Project Number: JAG-8007

TEACHING TO THE STUDENT

Student Teaching Practicum Portfolio and Reflections

An Interactive Qualifying Project Report
submitted to the Faculty
of the
WORCESTER POLYTECHNIC INSTITUTE
in partial fulfillment of the requirements for the
Degree of Bachelor of Science
by

Krystal Parker

Date: 28 February 2008

Professor John Goulet, Advisor

Table of Contents

Prologue: Personal Motivations

When I first walked into Forest Grove Middle School, I could not help but think about my middle school experience. I attended 3 middle schools in 2 different states during 7th and 8th grades. First, I attended Patton Junior High School (PJHS) in Fort Leavenworth, Kansas from August to November of 7th grade. PJHS, a Department of Defense school, had recently been remodeled and was known for its excellent academics. The students at PJHS came from military families or other families whose parents worked on Fort Leavenworth. Many of my friends and I reminisce about "the bubble" we lived in – most students were well-behaved, it was not often that we heard about students getting suspended or expelled, and the teachers always seemed genuinely excited about teaching and getting to know the students.

In November of 7th grade, my family moved to Georgia where I attended Hinesville Middle School (HMS). HMS was completely different from Patton Junior High: the floors were covered in chalk dust, students did not have lockers, and most classes did not have enough books for all of the students. During my first week at HMS, I heard about someone being arrested and almost got beat up in the lunch line because I would not let someone cut in front of me. While at HMS, I tested to be placed into Hinesville District's gifted program, and, after December of 7th grade, I attended Lewis Frasier Middle School (LFMS). LFMS was recently remodeled and the teachers were excited about teaching the students; most students who attended LFMS were from upper middle-class families. My middle school experiences helped me develop my passion for learning, my morals, and my social skills.

– – – – – –

People who decide to teach have various motivations – be it that they have summers off, were disappointed with the system and want to change it, will be able to work the same hours that their children are at school, or influence the future of America. However, teaching is not a nine-to-five job. Teachers spend summers furthering their education, long nights correcting papers, and busy days dealing with all kinds of student motivations. Thus, the *true* motivations for teaching extend far beyond and deeper than those listed above.

All students can learn. Teachers must recognize that all students learn differently and adjust their teaching style and curriculum accordingly. There should be high expectations for all students – not necessarily for what or how fast they learn, but rather how they learn it and how

they present their work. The ultimate question should be *Do we fit the child to the school or make the school fit the child?* Teachers should fit to the students. An excellent teacher understands that students have various motivations; the students' behaviors imply these motivations and other problems that they have.

The teachers I have met through my career as a student still have an impact on me today. I have had teachers who were so motivated and enthusiastic about what they were teaching that I was excited and interested in the subject. These teachers could make even the most mundane subjects and material interesting. However, some teachers, when compared to the better teachers, fell short. I hated going to these classes. These teachers failed to motivate me and make learning interesting. Thus, I want to teach so that students can be motivated, encouraged, enthusiastic, and enjoy learning. I want students to have the opportunity to have teachers who are willing to go the extra mile to help and who spark interest in otherwise mundane subjects. Teachers must teach their subjects but also learn to recognize and teach students whose interests lie elsewhere. Teachers should draw connections between specific concepts and real-world experiences.

I realize that many of my propositions may seem idealistic; however, as a teacher once told me, "You *have* to be idealistic in this profession." Every teacher, or at least all that I have come into contact with, has a vision for each student, the classroom, and the overall learning experience. The teacher then manages the students and lessons in such a way that the outcome is this image. This image – an image of the productive and worthwhile learning experience – is the cornerstone and motivation for all teaching goals and methods.

Chapter 1: Forest Grove Middle School

The motivation of the Forest Grove Middle School community is encourage the personal and intellectual development of its students: "The mission of Forest Grove is to meet learners at a critical turning point in their social, physical, academic, and moral development and provide them with knowledge and skills to meet the challenges of high school and beyond.[1]" The pre-teen years, i.e. 7th and 8th grades, are vital to a young person's development. Middle school students are very impressionable; they are easily persuaded by the media and their peers. Teachers and mentors at FGMS have the opportunity to help students learn and develop confidence, integrity, and perseverance.

1.1 Demographics

The US Census Bureau estimated that the Worcester population is approximately 176,000 in 2005, where approximately 41,000 people are of school age and just under 50,000 speak languages other than English at home, and approximately 27,000 students enrolled in the Worcester Public Schools for the 2007 school year. The Worcester school district has 4 middle and junior high schools, including Forest Grove Middle School (FGMS). FGMS is a 7th and 8th grade middle school with an approved vocational technical program. During the 2006 school year, FGMS had 979 students and 68 teachers, yielding a student-to-teacher ratio of 14.4:1. The female to male ratio is approximately 1:1. Of the 979 students, 5 are Native American, 70 are Asian, 119 are Black, 220 are Hispanic, and 553 are Caucasian. 404 students receive free lunch, and 77 are on reduced lunch.[2]

1.2 MCAS Results

The Massachusetts Comprehensive Assessment System (MCAS) is designed to test students' proficiency in several skills outlined by the Massachusetts Curriculum Frameworks. The mathematics tests for 7th and 8th grade students cover basic geometry, algebraic operations,

[1] Forest Grove Middle School Website <http://www.wpsweb.com/forestgrove/>

[2] National Center for Educational Statistics <http://nces.ed.gov/ccd/schoolsearch/school_list.asp?SchoolID=251323002213>

probability and statistics, patterns, and algebra.[3] The MCAS mathematics results for Forest Grove Middle School are not encouraging. 386 7th graders and 450 8th graders took the MCAS tests in the spring of 2007.[4] FGMS students performed below the state statistics in all proficiency levels, as seen in Table 1. The majority of the tested students fall under the "Needs Improvement and "Warning/Failing" categories. Both the 7th and 8th grade students are not proficient in

Table 1: Percentage of Students in Various Performance Levels

MATHEMATICS	Advanced/ Above Proficient (%)		Proficient (%)		Needs Improvement (%)		Warning/ Failing (%)	
	FGMS	State	FGMS	State	FGMS	State	FGMS	State
7th Grade	7	15	23	31	31	30	39	24
8th Grade	11	17	22	28	30	34	34	25

the tested math skills, with 39% of 7th graders and 34% of 8th graders failing to show proficiency in mathematics. Figure 1 exhibits the 2006 and 2007 MCAS results for 7th graders at Forest Grove Middle School.

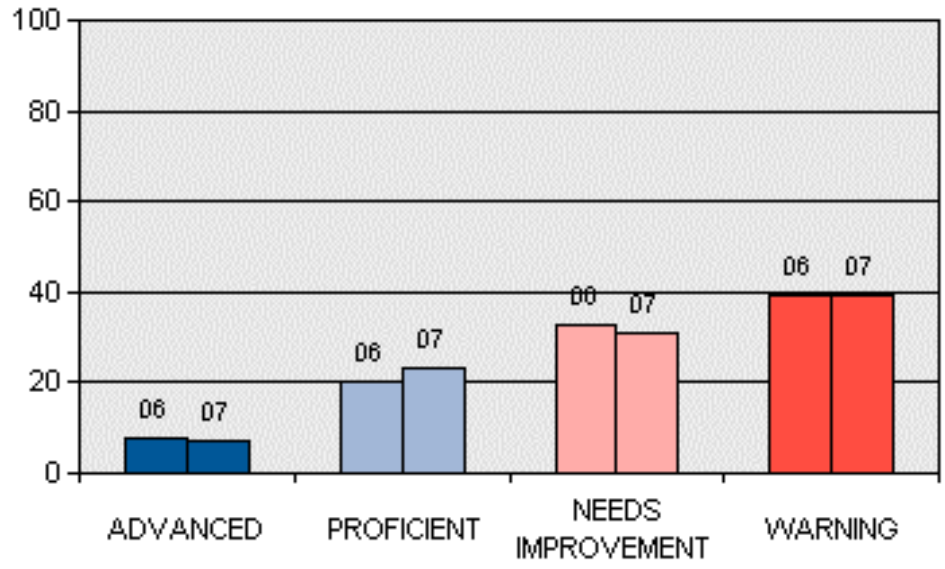


Figure 1: Percent of Students by Performance Level for Grade 7 Mathematics

[3] MCAS website <www.doe.mass.edu/mcas>
[4] Spring 2007 MCAS Results <http://profiles.doe.mass.edu/mcas/>

A large percentage of the students are within the "Needs Improvement" and "Warning/Failing" performance levels. There is not much improvement between 2006 and 2007 for 7th grade students. Similar to the 7th grade results, Figure 2 illustrates the

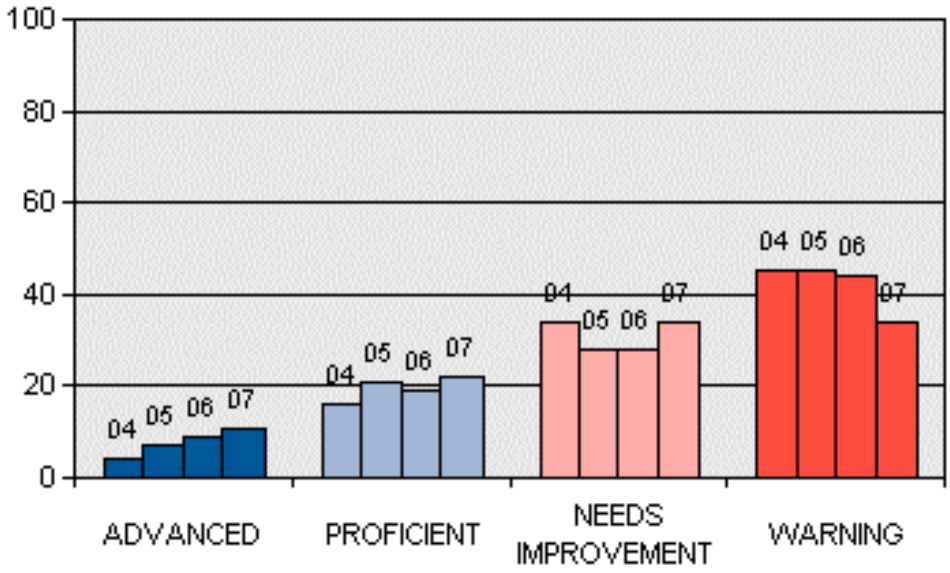


Figure 2: Percent of Students by Performance Level for Grade 8 Mathematics

2004 – 2007 MCAS results for 8th graders at FGMS. The 8th grade performance is generally within the "Needs Improvement" and "Warning/Failing" levels. However, the spring 2007 MCAS math results show an improvement; more students showed proficiency than in previous years and fewer students were categorized as failing.

Forest Grove Middle School also tests students using the Measures of Academic Process (MAP) testing. MAP is a unique test because the types of questions asked are a direct reflection of a student's performance; the adaptive nature of this test allows teachers to better evaluate a student's understanding and performance level. Students take this test four times a year in mathematics at FGMS. This test allows teachers and administrators to evaluate a student's improvement throughout the year, especially if the student performed poorly on MCAS.

1.3 The Daily Schedule

Each day students report to homeroom for attendance and general school announcements before going to their first class. Forest Grove utilizes a rotating schedule with 6 different daily combinations, A through F. Each day, students start with a different course but follow the same

class order: Math, Science, Social Studies, Reading, Elective, English. The Elective course changed each quarter to include: Music, Physical Education, an Enrichment Course, and Art. Table 2 describes the rotational days for the Mathematics classroom; see Chapter 3 for class descriptions.

Table 2: Rotational Schedule

Day	1	2	3	4	LUNCH	5	6
A	Yellow	Blue	Prep	Honor	LUNCH	Green	Orange
B	Blue	Prep	Honor	Green	LUNCH	Orange	Yellow
C	Prep	Purple	Green	Orange	LUNCH	Yellow	Blue
D	Purple	Green	Orange	Yellow	LUNCH	Blue	Prep
E	Green	Orange	Yellow	Blue	LUNCH	Prep	Purple
F	Orange	Yellow	Blue	Prep	LUNCH	Purple	Green

This rotation schedule allows students to have classes at different times each day; this benefits students and teachers because it allows students who perform best at a certain time of day to get the most out of each of their classes.

1.4 The Classroom

Mr. True's classroom is located on the second floor of FGMS. The room has 30 student desks, a teacher's desk, and a very old computer. A small white board by the teacher's desk lists the day's lesson and relevant frameworks. The science classroom is connected to the math classroom by a door; often the remarks and laughing of students in science can be heard. The walls are cluttered with math posters, pictures, and various school improvement plan policies. Lectures are given using a white board and an overhead projector. Although very rarely utilized, a projector and laptop were available for use.

Chapter 2: When am I *ever* going to use this?

One of the most common questions posed to teachers is: "When am I ever going to use this?" While I know that mathematics can be used in a variety of real-world applications, this concept is difficult for students to accept because the purpose of learning various mathematic skills is not immediately apparent. One of the reasons I want to teach middle school is that everything they learn is important, whether it be math, English, or gym. Some students may never need to know how to write the equation of a line or find the length of the missing side on a right triangle, but all students, no matter what skill level, will use the analytical thinking and problem solving skills they develop in their middle school mathematics courses. These skills can serve as a tool for understanding and analyzing real life problems and situations.

All education is cumulative; students learn both academic and life skills in each class. Students learn concepts such as following instructions, respecting classmates, appropriate classroom behavior, reading and writing, and problem solving skills in all classroom settings. In mathematics, however, all course material is cumulative. All new concepts build upon not only previous material but also, most importantly, fundamental mathematical concepts. It is nearly impossible for students to be successful in future mathematics courses if they do not have a strong basis in fundamental mathematical concepts such as addition, subtraction, multiplication, division, and critical thinking. Unfortunately, with the pressure to do well on MCAS and the ever changing and over-ambitious frameworks, many times students are forced to learn material that they are not prepared to learn because their understanding of those important fundamental concepts is lacking.

Because of the cumulative nature of mathematics, my mentor, Michael True, teaches the same group of students two years in a row; this is called cluster looping. Last year he taught the students in our 8^{th} grade cluster in 7^{th} grade math. Next year, he will teach 7^{th} grade and the following year will teach 8^{th} grade math to those same students. This is a recent change in Forest Grove Middle School (FGMS) but a logical change and a useful tool. It easier to justify the cumulative nature of mathematics when teaching two years in a row as the teacher is familiar with his previous lesson plans and student abilities.

While it is easy to understand the usefulness of one teacher teaching students for both 7^{th} and 8^{th} grade math, it is important to understand *why* the 7^{th} and 8^{th} grade courses are coupled.

The material students learn in 7th and 8th grade is so closely related; in fact, more often than not students comment, "Didn't we do something like this last year?" The Massachusetts Curriculum Frameworks for 7th and 8th grade are the same; furthermore, the Worcester Public Schools (WPS) 7th and 8th grade course descriptions are almost identical. The WPS 7th grade course description reads as follows:

> Students will focus on the Grade 7 Massachusetts Mathematics Curriculum Framework and the Worcester Public Schools Grade 7 Mathematics Curriculum. Major emphases include ratios and proportions, scale factor, two-dimensional measurement, working with data, and unit rate.[5]

The 8th grade math course utilizes skills developed in 7th grade, such as ratios and proportions, measurement, and data analysis. The WPS 8th grade course description reads as follows:

> Students will focus on the Grade 8 Massachusetts Mathematics Curriculum Framework and the Worcester Public Schools Grade 8 Mathematics Curriculum. Major emphases include slope and linear equations, the Pythagorean Theorem, surface area and volume, and probability and statistics.[6]

The course objectives for 8th grade math better explain the course expectations and goals. These objectives align with the MA Mathematics Curriculum Frameworks:

1. Apply the Pythagorean Theorem to the solution of problems.
2. Generalize, apply, and predict information from patterns table and graphs.
3. Evaluate formulas to express relationships given in written, tabular, and graphic form.
4. Demonstrate an ability to manipulate numbers, use order of operations, and integers.
5. Explore linear and non-linear functions.
6. Write about mathematical thinking.
7. Find measures of Central Tendency and represent data.

Listed below is the 8th grade math scope and sequence. It details the course material, proposed text, and met frameworks. This sequence also includes the number of days each lesson should take; it is a very regimented sequence, leaving almost no room for reviewing, projects, and creative teaching.

