratic functions.To multiply quadratics.To factor quadratics.To translate functions between standard and factored form.	<ul style="list-style-type: none">QuadraticsStandard FormFactored FormDistributionFactoringFactoring by GroupingCommon Binomial Factor

Think about this: What is the expression of a quadratic function?

Definitions:

- Quadratic Characteristics:**
 - Graph:** _____
 - Standard Form:** _____
 - _____ are numbers
 - _____ $\neq 0$
 - Factored Form:** _____
 - _____ $\neq 0$
 - _____ are zeros of the function

Practice: Identify each quadratic as either Standard Form, Factored Form, or neither. circle one)

1. $x^2 + 2x - 15$ Standard Form Factored Form Neither

2. $3(x - 9)^2 + 1$ Standard Form Factored Form Neither

3. $2(x - 1)(x + 1)$ Standard Form Factored Form Neither

Discuss: How can you take intercept form and change it to standard form?

Multiply: _____

Distribution: multiply each term in one set of parentheses to each term in the other set of parentheses.

FOIL: Guided Distribution

Table: Guided Distribution

Lesson 15: Factoring Quadratics

Practice: Rewrite the given quadratics in standard form.

$(4x - 1)(x + 2)$	$(3x + 2)(5x + 1)$	$\frac{1}{2}(x - 8)(x + 12)$
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Discuss: How can you take standard form and change it to factored form?

Examples: Rewrite the given quadratics in factored form.

- | | |
|---|---|
| <p>1. $2x^2 + 4x - 30$</p> <p>a. Are there any factors common to each term?
Factor that value.</p> <p>b. What is the new value of b and c?</p> <p>c. What two numbers multiply to c and add to b?</p> <p>d. Write the fully factored form.</p> | <p>2. $x^2 - 17x + 70$</p> <p>a. Are there any factors common to each term?
Factor that value.</p> <p>b. What is the new value of b and c?</p> <p>c. What two numbers multiply to c and add to b?</p> <p>d. Write the fully factored form.</p> |
|---|---|

Definition

- **Factoring:** This is “undoing” distribution. You identify:
 - Common _____ to each term
 - The values of _____ and _____
 - The factors of c that add to _____ (the factors can be _____ and/or _____)
 - These factors are _____ and _____ when writing factored form. (when a = 1)

Lesson 15: Factoring Quadratics

Consider this: How would you factor the following quadratics?

Example: Factor: $5x^2 + 11x + 2$

Mathematical Steps	Description
$5x^2 + 11x + 2$	Identify and factor any common factors (this example does not have any common factors).
	Identify the values of: _____
	Multiply _____ and _____ together
	Find the factors of the product of _____ that add to ____.
	Rewrite the original quadratic: _____
	Create groups with 2 terms each.
	Find the Greatest Common Factor (GCF) of each pair of terms.
	Identify the terms they have in common (the common binomial factor)
	Rewrite the quadratic in factored form. The GCF of each term goes into one set of parentheses and the common binomial factor in another.
	Check your answer by distributing and rewriting in standard form.

Definitions:

- **Factor by Grouping:** A way of factoring quadratics when _____.
 - Can only be used when there are _____ terms.
 - You can create a _____ term in a quadratic by rewriting the _____ to be a sum of the factors of _____.
 - Group the terms into pairs and factor out the GCF of each pair.
 - **Common Binomial Factor:** the two-term expression in common after the GCF is factored out of each pair.
 - The final expression is written in factored form.
 - One factor is the Common Binomial Factor.
 - The other factor is the sum of the two GCFs.

Lesson 15: Factoring Quadratics

Practice: Factor each of the given quadratics. Write your answer in factored form. Check your work by using distribution to return your answer to standard form.

1. $6x^2 - 5x + 1$

Answer:

Check Step:

2. $2x^2 - 8x + 6$

Answer:

Check Step:

3. $x^2 + 13x + 40$

Answer:

Check Step:

Where will you see this in upcoming material?

What are the calculator skills you needed?

Lesson 16: Finding the Zeros of Quadratics

Objectives	Terms
<ul style="list-style-type: none">To factor quadratics and identify zeros.To check zeros of quadratics.To graph a quadratic from different forms.To identify the zeros of a quadratic from a graph.	<ul style="list-style-type: none">Roots/zerosVertex FormParabolax-interceptsReal ZerosAxis of Symmetry

Think about this: What are the zeros of a quadratic function?

Definitions:

- There are different formats for writing a quadratic function. Each form provides different information.

Standard Form: _____ Gives you: Example:	Factored Form: _____ Gives you: Example:
Vertex Form: _____ Gives you: This is where: Example:	Graph:

- Axis of Symmetry:**
 - Is a _____ line, with the equation of: _____
 - It is the _____ of the vertex.
 - It cuts the graph of a quadratic into _____ halves.
- Zeros:** The zero of a quadratic is when the equation is _____ and you solve for _____.
 - Zeros are also known as _____.
 - Can find the zeros by graphing or using the Quadratic Formula.
 - Quadratic Formula:
- Check:** To check if the zeros are correct, you evaluate the quadratic with the _____ found while solving when $y = 0$. If the result is _____, then the value is an x-intercept or a zero of the quadratic function.

Lesson 16: Finding the Zeros of Quadratics

- **Graph:** The graph of a quadratic is called a _____.
 - The _____ of the quadratic are where the parabola crosses the _____.
 - If the graph crosses the x-axis and represents a real solution.
 - There are:
 - **2 real zeros**
 - **1 real zero**
 - **No real zero**

Examples: Use the space provided to find the x-intercepts and the vertex of each quadratic. Sketch your graph in the space provided.

1. **2 real zeros:** $y = (x + 5)(x - 3)$

a. x-intercept(s):

Sketch your graph here.

b. Vertex:

2. **1 real zero:** $y = 3(x + 4)^2$

a. x-intercept(s):

Sketch your graph here.

b. Vertex:

3. **No real zeros:** $y = 3x^2 + 4x + 5$

a. x-intercept(s):

Sketch your graph here.

b. Vertex:

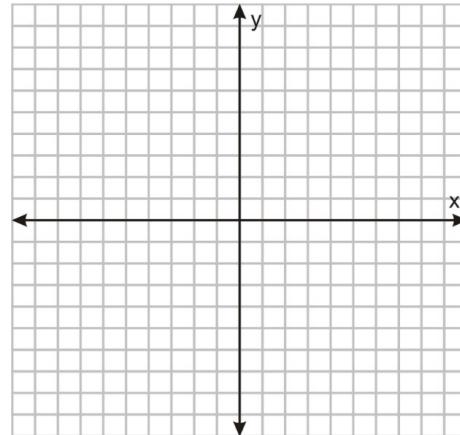
Lesson 16: Finding the Zeros of Quadratics

Example: Use your graphing calculator to graph each quadratic.

Graph each of the following quadratics.

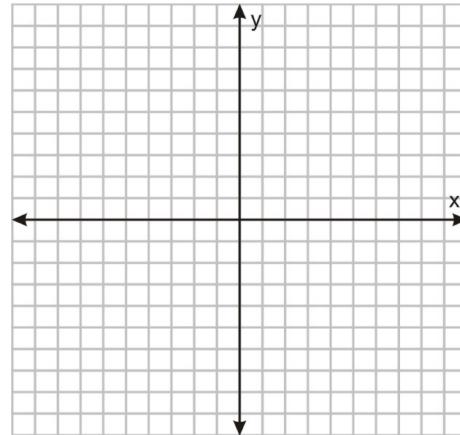
1. $y = \underline{\hspace{2cm}}$

- Sketch the graph.
- Where does the graph cross the x-axis?



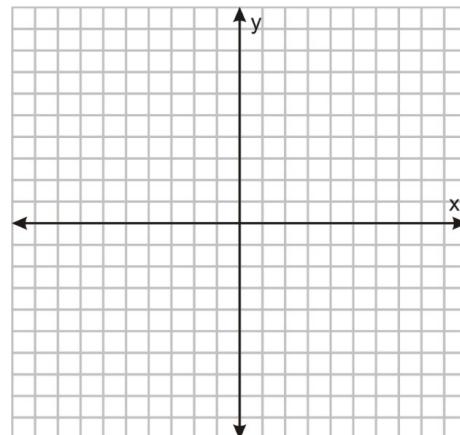
2. $y = \underline{\hspace{2cm}}$

- Sketch the graph.
- Where does the graph cross the x-axis?



3. $y = \underline{\hspace{2cm}}$

- Sketch the graph.
- Where does the graph cross the x-axis?



Lesson 16: Finding the Zeros of Quadratics

Solve by Factoring: Factor the quadratic and find the zeros.

Quadratic: $y =$ _____

Mathematical Steps	Description
	Factor out any factor common to all three terms.
	Rewrite in factored form.
	Set $y = 0$ (think about why we do this)
	Set each factor with a variable equal to 0 and solve for x
	Check your answers by plugging in each x -value into the quadratic.
	State the answer as $x =$ _____.

Practice: Find the zeros to each quadratic. Test your value(s).

1. $y = x^2 + 2x - 15$ Test Step: <div style="border: 1px dashed black; height: 40px; width: 100%;"></div> Zeros(s): <div style="border: 1px dashed black; height: 15px; width: 100%;"></div>	2. $y = 2x^2 - 7x - 4$ Test Step: <div style="border: 1px dashed black; height: 40px; width: 100%;"></div> Zero(s): <div style="border: 1px dashed black; height: 15px; width: 100%;"></div>
--	---

Where will you see this in upcoming material?	What are the calculator skills you needed?
---	--

Section III

Support Materials

Formulas

Use this space to organize any formulas and other information you need to memorize for Math 100.

Geometry Formulas

Use this space to record the geometry formulas (perimeter, area, volume, or surface area) you use in Math 100.

Shape	Formulas	Examples
Circle		
Rectangle		
Triangle		
Cylinder		
Rectangular Prism		

Linear Formulas

Use this space to record the linear formulas (slope, equations for a line, vertical and horizontal lines, etc.) you use in Math 100.

Name	Formula	Examples
Slope		
Slope-Intercept Form		
Point-Slope Form		
Standard Form		

Properties of Exponents

Use this space to record the properties of exponents as you learn about them in Math 100.

Property	Definition	Example
Product Rule		
Quotient Rule		
Power of a Power Rule		
Power of a Product Rule		
Power of a Fraction Rule		
Zero Exponent Rule		
Negative Exponent Rule (type 1)		
Negative Exponent Rule (type 2)		

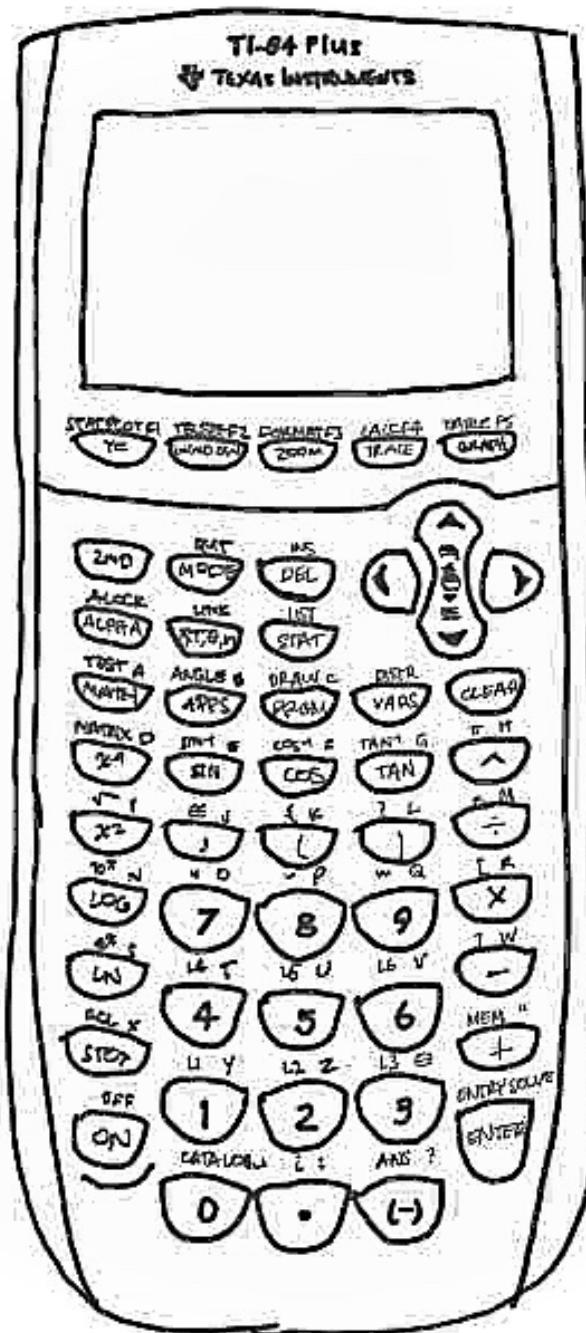
Metric Conversions

Fill in the Metric Conversions chart below as you work to memorize these measurements. You can also use the rest of the space on this page to keep track of other formulas.

milli-	centi-	deci-	meter gram liter	deca-	hecta-	kilo-
			1		100	

Calculator Guide

Use this space to record any calculator buttons and processes you need to memorize for Math 100.



Important Calculator Skills

Order of Operations (Exponents and Grouping Symbols)

1. Insert parentheses around the entire base of the exponential expression as needed
 - a. Example: To calculate $(2 + 6)^2$, type $(2 + 6)$ first
2. Select “^” to indicate an exponent
3. Type the desired exponent
 - a. To input a negative number, press (-) before typing the number
4. Press “ENTER” to evaluate

Absolute Value:

1. Select “MATH” button
2. Scroll right to the “NUM” menu
3. Select “ABS(“ which should be option 1. This is the absolute value function
4. Enter your number or expression inside the parenthesis
 - a. Example: ABS (-7) will return 7
5. Press “ENTER” to see the result

Example: Page 143, 3.008: Evaluate

$$\frac{(2 + 6)^2}{4 \times 9 - 4}$$

Additional Practice:

- Page 142 #3.006
- Page 167 #5.042
- Page 174 #6.011

How to enter fractions on your calculator:

TI-83: Fractions are entered as division between two integers using parentheses and the division operator

- How it might look on your calculator: $(4/5) - (3/7)$

TI-84: Steps

1. Select “**ALPHA**”
2. Select “**Y=**” to open the frac menu
3. Choose one of the following
 - a. “**n/d**” for a simple fraction (numerator/denominator)
 - b. “**U n/d**” for a mixed number (whole number + fraction)

Example: page 131, 2.031:

$$7\frac{2}{3} - 2\frac{3}{4}$$

Additional Practice:

- Page 129 #2.029

Converting decimals to fractions:

TI-83 and TI-84:

1. First enter your decimals
 - a. Ex. 14.85+14.52
2. Then select “MATH”
3. Select “FRAC” to convert the result to a fraction
 - a. The answer should display as 14.85+14.52>Frac, Answer
4. Press “ENTER” to see the fractional form of the result

Example: Page 124 #2.042:

$$13.53 + 7.385$$

Additional Practice:

- Page 125 #2.044
- Page 125 #2.045

Convert percents to fractions:

1. Divide the percent by 100 to convert to a decimal
 - a. Example: 25% divided by 100 becomes 0.25
2. Select “MATH”
3. Then Select “FRAC” to convert the decimal into a fraction
4. Press “ENTER” to see the result
 - a. Example: 0.25 becomes 1/4

Example: Page 145, 4.020: Write 75% as a fraction in the simplest form.

Additional Practice:

- Page 153 #4.021
- Page 153 #4.023

Radical and Fractional Exponents

Fractional exponents:

1. Insert parentheses around the entire base of the exponential expression when applicable
 - o Example: To evaluate $(4/5)^2$, type $(2 + 6)^2$
2. Select the “ \wedge ” key
3. Type the numerator
4. Press the “ \div ” key
5. Type the denominator of the exponent
6. Press “ENTER”
7. What it might look like in your calculator
 - o $(4/5) ^2$
 - o $((4) ^4 / (5))$

Radicals:

1. Select “MATH”
2. Choose menu option 5 “ $\sqrt[x]{()}$ ” to insert the square root function
3. Type the number or expression inside the parenthesis
4. Press “ENTER” to evaluate
 - a. Example: $\sqrt[2]{(25)}$ returns 5

Example: Page 225 #8.035:

Evaluate the following. Write “Not a real number” if applicable

a. $(-32)^{\frac{1}{5}}$

b. $(-25)^{\frac{1}{2}}$

Additional Practice:

- Page 211 #7.090

Entering Functions and Table of Values

Enter your function rule:

1. Press the “Y=” button to open the function editor
2. Type in the left-hand side of the function (e.g., $y = 2x + 1$)
 - a. Press “X,T,θ,n” to enter in your variable
3. To view table of values
 - a. press “2ND” and then “GRAPH” to open the table

x	y
-1	
0	
1	
5	

Example: Page 184 #6.071:

Fill in the table using the function rule

$$y = -10x + 1$$

x	f(x)
-8	
-7	
-3	
74	

Additional Practice:

- Page 225 #8.033:

Graphing Functions

1. Press “**Y=**” to open the function editor
2. Enter your function in one of the lines
 - a. Example: $Y1=2X+3$
3. Press “**GRAPH**” to display the graph

Setting the Window

1. Press “**WINDOW**”
2. Adjust the following:
 - a. Xmin: Minimum x-value
 - b. Xmax: Maximum x-value
 - c. Ymin: Minimum y-value
 - d. Ymax: Maximum Y value
 - e. Xscl and Yscl: Scale for tick marks (optional)

Finding Intercepts

1. y-intercepts
 - a. The y-intercept is where the graph crosses the y-axis.
 - b. On the graph, look at where $x = 0$.
 - c. You can also evaluate the function at $x = 0$ using the “**TABLE**” or “**CALC**” menu.
2. x-Intercepts
 - a. Press “**2nd** → **TRACE**” to access the “**CALC**” menu.
 - b. Choose 2: Zero.
 - c. Move the cursor near the x-intercept.
 - d. Set a left bound, then a right bound, and press “**ENTER**”.
 - e. The calculator will display the x-intercept.

Finding the intersection of two lines

1. Enter both functions in $Y1$ and $Y2$.
2. Press “**GRAPH**”.
3. Press “**2nd** → **TRACE**” to open the “**CALC**” menu.
4. Choose 5: “**INTERSECT**”.
5. Select the first curve, then the second curve.
6. Move the cursor near the intersection point and press “**ENTER**”.
7. The calculator will show the coordinates of the intersection.

Section IV

Module Review Problems

Refresh 1

This module focuses on the foundations of math. It takes you through the operations of addition, subtraction, multiplication, and division of whole numbers, fractions, and decimals. It will also review the basic geometric figures, how to identify units of measure, and rounding rules. Concepts **Refresh 1** are supported by **Lessons 2A - 2D**, which review the rounding rules you will need for this module.

Objectives:

By the end of this module, students will be able to:

- Understand place value and how to write numbers in expanded form.
 - Understand rounding rules and how to approximate values.
 - Perform addition, subtraction, multiplication, and division with whole numbers.
 - Understand what makes a value a fraction or a decimal and how to convert between the two forms.
 - Calculate the perimeter and area of polygons.
-
-

Give the digit in the thousands place and the tens place.

6,378

thousands:

tens:

Answer:

thousands: 6

tens: 7

Explanation:

- The thousands place is the fourth digit from the right.
- In 6,378, the digit in the thousands place is 6.
- The tens place is the second digit from the right.
- In 6,378, the digit in the tens place is 7.

1.001

Give the digits in the hundred thousands place and the ten thousands place.

301,592

hundred thousands:

ten thousands:

Answer:

hundred thousands: 3

ten thousands: 0

Explanation:

- The hundred thousands place is the sixth digit from the right.
- In 301,592, the digit in the hundred thousands place is 3.
- The ten thousands place is the fifth digit from the right.
- In 301,592, the digit in the ten thousands place is 0.

1.002

Write 915 in expanded form.

Answer:

$$915 = 900 + 10 + 5$$

Explanation:

- Break down each digit by its place value.
- 9 is in the hundreds place: 900.
- 1 is in the tens place: 10.
- 5 is in the ones place: 5.
- Combine: $900 + 10 + 5$.

1.003

Write 3,500,000 in expanded form.

Answer:

$$3,500,000 = 3,000,000 + 500,000$$

Explanation:

- Identify non-zero digits and their place values.
- 3 is in the millions place: 3,000,000.
- 5 is in the hundred-thousands place: 500,000.
- Combine: $3,000,000 + 500,000$.

1.004

Write the number for *fifty-nine thousand nine hundred three*.

Answer:

$$59,903$$

Explanation:

- "Fifty-nine thousand" = 59,000.
- "Nine hundred" = 900.
- "Three" = 3.
- Combine: 59,903.

1.005

Write the number for *fifty-one million thirty thousand*.

Answer:

$$51,030,000$$

Explanation:

- "Fifty-one million" = 51,000,000.
- "Thirty thousand" = 30,000.
- Combine: 51,030,000.

1.006

Add.

$$9 + 7$$

Answer: 16**Explanation:**

- Add the two numbers: $9 + 7$.
- $9 + 7 = 16$.
- Since the sum is greater than 9, regrouping occurs (carry to tens place).

1.007

Add.

$$\begin{array}{r} 63 \\ + 26 \\ \hline \end{array}$$

Answer: 89**Explanation:**

- Add ones: $3 + 6 = 9$.
- Add tens: $6 + 2 = 8$.
- Final sum: 89.

1.009

Add.

$$5 + 6 + 5$$

Answer: 16**Explanation:**

- Add the first two numbers: $5 + 6 = 11$.
- Add the last number: $11 + 5 = 16$.

1.008

Add.

$$69 + 6$$

Answer: 75**Explanation:**

- Add ones: $9 + 6 = 15$ (write 5, carry 1).
- Add tens: $6 + 1(\text{carry}) = 7$.
- Final sum: 75.

1.010

Add.

$$\begin{array}{r} 19 \\ + 64 \\ \hline \end{array}$$

Answer: 83

Explanation:

- Add ones: $9 + 4 = 13$ (write 3, carry 1).
- Add tens: $1 + 6 + 1(\text{carry}) = 8$.
- Final sum: 83.

1.011

Add.

$$\begin{array}{r} 552 \\ + 98 \\ \hline \end{array}$$

Answer: 650

Explanation:

- Add ones: $2 + 8 = 10$ (write 0, carry 1).
- Add tens: $5 + 9 + 1(\text{carry}) = 15$ (write 5, carry 1).
- Add hundreds: $5 + 1(\text{carry}) = 6$.
- Final sum: 650.

1.012

Refresh 1

Add.

$$\begin{array}{r} 385 \\ 95 \\ +8893 \\ \hline \end{array}$$

Answer: 9373

Explanation:

- Add ones: $5 + 5 + 3 = 13$ (write 3, carry 1).
- Add tens: $8 + 9 + 9 + 1 = 27$ (write 7, carry 2).
- Add hundreds: $3+8+8+2 = 21$ (write 1, carry 2).
- Add thousands: $0+0+8+2 = 10$ (write 0, carry 1).
- Final sum: 9373.

