Name_____ Period _____

Algebra 1 Summer Work Packet

Your Math Assignments

(1) Watch video lessons and take notes from the videos

Log onto Ms. Czyzniak's website

- Sign into www.somers.k12.ct.us using your ***school email address*** and password
- Select *Staff Directory* under the *District Info* tab
- Search for Czyzniak, and select the webpage icon
  - Under "*Click on the Link Below to Access Video Lessons*," Click "*Algebra*."
  - Under "*Unit 0: Math 8 Curriculum Unit*," watch the videos for Lessons 1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 1.7, 2.1, 2.2, and 2.3. (Note: If the videos appear upside down, try using a different browser—Google Chrome works well. If the video doesn't immediately open, try fast forwarding the video for a second or two.)
  - As you watch the videos, you are to write the notes in your attached packet as Ms. Czyzniak writes notes on her pages in the video. You must watch the videos and take notes from the videos, even if you believe you already know how to do the work. All notes/work must be done in pencil.

(2) Complete *My Tasks*

- Complete the *My Tasks* in the packet to the best of your ability, using the procedures learned in the video lesson, showing work.
- If you are confused about any of the content, write your questions/comments on a post-it note and attach it to the area in which the content occurs in the packet.

(3) Getting ready for the start of the school year

- Review the material in this packet just before school starts, especially if you had completed all the lessons early in the summer. It should be fresh when school starts.
- You will turn in your packet on the first day of school, and the notes for the video lessons and the *My Tasks* will be counted as a 24-point quiz. The packet will be graded on effort. Each lesson is worth 3 points. Failure to take video notes and/or use the steps from your video notes to complete tasks will result in loss of points. Five points will be deducted for each day late. A zero will be recorded if not turned in by the third day of school.

Paperwork to Turn In

(1) ***Academic Policies and Flipped Classroom*** **pages**
Review the attached Academic Policies and Flipped Classroom pages with your parents.

(2) ***Student Information*** **Sheet**
Complete the top section of the last page of this packet, the *Student Information Sheet,* and ask your parent or guardian to complete the bottom section. The back side is for teacher use only.

Required Daily Materials*

The following is a list of materials that you are expected to bring to class every day, ***starting on the first day of school***. There may be a graded "materials check" on the first day of school as well as unannounced graded checks throughout the year.

- ☐ **Scientific Calculator (Although any scientific calculator is acceptable, the *recommended* scientific calculator for 8th grade and for the high school is TI 30XIIS. With a marker, *write your full name (not initials) somewhere on your calculator and on the inside of your case!!!!***
- ☐ **2+ Sharpened Pencils**
- ☐ **Block Eraser**
- ☐ **3-Ring Binder**
- ☐ **Ruler with Both Standard and Metric Measures**. (Note: plastic rulers snap/break very easily—wooden or flexible rulers are more durable).
- ☐ **Highlighters**
- ☐ **Earbuds**
- ☐ **Chromebook** (after distribution by the school)

*If it would cause a financial hardship to obtain any of these supplies, please have your parent/guardian confidentially email Ms. Czyzniak, and she will ensure you have what you need.

Unit 0, Math 8 Curriculum, Part A

Part 1: Real Numbers

Part 2: Pythagorean Theorem

Part 1: Real Numbers

Lesson PST 1.1 Rational and Irrational Numbers

Real Numbers consist of rational and irrational numbers.

Rational Numbers

Written as ratio of two integers

1.5 $\quad 0.\overline{3}$ $\quad 7$ $\quad 1.75$

0.001 $\quad 0.111...$

$-0.\overline{51}$ $\quad 9.5$ $\quad \frac{3}{4}$ $\quad \sqrt{4}$

Integers

A **non-fractional** number that can be positive, negative, or zero.

-5 $\quad 1$

3 $\quad 8$

$\frac{30}{6}$ $\quad 3{,}043$

-97

Whole Numbers

All positive numbers, including zero, that do not include any fractional or decimal parts when simplified

138

$54{,}397$ $\quad \frac{8}{4}$ $\quad 0$

Natural (or Counting) Numbers

The whole numbers excluding zero

1 $\quad 9$ $\quad \frac{22}{11}$

5

Irrational Numbers

Cannot be written as ratio of two integers

π $\quad \sqrt{3}$ $\quad \sqrt{99}$

$\sqrt{2}$ $\quad -2\sqrt{7}$

$0.010010001000010000001...$

Unit 0, Part 1: Real Numbers

My Task: PST 1.1 Rational and Irrational Numbers

What type(s) of numbers are the following? Circle ***all*** that apply. (Remember to simplify first.)

1. 13.8	2. -40	3. $11\frac{1}{8}$	4. $\sqrt{3}$	5. $\sqrt{81}$
natural	*natural*	*natural*	*natural*	*natural*
whole	*whole*	*whole*	*whole*	*whole*
integer	*integer*	*integer*	*integer*	*integer*
rational	*rational*	*rational*	*rational*	*rational*
irrational	*irrational*	*irrational*	*irrational*	*irrational*
real	*real*	*real*	*real*	*real*

Which set of numbers is the most reasonable for the following situations and why? (Always determine if fractions/decimals, zero, or negatives would make sense in the situation.)

6. The number of desks in a room.	7. Heights of your classmates.	8. The temperature on a thermometer.
		

Review: How to Convert a Decimal to a Ratio (Fraction)

Convert 0.75 to a fraction

Step #1: ***Write the decimal as a fraction over 1***: $\frac{0.75}{1}$

Step #2: ***Multiply the top and the bottom by 10 for every number after the decimal point.*** (If you have 1 digit after the decimal point, multiply the top and bottom by 10; 2 digits, by 100; 3 digits, by 1000; 4 digits, by 10000, …)

Since 0.75 has 2 digits after the decimal point, multiply by 100 = $\frac{0.75}{1} \bullet \frac{100}{100} = \frac{75}{100}$

Step #3: ***Simplify (or reduce), if possible.*** The Greatest Common Factor (GCF) of 75 and 100 is 25, so divide the numerator and the denominator by 25. $\frac{75}{100}\left(\frac{\div 25}{\div 25}\right) = \frac{3}{25}$

Write each number as a ratio using integers to show that it is a rational number. ***Refer to the steps in the example above for guidance.*** Always simplify your fractions.

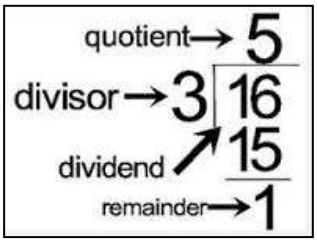
9. 0.4	10. -6	11. 15.1
12. 1.3	13. -24	14. -2.024

Unit 0, Part 1: Real Numbers

Lesson PST 1.2: Changing Repeating Decimals to Fractions

Review: Convert a Fraction to a Terminating Decimal

A review . . . two methods for converting from a fraction to a terminating decimal (a decimal that ends).

Using Long Division (required for Quiz 1.1 – 1.3!)		Using a Calculator
Before we begin . . . $\frac{16}{3}$ Some terminology . . .  	Convert $\frac{3}{8}$ to a decimal using ***long division***.	Convert $\frac{3}{8}$ to a decimal using a ***calculator***. Any fraction is just a division problem! Divide top down!

Review: Convert a Terminating Decimal to a Fraction

A review . . . converting a terminating decimal (a decimal that ends) to a fraction. [Every terminating decimal can be expressed as a fraction, so terminating decimals are rational numbers.]

Convert -33.591 to a fraction.

Convert a Repeating Decimal to a Fraction

New material . . . converting a repeating decimal (a decimal that has a digit, or a block of digits, that repeat over and over and over again without ever ending) to a fraction. [Every repeating decimal can be expressed as a fraction, so repeating decimals, like terminating decimals, are rational numbers.]

A ***repeating decimal*** has digits that repeat forever.

$\frac{1}{3} = 0.333...(the\ 3\ repeats\ forever)$

$\frac{1}{7} = 0.142857142857...(the\ 142857\ repeats\ forever)$

$\frac{77}{600} = 0.128333...(the\ 3\ repeats\ forever)$

Change $0.\overline{4}$ to a fraction.

Let $x = 0.4444...$

Change $0.\overline{36}$ to a fraction.

Change $0.1\overline{6}$ to a fraction. (Doozie!)

Unit 0, Part 1: Real Numbers

My Task: PST 1.2 Changing Repeating Decimals to Fractions

Change $0.\overline{7}$ to a fraction.

Change $0.\overline{24}$ to a fraction.

Change $0.5\overline{4}$ to a fraction.