[5] Worcester Public Schools Course Syllabus, 2007
[6] Worcester Public Schools Course Syllabus, 2007

Worcester Public Schools 8th Grade Math Scope and Sequence

Moving Straight Ahead		
Investigation	Days	Frameworks
4: Exploring Slope	5	8.P.5, 8.P.6, 8.M.5

Accentuate the Negative		
Investigation	Days	Frameworks
2: Adding and Subtracting Integers	5	8.N.6, 8.N.12
Reflections	1	
Chapter test	1	
End of Module	**12**	

Thinking with Mathematical Models		
Investigation	Days	Frameworks
1: Exploring Data Patterns	3	8.P.1, 8.P.5,8.P.8
2: Linear Models and Equations (omit 2.4)	3	8.P.4, 8.P.5, 8.P.6,8.P.7, 8.P.10, 8.M.5
Reflections	1	
Chapter test	1	
End of Module	**8**	

Looking for Pythagoras		
Investigation	Days	Frameworks
1: Coordinate Grids	3	8.M.3
2: Squaring Off	3	8.N.2, 8.N.9, 8.N.11, 8.M.3
3: The Pythagorean theorem	4	8.G.4
4: Using the Pythagorean Theorem (omit 4.3, 4.4)	2	8.N.1, 8.N.2, 8.N.11, 8.G.4
Reflections	1	
Chapter test	1	
End of Module	**14**	

Comparing and Scaling		
Investigation	Days	Frameworks
4: Making Sense of Proportions	3	8.N.3, 8.P.9, 8.M.1, 8.M.2, 8.M.4

Growing, Growing, Growing		
Investigation	Days	Frameworks
1: Exponential Growth	4	8.N.4, 8.N.7, 8.P.1, 8.P.4,

Frogs, Fleas, and Painted Cubes		
Investigation	Days	Frameworks
3: Quadratic patterns of change	3	8.P.1, 8.P.8

Filling and Wrapping		
Investigation	Days	Frameworks
3: Prisms and Cylinders	4	8.G.7, 8.G.8
4: Cones, Spheres, and Pyramids	3	8.G.7
Reflections	1	
Chapter test	1	
End of Module	**19**	

Kaleidoscopes, Hubcaps, and Mirrors		
Investigation	Days	Frameworks
1: Three Types of Symmetry	4	8.G.5, 8.G.6
2: Symmetry Transformations	4	8.G.5, 8.G.6
3: Exploring Congruence	4	8.G.2
Reflections	1	
Chapter test	1	
End of Module	**14**	

Prime Time		
Investigation	Days	Frameworks
4: Factorizations, Searching for Factor Strings	3	8.N.5

What Do You Expect?		
Investigation	Days	Frameworks
1: Evaluations Games of Chance	3	8.D.4
2: Analyzing Situations Using an Area Model	3	8.D.4
Reflections	1	
Chapter test	1	
End of Module	**11**	

Samples and Populations		
Investigation	Days	Frameworks
1: Comparing Data Sets	4	8.D.2, 8.D.3
2: Choosing a Sample from a Population	4	8.D.1, 8.D.2
3: Solving Real-World Problems	2	8.D.2, 8.D.3
4: Relating Two Variables	3	8.D.2, 8.P.8
Reflections	1	
Chapter test	1	
End of Module	**15**	

Say It with Symbols		
Investigation	Days	Frameworks
1: Equivalent Expressions	4	8.N.7, 8.N.8,8.N.12, 8.P.2, 8.P.3
2: Combining Expressions	3	8.N.8, 8.N.9, 8.N.10, 8.N.11,8.P.7
3: Solving Equations (omit 3.3, 3.4)	2	8.N.8, 8.N.9, 8.N.12, 8.P.3, 8.P.7

Shapes of Algebra		
Investigation	Days	Frameworks
2: Linear Equations and Inequalities	3	8.N.12, 8.P.4, 8.P.5, 8.P.7, 8.P.9, 8.P.10
Reflections	1	
Chapter test	1	
End of Module	**14**	

To meet the course objectives and ensure that all students learn the material described in the scope and sequence, WPS encourages teachers to use several educational resources and techniques, including the Connected Mathematics Project curriculum and District/School-wide classroom practices. For example, each teacher has a small white board in his classroom dedicated to describing the day's lesson; the white board includes: Launch (Bellwork/Classwork), Relevant Frameworks, the day's Objective, and a Summary.

The Connected Mathematics Project (CMP), developed by Michigan State University, includes an entire curriculum for middle school mathematics. The CMP curriculum is designed to allow students to explore mathematics and develop an understanding of concepts through mathematical reasoning and discovery.[7] The 8th grade package consists of 8 books; each book focuses on one or more of the 8th grade math objectives. The books used during my practicum were: "Looking for Pythagoras" (understanding and using the Pythagorean Theorem), "Comparing and Scaling" (ratios and proportions), "Growing, Growing, Growing" (recognizing exponential relationships), "Frogs, Fleas, and Painted Cubes" (quadratic relationships), and "Filling and Wrapping" (surface area and volume). CMP focuses on learning mathematics through group work, discovery, and investigation. Approaching mathematics in this manner allows students to more easily draw the connection(s) between the skills and concepts learned in math class and real applications. While the CMP curriculum by no means perfect, the approach presented challenges the *students* to discover the answer to their favorite question: "When am I every going to use this?"

[7] "Connected Mathematics Project" <http://connectedmath.msu.edu/>

Chapter 3: Understanding the Students

A teacher can put together extensive lesson plans and do hours of preparation, but the students dictate what is taught and how a teacher presents the material. A teacher can take every teaching methods, classroom management, and psychology class, but the students dictate the teaching style and classroom management techniques. Successful teachers understand their students' learning styles and backgrounds and use those characteristics to mold their teaching styles and lesson plans. *Successful teachers teach to their students.*

3.1 The Students

Forest Grove divides its students into two levels: honors and high school preparatory. Several years ago, Forest Grove divided students into three levels: honors, high school preparatory, and standard. Unfortunately, the change to two levels is disadvantaging students, as many are placed in classes that do not fit their learning style or proficiency in a subject. Fortunately, the students are generally placed in appropriate classes, i.e. placed with students of similar academic ability. And regardless of the two level system, the classes can still be described by honors, high school preparatory, and standard levels.

Before I characterize each of my classes, I think it is important to understand my expectations for my students, as they are the lenses through which I viewed each classroom situation. My expectations were extremely high, maybe even too ambitious, and did not vary with class level; however, my belief is that people only work as hard and do as much as that expected of them. I expected and challenged my students to work towards completing more difficult assignments and tests than they thought they could handle; I expected them to treat each other and myself with respect; I expected them to be honest both in and out of the classroom. Most importantly, I expected each student understand and respect that each student has a different learning style.

Purple: Honors Math

The honors group was an over-sized 29-student class; each day all but 1 of the desks in the classroom was filled. Controlling, entertaining, and teaching a group of this size, regardless of their intelligence level, was, at times, exhausting; however, this class was generally well-

behaved and the most mature of the 5 groups. Teaching this class was not the bulk of the problem but rather getting the students to calm down and begin working.

The honors class was extremely intelligent and could handle difficult concepts. This class was a lot of fun to teach; because of their level of understanding, I was able to present more challenging and interesting problems and lessons. However, the class complained, shut down, and/or questioned anytime they were initially presented with a new topic. While I welcome questions, especially when students are trying to understand and wrap their minds around a new topic, often the purple group asked ridiculous or irrelevant questions when presented with any material that forced them to think or go outside their "comfort zone."

While the majority of the students in this group understood new ideas – both conceptually and technically – with ease, there were several students in this class that would be more successful in another group. I question why they were put in an already oversized class when they could not perform to the level expected of the class.

Green: Standard Math

The green group was the smallest group I taught, 10 students; however, this class was generally the most draining and difficult to teach. The class was very moody. Everyday was a surprise with this group, as one or two students' moods dictated the attitude and daily performance of the class. The green group was also very social and talkative. In a 50 minute class, I could generally teach about 30 minutes of material; I spent the other 20 minutes attempting to calm down the class and get them to focus.

This class never asked many questions. They generally took information at face value; unfortunately, students would memorize patterns or tricks and assume that was the solution to every problem. Additionally, basic concepts, such as fractions and decimals, were often misunderstood or forgotten by these students. I remember my first realization of this; this group was great at finding the equation of a line when given two points. However, if you threw in a fractional slope, the students had no idea what to do. Fractions and decimals, concepts that should be solid by the time a student reaches 8^{th} grade, were foreign and misunderstood.

Orange: High School Preparatory Math

The orange group, with 15 students, was an average group of students: a few clowns, a shy girl or two, and the defiant student. However, the orange group often had more class clowns

than necessary. One person would cough or make an obnoxious noise and the rest of the students would follow in round. The biggest problem I encountered was the class' immaturity. At one point during my practicum, one of the girls was pushed down the stairs by one of her classmates; another student was reprimanded for spitting gum in someone's hair.

Although this class was the most immature of the 5 groups, it was not the most difficult to teach. This class generally asked relevant questions and was excited to understand new, challenging topics. There were several extremely intelligent students. One of the students earned 100+ on all tests; he could probably teach me calculus better than most professors. However, he began to goof off a lot and started to get in mild trouble a few months into my practicum.

Yellow: Standard Math

The yellow group, 12 students, was a difficult class. Each of the students came with so much baggage; these students have very difficult lives. The fact that they did anything was a miracle; some of the students were extremely bright and did very well considering what they had to deal with at home. Some of the students, however, had little or no motivation to do work. One of the girls in this class was repeating the 8^{th} grade for the third time. Two other students never receive more than 20 points on a test. These students struggled with basic mathematical concepts, such as multiplication and division. Similar to the green group, the students generally tried to find patterns or tricks and memorize them; unfortunately, the memorized techniques often had no basis or only worked for one type of problem. In general, students in this class put little effort into learning material but rather attempted to memorize.

Students in this class defended each other. If I asked a student to stop talking or to move to a different seat, at least two other students would spend the next five minutes arguing that he did not do anything and that I was wrong. More often than not, this class would argue with me about anything and everything I asked them to do.

Blue: High School Preparatory Math

The blue group, a class of 14 students, proved to be my most difficult class. They were a great group of students; many were motivated and extremely intelligent; however, very rarely did they take me seriously or listen to me. More often than not, I spent the hour reprimanding students for whining, major disruptions, or excessive talking. The whining and pouting in this

class was unbelievable. If I asked a student to stop talking or incessantly screaming out answers, the student would proceed to pout and refuse to participate in class.

Students asked questions and worked to understand the material. The biggest problem was the shut down; whenever I presented a new concept or idea or even when students were working on bellwork (this was always review!), I would hear, "I don't know how to do this, and I don't want to do it," from several students. I even, more often than I would have liked, had to "hand hold" certain students through class work or convince them to participate. Regardless of the whining, pouting, and lack of self-motivation, this was a very intelligent group of students.

3.2 Classroom Management

I was fortunate to have Mr. True in the classroom to help with extreme discipline problems and defiant students; he never interrupted or interjected in class unless either he or myself felt it was necessary. Although he was in the classroom, I taught the class and fielded any behavioral issues. The most difficult thing I encountered, however, was the difference between Mr. True's and my teaching and classroom management styles. For example, he did not mind minimal talking (not cheating) during tests; whereas I demanded silence. I came into the classroom 2 months into the school year, knowing that these students were used to a certain style of teaching, testing, and discipline. While in many cases I could follow Mr. True's precedent, I needed to develop and use my own style.

To keep some level of order in the classroom, there must be discipline. It is important to understand that I taught 8th grade. Thirteen year olds are still kids. They need to have some fun and have time to socialize; middle school is as much about a student's social development as his education. However, students should be expected to handle following instructions and respecting each other and their teacher.

In my managing my classroom, I was most successful when I used the steps detailed below to deal with individual students.

1. Talk to the student in class, asking them to stop talking, chewing gum, etc.
2. Move the student to a different desk – away from their classmates and/or the students they are talking with.
3. Warn that anymore distractions will result in a detention.
4. Assign detention.

Detentions must be given 24 hours in advance, i.e. if given on a Monday, a student would serve the detention on a Tuesday. More often than not, I did not actually make the student serve the detention. However, this entirely depended on the student's behavior the next day in class.

When an entire class was talking or out of hand, I would stand silently in front of the room until everyone stopped talking. I tried never to raise my voice, yell, or attempt to talk over the students. If talking continued to be a problem, I would explain that the next person to talk about something other than math would serve a detention the next afternoon. Or, if the class was doing group work or something more hands-on and refused to quiet down and focus, the class would do a worksheet or overhead instead of the project.

Chapter 4: Teaching to the Students

During my first month of teaching, I followed Mr. True's lead. I mimicked his teaching and discipline style. I came to the realization, however, that as a new teacher, I had the opportunity to try new things and new ways of teaching. I tried to stay away from using the book; I did not find the Connected Mathematics Project (CMP) books extremely helpful. Rather, I attempted to come up with other lessons, projects, hands on activities, etc., that covered the same material. Not only did I try to use new

4.1 Concepts Covered

The topics covered during my four and a half month practicum, in order, are the Pythagorean theorem, ratios and proportions, surface area and volume of three-dimensional objects, linear and nonlinear problems, and deciphering word problems. For each topic, I built the foundation by reviewing relevant previously learned concepts. Additionally, in-class work generally included at least one MCAS or MAP problem from past tests. On tests, I included more difficult bonus problems; these problems generally stemmed from an MCAS or MAP problem and served to challenge each student.

Applications of the Pythagorean Theorem and Proportions

Prior to my teaching practicum, the students learned about the Pythagorean theorem and proportions/ratios. I think it is important to see and understand real life applications of the topics learned in math class. In this set of lessons, students were presented with several situations in which they would use these mathematical concepts.

Handicap Ramp Project

The Handicap Ramp Project was an in-class group project where students groups used their understanding of the Pythagorean theorem, ratios and proportions, percentages, and scale factors to design a handicap ramp. Each lesson focused on a separate aspect of the project, after which students will work to design the handicap ramp.

Surface Area and Volume

These lessons included a review of volume and surface area, to include reviewing areas of two-dimensional shapes. Given several objects, cubes, balls, prisms, etc., students measured the dimensions and calculate the surface area and volume. Students not only have to understand the concepts of volume and surface area but also which dimensions are needed and how to measure them.

Understanding Word Problems – help with MCAS

Many students, including myself in middle school, shut down when they see word problems. This lesson was designed to help students develop a strategy to solve word problems. We analyzed word problem vocabulary and asked the question: "how can words help you solve a word problem?"

4.2 Homework

Homework was used for several purposes, to include assessing student understanding and evaluating the students' ability to follow directions. I assigned homework between 2 and 3 nights each week. Generally these homework assignments were fairly short – between 2 and 5 questions per night. I assigned to types of homework:

- Informal – Assignments grade based on effort made to complete assignment.
- Formal – Assignment grade based on completeness and following instructions.

Most often, these were informal homework assignments where I would merely check the next day in class to see if they completed the assignment. At least once every week, I collected an assignment. These assignments were to be done on a "clean sheet" of paper (a paper with no writing or notes written on it). When collecting an assignment, I was more concerned with the process the students' used to solve certain problems and the completeness of the assignment than the correct answers.

4.3 Assessments

Formal assessments, i.e. tests and quizzes, were given at least every other week, with at most 3 per month. The tests were designed to take students most of the period to finish. Tests and quizzes were always cumulative; they included both review problems and newer material. I

always included several bonus problems; these bonus problems were an extension of concepts the students previously learned.

The Purple, Blue, and Orange groups could handle finishing an entire 15 to 20-question test in a single period. These groups were always encouraged to try the bonus problems; these groups were also asked to not turn in their tests until after thy finished the entire test and tried the bonus problems. The Yellow and Green groups rarely finished a 20-question test; I encouraged students to do as many problems as they could.

Reviews were presented the day before any test. Some reviews were more extensive than others, the length based on the importance of the test. For two tests, I used a Jeopardy Review game. The review game was a great way to get students involved; all classes enjoyed the competition and change in teaching style. However, when certain groups were "losing" or did not agree with a decision I made, the resulting pout was ridiculous. Most importantly, however, any review, lecture or game, adequately prepared students for exams. My test questions often came directly from the review or were extremely similar problems.

4.4 Teaching Materials: Presenting & Assessing Understanding of Concepts

Each Monday, FGMS requires teachers to submit lesson plans. The lesson plans include outlines of the lessons planned, any assessments planned, proposed strategies for teaching and preparing for MCAS, the relevant frameworks and WPS benchmarks covered, and any additional information or resources. Included in this section is a lesson plan accompanied by homework, tests, overheads, etc., used to present and assess understanding of course material. The lesson plans cover the weeks of 3 December 07 through 25 February 08.