1.013

Subtract.

$$\begin{array}{r} 58 \\ -34 \\ \hline \end{array}$$

Answer: 24

Explanation:

- Subtract ones: $8 - 4 = 4$.
- Subtract tens: $5 - 3 = 2$.
- Final answer: 24.

1.015

Subtract.

$$17 - 8$$

Answer: 9

Explanation:

- Subtract 8 from 17.
- $17 - 8 = 9$.

1.014

What number is one thousand more than 6,235?

Answer: 7235

Explanation:

- Add 1000 to 6,235.
- $6,235 + 1,000 = 7,235$.

1.016

Subtract.

$$\begin{array}{r} 55 \\ - 38 \\ \hline \end{array}$$

Answer: 17

Explanation:

- Subtract ones: $5 - 8$ requires regrouping.
- Borrow from tens: 5 becomes 4, ones becomes 15.
- $15 - 8 = 7$.
- Subtract tens: $4 - 3 = 1$.
- Final answer: 17.

1.017

Subtract.

$$\begin{array}{r} 5148 \\ - 164 \\ \hline \end{array}$$

Answer: 4984

Explanation:

- Subtract ones: $8 - 4 = 4$.
- Tens: $4 - 6$ requires regrouping.
- Borrow from hundreds: 1 becomes 0, tens becomes 14.
- $14 - 6 = 8$.
- Hundreds: $0 - 1$ requires regrouping.
- Borrow from thousands: 5 becomes 4, hundreds becomes 10.
- $10 - 1 = 9$.
- Thousands: 4 remains.
- Final answer: 4984.

1.018

Subtract.

$$6028 - 1443$$

Answer: 4585

Explanation:

- Start with the ones place: $8 - 3 = 5$.
- Tens place: $2 - 4$ requires regrouping.
- Borrow from hundreds: 0 becomes 9, tens becomes 12.
- $12 - 4 = 8$.
- Hundreds: $9 - 4 = 5$.
- Thousands: $5 - 1 = 4$.
- Final answer: 4585.

1.019

Ravi biked 745 miles. John biked 411 miles. How many fewer miles did John bike?

Answer: 334

Explanation:

- Subtract John's miles from Ravi's miles: $745 - 411$.
- Compute: $745 - 411 = 334$.
- So John biked 334 fewer miles.

1.020

Today is Yolanda's birthday. She is 5 years old. How old is Yolanda in months?

Answer: 60 months

Explanation:

- 1 year = 12 months.
- Multiply: $5 \times 12 = 60$.
- So Yolanda is 60 months old.

1.021

Rewrite as a multiplication sentence.

$$4 + 4 + 4 = 12$$

Answer:

$$4 \times 3 = 12$$

Explanation:

- Count how many times 4 is added: 3 times.
- Multiplication is repeated addition.
- So $4 + 4 + 4 = 4 \times 3 = 12$.

1.022

Multiply.

$$5 \times 7$$

Answer: 35

Explanation:

- Multiply 5 by 7.
- $5 \times 7 = 35$.

1.023

Multiply.

$$1000 \times 9$$

Answer: 9000

Explanation:

- Multiply 9 by 1000.
- Add three zeros to 9: 9000.

1.024

Write the next three multiples of 2.

$$4, \underline{\quad}, \underline{\quad}, \underline{\quad}$$

Answer:

$$4, 6, 8, 10$$

Explanation:

- Multiples of 2 are found by adding 2 repeatedly.
- Start with 4, then add 2: $4 + 2 = 6$.
- Add 2 again: $6 + 2 = 8$.
- Add 2 once more: $8 + 2 = 10$.

1.025

Write the next three multiples of 3.

$$21, \underline{\quad}, \underline{\quad}, \underline{\quad}$$

Answer:

$$21, 24, 27, 30$$

Explanation:

- Multiples of 3 are found by adding 3 repeatedly.
- Start with 21, then add 3: $21 + 3 = 24$.
- Add 3 again: $24 + 3 = 27$.
- Add 3 once more: $27 + 3 = 30$.

1.026

Divide.

$$42 \div 7$$

Answer: 6

Explanation:

- Division is the inverse of multiplication.
- Find how many times 7 goes into 42.
- $7 \times 6 = 42$, so $42 \div 7 = 6$.

1.027

Lamar has a bookcase with 40 books. There are 4 shelves in the bookcase. Each shelf has the same number of books. How many books does each shelf have?

Answer: 10 books

Explanation:

- Divide the total number of books by the number of shelves.
- $40 \div 4 = 10$.
- So each shelf has 10 books.

1.028

Justin brought 18 packs of cola to a party, and each pack had 8 cans. Amy brought 7 cans of juice. How many cans did they bring in all?

Answer: 151 cans

Explanation:

- Calculate cans of cola: $18 \times 8 = 144$.
- Add Amy's cans: $144 + 7 = 151$.
- So they brought 151 cans in all.

1.029

Rewrite as a whole number.

$$\begin{array}{r} 60 \\ \hline 6 \end{array}$$

Answer:

10

Explanation:

- A fraction represents division.
- Divide 60 by 6: $60 \div 6 = 10$.
- So the whole number is 10.

1.030

Write the next three multiples of 2.

4, ___, ___, ___

Answer:

4, 6, 8, 10

Explanation:

- Multiples of 2 are found by adding 2 repeatedly.
- Start with 4, then add 2: $4 + 2 = 6$.
- Add 2 again: $6 + 2 = 8$.
- Add 2 once more: $8 + 2 = 10$.

1.031

Write the next three multiples of 3.

21, ___, ___, ___

Answer:

21, 24, 27, 30

Explanation:

- Multiples of 3 are found by adding 3 repeatedly.
- Start with 21, then add 3: $21 + 3 = 24$.
- Add 3 again: $24 + 3 = 27$.
- Add 3 once more: $27 + 3 = 30$.

1.032

Divide.

$$42 \div 7$$

Answer: 6

Explanation:

- Division is the inverse of multiplication.
- Find how many times 7 goes into 42.
- $7 \times 6 = 42$, so $42 \div 7 = 6$.

1.033

Justin brought 18 packs of cola to a party, and each pack had 8 cans. Amy brought 7 cans of juice. How many cans did they bring in all?

Answer: 151 cans

Explanation:

- Calculate cans of cola: $18 \times 8 = 144$.
- Add Amy's cans: $144 + 7 = 151$.
- So they brought 151 cans in all.

1.035

Lamar has a bookcase with 40 books. There are 4 shelves in the bookcase. Each shelf has the same number of books. How many books does each shelf have?

Answer: 10 books

Explanation:

- Divide the total number of books by the number of shelves.
- $40 \div 4 = 10$.
- So each shelf has 10 books.

1.034

Rewrite as a whole number.

$$\frac{60}{6}$$

Answer:

10

Explanation:

- A fraction represents division.
- Divide 60 by 6: $60 \div 6 = 10$.
- So the whole number is 10.

1.036

Evaluate each expression below.
Write "Undefined" as needed.

$$\frac{3}{0} = \underline{\quad}$$

$$0 \div 9 = \underline{\quad}$$

Answer: Undefined, 0
Explanation:

- Division by zero is undefined, so $\frac{3}{0}$ is "Undefined".
- $0 \div 9$ means zero divided into 9 parts, which equals 0.

1.037

Divide.

$$7) \overline{98}$$

Answer: 14
Explanation:

- Perform division as shown in the image.
- Regroup when necessary to complete the division.
- The quotient is 14.

1.039

Divide.

$$3) \overline{369}$$

Answer: 123
Explanation:

- Divide the dividend by the divisor as shown in the image.
- No regrouping is needed; perform standard division.
- The quotient is 123.

1.038

Divide.

$$4500 \div 9$$

Answer: 500
Explanation:

- Divide 4500 by 9.
- $9 \times 500 = 4500$.
- So the quotient is 500.

1.040

Divide.

$$630 \div 90$$

Answer: 7

Explanation:

- Divide 630 by 90.
- Remove one zero from each number: $63 \div 9 = 7$.
- So the quotient is 7.

1.041

Divide. Give the quotient and remainder.

$$26 \div 5$$

Quotient:

Remainder:

Answer:

Quotient: 5

Remainder: 1

Explanation:

- Divide 26 by 5.
- $5 \times 5 = 25$ (closest multiple without exceeding 26).
- Subtract: $26 - 25 = 1$.
- So quotient = 5 and remainder = 1.

1.042

Ahmad has 22 carnival ride tickets and it takes 4 tickets to ride the roller coaster. How many times can he ride the coaster? How many tickets will he have left over?

$$\boxed{\text{Number of times he can ride the coaster}} =$$

$$\boxed{\text{Number of tickets left over}} =$$

Answer:

Number of times he can ride the coaster = 5

Number of tickets left over = 2

Explanation:

- Divide the total tickets by tickets per ride: $22 \div 4$.
- 4 goes into 22 five times (since $4 \times 5 = 20$).
- Subtract: $22 - 20 = 2$ tickets remain.
- So he can ride 5 times and have 2 tickets left over.

1.043

Divide. Give the quotient and remainder.

$$556 \div 8$$

Quotient:

Remainder:

Answer:

Quotient: 69

Remainder: 4

Explanation:

- Divide 556 by 8.
- $8 \times 69 = 552$ (closest multiple without exceeding 556).
- Subtract: $556 - 552 = 4$.
- So quotient = 69 and remainder = 4.

1.044

Refresh 1

Use $<$, $>$, or $=$ to compare the numbers.

$$66 \underline{\quad} 2$$

$$60 \underline{\quad} 63$$

$$603 \underline{\quad} 167$$

$$47 \underline{\quad} 394$$

Answer: $>$, $<$, $>$, $<$

Explanation:

- Compare 66 and 2: 66 is greater.
- Compare 60 and 63: 60 is less.
- Compare 603 and 167: 603 is greater.
- Compare 47 and 394: 47 is less.

1.045

Round 384 to the nearest hundred.

Answer: 400

Explanation:

- Identify the hundreds place: 3.
- Look at the digit to the right (tens place): 8.
- Since $8 \geq 5$, round up.
- So 384 rounded to the nearest hundred is 400.

1.047

Order these numbers from least to greatest.

83,261 507,118 78,634 7,510

_____ $<$ _____ $<$ _____ $<$ _____

Answer:

$7,510 < 78,634 < 83,261 < 507,118$

Explanation:

- Compare the numbers by place value starting from the left.
- 7,510 is smallest (thousands).
- Next is 78,634, then 83,261, and finally 507,118.

1.046

Round 7,587 to the nearest hundred.

Answer: 7600

Explanation:

- Identify the hundreds place: 5.
- Look at the digit to the right (tens place): 8.
- Since $8 \geq 5$, round up.
- So 7,587 rounded to the nearest hundred is 7,600.

1.048

Round 281,380 to the nearest ten thousand.

Answer: 280,000

Explanation:

- Identify the digit in the ten-thousands place: 8.
- Look at the digit to the right (thousands place): 1.
- Since 1 < 5, round down.
- So 281,380 rounded to the nearest ten thousand is 280,000.

1.049

Estimate $81,146 - 22,010$ by first rounding each number to the nearest thousand.

Answer: 59,000

Explanation:

- Round 81,146 to the nearest thousand: 81,000.
- Round 22,010 to the nearest thousand: 22,000.
- Subtract the rounded numbers: $81,000 - 22,000 = 59,000$.

1.051

Estimate $9082 + 2542$ by first rounding each number to the nearest thousand.

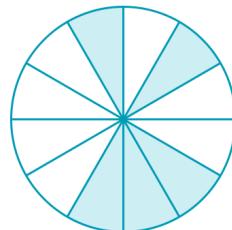
Answer: 12,000

Explanation:

- Round 9082 to the nearest thousand: 9000.
- Round 2542 to the nearest thousand: 3000.
- Add the rounded numbers: $9000 + 3000 = 12,000$.

1.050

The circle below is cut into 12 equal slices. What fraction of the circle is shaded?



Answer: $\frac{5}{12}$

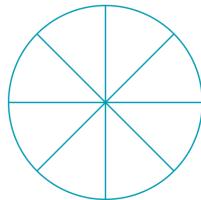
Explanation:

- Count the shaded slices: 5.
- Total slices: 12.
- Write as a fraction: $\frac{5}{12}$.

1.052

Refresh 1

The pie below is cut into 8 equal slices. Shade $1/4$ of this pie.



Answer:



Explanation:

- $1/4$ means one part out of four equal parts.
- The pie has 8 slices, so divide into groups of 2 slices each.
- Shade 2 slices to represent $1/4$.

1.053

Write $\frac{10}{15}$ in simplest form.

Answer: $\frac{2}{3}$

Explanation:

- Find the greatest common divisor (GCD) of 10 and 15, which is 5.
- Divide numerator and denominator by 5: $10 \div 5 = 2$, $15 \div 5 = 3$.
- So the fraction in simplest form is $\frac{2}{3}$.

1.055

Fill in the blank to make the two fractions equivalent.

$$\frac{\underline{\hspace{1cm}}}{30} = \frac{3}{5}$$

Answer: 18

Explanation:

- Compare denominators: 30 and 5.
- Multiply 5 by 6 to get 30.
- Multiply numerator by the same factor: $3 \times 6 = 18$.
- So the missing numerator is 18.

1.054

Write the fraction $\frac{5}{20}$ in simplest form.

Answer: $\frac{1}{4}$

Explanation:

- Find the GCD of 5 and 20, which is 5.
- Divide numerator and denominator by 5: $5 \div 5 = 1$, $20 \div 5 = 4$.
- So the fraction in simplest form is $\frac{1}{4}$.

1.056

What is the position of E on the number line below? Write your answer as a fraction or mixed number.



Answer: $1\frac{2}{4}$

Explanation:

- Identify the whole number part: E is past 1.
- Count the fractional parts: E is at 2 out of 4 equal sections beyond 1.
- So the position is $1\frac{2}{4}$ (which could also simplify to $1\frac{1}{2}$).

1.057

Plot $\frac{5}{6}$ and $1\frac{1}{3}$ on the number line below.



Answer:



Explanation:

- Divide the number line into equal parts based on the denominators.
- Place each fraction at its correct position according to its value.
- Verify that fractions with the same denominator are evenly spaced.

1.058

Refresh 1

Order these fractions from least to greatest.

$$\frac{2}{11} \quad \frac{9}{11} \quad \frac{7}{11}$$

$$\underline{\hspace{1cm}} < \underline{\hspace{1cm}} < \underline{\hspace{1cm}}$$

Answer: $\frac{2}{11} < \frac{7}{11} < \frac{9}{11}$

Explanation:

- All fractions have the same denominator (11), so compare numerators.
- Order numerators: 2, 7, 9.
- So the order is $\frac{2}{11} < \frac{7}{11} < \frac{9}{11}$.

1.059

Order these fractions from least to greatest.

$$\frac{2}{9} \quad \frac{2}{3} \quad \frac{2}{6}$$

$$\underline{\hspace{1cm}} < \underline{\hspace{1cm}} < \underline{\hspace{1cm}}$$

Answer: $\frac{2}{9} < \frac{2}{6} < \frac{2}{3}$

Explanation:

- All fractions have the same numerator (2), so compare denominators.
- Larger denominator means smaller fraction.
- Order denominators: 9, 6, 3.
- So the order is $\frac{2}{9} < \frac{2}{6} < \frac{2}{3}$.

1.060

What is $\frac{1}{4}$ of 20?

Answer: 5

Explanation:

- To find $\frac{1}{4}$ of 20, multiply 20 by $\frac{1}{4}$.
- $20 \times \frac{1}{4} = \frac{20}{4}$.
- Simplify: $\frac{20}{4} = 5$.

1.061

Multiply.

$$\frac{2}{5} \times 45$$

Answer: 18

Explanation:

- Multiply the whole number by the numerator: $45 \times 2 = 90$.
- Divide by the denominator: $90 \div 5 = 18$.
- So the product is 18.

1.062

Multiply. Write your answer as a fraction in simplest form.

$$\frac{3}{26} \times 8$$

Answer: $\frac{12}{13}$

Explanation:

- Multiply the numerator by the whole number: $3 \times 8 = 24$.
- Keep the denominator: 26.
- Fraction is $\frac{24}{26}$.
- Simplify by dividing numerator and denominator by 2: $\frac{24}{26} = \frac{12}{13}$.

1.063

Subtract.

$$\frac{5}{11} - \frac{2}{11}$$

Answer: $\frac{3}{11}$

Explanation:

- Fractions have the same denominator, so subtract numerators.
- $5 - 2 = 3$.
- Keep the denominator: 11.
- So the result is $\frac{3}{11}$.

1.064

Add. Write your answer as a fraction in simplest form.

$$\frac{3}{8} + \frac{1}{8}$$

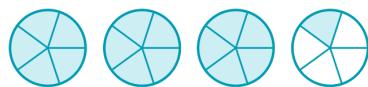
Answer: $\frac{1}{2}$

Explanation:

- Fractions have the same denominator, so add numerators.
- $3 + 1 = 4$.
- Keep the denominator: 8.
- Fraction is $\frac{4}{8}$.
- Simplify: $\frac{4}{8} = \frac{1}{2}$.

1.065

Each circle counts as one whole. Write a mixed number giving the amount shaded. Then, write this amount as an improper fraction.



a) Mixed number:

b) Improper fraction:

Answer: a) Mixed number: $3\frac{1}{5}$

b) Improper fraction: $\frac{16}{5}$

Explanation:

- Count the whole circles: 3.
- Count the shaded part of the last circle: $\frac{1}{5}$.
- Mixed number: $3\frac{1}{5}$.
- Convert to improper fraction:
 $(3 \times 5) + 1 = 15 + 1 = 16$.
- So improper fraction is $\frac{16}{5}$.

1.066

Write $\frac{23}{9}$ as a mixed number.

Answer: $2\frac{5}{9}$

Explanation:

- Divide 23 by 9.
- The quotient is 2 (whole number part).
- The remainder is 5 (numerator of the fraction).
- Keep the denominator as 9.
- So the mixed number is $2\frac{5}{9}$.

1.067

Write $1\frac{1}{5}$ as an improper fraction.

Answer: $\frac{6}{5}$

Explanation:

- Multiply the whole number (1) by the denominator (5): $1 \times 5 = 5$.
- Add the numerator (1): $5 + 1 = 6$.
- Keep the denominator as 5.
- So the improper fraction is $\frac{6}{5}$.

1.068

Add. Write your answer as a mixed number in simplest form.

$$6\frac{2}{11} + 1\frac{8}{11}$$

Answer: $7\frac{10}{11}$

Explanation:

- Add whole numbers: $6 + 1 = 7$.
- Add fractions: $\frac{2}{11} + \frac{8}{11} = \frac{10}{11}$.
- Combine: $7\frac{10}{11}$.

1.069

Add. Write your answer as a mixed number in simplest form.

$$9\frac{3}{8} + 6\frac{7}{8}$$

Answer: $16\frac{1}{4}$

Explanation:

- Add whole numbers: $9 + 6 = 15$.
- Add fractions: $\frac{3}{8} + \frac{7}{8} = \frac{10}{8}$.
- Rename $\frac{10}{8}$ as $1\frac{2}{8} = 1\frac{1}{4}$.
- Combine: $15 + 1\frac{1}{4} = 16\frac{1}{4}$.

1.070

Subtract. Write your answer as a mixed number in simplest form.

$$4\frac{7}{10} - 2\frac{9}{10}$$

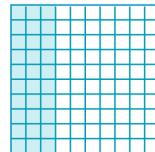
Answer: $1\frac{4}{5}$

Explanation:

- Subtract whole numbers: $4 - 2 = 2$.
- Subtract fractions: $\frac{7}{10} - \frac{9}{10} = -\frac{2}{10}$.
- Borrow 1 from 2: $1 + \frac{10}{10} - \frac{2}{10} = 1\frac{8}{10}$.
- Simplify $\frac{8}{10}$ to $\frac{4}{5}$.
- So the answer is $1\frac{4}{5}$.

1.071

The figure below is divided into 100 small squares of equal size. How much of the figure is shaded? Give the amount as a fraction and as a decimal.



Fraction:

Decimal:

Answer: Fraction: $\frac{30}{100}$ Decimal:

0.3

Explanation:

- Count the shaded squares: 30 out of 100.
- Write as a fraction: $\frac{30}{100}$.
- Convert to decimal: 0.3.

1.072

Give the digits in the tenths place and the hundredths place.

64.01

tenths:

hundredths:

Answer: tenths: 0

hundredths: 1

Explanation:

- The tenths place is the first digit to the right of the decimal point.
- In 64.01, the digit in the tenths place is 0.
- The hundredths place is the second digit to the right of the decimal point.
- In 64.01, the digit in the hundredths place is 1.

1.073

Write the following number in standard decimal form.

two hundredths

Answer: 0.02

Explanation:

- "Two hundredths" means 2 parts out of 100.
- The hundredths place is the second digit after the decimal point.
- So, the decimal form is 0.02.

1.074

Write the following number in standard decimal form.

eleven and five hundredths

Answer: 11.05

Explanation:

- "Eleven" is the whole number part.
- "Five hundredths" means 5 parts out of 100.
- Place 5 in the hundredths position: 11.05.

1.075

What is the location of C on the decimal number line below? Write your answer as a decimal.



Answer: 2.4

Explanation:

- The number line is divided into tenths (0.1 increments).
- Find point C between 2.3 and 2.5.
- C is at 2.4.

1.076

What is the location of C on the decimal number line below? Write your answer as a decimal.



Answer: 2.52

Explanation:

- The number line is divided into hundredths (0.01 increments).
- Find point C between 2.51 and 2.53.
- C is at 2.52.

1.077

Fill in the blank with the correct units.

- Chau drank about 2 ____ of juice with lunch. (cups/gallons)
- A whale weighs about 45 ____ . (ounces/pounds/tons)
- Kira's family went on a hike that was about 5 ____ . (inches/feet/yards/miles)

Answer: a) cups

- b) tons
c) miles

Explanation:

- (a) A person typically drinks a few cups of juice, not gallons.
- (b) Whales are extremely heavy, so their weight is measured in tons.
- (c) A hike is several miles long, not inches, feet, or yards.

1.078

Use $<$, $>$, or $=$ to compare the following decimals.

$$1.2 \quad \underline{\hspace{1cm}} \quad 1.07$$

$$0.36 \quad \underline{\hspace{1cm}} \quad 0.54$$

$$0.50 \quad \underline{\hspace{1cm}} \quad 0.5$$

Answer: $>$, $<$, $=$

Explanation:

- Compare 1.2 and 1.07: 1.2 is greater because 0.2 $>$ 0.07.
- Compare 0.36 and 0.54: 0.36 is less because 36 hundredths $<$ 54 hundredths.
- Compare 0.50 and 0.5: They are equal because both represent the same value.

1.079

Write 0.4 as a fraction in simplest form.

Answer: $\frac{2}{5}$

Explanation:

- 0.4 means 4 tenths.
- Write as $\frac{4}{10}$.
- Simplify by dividing numerator and denominator by 2: $\frac{4}{10} = \frac{2}{5}$.

1.081

Write 0.46 as a fraction. Do not try to simplify your answer.

Answer: $\frac{46}{100}$

Explanation:

- 0.46 means 46 hundredths.
- Write 46 as the numerator and 100 as the denominator.
- So the fraction is $\frac{46}{100}$.