Unit 0, Part 1: Real Numbers

Lesson PST 1.3: Approximating Square Roots

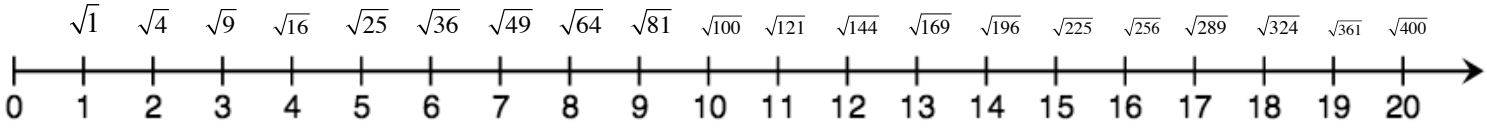
What is a "*perfect square*?"

Taking a positive integer and squaring it (multiplying it by itself) equals a perfect square.

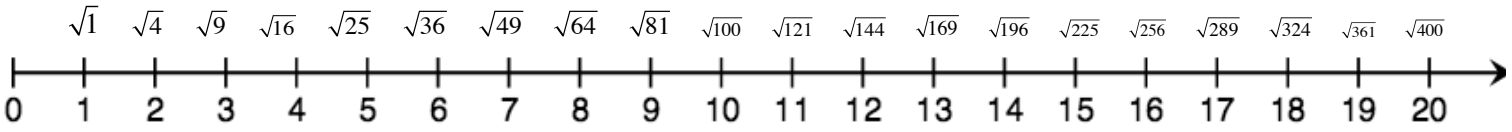
Example: 3 x 3 = 9 Thus: ***9*** is a perfect square.

Integer	Squaring an integer results in the following ***Perfect Squares***	Performing the inverse operation of squaring a number is finding the ***Square Root***
1	1^2 = **1**	$\sqrt{1}=1$
2	2^2 = **4**	$\sqrt{4}=2$
3	3^2 = **9**	$\sqrt{9}=3$
4	4^2 = **16**	$\sqrt{16}=4$
5	5^2 = **25**	$\sqrt{25}=5$
6	6^2 = **36**	$\sqrt{36}=6$
7	7^2 = **49**	$\sqrt{49}=7$
8	8^2 = **64**	$\sqrt{64}=8$
9	9^2 = **81**	$\sqrt{81}=9$
10	10^2 = **100**	$\sqrt{100}=10$
11	11^2 = **121**	$\sqrt{121}=11$
12	12^2 = **144**	$\sqrt{144}=12$
50	50^2 = **2500**	$\sqrt{2500}=50$
100	100^2 = **10,000**	$\sqrt{10000}=100$
1000	1000^2 = **1,000,000**	$\sqrt{1000000}=1000$

These are the locations of perfect squares on a number line.



Approximating a Square Root

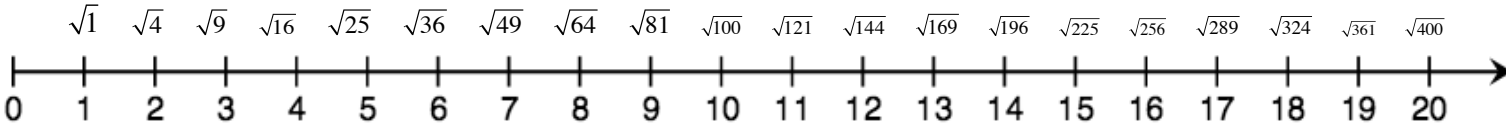


Use the number line above to simplify the following square roots

$\sqrt{256}$	$\sqrt{81}$	$\sqrt{49}$	$\sqrt{53}$

Since 53 is not a perfect square, we cannot simplify $\sqrt{53}$ to a whole number like we can with perfect squares! We have a method to approximate (estimate) square roots of non-perfect squares, but the method is a doozie!

(1) Identify where $\sqrt{53}$ would appear on the number line below.



(2) Write an equality to identify between which two square roots $\sqrt{53}$ would appear, then simplify the square roots immediately surrounding $\sqrt{53}$.

(3) So $\sqrt{53}$ is a decimal between _____ and _____.

(4) But let's be more precise and round to the nearest tenth. Is $\sqrt{53}$ approximately 7.1? 7.8? 7.5? We need to guess and check by squaring the values between 7.0 and 8.0.

7.0^2	7.1^2	7.2^2	7.3^2	7.4^2	7.5^2	7.6^2	7.7^2	7.8^2	7.9^2	8.0^2

(5) Let's be even more precise and round to the nearest hundredth. Is $\sqrt{53}$ approximately 7.23? 7.21? 7.29? We need to guess and check by squaring the values between 7.20 and 7.30.

7.20^2	7.21^2	7.22^2	7.23^2	7.24^2	7.25^2	7.26^2	7.27^2	7.28^2	7.29^2	7.30^2

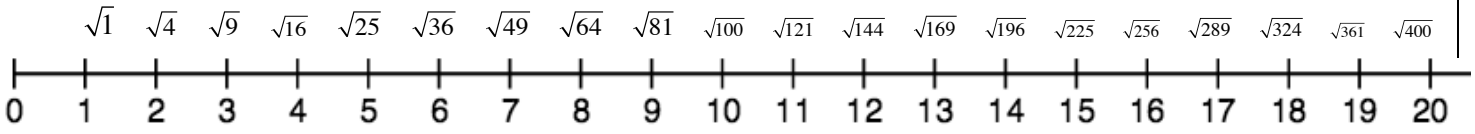
(6) What is the approximate value of $\sqrt{53}$, rounded to the nearest hundredth?

Real-World Link

Gravity. Legend states that while sitting in his garden one day, Sir Isaac Newton was struck on the head by an apple. Suppose the apple was 64 feet above the ground. How long did it take the apple to fall?

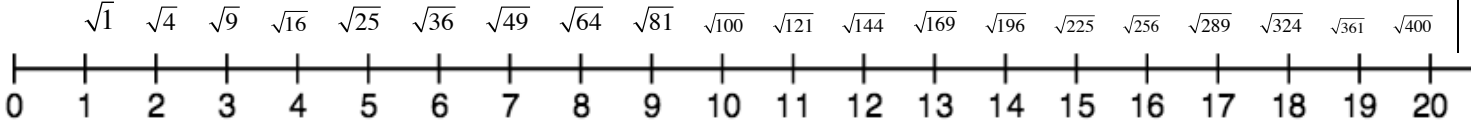
We are going to use a formula $t = \frac{\sqrt{h}}{4}$ to answer the question.

This formula can be used to find the time, t, in seconds that it will take an object to fall from a certain height, h, in feet. Let's substitute 64 into the formula in place of h to find the answer.



But suppose the apple wasn't 64 feet, or 49 feet, or 25 feet or any other "perfect square" feet above the ground? What if the apple was 19 feet above the ground? 19 is not a perfect square. How can you approximate $\sqrt{19}$ so that you can still use the formula to find the number of seconds for the apple to fall? Round to the nearest hundredth.

Step 1: Find between which two perfect squares the $\sqrt{19}$ falls.



Step 2: Round to the nearest tenth. Guess and Check.

What 2 values surround $\sqrt{19}$? Square: 4.0, 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8, 4.9 5.0

4.0^2	4.1^2	4.2^2	4.3^2	4.4^2	4.5^2	4.6^2	4.7^2	4.8^2	4.9^2	5.0^2

Step 3: Round to the nearest hundredth. Guess and Check.

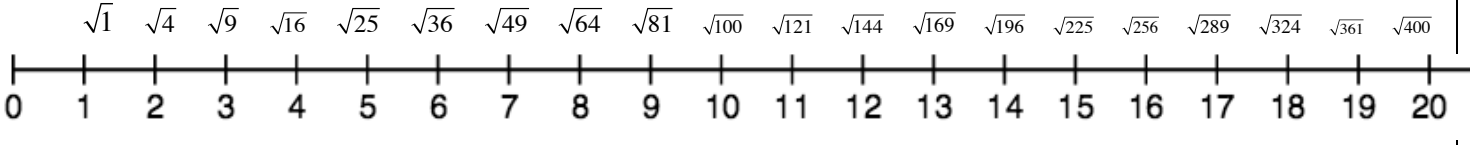
Is $\sqrt{19}$ closer to 4.30, 4.31, 4.32, 4.33, 4.34, 4.35, 4.36, 4.37, 4.38, 4.39 or 4.40?

4.30^2	4.31^2	4.32^2	4.33^2	4.34^2	4.35^2	4.36^2	4.37^2	4.38^2	4.39^2	4.40^2

Step 4: Answer the question.