FOREST GROVE MIDDLE SCHOOL
LESSON PLAN FORMAT

Week of 12 / 03 /07 **Teacher** True **Discipline** Math

CONTENT -- Outlines of Lessons

In-class group project where students groups will use their understanding of the Pythagorean theorem, ratios and proportions, percentages, and scale factors to design a handicap ramp and build a cardboard scale model. Each lesson focuses on a separate aspect of the project, after which students will work to design the handicap ramp:

Lesson 1: Application of the Pythagorean Theorem
- Project Objective: Calculate the length of the handicap ramp using the Pythagorean Theorem.

Lesson 2: Application of Ratios and Proportions – Similar Figures
- Project Objective: Determine the lengths of ramp supports using similar triangles.

Lesson 3: Converting Measurements and Using Percentages
- Project Objective: Compute cost of needed materials using percentages.

Lesson 4: Application of Ratios and Proportions – Scale Factors
- Project Objective: Build a cardboard scale model using understanding of scale factors.

ASSESSMENT -- Including Rubrics

Homework Check
Notebook Check
MCAS Question Review
In-class Participation
Handicap Ramp Project:
- Group work evaluations (see page 3)
- Self-evaluations (see page 4)

STRATEGIES

MCAS Strategy –
- Word problem vocabulary lessons, word wall, sample MCAS problems, group work.

MCAS Literacy Strategy –
- Utilize reading and writing skills: write out thought processes.
- Answers and designs for handicap ramp project written in sentences.

Reading and Writing Activities –
- Analyze word problem vocabulary – how can the words help you solve the problem?
- Answers/designs for handicap ramp written in sentences.

CONNECTIONS

MA Curriculum Frameworks –

- 8.G.4 – Demonstrate and understanding of the Pythagorean theorem. Apply the theorem to the solution of problems.
- 8.P.9 – Use linear equations to model and analyze problems involving proportional relationships.
- 8.G.2 – Classify figures in terms of congruence and similarity, and apply these relationships to the solution of problems.
- 8.M.1 – Select, convert (within the same system of measurement), and use appropriate units of measurement or scale.
- 8.M.4 – Use ratios and proportions (including scale factors) in the solution of problems, including problems involving similar plane figures and indirect measurement.
- 8.N.10 – Estimate and compute with fractions (including simplification of fractions), integers, decimals, and percents (including those greater than 100 and less than 1).

WPS Benchmarks –

- Applies algebraic methods to solve a variety of real-world and mathematical problems.
- Uses problem-solving strategies.
- Understands/uses concept of perimeter, area, and their relationships, surface area.
- Understands/uses patterns, symmetry, similar figures, and congruent figures.
- Uses formulas: perimeter, circumference, area, volume, surface area, and Pythagorean Theorem.
- Explore geometry.

School Improvement Plan –

- SIP 1.1-4 – Math definitions and word problems.
- SIP 2.1 – Math Department meetings.
- SIP 3.1-4 – 8th grade curriculum.

RESOURCES

CMP Looking for Pythagoras –

- Investigation 4: Using the Pythagorean Theorem

CMP Comparing and Scaling – Lessons:

- Investigation 4: Making Sense of Proportions

MCAS practice questions

My personal experiences and mathematical knowledge

Assorted overheads

Handicap Ramp Project: STUDENT & GROUP EVALUATION

Lesson 1: Application of the Pythagorean Theorem

- Project Objective: Calculate the length of the handicap ramp using the Pythagorean Theorem.

Assessment:

- Each student completes Pythagorean Theorem homework assignment.
- Group correctly calculates the handicap ramp length with minimal guidance.

Lesson 2: Application of Ratios and Proportions – Similar Figures

- Project Objective: Determine the lengths of ramp supports using similar triangles.

Assessment:

- Each student completes similar figures homework assignment.
- Group correctly calculates the support lengths.

QUIZ: Pythagorean Theorem, Ratios and Percentages, and Similar Figures

---

Lesson 3: Converting Measurements and Using Percentages

- Project Objective: Compute cost of needed materials using percentages.

Assessment:

- Each student completes percentages homework assignment.
- Groups correctly calculate the prices of materials and determine the most cost-effective distributor.

Lesson 4: Application of Ratios and Proportions – Scale Factors

- Project Objective: Build a cardboard scale model using understanding of scale factors.

Assessment:

- Each student completes scale factors homework assignment.
- Groups use scale factors to determine the materials needed to build the scale model of the handicap ramp.

QUIZ: Percentages, Ratios and Proportions, and Scale Factors

Project Completion:

- Students put together a display board illustrating their design processes and calculations.

Assessment:

- Groups work together to complete board.
- Students exhibit a written understanding of their calculations.

Handicap Ramp Project: SELF EVALUATION

Which best describes YOU?

As a team member I…
- Let my partners do all of my work
- Did not help my partners
- Did not listen to my partners' ideas

As a team member I…
- Let my partners do some of the work
- Only helped when my partners asked me
- Had trouble listening to others' ideas

As a team member I…
- Did all of my work
- Helped my partners
- Listened to my partners' ideas

Bellwork 12/5/07

① Approximate the $\sqrt{\ }$'s below!

a) $\sqrt{217}$

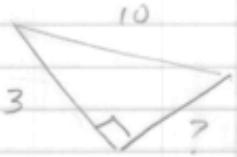
b) $\sqrt{327}$

c) $\sqrt{56}$

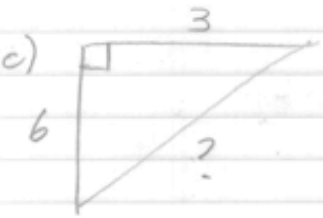
② Solve for the missing side

a)

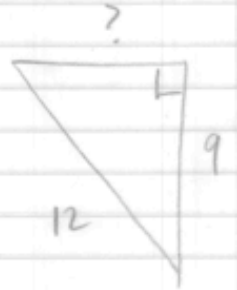
b)



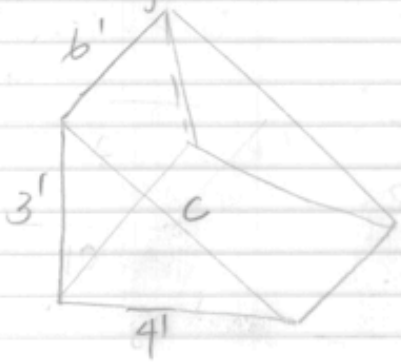
c)



d)



③ Right Triangular Prism



Find the volume and surface area.

What is the length of c?

1

Review / Bellwork

- slope of a line / y int — SHOW WORK

(4, 2) and (6, 8)

$\text{Slope} = \frac{8-2}{6-4} = \frac{6}{2} = 3$

$y\text{int} = -10$

$\text{equtn} = y = 3x - 10$

- $y = 6x - 7$
  $y = \frac{1}{2}x + 12$
  ] identify slope & y int

- fractional slope

$m = \frac{1}{2} \Rightarrow (4, 6)$ & $(10, 9)$

- fractions / percents

5%, 90%, 20% of:

20, 65, 8, 106

$\frac{5}{8}$ of 40

$\frac{5}{13}$ of 169

- pythagorean theorem

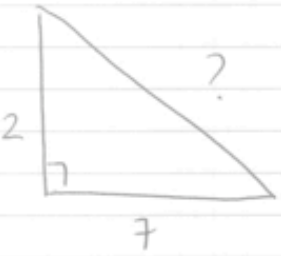
FORMULA?? $(a^2+b^2=c^2)$

label sides.

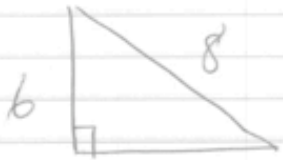
longest side? (across from 90°)

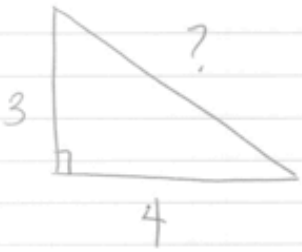
What is a right triangle?

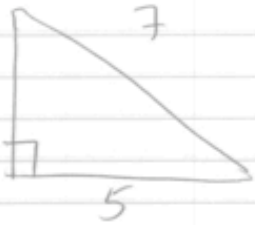
c is? (hypotenuse)

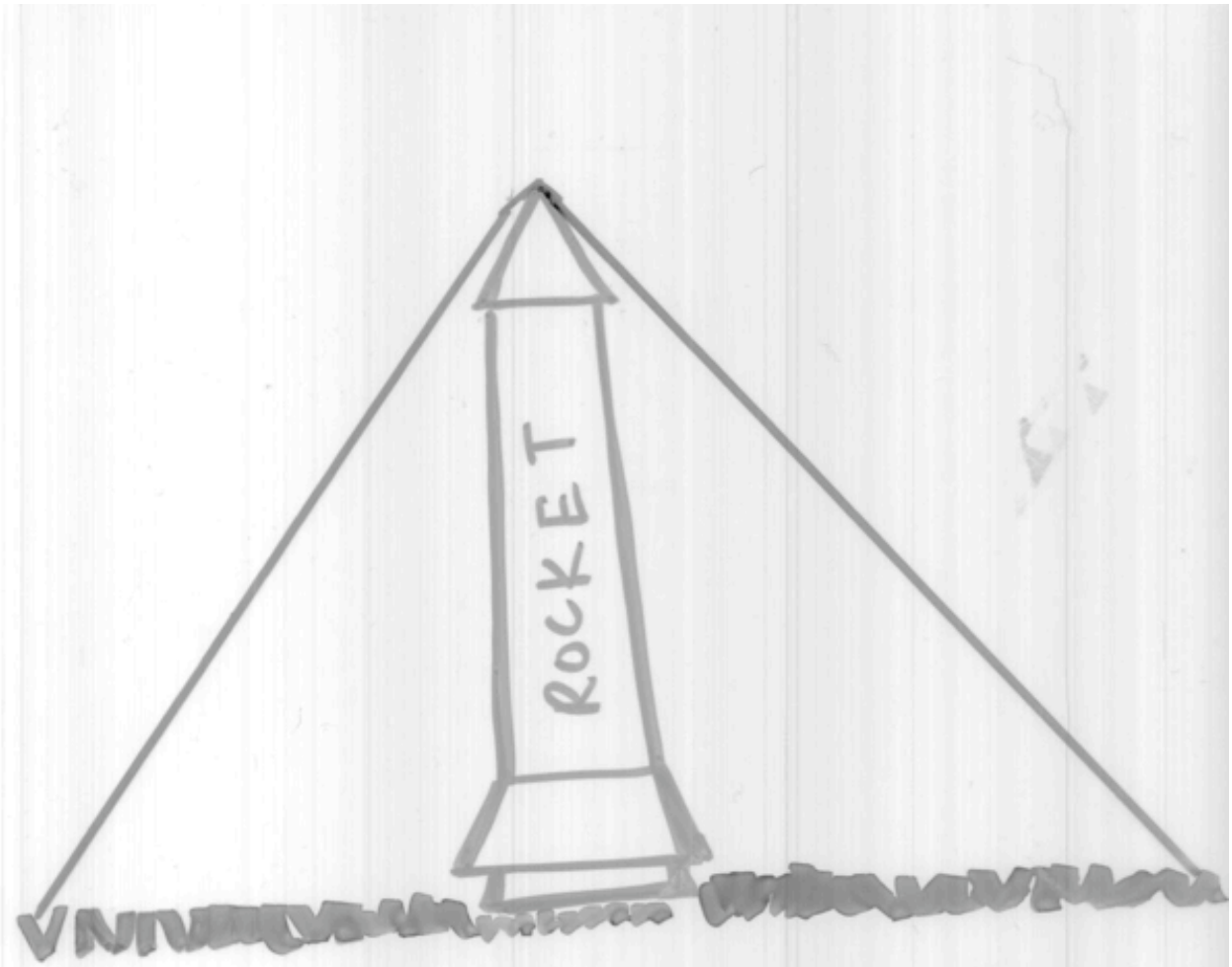


find ~~3~~.







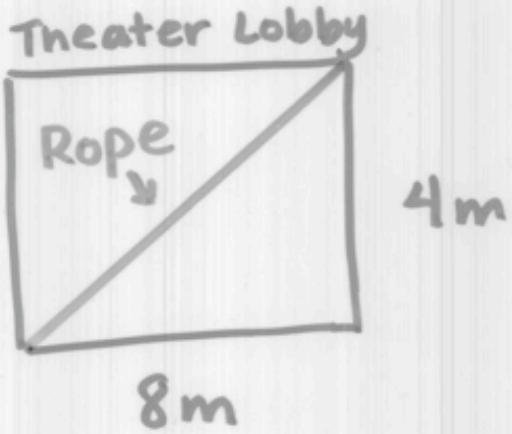


The rocket is 12 feet tall.
On either side of the rocket we have 7 feet of grass.

How long should <u>each</u> guidewire be?

How much wire should you buy?

The floor of the lobby of a theater is rectangular, as shown below:



Before a performance starts, a velvet rope is stretched diagonally across the lobby.

How long is the rope?

4.1 Setting Up & Solving Proportions

PROPORTION – equation that states 2 ratios are equal

→ 4 ways to write:

① $\frac{s_1}{h_1} = \frac{x}{h_2}$

② $\frac{s_1}{x} = \frac{h_1}{h_2}$

③ $\frac{h_2}{h_1} = \frac{x}{s_1}$

④ $\frac{h_1}{s_1} = \frac{h_2}{x}$

Analyzing Similar Figures

SCALE FACTOR

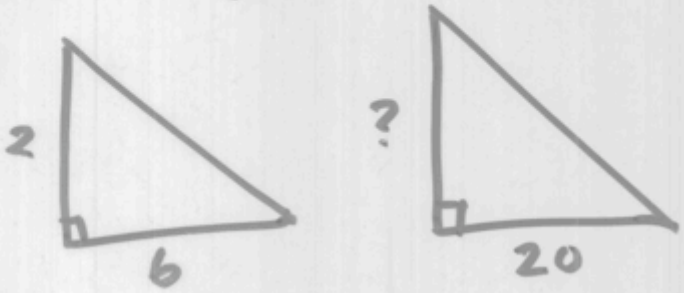
Process to solve problems:

① Find ratio of lengths (given scale factor)
② write a proportion to find missing information
③ solve.

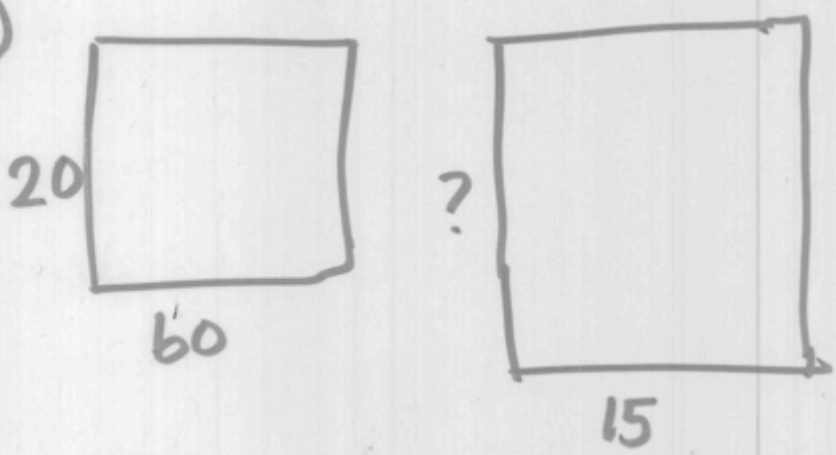
(1) A man 6 feet tall casts an 11 foot shadow. A building casts a 139 foot shadow. How tall is the building?

(2) A stop sign is 8 feet tall and casts a 10 foot shadow. A flagpole is 16 feet tall. How long is the pole's shadow?