1.080

Write $\frac{62}{100}$ as a decimal.

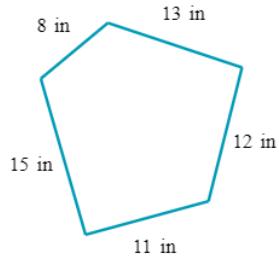
Answer: 0.62

Explanation:

- A fraction with denominator 100 converts to decimal by placing numerator in hundredths place.
- $\frac{62}{100}$ means 62 hundredths.
- So the decimal is 0.62.

1.082

Find the perimeter of the following polygon. Be sure to include the correct unit in your answer.



Answer: 59 in

Explanation:

- Add all side lengths shown in the figure.
- Sum: $12 + 8 + 12 + 8 + 19 = 59$.
- Include the unit: inches.

1.083

Find the perimeter of the square. Be sure to write the correct unit in your answer.



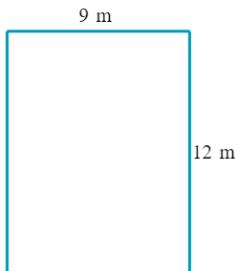
Answer: 60 in

Explanation:

- A square has 4 equal sides.
- Each side is 15 inches.
- Multiply: $15 \times 4 = 60$.
- Include the unit: inches.

1.084

Find the area of this rectangle.



Answer: 108m^2

Explanation:

- The area of a rectangle is found by multiplying its length by its width.
- From the figure, the length is 12 meters and the width is 9 meters.
- Multiply: $12 \times 9 = 108$.
- Include the correct unit: square meters (m^2).

1.085

The following topics are not included in the Class Notes but can be found in ALEKS

The following ALEKS topics are also included in Math 100, but sample problems are not included in the class notes. If you have would like help finding these topics to practice, come to office hours and ask a Math 100 TA.

- (1.086) Introduction to properties of addition
- (1.087) Understanding decimal position on a number line using zoom: Hundredths
- (1.088) Identifying parallel and perpendicular lines

Refresh 2

This module continues to develop more complex orders of operations, building on Refresh 1. You will work through prime factorization, more complex operations with fractions, and solving problems that represent real-world situations. Concepts in **Refresh 2** are supported by **Lessons 1A - 1D**, which review prime numbers and methods for factoring, **Lessons 3A - 3D**, which revisit the rules for order of operations, and **Lessons 4A - 4G**, which walk you through an overview of fractions.

Objectives:

By the end of this module, students will be able to:

- Identify the prime factors of a number.
 - Use Order of Operations to evaluate expressions using whole numbers, fractions, and decimals.
 - Compare and order numbers that include whole numbers, fractions, and decimals.
 - Work with 2-dimensional figures to find missing lengths and perimeters.
 - Classify and label solid geometric figures.
-
-

Refresh 2

<p>Two boxes are stacked one on top of the other. One box is 5 feet 10 inches tall, and the other is 3 feet 7 inches tall. How high is the stack? Write your answer in feet and inches. Use a number less than 12 for inches.</p> <p>Answer: 9 ft 5 in</p> <p style="text-align: right;">2.001</p>	<p>Divide. Give the quotient and remainder.</p> $563 \div 16$ <p>Quotient: Remainder:</p> <p>Answer: Quotient: 35 Remainder: 3</p> <p style="text-align: right;">2.002</p>
<p>Divide. Give the quotient and remainder.</p> $35,314 \div 5$ <p>Quotient: Remainder:</p> <p>Answer: Quotient: 7062</p> <p style="text-align: right;">2.004</p>	<p>Dan has to carry 300 apples from a farm to the market. How many baskets will he need, given that each basket can hold 45 apples?</p> <p>Answer: 7 baskets</p>
<p>Remainder: 4 Evaluate.</p> $(6 \div 2) + 3$ <p>Answer: 6</p> <p style="text-align: right;">2.005</p>	<p>For each number below, is it even or odd?</p> <p>(a) 89 (b) 581 (c) 318 (d) 23 (e) 46</p> <p>Answer: Odd: (a), (b), (d) Even: (c), (e)</p> <p style="text-align: right;">2.006</p>

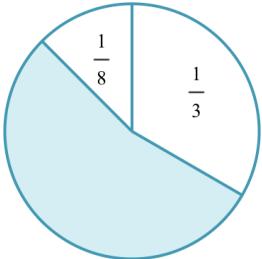
<p>Write all the factors of 27. Use commas to separate them.</p> <p>Answer: 1, 3, 9, 27</p> <p style="text-align: right;">2.007</p>	<p>Circle all the prime numbers.</p> <p style="text-align: center;">9 11 14 19 20 22</p> <p style="text-align: center;">None of the above</p> <p>Answer: Primes: 11 and 19</p> <p style="text-align: right;">2.008</p>
<p>Write 98 as a product of prime factors.</p> <p>Answer: $2 \times 7 \times 7$</p> <p style="text-align: right;">2.009</p>	<p>The first three terms of an arithmetic sequence are as follows.</p> <p style="text-align: center;">39, 32, 35</p> <p>Find the next two terms of this sequence.</p> <p>Answer: 18, 11</p> <p style="text-align: right;">2.010</p>
<p>The sequence of figures shows a pattern. If the pattern repeats, how many circles will Figure 4 have?</p> <p style="text-align: center;">    </p> <p>Figure 1 Figure 2 Figure 3</p> <p>Answer: 18 circles</p> <p style="text-align: right;">2.011</p>	<p>First, rewrite $\frac{2}{3}$ and $\frac{7}{10}$ so that they have a common denominator. Then, use $<$, $=$, or $>$ to order $\frac{2}{3}$ and $\frac{7}{10}$.</p> <p>Answer:</p> $\frac{2}{3} = \frac{20}{30} < \frac{21}{30} = \frac{7}{10}$ <p style="text-align: right;">2.012</p>

Refresh 2

<p>Multiply.</p> $\frac{2}{9} \times \frac{4}{5}$ <p>Answer: $\frac{8}{45}$</p>	<p>Multiply. Write your answer as a fraction in simplest form.</p> $\frac{2}{7} \times \frac{3}{5}$ <p>Answer: $\frac{6}{35}$</p>
<p>2.013</p> <p>Multiply. Write your answer as a fraction in simplest form.</p> $\frac{2}{7} \times 3 \times \frac{2}{3}$ <p>Answer: $\frac{4}{7}$</p>	<p>2.014</p> <p>At a certain school, $\frac{5}{7}$ of the students are boys. Today, $\frac{5}{6}$ of the boys brought their lunch. What fraction of the students are boys who brought their lunch today? Write your answer in simplest form.</p> <p>Answer: $\frac{25}{42}$ of the students</p>
<p>2.015</p> <p>There are 70 students in a speech contest. Yesterday, $\frac{1}{5}$ of them gave their speeches. Today, $\frac{2}{7}$ of the remaining students gave their speeches. How many students still haven't given their speeches?</p> <p>Answer: 40 students</p>	<p>2.016</p> <p>Find the reciprocals of the numbers below.</p> <p>The reciprocal of 10 is ____.</p> <p>The reciprocal of $\frac{1}{8}$ is ____.</p> <p>Answer: The reciprocal of 10 is $\frac{1}{10}$. The reciprocal of $\frac{1}{8}$ is 8.</p>

<p>Divide. Write your answer in simplest form.</p> $4 \div \frac{7}{6}$ <p>Answer: $\frac{24}{7}$</p> <p style="text-align: right;">2.019</p>	<p>Divide. Write your answer in simplest form.</p> $\frac{4}{3} \div \frac{5}{4}$ <p>Answer: $\frac{16}{15}$</p> <p style="text-align: right;">2.020</p>
<p>A field that is $\frac{5}{8}$ acres must be planted with seed. If 40 people will split the job equally, how many acres must each person plant?</p> <p>Write your answer in simplest form.</p> <p>Answer: $\frac{1}{64}$ acres</p> <p style="text-align: right;">2.021</p>	<p>Find the least common denominator (LCD) of $\frac{1}{20}$ and $\frac{9}{8}$.</p> <p>Answer: 40</p> <p style="text-align: right;">2.022</p>
<p>Subtract.</p> $\frac{1}{2} - \frac{1}{10}$ <p>Answer: $\frac{4}{10}$</p> <p style="text-align: right;">2.023</p>	<p>Add.</p> $\frac{3}{10} + \frac{2}{5}$ <p>Answer: $\frac{7}{10}$</p> <p style="text-align: right;">2.024</p>

Refresh 2

<p>Add. Write your answer as a fraction in simplest form.</p> $\frac{3}{8} + \frac{9}{10}$ <p>Answer: $\frac{51}{40}$</p> <p style="text-align: center;">2.025</p>	<p>Evaluate. Write your answer as a fraction in simplest form.</p> $\frac{1}{4} + \frac{5}{6} + \frac{3}{8}$ <p>Answer: $\frac{35}{24}$</p> <p style="text-align: center;">2.026</p>
<p>Leila made a shirt using $\frac{1}{3}$ yards of blue fabric and $\frac{1}{2}$ yards of red fabric. How many more yards of red fabric did Leila use?</p> <p>Write your answer as a fraction in simplest form.</p> <p>Answer: $\frac{1}{6}$ yards</p> <p style="text-align: center;">2.027</p>	<p>How much of the circle is shaded? Write your answer as a fraction in simplest form.</p>  <p>Answer: $\frac{13}{24}$</p> <p style="text-align: right;">2.028</p>
<p>Add. Write your answer as a mixed number in simplest form.</p> $3\frac{5}{8} + 2\frac{1}{4}$ <p>Answer: $5\frac{7}{8}$</p> <p style="text-align: center;">2.029</p>	<p>Add. Write your answer as a mixed number in simplest form.</p> $5\frac{2}{3} + \frac{3}{8}$ <p>Answer: $6\frac{1}{24}$</p> <p style="text-align: right;">2.030</p>

<p>Subtract. Write your answer as a mixed number in simplest form.</p> $7\frac{2}{3} - 2\frac{3}{4}$ <p>Answer: $4\frac{11}{12}$</p> <p style="text-align: right;">2.031</p>	<p>Evaluate.</p> $3\frac{1}{2} + 4\frac{2}{5} - 6\frac{7}{15}$ <p>Answer: $1\frac{13}{30}$</p> <p style="text-align: right;">2.032</p>
<p>Abdul took $\frac{5}{8}$ hours to clean the bedroom. Then he took $4\frac{1}{4}$ hours to clean the den. How much total time did Abdul take to clean the two rooms? Write your answer as a mixed number in simplest form.</p> <p>Answer: $4\frac{7}{8}$ hours</p> <p style="text-align: right;">2.033</p>	<p>Find the digits in the tens place, in the hundredths place, and in the ten thousandths place for the following number.</p> 961.5831 <p>tens: hundredths: ten thousandths:</p> <p>Answer: tens: 6 hundredths: 8 ten thousandths: 1</p>
<p>Write the following number in standard decimal form.</p> <p><i>two hundred and sixteen ten-thousandths</i></p> <p>Answer: 200.0016</p> <p style="text-align: right;">2.035</p>	<p>A ladder is 103 inches tall. How tall is it in feet and inches?</p> <p style="text-align: center;"><u> </u> ft <u> </u> in</p> <p>Answer: 8 ft 7 in</p> <p style="text-align: right;">2.036</p>

Refresh 2

<p>Order these numbers from least to greatest.</p> <p>4.17 4.107 4.1 4.1731</p> <p>Answer:</p> <p>$4.1 < 4.107 < 4.17 < 4.1731$</p>	<p>Round 3.14 to the nearest tenth.</p> <p>2.037 2.038</p>
<p>Write 0.004 as a fraction. Do not try to simplify your answer.</p> <p>Answer: $\frac{4}{1000}$</p>	<p>Write 0.84 as a fraction in simplest form.</p> <p>Answer: $\frac{21}{25}$</p>
<p>Write 2.97 as a mixed number and as an improper fraction. Do not try to simplify your answers.</p> <p>Mixed number:</p> <p>Improper fraction:</p> <p>Answer:</p> <p>Mixed number: $2\frac{97}{100}$</p> <p>Improper fraction: $\frac{297}{100}$</p>	<p>Add.</p> $\begin{array}{r} 13.53 \\ + 7.385 \\ \hline \end{array}$ <p>Answer: 20.915</p>

<p>Add.</p> $7.65 + 1.4 + 1.47$ <p>Answer: 10.52</p>	<p>Subtract.</p> $\begin{array}{r} 8.27 \\ - 2.34 \\ \hline \end{array}$ <p>Answer: 5.93</p>
<p>Subtract.</p> $97.19 - 85.2$ <p>Answer: 11.99</p>	<p>Subtract.</p> $9.9 - 7.689$ <p>Answer: 2.211</p>
<p>Compute.</p> $39.62 - 5 - 2.3$ <p>Answer: 32.32</p>	<p>Estimate $14.86 - 5.644$ by first rounding each number to the nearest tenth.</p> <p>Answer: 9.3</p>

Refresh 2

<p>The price of an item has been reduced by \$4.39. The original price was \$38.91. What is the price now?</p> <p>Answer: \$34.52</p> <p style="text-align: center;">2.049</p>	<p>Diane ran three times last week. Here are the distances she ran (in kilometers).</p> <p>8.77, 19.05, 13</p> <p>What is the total distance Diane ran on these three days?</p> <p>Answer: 40.82 kilometers</p> <p style="text-align: right;">2.050</p>
<p>Melissa bought an item for \$49. Before that, she had \$308.76. How much money does Melissa have now?</p> <p>Answer: \$259.76</p> <p style="text-align: center;">2.051</p>	<p>Multiply</p> <p>0.8×0.4</p> <p>Answer: 0.32</p> <p style="text-align: right;">2.052</p>
<p>Multiply.</p> $\begin{array}{r} 28.9 \\ \times \quad 5 \\ \hline \end{array}$ <p>Answer: 144.5</p> <p style="text-align: center;">2.053</p>	<p>Multiply.</p> $\begin{array}{r} 6.59 \\ \times \quad 8.6 \\ \hline \end{array}$ <p>Answer: 56.674</p> <p style="text-align: right;">2.054</p>

Multiply.

$$\begin{array}{r} 6.34 \\ \times 50.9 \\ \hline \end{array}$$

Answer: 322.706

Multiply.

$$100 \times 4.443$$

Answer: 444.3

2.055

2.056

Multiply.

$$3.82 \times 0.1$$

Answer: 0.382

Multiply.

$$0.008 \times 5.5$$

2.057

2.058

Let's estimate 0.031×3.98 by rounding each number to the place of its leftmost nonzero digit.

First round 0.031 to the nearest hundredth.

0.031 rounds to:

Now round 3.98 to the nearest one.

3.98 rounds to:

Multiply the rounded numbers:

Answer: $0.03 \times 4 = 0.12$

2.059

A box of chocolates costs \$6.34. Amanda bought 8 boxes. How much did she spend?

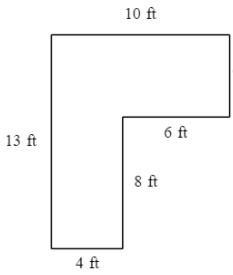
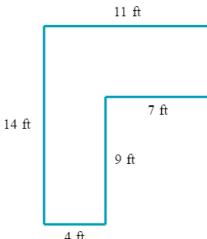
Answer: \$50.72

2.060

Refresh 2

<p>Maria needs 54.3 square feet of laminated wood. Suppose each square foot of laminated wood costs \$0.60. Find the amount she has to pay.</p> <p>Answer: \$32.58</p> <p>2.061</p>	<p>A phone company charges each customer a monthly fee of \$10.75. In addition, it charges \$0.04 per minute for in-state calls and \$0.11 per minute for out-of-state calls. What is the total monthly charge for a customer who made 450 minutes of in-state calls and 46 minutes of out-of-state calls?</p> <p>Answer: \$33.81</p> <p>2.062</p>
<p>Divide.</p> $4 \div 5$ <p>Answer: 0.8</p> <p>2.063</p>	<p>Divide.</p> $2.34 \div 9$ <p>Answer: 0.26</p> <p>2.064</p>
<p>Divide.</p> $29.6 \div 0.8$ <p>Answer: 37</p> <p>2.065</p>	<p>Divide.</p> $0.754 \div 5.2$ <p>Answer: 0.145</p> <p>2.066</p>

<p>Divide.</p> $66.1 \div 100$ <p>Answer: 0.661</p> <p style="text-align: right;">2.067</p>	<p>Divide.</p> $0.6 \div 0.001$ <p>Answer: 600</p> <p style="text-align: right;">2.068</p>
<p>Divide. Round your answer to the nearest hundredth.</p> $9.24 \div 0.72$ <p>Answer: 12.83</p> <p style="text-align: right;">2.069</p>	<p>The total price for 7 movie tickets is \$92.40. If each ticket costs the same amount, how much does one movie ticket cost?</p> <p>Answer: \$13.20</p> <p style="text-align: right;">2.070</p>
<p>Kala can plow 3.2 acres of land in an hour. How long will it take her to plow 2.4 acres of land?</p> <p>Answer: 0.75 hours</p> <p style="text-align: right;">2.071</p>	<p>Today, 7 friends went out for lunch. Their total bill was \$31.43, including tax and gratuity. They decided to split the bill equally and each paid with a \$10 bill. How much money will each person get back?</p> <p>Answer: \$5.51</p> <p style="text-align: right;">2.072</p>

<p>Write $\frac{19}{1000}$ as a decimal.</p> <p>Answer: 0.019</p> <p style="text-align: right;">2.073</p>	<p>A wire is first bent into the shape of a triangle. Each side of the triangle is 14 in long. Then the wire is unbent and reshaped into a rectangle. If the length of the rectangle is 14 in, what is its width?</p> <p>Answer: 7 in</p> <p style="text-align: right;">2.074</p>
<p>Find the missing side length. Assume that all intersecting sides meet at right angles. Be sure to include the correct unit in your answer.</p>  <p>Answer: 5 ft</p>	<p>Find the perimeter of the figure below. Notice that one side length is not given. Assume that all intersecting sides meet at right angles. Be sure to include the correct unit in your answer.</p>  <p>Answer: 50 ft</p>

The following topics are not included in the Class Notes but can be found in ALEKS

The following ALEKS topics are also included in Math 100, but sample problems are not included in the class notes. If you have would like help finding these topics to practice, come to office hours and ask a Math 100 TA.

- (2.077) Introduction to properties of multiplication
- (2.078) Divisibility rules for 2, 5, and 10
- (2.079) Divisibility rules for 3 and 9

- (2.080) Understanding decimal position on a number line using zoom:
Thousandths
- (2.081) Classifying solids
- (2.082) Vertices, edges, and faces of a solid

Module A

This module focuses on more simplistic order of operations, evaluating expressions, geometry, and Data Analysis. Concepts **Module A** are supported by **Lesson 6A - 6D**, which support your learning around data analysis and lessons **Lesson 7A - 7D**, which are a deeper dive into expressions and the language needed when describing to someone else how you are simplifying them. Additionally, **Lessons 8A - 8D** are helpful here to help you clearly see how expressions are different than equations.

Objectives:

By the end of this module, students will be able to:

- Understand how to write an exponential expression and when to evaluate exponents in Order of Operations.
 - Evaluate algebraic expressions using whole numbers.
 - Set up and solve word problems using proportions.
 - Calculate the volume of a rectangular prism.
 - Calculate the mean, median, mode, and weighted mean of data sets.
 - Understand the properties of integers.
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Module A

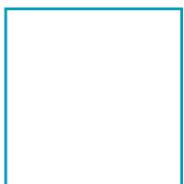
<p>Rewrite $6 \times 6 \times 6 \times 6$ using an exponent.</p> <p>Answer: 6^4</p>	<p>Evaluate.</p> <p>2^5</p>
<p>Rewrite as a power of ten.</p> <p>10,000</p> <p>Answer: 10^4</p>	<p>Evaluate.</p> <p>$23 - 3 \times 4$</p> <p>Answer: 11</p>
<p>Evaluate the following.</p> <p>$9 \div 3 + 4 + 4 \times 6$</p> <p>Answer: 31</p>	<p>Evaluate the following expression.</p> <p>$40 \div [2 + 2 \times (10 - 7)]$</p> <p>Answer: 5</p>

<p>Evaluate.</p> $6 + 4^2 \div 2$ <p>Answer: 14</p> <p style="text-align: right;">3.007</p>	<p>Evaluate.</p> $\frac{(2+6)^2}{4 \times 9 - 4}$ <p>Answer: 2</p> <p style="text-align: right;">3.008</p>
<p>Use $<$, $>$, or $=$ to compare the following numbers.</p> $-12 \quad \underline{\hspace{1cm}} \quad -2$ $-4 \quad \underline{\hspace{1cm}} \quad -7$ $-9 \quad \underline{\hspace{1cm}} \quad 7$ <p>Answer: $<$, $>$, $<$</p> <p style="text-align: right;">3.009</p>	<p>Find the value of $7 + n$ when $n = 15$</p> <p>Answer: 22</p> <p style="text-align: right;">3.010</p>
<p>Find the value of $30 \div n$ when $n = 5$</p> <p>Answer: 6</p> <p style="text-align: right;">3.011</p>	<p>Evaluate the expression when $a = 42$ and $b = 49$.</p> $b - \frac{a}{6}$ <p>Answer: 42</p> <p style="text-align: right;">3.012</p>

Module A

<p>Evaluate the expression when $b = 5$ and $c = 7$.</p> $\frac{c^2 - b}{c + 3b}$ <p>Simplify your answer as much as possible.</p> <p>Answer: 2</p>	<p>Solve for v.</p> $10 = v + 9$ <p>Answer: $v = 1$</p>
<p>Solve for x.</p> $54 = 3x$ <p>Simplify your answer as much as possible.</p> <p>Answer: $x = 18$</p>	<p>Solve for y.</p> $\frac{y}{4} + 15 = 16$ <p>Simplify your answer as much as possible.</p> <p>Answer: $y = 4$</p>
<p>Find the greatest common factor of 12 and 48.</p> <p>Answer: 12</p>	<p>Find the least common multiple (LCM) of 2 and 7.</p> <p>Answer: 14</p>

<p>Find the least common multiple of 3, 5, and 2.</p> <p>Answer: 30</p>	<p>The first three terms of a geometric sequence are as follows.</p> <p>81, 27, 9</p> <p>Find the next two terms of this sequence.</p> <p>Answer: 3, 1</p>
<p>3.019</p>	<p>3.020</p>
<p>Write 2.25 as a mixed number and as an improper fraction. Write your answers in simplest form.</p> <p>mixed number: improper fraction:</p> <p>Answer: mixed number: $2\frac{1}{4}$ improper fraction: $\frac{9}{4}$</p>	<p>Write 5.075 as a mixed number and as an improper fraction. Write your answers in simplest form.</p> <p>mixed number: improper fraction:</p> <p>Answer: mixed number: $5\frac{3}{40}$ improper fraction: $\frac{203}{40}$</p> <p>3.022</p>
	<p>3.021</p>

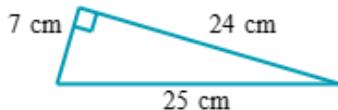
<p>Rita made \$198 for 9 hours of work. At the same rate, how many hours would she have to work to make \$154?</p> <p>Answer: 7 hours</p>	<p>A machine produces 240 bolts in 25 minutes. At the same rate, how many bolts would be produced in 45 minutes?</p> <p>Answer: 432 bolts</p>
<p>A certain drug is made from only two ingredients: compound A and compound B. There are 5 milliliters of compound A used for every 8 milliliters of compound B. If a chemist wants to make 832 milliliters of the drug, how many milliliters of compound B are needed?</p> <p>Answer: 512 milliliters of compound B</p>	<p>The volume of 100 drops of a liquid is 0.1 fluid ounces. What is the volume of 1000 drops?</p> <p>Answer: 0.1 fluid ounce(s)</p>
<p>Find the area of the following square. Write your answer in simplest form. Be sure to include the correct unit in your answer.</p>  <p>$\frac{2}{3}$ yd</p> <p>Answer: $\frac{4}{9}$ yd²</p>	<p>(a) Omar withdrew 40 dollars from his checking account. Write a signed number to represent this change in his account.</p> <p>(b) Omar withdrew 4000 dollars from his checking account. Write a signed number to represent this change in his account.</p> <p>Answer:</p> <p>(a) -40</p> <p>(b) -4000</p>

The perimeter of a rectangular garden is 356 feet. If the width of the garden is 82 feet, what is its length?