Animals . The maximum speed, *s*, that an animal can walk in feet per second is $s = 5.66\sqrt{l}$, where l represents the animal's leg length, in feet. What is the maximum speed that a giraffe can walk if it's leg length is 11 feet?

Step 1: Find between which two perfect squares the $\sqrt{11}$ falls.



Step 2: Round to the nearest tenth. Guess and Check.

Step 3: Round to the nearest hundredth. Guess and Check.

Step 4: Answer the question.

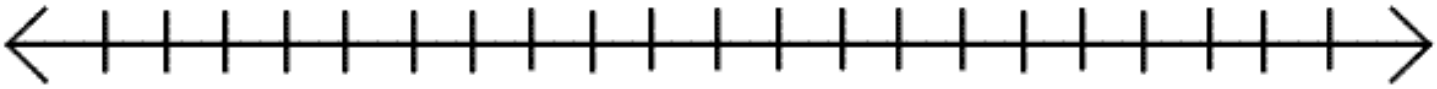
1. Approximate each square root to the nearest whole number, the nearest tenth, and the nearest hundredth using the method in lesson 1.3.

$\sqrt{90}$
$\sqrt{32}$
$\sqrt{45}$

2. Approximate $\sqrt{5}$ and $\sqrt{6}$ below. Show all work.

Approximate $\sqrt{5}$ to the nearest hundredth.	Approximate $\sqrt{6}$ to the nearest hundredth.

3. Use your approximations of $\sqrt{5}$ and $\sqrt{6}$ to plot them on the number line below. (Write an appropriate scale of numbers for the markings on the line.)



4. Complete the comparative statements.

$\sqrt{5}$ is between the whole numbers _____ and _____.

$\sqrt{5}$ is approximately _____ less than $\sqrt{6}$.

$\sqrt{6}$ is between the decimals (in tenths) _____ and _____.

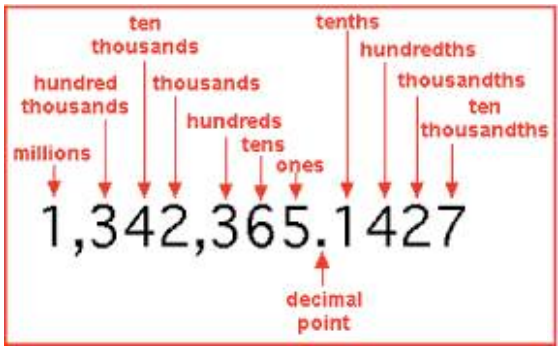
Unit 0, Part 1: Real Numbers

Lesson PST 1.4: Integer Powers of 10 and Exponential Notation

What is a number raised to the zero power?

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

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



The expression of a number using the decimal system (base 10) is called its ***expanded form using powers of 10***. In this system, each "decimal place" consists of a digit 0 - 9 (the ***decimal digit***) arranged such that each digit is multiplied by a power of 10, decreasing from left to right, and with a decimal place indicating the $\mathbf{10^0 = 1}$ for the one's place. For example, to expand the number 62904.53 using powers of 10:

Write the following in expanded notation using powers of 10: 79042.835

You Try: Write the following in expanded notation using powers of 10: 2,043,506.78

Exponential Notation

Drake sold 3,000,000 song downloads last year. Your friend says that 3,000,000 is the same as

$$3 \cdot 10 \cdot 10 \cdot 10 \cdot 10 \cdot 10 \cdot 10$$

Is your friend correct? _____

Demonstrate below another way to represent 3,000,000 using 3's and 10's (hint: ***exponents***)?

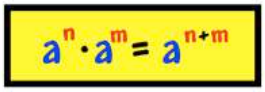
Exponential notation is a simplified way to represent repeated multiplication. For example,

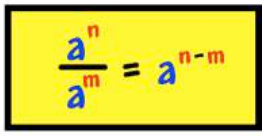
$$2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 = 2^7$$

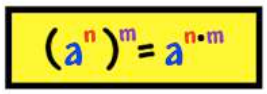
Basic Rules of Exponents: Generating Equivalent Numerical Expressions

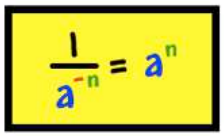
Exponential Rule	Example	You try . . .
$a^n \cdot a^m = a^{n+m}$	$3^4 \cdot 3^2 = 3^{4+2} = 3^6 = 729$	$2^3 \cdot 2^7$
$(a^n)^m = a^{n \cdot m}$	$(3^4)^2 = 3^{4 \cdot 2} = 3^8 = 6{,}561$	$(2^3)^7$
$a^{-n} = \frac{1}{a^n}$	$3^{-4} = \frac{1}{3^4} = \frac{1}{81}$	2^{-3}
$\frac{1}{a^{-n}} = a^n$	$\frac{1}{3^{-4}} = 3^4 = 81$	$\frac{1}{2^{-3}}$
$\frac{a^n}{a^m} = a^{n-m}$	$\frac{3^5}{3^3} = 3^{5-3} = 3^2 = 9$	$\frac{2^7}{2^3}$

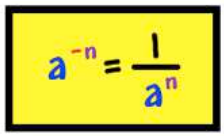
Let's Practice











1.	$\frac{4^3}{5^2}$
2.	$5^2 \bullet 5^5$
3.	$\frac{1}{8^{-3}}$
4.	$\frac{6^7}{6^3}$
5.	$\frac{4^3}{4^7}$
6.	$\frac{4^{-3}}{5^2}$

You try . . .

7. $\frac{5^4}{5^9}$	8. $\frac{3^{-2}}{6^4}$

Unit 0, Part 1: Real Numbers

My Task: PST 1.4: Integer Powers of 10 and Exponential Notation

1. What is the value of 5^0?	2. What is the value of 3475966^0?

Write the following in expanded notation using powers of 10.

3. 6,231.3
4. 985,241,018.76
5. 412.36741

6. Write the following in exponential notation: $3 \cdot 3 \cdot 3 \cdot 3 \cdot 3 \cdot 3 \cdot 3$	7..Demonstrate the number below in 4s and 10s: 40,000

Use the properties of exponents to generate equivalent numerical expressions.

8. $\frac{1}{4^{-2}}$	9. $\frac{7^2}{7^3}$
10. $4^1 \cdot 4^5$	11. $\frac{6^2}{3^3}$
12. $\frac{9^8}{9^4}$	13. $\frac{2^{-3}}{4^{-5}}$

Unit 0, Part 1: Real Numbers

Lesson PST 1.5: Scientific Notation and Operations With Scientific Notation

Scientific Notation

Scientific notation is a shorthand way of writing very small or very large numbers so that they are easier to compare or used in computations.

Review: Multiplying by the powers of 10

7.82 times 10

7.82 times 100

7.82 times 10^5

Scientific Notation

Number between 1 and 10 x An integer power of 10

Examples: 5.2×10^3, 8×10^9, 3.772×10^{-2}

Writing a large number in scientific notation.	Writing a small number in scientific notation.
65,300,000,000	0.0000583

Reversing the Process—from Scientific Notation to Standard Form

Write the number below in decimal form.	Write the number below in decimal form.
8.136×10^{10}	4.9107×10^{-3}

Have you ever seen these on a calculator?

3.21 E 9	7.8 E -5

Operations with Scientific Notation

Addition and Subtraction

Before numbers in scientific notation can be added or subtracted, the exponents must be equal.

Not equal

$$(3.4 \times 10^2) + (4.57 \times 10^3)$$

Drop the larger exponent down to the degree of the smaller exponent. Determine the number of powers of 10 that was reduced. Then, to compensate for the reduced value of the exponent, move the decimal point in the coefficient to the right one unit for every power of ten that had been reduced. Rewrite the numbers in the expression.

Multiplication

When numbers in scientific notation are multiplied, only the number is multiplied. The exponents are added.

$$(2.00 \times 10^3)(4.00 \times 10^4)$$

Division

When numbers in scientific notation are divided, only the number is divided. The exponents are subtracted.

$$\frac{9.60 \times 10^7}{1.60 \times 10^4}$$

Unit 0, Part 1: Real Numbers

My Task: PST 1.5: Scientific Notation and Operations With Scientific Notation

1. 230	2. 56 million	3. 3.02×10^{-5}
4. 8.9×10^{7}	5. 0.000048	6. 12 thousandths

7. The table contains several measurements written in decimal and scientific notation.

(A) Complete the table so that each measurement is written in both decimal and scientific notation.

(B) In the last column, rank the measurements in order of size (1 = smallest, 2 = next smallest, and so on up to 7 = largest).