(3)



(4)

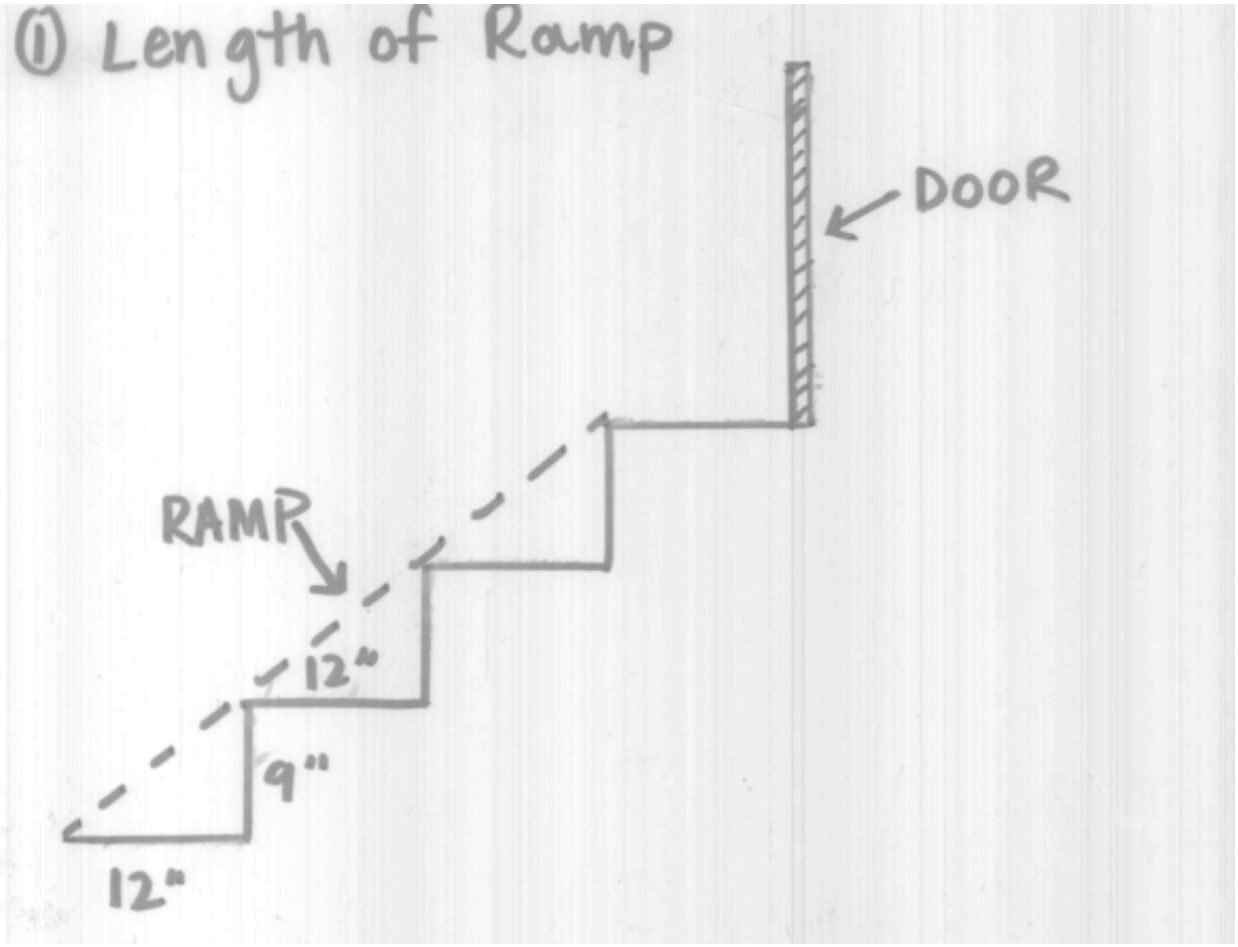


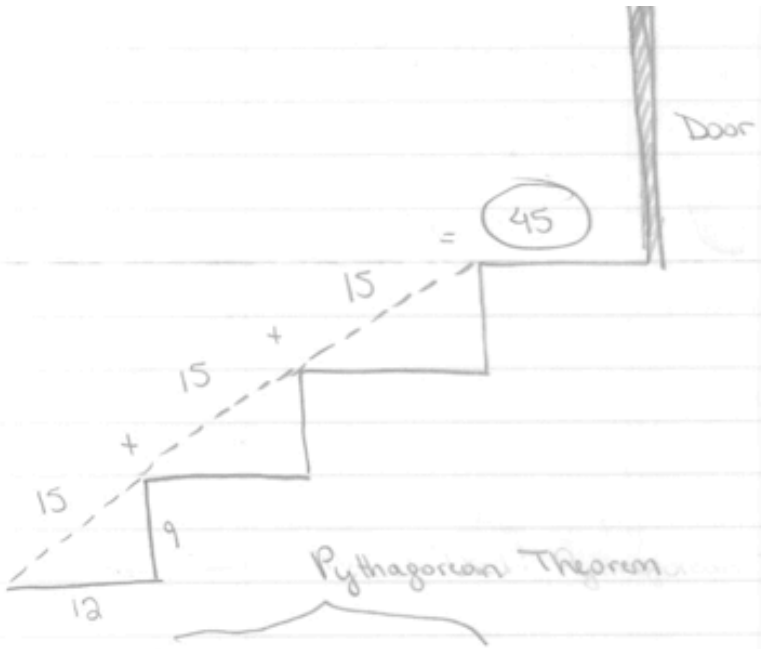
① A 5 pound turkey costs $12. A 20 pound turkey costs $45. Which is the best price?

② A 16 oz can of soda costs 75 cents. A 20 oz bottle costs $1.25. Which is the best price?

③ A pack of 25 cards costs $3. A pack of 50 cards costs $5. Which is the best price?

④ Cheetos cost $4 per bag. The store is running a deal: two bags of Cheetos for $7.50. How much are you saving?


① Length of Ramp
DOOR
RAMP
12"
9"
12"



Pythagorean Theorem

1 way: $a^2 + b^2 = c^2$

$12^2 + 9^2 = c^2$

$144 + 81 = c^2$

$225 = c^2$

$15 = c$

$15 + 15 + 15 = 45$

2nd way: $a^2 + b^2 = c^2$

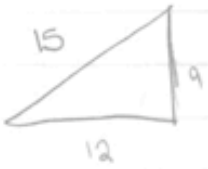
$36^2 + 27^2 = c^2$

$1296 + 729 = c^2$

$2025 = c^2$

$45 = c$

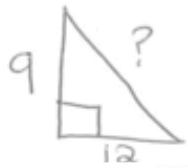
3rd way : 3-4-5 method



$3 * 3 = 9$

$3 * 4 = 12$

$3 * 5 = 15$



$a^2+b^2=c^2$
$9^2+12^2=c^2$
$81+144=c^2$
$225=c^2$
$c=15$

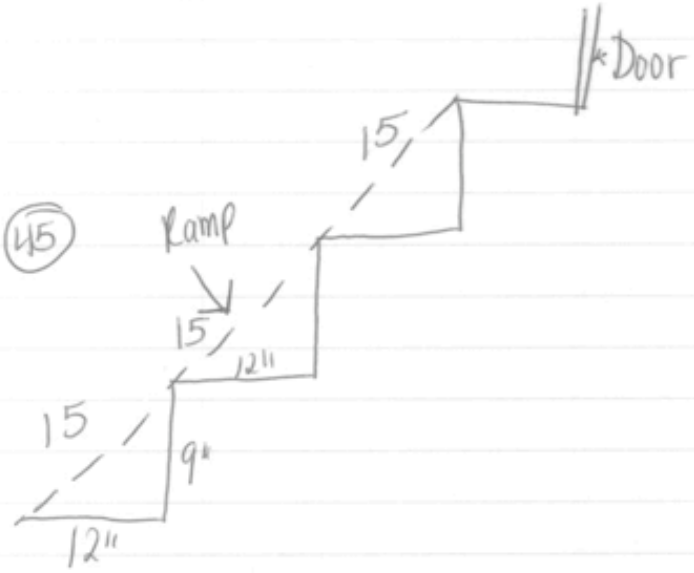
We used a 345 proportion. 12/6/07

You could find the answer by hypotnuse or multiply by 3 from a 3,4-5 triangle.

There are 3 stairs so we multiply it by 3.

$15 \times 3 = 45''$

The answer is 45 inches



FOREST GROVE MIDDLE SCHOOL
LESSON PLAN FORMAT

Week of 12 / 10 /07 **Teacher** True **Discipline** Math

CONTENT -- Outlines of Lessons

In-class group project where students groups will use their understanding of the Pythagorean theorem, ratios and proportions, percentages, and scale factors to design a handicap ramp and build a cardboard scale model. Each lesson focuses on a separate aspect of the project, after which students will work to design the handicap ramp:

Lesson 2: Application of Ratios and Proportions – Similar Figures
- Project Objective: Determine the lengths of ramp supports using similar triangles.

Lesson 3: Converting Measurements and Using Percentages
- Project Objective: Compute cost of needed materials using percentages.

Lesson 4: Application of Ratios and Proportions – Scale Factors
- Project Objective: Build a cardboard scale model using understanding of scale factors.

ASSESSMENT -- Including Rubrics

Homework Check
Notebook Check
MCAS Question Review
In-class Participation
Handicap Ramp Project:
- Group work evaluations (see page 3)
- Self-evaluations (see page 4)

STRATEGIES

MCAS Strategy –
- Word problem vocabulary lessons, word wall, sample MCAS problems, group work.

MCAS Literacy Strategy –
- Utilize reading and writing skills: write out thought processes.
- Answers and designs for handicap ramp project written in sentences.

Reading and Writing Activities –
- Analyze word problem vocabulary – how can the words help you solve the problem?
- Answers/designs for handicap ramp written in sentences.

CONNECTIONS

MA Curriculum Frameworks –
- 8.G.4 – Demonstrate and understanding of the Pythagorean theorem. Apply the theorem to the solution

of problems.
- 8.P.9 – Use linear equations to model and analyze problems involving proportional relationships.
- 8.G.2 – Classify figures in terms of congruence and similarity, and apply these relationships to the solution of problems.
- 8.M.1 – Select, convert (within the same system of measurement), and use appropriate units of measurement or scale.
- 8.M.4 – Use ratios and proportions (including scale factors) in the solution of problems, including problems involving similar plane figures and indirect measurement.
- 8.N.10 – Estimate and compute with fractions (including simplification of fractions), integers, decimals, and percents (including those greater than 100 and less than 1).

WPS Benchmarks –
- Applies algebraic methods to solve a variety of real-world and mathematical problems.
- Uses problem solving strategies.
- Understands/uses concept of perimeter, area, and their relationships, surface area.
- Understands/uses patterns, symmetry, similar figures, and congruent figures.
- Uses formulas: perimeter, circumference, area, volume, surface area, and Pythagorean Theorem.
- Explore geometry.

School Improvement Plan –
- SIP 1.1-4 – Math definitions and word problems.
- SIP 2.1 – Math Department meetings.
- SIP 3.1-4 – 8th grade curriculum.

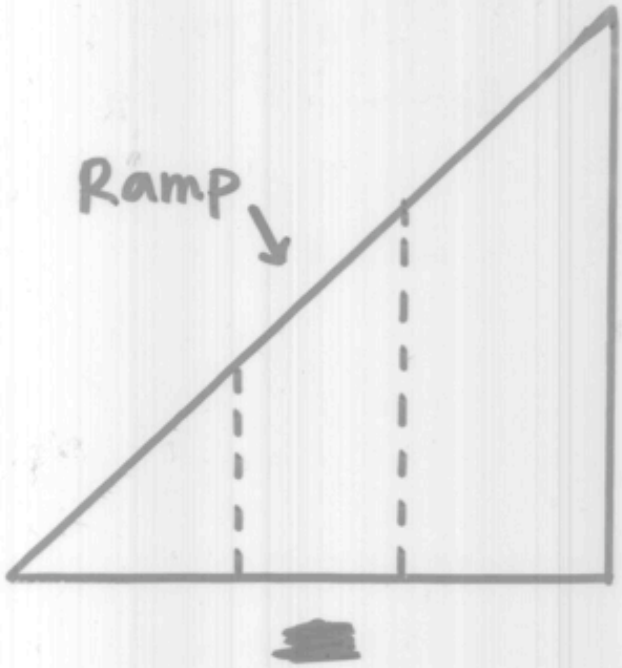
RESOURCES

CMP Looking for Pythagoras –
- Investigation 4: Using the Pythagorean Theorem

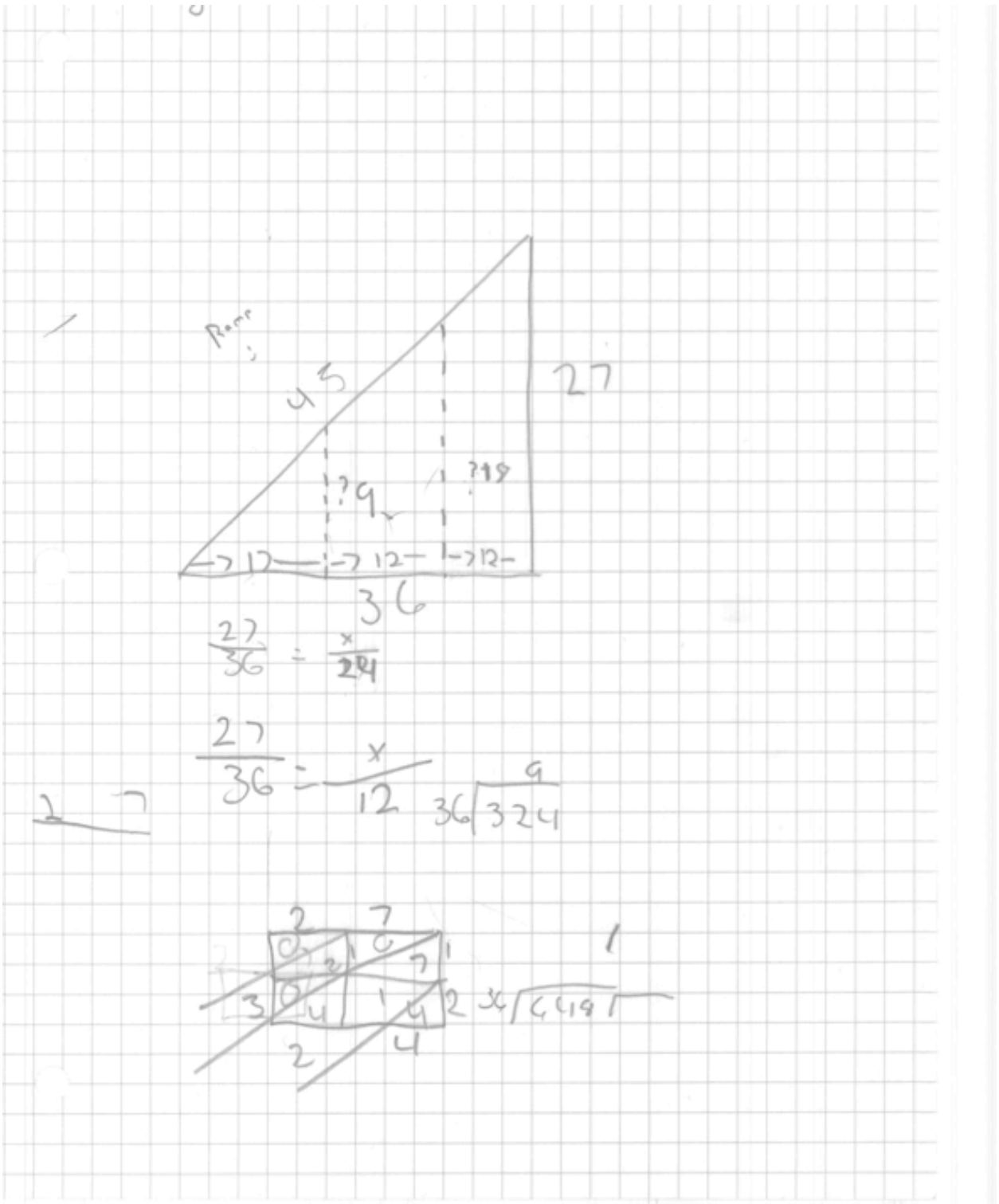
CMP Comparing and Scaling – Lessons:
- Investigation 4: Making Sense of Proportions