Answer: 96 feet

3.031

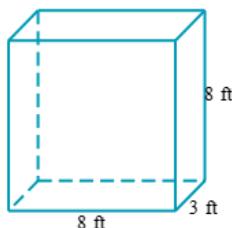
Find the area of the triangle below. Be sure to include the correct unit in your answer.



Answer: 84 cm^2

3.032

Find the volume of the rectangular prism.



Answer: 192 ft^3

3.033

A group of 5 students was asked, "How many hours did you watch television last week?" Here are their responses.

11, 9, 19, 5, 4

Find the median and mean number of hours for these students. If necessary, round your answers to the nearest tenth.

Answer:

Median: 9 hours

Here are the numbers of times 13 people ate out last month.

7, 4, 7, 5, 6, 7, 5, 5, 3, 6, 5, 4, 5

Find the mode(s) of this data set. If there is more than one mode, write them separated by commas. If there is no mode, write "No mode."

Answer:

5

3.035

Each day, Kolin records the number of news articles he reads. Here are his results for the last eight days.

2, 6, 3, 6, 6, 4, 6, 6

Find the mode and the range for the data.

Answer:

Mode: 6

Range: 4

3.036

<p>What is the average of 64 and 114?</p> <p>Answer: 89</p> <p>3.037</p>	<p>A group of 5 students was asked, "How many hours did you watch television last week?" Here are their responses.</p> <p>17, 18, 12, 6, 18</p> <p>Find the mean number of hours for these students. If necessary, round your answer to the nearest tenth.</p> <p>Answer: 14.2 hours</p> <p>3.038</p>
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- (3.039) Understanding the distributive property
- (3.040) Distinguishing between the area and perimeter of a rectangle
- (3.041) Interpreting a circle graph or pie chart
- (3.042) How changing a value affects the mean and median
- (3.043) Choosing the best measure to describe data
- (3.044) Weighted mean
- (3.045) Plotting integers on a number line
- (3.046) Reading the temperature from a thermometer

Module B

This module focuses on more complete order of operations, the connection between fractions, decimals, percentages, and application problems involving percentages. Concepts in **Module B** are supported by **Lessons 5A - 5D**, which help to make the connection between fractions, decimals, and percentages.

Objectives:

By the end of this module, students will be able to:

- Apply Order of Operations with problems including fractions.
 - Convert values between decimals, fractions, and percentages.
 - Use percentage to find tax, sales prices, and total amounts in real-world problems.
 - Identify segments within a circle and calculate circumference and area.
 - Complete problems using addition and subtraction of integer values.
-
-

Module B

<p>Evaluate. Write your answer as a fraction in simplest form.</p> $\left(\frac{3}{2}\right)^2$ <p>Answer: $2\frac{1}{4}$</p>	<p>Evaluate.</p> $\left(\frac{5}{6} + \frac{1}{5}\right) \cdot \frac{3}{4}$ <p>Answer: $\frac{31}{40}$</p>
<p>4.001</p>	<p>4.002</p>
<p>Evaluate.</p> $\left(\frac{2}{3} - \frac{1}{4}\right) \div \frac{4}{7}$ <p>Answer: $\frac{35}{48}$</p>	<p>Evaluate.</p> $\frac{4}{9} - \frac{5}{7} \left(\frac{2}{3}\right)^2$ <p>Write your answer in simplest form.</p> <p>Answer: $\frac{8}{63}$</p>
<p>4.003</p>	<p>4.004</p>
<p>Write $\frac{89}{20}$ as a decimal.</p> <p>Answer: 4.45</p>	<p>Write $\frac{15}{24}$ as a decimal.</p> <p>Answer: 0.625</p>
<p>4.005</p>	<p>4.006</p>

Write $\frac{5}{3}$ as a decimal. If necessary, use a bar to indicate which digit or group of digits repeats.

Answer: $1.\bar{6}$

4.007

Write $\frac{61}{18}$ as a decimal. If necessary, use a bar to indicate which digit or group of digits repeats.

Answer: $3.3\bar{8}$

4.008

Write $6\frac{37}{50}$ as a decimal.

Answer: 6.74

4.009

Write $3\frac{29}{80}$ as a decimal.

Answer: 3.3625

4.010

Write $5\frac{3}{11}$ as a decimal rounded to the nearest hundredth.

Answer: 5.27

4.011

Order these numbers from least to greatest.

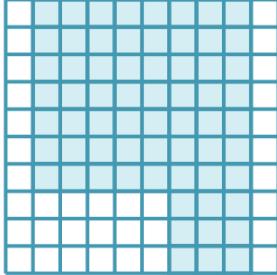
$$5\frac{7}{11}, 5.58, 5.515, \frac{111}{20}$$

Answer:

$$5.515 < \frac{111}{20} < 5.58 < 5\frac{7}{11}$$

4.012

Module B

<p>Write $\frac{2}{100}$ as a percentage.</p> <p>Answer: 2%</p> <p>4.013</p>	<p>Write 7% as a fraction. There is no need to simplify your answer.</p> <p>Answer: $\frac{7}{100}$</p> <p>4.014</p>
<p>The figure below is divided into 100 squares of equal size. What percent of the figure is shaded?</p>  <p>Answer: 65%</p>	<p>Write 76% as a decimal.</p> <p>Answer: 0.76</p> <p>4.016</p>
<p>Write 0.92 as a percentage.</p> <p>Answer: 92%</p> <p>4.017</p>	<p>(a) Write 920% as a decimal. (b) Write 0.0081 as a percentage.</p> <p>Answer:</p> <p>(a) $920\% = 9.2$</p> <p>(b) $0.0081 = 0.81\%$</p> <p>4.018</p>

<p>(a) Rewrite the percentage in the sentence below as a decimal. The 20 overseas investors own 7.7% of the business.</p> <p>(b) Rewrite the decimal in the sentence below as a percentage. The large tanks made up 0.72 of their sales last quarter.</p> <p>Answer:</p> <p>(a) Decimal: 0.077 (b) Percentage: 72%</p>	<p>Write 75% as a fraction in simplest form.</p> <p>Answer: $\frac{3}{4}$</p>
<p>4.019 Write 47.5% as a fraction in simplest form.</p> <p>Answer: $\frac{9}{40}$</p>	<p>4.020 Write $\frac{2}{5}$ as a percentage.</p> <p>Answer: 40%</p>
<p>4.021 Write $\frac{36}{50}$ as a percentage.</p> <p>Answer: 72%</p>	<p>4.022 Use a calculator to write $\frac{5}{57}$ as a percentage. Round your answer to the nearest tenth of a percent.</p> <p>Answer: 8.8%</p>
<p>4.023</p>	<p>4.024</p>

Module B

<p>Rewrite the fraction in the sentence below as a percentage.</p> <p>In 2009, a fire destroyed $\frac{3}{10}$ of the farmer's crops.</p> <p>Answer: 30%</p>	<p>Use a calculator to find 45% of 75. Do not round your answer.</p> <p>Answer: 33.75</p>
<p>4.025</p> <p>What is 30% of 95?</p> <p>Answer: 28.5</p>	<p>4.026</p> <p>What is 46% of 85?</p> <p>Answer: 39.1</p>
<p>4.027</p> <p>Answer the following questions.</p> <p>(a) What percent of 60 is 33?</p> <p>(b) 15% of what number is 12?</p> <p>Answer:</p> <p>(a) 55%</p> <p>(b) 80</p>	<p>4.028</p> <p>Answer the following questions.</p> <p>(a) What is 26.8% of 67.5?</p> <p>(b) 78.65 is 325% of what number?</p> <p>Answer:</p> <p>(a) 18.09</p> <p>(b) 24.2</p>

<p>Suppose that an individual has a body fat percentage of 18.8% and weighs 188 pounds. How many pounds of his weight is made up of fat? Round your answer to the nearest tenth.</p> <p>Answer: 35.3 pounds</p>	<p>An item is regularly priced at \$30. It is on sale for 30% off the regular price. How much (in dollars) is discounted from the regular price?</p> <p>Answer: Amount discounted: \$9</p>
<p>Estimate a 15% tip on a dinner bill of \$87.58 by first rounding the bill amount to the nearest ten dollars.</p> <p>Answer: Estimated tip: \$13.50</p>	<p>Carlos spent a total of \$30 at the grocery store. Of this amount, he spent \$24 on fruit. What percentage of the total did he spend on fruit?</p> <p>Answer: 80%</p>
<p>Compute.</p> $5 - 7 - 4 + 9 - 2$ <p>Answer: 1</p>	<p>A salesperson earns a commission of \$396 for selling \$2200 in merchandise. Find the commission rate. Write your answer as a percentage.</p> <p>Answer: 18%</p>

A book sold 38,200 copies in its first month of release. Suppose this represents 6.1% of the number of copies sold to date. How many copies have been sold to date?

Round your answer to the nearest whole number.

Answer: 626,230 copies

4.037

Compute.

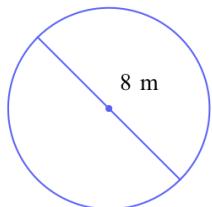
$$-2 + 1 + 8$$

Answer: 7

4.038

The diameter of a circle measures 8m. What is the circumference of the circle?

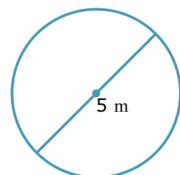
Use 3.14 for π , and do not round your answer. Be sure to include the correct unit in your answer.



Answer: 25.12m

4.039

Find the circumference and the area of a circle with diameter 5m. Use the value 3.14 for π , and do not round your answers. Be sure to include the correct units in your answers.



Answer:

Circumference: 15.7m

Area: 176π m²

4.040

Evaluate the following. (a) $ 10 $ (b) $ -9 $	Add. (a) $5 + (-5) =$ (b) $-4 + (-5) =$
Answer: (a) 10 (b) 9	Answer: (a) 0 (b) -9

4.041

4.042

Add. (a) $47 + (-25) =$ (b) $-46 + (-33) =$	Subtract. (a) $-5 - 1 =$ (b) $2 - 6 =$
Answer: (a) 22 (b) -79	Answer: (a) -6 (b) -4

4.043

4.044

Subtract. (a) $-5 - (-10) =$ (b) $4 - (-8) =$	Subtract. (a) $7 - (-2) =$ (b) $-33 - 44 =$
Answer: (a) 5 (b) 12	Answer: (a) 9 (b) -77

4.045

4.046

Write an inequality for the graph shown below. Use x for your variable.



Answer: $x < -4$

4.047

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- (4.048) Computing a percentage from a table of values
- (4.049) Introduction to a circle: Diameter, radius, and chord
- (4.050) Word problem involving the area between two concentric circles
- (4.051) Finding a percentage of a total amount in a circle graph
- (4.052) Computations from a circle graph
- (4.053) Calculating relative frequencies in a contingency table
- (4.054) Word problem with addition or subtraction of integers
- (4.055) Graphing a linear inequality on the number line

Module C

Module C continues with more complex order of operations with signed fractions and decimals, as well as simplifying ratios. Additionally, you will begin to work with square roots and the Pythagorean Theorem. The final concept in **Module C** is the introduction of points in the coordinate plane, on which we will spend more time when we are in Module D. Concepts in **Module C** are supported by **Lessons 9A - 9D**, which focus on evaluating expressions with integers and non-integers and **Lessons 10A - 10D**, which help you make the connection between radicals and rational exponents. **Lessons 11A - 11D** and **Lessons 12A - 12D** do a deep dive into lines and will help you prepare for Module D.

Objectives:

By the end of this module, students will be able to:

- Apply Order of Operations to expressions including decimals.
- Write and simplify ratios for real-world scenarios.
- Find the root of a perfect square and to use a calculator to approximate a square root value.
- Use ratios to complete unit conversions.
- Compare and order real numbers, including integers, rational numbers, and irrational numbers.
- Identify and apply properties of addition and multiplication to real numbers.
- Read and plot points in the coordinate plane.

Module B

Evaluate. 0.41^2 Answer: 0.1681 5.001	Evaluate. 0.2^3 Answer: 0.008 5.002
Evaluate the following. $9 \times 1.3 + 2 \times 7.3$ Answer: 26.3 5.003	Evaluate the following. $5(1.53) - 0.8(6.6)$ Answer: 2.37 5.004
Evaluate the following. $(16 - 14.6)^2 + 69.5 \div 0.5$ Answer: 140.96 5.005	Evaluate the following. $66\frac{1}{4} - 5.84$ Write your answer as a decimal. Answer: 60.41 5.006

<p>Evaluate the following.</p> $\frac{7}{5} \times 7.95$ <p>Write your answer as a decimal.</p> <p>Answer: 11.13</p> <p style="text-align: right;">5.007</p>	<p>Solve for u.</p> $-4u = \frac{12}{7}$ <p>Simplify your answer as much as possible.</p> <p>Answer: $u = -\frac{3}{7}$</p> <p style="text-align: right;">5.008</p>
<p>There are 11 books on a shelf. 3 of these books are new. The rest of them are used.</p> <p>(a) What is the ratio of used books to new books?</p> <p>(b) What is the ratio of used books to all books on the shelf?</p> <p>Answer:</p> <p>(a) 8 : 3</p> <p>(b) 8 : 11</p> <p style="text-align: right;">5.009</p>	<p>Write the ratio as a fraction in simplest form, with whole numbers in the numerator and denominator.</p> $9 \text{ kg} : 45 \text{ kg}$ <p>Answer: $\frac{1}{5}$</p> <p style="text-align: right;">5.010</p>
<p>Write the ratio as a fraction in simplest form, with whole numbers in the numerator and denominator.</p> $2.7 : 3.6$ <p>Answer: $\frac{3}{4}$</p> <p style="text-align: right;">5.011</p>	<p>Solve for v.</p> $30 = -\frac{v}{2}$ <p>Simplify your answer as much as possible.</p> <p>Answer: $v = -60$</p> <p style="text-align: right;">5.012</p>

What is the value of $\sqrt{49}$?

Answer: 7

5.013

Use a calculator to approximate $\sqrt{13.6}$

Round your answer to the nearest hundredth.

Answer: 3.69

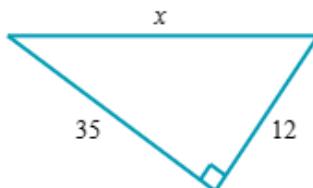
5.014

Find two consecutive whole numbers that $\sqrt{18}$ lies between.

Answer: 4 and 5

5.015

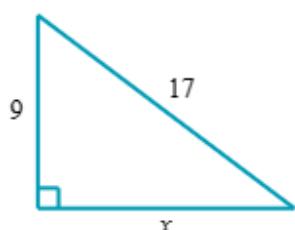
For the following right triangle, find the side length x .



Answer: 37

5.016

For the following right triangle, find the side length x . Round your answer to the nearest hundredth.



Answer: 14.42

5.017

Solve for u .

$$3.75 = 3u$$

Answer: $u = 1.25$

5.018

<p>Choose the correct units for the following.</p> <p>(a) Rafael used a fork that had a mass of about 28 _____. (grams or kilograms)</p> <p>(b) Lucy's finger is about 7 ____ long. (millimeters, centimeters, meters, or kilometers)</p> <p>(c) Shen poured about 9 ____ of medicine onto a spoon. (milliliters or liters)</p> <p>Answer:</p>	<p>A scientist is working with 3 meters of gold wire. How long is the wire in millimeters? Be sure to include the correct unit in your answer.</p> <p>Answer: 3000 mm</p>
<p>(a) grams A water dispenser has a capacity of 25,000 milliliters. What is its capacity in liters? Be sure to include the correct unit in your answer.</p> <p>Answer: 25 L</p>	<p>The tree in John's backyard is 8.7 m high. How high is it in centimeters? Be sure to include the correct unit in your answer.</p> <p>Answer: 870 cm</p>
<p>A rectangular field is 0.35 kilometers long and 0.2 kilometers wide. What is the area of the field in square meters? Do not round your answer. Be sure to include the correct unit in your answer.</p> <p>Answer: 70,000 m²</p>	<p>Solve for x.</p> $14 = \frac{7}{9}x$ <p>Simplify your answer as much as possible.</p> <p>Answer: $x = 18$</p>

<p>Solve for w.</p> $-3 = w - \frac{3}{8}$ <p>Simplify your answer as much as possible.</p> <p>Answer: $w = -\frac{21}{8}$</p> <p style="text-align: right;">5.025</p>	<p>Order these numbers from least to greatest.</p> $\frac{133}{10}, -13.\bar{4}, -13\frac{5}{11}, -\sqrt{180}$ <p>Answer:</p> $-13\frac{5}{11} < -13.\bar{4} < -\sqrt{180} < \frac{133}{10}$ <p style="text-align: right;">5.026</p>
<p>Evaluate the following.</p> <p>(a) $-5 \times 3 =$</p> <p>(b) $42 \div (-6) =$</p> <p>Answer:</p> <p>(a) -15</p> <p>(b) -7</p> <p style="text-align: right;">5.027</p>	<p>Evaluate.</p> $-1(-4)(3)(3)$ <p>Answer: 36</p> <p style="text-align: right;">5.028</p>
<p>Classify each number below as an integer or not.</p> $-\frac{17}{4}, -\frac{63}{9}, 92, -35.67, -417.32$ <p>Answer:</p> <p>Integers: $-\frac{63}{9}, 92$</p> <p>Not: $-\frac{17}{4}, -35.67, -417.32$</p> <p style="text-align: right;">5.029</p>	<p>Classify each number below as a rational number or an irrational number.</p> $-\pi, -51.\overline{85}, \sqrt{13}, -\frac{13}{14}, \sqrt{1}$ <p>Answer:</p> <p>Rational: $-51.\overline{85}, -\frac{13}{14}, \sqrt{1}$</p> <p>Irrational: $-\pi, \sqrt{13}$</p> <p style="text-align: right;">5.030</p>

Module C

<p>Subtract.</p> $\frac{1}{2} - \frac{4}{7}$ <p>Answer: $-\frac{1}{14}$</p> <p>5.031</p>	<p>Evaluate.</p> $-\frac{7}{4} - \left(-\frac{1}{6}\right)$ <p>Answer: $-\frac{19}{12}$</p> <p>5.032</p>
<p>Subtract.</p> $\frac{-8}{3} - \frac{5}{-8}$ <p>Answer: $-\frac{49}{24}$</p> <p>5.033</p>	<p>Evaluate. Write your answer as a fraction in simplest form.</p> $\frac{5}{6} + \frac{7}{12} - \left(-\frac{1}{2}\right)$ <p>Answer: $\frac{23}{12}$</p> <p>5.034</p>
<p>Multiply.</p> $\left(-\frac{7}{3}\right)(-6)$ <p>Write your answer in simplest form.</p> <p>Answer: 14</p> <p>5.035</p>	<p>Multiply.</p> $\frac{-1}{-9} \cdot \frac{-4}{8} \cdot 3$ <p>Answer: $-\frac{1}{6}$</p> <p>5.036</p>

<p>Divide. Write your answer as a fraction or mixed number in simplest form.</p> $-\frac{2}{3} \div \left(-\frac{8}{7}\right)$ <p>Answer: $\frac{7}{12}$</p> <p style="text-align: right;">5.037</p>	<p>Compute.</p> <p>(a) $-6.43 - 22.3 =$</p> <p>(b) $25.6 + (-53.93) =$</p> <p>Answer:</p> <p>(a) -28.73</p> <p>(b) -28.33</p> <p style="text-align: right;">5.038</p>
<p>Compute.</p> $-5.4 - 3 + 12.1$ <p>Answer: 3.7</p> <p style="text-align: right;">5.039</p>	<p>Multiply.</p> <p>(a) $-4.7 \times 6 =$</p> <p>(b) $-100 \times (-1.587) =$</p> <p>Answer:</p> <p>(a) -28.2</p> <p>(b) 158.7</p> <p style="text-align: right;">5.040</p>
<p>Evaluate each expression.</p> <p>(a) $-1.37 \div (-10) =$</p> <p>(b) $1.77 \div (-3) =$</p> <p>Answer:</p> <p>(a) 0.137</p> <p>(b) -0.59</p> <p style="text-align: right;">5.041</p>	<p>Evaluate the following.</p> $ -3 - 9 - 15 $ <p>Answer: -3</p> <p style="text-align: right;">5.042</p>

Suppose that Y and Z are points on the number line. If $YZ = 17$ and Y lies at -3 , where could Z be located? If there are several locations, separate them with commas.

Answer: $-20, 14$

Solve for v .

$$v - 3.57 = 4.51$$

Answer: $v = 8.08$

5.043

5.044

Solve for w .

$$8 + w = 2$$

Answer: $w = -6$

5.045

The following topics are not included in the Class Notes but can be found in ALEKS

The following ALEKS topics are also included in Math 100, but sample problems are not included in the class notes. If you would like help finding these topics to practice, come to office hours and ask a Math 100 TA.

- (5.046) Writing ratios using different notations
- (5.047) Volume of a cylinder
- (5.048) Word problem involving the Pythagorean Theorem

- (5.049) Simplifying a ratio of whole numbers: Problem type 2
- (5.050) Plotting rational numbers on a number line
- (5.051) Reading a point in the coordinate plane
- (5.052) Plotting a point in the coordinate plane

Module D

This module focuses on algebraic expressions and linear functions. It takes the skills you have built over the previous modules and applies them to equations, functions, and systems. You will simplify expressions using distribution and combining like terms, setting you up to be able to solve equations that have one or more variable terms. **Module D** also focuses on linear functions by having you evaluate them at given x -values and graph them in the coordinate place. You will also explore systems of equations, including parallel and perpendicular lines, and setting up and using algebraic reasoning to solve a system of two linear equations in variables. **Module D** is supported **Lessons 11A - 11D**, which focus on types of linear functions and graphing linear functions, and **Lessons 12A - 12D**, which focus on application problems and systems of equations.