Decimal Notation		Scientific Notation	Rank 1 = smallest 7 = largest
	=	1×10^{-2} m	
0.004 m	=		
200 m	=		
	=	8×10^{5} m	
40,000,000 m	=		
40 m	=		
	=	8×10^{-4} m	

Use the methods from this lesson to simplify the following operations involving scientific notation expressions.

8. $(2.1 \times 10^3) + (4 \times 10^5)$	9. $(1.4 \times 10^8) - (3.3 \times 10^2)$
10. $(6.3 \times 10^2)(8 \times 10^5)$	11. $\frac{(8.8\ x\ 10^9)}{(2.2\ x\ 10^2)}$
12. $(4.32 \times 10^5) - (2 \times 10)$ (DOOZY!)	13. $\frac{(6.4\ x\ 10^{-3})}{(3.2\ x\ 10^4)}\ (Doozy!)$
14. $(9.7 \times 10^4)(5.51 \times 10^8)$	15. $(3 \times 10^3) + (4.8 \times 10^{-1})$

Use appropriate scientific notation operation rules to find the following. Round to the nearest tenth, when appropriate.

16. The population of Mathville is 5.6×10^3. The population of Algebraland is 1.3×10^4. How many times greater is one town than the other? Be specific with your response.

17. By area Greece has 5.1×10^4 square miles of area. The United States has approximately 3.8×10^6 square miles of land. How many more square miles of land does the United States have than Greece?

18. The mass of the sun is 1.989×10^{30} kilograms. The mass of the earth is 5.98×10^{24} kilograms. How many times bigger is the sun than the earth?

19. At 186,282 miles per second, how far does light travel in a year? Give your answer in miles, but use scientific notation. A year is approximately 365.25 days.

The answer to this question is called a ***light year*** by astronomers, who use it to measure huge distances. Other than the sun, the star nearest the earth is Proxima Centauri, a mere 4.2 light years away.

Unit 0, Part 1: Real Numbers

Lesson PST 1.6: Evaluate Square Roots of Perfect Squares

Squares
$1^2 = 1$
$2^2 = 4$
$3^2 = 9$
$4^2 = 16$
$5^2 = 25$
$6^2 = 36$
$7^2 = 49$
$8^2 = 64$
$9^2 = 81$
$10^2 = 100$
$11^2 = 121$
$12^2 = 144$

How do you "undo" addition?

How do you "undo" division?

How do you "undo" squaring?

If $x^2 = 49$, what is x?

You try. If $x^2 = 7$, what is x?

$\sqrt{x} = 30$. Find x.	You try. $\sqrt{x} = 4$. Find x.
Simplify $\left(\frac{2}{3}\right)^2$	You try. *Simplify* $\left(\frac{5}{2}\right)^2$
Simplify. $\sqrt{\frac{4}{64}}$	You try. Simplify $\sqrt{\frac{81}{100}}$

Unit 0, Part 1: Real Numbers

My Task PST 1.6: Evaluate Square Roots of Perfect Squares

You try: Find x and **check** your answer.

1. $x^2 = 121$

2. $x^2 = 10$

3. $\sqrt{x} = 7$

4. *Simplify* $\left(\frac{1}{3}\right)^2$

5. Simplify. $\sqrt{\frac{100}{36}}$

6. Find a value for x and p that make the equation true.

$$x^2 = p + 1$$

$x =$ _____ $p =$ _____

Check your answer below.

Unit 0, Part 1: Real Numbers

Lesson PST 1.7 Rational and Irrational Numbers

Cubes	
1^3 =	1
2^3 =	8
3^3 =	27
4^3 =	64
5^3 =	125
6^3 =	216
7^3 =	343
8^3 =	512
9^3 =	729
10^3 =	1000
11^3 =	1331
12^3 =	1728

What is an expanded notation for 6^3?

What number multiplied by itself 3 times gives 8?

What are the two ways of saying "9^3"?

If $x^3 = 125$, what is x?

If $x^3 = 14$, what is x?

$\sqrt[3]{x} = 20$. Find x.	You try. $\sqrt[3]{x} = 9.1$. Find x.
Simplify $\left(\frac{2}{3}\right)^3$	You try. *Simplify* $\left(\frac{7}{4}\right)^3$
Simplify. $\sqrt[3]{\frac{216}{8}}$	You try. Simplify $\sqrt[3]{\frac{1}{125}}$

Unit 0, Part 1: Real Numbers

My Task PST 1.7: Evaluate Cubed Roots of Perfect Cubes

You try: Find x and **check** your answer.

1. $x^3 = 343$

2. $x^3 = 100$

3. $\sqrt[3]{x} = 15$

4. *Simplify* $\left(\frac{4}{5}\right)^3$

5. Simplify. $\sqrt[3]{\frac{1331}{1000}}$

6. Find a value for x and p that make the equation true.

$x^3 = p - 2$

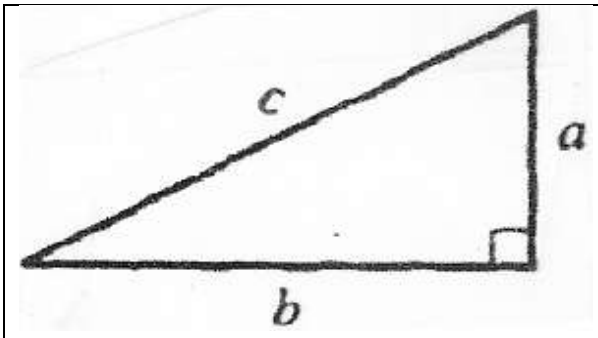
$x =$ _____ $p =$ _____

Check your answer below.

Part 2: Pythagorean Theyorem

Lesson PST 2.1: The Pythagorean Theorem and Proofs of the Pythagorean Theorem

The Babylonians knew about the sets of numbers now called ***Pythagorean Triples***—sets of positive numbers such that $a^2 + b^2 = c^2$. Right triangles have the property known today as the ***Pythagorean Relationships***.



Notice that the side opposite the right angle in the triangle is the longest. This is true in all right triangles. This side is called the ***hypotenuse***.

The Pythagorean Theorem

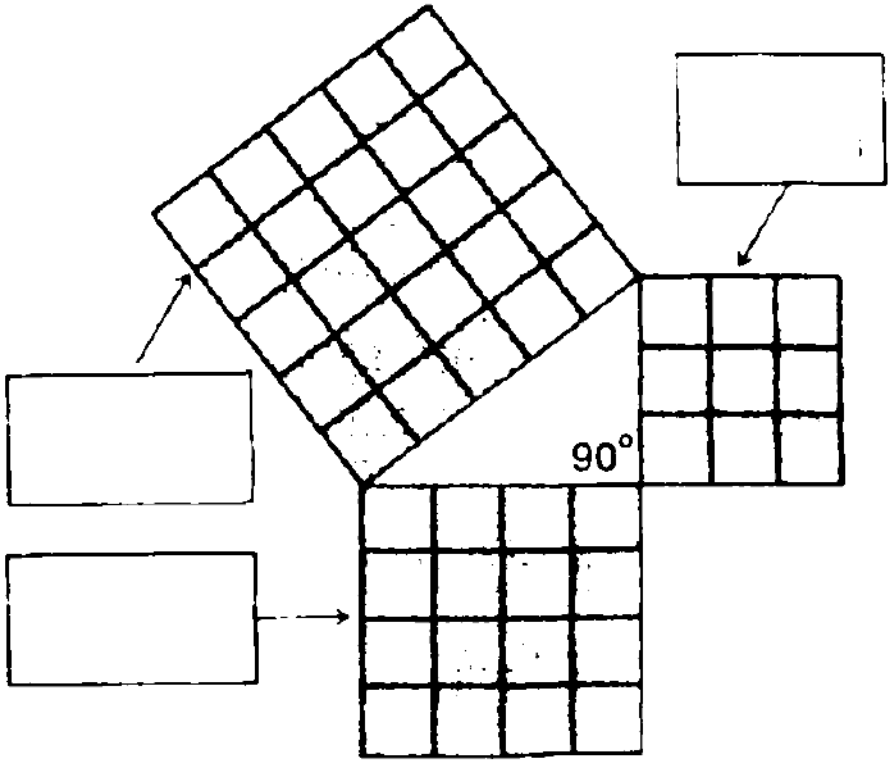
In a _____ triangle, the sum of the squares of the lengths of the _____ is equal to the square of the length of the _____.

$$a^2 + b^2 = c^2$$

symbol: If the Δ is a right Δ, then $a^2 + b^2 = c^2$

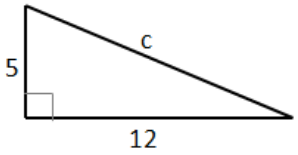
One Proof of the Pythagorean Theorem

Build squares on all sides of the triangle.