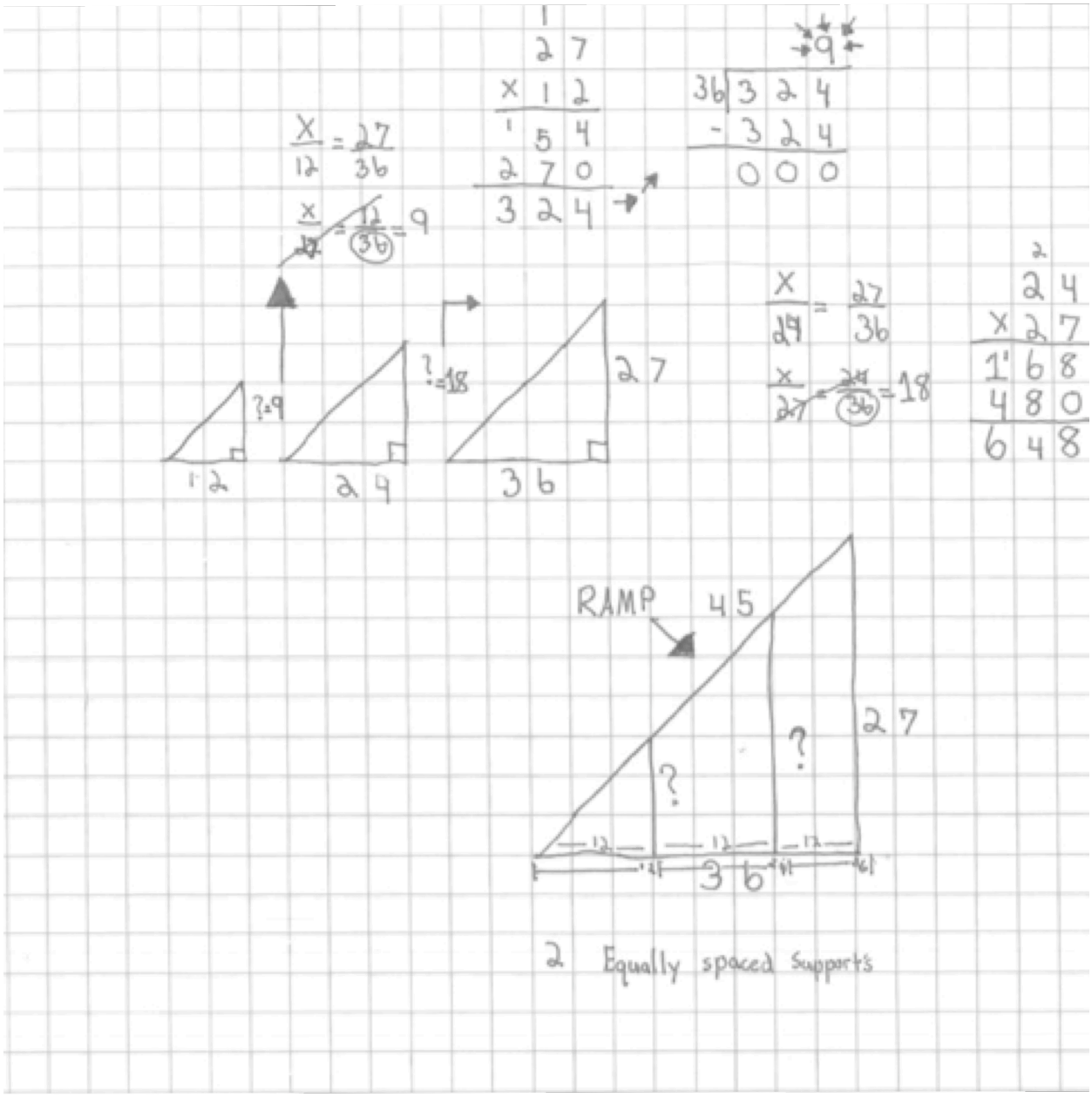
MCAS practice questions
My personal experiences and mathematical knowledge
Assorted overheads

② Ramp Supports



2 equally spaced supports


Rere :
45
27
?9
?19
12
12
12
36
27/36 = x/24
27/36 = x/12
9
36|324


27
x 12
54
270
324
9
36 | 324
-324
000
X/12 = 27/36
X/12 = 12/36 = 9
?=9
?=18
12
24
36
27
X/27 = 27/36
X/27 = 24/36 = 18
24
x 27
168
480
648
RAMP
45
27
?
?
12
12
12
36
2 Equally spaced supports

③ cost

a) How much plywood do you need to buy?

b) Company A:

$5 per foot + 6% tax

Company B:

$3 per binches + 7% tax

- What company do you use?
- How much does it cost?

JEOPARDY REVIEW GAME

Rules:

- The picking group has 1 minute to answer, then other groups have opportunity.
- Must work as a team – the same person should not answer every question.

Pythagorean Theorem

100 The ___ is always across from the ___ angle.

200 Find the missing side; legs are 6 and 7.

300 Most common right triangle?

400 Find the missing side; legs are 5 and 12.

500 Find the missing side; leg is 6, hypotenuse is 11.

Algebra

100 Given 2(x-7)+6=30, what do you do first?

200 6x+7=3x-2

300 3(x+2)=3x-2

400 2(x-7)+6=30

500 x/7+3=25

Number Sense

100 $\sqrt{3} \times \sqrt{3} = ?$

200 Prime Factorization of 135

300 When writing a number in scientific notation, the number times 10 to a power must be between ___ and ___.

400 Write in scientific notation 39201

500 LCM & GCF of 84 and 60

Proportions and Percents

100 Similar Triangles; 1: legs 3, 6; 2: legs x, 10

200 60% of 50

300 45% of 12

400 Similar Triangles; 1: legs 15,8; 2: legs x, 10

500 33% of 18

D=RxT

100 Drove 2 miles over 2 hours

200 Drove 20mph for 6 hours

300 Drove 4 hours to get to a restaurant that is 80 miles away

400 Fly 350mph over 2100 miles

500 Drove 30mph for 3 ½ hours

Equations of Lines

100 Slope means?

200 Equation of line through (4,2) and (7.8)

300 Slope of line through (-1,2) and (3.-6)

400 Find 3 points on the line y=2x-3

500 Find 3 points on the line y=1/3x+2

① Find the equation of the line that goes through these points:

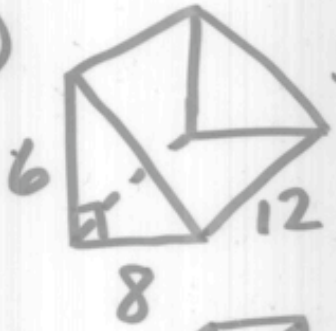
(4, 7) (2, 5)

② Find 3 other points on the line from #1.

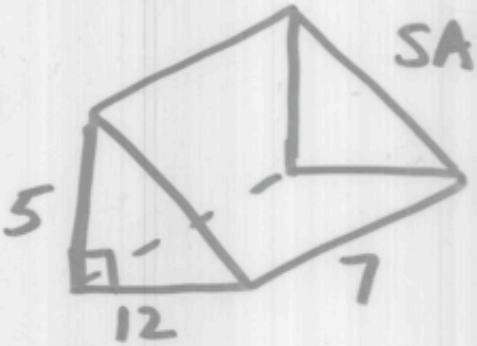
③ 0.8 of 21 ④ $\frac{8}{6}$ of 36

⑤ What does the absolute value tell you?

⑥ SA=?



⑦ SA=?



⑧

SA & Vol

⑨ $9x + 7 = 2(x + 7)$

(10)

x	1	2	3	4	...	10
y	5	9	13	?		?

Rule?

(11)

x	1	2	3	4	5	...	9
y	0	2	4	6	?		?

Rule?

(12) $1+2+3+\ldots.+29+30=?$

(13) $1+2+3+\ldots.+43+44=?$

(14)

x	1	2	3	4	5	...	10
y	5	25	125	625	?		?

Rule?

(15) $10+11+12+\ldots+29+30=?$

FOREST GROVE MIDDLE SCHOOL
LESSON PLAN FORMAT

Week of 1 / 14 / 08 **Teacher** True **Discipline** Math

CONTENT -- Outlines of Lessons

1. Review Friday's (1/11/08) test; students will have the opportunity to get extra points by doing problems similar to the problems answered incorrectly.
2. Review of volume and surface area, to include formulas for 2 and 3 dimensional shapes.
3. Measuring (rulers and systems of measurement)
4. Surface Area & Volume Lab:
    - Students will make a Surface Area and Volume formula sheet.
    - Given several objects, cubes, balls, prisms, etc., students will measure the dimensions and calculate the surface area and volume. (Students not only have to understand the concepts of volume and surface area but also which dimensions are needed and how to measure them.)
    - Given several prisms with the same volume, calculate the surface area. (Students should understand that figures might have the same volume but different surface areas.)

ASSESSMENT -- Including Rubrics

Homework Check
Notebook Check
MCAS Question Review
In-class Participation

STRATEGIES

MCAS Strategy –
- Word problem vocabulary lessons, word wall, sample MCAS problems, group work.

MCAS Literacy Strategy –
- Utilize reading and writing skills: write out thought processes.

Reading and Writing Activities –
- Analyze word problem vocabulary – how can the words help you solve the problem?

CONNECTIONS

MA Curriculum Frameworks –
- 8.G.4 – Demonstrate and understanding of the Pythagorean theorem. Apply the theorem to the solution of problems.
- 8.G.2 – Classify figures in terms of congruence and similarity, and apply these relationships to the solution of problems.

- 8.M.1 – Select, convert (within the same system of measurement), and use appropriate units of measurement or scale.
- 8.G.7 Identify three-dimensional figures (e.g., prisms, pyramids) by their physical appearance, distinguishing attributes, and spatial relationships such as parallel faces.
- 8.G.8 Recognize and draw two-dimensional representations of three-dimensional objects, e.g., nets, projections, and perspective drawings.

WPS Benchmarks –

- Uses problem solving strategies.
- Understands/uses concept of perimeter, area, and their relationships, surface area.
- Uses formulas: perimeter, circumference, area, volume, surface area, and Pythagorean Theorem.
- Explore geometry.

School Improvement Plan –

- SIP 1.1-4 – Math definitions and word problems.
- SIP 2.1 – Math Department meetings.
- SIP 3.1-4 – 8th grade curriculum.

RESOURCES

CMP Filling & Wrapping
CMP Looking for Pythagoras
MCAS practice questions
My personal experiences and mathematical knowledge
Assorted overheads

① Find the equation through these pts: (6, 2) (4, 0)

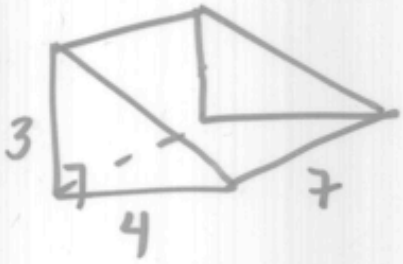
② find 3 other pts on the line

③ 0.9 of 13

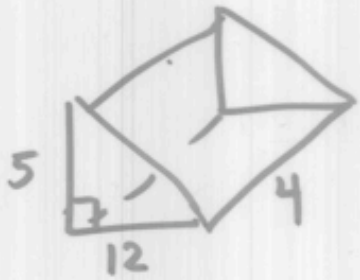
④ $\frac{9}{5}$ of 40

⑤ What does absolute value mean?

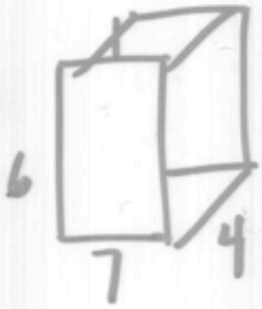
⑥



⑦



⑧



⑨ $3x + 5 = 7(x - 2)$

⑩

x	1	2	3	4	7
y	6	10	14	?	?

⑪

x	y
1	0
2	1
3	2
4	?
5	?

(12) $1+2+3+\ldots+20+21+22=?$

(13) $1+2+3+\cdots+39+40=?$

(14)

x	1	2	3	4	5	6
y	3	9	27	?	?	?

(15) $1+2+3+\ldots+44=?$

Measurement Class Work

DO NOT write on this paper. Use your own paper and the ruler provided.

1. Measure each line to the nearest 1/4 **and** 1/8 of an inch.
2. Measure each line in centimeters.

a _____

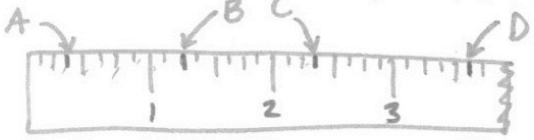
b _____

c _____

d _____

e _____

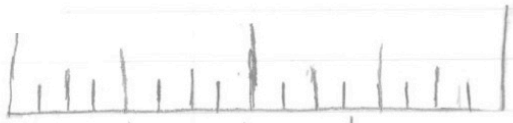
3. Determine the measurement in inches at points A, B, C, and D.



4. Determine the measurement in centimeters at points E, F, G, and H.

5. Any ideas about how to change between centimeters and inches?
(*Hint*: How many centimeters are in 1 inch?)

Filling & Wrapping
KLP 1/14/2008



1a. $5\frac{5}{8}$ inches
1b. $1\frac{3}{4}$ inches
1C. $4\frac{3}{8}$ inches
1d. 5 inches
1E. $3\frac{1}{4}$ inches
2A. $14\frac{3}{10}$ cm
2B. $4\frac{1}{2}$ cm
2C. $11\frac{1}{10}$ cm
2D. $12\frac{3}{10}$ cm
2E. $8\frac{3}{10}$ cm
3. A=$\frac{3}{8}$ B=$1\frac{1}{4}$ C=$2\frac{3}{8}$ d=$3\frac{5}{8}$
4. E=$\frac{1}{2}$ F=$\frac{9}{10}$ G=$1\frac{4}{5}$ H=$3\frac{3}{5}$
5.

✓

[redacted]

1/18/08

Math

1 a $5\frac{3}{4}$ in., $14\frac{1}{2}$ cm / b $1\frac{3}{4}$ in., $4\frac{1}{2}$ cm / c $4\frac{3}{8}$ in, $11\frac{1}{2}$ cm / d 5 in., $12\frac{3}{5}$ cm / e $3\frac{1}{2}$ in, $8\frac{1}{2}$ cm

3 (a) $\frac{3}{8}$ in (b) $1\frac{1}{4}$ in (c) $2\frac{3}{8}$ in (d) $3\frac{5}{8}$ in

4 (e) $\frac{1}{2}$ cm (f) $\frac{9}{10}$ cm (g) $1\frac{4}{5}$ cm (h) $3\frac{3}{5}$ cm

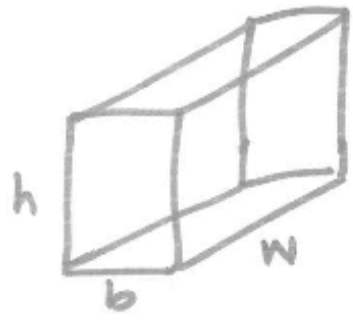
5 #cm x 2.5 = #in

Actually, you multiply INCHES by 2.5.
For example, 5 Inches = 5 * 2.5 cm

Surface Area and Volume

Name
Group

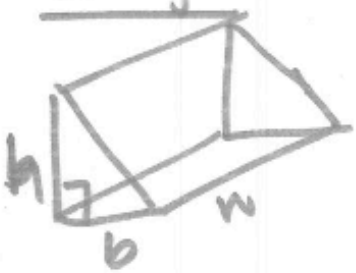
Prism



$V = b * h * w$

$SA = 2bh + 2bw + 2hw$

Wedge



$V = \frac{1}{2} * b * w * h$

SA ① break it up
② find dimensions
③ find areas
④ add up

Sphere

$V = \frac{4}{3}\pi r^3$

$SA = 4\pi r^2$

Cylinder

$V = \pi r^2 h$

$SA = 2\pi r h + 2\pi r^2$

CONE

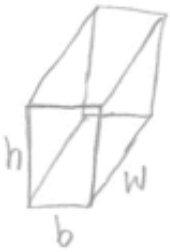
$V = \frac{1}{2}\pi r^2 h$

$SA = \pi r c + \pi r^2$

Blue Group

Surface Area and Volume

Prism



$V = b * h * W$

$SA = 2bw + 2hw + 2bh$

Key

W – width
b – base
h – hieght
π – pie (3.14)
r – radius
c – Hypotonuse ($a^2+b^2=c^2$)

Wedge

$V = \frac{1}{2} * b * h * w$

SA=
1) Break it up
2) find demenesions
3) Area's of each face
4) Add Area's together

Sphere

$V = \frac{4}{3}\pi r^3$

$SA = 4\pi r^2$

- Area of a $\triangle$ is $\frac{b*h}{2}$
- Area of a $\ominus$ is πr^2
- Circumference is πd or $2\pi r$

Cylinder

$V = \pi r^2 h$

$SA = 2\pi rh + 2\pi r^2$

$D = 2r$

$R = \frac{1}{2}D = \frac{D}{2}$

Cone

$V = \frac{1}{3} * \pi r^2 h$

$SA = \pi rc + \pi r^2$

FOREST GROVE MIDDLE SCHOOL
LESSON PLAN FORMAT

Week of 1 / 22 / 08 **Teacher** True **Discipline** Math

CONTENT -- Outlines of Lessons

Volume & Surface area of 3 dimensional objects: rectangular & triangular prisms, pyramids, cones, cylinders, and spheres

Surface Area & Volume Lab:

- Given several objects, cubes, balls, prisms, etc., students will measure the dimensions and calculate the surface area and volume. (Students not only have to understand the concepts of volume and surface area but also which dimensions are needed and how to measure them.)
- Given several prisms with the same volume, calculate the surface area. (Students should understand that figures might have the same volume but different surface areas.)