Objectives:

By the end of this module, students will be able to:

- Convert compound units and compare unit rates.
- Use Order of Operations with integer values.
- Evaluate algebraic expressions using distribution and combining like terms.
- Solve single- and multi-step equations.
- Write and solve equations representing real-world problems using variables.
- Graph linear functions in the coordinate plane.
- Set up and solve a system of linear equations representing real-world problems.

<p>The cost for a pack of 25 pencils is \$4.75.</p> <p>Find the unit price in dollars per pencil.</p> <p>If necessary, round your answer to the nearest cent.</p> <p>Answer: \$0.19</p> <p style="text-align: right;">6.001</p>	<p>Answer each part. If necessary, round your answers to the nearest hundredth.</p> <p>(a) Tom runs 3 miles in 29 minutes. How many miles does he run per minute?</p> <p>(b) Salma bought 7 pounds of sugar for \$4. How many pounds of sugar did she get per dollar?</p> <p>Answer:</p>
<p>A phone company offers two monthly plans. Plan A costs \$15 plus an additional \$0.13 for each minute of calls. Plan B costs \$28 plus an additional \$0.09 for each minute of calls.</p> <p>(a) For what amount of calling do the two plans cost the same?</p> <p>(b) What is the cost when the two plans cost the same?</p> <p>Answer:</p>	<p>(a) 0.1 miles per minute Convert 41°F to degrees Celsius. If necessary, round your answer to the nearest tenth of a degree. (b) 1.75 pounds per dollar Here are the formulas.</p> $C = \frac{5}{9}(F - 32)$ $F = \frac{9}{5}C + 32$ <p>Answer: 41°F = 5°C</p> <p style="text-align: right;">6.002</p>
<p>(a) 325 minutes (b) \$57.25 An apartment has 110 square meters of carpeting. How much is this in square feet? Use the following conversion: 1 square meter is 10.8 square feet.</p> <p>Answer: 1188 ft²</p> <p style="text-align: right;">6.005</p>	<p>A cyclist rides his bike at a rate of 27 miles per hour. What is this rate in miles per minute? How many miles will the cyclist travel in 2 minutes? Do not round your answers.</p> <p>Rate:</p> <p>Distance traveled in 2 minutes:</p> <p>Answer:</p> <p>Rate: 0.45 mi/min</p> <p>Distance traveled in 2 minutes: 0.9 mi</p> <p style="text-align: right;">6.006</p>

Module D

<p>Evaluate.</p> <p>(a) $(-5)^2 =$</p> <p>(b) $(-9)^3 =$</p> <p>Answer:</p> <p>(a) 25</p> <p>(b) -729</p>	<p>Evaluate.</p> <p>(a) $-(6)^2 =$</p> <p>(b) $(-7)^2 =$</p> <p>Answer:</p> <p>(a) -36</p> <p>(b) 49</p>
<p>Evaluate. Write your answers as fractions.</p> <p>(a) $-\left(\frac{2}{5}\right)^3 =$</p> <p>(b) $\frac{2^2}{-5} =$</p> <p>Answer:</p> <p>(a) $-\frac{8}{125}$</p> <p>(b) $-\frac{4}{5}$</p>	<p>Evaluate.</p> $-5 \times (-6) - (-6)$ <p>Answer: 36</p>
<p>Evaluate.</p> $\left((-2)^2 - 4\right)^3 + 4 \cdot 2$ <p>Answer: 8</p>	<p>Evaluate the expression when $b = -3$ and $y = 3$.</p> $b - 8y$ <p>Answer: -27</p>

<p>Evaluate the expression when $x = -6$.</p> $x^2 - 5x - 7$ <p>Answer: 59</p>	<p>Evaluate the expression when $x = -\frac{7}{9}$ and $y = \frac{2}{3}$.</p> $x - 2y$ <p>Write your answer in simplest form.</p> <p>Answer: $-\frac{19}{9}$</p>
<p>6.013</p>	<p>6.014</p>
<p>Evaluate the expression when $w = 10.2$, $x = 12.3$, and $y = -7$.</p> $w - x - y$ <p>Answer: 4.9</p>	<p>Evaluate the expression when $m = -4.2$ and $n = 8.7$.</p> $2n - 7m$ <p>Answer: 46.8</p>
<p>6.015</p>	<p>6.016</p>
<p>Simplify.</p> $6y - 3y$ <p>Answer: $3y$</p>	<p>Simplify.</p> $-2a^2 + 10a^2$ <p>Answer: $8a^2$</p>
<p>6.017</p>	<p>6.018</p>

Module D

<p>A store is having a sale on jelly beans and trail mix. For 8 pounds of jelly beans and 4 pounds of trail mix, the total cost is \$25. For 3 pounds of jelly beans and 2 pounds of trail mix, the total cost is \$11.</p> <p>Find the cost for each pound of jelly beans and each pound of trail mix.</p> <p>Answer:</p> <p>Cost for each pound of jelly beans: \$1.50</p> <p>Cost for each pound of trail mix:</p>	<p>Multiply. $6u \cdot 4$</p> <p>Answer: $24u$</p> <p style="text-align: right;">6.020</p>
<p>\$3.25 Use the distributive property to remove the parentheses. <small>6.019</small></p> $4(w + 3)$ <p>Answer: $4w + 12$</p> <p style="text-align: center;">6.021</p>	<p>Use the distributive property to remove the parentheses.</p> $-2(-u^3 - 3 + 6y^2)$ <p>Answer: $2u^3 + 6 - 12y^2$</p> <p style="text-align: right;">6.022</p>
<p>The sum of two numbers is 39. One number is 2 times as large as the other. What are the numbers?</p> <p>Larger number:</p> <p>Smaller number:</p> <p>Answer:</p> <p>Larger number: 26 Smaller number: 13</p>	<p>Simplify.</p> $3(2y + 3) - 9y$ <p>Answer: $-3y + 9$</p> <p style="text-align: right;">6.024</p>

<p>For each value of y, determine whether it is a solution to $4 - 5y = 54$.</p> <p>(a) $y = -10$ (b) $y = -4$ (c) $y = 2$ (d) $y = 3$</p> <p>Answer: Is it a solution? Yes: -10 No: $-4, 2, 3$</p>	<p>Solve for u.</p> $-u + 7 = 280$ <p>Answer: $u = -273$</p>
<p>Solve for v.</p> $\frac{v}{2} + 4 = -6$ <p>Simplify your answer as much as possible.</p> <p>Answer: $v = -20$</p>	<p>Find the value of</p> $9w - 2$ <p>given that $4w - 5 = 3$. Simplify your answer as much as possible.</p> <p>Answer: 16</p>
<p>6.027</p>	<p>6.028</p>
<p>Solve for y.</p> $2(3y + 7) = 68$ <p>Simplify your answer as much as possible.</p> <p>Answer: $y = 9$</p>	<p>Solve for x.</p> $\frac{x + 48}{-9} = -6$ <p>Simplify your answer as much as possible.</p> <p>Answer: $x = 6$</p>
<p>6.029</p>	<p>6.030</p>

Module D

<p>Solve the following system of equations.</p> $\begin{aligned} -3x + 2y &= -6 \\ 6x - 7y &= 12 \end{aligned}$ <p>Answer: $x = 2, y = 0$</p>	<p>Solve for v.</p> $\frac{v}{5} + 22 = -9.25$ <p>Answer: $v = -156.25$</p>
<p>Solve for x.</p> $14 = 6x + x$ <p>Simplify your answer as much as possible.</p> <p>Answer: $x = 2$</p>	<p>Solve for w.</p> $-22 = 7(w + 2) - 3w$ <p>Simplify your answer as much as possible.</p> <p>Answer: $w = -9$</p>
<p>Solve for u.</p> $2u + 9 = 8u + 21$ <p>Simplify your answer as much as possible.</p> <p>Answer: $u = -2$</p>	<p>Solve for x.</p> $8x + 5(x - 2) = 29$ <p>Simplify your answer as much as possible.</p> <p>Answer: $x = 3$</p>

<p>Solve for u.</p> $-4u + 32 = 8(u - 8)$ <p>Simplify your answer as much as possible.</p> <p>Answer: $u = 8$</p> <p style="text-align: right;">6.037</p>	<p>Solve for v.</p> $-6(-3v + 8) - 6v = 6(v - 7) - 3$ <p>Simplify your answer as much as possible.</p> <p>Answer: $v = \frac{1}{2}$</p> <p style="text-align: right;">6.038</p>
<p>Solve for w.</p> $\frac{w}{2} - 3 = \frac{w}{3}$ <p>Simplify your answer as much as possible.</p> <p>Answer: $w = 18$</p> <p style="text-align: right;">6.039</p>	<p>Solve for w.</p> $-\frac{4}{5} = \frac{7}{2}w - \frac{8}{3}$ <p>Simplify your answer as much as possible.</p> <p>Answer: $w = \frac{8}{15}$</p> <p style="text-align: right;">6.040</p>
<p>Solve for x.</p> $-x - \frac{4}{3} = \frac{2}{5}x - \frac{2}{3}$ <p>Simplify your answer as much as possible.</p> <p>Answer: $x = -\frac{10}{21}$</p> <p style="text-align: right;">6.041</p>	<p>Solve for u.</p> $\frac{2u - 2}{3} = \frac{2u - 5}{5} + 3$ <p>Simplify your answer as much as possible.</p> <p>Answer: $u = 10$</p> <p style="text-align: right;">6.042</p>

Module D

Solve the following system of equations.

$$-8x + 3y = 7$$

$$13x - 3y = -17$$

Answer: $x = -2, y = -3$

6.043

Solve for y .

$$\frac{y+2}{7} = \frac{5}{4}$$

Simplify your answer as much as possible.

Answer: $y = \frac{27}{4}$

6.044

Solve for y .

$$y - h = r$$

Answer: $y = r + h$

6.045

Solve for x .

$$x - y + z = A$$

Answer: $x = A + y - z$

6.046

Solve for W .

$$A = 9W$$

Answer:

$$W = \frac{A}{9}$$

6.047

Solve for s .

$$-3 = -18r + 6s$$

Answer:

$$s = \frac{-3 + 18r}{6}$$

6.048

<p>Solve for b.</p> $r = (1 + b)m$ <p>Answer:</p> $b = \frac{r}{m} - 1$	<p>Solve for Z.</p> $\frac{7}{8}(Y - Z) = X$ <p>Answer: $Z = -\frac{8}{7}X + Y$</p>
<p>6.049</p>	<p>6.050</p>
<p>Yesterday, Bob had n baseball cards. Today, he gave 14 away. Using n, write an expression for the number of cards Bob has left.</p> <p>Answer: $n - 14$</p>	<p>Translate the phrase into an algebraic expression.</p> <p><i>b less than 2</i></p> <p>Answer: $2 - b$</p>
<p>6.051</p>	<p>6.052</p>
<p>Translate this phrase into an algebraic expression.</p> <p><i>Six less than the product of 15 and Vanessa's age</i></p> <p>Use the variable v to represent Vanessa's age.</p> <p>Answer: $15v - 6$</p>	<p>Translate this sentence into an equation.</p> <p><i>The sum of 13 and Mai's savings is 51.</i></p> <p>Use the variable m to represent Mai's savings.</p> <p>Answer: $13 + m = 51$</p>
<p>6.053</p>	<p>6.054</p>

<p>Translate the sentence into an equation.</p> <p><i>Twice the difference of a number and 7 equals 6.</i></p> <p>Use the variable c for the unknown number.</p> <p>Answer: $2(c - 7) = 6$</p>	<p>The yearbook club had a meeting. The meeting had 10 people, which is one-half of the club. How many people are in the club?</p> <p>Answer: 20 people</p>
<p>Huilan's age is three times Thomas's age. The sum of their ages is 20. What is Thomas's age?</p> <p>Answer: 5 years old</p>	<p>Greg rented a truck for one day. There was a base fee of \$20.99, and there was an additional charge of 72 cents for each mile driven. Greg had to pay \$140.51 when he returned the truck. For how many miles did he drive the truck?</p> <p>Answer: 166 miles</p>
<p>Keisha has a job transporting soft drinks by truck. Her truck is filled with cans that weigh 14 ounces each and bottles that weigh 70 ounces each. There is a combined total of 880 cans and bottles in her truck. Let x be the number of 14-ounce cans in her truck. Write an expression for the combined total weight (in ounces) of the cans and bottles in her truck.</p> <p>Answer: $14x + 70(880 - x)$</p>	<p>Customers of a phone company can choose between two service plans for long distance calls. The first plan has a \$26 monthly fee and charges an additional \$0.10 for each minute of calls. The second plan has no monthly fee but charges \$0.14 for each minute of calls. For how many minutes of calls will the costs of the two plans be equal?</p> <p>Answer: 650 minutes</p>

Brian's gas tank is $\frac{1}{3}$ full. After he buys 2 gallons of gas, it is $\frac{1}{2}$ full. How many gallons can Brian's tank hold?

Answer: 12 gallons

6.061

A copy machine makes 32 copies per minute. How long does it take to make 168 copies?

_____ minutes _____ seconds

Answer: 5 minutes 15 seconds

6.062

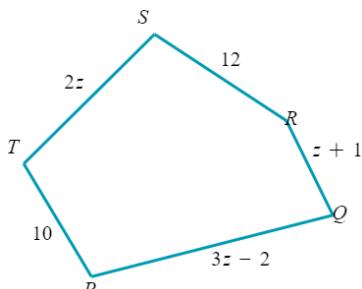
Two trains leave stations 374 miles apart at the same time and travel toward each other. One train travels at 80 miles per hour while the other travels at 90 miles per hour. How long will it take for the two trains to meet? Do not do any rounding.

Answer: 2.2 hours

6.063

The perimeter of the pentagon below is 63 units. Find the length of side \overline{QR} .

Write your answer without variables.



Answer: $\overline{QR} = 8$

The length of a rectangle is twice its width. If the perimeter of the rectangle is 42 cm, find its area.

Answer: 98 cm²

6.065

The circumference of a circular garden is 116.18 feet. What is the radius of the garden?

Use 3.14 for π and do not round your answer.

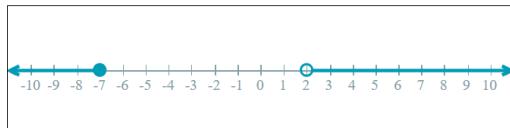
Answer: 18.5 feet

6.066

Graph the compound inequality on the number line.

$$x \leq -7 \text{ or } x > 2$$

Answer:



Write a compound inequality for the graph shown below. Use x for your variable.



Answer: $x < 0$ or $x > 2$

6.067

6.068

Rewrite the set W by listing its elements. Make sure to use the appropriate set notation.

$$W = \{x | x \text{ is an integer and } -1 \leq x <$$

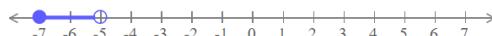
Answer:

$$W = \{-1\}$$

6.069

Graph the set $\{x | -7 \leq x < -5\}$ on the number line. Then, write the set using interval notation.

Answer:



$$\{x | -7 \leq x < -5\} = [-7, -5)$$

6.070

Fill in the table using this function rule.

$$y = -10x + 1$$

Answer:

x	y
-1	11
0	1
1	-9
5	-49

6.071

For each ordered pair, determine whether it is a solution to $6x + 7y = 19$.

(a) (2, 1)

(b) (3, -4)

(c) (0, -3)

(d) (-5, 7)

Answer:

Is it a solution?

Yes: (a) and (d)

No: (b) and (c)

<p>Find an ordered pair (x, y) that is a solution to the equation.</p> $2x - y = 9$ <p>Answer: $(x, y) = (0, -9)$ <i>There are many possible answers.</i></p> <p style="text-align: right;">6.073</p>	<p>Find the y-intercept and x-intercept of the line.</p> $3x + 5y = -14$ <p>(a) y-intercept = (b) x-intercept =</p> <p>Answer: (a) y-intercept = $-\frac{14}{5}$ (b) x-intercept = $-\frac{14}{3}$</p> <p style="text-align: right;">6.074</p>
<p>Find the x-intercept and the y-intercept of the line below. Write “None” if applicable.</p> <p>x-intercept = y-intercept =</p> <p>Answer: x-intercept = None y-intercept = 3</p> <p style="text-align: right;">6.076</p>	<p>Find the x-intercept and y-intercept of the line.</p> $3x - 5y = 15$ <p>(a) y-intercept = (b) x-intercept =</p> <p>Answer: (a) y-intercept = -3 (b) x-intercept = 5</p> <p style="text-align: right;">6.076</p>
<p>Find the slope of the line passing through the points $(-6, 6)$ and $(4, -7)$.</p> <p>Answer: $-\frac{13}{10}$</p> <p style="text-align: right;">6.077</p>	<p>For each equation, determine whether it is linear.</p> <p>(a) $6y = 4 - x$ (b) $2.2 = 0.04x - 0.1y$ (c) $y = 8x^2 + x$ (d) $8x + \frac{6}{y} = 7$</p> <p>Answer: Is the equation linear? Yes: (a) and (b) No: (c) and (d)</p> <p style="text-align: right;">6.078</p>

<p>Fill in the blanks below.</p> <p>(a) Find the slope of the line passing through the points $(-9, -8)$ and $(3, -8)$.</p> <p>Slope =</p> <p>(b) Find the slope of the line passing through the points $(7, -1)$ and $(7, -6)$.</p> <p>Slope =</p> <p>Answer:</p>	<p>The points $(-5, -11)$ and $(r, 5)$ lie on a line with slope 2. Find the missing coordinate r.</p> <p>Answer: $r = 3$</p>
<p>(a) slope = zero Find the y-intercept and the slope of the line. (b) slope = undefined</p> $y = -\frac{5}{4}$ <p>y-intercept =</p> <p>Slope =</p> <p>Answer:</p> <p>y-intercept = $-\frac{5}{4}$</p> <p>Slope = 0</p>	<p>Write an equation in slope-intercept form for the line with slope -2 and y-intercept -4.</p> <p>Answer:</p> $y = -2x - 4$
<p>A line passes through the point $(4, -3)$ and has a slope of $\frac{5}{4}$. Write an equation in slope-intercept form for this line.</p> <p>Answer:</p> $y = \frac{5}{4}x - 8$	<p>A line passes through the point $(-8, -8)$ and has a slope of $-\frac{5}{4}$. Write an equation in point-slope form for this line.</p> <p>Answer:</p> $y + 8 = -\frac{5}{4}(x + 8)$

<p>Find an equation for the line that passes through the points $(-6, 2)$ and $(4, -6)$.</p> <p>Answer:</p> $y = -\frac{4}{5}x - \frac{14}{5}$ <p style="text-align: right;">6.085</p>	<p>Write equations for the vertical and horizontal lines passing through the point $(5, 2)$.</p> <p>vertical line:</p> <p>horizontal line:</p> <p>Answer:</p> <p>vertical line: $x = 5$ horizontal line: $y = 2$</p> <p style="text-align: right;">6.086</p>
<p>Consider the line $y = 3 - 6x$. What is the slope of a line parallel to this line?</p> <p>What is the slope of a line perpendicular to this line?</p> <p>Answer: Parallel slope: -6 Perpendicular slope: $\frac{1}{6}$</p> <p style="text-align: right;">6.087</p>	<p>Consider the line $x + 4y = 4$. What is the slope of a line parallel to this line?</p> <p>What is the slope of a line perpendicular to this line?</p> <p>Answer: Parallel slope: $-\frac{1}{4}$ Perpendicular slope: 4</p> <p style="text-align: right;">6.088</p>
<p>The equations of three lines are given below.</p> <p>Line 1: $-3y = 5x + 2$ Line 2: $10x - 6y = 8$ Line 3: $y = -\frac{3}{5}x - 4$</p> <p>For each pair of lines, determine whether they are parallel, perpendicular, or neither:</p> <p>Line 1 and Line 2: Line 1 and Line 3: Line 2 and Line 3:</p> <p>Answer:</p> <p>Neither. Neither. Perpendicular</p>	<p>Consider the line $-8x + 4y = 4$. Find the equation of the line that is perpendicular to this line and passes through the point $(7, 3)$.</p> <p>Find the equation of the line that is parallel to this line and passes through the point $(7, 3)$.</p> <p>Answer: Perpendicular: $y = -\frac{1}{2}x + \frac{13}{2}$ Parallel: $y = 2x - 11$</p> <p style="text-align: right;">6.090</p>

The Sugar Sweet Company is going to transport its sugar to market. It will cost \$3500 to rent trucks, and it will cost an additional \$250 for each ton of sugar transported. Let C represent the total cost (in dollars), and let S represent the amount of sugar (in tons) transported. Write an equation relating C to S . Then use this equation to find the total cost to transport 16 tons of sugar.

Answer:

$$\text{Equation: } C = 3500 + 250S$$

Total cost: \$7500

6.091

Use substitution to solve the system.

$$x - 3y = -4$$

$$-5x + 4y = -13$$

Answer: $x = 5, y = 3$

6.092

Suppose that the relation H is defined as follows.

$$H = \{(9, n), (2, q), (2, p)\}$$

Give the domain and range of H .

Write your answers using set notation.

Answer:

$$\text{domain} = \{9, 2\}$$

$$\text{range} = \{n, q, p\}$$

6.093

The functions f and g are defined as follows.

$$f(x) = 4x^2 - x$$

$$g(x) = -2x - 1$$

Find $f(-4)$ and $g(3)$.

Simplify your answers as much as possible.

Answer:

$$f(-4) = 68$$

$$g(3) = -7$$

6.094

The function g is defined by $g(x) = 2x^2 - 6$.

Find $g(3a)$.

Answer:

$$18a^2 - 6$$

6.095

Kaitlin rented a truck for one day. There was a base fee of \$10.00, and there was an additional charge of 6 cents for each mile driven. The total cost, C (in dollars), for driving x miles is given by the following function.

$$C(x) = 10.00 + 0.06x$$

What is the total rental cost if Kaitlin drove 20 miles?

Answer: 11.20 dollars

For each ordered pair, determine whether it is a solution to the system of equations.

$$-14x + 2y = -6$$

$$y = 7x - 3$$

Is it a solution? Yes or No

$$(-1, 7) \quad (0, -3) \quad (2, -4) \quad (2, 11)$$

Answer:

Yes: $(0, -3)$ and $(2, 11)$

No: $(-1, 7)$ and $(2, -4)$

Bob tutors chemistry. For each hour that he tutors, he earns 30 dollars. His earnings, E (in dollars), after tutoring for h hours is given by the following function.

$$E(h) = 30h$$

How much does Bob earn if he tutors for 5 hours?

Answer: 150 dollars

6.096

Charlie wants to save \$700 to buy a TV. He saves \$19 each week. The amount, A (in dollars), that he still needs after w weeks is given by the following function.

$$A(w) = 700 - 19w$$

Answer:

(a) If Charlie still needs \$358, how many weeks has he been saving? **18 weeks**

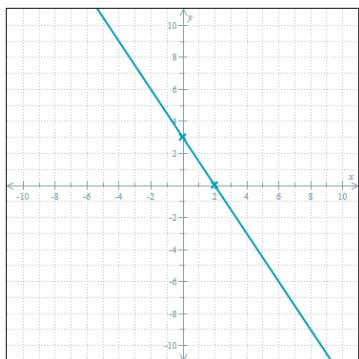
(b) How much money does Charlie still need after 6 weeks? **\$586**

6.098

Graph the line.

$$y = -\frac{3}{2}x + 3$$

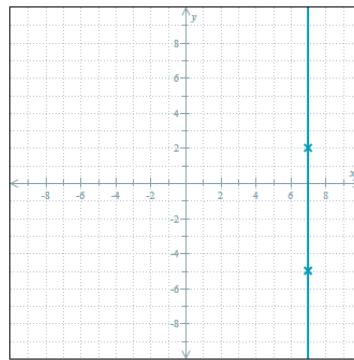
Answer:



6.100

Graph the line $x = 7$.