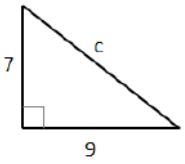


Let's Practice the Pythagorean Theorem

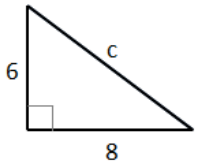
1. Find the length of the missing side.



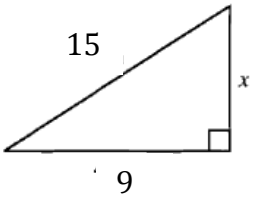
2. Find the length of the missing side.



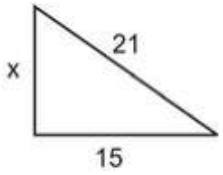
3. You try. Find the length of the missing side.



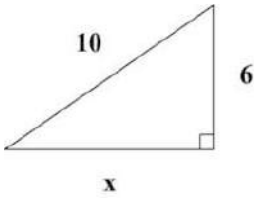
4. Find the length of the missing side.



5. Find the length of the missing side.



6. You try. Find the length of the missing side.

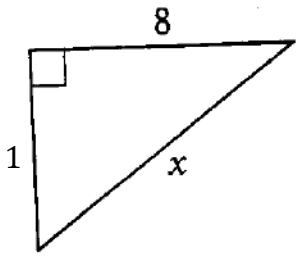


Unit 0, Part 2: Pythagorean Theorem

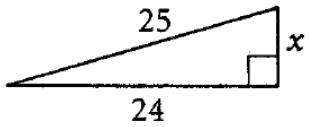
My Task: PST 2.1 The Pythagorean Theorem and Proofs of the Pythagorean Theorem

Find the value of x. Remember to label the sides a, b, and c. Then determine if you are finding a missing leg length or a missing hypotenuse length. Set up your equation and solve!

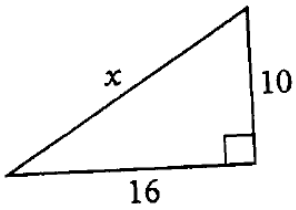
1.



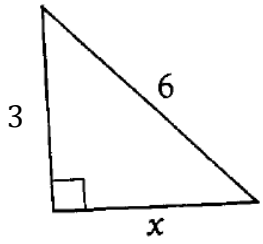
2.



3.



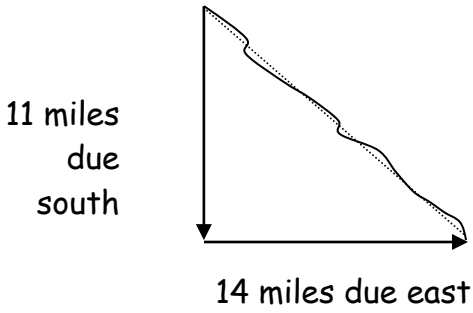
4.



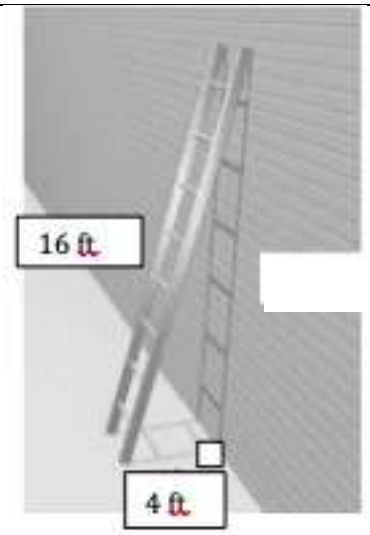
Unit 0, Part 2: Pythagorean Theorem

Lesson PST 2.2: The Pythagorean Theorem in Real-Life Situations

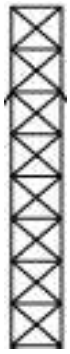
1. A hiker leaves camp and follows the route shown. How far is she from camp?



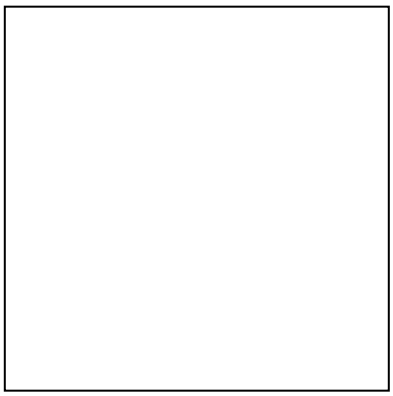
2. The following is a rule of thumb for safely positioning a ladder. The distance from the bottom of the ladder to the wall should be one-fourth the length of the ladder. Thus, the bottom of a 16-foot ladder should be 4 feet from the wall. How far up the wall will the ladder reach?



3. The mobile phone company is anchoring wires to the top of their 1200 ft high communication towers. The cable for the support wire comes in a roll that is 3900 ft long. The company requires you to use the entire roll. The cable can only be cut twice to ensure its strength. All cables need to be equal. How long will each cable be and how far from the base of the tower do they need to be anchored?



4. In the city planning meeting, a scale drawing of a park was drawn. The park falls inside a square city block. The scale was 3 inches equal 3/10 miles. One side of the city blocks was 4 inches in the drawing. One member of the city planners said, "There needs to be a shortcut through the park from the corners." How long in miles will the short cut be? Round answers to the nearest tenth of a mile.

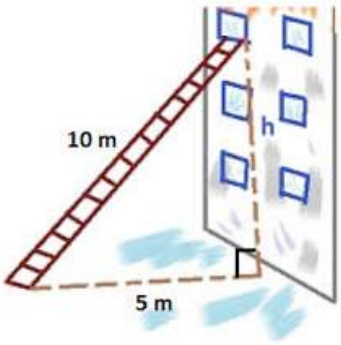


3 in = 3/10 miles

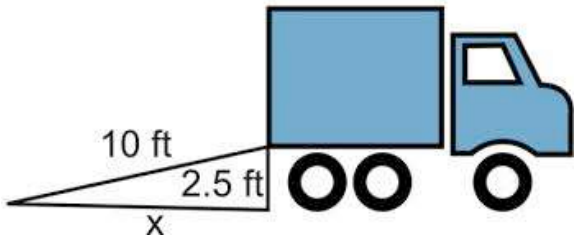
Unit 0, Part 2: Pythagorean Theorem

My Task: PST 2.2: The Pythagorean Theorem in Real-Life Situations

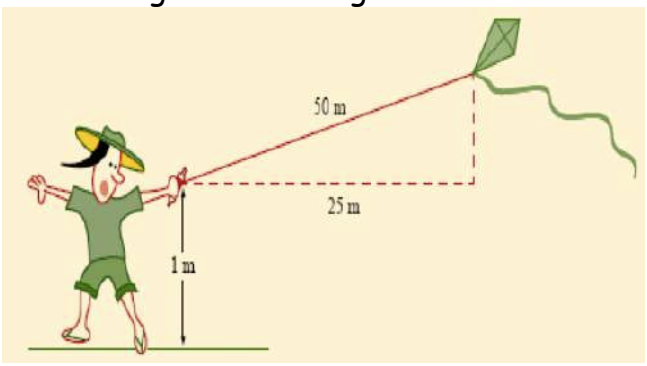
1. How high up the building does the ladder reach?



2. How far away from the truck is the bottom of the ramp?



3. How high above the ground is the kite?



4. You are locked out of your house, and the only open window is on the second floor, 20 feet above the ground. You need to borrow a ladder from one of your neighbors. There's a bush along the edge of the house, so you will have to place the ladder 15 feet from the house. What length of ladder do you need to reach the window?

5. A baseball diamond is a square with sides of 90 feet. What is the shortest distance, to the *nearest tenth of* a foot, between the first base and third base?

6. A suitcase measures 24 inches long and 18 inches high. You would like to pack a 28-inch-long umbrella in your suitcase. Will your umbrella fit in this suitcase? Explain.

7. Two joggers run 8 miles north and then 5 miles west. What is the shortest distance, to the *nearest tenth* of a mile, they must travel to return to their starting point?