ASSESSMENT -- Including Rubrics

Homework Check
Notebook Check
MCAS Question Review
In-class Participation

STRATEGIES

MCAS Strategy –

- Word problem vocabulary lessons, word wall, sample MCAS problems, group work.

MCAS Literacy Strategy –

- Utilize reading and writing skills: write out thought processes.

Reading and Writing Activities –

- Analyze word problem vocabulary – how can the words help you solve the problem?

CONNECTIONS

MA Curriculum Frameworks –

- 8.G.4 – Demonstrate and understanding of the Pythagorean theorem. Apply the theorem to the solution of problems.
- 8.G.2 – Classify figures in terms of congruence and similarity, and apply these relationships to the solution of problems.
- 8.G.7 Identify three-dimensional figures (e.g., prisms, pyramids) by their physical appearance, distinguishing attributes, and spatial relationships such as parallel faces.

- 8.G.8 Recognize and draw two-dimensional representations of three-dimensional objects, e.g., nets, projections, and perspective drawings.

WPS Benchmarks –
- Uses problem solving strategies.
- Understands/uses concept of perimeter, area, and their relationships, surface area.
- Uses formulas: perimeter, circumference, area, volume, surface area, and Pythagorean Theorem.
- Explore geometry.

School Improvement Plan –
- SIP 1.1-4 – Math definitions and word problems.
- SIP 2.1 – Math Department meetings.
- SIP 3.1-4 – 8th grade curriculum.

RESOURCES

CMP Filling & Wrapping
CMP Looking for Pythagoras
MCAS practice questions
My personal experiences and mathematical knowledge
Assorted overheads

1. 

Name of Object: Soup can

Formulas: Surface Area = $2\pi r*h+2\pi r^2$

Volume = πr^2*h

d=2⅞ (rounded=3) h=4⅜ (rounded=4½)

SA= 54π

V= 192π

SA= $2\pi r*h+2\pi r^2$

$2*\pi*1.5*4.5+2*\pi*1.5^2$

$9*4.5$ 6

$40.5+2*3*2.25$

$40.5+13.50$

4.5 × 3 = 13.5

½ 4.50

2.25

2250

900

80

19.2.50

3 × 1.5 = 6 / 9.0

4 × 4.5 = 9 / 40.5

1 × 40.5 = 13.5

54.0

1 × 3 = 3 / 2.25

2 × 6 = 6 / 13.50

V= πr^2*h

$\pi*1.5^2*4.5$

$2.25*4.5$

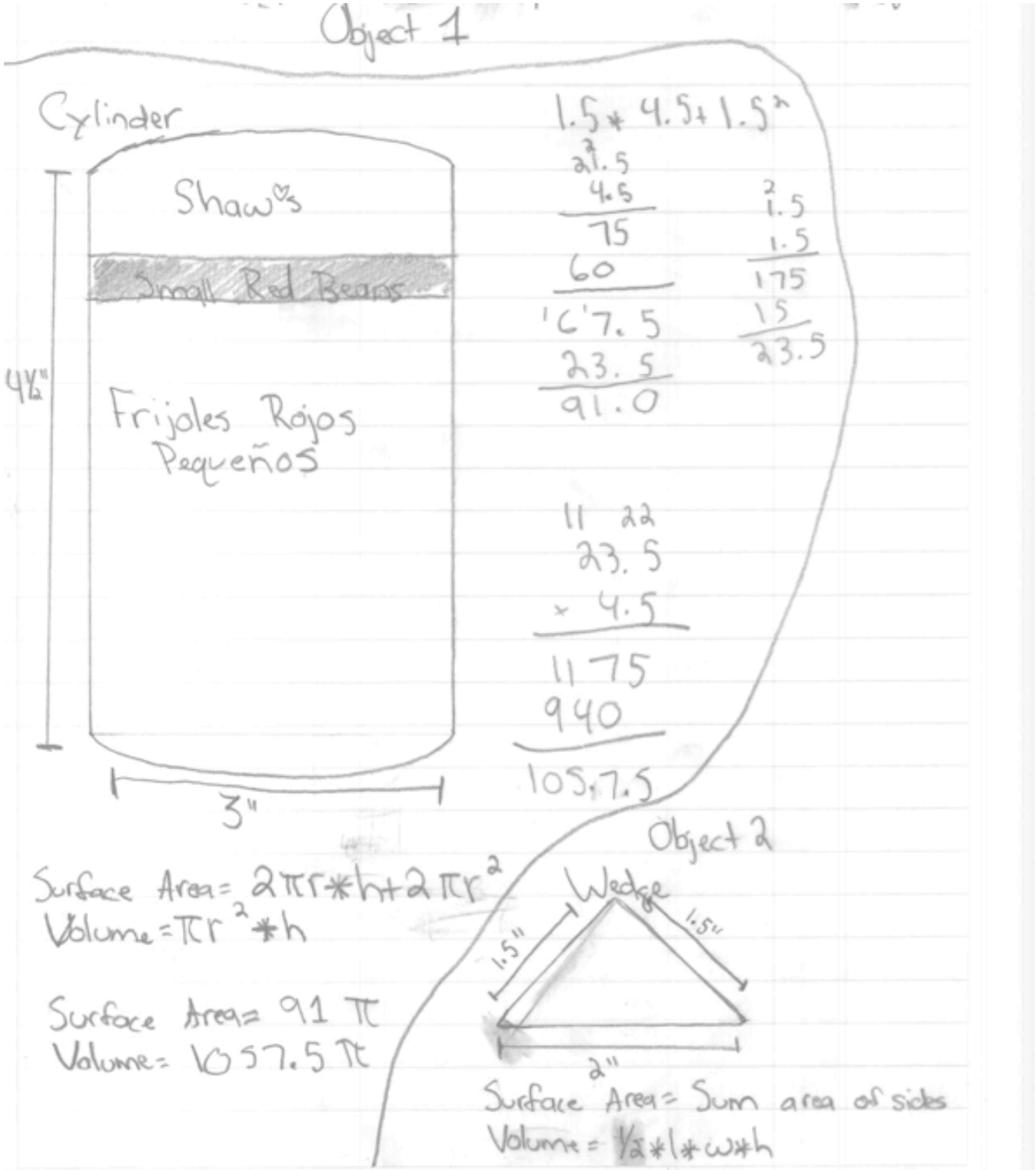
192π

2. 

Name of Object: Rectangular Prism

Formulas: Surface Area = $2LW+2wh+2Lh$

Volume = $l*w*h$


Object 1
Cylinder
Shaw♡s
Small Red Beans
Frijoles Rojos Pequeños
4½"
3"
1.5 * 4.5 + 1.5²
21.5
4.5
75
60
'C'7.5
23.5
91.0
2 1.5
1.5
175
15
23.5
11 22
23.5
× 4.5
1175
940
105.7.5
Surface Area = 2πr*h+2πr²
Volume = πr²*h
Surface Area = 91 π
Volume = 105 7.5 π
Object 2
Wedge
1.5"
1.5"
2"
Surface Area = Sum area of sides
Volume = ½*l*w*h

TEST

① GCF & LCM of 62 100

② GCF & LCM of 70 35

③ GCF & LCM of 110 121

④ Define LCM.

⑤ Define GCF.

⑥ 

d = 16

A = ?

C = ?

⑦ 

r = 5

A = ?

C = ?

⑧ C = 12π

d = ?

A = ?

⑨ A = 49π

r = ?

C = ?

⑩ 

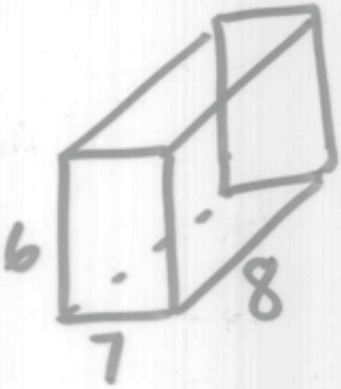
Area = ?

Perimeter = ?

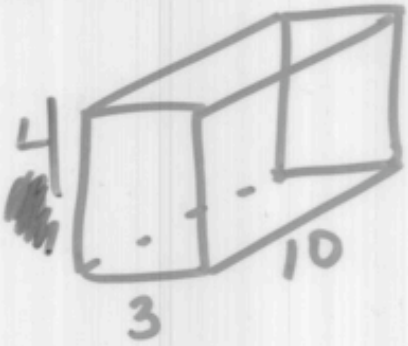
(11) Equation of the line:

(4, 8) [redacted] (3, 10)

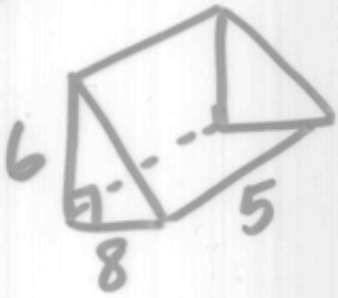
(12) SA & Vol



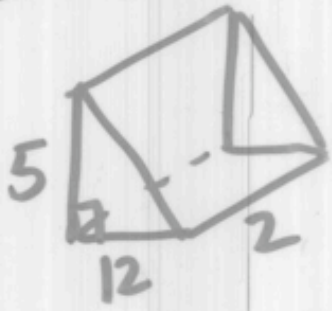
(13) SA & Vol



(14) SA + Vol



(15) SA + Vol



(16)

r=5
h=6
SA=?

(17)

r=2
h=8
SA=?

1. GCF: 2 LCM: 3100
2. GCF: 35 LCM: 70
3. GCF: 11 LCM: 1210
4. Lowest # that both numbers can go into
5. Greatest # that can go into both numbers
6. $A = 64\pi$ $C = 16\pi$
7. $A = 25\pi$ $C = 10\pi$
8. $A = 36\pi$ $D = 12$
9. $r = 7$ $C = 14\pi$
10. $A = 56$ $P = 34$
11. $y = 2x + 4$ -6
12. $SA = 292$ $V = 336$
13. $SA = 164$ $V = 120$
14. $SA = 168$ $V = 120$
15. $SA = 120$ $V = 60$
16. $SA = 110\pi$ $V = 150\pi$ $+2$
17. $SA = 40\pi$ $V = 32\pi$ $+2$
18. $y = x^3 - 1$ $+2$
19. $SA = 90\pi$ $V = 100\pi$ $+2$
20. DR: 4 3/4 miles DR: 5 miles

45

Please start paying 2,1
more attention in class.

1) 62 2*31 and 100 2*5*5

GCF: 8 -6

LCM: 4,960

2) 70 & 35 2*5*7 5*7 5*7

GCF: 2

Lcm: 700 -6

3) 110 & 121

GCF: (11)

Lcm: 1210 -3

4) Lcm = The Smallest that both will go into

5) GCF = The Biggest number that both will go into -6

6) (A) D: 16
A: 64π
C: 16π -2

(B) r: 5
A: ? 25π
C: ? 10π -2

7) C: 12π
d: 12
A: 36π -2

8) A: 49π
R: ? 56
C: ? 28π -6

FOREST GROVE MIDDLE SCHOOL
LESSON PLAN FORMAT

Week of 1 / 27 / 08 **Teacher** True **Discipline** Math

CONTENT -- Outlines of Lessons

Volume & Surface area of 3 dimensional objects: rectangular & triangular prisms, pyramids, cones, cylinders, and spheres

Surface Area and Volume Misconceptions:

- Given several prisms with the same volume, calculate the surface area.
  i. Figures may have the same volume but different surface areas.
  ii. Figures may have a larger numerical value for surface area than volume and vice versa.
  iii. Figures may also have the same numerical value for both volume and surface area.

Understanding Linear and Nonlinear Relationships

Test covering surface area and perimeter of 2D objects and volume and surface area of 3D objects.

ASSESSMENT -- Including Rubrics

Homework Check
Notebook Check
MCAS Question Review
In-class Participation

STRATEGIES

MCAS Strategy –

- Word problem vocabulary lessons, word wall, sample MCAS problems, group work.

MCAS Literacy Strategy –

- Utilize reading and writing skills: write out thought processes.

Reading and Writing Activities –

- Analyze word problem vocabulary – how can the words help you solve the problem?

CONNECTIONS

MA Curriculum Frameworks –

- 8.G.4 – Demonstrate and understanding of the Pythagorean theorem. Apply the theorem to the solution of problems.
- 8.G.2 – Classify figures in terms of congruence and similarity, and apply these relationships to the solution of problems.
- 8.G.7 Identify three-dimensional figures (e.g., prisms, pyramids) by their physical appearance,

distinguishing attributes, and spatial relationships such as parallel faces.
- 8.G.8 Recognize and draw two-dimensional representations of three-dimensional objects, e.g., nets, projections, and perspective drawings.

WPS Benchmarks –
- Uses problem solving strategies.
- Understands/uses concept of perimeter, area, and their relationships, surface area.
- Uses formulas: perimeter, circumference, area, volume, surface area, and Pythagorean Theorem.
- Explore geometry.

School Improvement Plan –
- SIP 1.1-4 – Math definitions and word problems.
- SIP 2.1 – Math Department meetings.
- SIP 3.1-4 – 8th grade curriculum.

RESOURCES

CMP Filling & Wrapping
CMP Looking for Pythagoras
MCAS practice questions
My personal experiences and mathematical knowledge
Assorted overheads

Find the rule & missing #s

①

x	1	2	3	4	5	...	8
y	2	6	10	14	?		?

②

x	y
1	8
2	13
3	18
4	?
⋮	
6	?

③

x	y
1	0
2	-1
3	-2
4	?
...	
9	?

④

x	1	2	3	4	5	...	9	10
y	14	17	20	23	?		?	?

QUIZ 1-18-08

①

x	1	2	3	4	5	...	10
y	4	7	10	13	??		??

Is this linear?
What is the rule?

↑ Missing #s?

②

x	y
1	2
3	4
5	6
7	8
9	??
11	??

③

x	y
1	2
2	4
3	8
4	16
5	??
6	??

④

x	1	2	3	4	5	6
y	7	9	11	13	??	??

102

1/18/08

①

x	1	2	3	4	5	....	10
y	4	7	10	13	16		31

Linear = Yes
Rule = $y = 3x + 1$

②

x	y
1	2
3	4
5	6
7	8
9	10
11	12

Linear = Yes
Rule = $y = 1x + 1$

③

x	y
1	2
2	4
3	8
4	16
5	32
6	64

Linear = No
Rule = $y = 2^x$

④

x	1	2	3	4	5	6
y	7	9	11	13	15	17

Linear = Yes
Rule = $y = 2x + 5$

FOREST GROVE MIDDLE SCHOOL
LESSON PLAN FORMAT

Week of 2 / 4 / 08 **Teacher** True **Discipline** Math

CONTENT -- Outlines of Lessons

Understanding Word Problems

- Analyze word problem vocabulary – how can words help you solve a word problem?
- Develop problem solving strategies.

Dispel any surface area and volume misconceptions:

- Given several prisms with the same volume, calculate the surface area.
  i. Figures may have the same volume but different surface areas.
  ii. Figures may have a larger numerical value for surface area than volume and vice versa.
  iii. Figures may also have the same numerical value for both volume and surface area.

ASSESSMENT -- Including Rubrics

Homework Check
Notebook Check
MCAS Question Review
In-class Participation

STRATEGIES

MCAS Strategy –

- Word problem vocabulary lessons, word wall, sample MCAS problems, group work.

MCAS Literacy Strategy –

- Utilize reading and writing skills: write out thought processes.

Reading and Writing Activities –

- Analyze word problem vocabulary – how can the words help you solve the problem?

CONNECTIONS

MA Curriculum Frameworks –

- 8.G.4 – Demonstrate and understanding of the Pythagorean theorem. Apply the theorem to the solution of problems.
- 8.G.2 – Classify figures in terms of congruence and similarity, and apply these relationships to the solution of problems.
- 8.G.7 Identify three-dimensional figures (e.g., prisms, pyramids) by their physical appearance, distinguishing attributes, and spatial relationships such as parallel faces.
- 8.G.8 Recognize and draw two-dimensional representations of three-dimensional objects, e.g., nets, projections, and perspective drawings.

WPS Benchmarks –

- Uses problem solving strategies.
- Understands/uses concept of perimeter, area, and their relationships, surface area.
- Uses formulas: perimeter, circumference, area, volume, surface area, and Pythagorean Theorem.
- Explore geometry.

School Improvement Plan –

- SIP 1.1-4 – Math definitions and word problems.
- SIP 2.1 – Math Department meetings.
- SIP 3.1-4 – 8th grade curriculum.

RESOURCES

CMP Filling & Wrapping
CMP Looking for Pythagoras
MCAS practice questions
My personal experiences and mathematical knowledge
Assorted overheads

Word Problem Vocabulary – words and phrases that give you hints!

Addition
- Increased by
- More than
- And
- Combined together
- Combined
- Total of
- Sum
- Added to

Subtraction
- Reduced by
- Fewer than
- Decreased by
- Difference of
- Less than
- Difference between

Multiplication
- Of
- Multiplied by
- Times
- For
- Product of

Division
- Ratio of
- Quotient of
- Percent (divide by 100)
- Per
- Out of

Similar
- As
- Like
- Similar to

Different
- Unlike
- As opposed to

Equals
- Is
- Are
- Was
- Were
- Will be
- Gives
- Yields
- Sold for

Strategy
1. Read the entire problem
2. Write everything down that you know – also name the variables
3. Write down what you're looking for.
4. Figure out how to find what you're looking for:
    a. Draw a picture
    b. Use key words
5. Solve the problem

Practice Problems

1. The sum of 8 and y
2. 4 less than x
3. 6 miles per x gallons
4. The difference of 5 and y
5. The ratio of 9 more than x to x
6. Mike ran 2 miles farther than Jan.
7. Liz is 6 years younger than Bob.
8. The width is 5 times greater than the length
9. The difference between Liz's age and Bob's age is 7.
10. Joe has 10 fewer dollars than Amy.
11. The length is twice the width.
12. The length divided by the width is 9.

13. The length of a football field is 30 yards more than its width. How long is the field?

14. 1 gallon of milk is poured into 3 different sized cups. How much milk is left after 1 cup is poured?

15. A rectangle is 4 times as long as the width plus 6. The area of the rectangle is 60. What are the dimensions?

16. A triangle has a perimeter of 50. If 2 of its sides are equal and the third side is 5 more than the equal sides, what is the length of the third side?

17. In a quadrilateral two angles are equal. The third angle is equal to the sum of the two equal angles. The fourth angle is 60° less than twice the sum of the other three angles. Find the measures of the angles in the quadrilateral.

18. Mr. True was going to buy a car for $5800. The car dealer gave Mr. True two options for buying the car. He could pay for the full amount in cash, or he could pay $1000 down and then $230 a month for 24 month son the installment plan. How much more would Mr. True pay for the car on the installment plan?

19. An average adult heart beats 72 times per minute. An average ten year old's heart beats 84 times per minute. After one day, how many more beats has a ten year old's heart made than an adult's?

20. A plane takes 6 hours to fly from San Francisco to New York, and 5 hours to return back. The wind velocity is 50 miles per hour, from New York to San Francisco. What is the speed of the airplane?

FOREST GROVE MIDDLE SCHOOL
LESSON PLAN FORMAT

Week of 2 / 11 / 08 **Teacher** True **Discipline** Math

CONTENT -- Outlines of Lessons

Continue word problem and surface area lessons, described below.

- Understanding Word Problems
  - Analyze word problem vocabulary – how can words help you solve a word problem?
  - Develop problem solving strategies.
  - Each student will write and solve 2 word problems.
- Dispel any surface area and volume misconceptions:
  - Given several prisms with the same volume, calculate the surface area.
    i. Figures may have the same volume but different surface areas.
    ii. Figures may have a larger numerical value for surface area than volume and vice versa.

Review of word problem vocabulary, 2D area, and 3D surface area/volume concepts.

Unit Test.

ASSESSMENT -- Including Rubrics

Homework Check
Notebook Check
MCAS Question Review
In-class Participation

STRATEGIES

MCAS Strategy –

- Word problem vocabulary lessons, word wall, sample MCAS problems, group work.

MCAS Literacy Strategy –

- Utilize reading and writing skills: write out thought processes.

Reading and Writing Activities –

- Analyze word problem vocabulary – how can the words help you solve the problem?

CONNECTIONS

MA Curriculum Frameworks –

- 8.G.4 – Demonstrate and understanding of the Pythagorean theorem. Apply the theorem to the solution of problems.
- 8.G.2 – Classify figures in terms of congruence and similarity, and apply these relationships to the solution of problems.

- 8.G.7 Identify three-dimensional figures (e.g., prisms, pyramids) by their physical appearance, distinguishing attributes, and spatial relationships such as parallel faces.
- 8.G.8 Recognize and draw two-dimensional representations of three-dimensional objects, e.g., nets, projections, and perspective drawings.

WPS Benchmarks –

- Uses problem solving strategies.
- Understands/uses concept of perimeter, area, and their relationships, surface area.
- Uses formulas: perimeter, circumference, area, volume, surface area, and Pythagorean Theorem.
- Explore geometry.

School Improvement Plan –

- SIP 1.1-4 – Math definitions and word problems.
- SIP 2.1 – Math Department meetings.
- SIP 3.1-4 – 8th grade curriculum.

RESOURCES

CMP Filling & Wrapping
CMP Looking for Pythagoras
MCAS practice questions
My personal experiences and mathematical knowledge
Assorted overheads

JEOPARDY REVIEW GAME

Rules:

- The picking group has 1 minute to answer, then other groups have opportunity.
- Must work as a team – the same person should not answer every question.
- Using notes is ok! – especially formula & word sheets!

Tell Me About It…

100 L = W-8

200 W = 3*L

300 L/W = 8

400 L*W = 10

500 L = 2*(6+W)

200 L = W+9

600 W = L-7

400 L = 2*W+1

800 W/L = 5

1000 L = 4*(W-2)

What does it tell you?

100 The length is 7 more than the width.

200 Mary is four times as old as John.

300 Tickets cost six dollars per show.

400 Amy is 2 years younger than Bob.

500 The length is 8 more than twice the width.

200 Al has $8 fewer than George.

600 The total of Amy and Mary's ages is 17.

400 Bill had $7 more than Lane but spent 4 on CDs.

800 The product of John's age and 3 times Bob's age is 20.

1000 The quotient of the length and twice the width is 8.

Inequalities

100 Draw a number line for: $x > 4$

200 From number line write symbols: $x \geq -2$

300 Draw a number line for: $8 \geq x$

400 From a number line write symbols: $6 \geq x \geq -2$

500 Draw a number line for: $7 > x \geq 2$

200 From a number line write symbols: $x > 3$

600 Draw a number line for: $-4 \geq x$

400 From a number line write symbols: $6 < x < 10$

800 Draw a number line for: $8 \geq x > 3$

1000 From a number line write symbols: $-2 \geq x > -4$

Filling & Wrapping

100 SA & Vol Rectangular Prism – 3-4-5

200 SA & Vol Rectangular Prism – 2-5-10

300 SA & Vol Wedge – 6-8-3

400 SA & Vol Wedge – 5-12-2

500 SA Cylinder – r = 3, h = 4

200 SA & Vol Rectangular Prism – 7-3-7

600 SA & Vol Rectangular Prism – 3-8-1

400 SA & Vol Wedge – 3-4-9

800 SA & Vol Wedge – 8-15-1

1000 SA Cylinder – r = 3, h = 9

I Should Remember How to Do This…

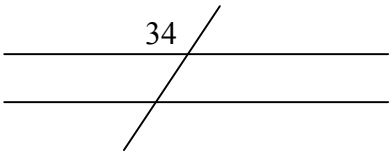
100 (4,5) (5,12) – y=7x-23

200 20% of 99

300 8/3 of 72

400 LCM & GCF of 63 and 36

500 Parallel Lines w/ Transversal

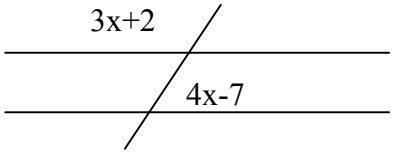


200 if Area of a Circle = 49π, Circumference = ?

600 (5,7) (4,12) – y=-5x+32

400 3/7 of 63

800 Parallel Lines w/ Transversal



1000 LCM & GCF of 8, 12, 20

QV12 2-16-08 ①

① Find the equation of the line
(5,7) (4,12)

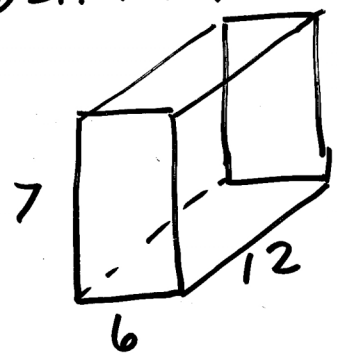
② 20% of 99

③ LCM & GCF of 63 & 36

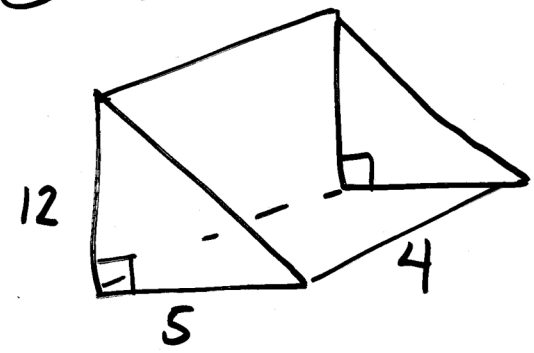
④ $\frac{9}{5}$ of 75

⑤ LCM & GCF of 72 & 108

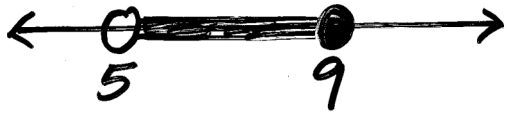
⑥ SA & Vol



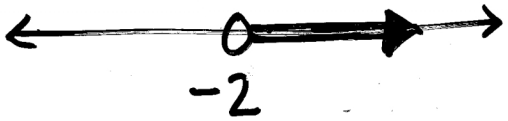
⑦ SA & Vol



⑧ Write an inequality for



⑨ Write an inequality for



(10) Draw a number line for
$3 \geq x > -1$

(11) Write a Sentence describing
$L = w - 8$

(12) Write a sentence describing
$L = 3 * W$

(13) Write a sentence describing
$W = 2 * L + 3$

(14) Write an equation
Amy is 2 years younger than Bob.

(15) Write an equation
John is six times as old as Bob.

(16) Write an equation.
The width is 5 more than 3 times the ~~width~~ length.

(17) Solve for m
$m + m - 2 + m + 3 + 2m = 51$

1. $y = -5x + 32$

2. 19.8

3. GCF: 9 LCM: 252

4. 36

5. GCF: 36 LCM: 216

6. SA: 396 V: 504

7. SA: 180 V: 120

8. $5 < x \leq 9$

9. $-2 < x$

10. 

11. L is equal to W decreased by 8

12. L is 3 multiplied by W

13. W is similar to 2 times L increased by 3

14. $A = B - 2$

15. $J = B * 6$

16. $W = 3 * L + 5$

17. $M = 10$

18. M= 16 T=26 B=19 J=32 -2

19. $y = (x+2) + 2$

20. $x = 3$ +1

26. 1200π

$\frac{7}{5} - \frac{12}{4} = \frac{-5}{1} = -5$ $y = -5x + 32$

$63 - 3 \cdot 3 \cdot 7$ $36 - 2 \cdot 2 \cdot 3 \cdot 3$

$9 \times 4 = 36 \times 7 =$

$\frac{9}{1} \text{ or } \frac{7}{1} = 36$

$72 - 3 \cdot 3 \cdot 2 \cdot 2 \cdot 2$ $108 - 2 \cdot 2 \cdot 3 \cdot 3 \cdot 3$

$36 \times 3 \times 2 = 216$

240

Mary

Tom - M+5

Bob - T-2 or M+S-2

J - M·2

$M + M + S + M + S - 2 + M \cdot 2 = 78$

$M^4 + S + S - 2 + 2 = 78$

$M4 + S + S - 4 =$

$M4 \pm 6 = 78$

$\frac{M4}{4} = \frac{72}{4}$ $M = 18$

1. $y = -5b + 32$
2. 19.8
3. LCM = 252 gcf = 9
4. 135
5. GCF = 32 LCM = 192 **-5**
6. SA = 396 V = 504
7. SA = 180 V = 120
8. $5 < x \leq 9$
9. $-2 < x$
10. 
11. Legosh is the ~~oldest~~ youngest **-3**
12. Legosh is 3 times as old as
13. Width is 3 more than Length
14. $A = B - 2$
15. $J = BX6$
16. $W = LX3 + 5$
17. $2m^4 = 50$ **-5**
18. m = 14 T = 19 B = 17 J = 28
19. $Y = 20 - 4$
20. ?
21. Parents by 4 months
22. ?
23. 820 **+2**
24. ?
25. ?
26. 70 ft

Chapter 5: Conclusions – When am *I* ever going to use this?

I started my practicum with a job lined up for after graduation and a recently completed MQP, and I found myself asking that pesky question, "*When am I ever going to use this?*"

My first few hours of teaching were a nightmare. I couldn't remember the answer to my question or even what I question I just asked; I was too distracted by managing the classroom. But everything eventually fell into place. I soon learned the routine and could easily teach my lesson while asking students to pay attention, moving seats, stopping note passing, and answering student questions. I worked as a team with my mentor to help both my students and my teaching abilities excel. I learned that I could have my lesson plans perfectly written, but I probably would not end up teaching anything I planned. I had to adapt my lesson plans to my students instead of forcing them to learn at my pace. Adapting lesson plans demanded that I recognize my students' strengths, weaknesses, and limitations. I learned which classes could handle group work and review games and which classes needed more attention paid to the fundamental mathematical concepts.

What did I get out of student teaching? There are the obvious skills: teaching practices and methods, public speaking, working with difficult people, being creative, management techniques, patience, etc. But the most important thing I learned was that education is *definitely not* all about learning the course material; it's about helping students mature into well-rounded people with an appreciation for their opportunities and who become contributing members of their communities.

Every teacher, or at least all that I have come into contact with, has a vision for each student, the classroom, and the overall learning experience. My vision was to help students excel in academics *and life*. Teaching middle school is as much, if not more, about the social development of the students than learning the academic material.

When am I ever going to use this? Outside of the more obvious answers, to help me excel in future teaching and management situations, I will use this experience everyday. Everyday I am faced with situations in which I not only have to complete a specific task or learn certain materials but also have the opportunity to learn something greater from the experience. Every situation I am faced with gives me the opportunity to strive towards excellence both in academics and in life.

Appendix

Forest Grove Middle School School Improvement Plan[8]

Introduction

The teaching staff of Forest Grove Middle School began the development of the 2006-2008 School Improvement Plan in the early fall of 2006. Teachers and instructional aides worked by cluster, by discipline and by faculty, examining MCAS and MAP data, term and interim reports and classroom performance to determine the areas of academic weakness and to define instructional strategies to address these identified needs. In addition, Forest Grove's department chairs provided leadership in the area of curriculum design, which complements the MA Curriculum Frameworks and WPS Benchmarks.

Using the Massachusetts Department of Education's 2005 and 2006 CPIs which the DOE included in their Adequate Yearly Progress Report (AYP), we calculated the baseline scores for Cycle V. In order to calculate the target gain, we used the formula 100 – baseline / # of cycles left**.** This formula enabled us to determine the Cycle V Performance Targets.

Testing results from the 2006 MCAS Report indicated that in ELA, 49% of the present 7th grade students scored in *the Proficient/Advanced* category. However, 37% remains in the *Needs Improvement* category and 14% in the W*arning* category. Although the *Warning High* and *Low* scores did show a decrease, 28% of the grade 8 students scored in the *Needs Improvement High* and *Low* categories.

After reviewing these targets, we determined that our major challenges are to improve the performance of our Special Education, Limited English Proficiency, Hispanic and low income students in the area of English/Language Arts and our Special Education, Limited English Proficiency, African American, and Hispanic students in the area of mathematics.

In addition, the WPS Middle School Task Force has helped us to identify the lack of grade level literacy and numeracy skills as a fundamental need for many students entering grade 7 throughout the system. Specifically, MAP and MCAS data have identified inferring and non-fiction as areas of weakness in ELA and open response, number sense, geometry and measurement as weaknesses in mathematics.