Answer:

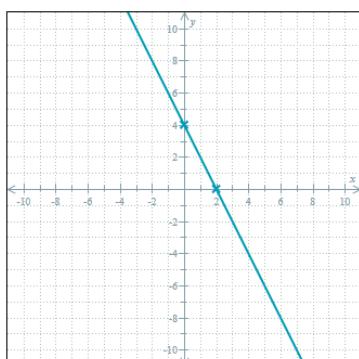


6.101

Graph the line whose y -intercept is 4 and whose x -intercept is 2.

$$y + 4 = -\frac{1}{2}(x + 1)$$

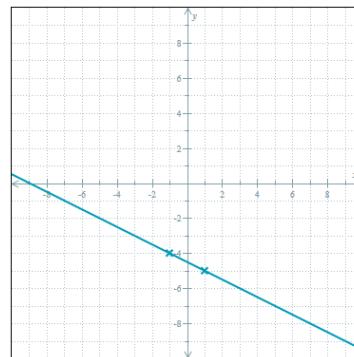
Answer:



6.102

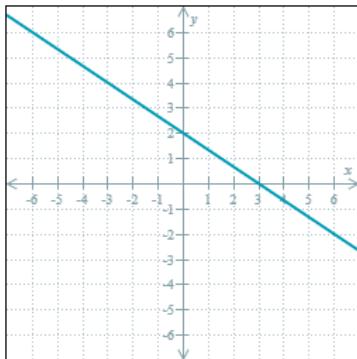
Graph the line.

Answer:



6.103

Find the x -intercept and the y -intercept of the line below.

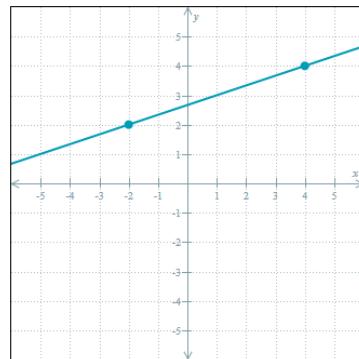


Answer:

- (a) x -intercept: 3
- (b) y -intercept: 2

6.104

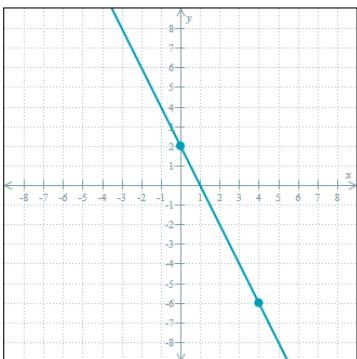
Find the slope of the line graphed below.



Answer: $\frac{1}{3}$

6.105

Write an equation of the line below.

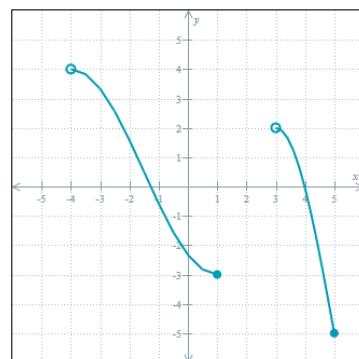


Answer:

$$y = -2x + 2$$

6.106

The entire graph of the function g is shown in the figure below. Write the domain and range of g as intervals or unions of intervals.



Answer:

$$\begin{aligned} \text{domain} &= (-4, 1] \cup (3, 5] \\ \text{range} &= [-5, 4) \end{aligned}$$

6.107

The following topics are not included in the Class Notes but can be found in ALEKS

The following ALEKS topics are also included in Math 100, but sample problems are not included in the class notes. If you have would like help finding these topics to practice, come to office hours and ask a Math 100 TA.

- (6.108) Computing unit prices to find the better buy
- (6.109) Properties of addition
- (6.110) Properties of real numbers
- (6.111) Identifying properties used to solve a linear equation
- (6.112) Solving equations with zero, one, or infinitely many solutions
- (6.113) Graphing a linear equation of the form $y = mx$
- (6.114) Graphing a line given its equation in slope-intercept form: Integer slope
- (6.115) Graphing a line given its equation in standard form
- (6.116) Graphing a line by first finding its x- and y-intercepts
- (6.117) Classifying slopes given graphs of lines
- (6.118) Graphing a line given its slope and y-intercept
- (6.119) Graphing a line through a given point with a given slope
- (6.120) Identifying linear functions given ordered pairs
- (6.121) Graphing a line by first finding its slope and y-intercept
- (6.122) Writing an equation and graphing a line given its slope and y-intercept
- (6.123) Writing an equation and drawing its graph to model a real-world situation: Advanced
- (6.124) Combining functions to write a new function that models a real-world situation
- (6.125) Comparing properties of linear functions given in different forms

- (6.126) Interpreting the parameters of a linear function that models a real-world situation
- (6.127) Application problem with a linear function: Finding a coordinate given the slope and a point
- (6.128) Application problem with a linear function: Finding a coordinate given two points
- (6.129) Identifying independent and dependent variables from equations or real-world situations
- (6.130) Solving a linear equation by graphing
- (6.131) Identifying functions from relations
- (6.132) Vertical line test
- (6.133) Table for a linear function
- (6.134) Evaluating a piecewise-defined function
- (6.135) Determining whether an equation defines a function: Basic
- (6.136) Domain and range of a linear function that models a real-world situation
- (6.137) Domain and range from the graph of a continuous function
- (6.138) Finding an output of a function from its graph
- (6.139) Finding inputs and outputs of a function from its graph
- (6.140) Finding where a function is increasing, decreasing, or constant given the graph
- (6.141) Choosing a graph to fit a narrative: Basic
- (6.142) Graphing an integer function and finding its range for a given domain
- (6.143) Graphing a function of the form $f(x) = ax + b$: Integer slope
- (6.144) Graphing a function of the form $f(x) = ax + b$: Fractional slope
- (6.145) Graphically solving a system of linear equations
- (6.146) Interpreting the graphs of two functions

Module D

Module E

Module E will walk you through the properties of exponents, how to work with polynomials, and how to solve quadratic equations using different methods. With the properties of exponents, you will learn how to calculate simple interest, sales prices, and total cost with tax and markups, as well as calculate the starting amount when taking percentages into account. You will also work with adding, subtracting, multiplying, dividing, and factoring polynomials. In addition, you will work more with rational functions, including how to evaluate a rational function and identify the domain of a rational function. You will also learn how to simplify radical expressions and find perfect nth roots. The rest of **Module E** will take you through graphing quadratic functions and identifying characteristics of the graphs. You will also use the skills you've previously learned about exponents. For support in **Module E**, we recommend you review **Lessons 3A - 3D**, which reviewed properties of exponents, and **Lessons 10A - 10D**, which reviewed properties of radicals and rational exponents. **Module E** is further supported by **Lessons 13A - 13D**, which explored rational expressions, **Lessons 14A - 14D**, which focused on different types of functions and their graphs, and **Lessons 15A - 15D** and **16A - 16D**, which focus on factoring and graphing quadratics.

Objectives:

By the end of this module, students will be able to:

- Calculate the percentage increase or decrease.
- Identify characteristics of non-linear functions, including intercepts, behavior, and minima and maxima.
- Graph basic quadratic functions.

Module D

- Understand the different properties of exponents and simplify exponential expressions.
 - Find the sum, difference, or product of polynomial expressions.
 - Factor polynomial expressions, with a focus on quadratics.
 - Evaluate rational functions and identify domain and range.
 - Evaluate radicals and rational exponents.
 - Evaluate and graph exponential functions.
-
-

Solve for x .

$$4^{-x-3} = 8$$

Answer: $x = -\frac{9}{2}$

7.001

A house on the market was valued at \$251,000. After several years, the value increased by 8%. By how much did the house's value increase in dollars? What is the current value of the house?

Answer:

Increase in value: \$20,080

Current house value: \$271,080

7.002

An item on sale costs 95% of the original price. The original price was \$45. Use calculator to find the sale price.

Answer:

The sale price is \$42.75.

7.003

The price of an item has been reduced by 40%. The original price was \$70. What is the price of the item now?

Answer:

The price is now \$42.

7.004

A laptop has a listed price of \$609.95 before tax. If the sales tax rate is 6.5%, find the total cost of the laptop with sales tax included.

Round your answer to the nearest cent, as necessary.

Answer: \$649.45

7.005

A company has recently been hiring new employees. Today the company has 36% more employees than it did a year ago. If there are currently 51,000 employees, how many employees did the company have a year ago?

Answer: 37,500 employees

7.006

<p>A table is on sale for \$816, which is 15% less than the regular price. What is the regular price?</p> <p>Answer: \$960</p>	<p>The price of an item yesterday was \$95. Today, the price fell to \$38. Find the percentage decrease.</p> <p>Answer: 60%</p>
<p>The price of a gallon of unleaded gas has dropped to \$2.84 today. Yesterday's price was \$2.89. Find the percentage decrease. Round your answer to the nearest tenth of a percent.</p> <p>Answer: 1.7%</p>	<p>Charlie deposits \$2000 into an account that pays simple interest at a rate of 5% per year. How much interest will he be paid in the first 6 years?</p> <p>Answer: \$600</p>
<p>Suppose Hong borrows 6500 at an interest rate of 19% compounded each year. Assume that no payments are made on the loan. Follow the instructions below. Do not do any rounding.</p> <p>(a) Find the amount owed at the end of 1 year. (b) Find the amount owed at the end of 2 years.</p> <p>Answer: (a) \$7735, (b) \$9204.65</p>	<p>Simplify the following expression.</p> $-8x^2 + 9 + 10x^2 - 10 - 7x$ <p>Answer:</p> $2x^2 - 7x - 1$

<p>The function f is defined as follows.</p> $f(x) = 2x^2 + 7$ <p>If the graph of f is translated vertically downward by 6 units, it becomes the graph of a function $g(x)$. Find the expression for $g(x)$.</p> <p>Answer:</p> $g(x) = 2x^2 + 1$	<p>Find the average rate of change of $h(x) = -3x^2 - x$ from $x = 1$ to $x = 4$. Simplify your answer as much as possible.</p> <p>Answer: -16</p>
<p>Follow the instructions below.</p> <p>(a) Write $y \cdot y^3$ without exponents.</p> $y \cdot y^3 = \underline{\hspace{2cm}}$ <p>(b) Fill in the blank.</p> $y \cdot y^3 = y \underline{\hspace{2cm}}$ <p>Answer:</p> <p>(a) $y \cdot y \cdot y \cdot y$ (b) 4</p>	<p>Simplify.</p> $v^2 \cdot v^4$ <p>Answer: v^6</p>
<p>Multiply.</p> $-5u^4 (-u^4)$ <p>Simplify your answer as much as possible.</p> <p>Answer: $5u^8$</p>	<p>Multiply.</p> $3v^7 \cdot 2w^3v^5 \cdot 8w$ <p>Simplify your answer as much as possible.</p> <p>Answer: $48v^{12}w^4$</p>

Module E

<p>Order the expressions by choosing $>$, $<$, or $=$.</p> <p>Answer:</p> $2^5 \times 2^2 = 2^7$ $2^2 \times 5^2 = 10^2$ $2^5 \times 5^2 < 10^{10}$	<p>Follow the instructions below. Write $(b^2)^3$ without exponents.</p> $(b^2)^3 = \underline{\hspace{2cm}}$ <p>Fill in the blank.</p> $(b^2)^3 = b \underline{\hspace{2cm}}$ <p>Answer:</p> $(b^2)^3 = b \cdot b \cdot b \cdot b \cdot b \cdot b$ $(b^2)^3 = b^6$
<p>Simplify. 7.019</p> $(v^3)^6$ <p>Write your answer without parentheses.</p> <p>Answer: v^{18}</p>	<p>Simplify. 7.020</p> $(8z)^2$ <p>Write your answer without parentheses.</p> <p>Answer: $64z^2$</p>
<p>Simplify. 7.021</p> $(-2a^2b^3)^5$ <p>Write your answer without parentheses.</p> <p>Answer: $-32a^{10}b^{15}$</p>	<p>Simplify. 7.022</p> $\left(\frac{3a}{b^3}\right)^4$ <p>Write your answer without parentheses.</p> <p>Answer: $\frac{81a^4}{b^{12}}$</p>

Simplify. $(-x^3z^2)^4(2x^2yz^3)$	Simplify. $\frac{9abc}{72c}$
Answer: $2x^{14}yz^{11}$	Answer: $\frac{ab}{8}$

7.025

7.026

Simplify. $\frac{y^7}{y^4}$	Simplify. $\frac{5y}{20y^5}$
Answer: y^3	Answer: $\frac{1}{4y^4}$

7.027

7.028

Simplify. $\frac{z^7y^6}{zy^5}$	Simplify. $\frac{36w^3x^4}{4w^2x}$
Answer: z^6y	Answer: $9wx^3$

7.029

7.030

Module E

<p>Simplify. Write your answer using only positive exponents.</p> $\left(\frac{a^4b^4}{a^2b^7}\right)^2$ <p>Answer:</p> $\frac{a^4}{b^6}$ <p style="text-align: center;">7.031</p>	<p>Evaluate the expressions.</p> $-(3)^0 =$ $3\left(-\frac{8}{9}\right)^0 =$ <p>Answer: -1, 3</p> <p style="text-align: center;">7.032</p>
<p>Evaluate.</p> 10^{-6} <p>Answer:</p> $\frac{1}{1,000,000}$ <p style="text-align: center;">7.033</p>	<p>Rewrite the following without an exponent.</p> 3^{-3} <p>Answer:</p> $\frac{1}{27}$ <p style="text-align: center;">7.034</p>
<p>Rewrite the following without an exponent.</p> $\left(\frac{8}{3}\right)^{-1}$ <p>Answer:</p> $\frac{3}{8}$ <p style="text-align: center;">7.035</p>	<p>Rewrite the following without an exponent.</p> $(-8)^{-1}$ <p>Answer:</p> $-\frac{1}{8}$ <p style="text-align: center;">7.036</p>

<p>Order the expressions by choosing <, >, or =</p> <p>Answer:</p> $\left(\frac{1}{5}\right)^{-1} < \left(\frac{1}{5}\right)^{-2}$ $\left(\frac{1}{5}\right)^{-2} > 5^{-2}$	<p>Rewrite the expression without using a negative exponent.</p> $-2p^{-2}$ <p>Simplify your answer as much as possible.</p> <p>Answer:</p> $-\frac{2}{p^2}$
<p>Simplify. $\left(\frac{1}{5}\right)^{-1} > 5^{-2}$</p> $v^{-4} \cdot v^9$ <p>7.037</p> <p>Write your answer with a positive exponent only.</p> <p>Answer: v^5</p>	<p>Simplify.</p> $4v^4y^{-8} \cdot 7y^7 \cdot 2x^{-6}$ <p>Use only positive exponents in your answer.</p> <p>Answer:</p> $\frac{56v^5x^2}{y}$ <p>7.040</p>
<p>Simplify. Write your answer with a positive exponent only.</p> $\frac{y^{-4}}{y^{-3}}$ <p>7.041</p> <p>Answer:</p> $\frac{1}{y}$	<p>Simplify. Write your answer using only positive exponents.</p> $\frac{m^4n^{-1}p^{-8}}{m^{-5}n^3p^2}$ <p>7.042</p> <p>Answer:</p> $\frac{m^9}{n^4p^{10}}$

Module E

<p>Simplify.</p> $(w^{-5})^2$ <p>Write your answer without using negative exponents.</p> <p>Answer:</p> $\frac{1}{w^{10}}$ <p style="text-align: center;">7.043</p>	<p>Simplify.</p> $(-4w^{-4}x^3)^2$ <p>Write your answer using only positive exponents.</p> <p>Answer:</p> $\frac{16x^6}{w^8}$ <p style="text-align: right;">7.044</p>
<p>Simplify. Write your answer using only positive exponents.</p> $\left(\frac{3m^2}{m^{-5}}\right)^{-2}$ <p>Answer:</p> $\frac{1}{9m^{14}}$ <p style="text-align: center;">7.045</p>	<p>Simplify. Write your answer using only positive exponents.</p> $\left(\frac{a^5b^{-2}c^4}{a^{-3}c^{-4}}\right)^3$ <p>Answer:</p> $\frac{a^{24}c^{24}}{b^6}$ <p style="text-align: right;">7.046</p>
<p>Simplify. Write your answer using only positive exponents.</p> $\left(\frac{3u^3v}{w^{-1}}\right)^{-2} (v^{-3}w^5)$ <p>Answer:</p> $\frac{w^3}{9u^6v^5}$ <p style="text-align: center;">7.047</p>	<p>Write 8.641×10^5 in standard notation.</p> <p>Answer: 864,100</p> <p style="text-align: right;">7.048</p>

<p>Write 1.65×10^{-3} in standard notation.</p> <p>Answer: 0.00165</p> <p style="text-align: right;">7.049</p>	<p>Simplify.</p> $(7v^2 - 6v - 5) + (4v^2 - 3v + 2)$ <p>Answer: $11v^2 - 9v - 3$</p> <p style="text-align: right;">7.050</p>
<p>Use the distributive property to remove the parentheses.</p> $(8c^3 - 2c^4)7c^5$ <p>Simplify your answer as much as possible.</p> <p>Answer: $56c^8 - 14c^9$</p> <p style="text-align: right;">7.051</p>	<p>Rewrite without parentheses.</p> $-2v^5(-5v^3 + 6v^2 - 3)$ <p>Simplify your answer as much as possible.</p> <p>Answer: $10v^8 - 12v^7 + 6v^5$</p> <p style="text-align: right;">7.052</p>
<p>Multiply.</p> $(y - 3)(y + 4)$ <p>Simplify your answer.</p> <p>Answer: $y^2 + 1y - 12$</p> <p style="text-align: right;">7.053</p>	<p>Multiply.</p> $(a + 4)(8a - 5)$ <p>Simplify your answer.</p> <p>Answer: $8a^2 + 27a - 20$</p> <p style="text-align: right;">7.054</p>

Module E

<p>Multiply.</p> $(7 - u)(7 + u)$ <p>Simplify your answer.</p> <p>Answer: $49 - u^2$</p>	<p>Rewrite without parentheses and simplify.</p> $(v + 4)^2$ <p>Answer: $v^2 + 8v + 16$</p>
<p>Multiply.</p> $(-5a - 4)(3a + 5)$ <p>Simplify your answer.</p> <p>Answer: $-15a^2 - 37a - 20$</p>	<p>Factor.</p> $12y + 18$ <p>Answer: $6(2y + 3)$</p>
<p>Find the greatest common factor of $12c^2$ and $8c$.</p> <p>Answer: $4c$</p>	<p>Factor $15n^2 - 13n$.</p> <p>Answer: $n(15n^2 - 13n)$</p>

<p>Rewrite the expression by factoring out $(x + 6)$.</p> $3x^2(x + 6) + (x + 6)$ <p>Answer: $(x + 6)(3x^2 + 1)$</p>	<p>Factor by grouping.</p> $16u^3 + 12u^2 + 12u + 9$ <p>Answer: $(4u + 3)(4u^2 + 3)$</p>
<p>Factor by grouping.</p> $y^3 - 2y^2 - 2y + 4$ <p>Answer: $(y - 2)(y^2 - 2)$</p>	<p>Factor.</p> $z^2 - 3z - 18$ <p>Answer: $(z - 6)(z + 3)$</p>
<p>Factor completely.</p> $2v^2 - 24v + 70$ <p>Answer: $2(v - 7)(v - 5)$</p>	<p>Factor.</p> $5z^2 + 12z - 9$ <p>Answer: $(5z - 3)(z + 3)$</p>

Module E

<p>Find the range of the quadratic function.</p> $f(x) = 2x^2 - 4x + 5$ <p>Write your answer using interval notation.</p> <p>Answer: $[3, \infty)$</p>	<p>Factor.</p> $u^2 + 10u + 25$ <p>Answer: $(u + 5)^2$</p>
<p>Factor.</p> $9y^2 + 48y + 64$ <p>Answer: $(3y + 8)^2$</p>	<p>Factor.</p> $25 - x^2$ <p>Answer: $(5 + x)(5 - x)$</p>
<p>Factor.</p> $81u^2 - 49$ <p>Answer: $(9u + 7)(9u - 7)$</p>	<p>Solve.</p> $(z - 8)(z - 9) = 0$ <p>(If there is more than one solution, separate them with commas.)</p> <p>Answer: $z = 8, 9$</p>

<p>Solve for v.</p> $v^2 = -13v$ <p>If there is more than one solution, separate them with commas. If there is no solution, write “No solution”.</p> <p>Answer: $v = 0, -13$</p> <p style="text-align: right;">7.073</p>	<p>Solve for u.</p> $u^2 + 10u + 24 = 0$ <p>If there is more than one solution, separate them with commas. If there is no solution, write “No solution.”</p> <p>Answer: $u = -4, -6$</p> <p style="text-align: right;">7.074</p>
<p>Find all excluded values for the expression. That is, find all values of v for which the expression is undefined.</p> $\frac{v - 1}{v - 4}$ <p>If there is more than one value, separate them with commas.</p> <p>Answer: $v = 4$</p> <p style="text-align: right;">7.075</p>	<p>The function f is defined as follows.</p> $f(x) = \frac{x - 1}{x + 12}$ <p>Find $f(-4)$. Simplify your answer as much as possible. If applicable, write “Undefined”.</p> <p>Answer: $f(-4) = -\frac{5}{8}$</p> <p style="text-align: right;">7.076</p>
<p>The function g is defined as follows.</p> $g(x) = \frac{x^2 + 14x + 48}{x^2 - 16}$ <p>Find $g(-4)$. Simplify your answer as much as possible. If applicable, write “Undefined”.</p> <p>Answer: $g(-4) : \text{Undefined}$</p> <p style="text-align: right;">7.077</p>	<p>The function g is defined below.</p> $g(x) = \frac{x - 7}{x^2 - 49}$ <p>Find all values of x that are NOT in the domain of g. If there is more than one value, separate them with commas.</p> <p>Answer: $x = 7, -7$</p> <p style="text-align: right;">7.078</p>

Module E

<p>Find the least common multiple of $10w^4$ and $8y^3$.</p> <p>Answer: $40w^4y^3$</p>	<p>Find the least common multiple of these two expressions.</p> $4w^4v^3u^2 \quad \text{and} \quad 18wu^6$ <p>Answer: $36w^4v^3u^6$</p>
<p>7.079</p> <p>Simplify.</p> $\frac{3}{\frac{7}{6}}$ <p>Answer: $\frac{18}{7}$</p>	<p>7.080</p> <p>Simplify.</p> $\frac{\frac{6}{5} - \frac{5}{2}}{\frac{3}{2} - \frac{5}{4}}$ <p>Answer: $-\frac{26}{5}$</p>
<p>7.081</p> <p>Find all real square roots of 100. If there is more than one answer, separate them with commas. If there are none, write “None”.</p> <p>Answer: $10, -10$</p>	<p>7.082</p> <p>Simplify.</p> $\sqrt{\frac{12}{75}}$ <p>Be sure to write your answer in simplest form.</p> <p>Answer: $\frac{2}{5}$</p>
<p>7.083</p>	<p>7.084</p>