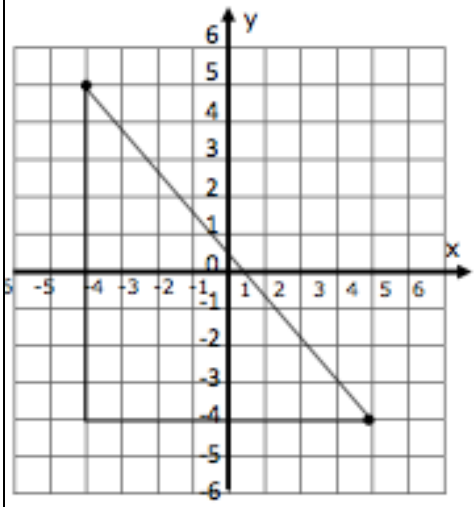
8. Jill's front door is 42 inches wide and 84 inches tall. She purchased a flat table top that is 96 inches in diameter. Will the table fit through the front door?

Unit 0, Part 2: Pythagorean Theorem

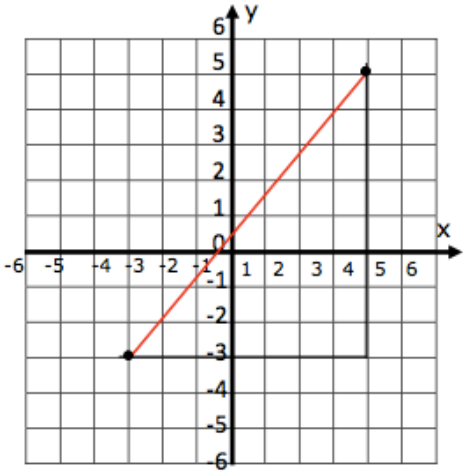
Lesson PST 2.3: The Pythagorean Theorem in a Coordinate System

Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.

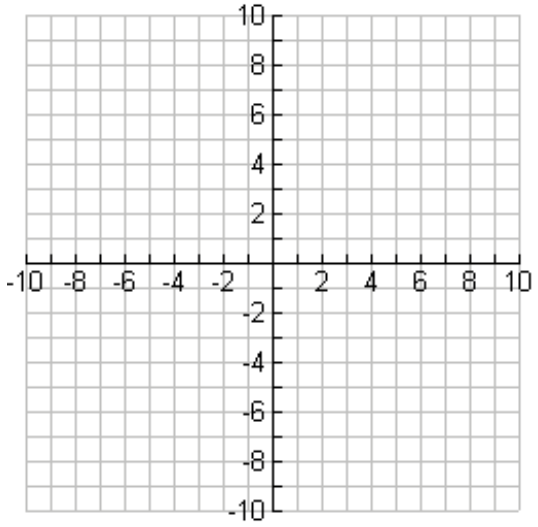
1. Find the length of the hypotenuse below.



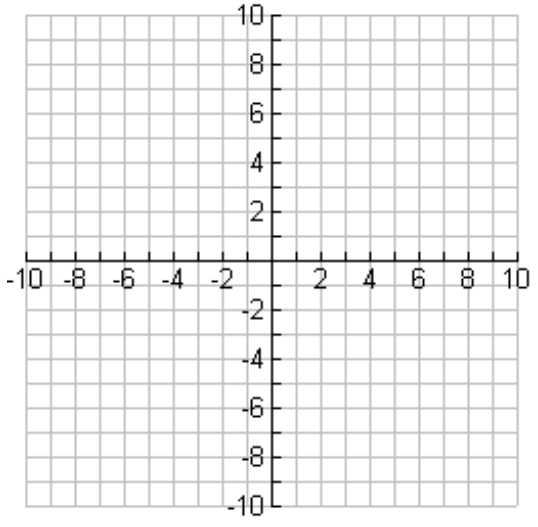
2. Find the length of the hypotenuse below.



3. Find the distance between (-3, 5) and (-5, -5).

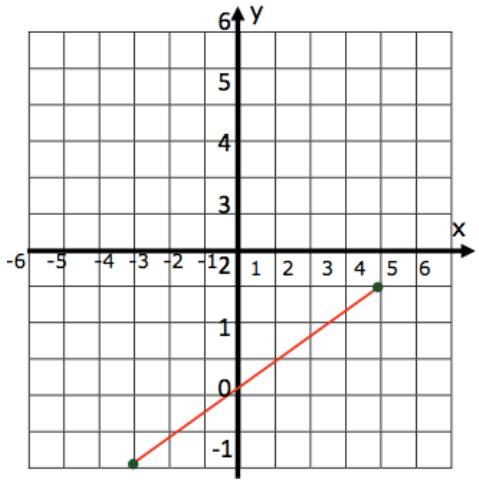


4. Find the distance between (5, 2) and (1, -3).

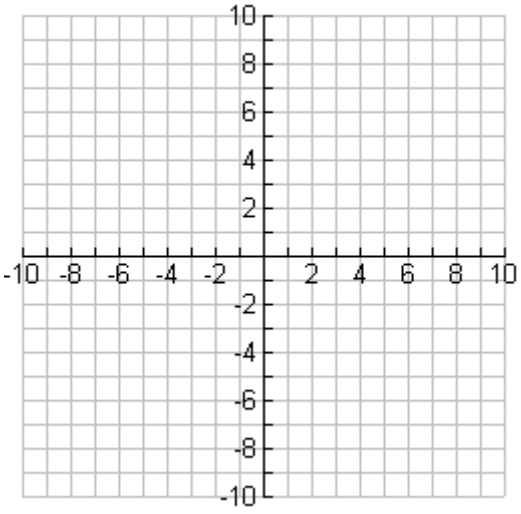


You try: Apply the Pythagorean Theorem in the coordinate system to find the length of the segment.

1. Find the distance between the points.



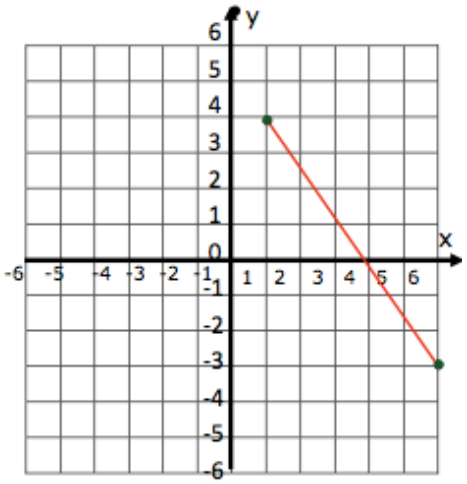
2. Find the distance between the coordinates (9, 8) and (-6, -7)



Unit 0, Part 2: Pythagorean Theorem

My Task: PST 2.3: The Pythagorean Theorem in a Coordinate System

1.



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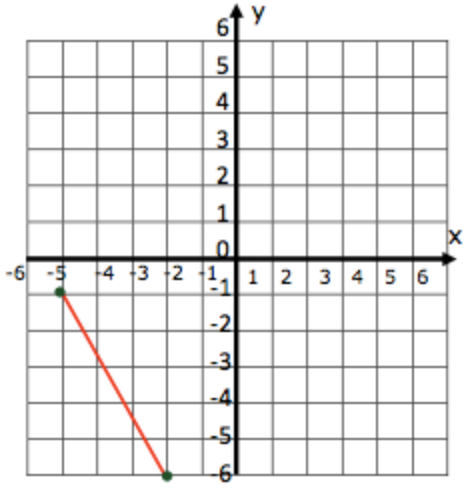

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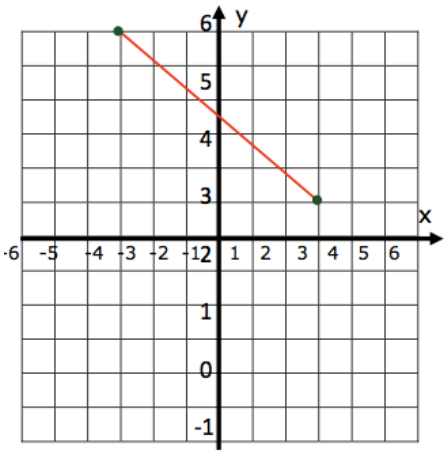

