

Student Teaching Practicum at Doherty Memorial High School

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Abstract

During the fall of 2017, I undertook a teaching practicum at Doherty Memorial High School in Worcester, Massachusetts. As a student teacher, I was able to complete my Interdisciplinary Qualifying Project while also working with local youth to develop critical mathematical and learning skills. In this report, I explore the current educational landscape in Massachusetts, the Worcester Public School system and my assigned school in depth. One goal of this paper is to demonstrate my growth in the six essential elements of CAP, or candidate assessment of performance. In addition to anecdotal evidence, I include sample assessments, student work and lesson plans to show proficiency in all six areas: high expectations, well-structured lessons, safe learning environment, adjustment to practice, meeting diverse needs and reflective practice. Lastly, I will describe and analyze the five classes I taught this fall in greater depth and with reference to student feedback and techniques I developed to work with specific students. Additional materials and citations can be found in the appendices and references sections respectively.

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Chapter 1: Background

This chapter will bring to light the strengths and weaknesses within Doherty Memorial High School in Worcester, Massachusetts, its surrounding district and the state generally. It outlines standards, reforms, scores and details of this upcoming experience. This background is integral to a successful practicum. Chapter 1 will provide the context and framework for the teaching practicum project I am undertaking this Fall 2017.

Massachusetts Education Reform Act of 1993

New England and particularly Massachusetts have for a long time been national leaders in education. Even given this long-standing tradition of excellence, just prior to the turn of the century came the desire to standardize and unify Massachusetts' schools. Before 1993, physical education and history were the only courses required on behalf of the state. After the Massachusetts Education Reform Act of 1993 (MERA), requirements and accountability increased swiftly, thus ushering in a new era of scholarly excellence in the state.

Perhaps the most critical change that MERA brought about was a statewide standard for schools and their students. These standards were tested via the Massachusetts Comprehensive Assessment System (MCAS). The tests, administered in grades 4, 8 and 10, offer insight into areas where individual students are struggling with regard to curriculum standards; therefore, educators can take a more compartmentalized and effective approach to bringing these students up to speed. In addition to these testing standards, required funding of \$5500 per student in 1993 was introduced. This created a baseline for school spending, preventing underserved communities from mispending state-provided funds. Funds were also approved for the purpose of opening charter schools, or independent public schools that would follow the same state standards.

The next major changes that came with MERA were the generalized and unified curriculum, called the Common Core, and new standards for teachers. All educators, new and veteran, now need to pass a test in their field and one in communication and literacy skills. This standard brings greater accountability to teachers in Massachusetts. The Common Core, adopted and developed in the 1990s, created specific guidelines for the skills the students must possess and demonstrate throughout their primary and secondary education.

Finally, through MERA, the state gained the ability to assess school performance and take struggling schools into receivership whenever it deems necessary (Chester, 2014). This is the final layer of accountability put into place through the Massachusetts Educational Reform Act of 1993, which is still in place today.

Massachusetts and the International Community

Both due to the Massachusetts Educational Reform Act of 1993 and the focus that the state of Massachusetts puts on its education programs, our state is one of the best in the country in that area. As recently as February 2017, U.S. News and World Report ranked Massachusetts the number one state for education in the country (Guilardi, 2017). Our excellence leads to some comparisons to the international community. If Massachusetts itself was a country, it would rank 9th in the world in math proficiency, according to a 2014 article from Forbes (Crotty, 2014).

These international comparisons are difficult to make in large part due to the different testing styles around the world. For example, in China, most students who are tested come from the Shanghai or Hong Kong provinces, where mostly affluent residents receive an education. Access to materials and other educational resources can skew the data so that China's national education results appear higher than if a true random sample was taken. In the United States, all children are entitled to an education, and all public school students are tested. Therefore, our

country's results very nearly represent a true picture of our student's abilities, but it can be difficult to compare the U.S. to other countries.

Certain international tests account for differences in states' education and testing scores. The Trends in International Mathematics and Science Study (TIMSS) is one such test. Though 8th graders provide the data for this study, its results are pertinent largely to Massachusetts' performance on the world stage in education (Crotty, 2014).

Country/ Benchmarking Entity	Average Scaled Score (Std. Error)	Standard Deviation	Rank*	Significance of Mean Difference
Korea, Republic of	613 (2.9)	90	1	$p < 0.05$
Singapore	611 (3.8)	84	2	$p < 0.05$
Chinese Taipei	609 (3.2)	106	3	$p < 0.05$
Hong Kong SAR	586 (3.8)	84	4	$p < 0.05$
Japan	570 (2.6)	85	5	Not Significant
Massachusetts	561 (5.3)	73	5	-----
United States	509 (2.6)	77	9	$p < 0.05$
TIMSS Centerpoint	500	100	----	$p < 0.05$

Table 1: TIMSS Math Results for 8th Graders, 2011 (Crotty, 2014)

Worcester Public Schools

Worcester Public School District serves the community of Worcester, Massachusetts. It contains seven high schools, four middle schools and thirty-one elementary schools. Superintendent Maureen Binienda, who has held the post for a little over a year, heads Worcester Public Schools. Additionally, Marcos Rodrigues serves as the Chief Academic Officer for the district. Worcester is home to over 25,000 students and employs nearly 2,000 teachers on its staff. Its approximate budget is \$384 million, which represents about \$14,000 per pupil. The student teacher ratio in Worcester Public Schools is 14 to 1 (Worcester Public Schools, 2017).

Worcester Public Schools has a large population of English Language Learners and students of diverse backgrounds. In the district, 31.1% of students are white, 41.8% are Hispanic, 15.4% are African American and 7.4% are Asian. The district has about equal proportions of male and female students. Worcester Public Schools has a 94.6 attendance rate, comparable to the state. Fifty-three percent of students do not speak English as their first language and 34.2% are English Language Learners, compared to 20.1% and 17.4% respectively on the state level. Fifty-seven percent of Worcester students are economically disadvantaged, whereas 30.2% fall under that category within Massachusetts.

Only two in five high school students in Worcester plan to attend a 4-year college or university, compared to three in five in the state. Worcester Public Schools has an 84.4% 4-year graduation rate. Finally, average class size in the district is 16.7, which is below the state average (Massachusetts, 2017). In the following section, Doherty Memorial High School will be compared to the state and district data. Many tables and charts will highlight key differences.

Doherty Memorial High School

Socio-economics, Demographics and Academic Performance

Doherty Memorial High School is one of the seven high schools in the district. It is a level 3 school, meaning it is in the lowest 20% of schools as far as academic performance. Doherty's enrollment is 1,555 and it has a student-teacher ratio of 17.2 to 1. The principal of DMHS is Mrs. Sally Maloney.

The male to female ratio at Doherty is nearly even, with about 100 more boys. Forty percent of students are white, 31.7% are Hispanic, 16.1% are African American and 7.8% are Asian. The ELL population is representative of the district as a whole, as 47.9% are without

English as their first language and 22.8% are registered as English Language Learners. About 1 in 6 students has a disability and 43.9% of students are economically disadvantaged.

Nearly 55% of Doherty Memorial graduates plan to attend a 4-year college or university. About 2% of students at Doherty drop out over the course of their time there. These rates are higher amongst ELL students, students with significant socio-economic disadvantage, and students of color. Average class size at Doherty is 13.5. About 1 in 8 students receives an in-school suspension over the course of the school year. As of the spring of 2016, MCAS score reports indicated that 71% of Doherty students are proficient or better on the math portion of the test, while 17% need improvement and about 13% received the warning/failing category (Massachusetts, 2017). Please review the following tables for more information.

Enrollment by Race/Ethnicity (2016-17)			
Race	% of School	% of District	% of State
African American	16.1	15.4	8.9
Asian	7.8	7.4	6.7
Hispanic	31.7	41.8	19.4
Native American	0.3	0.2	0.2
White	40.6	31.1	61.3
Native Hawaiian, Pacific Islander	0.0	0.0	0.1
Multi-Race, Non-Hispanic	3.5	4.1	3.4

Enrollment by Gender (2016-17)			
	School	District	State
Male	847	13,097	488,985
Female	708	12,382	464,716
Total	1,555	25,479	953,748

Tables 2 & 3: Demographic data from Doherty High (Massachusetts, 2017)

Title	% of School	% of District	% of State
First Language not English	47.9	53.5	20.1
English Language Learner	22.8	34.2	9.5
Students With Disabilities	16.5	18.8	17.4
High Needs	58.9	76.3	45.2
Economically Disadvantaged	43.9	57.2	30.2

Table 4: Special populations data from Doherty High (Massachusetts, 2017)

Plan	% of School	% of District	% of State
4-Year Private College	24	17	30
4-Year Public College	31	23	30
2-Year Private College	0	1	1
2-Year Public College	30	37	20
Other Post-Secondary	3	3	2
Work	8	12	8
Military	2	3	2
Other	2	0	1
Unknown	1	4	6

Table 5: Graduate data from Doherty High (Massachusetts, 2017)

Grade and Subject	Proficient or Higher		Advanced		Proficient		Needs Improvement		Warning/ Failing		Included
	SCHOOL	STATE	SCHOOL	STATE	SCHOOL	STATE	SCHOOL	STATE	SCHOOL	STATE	
GRADE 10 - ENGLISH LANGUAGE ARTS	83	91	41	47	43	45	11	6	5	3	349
GRADE 10 - MATHEMATICS	71	78	52	54	19	24	17	15	13	8	350
GRADE 10 - SCIENCE AND TECH/ENG	62	73	21	29	41	44	30	21	8	5	330
ALL HIGH SCHOOL GRADES - ENGLISH LANGUAGE ARTS	83	92	41	47	43	45	11	6	5	2	349
ALL HIGH SCHOOL GRADES - MATHEMATICS	71	78	52	55	19	24	17	15	13	7	350
ALL HIGH SCHOOL GRADES - SCIENCE AND TECH/ENG	62	74	21	30	41	44	30	21	8	5	330

Table 6: MCAS data from Doherty High (Massachusetts, 2017)

Classes for Practicum

The classes that I will be teaching for my Fall 2017 practicum include upperclassmen level remedial mathematics courses. My supervising practitioner (SP) Phil Spellane has taught these classes for a number of years, and his expertise will be drawn on extensively throughout my experience. This year, Mr. Spellane has five periods, with a study and prep period to round out his schedule.

First period is an honors level Probability and Statistics course. Seniors typically take this course as a fourth math course. All students at Doherty are required to take four math courses to graduate. This class has a reputation of being an easy honors course, where many students feel entitled to an A without doing much work.

Periods two, three and six are all the same course: Topics in Mathematics. This class is for students who failed the MCAS standardized exam or received a low enough score to delay their taking Algebra II. Typically, students will take Algebra I as freshmen, Geometry as

sophomores, this Topics class junior year, and Algebra II senior year. The purpose of the course is to fill in the gaps of knowledge from Algebra I and Geometry and prepare students for Algebra II. Students in these classes sometimes lack motivation; for many of them, school is not a priority. Period 3 of this class is an English Language Learners course, so all students in this class have been designated ELL.

The final course on Mr. Spellane's schedule is seventh period Algebra II at the college level, which is the level below honors. This class is largely upperclassmen. Many of the students in this class took Topics with Mr. Spellane in the previous year. Each class meets every day for forty-three minutes as part of a block schedule with a cascading long period of one hour.

Standards and Content for Classes

The standards for all classes in Massachusetts Public Schools come from the Common Core, adopted as part of the Massachusetts Educational Reform Act of 1993. The Common Core outlines specific goals and sub-goals for all mathematical topics – in addition to other subject areas – from Pre-Kindergarten through 12th grade.

Our standards come from the Massachusetts Curriculum Framework for Mathematics. This document was last updated in September 2017; it contains nearly 100 pages of specific skills from areas across mathematics. For elementary education, standards go by year. For secondary education, the standards are organized by subject matter, because not all students follow the same progression of courses.

My Topics in Algebra and Geometry course, which has three sections, does not follow a set framework or curriculum. It is designed to fill in gaps in student knowledge from both Algebra I and Geometry, while also attempting to introduce some topics from Algebra II. For this reason, the course draws from a wide array of standards. The course will draw on the following:

- HSA-SSE: High School Algebra – Seeing Structure in Expressions
- HSA-APR: High School Algebra – Arithmetic with Polynomials and Rational Expressions
- HSA-CED: High School Algebra – Creating Equations
- HSA-REI: High School Algebra – Reasoning with Equations and Inequalities
- HSF-IF: High School Functions – Interpreting Functions
- HSF-BF: High School Functions – Building Functions
- HSF-LE: High School Functions – Linear, Quadratic and Exponential Models
- HSF-TF: High School Functions – Trigonometric Functions
- HSG-CO: High School Geometry – Congruence
- HSG-SRT: High School Geometry – Similarity, Right Triangles and Trigonometry
- HSG-C: High School Geometry – Circles
- HSG-GPE: High School Geometry – Expressing Geometric Properties with Equations
- HSG-GMD: High School Geometry – Geometric Measurement and Dimension
- HSG-MG: High School Geometry – Modeling with Geometry

My Algebra II class Period 7 will encompass many of the function standards and algebra standards over the course of my time there. A typical Algebra II class reviews linear equations, relations and functions, quadratic functions, polynomials, inverses, exponential functions, rational functions, and trigonometry. The class will draw on the following standards:

- HSA-SSE: High School Algebra – Seeing Structure in Expressions

- HSA-APR: High School Algebra – Arithmetic with Polynomials and Rational Expressions
- HSA-CED: High School Algebra – Creating Equations
- HSA-REI: High School Algebra – Reasoning with Equations and Inequalities
- HSF-IF: High School Functions – Interpreting Functions
- HSF-BF: High School Functions – Building Functions
- HSF-LE: High School Functions – Linear, Quadratic and Exponential Models
- HSF-TF: High School Functions – Trigonometric Functions

My Probability and Statistics course Period 1 will draw from the state standards for that subject. The material varies but falls into four main areas, dictated by the four curriculum standards:

- HSS-ID: High School Statistics – Interpreting Categorical and Quantitative Data
- HSS-IC: High School Statistics – Making Inferences and Justifying Conclusions
- HSS-CP: High School Statistics – Conditional Probability and the Rules of Probability
- HSS-MD: High School Statistics – Using Probability to Make Decisions

6 Essential Elements

The state of Massachusetts requires each teaching candidate to demonstrate proficiency in the 6 Essential Elements of the Candidate Assessment of Performance (CAP). The elements include Well-Structured Lessons, Adjustments to Practice, Meeting Diverse Needs, Safe Learning Environment, High Expectations and Reflective Practice.

A well-structured lesson is the first of the essential elements and the most critical in my view. When facing five class periods a day, five days a week, it is of utmost importance that a

plan is made for each class. Though important to note that things rarely go exactly to plan, having a structure to your lesson and backup plans if things fall through can be the difference between a successful day and a disastrous one. The content of each lesson should also be well structured. No class should be forty-three minutes of lecture, or forty-three minutes of group work, but rather some combination of different teaching techniques to maximize the effectiveness of your lessons.

The second essential element is adjustment to practice. This element covers things like analysis of assessment results and the subsequent modifications necessary to improve lesson plans. If students really struggle with a topic, it is ineffective to just plow through and go on to the next lesson. Rather, by adjusting your practice, weaker topics can be reviewed and students can become proficient as they move from topic to topic.

Meeting diverse needs is the third essential element. At Doherty Memorial High, with high populations of low socio-economic background and ELL students, there will be no shortage of diverse needs. I look forward to meeting these needs as they arise. Though impossible to tailor each lesson plan to 30 different students, slight modifications can help some. Clarity and repetition, which many diverse learners need, will also help the class as a whole.

The fourth essential element is a safe learning environment. This is the element that I feel will be the best indicator of my success at Doherty. If students don't trust me, I have failed as a teacher. I hope to foster an environment in which students feel comfortable asking for help and where they are okay with making mistakes. I will employ supportive responses and positive reinforcement to meet this goal.