<p>Evaluate the following. Write “Not a real number” if applicable.</p> <p>(a) $-\sqrt{121} =$ (b) $\sqrt{-4} =$</p> <p>Answer: (a) -11 (b) Not a real number</p> <p style="text-align: right;">7.085</p>	<p>Evaluate the following. Write “Not a real number” if applicable.</p> <p>(a) $\sqrt{(-4)^4} =$ (b) $\sqrt{(-5)^2} =$</p> <p>Answer: (a) 16 (b) 5</p> <p style="text-align: right;">7.086</p>
<p>Simplify.</p> $\sqrt{y^{20}}$ <p>Assume that the variable represents a positive real number.</p> <p>Answer: y^{10}</p> <p style="text-align: right;">7.087</p>	<p>Simplify.</p> $\sqrt{25z^{14}}$ <p>Assume that the variable z represents a positive real number.</p> <p>Answer: $5z^7$</p> <p style="text-align: right;">7.088</p>
<p>Find the value of $\sqrt[3]{1000}$.</p> <p>Answer: 10</p> <p style="text-align: right;">7.089</p>	<p>Evaluate the following. Write “Not a real number” if applicable.</p> <p>(a) $\sqrt[4]{-81} =$ (b) $\sqrt[3]{-8} =$</p> <p>Answer: (a) Not a real number (b) -2</p> <p style="text-align: right;">7.090</p>

Module E

<p>Simplify.</p> $\sqrt[4]{\frac{1}{16}}$ <p>Be sure to write your answer in lowest terms.</p> <p>Answer: $\frac{1}{2}$</p> <p>7.091</p>	<p>Write the following as an exponential expression.</p> $\sqrt[8]{14}$ <p>Answer:</p> $14^{\frac{1}{8}}$ <p>7.092</p>
<p>Evaluate.</p> <p>(a) $81^{\frac{1}{4}} =$</p> <p>(b) $27^{\frac{1}{3}} =$</p> <p>Answer:</p> <p>(a) 3</p> <p>(b) 3</p> <p>7.093</p>	<p>Simplify.</p> $\sqrt{96}$ <p>Answer: $4\sqrt{6}$</p> <p>7.94</p>
<p>Simplify.</p> $\sqrt{150}$ <p>Answer: $5\sqrt{6}$</p> <p>7.95</p>	<p>Simplify.</p> $\sqrt{8w^8}$ <p>Assume that the variable w represents a positive real number.</p> <p>Answer: $2w^4\sqrt{2}$</p> <p>7.96</p>

<p>Simplify.</p> $\sqrt{w^7}$ <p>Assume that the variable represents a positive real number.</p> <p>Answer: $w^3\sqrt{w}$</p> <p style="text-align: right;">7.97</p>	<p>Simplify.</p> $\sqrt{48x^{15}}$ <p>Assume that the variable represents a positive real number.</p> <p>Answer: $4x^7\sqrt{3x}$</p> <p style="text-align: right;">7.98</p>
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<p>Solve $u^2 = -16$, where u is a real number.</p> <p>Simplify your answer as much as possible.</p> <p>If there is more than one solution, separate them with commas.</p> <p>If there is no solution, write “No solution”.</p> <p>Answer: No solution</p> <p style="text-align: right;">7.99</p>	<p>Solve $x^2 = 54$, where x is a real number.</p> <p>Simplify your answer as much as possible.</p> <p>If there is more than one solution, separate them with commas.</p> <p>If there is no solution, write “No solution.”</p> <p>Answer: $x = 3\sqrt{6}, -3\sqrt{6}$</p> <p style="text-align: right;">7.100</p>
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<p>Use the quadratic formula to solve for x.</p> $3x^2 - 9x + 4 = 0$ <p>(If there is more than one solution, separate them with commas.)</p> <p>Answer: $x = \frac{9+\sqrt{33}}{6}, \frac{9-\sqrt{33}}{6}$</p> <p style="text-align: right;">7.101</p>	<p>Compute the value of the discriminant and give the number of real solutions of the quadratic equation.</p> $-2x^2 + 3x + 6 = 0$ <p>Discriminant:</p> <p>Number of Real Solutions:</p> <p>Answer:</p> <p>Discriminant: 57</p> <p>Number of Real Solutions: 2</p> <p style="text-align: right;">7.102</p>
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Answer the questions below about the quadratic function.

$$f(x) = -2x^2 - 4x - 5$$

Answer:

- (a) Does the function have a minimum or maximum value? **Maximum**
- (b) Where does the minimum or maximum value occur? $x = -1$
- (c) What is the function's minimum or maximum value? -3

A ball is thrown vertically upward. After t seconds, its height h (in feet) is given by the function $h(t) = 64t - 16t^2$. After how long will it reach its maximum height? Do not round your answer.

Answer: Time: 2 seconds

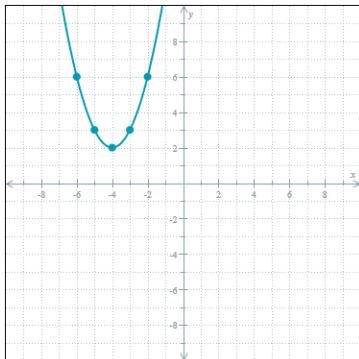
7.104

7.103

Graph the parabola.

$$y = (x + 4)^2 + 2$$

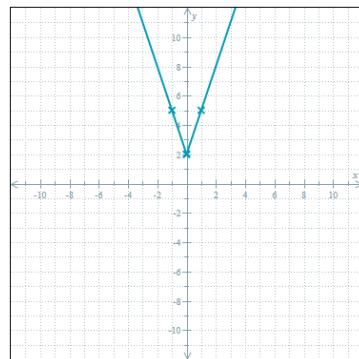
Answer:



Graph the equation.

$$y = 3|x| + 2$$

Answer:



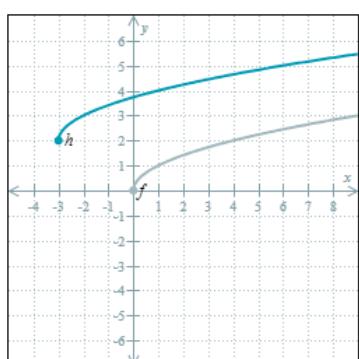
7.105

7.106

The graph of f is translated a whole number of units horizontally and vertically to obtain the graph of h .

The function f is defined by $f(x) = \sqrt{x}$.

Write down the expression for $h(x)$.

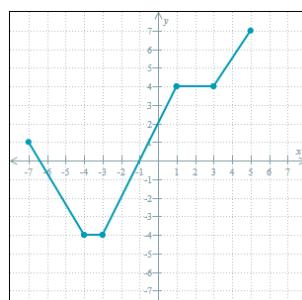


Answer:

$$h(x) = \sqrt{x + 3} + 2$$

Determine the interval(s) on which the function is (strictly) increasing.

Write your answer as an interval or list of intervals. When writing a list of intervals, make sure to separate each interval with a comma and to use as few intervals as possible. Write "None" if applicable.



Answer:

$$(-3, 1), (3, 5)$$

7.107

235

7.108

The following topics are not included in the Class Notes but can be found in ALEKS

The following ALEKS topics are also included in Math 100, but sample problems are not included in the class notes. If you have would like help finding these topics to practice, come to office hours and ask a Math 100 TA.

- (7.109) Finding intercepts of a nonlinear function given its graph
- (7.110) Factoring a quadratic by the *ac*-method
- (7.111) Finding the vertex, intercepts, and axis of symmetry from the graph of a parabola
- (7.112) Graphing a parabola of the form $y = x^2 + bx + c$
- (7.113) Graphing a parabola of the form $y = ax^2 + bx + c$: Integer coefficients
- (7.114) Finding the domain and range from the graph of a parabola
- (7.115) Solving a quadratic equation by graphing
- (7.116) Comparing properties of quadratic functions given in different forms
- (7.117) Classifying the graph of a function
- (7.118) How the leading coefficient affects the shape of a parabola
- (7.119) Table for an exponential function
- (7.120) Graphing an exponential function: $f(x) = b^x$
- (7.121) Graphing an exponential function: $f(x) = a(b)^x$
- (7.122) Graphing an exponential function and finding its domain and range
- (7.123) Evaluating an exponential function that models a real-world situation
- (7.124) Finding a final amount in a word problem on exponential growth or decay

- (7.125) Finding the final amount in a word problem on compound interest
- (7.126) Finding the initial amount and rate of change given an exponential function

Module F

This module is a bonus module. The concepts in will provide you with material that you will see as you move through Math 112. The material in this module includes more practice with quadratic functions, rational expressions, square and cube root functions, inverse functions, exponential equations, and much more. We recommend this module for anyone that wants to be successful in Math 112 and wants to see what concepts are coming up next.

Objectives:

This module will help students explore material in preparation for Math 112.

<p>Evaluate.</p> $\frac{6!3!}{2!5!}$ <p>Simplify your answer as much as possible.</p> <p>Answer: 18</p> <p style="text-align: right;">8.001</p>	<p>Factor completely.</p> $-3y^2 - 14y - 15$ <p>Answer:</p> $-(y + 3)(3y + 5)$ <p style="text-align: right;">8.002</p>
<p>Factor completely.</p> $50w^2 - 70$ <p>Answer:</p> $2(5w + 6)(5w - 6)$ <p style="text-align: right;">8.003</p>	<p>Solve for w.</p> $4w^2 = -w + 3$ <p>If there is more than one solution, separate them with commas. If there is no solution, write “No solution.”</p> <p>Answer: $w = \frac{3}{4}, -1$</p> <p style="text-align: right;">8.004</p>
<p>Find all excluded values for the expression. That is, find all values of t for which the expression is undefined.</p> $\frac{t + 4}{t^2 + 8t + 16}$ <p>If there is more than one value, separate them with commas.</p> <p>Answer: $t = -4$</p> <p style="text-align: right;">8.005</p>	<p>Multiply.</p> $\frac{12b}{a^4} \times \frac{3a^5}{4b^4}$ <p>Simplify your answer as much as possible.</p> <p>Answer:</p> $\frac{9a}{b^2}$ <p style="text-align: right;">8.006</p>

Multiply.

$$\frac{15x + 40}{6x + 48} \times \frac{2x + 16}{3x + 8}$$

Simplify your answer as much as possible.

Answer:

$$\frac{5}{3}$$

8.007

Multiply.

$$\frac{x^2 + x - 6}{x + 1} \times \frac{3x + 3}{x^2 - 4}$$

Simplify your answer as much as possible.

Answer:

$$\frac{3x + 9}{x + 2}$$

8.008

Divide.

$$\frac{25a^2b^4}{2b} \div \frac{5a}{4b}$$

Simplify your answer as much as possible.

Answer: $10ab^4$

8.009

Divide.

$$\frac{3x - 18}{3x + 8} \div \frac{x - 6}{3x + 9}$$

Simplify your answer as much as possible.

Answer:

$$\frac{9(x + 3)}{3x + 8}$$

8.010

Divide.

$$\frac{x^2 + x - 2}{x^2 - 5x + 6} \div \frac{4x - 4}{x - 3}$$

Simplify your answer as much as possible.

Answer:

$$\frac{x - 2}{4(x - 2)}$$

8.011

Find the least common denominator of

$$\frac{5x}{x - 1} \quad \text{and} \quad \frac{7x}{x - 7}$$

Answer:

$$(x - 1)(x - 7)$$

8.012

<p>Fill in the blank to make equivalent rational expressions.</p> $\frac{5}{2w^7} = \frac{\square}{6w^8}$ <p>Answer: $15w$</p>	<p>Add. Simplify your answer as much as possible.</p> $\frac{1}{2} + \frac{z}{2}$ <p>Answer:</p> $\frac{1+z}{2}$
<p>Add. Simplify your answer as much as possible.</p> $\frac{9}{a+7} + \frac{3}{a+7}$ <p>Answer:</p> $\frac{12}{a+7}$	<p>Subtract. Simplify your answer as much as possible.</p> $\frac{5b - 10y}{3b} - \frac{2b - 5b}{3b}$ <p>Answer:</p> $\frac{3b - 5y}{3b}$
<p>Add. Simplify your answer as much as possible.</p> $\frac{9}{z+2} + \frac{7z+5}{z+2}$ <p>Answer: 7</p>	<p>Add. Simplify your answer as much as possible.</p> $\frac{2}{3} + \frac{5}{3c}$ <p>Answer:</p> $\frac{2c+5}{3c}$

<p>Add. Simplify your answer as much as possible.</p> $\frac{5}{9d} + \frac{1}{6d}$ <p>Answer:</p> $\frac{13}{18d}$ <p style="text-align: center;">8.019</p>	<p>Add. Simplify your answer as much as possible.</p> $\frac{-5}{8v} + \frac{3}{2v^2}$ <p>Answer:</p> $\frac{-5v + 12}{8v^2}$ <p style="text-align: center;">8.020</p>
<p>Add. Simplify your answer as much as possible.</p> $\frac{4}{3x} + \frac{3}{x - 5}$ <p>Answer:</p> $\frac{13x - 20}{3x(x - 5)}$ <p style="text-align: center;">8.021</p>	<p>Subtract. Simplify your answer as much as possible.</p> $\frac{5}{6 - 7x} - \frac{x}{7x - 6}$ <p>Answer:</p> $\frac{-5 - x}{7x - 6}$ <p style="text-align: center;">8.022</p>
<p>Simplify.</p> $\frac{\frac{3}{5x}}{\frac{x-3}{x}}$ <p>Answer:</p> $\frac{3}{5(x - 3)}$ <p style="text-align: center;">8.023</p>	<p>Solve for x.</p> $\frac{-10}{x} = \frac{-18}{x + 4}$ <p>Answer: $x = 5$</p> <p style="text-align: center;">8.024</p>

<p>Solve for x.</p> $-\frac{2}{x} = 4$ <p>Simplify your answer as much as possible.</p> <p>Answer:</p> $x = -\frac{1}{2}$ <p style="text-align: center;">8.025</p>	<p>Solve for v.</p> $8 = \frac{4}{v+6}$ <p>Simplify your answer as much as possible.</p> <p>Answer:</p> $v = -\frac{11}{2}$ <p style="text-align: center;">8.026</p>
<p>Solve for x.</p> $2 = \frac{2}{3} - \frac{5}{x}$ <p>Simplify your answer as much as possible.</p> <p>Answer:</p> $x = -\frac{15}{4}$ <p style="text-align: center;">8.027</p>	<p>Solve for w.</p> $\frac{w+1}{10w} - \frac{7}{6} = \frac{1}{w}$ <p>If there is more than one solution, separate them with commas. If there is no solution, write “No solution”.</p> <p>Answer:</p> $w = -\frac{27}{32}$ <p style="text-align: center;">8.028</p>
<p>Solve for v.</p> $7 + \frac{3}{v-3} = \frac{4v}{v-3}$ <p>If there is more than one solution, separate them with commas. If there is no solution, write “No solution”.</p> <p>Answer: $v = 6$</p> <p style="text-align: center;">8.029</p>	<p>Solve for w.</p> $-\frac{8}{3w+15} + 2 = \frac{3}{w+5}$ <p>If there is more than one solution, separate them with commas. If there is no solution, write “No solution”.</p> <p>Answer:</p> $w = -\frac{13}{6}$ <p style="text-align: center;">8.030</p>

<p>A plane has a cruising speed of 150 miles per hour when there is no wind. At this speed, the plane flew 300 miles with the wind in the same amount of time it flew 200 miles against the wind. Find the speed of the wind.</p> <p>Answer: Speed of the wind: 30 miles/hour</p>	<p>Find the domain of the function.</p> $v(x) = \sqrt{x} + 3$ <p>Write your answer using interval notation.</p> <p>Answer: $[0, \infty)$</p>
8.031	8.032

<p>Fill in the table using this function rule. Simplify your answers as much as possible. Write “Not a real number” if applicable.</p> $f(x) = \sqrt{x+7}$ <p>Answer:</p> <table border="1"> <thead> <tr> <th>x</th><th>$f(x)$</th></tr> </thead> <tbody> <tr> <td>-8</td><td>Not a real number</td></tr> <tr> <td>-7</td><td>0</td></tr> <tr> <td>-3</td><td>$1/2$</td></tr> </tbody> </table>	x	$f(x)$	-8	Not a real number	-7	0	-3	$1/2$	<p>The function is defined as follows.</p> $f(x) = \sqrt[3]{x} - 2$ <p>Find $f(27)$ and $f(-216)$.</p> <p>Answer: $f(27) = 1$ $f(-216) = -8$</p>
x	$f(x)$								
-8	Not a real number								
-7	0								
-3	$1/2$								
8.034	8.034								

<p>Evaluate the following.</p> <p>Write “Not a real number” if applicable.</p> <p>a) $-32^{1/5}$</p> <p>b) $(-25)^{1/2}$</p> <p>Answer:</p> <p>a) -2</p> <p>b) Not a real number</p>	<p>Simplify.</p> $32^{\frac{3}{5}}$ <p>Answer: 8</p>
8.035	8.036

<p>Simplify. Write your answers without exponents.</p> <p>(a)</p> $\left(\frac{1}{625}\right)^{-3/4}$ <p>(b)</p> $27^{-2/3}$ <p>Answer:</p> <p>(a) 125 (b) $\frac{1}{9}$</p>	<p>Simplify. Assume that the variable represents a positive real number.</p> $x^{\frac{3}{5}} \times x^{\frac{3}{4}}$ <p>Answer:</p> $x^{\frac{27}{20}}$
<p>Simplify. Write your answer using only a positive exponent. Assume that the variable represents a positive real number.</p> $\frac{w^{\frac{1}{2}}}{w^{\frac{5}{8}}}$ <p>Answer:</p> $\frac{1}{w^{\frac{1}{8}}}$	<p>Simplify the expression. Write your answer using only positive exponents. Assume that all variables are positive real numbers.</p> $\frac{x^{-\frac{1}{2}} x^{\frac{5}{2}}}{x^{\frac{1}{3}}}$ <p>Answer:</p> $x^{\frac{5}{3}}$
<p>Simplify.</p> $\left(y^{\frac{8}{15}}\right)^3$ <p>Write your answer without parentheses. Assume that the variable represents a positive real number.</p> <p>Answer:</p> $y^{\frac{8}{5}}$	<p>Simplify the expression.</p> $\left(a^{\frac{1}{5}} \times c^{-\frac{2}{3}}\right)^4$ <p>Write your answer without using negative exponents. Assume that all variables are positive real numbers.</p> <p>Answer:</p> $\frac{a^{\frac{4}{5}}}{c^{\frac{8}{3}}}$

<p>Simplify.</p> $\sqrt{5} + 4\sqrt{5}$ <p>Answer: $5\sqrt{5}$</p> <p style="text-align: right;">8.043</p>	<p>Simplify.</p> $\sqrt{5} \times \sqrt{6}$ <p>Answer: $\sqrt{30}$</p> <p style="text-align: right;">8.044</p>
<p>Simplify.</p> $\sqrt{2} \times \sqrt{50}$ <p>Answer: 10</p> <p style="text-align: right;">8.045</p>	<p>Simplify. Assume that the variable represents a positive real number.</p> $\sqrt{7x} \times \sqrt{10}$ <p>Answer: $\sqrt{70x}$</p> <p style="text-align: right;">8.046</p>
<p>Simplify. Assume that the variable represents a positive real number.</p> $\sqrt{3b}\sqrt{6b^8}$ <p>Answer:</p> $3b^4\sqrt{2b}$ <p style="text-align: right;">8.047</p>	<p>Multiply. Simplify your answer as much as possible.</p> $\sqrt{3}(12 + \sqrt{2})$ <p>Answer:</p> $12\sqrt{3} + \sqrt{6}$ <p style="text-align: right;">8.048</p>

<p>Multiply. Simplify your answer as much as possible.</p> $\sqrt{3}(9\sqrt{15} + \sqrt{7})$ <p>Answer:</p> $27\sqrt{5} + \sqrt{21}$ <p style="text-align: right;">8.049</p>	<p>For each sum or product, determine whether the result is a rational number or an irrational number.</p> <p>(a) $2 + \sqrt{21}$ (b) $\frac{10}{19} + \frac{5}{13}$ (c) $\sqrt{14} + 18$ (d) $15 \times \frac{9}{16}$</p> <p>Answer: Rational: (b) and (d) Irrational: (a) and (c)</p> <p style="text-align: right;">8.050</p>
<p>Simplify.</p> $\frac{\sqrt{78}}{\sqrt{6}}$ <p>Answer: $\sqrt{13}$</p> <p style="text-align: right;">8.051</p>	<p>Simplify.</p> $\frac{\sqrt{48} - 18}{2}$ <p>Answer: $2\sqrt{3} - 9$</p> <p style="text-align: right;">8.052</p>
<p>Write in simplified radical form with at most one radical. Assume that the variable represents a positive real number.</p> $\frac{\sqrt{v}}{\sqrt[4]{v}}$ <p>Answer:</p> $\sqrt[4]{v}$ <p style="text-align: right;">8.053</p>	<p>Solve for v, where v is a real number If there is more than one solution, separate them with commas. If there is no solution, write “No solution”.</p> $\sqrt{v} = 16$ <p>Answer:</p> $v = 256$ <p style="text-align: right;">8.054</p>

<p>Solve for u, where u is a real number. If there is more than one solution, separate them with commas. If there is no solution, write “No solution”.</p> $-5 + \sqrt{u - 7} = 4$ <p>Answer: $u = 88$</p> <p style="text-align: right;">8.055</p>	<p>Solve for v, where v is a real number. If there is more than one solution, separate them with commas. If there is no solution, write “No solution”.</p> $v = \sqrt{9v - 18}$ <p>Answer: $v = 6, 3$</p> <p style="text-align: right;">8.056</p>
<p>Suppose a pendulum is L meters long. The time, t, in seconds that it takes to swing back and forth once is given by $t = 2.01\sqrt{L}$. If a pendulum is 7.84 meters long, how long does it take to swing back and forth once? Round your answer to the nearest tenth.</p> <p>Answer: 5.6 seconds</p> <p style="text-align: right;">8.057</p>	<p>Suppose that an object is dropped from a height of h meters and hits the ground with a velocity of v meters per second. Then $v = \sqrt{19.6h}$. If an object hits the ground with a velocity of 27.1 meters per second, from what height was it dropped? Carry your intermediate computations to at least four decimal places, and round your answer to the nearest tenth.</p> <p>Answer: 37.5 meters</p>
<p>Solve for u, where u is a real number. If there is more than one solution, separate them with commas. If there is no solution, write “No solution”.</p> $\sqrt[4]{u} = 3$ <p>Answer: $u = 81$</p> <p style="text-align: right;">8.059</p>	<p>Solve $x^3 = 5$ where x is a real number. Simplify your answer as much as possible. If there is more than one solution, separate them with commas.</p> <p>Answer: $x = \sqrt[3]{5}$</p> <p style="text-align: right;">8.060</p>

<p>Solve for x, where x is a real number. If there is more than one solution, separate them with commas. If there is no solution, write “No solution”.</p> $x^{\frac{1}{4}} = 2$ <p>Answer: $x = 16$</p>	<p>Solve $(v - 1)^2 - 12 = 0$, where v is a real number. Simplify your answer as much as pos- sible. If there is more than one solution, separate them with commas. If there is no solution, write “No solution”.</p> <p>Answer:</p> $v = 2\sqrt{3} + 1, -2\sqrt{3} + 1$
<p>Use the quadratic formula to solve for x. Round your answer to the nearest hundredth. If there is more than one solution, separate them with commas.</p> $8x^2 - 8x - 1 = 0$ <p>Answer:</p> $x = 1.11, -0.11$	<p>Find all values of h for which the quadratic equation has two real sol- utions. Write your answer as an equality or inequality in terms of h.</p> $6x^2 + 5x - h = 0$ <p>Answer:</p> $h > -\frac{25}{24}$
<p>^{8.063} Solve. If there is more than one solu- tion, separate them with commas.</p> $(x^2 - 5)^2 + 2(x^2 - 5) = -1$ <p>Answer:</p> $x = 2, -2$	<p>^{8.064} Find all real number solutions. If there is more than one solution, separate them with commas.</p> $3x^{\frac{2}{3}} + x^{\frac{1}{3}} - 2 = 0$ <p>Answer:</p> $x = \frac{8}{27}, -1$

Solve

$$(t - 10)^{\frac{3}{4}} = 2$$

where t is a real number.