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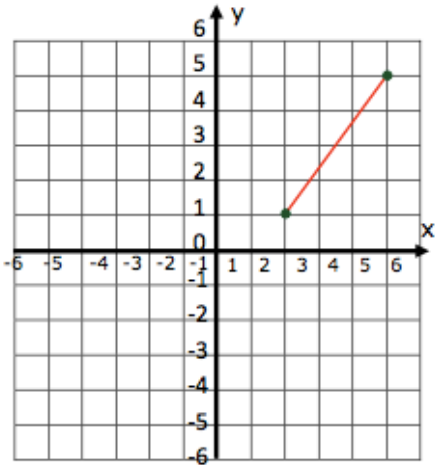
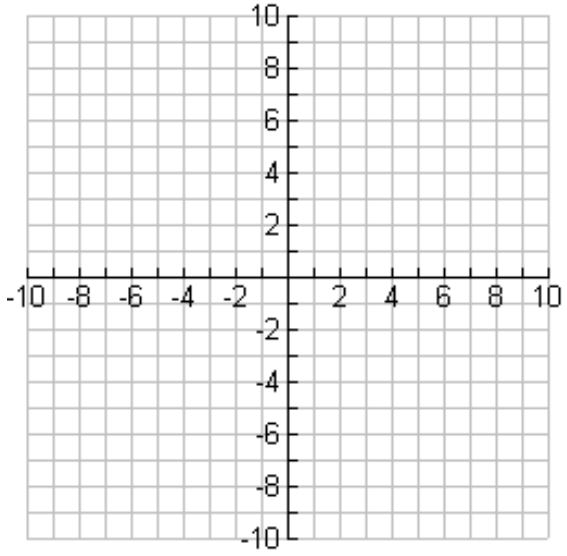
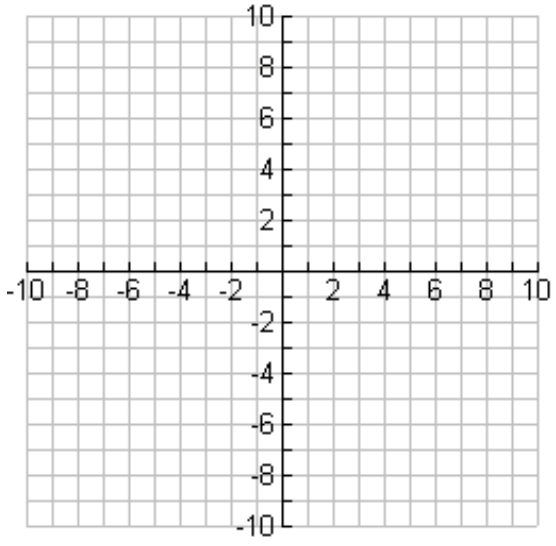


5. Find the distance between points (6, -2) and (-3, 3).



6. Find the distance between points (-1, 7) and (8, 4).



Carefully Review the Following Pages, and You and Your Parents are to Complete the Front Side of the *Student Information Sheet*

Name _____ School Year _____

Ms.Czyzniak's Academic Policies and Classroom Expectations—Algebra 1

Welcome to Algebra 1!!! Please remember that ***successfully passing this course will result in a high school math credit***. Therefore, the material will be rigorous and challenging and matched to the abilities and achievement levels of high-ability students.

Units to be covered this year, which follow Connecticut's Curriculum Design for Common Core Standards (CCS)

Unit 0 Math 8 Curriculum	Unit 1 Patterns	Unit 2 Linear Equations and Inequalities	Unit 3 Functions
Unit 4 Linear Functions	Unit 5 Scatterplots and Trend Lines	Unit 6 Systems of Linear Equations	Unit 7 Beyond Linear Functions

Grading

Grades are updated frequently. Check your grade often in the electronic grade book to ensure that all assignments have been submitted and accurately recorded. **The integrity of assessments has to be maintained year-to-year, so assessments cannot leave room 403. These assessments are available for your review at any time in the classroom, and arrangements can be made for parents who request to see their child's scored assessments.**

Assignments *will be graded as follows:*

Graded Assignments

All graded work is based on the number of points assigned to each problem. For example, if you took a quiz worth 35 points and you earned 28 points, you can calculate your percent grade as shown:

$$\frac{28}{35} = 0.8 = 80\%$$

Quarter Grades

Quarter grades are determined by dividing the total points you earned in the quarter by the total points assigned that quarter. For example, if assignments in the quarter totaled 300 points and you earned 245 points, then your quarter grade would be as shown.

$$\frac{245}{300} = 0.817 = 81.7\%$$

- If you are absent for any graded assignment, an "*ABS-0*" will be recorded in the electronic grade book. The "*ABS-0*" code calculates a zero for the assignment until the assignment is completed and the actual grade entered.
- Cheating or copying work/answers will result in a grade of zero for the assignment for all involved parties, and parents and school administration may be notified of such a breach of academic integrity. Understand . . . if you allow another student to copy your work or even if you fail to protect your work from being copied, you, as well as the copier, will earn a zero.

Homework

Unless we are in the flipped classroom, homework, unless otherwise announced, will be due the next school day, at the start of class, and points will be awarded based on completion, effort, and neatness. All homework must always be:

(1) **Done in pencil.** Math work is neater and easier to follow when done in pencil than when done in ink. Points will be deducted if work is not done in pencil.

(2) **Thorough**. You are required to show all work directly on the homework paper. If you used a calculator to help you solve, the keystrokes that you input should be included in your work. Your work helps YOU pinpoint exactly where mistakes occur.

(3) **Complete**. All solutions do not have to be correct, but all problems must be attempted with "sincere effort." Completely skipping a problem(s) will result in point deduction.

(4) **Ready at the start of class**. No late homework will be accepted unless it had been assigned on the day of an excused absence.

(5) **Corrected** as it is being reviewed in class.

Absences & Missed Work : See reverse side for details.

Required Daily Classroom Materials

Unit Packet	2+ Sharpened Pencils	Chromebook & Earbuds	Scientific Calculator	Block Eraser	3-Ring Binder	Ruler	Highlighter(s)	Dry Eraser (old sock!)

9th Grade Recommendations Will be Based on Your Final Grade

Final Grade in Algebra I	Credit	9th-Grade Math Recommendation
86.5% or higher	Will Earn a High School Credit	Honors Geometry
70% - 86.4%	Will Earn a High School Credit	Geometry
60% - 69.9%	Will Earn a High School Credit	Students who earn below a C- are *recommended* to repeat (without additional credit) Algebra I to ensure a proper foundation for future math classes. However, the final decision for course selection will rest with the student's parents.
Below 60%	Will NOT Earn a High School Credit	Algebra I

When You Are Absent . . . Making up missed work is YOUR responsibility!

Lessons: All of my lessons are on videos. If you are absent from school yet feeling well enough, you should check my lesson plans to see what lesson is scheduled, watch the video lesson, and complete the homework assignment to be current!

Homework Assignments: (in the non-flipped classroom)

- If you were present for class on the date the assignment was announced but absent on the day the assignment was due, you are expected to turn in the work at the start of class on the date of your return.
- If you were absent on the date the assignment was announced, you have 5 SCHOOL DAYS to turn it in upon return to school, or a zero will be recorded. Do not expect your teacher to remind you that you have an outstanding assignment.
- Any homework assigned prior to an absence is expected to be turned in immediately upon returning to school.

Test or Quiz REVIEWS: Being absent from a test or quiz REVIEW does not grant a postponement of the assessment date. If you were notified of the test date in advance and you are present in school on the date of the test/quiz, you will be expected to take the assessment with your classmates.

Test or Quiz: If you were notified of a test or quiz date in advance and were absent on the date of the assessment, you may be expected to take the test or quiz on the day you return to school, so be prepared.

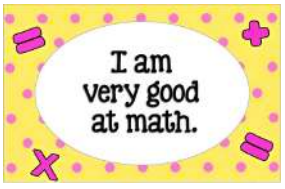
(Note: Flexibility will be exercised for lengthy absences.)

All ***deadline dates*** are firm for long-term assignments. Please understand that it is your responsibility to turn in long-term assignments on or before the deadline date, even if you are absent on the final date for submission. Out of fairness to your peers who have completed these assignments on time, please do not request or ask a parent to request an extension. Try to be at least two days ahead just in case. Be responsible!

Question: ***"When are we ever going to use this math in real life?"***

Answer: *Math teachers understand that at times math seems irrelevant and disconnected from your personal world. And it is true that you will probably never use some algebra skills in your day-to-day life. But learning math goes beyond the skills themselves. While you are practicing these skills, your brain is getting stronger and you are improving your ability to think logically! That is, math tasks will help you to learn how to think ideas through in a sequential, rational manner, supporting your capacities to make sound decisions—in all areas of your life.*

Furthermore, do you want to have a successful career? Most good jobs require some form of math aptitude, especially jobs involving a solid ability to reason, such as those in the fields of medicine, architecture, finance, science, law, engineering, business, public protection, etc. Stick with math because your brain is getting a necessary and fantastic workout!



Everyone Can Learn and Excel at Math

An embarrassing fact: ***The United States is the only advanced industrial nation where people are quick to say, "I am not good in math."*** People would be terribly offended if you ever called them illiterate but may laugh if you called them innumerate (unable to do arithmetic). Let's change that! Don't fall into the trap of thinking that learning math is beyond your abilities or that math skills are not important. Everyone can learn and excel at math as long as you are willing to engage your brain.