High expectations serve as the fifth essential element. Many of the students I have in class have been told they are not good at learning, whether directly by teachers or indirectly

through grades and MCAS scores. Such beliefs will be challenging to break. However, in truth anyone can learn and everyone should shoot for the highest levels of success and achievement.

The sixth and final essential element I will demonstrate proficiency in is reflective practice. One of my most pressing goals this fall is to use my free time to reflect on the work I am doing and how I could do it better. My supervising practitioner and program supervisor will play a large role in my reflective practice as I begin to find my personal teaching style.

Transferring WPI Experience

One of my greatest strengths as a teaching candidate is my background at Worcester Polytechnic Institute (WPI). The curriculum and system at WPI make for a challenging experience for all students. A distinct focus is placed on project-based learning and real world application. As a teaching candidate, I can draw on these focuses to better prepare my students for college and their lives ahead.

Mathematics is inherently an abstract field. Tying it to the real world can bring relevance to the subject and generate interest among students. By offering students these types of examples, hopefully I can prove the validity and value of the work they are doing. My experience at WPI reminds me that theory and practice must be tied hand in hand. Thus, simply teaching my students the material is not enough. We must use the material they learn to solve problems that they will face in the real world, both through simulation and projects. The following chapters will reflect my proficiency in all the areas necessary for a teaching candidate to earn their license and have success at the professional level.

Chapter 2: Well-Structured Lessons

The first major element of the Candidate Assessment of Performance is Well-Structured Lessons. The CAP describes a teacher who practices well-structured lesson plans in an exemplary fashion in the following way:

Develops well-structured and highly engaging lessons with challenging, measurable objectives and appropriate student engagement strategies, pacing, sequence, activities, materials, resources, technologies, and grouping to attend to every student's needs. Is able to model this element. (DESE CAP, 2017)

For the teacher, each day presents a new challenge, and a new opportunity. With Common Core Standards looming overhead, standardized testing around every corner, and unique student needs, each day must have a lesson with a detailed structure and goal. This structure and goal can be accommodated for in a lesson plan. The lesson plans we used throughout the practicum were modified from Grant Wiggins and Jay McTighe. They include overarching goals and motivation, specific content and language objectives, standards, and strategies to deliver material (Wiggins & McTighe, 2001). Having a specific outline for proper lesson planning made the process streamlined and consistent. Each Thursday, I would submit the lesson plans for each of my classes for the following week. That way, the direction of the course and any supplementary materials were clearly documented and tracked.

Lesson planning is critical to successful teaching. By having well-structured lesson plans, students will understand what is expected of them. From the teacher's perspective, students who are on 504 or IEP plans can be best accommodated for by a well-structured lesson plan. We make specific modifications as teachers for these students to ensure their participation and comfort in our classes. This way, all students are accounted for.

In addition to any modifications, most lessons should follow a specific pattern so that students can get into good habits and complete work when asked to. Almost all of my lessons began with a Do Now activity. This task was put on the board before the bell rang each class. This practice encouraged students to take their seats and begin working right away. Because most days we only had forty-three minutes per class, each minute was important. Do Now activities sometimes centered around the topic from the previous day to reignite those processes, or sometimes introduced new material via simple problems that were sometimes handed in to check for prior knowledge. Some sample Do Nows included:

- I drive 65 miles per hour for 3.5 hours. How far did I drive? How many states could I get to if I started in Worcester?
- Graph two lines that have the same y-intercept. Write the equations for those lines. How are they the same? How are they different?
- You are selecting a card from a deck of cards. You select a Queen of Hearts and do not replace it back in to the deck. What is the probability that your next card will be a Queen? That it will be a heart?

After the Do Now, lessons would usually involve one or two learning activities. These activities were typically a brief lecture by the teacher followed by some worked examples on the board and a worksheet of practice problems to be done in a Think-Pair-Share style. Students would think on their own to solve the problems, then pair up to check answers and ask questions, and finally share their answers to the class. I would frequently call students to the board to show their work for the other students. This works on presentation skills in addition to mathematics skills. After the learning activities, a short closing would wrap up the lesson. This closing was sometimes a quick problem from the worksheet or another source. Sometimes the closing would

be an application of the topic to the real world or an open-ended question to usher in the lesson for the following day. This way, each lesson can stand on its own, but each is also connected to the others. In this way, I demonstrated well-structured lessons by planning consistently and providing a routine for students. Examples of lessons plans from early in the practicum can be found in Appendix A and B, while examples of lesson plans from later in the practicum can be found in Appendix C and D. Appendix H includes an interesting visual aid implemented in my Topics classes called a flipbook, further demonstrating the varied and in-depth strategies I used to create well-structured lessons.

Chapter 3: Adjustment to Practice

The second element of the Candidate Assessment of Performance is Adjustment to Practice. The CAP describes a teacher who practices this element in an exemplary way as doing the following:

Organizes and analyzes results from a comprehensive system of assessments to determine progress toward intended outcomes and frequently uses these findings to adjust practice and identify and/or implement appropriate differentiated interventions and enhancements for individuals and groups of students and appropriate modifications of lessons and units.

Is able to model this element. (DESE CAP, 2017)

Adjustment to practice is one of the hardest elements for new and old teachers alike. It is common for teachers to get stuck in old habits and continually teach lessons the same way class-to-class, day-to-day and year-to-year. Unfortunately, this easy way out does not provide for the needs of individual students and makes for a lethargic, passive development of educational skill. Instead, effective teachers use a number of strategies to improve their skills and the overall classroom experience for each of their students.

Two assessments I gave this semester caused me to make major adjustments to practice. The first was a quiz I gave all of my Topics in Algebra and Geometry students on graphing inequalities in one and two dimensions. The unit was short and we quizzed Friday with the expectation of starting new material Monday. However, after analyzing the results of the quiz (samples attached in Appendix K), it was obvious that students did not have a firm grasp of graphing inequalities in two dimensions. Therefore I chose to instead review this topic on Monday and Tuesday and reassess via some handed in problems. This adjustment demonstrates how student data shapes lessons and the direction of the class. The second assessment that

caused a similar shift was a test on probability in my Statistics class (assessment attached in Appendix L). Students across the board struggled with a combinatorics problem. I chose to spend an additional three days reviewing permutations and combinations in order to solidify the material for the students. Again, I retested students in this class with a handed in problem. In both situations, students showed marked improvement in performance on the retest.

In addition to these assessments, I also had frequent check-ins with my students, particularly in my Period 6 Topics class. One day, I had students answer seven questions about the distribution of responsibility between teacher and student, ways I could improve my teaching and ways they could improve their learning. This exercise helped struggling students get back on track by making them realize areas they could improve in, but also allowed me to gain insight into my weaknesses. From their responses (attached in Appendix M), I learned that my students wanted me to write larger on the board, use different colored markers when writing and use multiple methods to solve problems. I implemented these changes over the coming weeks with relative success, as I noticed more students were engaged.

Finally, a way I adjusted to practice from the very beginning was by getting to know my students well. At the beginning of my practicum, I had each of my 114 students fill out a notecard with their preferred name, their grade, any sports, activities or jobs they were involved with, their goal for the class and what their plans were after high school. This way, I could tailor my class and curriculum for the specific needs of my students. Many of my students were looking to join the military or the workforce right out of high school, so my goal was not just to prepare my students for college but for real life scenarios in which they would need to use mathematics. This adjustment to my teaching was effective because students felt as though the

work they were doing had a purpose. For me, getting to know my students was just one way I adjusted to practice as a teacher.

Chapter 4: Meeting Diverse Needs

The third element of the Candidate Assessment of Performance is Meeting Diverse Needs. The CAP describes a teacher who practices this element in an exemplary way as doing the following:

Uses a varied repertoire of practices to create structured opportunities for each student to meet or exceed state standards/local curriculum and behavioral expectations. Is able to model this element. (DESE CAP, 2017)

The importance of meeting diverse needs cannot be overstated, particularly in classrooms like the ones I took over during my practicum. My Period 2 Topics has 26 students, 12 of whom have SPED designations. My Period 3 Topics has 18 students, 17 of whom are ELL Level 3 or below. My Period 6 Topics has 27 students, 16 of whom have SPED designations. Most special education students had some intellectual impairment, ADD/ADHD or a sensory impairment. My ELL students were mostly level 1 and 2, meaning that they were either entering or beginning usage of the English language. Many students could not use more than short phrases or sentences in English, with some semantic and syntactic errors in oral and written text. I had to account for a myriad of needs during my practicum experience. There were many techniques I took advantage of to meet these needs.

I was able to fill out IEP information sheets for two students; those sheets are attached in Appendix I and J. These plans gave me insight into the IEP process and the specific needs of my students, as well as how the school met those needs. Students in my classes required accommodations such as taking assessments in a quiet location with an aid, worked examples with specific students before taking the quiz, and additional time on assessments and classwork. I made sure to implement these aspects for every assessment and each student who needed them.

While individualized plans for students who have special needs can benefit those students, a strategy called universal design in learning can also work towards that end. By making material accessible for all students, no matter what obstacles they face, we can account for the needs of the weaker students in the class while also addressing the needs of the general student population. Instructions on my tests and quizzes were clear and explicit, so each student could complete each assessment.

Beyond just these strategies, I also did many small things to address what each student was able to do. I was able to push the exceptional students in the class with bonus problems on assessments, challenge problems in class and additional problems for standard lessons. I developed vocabulary more explicitly by using the key terms at the beginning of each class in my ELL Topics in Algebra and Geometry class. Finally, scaffolding techniques like worked examples and fill in note sheets allowed students to build knowledge on an existing foundation. All of these ways to meet the needs of each student indicate I was able to demonstrate this CAP element effectively during my practicum.

Chapter 5: Safe Learning Environment

The fourth element of the Candidate Assessment of Performance is Safe Learning Environment. The CAP describes a teacher who practices this element in an exemplary way as doing the following:

Uses rituals, routines, and proactive responses that create and maintain a safe physical and intellectual environment where students take academic risks and play an active role—individually and collectively—in preventing behaviors that interfere with learning. Is able to model this element. (DESE CAP, 2017)

Creating a safe learning environment was the CAP element that I demonstrated best throughout the course of my practicum. I thrive off of rituals and routine, so I was able to translate those elements into my classroom effectively. I instituted Do Now activities to start almost every class, then went over homework from the previous night, and gave a brief lesson and practice problems to round out the forty-three minutes we had together. Students understood this schedule and followed the procedure instituted after a few days of growing pains. Our rituals and routines helped make students comfortable in my classroom.

One aspect of Mr. Spellane's students I saw during my observations was that they did not support one another when one student would take an academic risk. If a student came to the board and did a problem, but could not complete it, other students in the class would mock that student. I wanted to avoid this in my classroom. To meet that goal, I modeled proper positive reinforcement for students who took academic risks, even when their answers were incorrect. I used praises such as "excellent question", "you are close, don't give up on the problem", and "thank you for asking, can anyone help her?". Some students eventually adopted my responses. At the very least, students did not mock one another in my classroom.

Another indicator that I was able to create a safe learning environment in my classrooms was the participation of my students. Particularly in my Period 3 ELL Topics in Algebra and Geometry class, students offered answers very freely and without fear. Students came to the board to do problems, asked questions when they had them and genuinely invested themselves in their education. It was great to know that they were comfortable enough to take these risks in my classroom. I so appreciated their participation, as it made for a more inclusive and discussion-based class. My seniors in Period 1 and 7 also did a great job asking questions when they did not understand material. As a teacher, it can be difficult to assess knowledge without a formal assessment. However, when students ask questions, we as teachers can actually witness the “aha” moment that bridges the gap of knowledge in students. In all these ways, I was able to demonstrate a safe learning environment in my classes.

Chapter 6: High Expectations

The fifth element of the Candidate Assessment of Performance is High Expectations. The CAP describes a teacher who practices this element in an exemplary way as doing the following:

Effectively models and reinforces ways that students can consistently master challenging material through effective effort. Successfully challenges students' misconceptions about innate ability. Is able to model this element. (DESE CAP, 2017)

Holding students to a high standard is a particularly difficult task when it comes to routinely underperforming students. For many of my students, homework had never been an expectation. Students could simply show up to class when they wanted, not do any work, and still receive passing grades to be sent along to the next level. I found it extremely difficult to break students from twelve years of these bad habits in order to actually do work.

My first expectations I set for the class came on the very first day of my teaching each class. I made clear that students in my class were expected to show effort and show respect. These were my two classroom rules; I reiterated them throughout the practicum and students responded well to them when I reminded them. Students met expectations of effort by working independently on worksheets, doing group work and asking questions during class. Students were expected to do homework; after some pushback, my routine checks of homework led to students meeting my expectations. In addition to homework assignments, students in my classes did not have to do projects in previous years. To raise the bar for these students, I assigned two major projects: a graphing project for my Topics classes and a budgeting project for my Algebra II seniors. The projects are found in Appendices O and P respectively, while student sample work can be found in Appendices Q and R.

There were many times when I would not give students the answers to worksheet problems but rather had them check with a partner and discuss. This way, the onus was on them and my expectations were that they could arrive at an answer on their own. I also used worked examples in my lectures to show demonstrate effort and resilience to students through challenging problems. In these ways, I was able to develop high expectations for my students throughout the practicum experience.

The purpose of creating high expectations can be traced back to Bloom's taxonomy. As students progress in a certain subject area, they are continually expected to do more and more with the material. Bloom described these levels of knowledge development using his taxonomy. First, students must remember basic concepts and definitions, and then comprehend those concepts by being able to organize and compare information. After this, students should be able to apply the knowledge to an outside system, analyze causal relationships between concepts, evaluate patterns of information and create new links using old information (Anderson & Krathwohl, 2001). As we teach, we slowly rise up this taxonomy by asking definition questions and doing rote problems early in the lesson. We later ask students to organize this information in relation to other lessons and create solutions to problems using the new information. By routinely and consistently pushing students to the next level on the taxonomy, we drive their understanding and push expectations to the point where they can have the most academic success.

Chapter 7: Reflective Practice

The sixth and final element of the Candidate Assessment of Performance is Reflective Practice. The CAP describes a teacher who practices this element in an exemplary way as doing the following:

Regularly reflects on the effectiveness of lessons, units, and interactions with students, both individually and with colleagues; and uses and shares with colleagues, insights gained to improve practice and student learning. Is able to model this element. (DESE CAP, 2017)

I feel that reflective practice is the most important element for a teacher after having gone through this practicum experience. Most teachers get set in their ways easily; they do what is comfortable without much input from others or adjustment when things don't go as planned. If we as teachers can put aside pride and stubbornness, our overall teaching will improve vastly. The reflection necessary to become a great teacher can take many forms.

The easiest way I found to use reflective practice as a teaching candidate was to take input from my mentor teacher and Program Supervisor, as well as other teachers at Doherty High. The math department at Doherty was particularly helpful in guiding my practice. Each fifth period, we would have lunch together in the department head's room. During this time, we would discuss how to handle disciplinary problems with students, share best practices and reflect on topics that students struggled with. It was from these lunches that I learned the most about what being a teacher really involves. These opportunities also allowed me to reflect on the way I taught with specific reference to how the seasoned veteran teachers of Doherty taught.

A second way that I sought feedback and reflection was via my Program Supervisor (PS) Alicia Gram and my Supervising Practitioner (SP) Phil Spellane. During our Three-Way

meetings and other meeting opportunities, we discussed ways that I could improve my teaching. At first, I relied heavily on the textbook in both my Algebra II and Probability and Statistics classes. From My PS and SP, I learned strategies to pull away from the book, generate my own curriculum-based activities, and engage in more active discussions with my classes rather than simply reading textbook definitions, problems and answers. Mrs. Gram's extensive experience with Probability and Statistics, as well as her materials such as dice and playing cards, were hugely valuable to my success in that class. Mr. Spellane's experience teaching the Topics courses for a number of years gave me ways to improve in both discipline and teaching of those classes. The insights of both my PS and SP drove my reflective practice in those ways.