The teaching staff of Forest Grove will strive to meet the challenges articulated in our 2006-2008 School Improvement Plan through the following measures:

---

[8] WPS Forest Grove Middle School School Improvement Plan <http://wpsweb.com/docs/sip/ms/forest_grove.pdf>

- Continuous Reference to Testing Data
- Differentiated Instructional Techniques
- Grade 7 & 8 Cluster Looping
- Additional Instruction in Numeracy
- ELA and Math Vacation Camps
- Monthly Literacy Strategies
- Development of Higher Order Thinking Skills
- Applicable Professional Development
- Extended Use of Technology
- Increased Articulation and Involvement of Parents and Families
- After School and Summer Programs (21st Century)
- Writers' Express Teacher Training
- AVID Program
- Junior Achievement Program
- Grant Initiatives (MA DOE Reading Implementation Grant, BC/BS Healthy Choices Grant, Cultural Commission Humanities Grant)

Mathematics Analysis

Data analysis in mathematics began with instructional staff analyzing MCAS math scores, using the information that they provided to guide our efforts to improve Math instruction and accelerate students who are performing below grade level. Last year's grade seven scores, this year's grade eight students, placed 28% (130 students) in the *Proficient* or *Advanced* category; 33% (155 students) in the *Needs Improvemen*t category; 39% (181 students) scored in the *Warning* category. Last year's grade six scores (our current seventh grade) placed 33% (125 students) in the *Proficient* or *Advanced* category and 32% (119 students) placed in the *Needs Improvement* category and 35% (130 students) in the *Warning* category. Our goals are to decrease the number of students in the *Warning* category from 39% to 36% in the eighth grade and from 35% to 30% in the seventh grade. Open response questions as well as number sense, geometry, and measurement are performance areas targeted for improvement.

Measures of Academic Progress (MAP) data from the Fall of 2006 and Winter of 2007 were analyzed for students in grades seven and eight. Goals to increase the mean math RIT scores were written for both grade levels. Each student was given performance areas to target for improvement. Instructional staff will apply these findings to instructional planning and differentiated instruction for all students.

CMP pre-tests are given continually to compact students out of the unit material where appropriate and enrichment opportunities are provided accordingly. We plan to continue research based sustained staff development in mathematics instruction through "Massachusetts Insights Math Coaching Workshops".

FGMS School Improvement Plan Policies

GRADE EIGHT

POLICY 1 PROBLEM SOLVING

Investigates problem solving situations
Creates problems from natural, meaningful, real-world activities
Uses question and speculation techniques
Uses data source: from a chart or table, from a graph, from other data sources
Finds patterns in problem solving situations
Develops the ability to give reasonable solutions
Understands questions; writes problems in own words
Chooses/uses strategies
Records problems using abstract symbols
Identifies related problems
Solves simple problems utilizing prior knowledge
Works backwards
Estimates an answer; decides when to estimate
Understands multi-step problems, problems with more than one answer, problems with two or more questions, and problems without solutions
Solves the problem: using number sentence/equation, formulas, without solutions, interprets remainders
Applies problem solving lessons
Data collection and analysis lessons

POLICY 3 REASONING

Compares and contrasts, classifies and sorts
Uses patterns, spatial visualization
Develops and explains logical reasoning
Understands reasoning from graphs
Predicts and verifies
Evaluates evidence and conclusions
Makes generalizations
Uses order and sequence, properties
Solves non-routine problems
Generates problems
Uses alternate ways to solve problems

POLICY 5 NUMBER SENSE & NUMERATION

Experiences numbers: 0-99,999
Conserves numbers
Compares and orders whole numbers, fractions, and decimals
Estimates quantities
Place value: whole numbers, decimals
Coordinates counting and group skills
Understands relative magnitude of numbers
Introduces the concept of integers
Uses decimal place value, expanded notation
Recognizes pattern in a sequence of numbers
Understands Roman Numerals
Understands/uses exponents, prime and composite numbers, square roots, square numbers
Uses scientific notation

POLICY 6 ESTIMATION AND MEASUREMENT

GRADE EIGHT

Uses visual and front end estimation skills
Uses reference point or benchmark
Rounds whole numbers, decimals
Uses compatible numbers, clustering, sampling
Decides when to estimate, adjusts an estimate
Uses problem solving strategies
Determines reasonable answers
Uses precision in measurement
Measures length: customary units, metric units
Understands/uses concept of perimeter, area, and their relationships, surface area
Understands/uses the concept of: weight (mass), volume, capacity, circumference, temperature
Converts units
Indirect measurement: uses scale drawings
Understands/uses elapsed time

POLICY 7 REAL NUMBER SYSTEM

Compares and orders: whole numbers, decimals, fractions, and integers
Understands/uses whole number place value, decimal place value, Roman Numerals, exponents,
Understands/uses scientific notation, square numbers, and square units
Understands/uses whole number properties: addition, subtraction, multiplication, division
Understands the concept of *addition*
Uses problem solving strategies for all operations
Understands commutative property of +
Adds 2-3 digit numbers, 3-4 digit numbers, and larger numbers with and without regrouping
Uses vertical and horizontal formats
Understands the concept of *subtraction*
Estimates differences
Subtracts 2-3 digit numbers, 3-4 digit numbers, and larger numbers with and without regrouping
Subtracts mentally, using subtraction families
Understands the concept of *multiplication*
Multiplies 2-3 digit numbers, 3-4 digit numbers, and larger numbers
Estimates products
Understands multiplication: using patterns, arrays and symbols
Learns basic facts and fact families
Develops basic fact strategies, mental computation techniques
Understands the concept of *division*
Uses repeated subtraction, relates division to multiplication
Develops basic fact strategies and mental computation skills
Learns basic facts and fact families
Uses inverse operation to find missing factors
Estimates quotients
Uses 2-digit and 3-digit divisors; 2-digit and 3-digit quotients
Selects appropriate computation techniques
Understands/uses prime and composite numbers
Understands *fractions*
Reads and writes fractions; compares and orders
Recognizes parts of a whole, parts of a group
Compares like denominators, unlike denominators, identifies fractions equivalent
Recognizes equivalent fractions, mixed numbers,
Understands/uses lowest terms fractions

GRADE EIGHT

Converts improper fractions and mixed numbers
Adds and subtracts fractions: like denominators, unlike denominators
Converts decimals, fractions
Adds, subtracts, multiplies and divides mixed numbers
Explores the meaning of *decimals*
Reads and writes decimals
Relates decimals to money/fractions
Understands/uses place value with decimals
Compares, orders, rounds, and estimates decimals
Converts decimals, fractions, and percent
Adds, subtracts, multiplies using decimals
Divides: with whole number divisors, with decimal number divisors
Uses repeated quotients
Understands the concept of *ratio*
Understands/uses equal ratio, tangent ratio
Estimates ratio
Understands/uses cross products
Understands the concept of *proportions*
Solves proportions
Understands the concept of *percent*
Estimates percents
Understands/uses circle graphs
Understands/uses interest, discounts and sale prices, percent of increase or decrease, commission
Finds a percent of a number, what percent one number is of another, and when a percent is known
Understands/uses calculator, using percent key
Understands/uses *integers*
Understands/uses negative numbers, integers on a number line
Compares and orders, models
Understands/uses properties: Grouping symbols: / , ( ) " ", [ ], Distributive property, division by zero
Understands/uses integer operations, absolute value
Solves linear equations
Understands/uses *rational numbers*; computes with rational numbers; uses scientific notation
Understands/uses *irrational numbers*
Understands/uses *exponents*

POLICY 8 ALGEBRA

Applies algebraic methods to solve a variety of real-world and mathematical problems
Understands/uses missing numbers
Understands/uses/writes number sentences
Uses term: variables, expression
Distinguishes between expression and equations
Simplifies, compares and evaluates expressions
Understands/uses inequality symbol, missing factors, and integers
Uses equivalent forms of numerical expressions
Develops confidence in solving linear equations: informally by inspection, formally by steps
Solves equations: one-step, two-step, distributive property
Understands/uses slope: tables, graphs, verbal rules, and equations, graphs ordered pairs

GRADE EIGHT

Understands/uses input/output tables
Understands/uses functions: informally
Investigates informally: inequalities and non-linear equations
Understands/uses powers and roots

POLICY 9 GEOMETRY

Explores geometry
Understands/uses concrete models, builds/draws geometric solids
Identifies/relates plane and skeletal figures
Understands/uses patterns, symmetry, similar figures, and congruent figures
Understands/uses points, lines, and segments
Classifies angles, polygons, and polyhedrons
Understands/uses/measures/estimates angles
Understands/uses coordinate geometry
Uses formulas: perimeter, circumference, area, volume, surface area, and Pythagorean Theorem
Understands/uses motion geometry: tessellations, translations (slides), rotations (turns), and reflections (flips)
Understands/uses applications; topology
Understands/uses tangent sine and cosine ratios

POLICY 10 STATISTICS & PROBABILITY

Collects and organizes data
Makes: bar graphs, pictographs, line graphs, pie (circle) graphs
Realizes which display of data is more appropriate
Summarizes results; predicts and verifies; conducts a survey; tallies and records results
Uses and models Venn Diagrams
Explores probability experiments
Understands/uses probability, equally likely outcomes
Uses mathematical and experimental probabilities
Understands fair and unfair games
Understands/uses mean, median, mode, and range
Understands/uses misleading statistics/biased representation
Makes a questionnaire, conducts a simulation, makes and interprets a frequency chart
Understands/uses sampling, compound events and tree diagrams, permutations and combinations
Understands/uses box and whisker graphs, frequency tables, histograms, stem and leaf plots
Understands/uses graphing inequalities
Interprets graphs: multiple line/pie (circle)/double bar/divided bar/scattergrams
Understands/uses graphing ordered pairs

POLICY 11 PATTERNS, FUNCTIONS & RELATIONSHIPS

Recognizes, describes, and continues patterns
Uses geometric patterns: color, size, shape, tessellation
Uses spatial/position/geometric patterns
Uses problem solving strategies: find a pattern, make a table
Understands/uses inverse operations and equations
Uses ordered pairs/number pair; graphs ordered pairs
Understands/uses relation rules, , graphs linear functions and relations
Understands/uses correlations, scatter plots, circle graphs, uses input/output tables
Interprets slope
Understands function rules (and relationships)

Massachusetts Curriculum Frameworks, Grades 7 and 8

Number Sense and Operations

Understand numbers, ways of representing numbers, relationships among numbers, and number systems
Understand meanings of operations and how they relate to one another
Compute fluently and make reasonable estimates

Students engage in problem solving, communicating, reasoning, connecting, and representing as they:

8.N.1 Compare, order, estimate, and translate among integers, fractions and mixed numbers (i.e., rational numbers), decimals, and percents.

8.N.2 Define, compare, order, and apply frequently used irrational numbers, such as $\sqrt{2}$ and π.

8.N.3 Use ratios and proportions in the solution of problems, in particular, problems involving unit rates, scale factors, and rate of change.

8.N.4 Represent numbers in scientific notation, and use them in calculations and problem situations.

8.N.5 Apply number theory concepts, including prime factorization and relatively prime numbers, to the solution of problems.

8.N.6 Demonstrate an understanding of absolute value, e.g., $|-3| = |3| = 3$.

8.N.7 Apply the rules of powers and roots to the solution of problems. Extend the Order of Operations to include positive integer exponents and square roots.

8.N.8 Demonstrate an understanding of the properties of arithmetic operations on rational numbers. Use the associative, commutative, and distributive properties; properties of the identity and inverse elements (e.g., $-7 + 7 = 0$; $3/4 \times 4/3 = 1$); and the notion of closure of a subset of the rational numbers under an operation (e.g., the set of odd integers is closed under multiplication but not under addition).

8.N.9 Use the inverse relationships of addition and subtraction, multiplication and division, and squaring and finding square roots to simplify computations and solve problems, e.g. multiplying by 1/2 or 0.5 is the same as dividing by 2.

8.N.10 Estimate and compute with fractions (including simplification of fractions), integers, decimals, and percents (including those greater than 100 and less than 1).

8.N.11 Determine when an estimate rather than an exact answer is appropriate and apply in problem situations.

8.N.12 Select and use appropriate operations—addition, subtraction, multiplication, division, and positive integer exponents—to solve problems with rational numbers (including negatives).

Patterns, Relations, and Algebra

Understand patterns, relations, and functions
Represent and analyze mathematical situations and structures using algebraic symbols
Use mathematical models to represent and understand quantitative relationships
Analyze change in various contexts

Students engage in problem solving, communicating, reasoning, connecting, and representing as they:

8.P.1 Extend, represent, analyze, and generalize a variety of patterns with tables, graphs, words, and, when possible, symbolic expressions. Include arithmetic and geometric progressions, e.g., compounding.

8.P.2 Evaluate simple algebraic expressions for given variable values, e.g., $3a^2 - b$ for $a = 3$ and $b = 7$.

8.P.3 Demonstrate an understanding of the identity $(-x)(-y) = xy$. Use this identity to simplify algebraic expressions, e.g., $(-2)(-x+2) = 2x - 4$.

8.P.4 Create and use symbolic expressions and relate them to verbal, tabular, and graphical representations.

8.P.5 Identify the slope of a line as a measure of its steepness and as a constant rate of change from its table of values, equation, or graph. Apply the concept of slope to the solution of problems.

8.P.6 Identify the roles of variables within an equation, e.g., $y = mx + b$, expressing y as a function of x with parameters m and b.

8.P.7 Set up and solve linear equations and inequalities with one or two variables, using algebraic methods, models, and/or graphs.

8.P.8 Explain and analyze—both quantitatively and qualitatively, using pictures, graphs, charts, or equations—how a change in one variable results in a change in another variable in functional relationships, e.g., $C = \pi d$, $A = \pi r^2$ (A as a function of r), $A_{rectangle} = lw$ ($A_{rectangle}$ as a function of l and w).

8.P.9 Use linear equations to model and analyze problems involving proportional relationships. Use technology as appropriate.

8.P.10 Use tables and graphs to represent and compare linear growth patterns. In particular, compare rates of change and x- and y-intercepts of different linear patterns.

Geometry

Analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships
Specify locations and describe spatial relationships using coordinate geometry and other representational systems
Apply transformations and use symmetry to analyze mathematical situations
Use visualization, spatial reasoning, and geometric modeling to solve problems

Students engage in problem solving, communicating, reasoning, connecting, and representing as they:

8.G.1 Analyze, apply, and explain the relationship between the number of sides and the sums of the interior and exterior angle measures of polygons.

8.G.2 Classify figures in terms of congruence and similarity, and apply these relationships to the solution of problems.

8.G.3 Demonstrate an understanding of the relationships of angles formed by intersecting lines, including parallel lines cut by a transversal.

8.G.4 Demonstrate an understanding of the Pythagorean theorem. Apply the theorem to the solution of problems.

8.G.5 Use a straightedge, compass, or other tools to formulate and test conjectures, and to draw geometric figures.

8.G.6 Predict the results of transformations on unmarked or coordinate planes and draw the transformed figure, e.g., predict how tessellations transform under translations, reflections, and rotations.

8.G.7 Identify three-dimensional figures (e.g., prisms, pyramids) by their physical appearance, distinguishing attributes, and spatial relationships such as parallel faces.

8.G.8 Recognize and draw two-dimensional representations of three-dimensional objects, e.g., nets, projections, and perspective drawings.

Measurement

Understand measurable attributes of objects and the units, systems, and processes of measurement

Apply appropriate techniques, tools, and formulas to determine measurements

Students engage in problem solving, communicating, reasoning, connecting, and representing as they:

8.M.1 Select, convert (within the same system of measurement), and use appropriate units of measurement or scale.

8.M.2 Given the formulas, convert from one system of measurement to another. Use technology as appropriate.

8.M.3 Demonstrate an understanding of the concepts and apply formulas and procedures for determining measures, including those of area and perimeter/circumference of parallelograms, trapezoids, and circles. Given the formulas, determine the surface area and volume of rectangular prisms, cylinders, and spheres. Use technology as appropriate.

8.M.4 Use ratio and proportion (including scale factors) in the solution of problems, including problems involving similar plane figures and indirect measurement.

8.M.5 Use models, graphs, and formulas to solve simple problems involving rates, e.g., velocity and density.

Data Analysis, Statistics, and Probability

Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them

Select and use appropriate statistical methods to analyze data

Develop and evaluate inferences and predictions that are based on data

Understand and apply basic concepts of probability

Students engage in problem solving, communicating, reasoning, connecting, and representing as they:

8.D.1 Describe the characteristics and limitations of a data sample. Identify different ways of selecting a sample, e.g., convenience sampling, responses to a survey, random sampling.

8.D.2 Select, create, interpret, and utilize various tabular and graphical representations of data, e.g., circle graphs, Venn diagrams, scatterplots, stem-and-leaf plots, box-and-whisker plots, histograms, tables, and charts. Differentiate between continuous and discrete data and ways to represent them.

8.D.3 Find, describe, and interpret appropriate measures of central tendency (mean, median, and mode) and spread (range) that represent a set of data. Use these notions to compare different sets of data.

8.D.4 Use tree diagrams, tables, organized lists, basic combinatorics ("fundamental counting principle"), and area models to compute probabilities for simple compound events, e.g., multiple coin tosses or rolls of dice.