From Ms. Diane Czyzniak, 8th-Grade Math Teacher

Parent Page

Dear Parents,

Our 8th-grade math students will be embarking on a journey this year that is intended to present opportunities for deeper student learning in math, offer flexibility in task completion, provide more individualized teacher assistance, and enhance your teacher's abilities to reach all students. Your child's math classroom will become a "modified-flipped" classroom, also known as a "blended learning" classroom. Your educational experience had been different from what is being implemented in this year's math class. Acknowledging this fact is probably the most important step in being able to help your child. Before you start to hear chatter about how the teacher "isn't teaching anymore," please arm yourself with the following information!

Flipped math classrooms are a means to take advantage of students' growing use of technology by turning traditional ways of teaching on their head. Typically, teachers use class time to present a lecture on the topic at hand—whether it's solving equations, applying the Pythagorean Theorem to word problems, transforming figures on a coordinate plane, etc. A teacher stands in front of the students and tells them what they need to know. Students then go home and work on lessons that show they are taking steps to master the topic. But in a flipped classroom, the usual order is flipped; students use his/her time at home to watch the teacher's lectures—as often as is necessary to learn the material—on a computer or iPad or smartphone (at home only for the phone!) These lessons contain the exact material that would have been presented in the traditional classroom. Then students come to the next class period to work on problems, getting help from the teacher or working collaboratively with their fellow students. So the flipped classroom is a model whereby the lecture and homework elements of the math course are reversed. Video lectures are viewed by students at home before the class session, while in-class time is devoted to tasks, partner activities, or projects.

The structure of the classroom takes advantage of students' natural inclination for technology to help them learn how to learn and also respects the fact that children today are very busy outside of the school day and need flexibility in scheduling time for their school work.

A ***modified flipped (or blending learning) math classroom*** has a twist to the flipped classroom, offering your child even greater choice. Since all of the lessons are on videos, your child can ***either*** watch the videos at home and complete tasks at school ***or*** watch the videos at school and complete the tasks at home . . . whichever method works best for your child's learning.

Teacher's Role in the Modified Flipped Classroom. With a flipped learning model, learning becomes "student centered." Your child's teacher will act as a coach, guiding students in the exploration and mastery of content and skills. Students will have more one-on-one time with his/her teacher during class time, as she is available for individualized or small-group instruction as needed. During in-class practice activities, the teacher will provide feedback, coaching, and one-on-one support that is not possible when lecture dominates class time—so this shift in pedagogy lets your teacher monitor student performance more closely. There is something powerful about moving the teacher from lecturing in the front of the room, which changes the dynamics of the class. Spending quality time with each child helps teachers know students better both cognitively and relationally.

Students' Role in the Modified Flipped Classroom.

1. Students must be responsible about their ChromeBook accessibility (usage and focus).
2. Students must set calendar goals for task completion based on their own personal after-school schedule.
3. Students must understand that they are to take notes during video lessons (making the video the entire focus, so cell phones and other distractions are off), complete the associated task for an effort/completion grade, and write down any questions to ask his/her teacher.
4. During the class period, students are expected to focus on math work for the entire period, whether watching video lessons, completing written tasks, or preparing for assessments. (Students who complete the block of lessons early can work on a challenging extra-credit project.) With teacher permission, students may collaborate with other students during class time to help each other achieve mastery.
5. Students must ask the teacher for help during class when they are confronted with obstacles in mastering the material.
6. Students will prepare for graded progress checks and seek necessary teacher help prior to taking these checks.
7. Students should be mindful of completing all tasks before the required test or quiz dates.

Parents' Role in the Modified Flipped Classroom. The following points will help your child's success in math class this year:

1. Allow a quiet space for students to watch videos and/or complete tasks, with minimal distractions.
2. Encourage your child to rewatch videos for greater comprehension and for assessment preparation.
3. ***Frequently check teacher's website and parent portal to ensure that your child is not falling behind***. A recommended due date schedule for videos/tasks and progress checks are posted on the lesson plans found on the teacher's website. At least at the start of the school year, all students will take tests and quizzes on the same date. Although students may exercise flexibility in completing individual tasks, the assessment dates are firm.
4. Watch the videos, too, to share in your child's learning!

The Modified Flipped Classroom

How Can a Modified Flipped Math Classroom Work For Me????

Personalized Teacher Assistance!

If your teacher is not constricted to presenting a lecture to the whole class during class time, she has time for or small group or one-on-one instruction with you to address ***your*** specific questions!

Absent From School? Get Well & Don't Worry!

An absence won't cause you to fall behind or miss information because your lessons are always at your

Build Time Management Skills! A flipped classroom allows you more control to learn on your own time and at your own pace (within reason, of course). In order to stay on track with the curriculum, you will be given a date by which a group of lessons must be completed. However, while you are expected to watch a video, work on a task, take a progress check, etc., *during class time*, you have control over your own math schedule outside of school. Do you have a busy after-school schedule next week and won't have much time for homework? That's okay! Since you are not limited to specific due dates for independent lessons, you have access to all of the information you need to keep moving forward—schedule some time to work on lessons over the weekend to get ahead so that you can afford to skip a couple nights of math work during your busy

No more distractions! These video lessons are the exact lessons that would have been presented to your whole class in a traditional classroom environment. When you are watching a video lecture, the lecture is free from interruptions that would disturb your focus, as often occurs during whole-class lectures! And if you did lose focus for a few seconds while watching a video, you can always rewind and replay!

Video Lessons are a Handy Tool For Assessment Reviews!

Before a quiz or a test, rewatch videos for a good review of the material!

Collaboration Opportunities for Mature Learners!

Students who have proven that they use class time wisely and appropriately will be allowed to collaborate with a partner on content and tasks, if they choose to. With teacher permission, you can share knowledge and work together on tasks during class time.

How Do I Learn in a Modified Math Classroom????

The Steps . . .

1. Identify any due dates for classroom activities, quizzes, and tests. Take out a calendar and plan your tasks, scheduling classroom work, homework, and progress checks, to ensure you do not fall behind.
2. Watch the video and take notes during the video lesson and complete the task that goes with the video lesson.
3. Show the teacher your video notes and the completed task for an effort-and-completion grade.
4. Correct your answers to the task from a key provided by your teacher.
5. Your teacher is available to offer personal guidance to you! Be sure to seek any assistance prior to the graded progress check or any time that you are stuck!
6. Take a graded progress check to make sure that you've mastered the material!
7. Prepare for assessments by practicing your skills and/or rewatching videos!

Algebra 1 Student Information Sheet—Please Print Clearly Period _____

Student's Last Name	Student's First Name	Nickname, if preferred

Student: Please complete the survey below	Always	Sometimes	Never
1. I take good notes in class and am attentive and focused			
2. I have a specific place with few distractions at home to practice math			
3. I review my class notes before beginning the homework			
4. I take my time doing math homework so that I can master the material			
5. I am willing to devote the necessary time and effort to truly master the material on which I am going to be tested			
6. My grades in my math class are important to me			
7. I believe that I can succeed in math class			

Student: Please ask your parent/guardian to complete the rest of this form.

For Parent/Teacher Use

Dear Parent/Guardian,

I would appreciate your completing the following information in case I need to contact you.

☐ Check this box if both people listed would like to receive emails. (Otherwise, I will email only the first listed name.)

Name	E-Mail Address ***Please print clearly.***	Daytime Phone Number ***(Please provide the number only if you can receive calls during the day.)***
Parent/Guardian:		
Parent/Guardian:		

Kindly review with your son/daughter the classroom academic policies and classroom expectations sheet (front and back). Also review the information on the modified flipped classroom. Sign below that you have read this information.

☐ I have read Ms. Czyzniak's academic policies and classroom expectations and discussed these with my son/daughter.
☐ I have read the information describing the modified flipped classroom and understand that I should check parent portal frequently to ensure that may child is keeping pace with assignments.

Parent's Signature _____

If you would like, cut on the dotted line below and keep the contact information for your reference.

Feel free to contact me any time with concerns or questions. The best way to contact me is via e-mail: dczyzniak@somers.k12.ct.us. You may also call 749-2270, extension 5403 and leave a message. Daily lesson plans, videos, and assignments are posted on the Somers Public School website: www.Somers.k12.ct.us. Follow the *Staff Directory* link under the *District Info* tab.

Date/Time	Left Message	Spoke With . . .	Topic	Follow-Up Action