The next and most important way that I integrated reflective practice into my teaching was by using student data. Given the extremely diverse backgrounds and needs of my students, I felt it was important to get to know each student and how they learned, then adjust my practice based on this new information. By taking in actual data from my students, I could better understand what they were struggling with, then think how I could teach the material differently to accommodate for their needs and ensure their understanding. I often asked for feedback in small ways, such as students writing how confident they are with certain material on Do Now activities that were handed in. There were also two large opportunities for reflection in my Period 6 and with the Student Feedback Survey.

My Period 6 Topics class was by far my hardest class. They frequently lacked motivation, attention and respect. In a week of particular difficulty with this class, I dedicated half a class period to air my grievances and ask for feedback. That class, we talked about the "contract" between student and teacher when it comes to learning. The teacher is expected to do the work to teach and the student is expected to do the work to learn. I asked students to answer 7 questions

anonymously and hand in their results. The first two questions asked what percentage of the responsibility of learning falls on the teacher and the student respectively. Most students responded that the ratio of responsibility is between 60-40 and 40-60. This result seemed to focus students and remind them of their responsibility in the learning process. The next two questions pertained to one thing in the class that was going well for that student, and one thing in the class that student was struggling with. This gave me insight into curriculum problems in that class and gaps of knowledge I needed to address.

The final three questions were all focused towards our goal of improving the class and student learning. First, I asked what I could do to improve my teaching for them personally. Then I asked what they could do to improve their learning. Finally, I had them answer the open response, “I wish my teacher knew...” The responses to these three questions were hugely helpful for my reflection. Students brought issues to my attention that I did not realize existed. I got feedback that my board writing was too small, that I did not use enough colored markers to differentiate ideas, that I sometimes spoke in monotone and that I need to explain in multiple ways more frequently, just to name a few responses. I took all of these suggestions under consideration as I shaped my practice in the last few weeks of my practicum. Lastly, the comments students made on the last question allowed me a window into their lives I typically wouldn't get. My students wished I knew how hard they were working in my class, how difficult things were for them at home or work, and how this class compared to their others (sample responses found in Appendix M). Getting to know my students on a more personal level was one of my goals for this practicum, and the feedback I received from that impromptu survey helped me achieve that goal.

Finally, the Student Feedback Survey from the Massachusetts Department of Education was given in all of my classes at about the halfway point in the practicum. The results and analysis of the survey will be in a later chapter. The feedback from students via that survey was the largest example of reflective practice during my practicum. However, conversations with other teachers, my PS and SP, and other short reflections from my students also played an integral role in my development in this essential element.

Chapter 8: My WPI Education

As a WPI student, I felt that I had a lot to offer the Worcester youth I taught. I have been given so many privileges throughout my life, not the least of which was being able to attend a prestigious private institution in the Northeast to study mathematics. In addition to the content that I have learned here at WPI, I have developed life skills, study habits and relationships that were integral to my success. My hope was that I could pass on some of the things I have learned through my time at WPI to the students I taught at Doherty Memorial.

I am a Mathematical Sciences and Psychological Science double major, which offers me a unique perspective on my teaching and my relationships with my students. First, my deeply theoretical classes in the math department have taught me that there is a side to the subject matter beyond rote problem solving and application work. The use of proof and definition to expand knowledge is something I wish I had been able to incorporate into my teaching more effectively. I know this aspect of mathematics can be difficult to grasp for low level students like the ones I had, but it also piqued my interest in the field. I feel it could have done the same for them.

My other field of studying being psychology, I was able to identify in my students many emotional needs and describe behavior in terms of motivation. Maslow's hierarchy of needs begins with basic needs like food, water, shelter and security and extends upward to belongingness and esteem (Maslow, 1943). It was clear throughout my practicum that some students were not meeting basic physiological needs. Some came in hungry, cold or tired. Assuring that these students met those needs was the only way to eventually get math content to them. To move them further up the hierarchy of needs, I ensured their security through a safe learning environment where they were not at risk of humiliation or social exile. Finally, I hope to create a sense of belonging in my classes and support students' esteem with regular positive

feedback. Undoubtedly, my education in my two fields of study led to a good portion of my success.

The project-based curriculum at WPI is a huge selling point for the school and also a large reason I decided to attend. Projects offer students the ability to collaborate with others, developing communication skills in addition to meeting content objectives. Projects also typically allow students to meet the material where they are; in other words, if a student is interested in a certain facet of the material, he or she can focus more in depth on that aspect in a project setting. Our curriculum at WPI definitely drove my curriculum at Doherty. I tried to incorporate projects into each of my classes. Specifically, my Probability and Statistics class had a project or activity almost every day to really emphasize the importance of real world applications for statistical principles.

In all, both what I have learned at WPI and how I learned it greatly impacted the way I taught my classes at the high school level. I was able to incorporate my mathematical knowledge, my love and use for psychology, as well as our project-based curriculum to give my students the best chance to succeed academically and grow as individuals.

Chapter 9: My Classes

Period 1: Probability and Statistics

The final class that I took over, but by far the most enjoyable for me was my first period Probability and Statistics course. This class was made up of 15 seniors, most of whom had been placed in that class without their knowledge. The course had a reputation of being an easy senior-level course that smart students would take if they wanted to avoid Calculus. All students at Doherty are required to take four years of mathematics, so the students all needed to pass this class in order to graduate. The main challenge in this class was not motivating the students – many of them were honors level students – but rather the time of the course.

First period was not an easy time to teach, particularly to teach seniors. I often started class with fewer than five students actually in the room. Students trickled in throughout first period with limited repercussions, due to a somewhat lackadaisical policy by the school on tardy students. The frequent absences and tardiness made it difficult to plan traditional Do Now activities and structure the early portion of the class. To overcome this obstacle, I utilized the beginning of class to go over homework problems, check in with students and organize activities. Because there was no standardized tests or any strict curriculum timeline, I used mostly activities and group application problems in this class.

The seniors in this class were very curious and interested in the subject matter, so these types of large problems and projects offered them a new mathematical outlet for their passions and abilities. Projects where students gathered data, analyzed it and answered questions together simulated the real-world environment in which they will have to work with others to solve large magnitude issues. Particularly for seniors, I think this method was effective for teaching. In addition to being effective, the project-based curriculum I utilized in this class was also very

enjoyable. The students and I were energized by the day's big problem. We enjoyed the small activities like rolling dice and picking playing cards. My hope is that this style also allowed for increased retention of the material we covered. The hands on activities we did should solidify and contextualize the information presented in the class. Overall, Probability and Statistics was a great class to teach, because of the motivated students, the course material and the different teaching style I was able to experiment with.

Period 2: Topics in Algebra and Geometry

The first class that I took over in my teaching practicum was Period 2 Topics. This course is designed to be a bridge between Algebra I and Algebra II. It reviews concepts from Algebra I and Geometry for the first two thirds of the school year, and then prepares students for Algebra II in the final third. This class is specifically for students who scored within the Needs Improvement category on the MCAS during 10th grade. As a result, this class contained 26 students, most of whom were juniors and many of whom were very weak math students. However, many students were in this class because of behavioral issues or emotional/mental obstacles but were brilliant. This wide array of student ability posed many challenges.

One particular student in this class had faced some behavioral challenges throughout his high school career. He was a very capable student when it came to most material, but he spoke out throughout class on a consistent basis. He sat in the center of the room – this class did not have a seating plan – directly behind three students who were on IEPs. The troubled student often distracted the three students around him and would talk over me while I lectured. He would occasionally ask inappropriate questions and generally try to direct the class away from the lesson plan to garner attention from his classmates. This student made it necessary for me to roam the room and teach portions of the class from his zone. I would walk by his group

frequently to ensure that they were all on task. By working with the students with IEPs one-on-one, I could usually redirect this student to the task at hand. Deadlines were also imposed to regulate his behavior. For example, if he knew I would collect a worksheet in five minutes, he would work diligently, whereas if there were no time restriction, he would begin chatting with those around him.

As a whole, this class was the one I felt I connected best with. I had this class for twelve weeks and we grew to know each other very well. By the end, they were all prepared for my Do Nows, they all came to the board to do examples and they participated fully in class. I was extremely proud of the students in this class and was honored to have taught them.

Period 3: Topics in Algebra and Geometry ELL

The second class that I began teaching was third period Topics ELL. This class was much smaller than either period two or six, but had twice the energy of any other group I worked with. This class welcomed eighteen students who were all English Language Learners. Students ranged largely in their English abilities. In Massachusetts, ELL students are rated Level 1 to 6, with Level 6 being completely proficient and Level 1 being almost no English ability. I had students in both levels in this class, though most students were in Level 3 or lower.

These students were extremely motivated in general. I never had a problem in this class with students volunteering to come to the board or offer answers all the time. Some students were uncomfortable reading English, so I created numerous opportunities in the course for them to read written English, speak it aloud and write it themselves. This way, we developed language abilities and met language objectives while also meeting content objectives. The energy that this class brought to our lessons every day sometimes went unbridled and consistently needed to be monitored and reined in.

For the first week of my time with this class, the first five minutes involved students walking around the room greeting one another. Perhaps because of cultural differences, this greeting involved hugs and kisses and brief conversation about the day's happenings. This whole affair would eat up almost five minutes of class time. In the second week, I made a seating plan to keep friends away from one another and limit those initial greetings. The seating plan was largely effective but needed to be changed every few weeks, as these extremely friendly students kept making new friends to greet at the start of class. Overall, students in this class performed well and were truly a pleasure to teach. Their energy was infectious and their participation was exemplary for a Topics class.

Period 6: Topics in Algebra and Geometry

Period 6 was the third class that I took over during my teaching practicum. This class was the most unruly group of the three Topics classes. It was also one of my largest groups, with 27 students. Some of these students had very good algebra backgrounds, but had just tested poorly on MCAS. Others of these students knew almost no algebra. I was very frustrated by their lack of basic knowledge and ability. I had to use valuable class time to review basic addition, multiplication and division facts. Some Do Now activities were dedicated to these basic operations. The more advanced students in the class resented this fact, but we tried to move stronger students up to Algebra II as the course progressed.

Most of the students in this class were juniors. Disrespect was a major factor in this classroom. Numerous times I would tell students to put away their phones or to take out their headphones or ear buds. Students frequently spoke over me during lectures. At one point, I stopped lecture to tell the students how much this upset me. I reiterated how much I cared about

them and wanted to see them succeed, and that they would have to work with me and put effort into mathematics if they wanted to lead successful lives. The class responded fairly well to this speech but there were still behavioral problems.

One student in particular was an exceptional challenge. She sat in the back of the room every day and played on her phone with her ear buds in the entire time. She handed in worksheets and quizzes completely blank, never took notes and asked to go to the bathroom every day. I would sit with her to work through a problem on the worksheet, then ask her to do one, only to find that she did not do any more problems by the end of class. We made a plan to only let her use the restroom once a week and I made a call home to discuss any problems there that might be preventing her success. By the end of the practicum, this student was moved to a different classroom where she had a better chance to succeed. After the call home and her IEP meeting, I did notice a few small changes in her effort. In all, Period 6 was my most challenging class, but my most rewarding success story.

Period 7: Algebra II College Level

This class was the fourth I took over about halfway through the practicum. These students had largely settled in to Mr. Spellane's teaching style and required some transition to do things the way I wanted. This class was made up of 29 students, almost all of whom were seniors who had taken Topics the previous year with Mr. Spellane. Again, they had been engrained in his teaching style and required a great deal of effort to adapt them to my teaching style. Most of these students had come to terms with what was expected of them in a mathematics class, as they were seniors, but others refused to do work unless it was counted. As a result, I often collected Do Nows or sample problems done during class or assigned homework to be checked to ensure students would complete the work.

This class was a challenge similar to Period 1 in that the chronic absenteeism that plagued that school's seniors was also evident last period when I taught this class. Though this was my largest class, I often had 5-8 students absent on any given day. This situation always kept me on my toes. I had to create an organization system to track absences, assign make up work and work with the students who needed it during my extra help session on Tuesdays.

I relied heavily on the new textbooks in this class. They were excellent resources I did not have in my Topics classes and the textbook was even accompanied by online resources including slides, lesson plans, worksheets, tests and quizzes. I utilized many of these resources during my time teaching Algebra II. I also attempted to use projects and other activities that directly related to the students in this class. At the beginning of my teaching in all my classes I had students write some information about themselves on a notecard to be handed in. This information included their name, year in school, goal for the class, any clubs/sports/jobs they were a part of, and their plans after high school. I used this tool to better understand the needs and goals of my students.

Most students in this class were planning on going to college after graduating from Doherty in the spring. Others were going into military service and yet others were planning on going into the workforce right out of high school. Because very few of my students were interested in STEM fields in this class, I could focus the mathematics content on more soft skills like presenting orally in front of the class. We also dedicated an entire project to budgeting their money and creating financial plans for after graduation. These types of activities and projects directly related to the students' needs and interests, so they were more motivated to complete the work well. This class was fun to teach and I felt a great connection to the students.

Chapter 10: Feedback and Professional Development

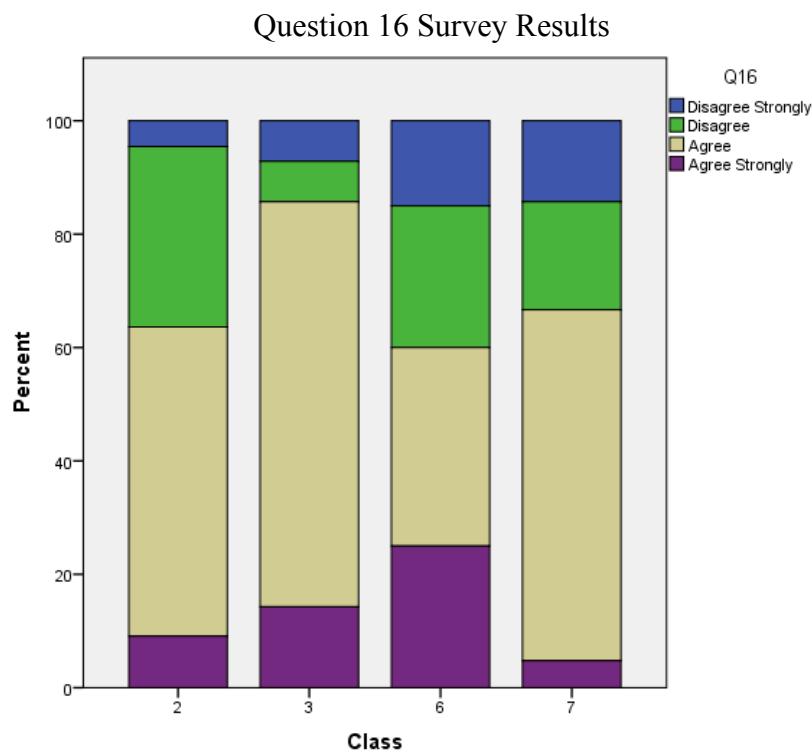
I attended a number of professional development activities through my fifteen-week practicum. During the week before school began in August, there were two full days of professional development for Worcester Public Schools high school teachers. The first day was dedicated to training sponsored by McGraw Hill for the new textbooks used by Algebra and Geometry classes throughout the district. I attended this session along with the other math student teachers doing a fall practicum. I learned a great deal about how to use online book resources and best utilize the brand new textbooks the district was receiving. This development was integral in my success in my Algebra II class.

I also attended a math department meeting and small staff meetings throughout the semester. The department meeting was particularly interesting as they were discussing common assessments to be done in January. Different pods of teachers organized by subject matter and created an assessment for all students taking that subject. I got specific insight into Algebra II as four different teachers in the department were teaching the course. Their views and strategies were helpful for creating my own lesson plans and unit goals, as I needed my students to be prepared for the common assessment as well. These two main professional development sessions allowed me to improve my professionalism and recognize the many duties of a schoolteacher.

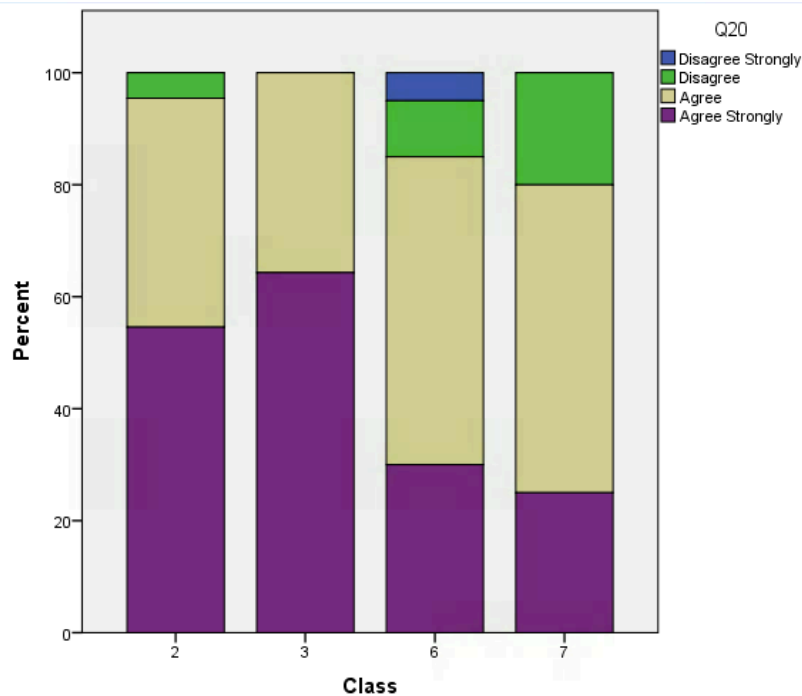
Student Feedback Survey Results and Analysis

As part of my reflective practice and professional development, I administered a student survey provided by the Massachusetts Department of Education roughly halfway through my practicum. The survey is attached in Appendix F and G. It contains questions about the effectiveness of the teacher and the classroom environment. My particular interest in analyzing the data from the survey was to compare the effectiveness of instruction between classes.

Questions 16 and 20 referred to method of instruction. Question 16 was “In this class, students are asked to teach (or model) to other classmates a part or whole lesson.” Question 20 was “I can show my learning in many ways (e.g. writing, graphs, pictures) in this class.” Classes in Period 2, 3, 6 and 7 were surveyed. The percentages of strongly agree, agree, disagree and strongly disagree are as follows. As you can see, the majority of students agree that instruction is multi-modal, with higher rates of agreement in Period 3 than in other sections. Letting students come to the board to do problems as a method of student modeling will improve my rating on this portion of instruction.

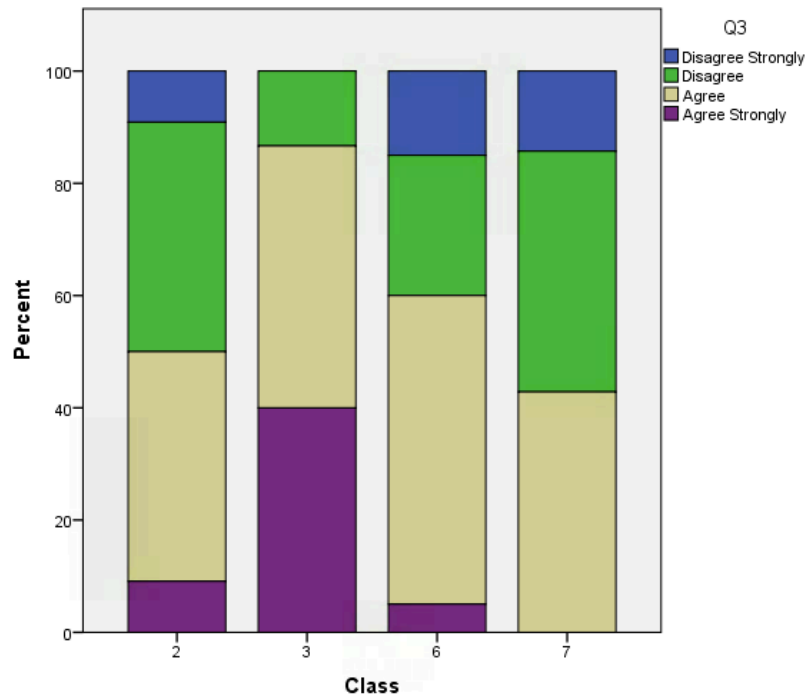


Question 20 Survey Results

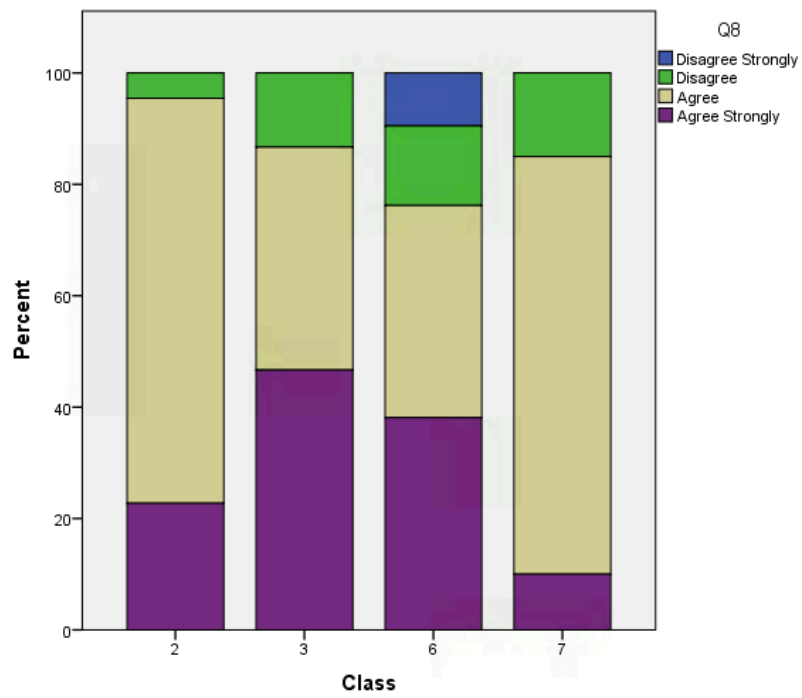


Additionally, I focused on questions that pertained to the expectations portion of teaching all students. These questions included number 3, “Students push each other to do better work in this class,” number 8, “When asked, I can explain what I am learning and why,” number 10, “The level of my work in this class goes beyond what I thought I was able to do,” and number 18, “During a lesson, my teacher is quick to change how he or she teaches if the class does not understand.” Particularly for question 10 and 18, I found a much higher proportion of students who disagreed on some level than for other questions. Complete survey results can be found in Appendix N. As I continued my practicum after the results of this survey, I sought to improve my expectations and ability to adapt to different learning styles on the fly.

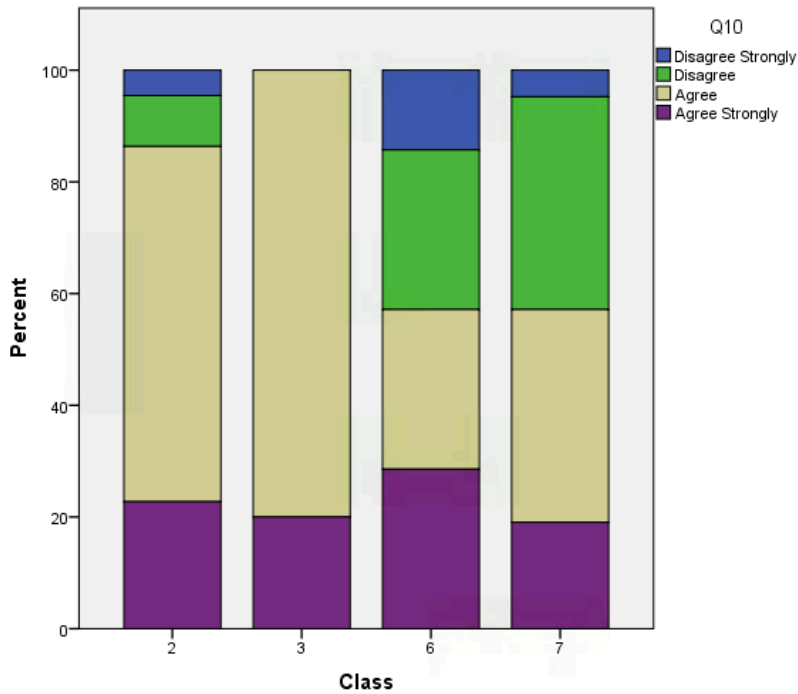
Question 3 Survey Results



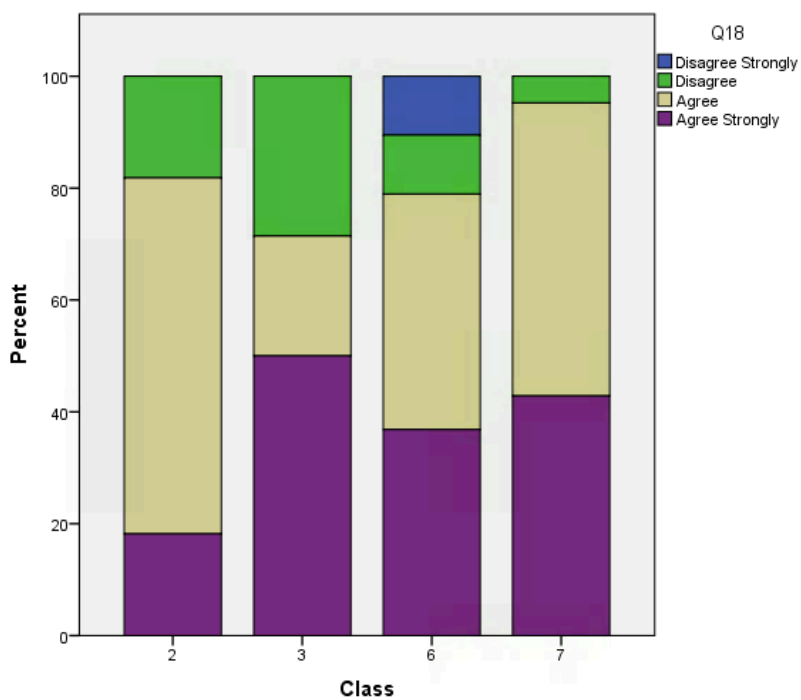
Question 8 Survey Results



Question 10 Survey Results



Question 18 Survey Results



Advanced Cross-tabulation for Question 10

Class * Q10 Crosstabulation

		Q10				Total	
		Disagree Strongly	Disagree	Agree	Agree Strongly		
Class	2	Count	1	2	14	5	22
		% within Class	4.5%	9.1%	63.6%	22.7%	100.0%
		% within Q10	20.0%	12.5%	35.0%	27.8%	27.8%
		% of Total	1.3%	2.5%	17.7%	6.3%	27.8%
	3	Count	0	0	12	3	15
		% within Class	0.0%	0.0%	80.0%	20.0%	100.0%
		% within Q10	0.0%	0.0%	30.0%	16.7%	19.0%
		% of Total	0.0%	0.0%	15.2%	3.8%	19.0%
	6	Count	3	6	6	6	21
		% within Class	14.3%	28.6%	28.6%	28.6%	100.0%
		% within Q10	60.0%	37.5%	15.0%	33.3%	26.6%
		% of Total	3.8%	7.6%	7.6%	7.6%	26.6%
7	Count	1	8	8	4	21	
	% within Class	4.8%	38.1%	38.1%	19.0%	100.0%	
	% within Q10	20.0%	50.0%	20.0%	22.2%	26.6%	
	% of Total	1.3%	10.1%	10.1%	5.1%	26.6%	
Total	Count	5	16	40	18	79	
	% within Class	6.3%	20.3%	50.6%	22.8%	100.0%	
	% within Q10	100.0%	100.0%	100.0%	100.0%	100.0%	
	% of Total	6.3%	20.3%	50.6%	22.8%	100.0%	

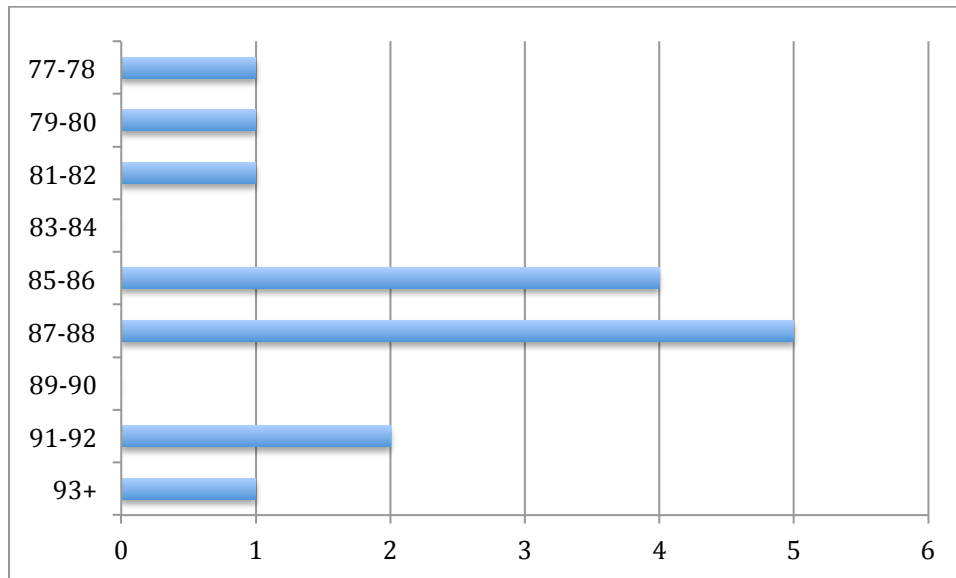
Chapter 11: Measure of Student Learning

As part of my development as a teacher, I utilized a shared assessment to indicate student learning compared to previous years. To do this, I borrowed and administered one of Mr. Spellane's Probability and Statistics tests. After lesson planning and teaching the chapter, I gave the students Mr. Spellane's test, and then compared their results to the results of previous years and expectations set by Mr. Spellane. This exercise was useful to see the effectiveness of my teaching compared to that of a seasoned veteran teacher. I could also see the content areas where I lacked depth or focused my efforts too heavily. The reflection that followed this experience shaped my teaching of future classes. Due to the small sample size of the Probability and Statistics class, I also compared results from my three Topics in Algebra and Geometry classes to expectations set by my supervising practitioner.

Chapter 3 Test – Probability and Statistics

Observed Scores

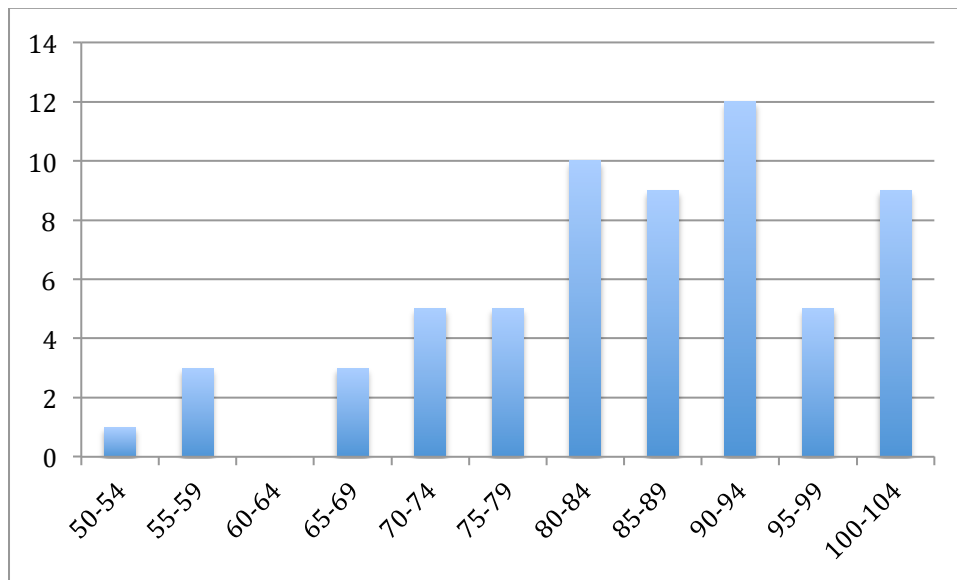
88	87	85	93	82
87	91	88	78	86
80	85	88	92	85



The distribution of these scores somewhat represents a bell curve, with most scores falling between 85 and 88. The class mean was 86.3 with a standard deviation of 4.0. If the distribution were normally distributed we would expect 68% of the scores to fall in the range of 82.3 to 90.3. Sixty seven percent of observed values fall in this range. Mr. Spellane expects an approximately normal distribution centered around 85. Our data is very close to this distribution. Though the sample size is small with only fifteen students, this data serves to validate the test structure. My results match the normal distribution and class average that were observed by Mr. Spellane in previous years. However, I wanted to expand my measures of student learning to demonstrate adjustment to practice, reflective practice, and meeting diverse needs.

Topics in Algebra and Geometry – Inequalities Quiz

74	68	100	90	89	84	87	87	101
87	86	93	80	102	93	92	85	67
83	92	103	94	82	56	73	92	77
77	82	75	84	90	59	78	104	66
80	94	92	88	102	74	84	70	91
99	96	84	89	56	97	96	100	102
51	80	104	70	97	86	76	92	



For my 62 Topics in Algebra and Geometry students, the class average was an 85.2 with a standard deviation of 12.6. Again, Mr. Spellane expects an approximate normal distribution with mean around 85. Our observed mean is right where it should be. Our distribution appears to

skew right however, with most values at the B level or higher. We would also expect 68% of the scores to be within the range 74.4 to 97.6 in a normal distribution. Approximately 64.5% of the quiz scores fall into that range. The standard deviation for this data set is noticeably higher than that for the Probability and Stats test. This to me indicates the exceptional range in ability and need for my Topics students.

While I recognize the diversity in needs of my students, this quiz was an indicator that I need to improve my practice. The accommodations that I made for this quiz included additional written instructions for students on IEP and appropriate 504 plans. I also worked with some students one on one to break down the problem and guide them toward the answer. Students who had a quiet separate environment and extra time accommodations were accounted for and sent to the SPED teacher to finish their quizzes. The spectrum of scores showed me that I needed to do a better job both accommodating for the weaker students and challenging the stronger students in my classes. I can do this by offering more bonus problems for the students who find the material easy and give additional written instructions to students on IEP plans. I employed these strategies for later assessments throughout the fall.

The assessment is attached in Appendix K. There are four types of problems and one bonus problem. Students had to graph an inequality in one dimension, graph an inequality in two dimensions on the coordinate plane, graph a compound inequality in one dimension, and graph a compound inequality in two dimensions. The bonus question was to write a compound inequality based on the graph of the inequality on a number line. I designed well-structured lesson plans for this unit by breaking up the four days leading up to the quiz into the four different topics on this quiz. We utilized Do Now activities to introduce new topics and tie them to the previous topic. For example, whereas in one dimension, a closed circle models inclusion in the

solution set, in two dimensions a solid line models the inclusion. However, an open circle and dotted line represent exclusion from the solution set. These pairings relate, so we created a chart in student notes to display when we should use dotted versus solid lines, open versus closed circles, shading above versus shading below and drawing the arrow right versus left. This chart gave students a visual aid and examples to reference during the quiz.

After seeing the results of this quiz, I found that many students did not fully understand how to graph compound inequalities in two dimensions. Frequently, they would struggle just graphing lines. They also had trouble with shading the correct region. To adjust my practice as a result of this data, I chose to spend an additional two days reviewing the material from this portion of the unit. We went over the quiz problems in greater depth as a class, and then I assigned more examples to be done individually. When I collected these additional problems, I found that students did a much better job graphing compound inequalities. This form of reassessment was sufficient for me to move on to the next unit. In all, this shared assessment allowed great insight into the effectiveness of my teaching with reference to the CAP elements.

Chapter 12: Community Involvement

Throughout my practicum experience at Doherty Memorial High School, I was able to engage the community in many different ways outside of the normal classroom setting. The people of Worcester – specifically around Doherty – are lively, friendly and welcoming. I relished the opportunity to get to know them better. My first experiences engaging the community came as a supplement to my teaching.

A problematic student in my Period 6 Topics in Algebra and Geometry class made it necessary to call home and inquire about her outside circumstances and form an action plan to get her back on track. While it was daunting to cold call a parent and discuss her struggling student, the task actually gave me great insight into what some of my students faced in their home lives. This student had some problems with the law and was likely acting out in my class as a way to deal with that situation.

Earlier in the fall I attended the Know Your School Night at Doherty, which is a type of community parent teacher conference. Some parents come in and circle through their child's classes, meeting all of their teachers and discussing the outline of the class. This was an opportunity to put a face to a name and better understand the background of some of my students. Grandparents or stepparents raise many of them. More telling was that only six families came to the Know Your School Night for Mr. Spellane's five classes. This indicates to me that many of my students' parents were either too busy or too disinterested to attend. In both cases, having a parent or guardian who cannot invest time in you as a student can greatly affect motivation and the perceived value of education.

Beyond those two somewhat negative experiences engaging the Doherty community, I also had numerous enjoyable ones. Each day in the parking lot while walking out to my car, I

saw students congregating, sharing stories and laughing. I was brought back to my own high school days and the great relationships I formed there. At football and basketball games I attended, I saw the intense energy some of my students displayed on and off the court or field. Through these experiences, I connected better to my students, the faculty and Doherty Memorial High School as a whole.

Conclusion

As I sit in my classroom during my final day at Doherty Memorial High School, I reflect back on these past sixteen weeks and all the challenges I faced. I had 114 of the most needy students the school had to offer. Some had behavioral problems, others were special education and yet others did not speak any English. I fought hard to keep all of my students on track. Over the course of my practicum I watched them grow and develop into more motivated, capable individuals. At the same time, I grew and became a better professional through this experience. While I clearly demonstrated that I use well-structured lessons, adjust to practice, reflect, create a safe learning environment, impose high expectations and meet diverse needs, I also have done all the small things that can make an ordinary teacher exceptional. This practicum experience has allowed me to explore a teaching career and directly impact the lives of countless Worcester youth. For this, I am grateful. For this, I am a better student, teacher and professional.

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Appendices

Appendix A: Sample Lesson Plan from September

Lesson Plan Title: Distance/Rate/Time Word Problems

Teacher's Name: Mr. Perry

Subject/Course: Topics in Alg/Geo

Unit: Proportions and Rates

Grade Level: 11-12

Overview of and Motivation for Lesson:

Solving real world problems involving rates can apply to speed, cost when shopping and other expansions of unit rates

Stage 1-Desired Results	
<p>Standard(s):</p> <ul style="list-style-type: none"> HAS-REI.1-2 	
<p>Aim/Essential Question:</p> <ul style="list-style-type: none"> How can we use a unit rate to calculate specific values we need? 	
<p>Understanding(s): <i>Students will understand that . . .</i></p> <ul style="list-style-type: none"> unit rates show an amount of something per one unit of another variable we can use unit rates to solve proportions and percent problems presented via word problems 	
<p>Content Objectives: <i>Students will be able to . . .</i></p> <ul style="list-style-type: none"> translate word problems to the appropriate proportion use order of operations to isolate variables solve for variables represented by proportions 	<p>Language Objectives: ELD Level 3 Choose an item. <i>Students will be able to . . . in English</i></p> <ul style="list-style-type: none"> Describe proportions and operations verbally <p>ELD Level 5 Choose an item. <i>Students will be able to . . . in English</i></p> <ul style="list-style-type: none"> Read and comprehend word problems involving proportions and unit rates
<p>Key Vocabulary</p> <ul style="list-style-type: none"> proportion rate unit rate numerator denominator 	
Stage 2-Assessment Evidence	
<p>Performance Task or Key Evidence</p> <ul style="list-style-type: none"> Solving word problems about rates on a worksheet (Distance/Rate/Time Word Problems) 	

<p>Key Criteria to measure Performance Task or Key Evidence</p> <ul style="list-style-type: none"> • Correct answers to worksheet problems 									
<p>Stage 3- Learning Plan</p>									
<p>Learning Activities: Do Now/Bell Ringer/Opener: Short problem on speed rate, extrapolate to how long it would take to go a set distance</p> <p>Learning Activity 1: Short lecture (<5 min) on finding key words when looking at word problems</p> <p>Application Hand out the worksheet and have students work in small groups (3-4) on problems, have students go to the board to write solutions and present to class</p> <p>Summary/Closing Review the week: proportions, percents, percent change, rates</p>									
<p>Multiple Intelligences Addressed:</p> <table style="width: 100%; border: none;"> <tr> <td><input checked="" type="checkbox"/> Linguistic</td> <td><input checked="" type="checkbox"/> Logical-Mathematical</td> <td><input type="checkbox"/> Musical</td> <td><input type="checkbox"/> Bod ly-kinesthetic</td> </tr> <tr> <td><input type="checkbox"/> Spatial</td> <td><input checked="" type="checkbox"/> Interpersona</td> <td><input type="checkbox"/> Intrapersonal</td> <td><input type="checkbox"/> Natur listic</td> </tr> </table>		<input checked="" type="checkbox"/> Linguistic	<input checked="" type="checkbox"/> Logical-Mathematical	<input type="checkbox"/> Musical	<input type="checkbox"/> Bod ly-kinesthetic	<input type="checkbox"/> Spatial	<input checked="" type="checkbox"/> Interpersona	<input type="checkbox"/> Intrapersonal	<input type="checkbox"/> Natur listic
<input checked="" type="checkbox"/> Linguistic	<input checked="" type="checkbox"/> Logical-Mathematical	<input type="checkbox"/> Musical	<input type="checkbox"/> Bod ly-kinesthetic						
<input type="checkbox"/> Spatial	<input checked="" type="checkbox"/> Interpersona	<input type="checkbox"/> Intrapersonal	<input type="checkbox"/> Natur listic						
<p>Student Grouping</p> <p><input checked="" type="checkbox"/> Whole Class <input checked="" type="checkbox"/> Small Group <input type="checkbox"/> Pairs <input checked="" type="checkbox"/> Individual</p>									
<p>Instructional Delivery Methods</p> <p><input checked="" type="checkbox"/> Teacher Modeling/Demonstration <input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Cooperative Learning <input type="checkbox"/> Centers <input checked="" type="checkbox"/> Problem Solving <input type="checkbox"/> Independent Projects</p>									
<p>Accommodations Additional directions on worksheets of students with IEPs</p>	<p>Modifications Written steps on board</p>								
<p>Homework/Extension Activities: Complete worksheet for homework</p>									
<p>Materials and Equipment Needed:</p> <ul style="list-style-type: none"> • Worksheets 									

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Appendix B: Sample Lesson Plan from October

Lesson Plan Title: Graphing Linear Equations

Teacher's Name: Mr. Perry

Subject/Course: Topics in Alg/Geo

Unit: Linear Functions

Grade Level: 11-12

Overview of and Motivation for Lesson:

Using graphing to model linear equations can allow spatial learning to visualize slope and intercepts and is applicable to many real world systems

Stage 1-Desired Results	
<p>Standard(s):</p> <ul style="list-style-type: none"> HSA-REI.D.10-11- Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line). Show that any point on the graph of an equation in two variables is a solution to the equation. Explain why the x-coordinates of the points where the graphs of the equations $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where $f(x)$ and/or $g(x)$ are linear, polynomial, rational, absolute value, exponential, and logarithmic functions. 	
<p>Aim/Essential Question:</p> <ul style="list-style-type: none"> Use a linear equation in slope intercept form to graph a line 	
<p>Understanding(s): <i>Students will understand that . . .</i></p> <ul style="list-style-type: none"> a linear equation in slope intercept form will always have the slope as the m term and y intercept as the b term we can use the slope and y intercept to graph the equation on a Cartesian plane 	
<p>Content Objectives: <i>Students will be able to . . .</i></p> <ul style="list-style-type: none"> identify the slope and y intercept in a linear equation define the rise and the run in a slope value graph a linear equation on a Cartesian plane 	<p>Language Objectives: ELD Level 3 Choose an item. <i>Students will be able to . . . in English</i></p> <ul style="list-style-type: none"> Use words like rise and run to describe how a line changes in writing <p>ELD Level 5 Choose an item. <i>Students will be able to . . . in English</i></p> <ul style="list-style-type: none"> Describe the change of a line and its intercept orally Click here to enter text.
<p>Key Vocabulary</p> <ul style="list-style-type: none"> linear equation slope intercept axis 	
Stage 2-Assessment Evidence	

Performance Task or Key Evidence	
<ul style="list-style-type: none"> Graphing of linear equations 	
Key Criteria to measure Performance Task or Key Evidence	
<ul style="list-style-type: none"> Correct slope and intercept of lines on worksheet graph paper 	
Stage 3- Learning Plan	
Learning Activities:	
Do Now/Bell Ringer/Opener: Define in your own words slope and draw a coordinate plane	
Learning Activity 1: A brief lecture on the definitions of slope and intercept, how to draw a coordinate plane, and what rise and run refer to in a slope fraction. Walk through the steps of graphing a linear equation and do a worked example.	
Learning Activity 2: Put four equations on the board and have some students come to the board and graph them; others will pick one and do it at their desk. Ensure that common errors are addressed.	
Application Introduce the short project attached. Walk through instructions to making the “stained glass window”. Hand out worksheets and coloring supplies. To be done individually.	
Summary/Closing Graph the first line on the worksheet for students to ensure they have it right. Recollect worksheets to be worked on the following day.	
Multiple Intelligences Addressed:	
<input checked="" type="checkbox"/> Linguistic	<input checked="" type="checkbox"/> Logical-Mathematical
<input checked="" type="checkbox"/> Spatial	<input type="checkbox"/> Interpersonal
<input type="checkbox"/> Musical	<input checked="" type="checkbox"/> Intrapersonal
<input type="checkbox"/> Bodily-kinesthetic	<input type="checkbox"/> Naturalistic
Student Grouping	
<input checked="" type="checkbox"/> Whole Class	<input type="checkbox"/> Small Group
<input type="checkbox"/> Pairs	<input checked="" type="checkbox"/> Individual
Instructional Delivery Methods	
<input checked="" type="checkbox"/> Teacher Modeling/Demonstration	<input checked="" type="checkbox"/> Lecture
<input type="checkbox"/> Cooperative Learning	<input type="checkbox"/> Centers
<input type="checkbox"/> Independent Projects	<input checked="" type="checkbox"/> Discussion
	<input checked="" type="checkbox"/> Problem Solving
Accommodations	Modifications
Additional oral directions for students with IEPs	Written steps on board, repeated oral instructions for ELL class
Homework/Extension Activities:	
Materials and Equipment Needed:	
<ul style="list-style-type: none"> Worksheets 	

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Appendix C: Sample Lesson Plan from October

Lesson Plan Title: Quiz Review

Teacher's Name: Mr. Perry

Subject/Course: Algebra II

Unit: Linear Equations and Inequalities

Grade Level: 11-12

Overview of and Motivation for Lesson:

Preparation for the quiz on Thursday for chapter 1.6-8

Stage 1-Desired Results	
<p>Standard(s):</p> <ul style="list-style-type: none"> A.CED.3 Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. 	
<p>Aim/Essential Question:</p> <ul style="list-style-type: none"> How can we solve a system of equations if it has 3 variables? How can we find the maximum and minimum values of a function over a region? 	
<p>Understanding(s): <i>Students will understand that . . .</i></p> <ul style="list-style-type: none"> graphing is one method used to solve systems of three equations substitution and elimination can still be used for systems of three equations the vertices of a solution set in a graph of a system of inequalities represent highest or lowest possible values bounds and constraints limit the values we can use in a function vertices of a region can be used to find the maximum and minimum points of a function 	
<p>Content Objectives: <i>Students will be able to . . .</i></p> <ul style="list-style-type: none"> solve systems of linear equations in three variables apply this knowledge to real world application problems determine the coordinates of the vertices of the region formed by the graph of linear inequalities find the maximum and minimum values of a function over a region by evaluating the function at the vertices 	<p>Language Objectives:</p> <p>ELD Level 3 Choose an item.<i>Students will be able to . . . in English</i></p> <ul style="list-style-type: none"> Describe a graph and function in writing using directional words like right, left, above, below, domain, range, maximum, minimum <p>ELD Level 5 Choose an item. <i>Students will be able to . . . in English</i></p> <ul style="list-style-type: none"> Click here to enter text. Describe a graph in writing and orally using directional words
<p>Key Vocabulary</p> <ul style="list-style-type: none"> system of equations region intersection feasible region bounded/unbounded system of inequalities inequality intersection maximum minimum linear programming optimize 	

Stage 2-Assessment Evidence	
Performance Task or Key Evidence	
<ul style="list-style-type: none"> Practice problems on pre-quiz activities 	
Key Criteria to measure Performance Task or Key Evidence	
<ul style="list-style-type: none"> Problems to be checked by students in TPS and by teacher in spot checks 	
Stage 3- Learning Plan	
Learning Activities:	
Do Now/Bell Ringer/Opener: Warm-up problem of solving a system of equations with 3 equations. Simple substitution, keep it under 10 minutes. Just give correct answer to spend most time reviewing.	
Learning Activity 1:	
In pairs, do one problem of a linear optimization and one system problem. The pair decides who does which based on what they are stronger with. Walk your partner through the solution and how to get it. This way, students will get another voice and way of describing problems.	
Learning Activity 2:	
Pre-quiz of four to 6 problems of linear optimization and systems of equations. Do in TPS style.	
Application	
Problems directly relate to problems they will see on the quiz	
Summary/Closing	
Reminder of the quiz format and quizzing policy	
Multiple Intelligences Addressed:	
<input checked="" type="checkbox"/> Linguistic	<input checked="" type="checkbox"/> Logical-Mathematical
<input type="checkbox"/> Spatial	<input checked="" type="checkbox"/> Interpersonal
<input type="checkbox"/> Musical	<input checked="" type="checkbox"/> Intrapersonal
<input type="checkbox"/> Bodily-kinesthetic	<input type="checkbox"/> Naturalistic
Student Grouping	
<input checked="" type="checkbox"/> Whole Class	<input type="checkbox"/> Small Group
<input checked="" type="checkbox"/> Pairs	<input checked="" type="checkbox"/> Individual
Instructional Delivery Methods	
<input checked="" type="checkbox"/> Teacher Modeling/Demonstration	<input checked="" type="checkbox"/> Lecture
<input type="checkbox"/> Cooperative Learning	<input type="checkbox"/> Centers
<input type="checkbox"/> Independent Projects	<input checked="" type="checkbox"/> Discussion
	<input checked="" type="checkbox"/> Problem Solving
Accommodations	Modifications
Additional oral directions and accommodations for students with IEPs and 504s as needed	
Homework/Extension Activities:	
Materials and Equipment Needed:	
<ul style="list-style-type: none"> Textbook 	

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Appendix D: Sample Lesson Plan November

Lesson Plan Title: 3.1 and 3.2 Review

Teacher’s Name: Mr. Perry

Subject/Course: Prob & Stat

Unit: Probability

Grade Level: 12

Overview of and Motivation for Lesson:

Discover probability in the real world and its applications in day-to-day life

Stage 1-Desired Results	
<p>Standard(s): S.CP.1 – Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events (“or,” “and,” “not”). S.CP.2 - Understand that two events <i>A</i> and <i>B</i> are independent if the probability of <i>A</i> and <i>B</i> occurring together is the product of their probabilities, and use this characterization to determine if they are independent.</p>	
<p>Aim/Essential Question:</p> <ul style="list-style-type: none"> How does probability change in concurrent events? 	
<p>Understanding(s): <i>Students will understand that . . .</i></p> <ul style="list-style-type: none"> The complement of an event is the probability of that event not happening The sum of the probabilities is 1 and no probability can be smaller than 0 As we take more and more samples, our empirical data comes closer to theoretical values Previous events can impact the probability of an event happening If a previous event has no impact on an event, the two events are independent The probability of two independent events occurring successively is equal that the product of their individual probabilities 	
<p>Content Objectives: <i>Students will be able to . . .</i></p> <ul style="list-style-type: none"> Determine the type of probability a value is Find the probability of a complement of an event Determine basic theoretical probabilities Use data to determine empirical probability Identify a sample space Find conditional probability Determine if events are independent Calculate probability for successive events 	<p>Language Objectives: ELD Level 3 Choose an item. <i>Students will be able to . . . in English</i></p> <ul style="list-style-type: none"> Describe events and their outcomes in writing using words like chances, odds, probability and outcome <p>ELD Level 5 Choose an item. <i>Students will be able to . . . in English</i></p> <ul style="list-style-type: none"> Describe orally events and their outcomes using words like chances, odds, probability and outcome
<p>Key Vocabulary</p> <ul style="list-style-type: none"> probability experiment outcome sample space tree diagram classical (theoretical) probability empirical probability subjective probability complement 	

<ul style="list-style-type: none"> conditional probability independent dependent 	
Stage 2-Assessment Evidence	
Performance Task or Key Evidence	
<ul style="list-style-type: none"> Answers in class discussion, problems from textbook 	
Key Criteria to measure Performance Task or Key Evidence	
<ul style="list-style-type: none"> Participation in the activity and completion of the accompanying problems 	
Stage 3- Learning Plan	
Learning Activities:	
Do Now/Bell Ringer/Opener:	
<ul style="list-style-type: none"> p 120 #10 Check college football bracket challenge for each student for correctness and understanding. Put chart on board and have students answer a, b and c. 	
Learning Activity 1 (review):	
<ul style="list-style-type: none"> An example of a probability experiment where students need to identify events, outcomes, sample space. Give an example of subjective, empirical and theoretical probability. Find conditional probability from a table. 	
Learning Activity 2 (problems):	
P113 #23-26, P121 #15-17. Problems to be done in TPS style where they actually check with a partner before putting the answers on the board. Students can then ask questions. As needed, I will explain problems and walk through solutions.	
Application	
Probability problems will solidify conditional probability and the multiplication rule	
Summary/Closing	
Wrap up the first two sections, reminder of Quiz Tuesday	
Multiple Intelligences Addressed:	
<input checked="" type="checkbox"/> Linguistic <input checked="" type="checkbox"/> Logical-Mathematic I <input type="checkbox"/> Musical <input type="checkbox"/> Bodily-kinesthetic <input type="checkbox"/> Spatial <input checked="" type="checkbox"/> Interpersonal <input checked="" type="checkbox"/> Intrapersonal <input type="checkbox"/> Naturalistic	
Student Grouping	
<input checked="" type="checkbox"/> Whole Class <input type="checkbox"/> Small Group <input checked="" type="checkbox"/> Pairs <input checked="" type="checkbox"/> Individual	
Instructional Delivery Methods	
<input checked="" type="checkbox"/> Teacher Modeling/Demonstration <input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Discussion <input type="checkbox"/> Cooperative Learning <input type="checkbox"/> Centers <input checked="" type="checkbox"/> Problem Solving <input type="checkbox"/> Independent Projects	
Accommodations	Modifications
Additional oral directions for students with IEPs, 504s and ELLs	Written steps on board, repeated oral instructions for ELL class
Homework/Extension Activities:	
<ul style="list-style-type: none"> Study 	
Materials and Equipment Needed:	
<ul style="list-style-type: none"> Textbooks 	

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Appendix E: Sample Worksheet For Topics

6-3 Skills Practice

Elimination Using Addition and Subtraction

Use elimination to solve each system of equations.

1. $x - y = 1$
 $x + y = 3$

2. $-x + y = 1$
 $x + y = 11$

3. $x + 4y = 11$
 $x - 6y = 11$

4. $-x + 3y = 6$
 $x + 3y = 18$

5. $3x + 4y = 19$
 $3x + 6y = 33$

6. $x + 4y = -8$
 $x - 4y = -8$

7. $3x + 4y = 2$
 $4x - 4y = 12$

8. $3x - y = -1$
 $-3x - y = 5$

9. $2x - 3y = 9$
 $-5x - 3y = 30$

10. $x - y = 4$
 $2x + y = -4$

11. $3x - y = 26$
 $-2x - y = -24$

12. $5x - y = -6$
 $-x + y = 2$

13. $6x - 2y = 32$
 $4x - 2y = 18$

14. $3x + 2y = -19$
 $-3x - 5y = 25$

15. $7x + 4y = 2$
 $7x + 2y = 8$

16. $2x - 5y = -28$
 $4x + 5y = 4$

17. The sum of two numbers is 28 and their difference is 4. What are the numbers?

18. Find the two numbers whose sum is 29 and whose difference is 15.

19. The sum of two numbers is 24 and their difference is 2. What are the numbers?

20. Find the two numbers whose sum is 54 and whose difference is 4.

Appendix F: Student Feedback Survey



CAP Student Feedback Survey
Grades 6-12: Short Form

Name of **teacher**: _____ Date: _____

Directions: Read each statement and then choose **one** answer choice that you think fits best. There are no right or wrong answers. Your teacher will use your class's responses to better understand what it's like to be a student in this class. Your teacher will not see your individual answers.

		Strongly Agree	Agree	Disagree	Strongly Disagree
1.	My teacher demonstrates that mistakes are a part of learning.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2.	My teacher asks us to summarize what we have learned in a lesson.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3.	Students push each other to do better work in this class.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4.	I am able to connect what we learn in this class to what we learn in other subjects.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5.	My teacher uses open-ended questions that enable me to think of multiple possible answers.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6.	In discussing my work, my teacher uses a positive tone even if my work needs improvement.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7.	In this class, students review each other's work and provide each other with helpful advice on how to improve.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8.	When asked, I can explain what I am learning and why.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9.	In this class, other students take the time to listen to my ideas.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10.	The level of my work in this class goes beyond what I thought I was able to do.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
11.	The material in this class is clearly taught.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
12.	If I finish my work early in class, my teacher has me do more challenging work.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
13.	My teacher asks me to rate my understanding of what we have learned in class.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
14.	To help me understand, my teacher uses my interests to explain difficult ideas to me.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>





CAP Student Feedback Survey
Grades 6-12: Short Form

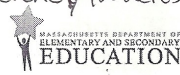
		Strongly Agree	Agree	Disagree	Strongly Disagree
15.	In this class, students work together to help each other learn difficult content.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
16.	In this class, students are asked to teach (or model) to other classmates a part or whole lesson.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
17.	Our class stays on task and does not waste time.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
18.	During a lesson, my teacher is quick to change how he or she teaches if the class does not understand (e.g., switch from using written explanations to using diagrams).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
19.	My teacher encourages us to accept different points of view when they are expressed in class.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
20.	I can show my learning in many ways (e.g., writing, graphs, pictures) in this class.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

OPTIONAL: If you have any additional feedback for your teacher, please share it here.

Appendix G: Student Feedback Survey: Item Key

ESE Model Student Feedback Survey: ITEM KEY
Grades 6-12: Short Form

are there any areas I am deficient in across the board



This item key is not intended for distribution to students. The following table provides a crosswalk between survey items and the Standards and Indicators of Effective Teaching Practice addressed throughout the survey. *are there significant differences between topics classes*
 You may sort the items by Standard/Indicator by selecting the table and finding the Sort function in the Table Layout tab.

Standard I: Curriculum, Planning & Assessment	Standard II: Teaching All Students
I.A: Curriculum & Planning	II.A: Instruction
I.B: Assessment	II.B: Learning Environment
I.C: Analysis	II.C: Cultural Proficiency
	II.D: Expectations

Standard/ Indicator	#	Item
II.B	1.	My teacher demonstrates that mistakes are a part of learning.
I.A	2.	My teacher asks us to summarize what we have learned in a lesson.
II.D	3.	Students push each other to do better work in this class.
I.A	4.	I am able to connect what we learn in this class to what we learn in other subjects.
I.A	5.	My teacher uses open-ended questions that enable me to think of multiple possible answers.
II.B	6.	In discussing my work, my teacher uses a positive tone even if my work needs improvement.
I.C	7.	In this class, students review each other's work and provide each other with helpful advice on how to improve.
II.D	8.	When asked, I can explain what I am learning and why.
II.C	9.	In this class, other students take the time to listen to my ideas.
II.D	10.	The level of my work in this class goes beyond what I thought I was able to do.
I.A	11.	The material in this class is clearly taught.
II.C	12.	If I finish my work early in class, my teacher has me do more challenging work.
I.A	13.	My teacher asks me to rate my understanding of what we have learned in class.
II.B	14.	To help me understand, my teacher uses my interests to explain difficult ideas to me.
II.C	15.	In this class, students work together to help each other learn difficult content.
II.A	16.	In this class, students are asked to teach (or model) to other classmates a part or whole lesson.
II.B	17.	Our class stays on task and does not waste time.

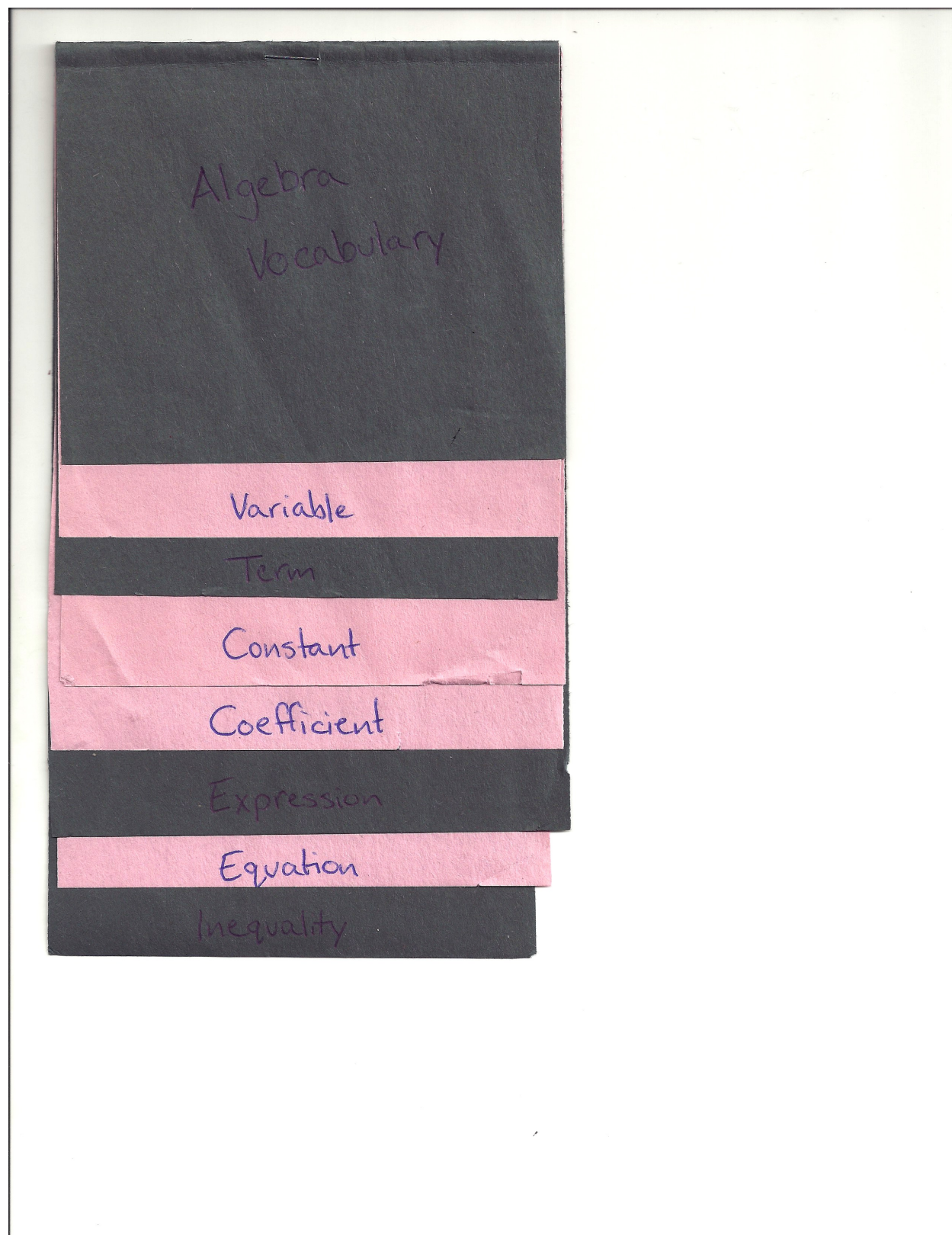
ESE Model Student Feedback Survey: ITEM KEY

Grades 6-12: Short Form



Standard/ Indicator	#	Item
II.D	18.	During a lesson, my teacher is quick to change how he or she teaches if the class does not understand (e.g., switch from using written explanations to using diagrams).
II.C	19.	My teacher encourages us to accept different points of view when they are expressed in class.
II.A	20.	I can show my learning in many ways (e.g., writing, graphs, pictures) in this class.

Appendix H: Sample Vocabulary Supplement (Flipbook)



Algebra
Vocabulary

Variable

Term

Constant

Coefficient

Expression

Equation

Inequality

Examples

x y z

a b c

an unknown quantity or
expression whose value can
change

Variable

Term

Constant

Coefficient

Expression

Equation

Appendix I: IEP Form 1

Return to K. Dewley

Teacher: Mr. Spellane Subject Area: Topics Alg/Geo Date: 10-17-17

Student Name: ~~Lucas Resto~~ Grade: 11

It is my responsibility to monitor the progress of inclusion students in your classroom. Please assist me in collecting the necessary information to ensure that this student's educational plan is appropriate.

Behavior	<input type="checkbox"/> Excellent	<input checked="" type="checkbox"/> Good	<input type="checkbox"/> Fair	<input type="checkbox"/> Poor
Class Participation	<input type="checkbox"/> Excellent	<input type="checkbox"/> Good	<input checked="" type="checkbox"/> Fair	<input type="checkbox"/> Poor
Test Scores	<input type="checkbox"/> Excellent	<input type="checkbox"/> Good	<input checked="" type="checkbox"/> Fair	<input type="checkbox"/> Poor
Homework completion	<input type="checkbox"/> Excellent	<input checked="" type="checkbox"/> Good	<input type="checkbox"/> Fair	<input type="checkbox"/> Poor
Grades	<input type="checkbox"/> Excellent	<input checked="" type="checkbox"/> Good	<input type="checkbox"/> Fair	<input type="checkbox"/> Poor
Interpersonal Skills	<input type="checkbox"/> Excellent	<input type="checkbox"/> Good	<input checked="" type="checkbox"/> Fair	<input type="checkbox"/> Poor
Organizational Skills	<input type="checkbox"/> Excellent	<input type="checkbox"/> Good	<input checked="" type="checkbox"/> Fair	<input type="checkbox"/> Poor
Ability to focus and remain on task	<input type="checkbox"/> Excellent	<input type="checkbox"/> Good	<input checked="" type="checkbox"/> Fair	<input type="checkbox"/> Poor

How does this student's performance compare in relation to the Massachusetts Curriculum Frameworks/Common Core State Standards?

↓ average

Please list 3 areas of student strength:

1. Asking questions
2. Trying/retrying problems
3. Communication with classmates

Please list 3 areas of needed growth:

1. Attitude
2. Defeatism
3. Test-taking

Comments (Please indicate if you feel that the student should have a goal developed for a particular skill deficit): Click here to enter text.

individual + independent

Thank you for your assistance and cooperation. If you need additional information or have questions or concerns, please feel free to contact me.

Appendix J: IEP Form 2

Meeting Scheduled for: 12/4/17 @ 8:00 AM Return by: 11/29/17

Teacher: Mr. Spellane Subject Area: Math (Topics) Date: 11/15/17

Student Name: Courtney Harriot Grade: 10

It is my responsibility to monitor the progress of inclusion students in your classroom. Please assist me in collecting the necessary information to ensure that this student's educational plan is appropriate.

Behavior	<input type="checkbox"/> Excellent	<input checked="" type="checkbox"/> Good	<input type="checkbox"/> Fair	<input type="checkbox"/> Poor
Class Participation	<input checked="" type="checkbox"/> Excellent	<input type="checkbox"/> Good	<input type="checkbox"/> Fair	<input type="checkbox"/> Poor
Test Scores	<input type="checkbox"/> Excellent	<input checked="" type="checkbox"/> Good	<input type="checkbox"/> Fair	<input type="checkbox"/> Poor
Homework completion	<input type="checkbox"/> Excellent	<input checked="" type="checkbox"/> Good	<input type="checkbox"/> Fair	<input type="checkbox"/> Poor
Grades	<input type="checkbox"/> Excellent	<input checked="" type="checkbox"/> Good	<input type="checkbox"/> Fair	<input type="checkbox"/> Poor
Interpersonal Skills	<input type="checkbox"/> Excellent	<input checked="" type="checkbox"/> Good	<input type="checkbox"/> Fair	<input type="checkbox"/> Poor
Organizational Skills	<input type="checkbox"/> Excellent	<input type="checkbox"/> Good	<input checked="" type="checkbox"/> Fair	<input type="checkbox"/> Poor
Ability to focus and remain on task	<input type="checkbox"/> Excellent	<input checked="" type="checkbox"/> Good	<input type="checkbox"/> Fair	<input type="checkbox"/> Poor

How does this student's performance compare in relation to the Massachusetts Curriculum Frameworks/Common Core State Standards?

Student is meeting most content objectives and standards

Please list 3 areas of student strength:

1. Student asks good questions in class and individually
2. Student does the work when asked
3. Attention during lecture time.

Please list 3 areas of needed growth:

1. Focus + perseverance through tough problems
2. Limiting distractions around him
3. Organizing notes + materials

Comments (Please indicate if you feel that the student should have a goal developed for a particular skill deficit):

Courtney is a pleasure! Sometimes his work is disorganized and it can take a few minutes for him to find homework or notes. His skills in this area would be a great place focus of improvement.

PLEASE RETURN TO MELISSA PERRY, M.ED. RM. 321A THANK YOU!

Appendix K: Inequality Quiz Student Responses

Quiz – Graphing Inequalities

B

Solve the compound inequality and graph on the number line.

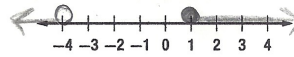
9) $x < 5$ and $x \geq -1$



C

10) $x - 1 < -5$ or $2x + 4 \geq 6$

$x < -4$ or $2x \geq 2$
 $x \geq 1$

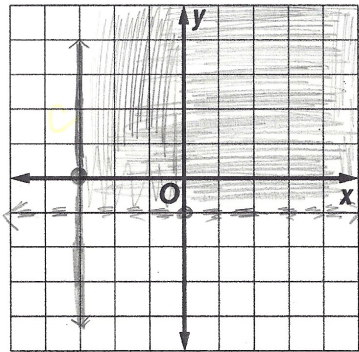


C

Solve the compound inequality by graphing on the plane. Your final answer is the overlapping shaded region.

11) $x \geq -3$

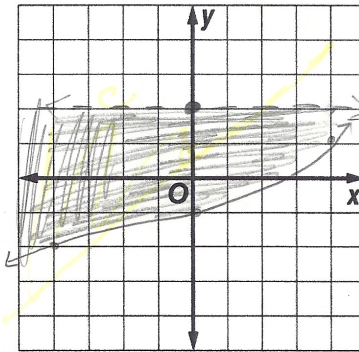
$y < -2x + 1$



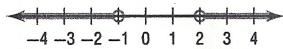
X

12) $y < 2$

$y \geq \frac{3}{4}x + 1$



Bonus: What are the inequalities graphed on the following number line?



$x < -1$ or $x > 2$

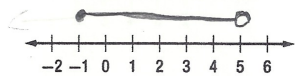
+4

Quiz – Graphing Inequalities

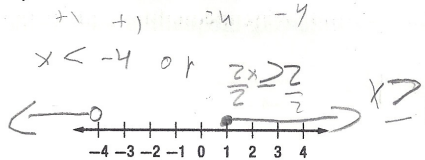
B

Solve the compound inequality and graph on the number line.

9) $x < 5$ and $x \geq -1$

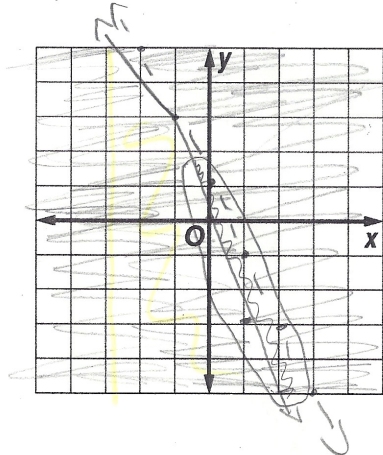


10) $x - 1 < -5$ or $2x + 4 \geq 6$

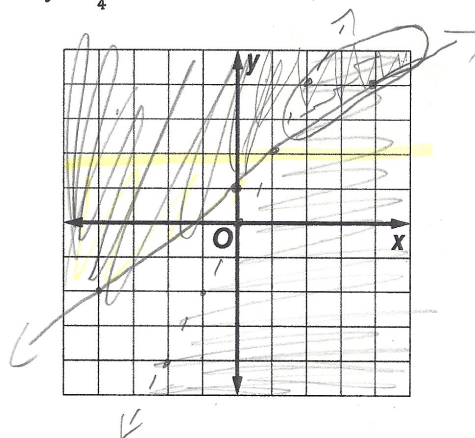


Solve the compound inequality by graphing on the plane. Your final answer is the overlapping shaded region.

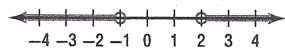
11) $x \geq -3$
 $y < -2x + 1$



12) $y < 2$
 $y \geq \frac{3}{4}x + 1$



Bonus: What are the inequalities graphed on the following number line?



$-1 < x < 2$

Quiz – Graphing Inequalities

A

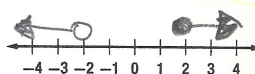
Solve the compound inequality and graph on the number line.

9) $x < 5$ and $x \geq -2$



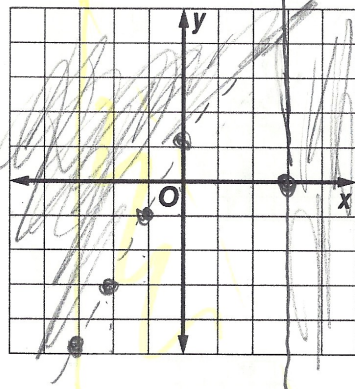
10) $x - 1 < -3$ or $2x + 4 \geq 8$

$x < -2$ $x \geq 2$



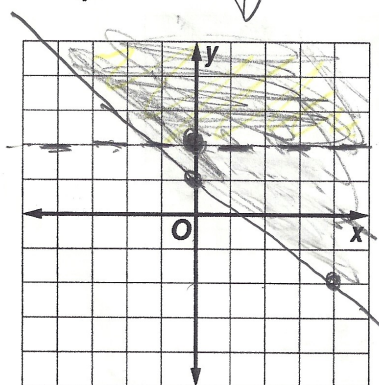
Solve the compound inequality by graphing on the plane. Your final answer is the overlapping shaded region.

11) $x \geq -3$
 $y < -2x + 1$



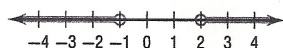
solution

12) $y > 2$
 $y \geq -\frac{3}{4}x + 1$



solution

Bonus: What are the inequalities graphed on the following number line?



$x < -1$ or $x > 2$

14

Appendix L: Probability and Statistics Test

NAME:

Key

Probs + Stats

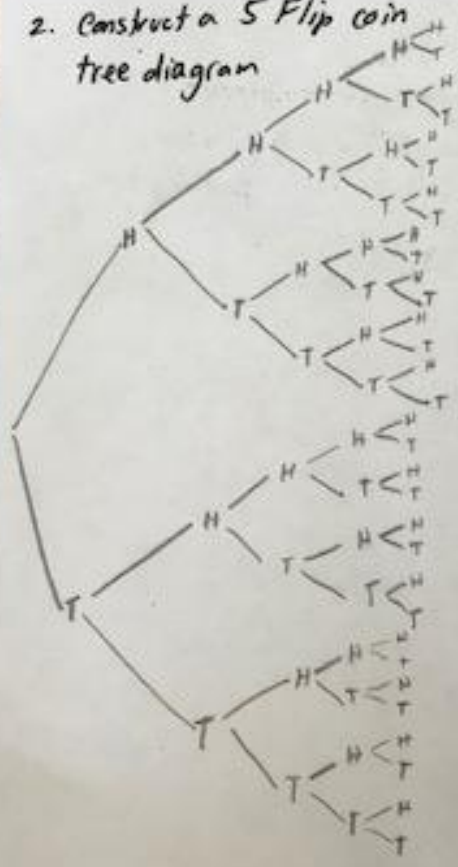
CHAPTER 3 TEST

1.

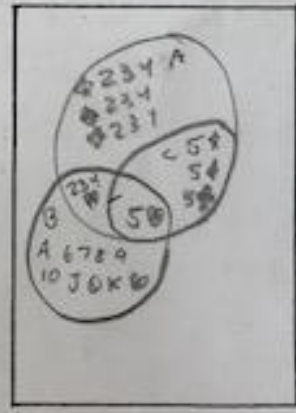
	M	F	
18-30	115	240	355
31-40	410	521	931
41-50	366	347	713
50+	59	42	101
	950	1150	2100

- a) complete chart
- b) FIND $p(m/31-40)$ $\frac{410}{931}$ $\frac{410}{950}$
- c) FIND $p(31-40/m)$ \rightarrow
- d) FIND $p(41-50)$ $\frac{713}{2100}$
- e) FIND $p(F \text{ and } 18-30)$ $\frac{240}{2100}$
- f) FIND $p(F \text{ and } 41-50)$ $\frac{347}{2100}$

2. Construct a 5 Flip coin tree diagram



- ③ Draw a Venn diagram for these events.
sample space: Deck of Cards
event A: cards (2,3,4,5)
event B: hearts
event C: 5s



4.



a) How many 3 # lock combos are possible for this lock.
 $(40)(40)(40) \rightarrow 64000$

b) How many "Lock Combos" are there if you cannot have same # 3 times as a Combo.
 $(40)(40)(40) - 40 \rightarrow 63960$

c) How many "Lock Combos" are possible if you know the 1st number of Combo.
 $1(40)(40) \rightarrow 1600$

5. A Company has 185 employees. Of these employees 45 are women. A Committee of 15 people are selected and All women were selected at "Random". What is probability that this happened.

$$\frac{45 C_{15}}{185 C_{15}} =$$

.0000000008 or

0.000000008%

Appendix M: Period 6 Reflection Responses

① 50%

② 65%

③ staying up

④ My Quizes and classwork

⑤ Write bigger on the board.

⑥ Stay off my phone

⑦ My back around.

~~How to~~

- ① 60%
- ② 40%
- ③ I think I might not understand things completely and it confuses me even more sometimes
- ④ learning and Passing
- ⑤ using different color markers in the steps of problems
- ⑥ stay on track
- ⑦ how to do a backflip

~~_____~~
1) 60

2) 40

3) Polynomials

4) I don't know

5) change how you
teach

6) start listen more

7)

Appendix N: Tabulated Data from Student Feedback Survey

Clas	Stu	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20
2	1	4	3	2	3	2	3	3	3	2	3	4	3	4	4	4	4	3	3	3	4
2	2	3	2	1	1	3	3	2	3	1	2	3	2	2	1	2	1	2	2	2	2
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7	12	4	2	2	2	3	4	3	3	3	4	4	2	3	3	3	3	2	3	3	4	
7	13	3	3	3	3	3	3	2	2	2	2	2	2	3	3	3	3	3	3	3	3	
7	14	3	2	2	3	3	3	2	2	2	2	3	1	2	2	2	2	3	3	3	3	

7	15	4	3	3	3	3	3	3	3	3	2	3	3	3	3	3	3	3	3	3
7	16	4	4	3	3	4	3	4	3	4	4	4	4	4	3	3	3	4	3	4
7	17	3	3	3	3	3	4	4	4	3	2	4	2	3	3	3	3	3	3	3
7	18	3	3	1	2	3	4	1	4	3	2	4	2	4	1	2	1	3	4	3
7	19	4	2	1	2	3	4	1	3	1	3	3	2	2	2	1	2	2	4	4
7	20	0	3	1	1	3	3	1	3	3	2	3	1	0	3	1	2	1	4	3
7	21	4	3	3	3	4	4	3	3	3	3	4	2	3	4	3	3	3	4	3

Appendix O: Graphing Project for Topics in Algebra and Geometry

STAINED GLASS BLUEPRINTS

NAME: _____ DATE: _____ PERIOD: _____

- 1) Graph each line on your paper using pencil. Make sure that your lines are straight by using a ruler. Extend the lines to the edge of your paper. You may trim the edges later to make it neat.
- 2) When you have finished graphing all the lines, color your design to create a stained glass window.
- 3) You may wish to go over certain parts of the design with a dark pen, crayon, or marker to emphasize different portions.

1) $y = -3/2x + 12$

7) $y = 4/5x - 4$

2) $y = 3/2x + 12$

8) $y = -4/5x - 4$

3) $y = -3/2x - 12$

9) $y = 12$

4) $y = 3/2x + 12$

10) $y = -12$

5) $y = 4/5x + 4$

11) $x = 10$

6) $y = -4/5x + 4$

12) $x = -10$

After you have graphed all the lines, plot these points. Connect them in the order that they are plotted. For example, graph $(-2,0)$. Then graph $(0,4)$ and connect it back to $(-2,0)$. When you reach a STOP, you have completed a shape. Pick up the pencil and start the next column without connecting it to the previous one.

$(-2, 0)$	$(0, 10)$	$(-1, 0)$	$(0, -4)$	$(0, 4)$
$(0, 4)$	$(5, 0)$	$(0, 3)$	$(1, -6)$	$(1, 6)$
$(2, 0)$	$(0, -10)$	$(1, 0)$	$(0, -10)$	$(0, 10)$
$(0, -4)$	$(-5, 0)$	$(0, -3)$	$(-1, -6)$	$(-1, 6)$
$(-2, 0)$	$(0, 10)$	$(-1, 0)$	$(0, -4)$	$(0, 4)$
STOP	STOP	STOP	STOP	STOP

DESIGN YOUR OWN STAINED GLASS

1. Create your own stained glass design, using at least 10 equations. 2. Create a list of the equations you used. 3. Graph and color your design.

SOME POINTERS:

- ✓ Changing signs will reflect your design, for instance...
 - Changing to will reflect the line across the y-axis. (Opposite sign for the slope)
 - Changing to will reflect the line across the x-axis. (Opposite signs for the slope and the y-intercept)
- ✓ You can create shapes as in the original activity by making a list of ordered pairs to connect.

STAINED GLASS WINDOW EQUATIONS

- 1) _____
- 2) _____
- 3) _____
- 4) _____
- 5) _____
- 6) _____
- 7) _____
- 8) _____
- 9) _____
- 10) _____

Appendix P: Budgeting Project for Algebra II

Budgeting Project

This week in class, we will be reviewing linear equations. Throughout our week of review, we will be using linear equations to talk about budgeting life after high school.

Day 1:

What is your plan after DHS?

What is your planned job after DHS?

What is your expected monthly income during this time? How many hours do you plan to work? How much per hour?

What are your expected fixed expenses? And what are their expected costs?

What are your expected variable expenses? And what are their expected costs?

Day 2:

With the information brainstormed from yesterday, you are going to be thinking about how to budget your time after DHS.

Write a linear equation representing money saved over time based on the information you calculated yesterday

Graph that equation below to represent the first two years after college. Remember to label both the axes.

What does the slope of this line represent?

What is one savings goal you have? Will you be able to attain this goal after the first two years?

Day 3:

Today, you are going to consider different budget plans that fulfill your long term goals.

Below you will graph all of your different scenarios with different colored pencils. Start by graphing the original equation in black:

Scenario 1: Write an equation for a scenario where you graduate college with some money already saved. How would this change your equation and line? Graph it.

Scenario 2: Write an equation for a scenario where you have an added expense you did not originally plan to have. What is this expense? How does this change your graph? Graph it.

Scenario 3: Write an equation for a scenario where you cut out an expense. Why were you able to cut out this expense? What does it do to your line? Graph it.

Scenario 4: Write an equation for an increase in expected income. Why did your income increase? Is this a real possibility for you to accomplish? How did it change the graph? Graph it.

Day 4: Today you are going to reflect on this project. Please answer the following questions thoughtfully and thoroughly.

What is the purpose of budgeting?

What are some of the tradeoffs you see in your future and how are you going to anticipate them?

What are some of the key takeaways you have gotten out of this project?

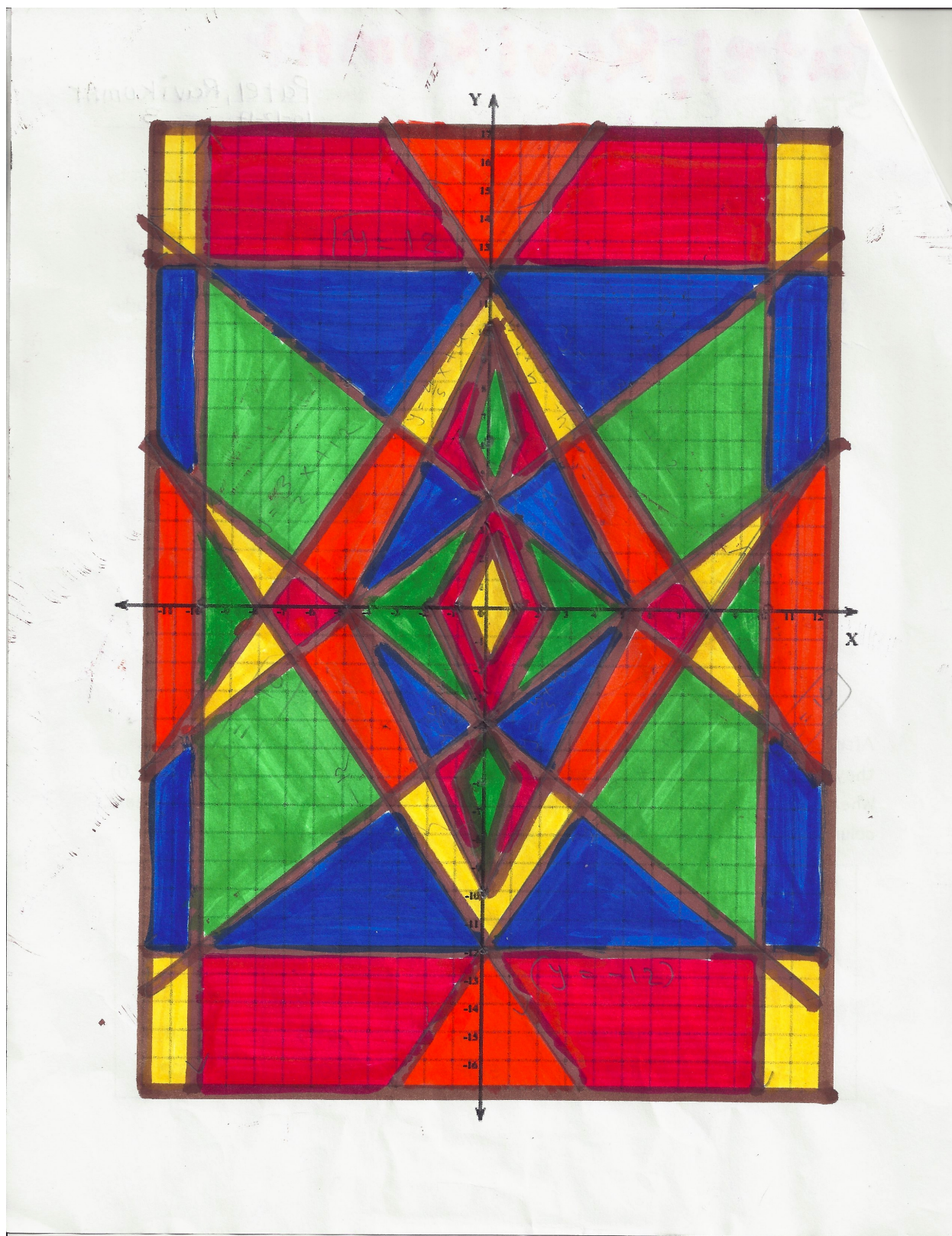
What did you like about this project?

What do you think can be improved about this project?

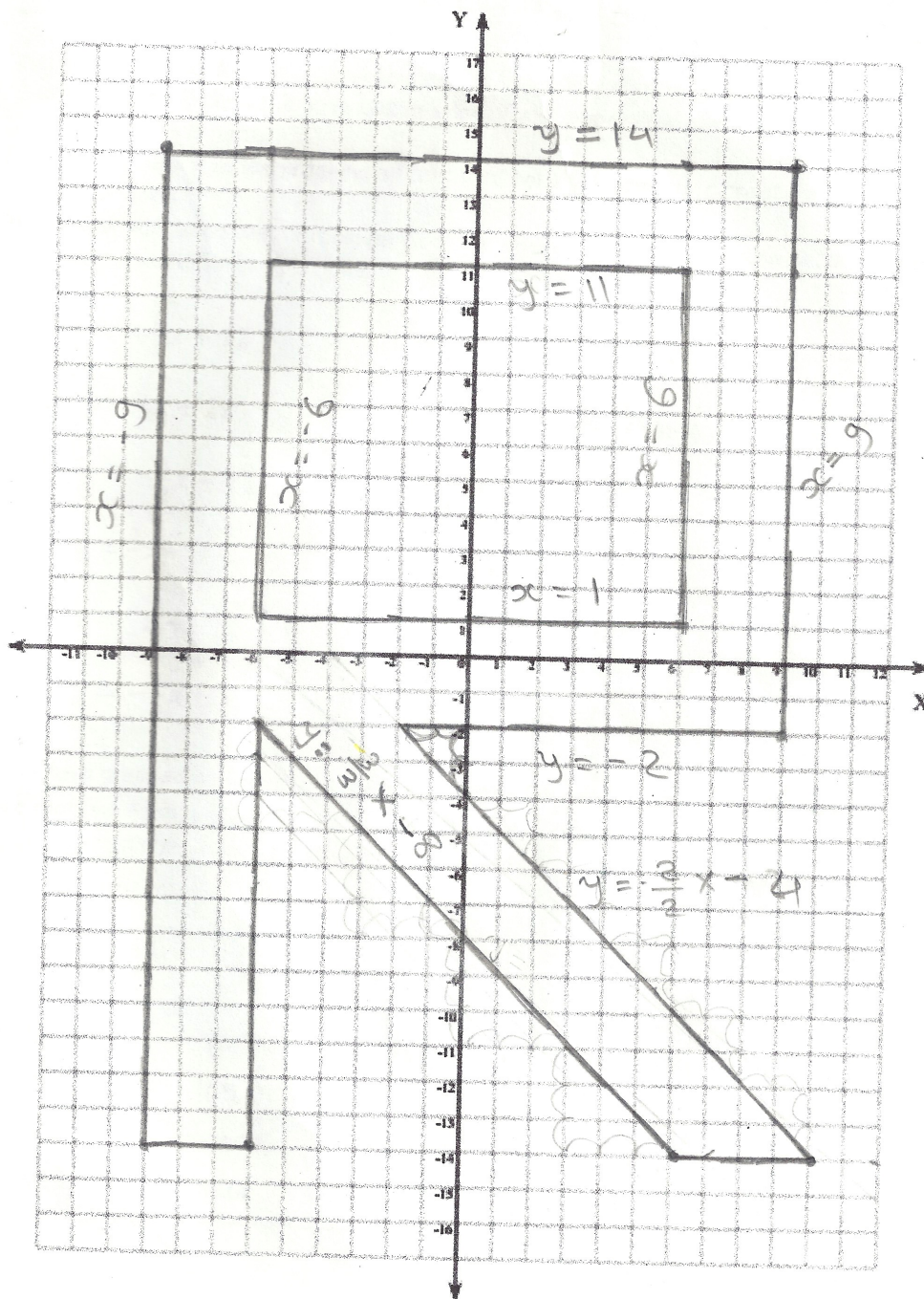
Additional Comments:

Adapted from Ms. Daly Place

Appendix Q: Exemplary Student Work – Graphing Project



~~Patel Ravin Kumar~~



10
8
0
10
10

Appendix R: Exemplary Student Work – Budgeting Project

11/10/17 P7

Budgeting Project

This week in class, we will be reviewing linear equations. Throughout our week of review, we will be using linear equations to talk about budgeting life after high school.

Definitions Needed:

- Earned Income Money you earned from job or working
- Unearned Income Money in a bank w/ interest
- Fixed Expenses rent & "bills"
- Variable Expenses things that happen

Day 1:

What is your plan after DHS?

- Move to Florida and attend FSU
- Get degree in anesthesia;

What is your planned job after DHS?

- Work in retail until I can get a job in
~~see~~ a hospital

What is your expected monthly income during this time? How many hours do you plan to work?
How much per hour?

- \$ 600 a month
- \$ 30 hrs a week
- \$ 11 a hr

What are your expected fixed expenses? And what are their expected costs?

phone bill \$ 50	
food \$ 100	\$ 275
car insurance \$ 125	

What are your expected variable expenses? And what are their expected costs?

clothes \$ 70	
shoes \$ 90	\$ 160

Day 2: With the information brainstormed from yesterday, you are going to be thinking about how to budget your time after DHS.

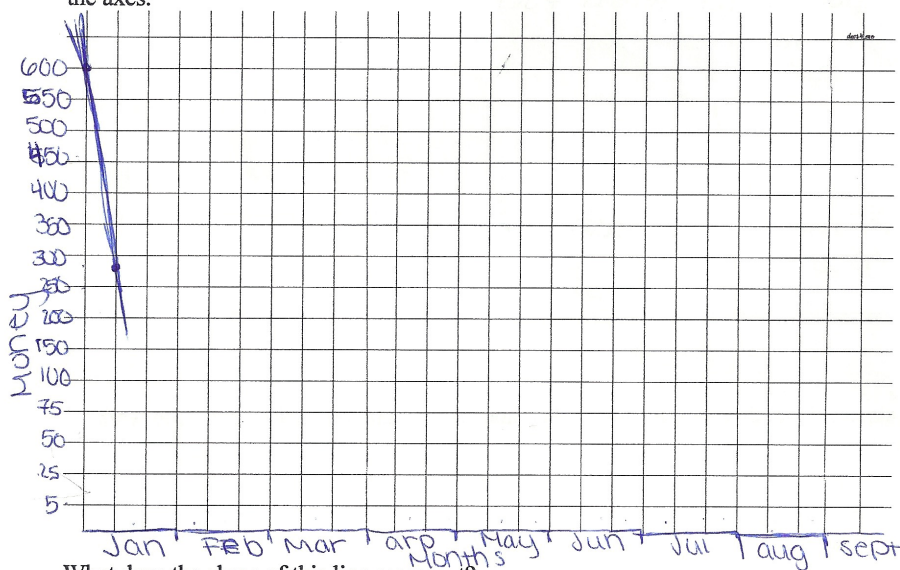
Write a linear equation representing money saved over time based on the information you calculated yesterday.

$$S = \text{scribbled out}$$

$$S = 325m + 600$$

$$600 - 275 = 325$$

Graph that equation below to represent the first two years after college. Remember to label both the axes.



What does the slope of this line represent?

It represents how my money budget would look during each month.

What is one savings goal you have? Will you be able to attain this goal after the first two years?

My saving goal would be to put away whatever I have left after paying bills and use ~~any~~ anything else to pay things I'll need along the way.

11/10/17 P7

Part 3

- If I were to have more money saved I could buy more clothes or food
- If I had an added expense then it would take away from the variable expenses.
- If I cut an expense then I'll most likely have to worry about it popping up again and I'd still have to budget
- If my income were to increase I would save more money

Part 4

- The purpose of budgeting is to make sure you don't spend most of what you make.
- I've taken away the fact that ~~everything~~ is expensive
- There's not really much to like or change about the project.

50
15
15
15

95