Simplify your answer as much as possible.

(If there is more than one solution, separate them with commas.)

Answer:

$$t = 2\sqrt[3]{2} + 10$$

8.067

Solve

$$2u^{\frac{-3}{2}} = \frac{1}{5}$$

where u is a real number.

Simplify your answer as much as possible.

(If there is more than one solution, separate them with commas.)

Answer:

$$u = \sqrt[3]{100}$$

8.068

Find the x -intercept(s) and the coordinates of the vertex for the parabola $y = x^2 + x - 3$. If there is more than one x -intercept, separate them with commas.

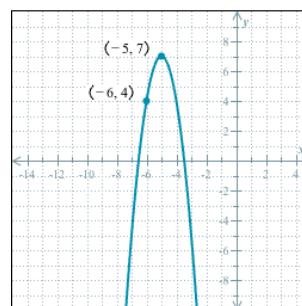
Answer:

x -intercepts: $-3, 1$

vertex: $(-1, -4)$

8.069

Find the equation of the quadratic function f whose graph is shown below.



Answer:

$$f(x) = -3(x + 5)^2 + 7$$

Suppose that the functions s and t are defined for all real numbers as follows.

$$s(x) = 2x - 3$$

$$t(x) = x - 4$$

Write the expressions for $(s - t)(x)$ and

$(s + t)(x)$ and evaluate $(s \times t)(-1)$.

Answer:

$$(s - t)(x) = x + 1$$

$$(s + t)(x) = 3x - 7$$

$$(s \times t)(-1) = 25$$

Suppose that the functions f and g are defined as follows:

$$f(x) = (-2 + x)(1 + x)$$

$$g(x) = -3 - x$$

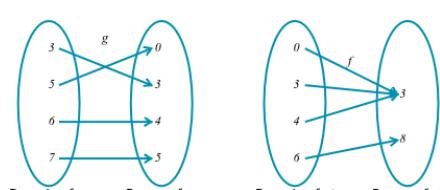
$$(a) \text{ Find } \left(\frac{f}{g}\right)(-4).$$

(b) Find all values that are NOT in the domain of $\frac{f}{g}$.

Answer:

$$(a) 18 \quad (b) -3$$

8.072

<p>Suppose that the functions f and g are defined as follows:</p> $f(x) = 4x - 5$ $g(x) = \sqrt{3x + 1}$ <p>Find $\frac{f}{g}$ and $f - g$. Then, give their domains using interval notation.</p> <p>Answer:</p> $\left(\frac{f}{g}\right)(x) = \frac{4x-5}{\sqrt{3x+1}}$ $(f - g) = 4x - 5 - \sqrt{3x + 1}$ <p>Domain of $\frac{f}{g} : (-\frac{1}{3}, \infty)$</p>	<p>Suppose that the functions u and w are defined as follows:</p> $u(x) = 3x + 5$ $w(x) = -2x + 1$ <p>Find the following.</p> <p>(a) $(w \circ u)(1) =$ (b) $(u \circ w)(1) =$</p> <p>Answer:</p> <p>(a) -15 (b) 2</p>
<p>Domain of $\frac{f}{g} : [-\frac{1}{3}, \infty)$ Suppose $H(x) = \sqrt[3]{2x - 9}$ Find two functions f and g such that $(f \circ g)(x) = H(x)$. ^{8.073} Neither function can be the identity function. (There may be more than one correct answer.)</p> <p>Answer:</p> $f(x) = \sqrt[3]{x}$ $g(x) = 2x - 9$	<p>Two functions g and f are defined in the figure below. Find the domain and range of the composition $f \circ g$. Write your answers in set notation.</p> <p>^{8.074}</p>  <p>Answer: Domain: $\{3, 5, 6\}$ Range: $\{3\}$</p>
<p>For the real-valued functions</p> $g(x) = x^2 - 3 \quad \text{and} \quad h(x) = x - 1$ <p>find the composition $g \circ h$ and specify its domain using interval notation.</p> <p>Answer:</p> $(g \circ h)(x) = x^2 - 2x - 2$ <p>Domain of $g \circ h : (-\infty, \infty)$</p>	<p>For each of the following, determine whether the equation defines y as a function of x.</p> <p>(a) $x^2 + y^2 = 4$ (b) $y = \sqrt{x + 3}$ (c) $x^2 + 5y = 6$ (d) $4x + y = 0$</p> <p>Answer: Function: (b) and (c) Not a function: (a) and (d)</p>

<p>The one-to-one functions g and h are defined as follows:</p> $g = \{(-1, 9), (0, 4), (1, 7), (4, 2), (9, -2)\}$ $h(x) = 2x + 9$ <p>Find the following:</p> <p>Answer:</p> <ul style="list-style-type: none"> (a) $g^{-1}(9) = -1$ (b) $h^{-1}(x) = \frac{x-9}{2}$ (c) $(h \circ h^{-1})(5) = 5$ <p style="text-align: right;">8.079</p>	<p>The one-to-one function g is defined below.</p> $g(x) = \frac{8x - 3}{5x + 8}$ <p>Find $g^{-1}(x)$, where g^{-1} is the inverse of g.</p> <p>Also state the domain and range of g^{-1} in interval notation.</p> <p>Answer:</p> $g^{-1}(x) = \frac{-8x - 3}{5x - 8}$ <p>Domain of $g^{-1} : (-\infty, \frac{8}{5}) \cup (\frac{8}{5}, \infty)$</p>
<p>The one-to-one function f is defined below.</p> $f(x) = 10 - x^3$ <p>Find $f^{-1}(x)$, the inverse of f. Then give the domain of f^{-1} using interval notation.</p> <p>Answer:</p> $f^{-1} = \sqrt[3]{10 - x}$ <p>Domain of $f^{-1} : (-\infty, \infty)$</p> <p style="text-align: right;">8.081</p>	<p>Suppose that \$2400 is initially invested in an account at a fixed interest rate, compounded continuously. Suppose also that, after five years, the amount of money in the account is \$2926. Find the interest rate per year.</p> <p>Write your answer as a percentage. Do not round any intermediate computations, and round your percentage to the nearest hundredth.</p> <p>Answer: 3.96% per year</p>
<p>The number of bacteria $P(t)$ in a certain population increases according to the following function, where time t is measured in hours.</p> $P(t) = 2700e^{0.25t}$ <p>Find the initial number of bacteria in the population and the number of bacteria after 8 hours.</p> <p>Round your answers to the nearest whole number as necessary.</p> <p>Answer:</p> <p>Initial number: 2700 bacteria</p> <p>Number after 8 hours: 19,950 bacte-</p>	<p>A loan of \$37,000 is made at 8.5% interest, compounded annually. After how many years will the amount due reach \$61,000 or more? (Use the calculator if necessary.)</p> <p>Write the smallest possible whole number answer.</p> <p>Answer:</p> <p>7 years</p> <p style="text-align: right;">8.084</p>

<p>Rewrite as an exponential equation.</p> $\log_2 32 = 5$ <p>Answer:</p> $2^5 = 32$ <p style="text-align: right;">8.085</p>	<p>Rewrite as a logarithmic equation.</p> $e^y = 4$ <p>Answer:</p> $\ln 4 = y$ <p style="text-align: right;">8.086</p>
<p>Evaluate.</p> $\log_9 \frac{1}{81}$ <p>Answer: -2</p> <p style="text-align: right;">8.087</p>	<p>Solve for x.</p> $\log_{100} x = \frac{1}{2}$ <p>Simplify your answer as much as possible.</p> <p>Answer: $x = 10$</p> <p style="text-align: right;">8.088</p>
<p>Fill in the missing values to make the equations true.</p> <p>(a) $\log_2 3 - \log_2 7 = \log_2 \underline{\hspace{2cm}}$</p> <p>(b) $\log_4 \underline{\hspace{2cm}} + \log_4 9 = \log_4 99$</p> <p>(c) $\log_6 \frac{1}{25} = \underline{\hspace{2cm}} \log_6 5$</p> <p>Answer:</p> <p>(a) $\frac{3}{7}$ (b) 11 (c) -2</p> <p style="text-align: right;">8.089</p>	<p>Use the properties of logarithms to expand.</p> <p>Each logarithm should involve only one variable and should not have any exponents or fractions.</p> <p>Assume that all variables are positive.</p> $\log(yz^5)$ <p>Answer:</p> $\log y + 5 \log z$ <p style="text-align: right;">8.090</p>

<p>Use the properties of logarithms to expand. Each logarithm should involve only one variable and should not have any radicals or exponents. You may assume that all variables are positive.</p> $\log \sqrt{x^7yz^3}$ <p>Answer:</p> $\frac{7}{2} \log x + \frac{1}{2} \log y + \frac{3}{2} \log z$	<p>Write the expression as a single logarithm.</p> $3 \log_a (x - 4) - 5 \log_a (x + 7)$ <p>Answer:</p> $\log_a \left(\frac{(x - 4)^3}{(x + 7)^5} \right)$
<p>Use the change of base formula to compute</p> $\log_{\frac{1}{7}} \frac{1}{5}$ <p>Round your answer to the nearest thousandth.</p> <p>Answer: 0.8273</p>	<p>Consider the following equation.</p> $\log_4 (13^{x+2}) = 3$ <p>Find the value of x. Round your answer to the nearest thousandth.</p> <p>Answer: $x = -0.379$</p>
<p>Solve for x.</p> $\log_3 (-6 - 5x) = 4$ <p>Answer:</p> $x = -\frac{87}{5}$	<p>Solve for x. Do not round any intermediate computations, and round your answer to the nearest hundredth.</p> $5 + \ln (x + 3) = 4$ <p>Answer: $x = -2.63$</p>

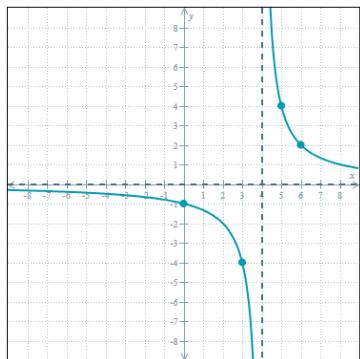
<p>Solve for x. If there is more than one solution, separate them with commas. If there is no solution, write “No solution”.</p> $-\log_2(x+3) = 2 - \log_2(x+6)$ <p>Answer: $x = -2$</p>	<p>Solve for x.</p> $\log(2x-1) = \log 17$ <p>Answer: $x = 9$</p>
<p>Solve for x. If there is more than one solution, separate them with commas.</p> $25^{4-6x} = 5^{x^2-14x-55}$ <p>Answer: $x = -7, 9$</p>	<p>Solve for x in the equation below. Round your answer to the nearest hundredth. Do not round any intermediate computations.</p> $6^{x+4} = 12$ <p>Answer: $x = -2.61$</p>
<p>Solve for in the equation below. Round your answer to the nearest hundredth. Do not round any intermediate computations.</p> $e^{-4x} = 2$ <p>Answer: $x = -0.17$</p>	<p>Solve for x. Write the exact answer using either base-10 or base-e logarithms.</p> $5^{-5x} = 18^{x+10}$ <p>Answer:</p> $x = \frac{10 \log 18}{-\log 18 - 5 \log 5}$

Graph the rational function.

$$f(x) = \frac{-4}{-x + 4}$$

Start by drawing the vertical and horizontal asymptotes. Then fill in each piece of graph.

Answer:

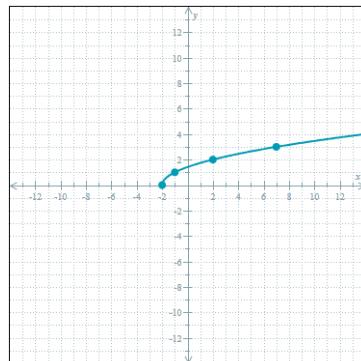


8.103

Graph the function.

$$f(x) = \sqrt{x + 2}$$

Answer:

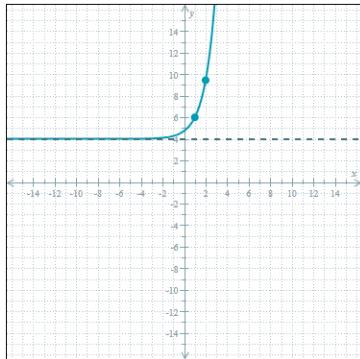


8.104

Graph the exponential function. Plot at least two points, and also draw the asymptote.

$$g(x) = 2e^{x-1} + 4$$

Answer:

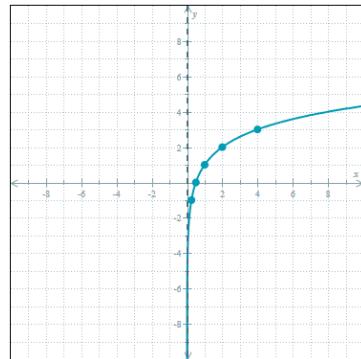


8.105

Graph the logarithmic function. Plot at least two points, and also draw the asymptote.

$$f(x) = 1 + \log_2 x$$

Answer:



8.106

Section V

Assignments Worksheets

Assignment # _____ Notes

Assignment # _____ Notes

Assignment # _____ Notes

Part A

Part B

Part C

Assignment # _____ Notes

Question 1	
Question 2 Work	Question 2 Answer
Question 3 Work	Question 3 Answer

Assignment # _____ Notes

Assignment # _____ Notes

Assignment # _____ Notes

Part A

Part B

Part C

Assignment # _____ Notes

Question 1	
Question 2 Work	Question 2 Answer
Question 3 Work	Question 3 Answer

Assignment # _____ Notes

Assignment # _____ Notes

Assignment # _____ Notes

Part A

Part B

Part C

Assignment # _____ Notes

Question 1	
Question 2 Work	Question 2 Answer
Question 3 Work	Question 3 Answer

Assignment # _____ Notes

Assignment # _____ Notes

Assignment # _____ Notes

Part A

Part B

Part C

Assignment # _____ Notes

Question 1	
Question 2 Work	Question 2 Answer
Question 3 Work	Question 3 Answer

Assignment # _____ Notes

Assignment # _____ Notes

Assignment # _____ Notes

Part A

Part B

Part C

Assignment # _____ Notes

Question 1	
Question 2 Work	Question 2 Answer
Question 3 Work	Question 3 Answer

Assignment # _____ Notes

Assignment # _____ Notes

Assignment # _____ Notes

Part A

Part B

Part C

Assignment # _____ Notes

Question 1	
Question 2 Work	Question 2 Answer
Question 3 Work	Question 3 Answer

Assignment # _____ Notes

Assignment # _____ Notes

Assignment # _____ Notes

Part A

Part B

Part C

Assignment # _____ Notes

Question 1	
Question 2 Work	Question 2 Answer
Question 3 Work	Question 3 Answer

Assignment # _____ Notes

Assignment # _____ Notes

Assignment # _____ Notes

Part A

Part B

Part C

Assignment # _____ Notes

Question 1	
Question 2 Work	Question 2 Answer
Question 3 Work	Question 3 Answer

Assignment # _____ Notes

Assignment # _____ Notes

Assignment # _____ Notes

Part A

Part B

Part C

Assignment # _____ Notes

Question 1	
Question 2 Work	Question 2 Answer
Question 3 Work	Question 3 Answer

Assignment # _____ Notes

Assignment # _____ Notes

Assignment # _____ Notes

Part A

Part B

Part C

Assignment # _____ Notes

Question 1	
Question 2 Work	Question 2 Answer
Question 3 Work	Question 3 Answer

Assignment # _____ Notes

Assignment # _____ Notes

Assignment # _____ Notes

Part A

Part B

Part C

Assignment # _____ Notes

Question 1	
Question 2 Work	Question 2 Answer
Question 3 Work	Question 3 Answer

Assignment # _____ Notes

Assignment # _____ Notes

Assignment # _____ Notes

Part A

Part B

Part C

Assignment # _____ Notes

Question 1	
Question 2 Work	Question 2 Answer
Question 3 Work	Question 3 Answer

Assignment # _____ Notes

Assignment # _____ Notes

Assignment # _____ Notes

Part A

Part B

Part C

Assignment # _____ Notes

Question 1	
Question 2 Work	Question 2 Answer
Question 3 Work	Question 3 Answer

Assignment # _____ Notes

Assignment # _____ Notes

Assignment # _____ Notes

Part A

Part B

Part C

Assignment # _____ Notes

Question 1	
Question 2 Work	Question 2 Answer
Question 3 Work	Question 3 Answer

Assignment # _____ Notes

Assignment # _____ Notes

Assignment # _____ Notes

Part A

Part B

Part C

Assignment # _____ Notes

Question 1	
Question 2 Work	Question 2 Answer
Question 3 Work	Question 3 Answer

Assignment # _____ Notes

Assignment # _____ Notes

Assignment # _____ Notes

Part A

Part B

Part C

Assignment # _____ Notes

Question 1	
Question 2 Work	Question 2 Answer
Question 3 Work	Question 3 Answer

Assignment # _____ Notes

Assignment # _____ Notes

Assignment # _____ Notes

Part A

Part B

Part C

Assignment # _____ Notes

Question 1	
Question 2 Work	Question 2 Answer
Question 3 Work	Question 3 Answer

Assignment # _____ Notes

Assignment # _____ Notes

Assignment # _____ Notes

Part A

Part B

Part C

Assignment # _____ Notes

Question 1	
Question 2 Work	Question 2 Answer
Question 3 Work	Question 3 Answer

Assignment # _____ Notes

Assignment # _____ Notes

Assignment # _____ Notes

Part A

Part B

Part C

Assignment # _____ Notes

Question 1	
Question 2 Work	Question 2 Answer
Question 3 Work	Question 3 Answer

Assignment # _____ Notes

Section VI

Practice Assessment Scratch Paper

Practice Quiz __ Scratch Paper

Name _____

Class Day and Time: _____

(Q1) ALEKS Assignment #Q1:

(Q2) ALEKS Assignment #Q2:

(Q3) ALEKS Assignment #Q3:

(Q4) ALEKS Assignment #Q4:

(Q5) ALEKS Assignment #Q5:

Practice Quiz __ Scratch Paper

(Q6) ALEKS Assignment #Q6:	(Q7) ALEKS Assignment #Q7:
(Q8) ALEKS Assignment #Q8:	(Q9) ALEKS Assignment #Q9:
(Q10) ALEKS Assignment #Q10:	(Q11) ALEKS Assignment #Q11:
(Q12) ALEKS Assignment #Q12:	(Q13) ALEKS Assignment #Q13:

Math 100 Practice Test

Name: _____

Class Day/Time: _____

(Q1) Page 1: Written Responses #1 - 2

Written Response Question #1

- Show your work for Question #1 of your test in the space provided.
- Remember to show your work. Your answer should refer back to the prompt.
- Clearly label each part of the questions.
- Neatly box your answer.

Written Response Question #2

- Show your work for Question #2 of your test in the space provided.
- Remember to show your work. Your answer should refer back to the prompt.
- Clearly label each part of the questions.
- Neatly box your answer.

Math 100 Practice Test _____

(Q2) Page 2: Questions 3 - 8

3)	4)
Answer:	Answer:
5)	6)
Answer:	Answer:
7)	8)
Answer:	Answer:

Math 100 Practice Test _____

(Q3) Page 3: Questions 9 - 14

9)	10)
Answer:	Answer:
11)	12)
Answer:	Answer:
13)	14)
Answer:	Answer:

Math 100 Practice Test _____

(Q4) Page 4: Questions 15 – 20

15)	16)
Answer:	Answer:
17)	18)
Answer:	Answer:
19)	20)
Answer:	Answer:

Math 100 Practice Test _____

(Q5) Page 5: Questions 21 – 24

21)	22)
Answer:	Answer:
23)	24)
Answer:	Answer:

Practice Quiz __ Scratch Paper

Name _____

Class Day and Time: _____

(Q1) ALEKS Assignment #Q1:

(Q2) ALEKS Assignment #Q2:

(Q3) ALEKS Assignment #Q3:

(Q4) ALEKS Assignment #Q4:

(Q5) ALEKS Assignment #Q5:

Practice Quiz __ Scratch Paper

(Q6) ALEKS Assignment #Q6:	(Q7) ALEKS Assignment #Q7:
(Q8) ALEKS Assignment #Q8:	(Q9) ALEKS Assignment #Q9:
(Q10) ALEKS Assignment #Q10:	(Q11) ALEKS Assignment #Q11:
(Q12) ALEKS Assignment #Q12:	(Q13) ALEKS Assignment #Q13:

Math 100 Practice Test

Name: _____

Class Day/Time: _____

(Q1) Page 1: Written Responses #1 - 2

Written Response Question #1

- Show your work for Question #1 of your test in the space provided.
- Remember to show your work. Your answer should refer back to the prompt.
- Clearly label each part of the questions.
- Neatly box your answer.

Written Response Question #2

- Show your work for Question #2 of your test in the space provided.
- Remember to show your work. Your answer should refer back to the prompt.
- Clearly label each part of the questions.
- Neatly box your answer.

Math 100 Practice Test _____

(Q2) Page 2: Questions 3 - 8

3)	4)
Answer:	Answer:
5)	6)
Answer:	Answer:
7)	8)
Answer:	Answer:

Math 100 Practice Test _____

(Q3) Page 3: Questions 9 - 14

9)	10)
Answer:	Answer:
11)	12)
Answer:	Answer:
13)	14)
Answer:	Answer:

Math 100 Practice Test _____

(Q4) Page 4: Questions 15 – 20

15)	16)
Answer:	Answer:
17)	18)
Answer:	Answer:
19)	20)
Answer:	Answer:

Math 100 Practice Test _____

(Q5) Page 5: Questions 21 – 24

21)	22)
Answer:	Answer:
23)	24)
Answer:	Answer: