TEACHING PRACTICUM AT WORCESTER TECHNICAL HIGH SCHOOL

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INTERACTIVE QUALIFYING PROJECT: A & B TERMS 2018
WORCESTER POLYTECHNIC INSTITUTE
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ABSTRACT

For my Interactive Qualifying Project, I student taught for the 2018 fall semester at Worcester Technical High School. In this IQP report, I extensively demonstrate the connection between the theory of education and the application of this theory in the classroom. After a brief background section on the education system in Massachusetts, I analyze the six Candidate Assessment of Performance (CAP) essential elements to explain how my classroom instruction improved to proficiently model each element of CAP. There are six chapters to explore the values and applications of each element: well-structured lessons, meeting diverse needs, adjustment to practice, safe learning environment, high expectations, reflective practice. Each section comes with its own supporting evidence of lesson plans, projects, surveys, student work and the like. I then evaluate how my education at WPI has prepared me for the classroom. Lastly, I provide examples of major takeaways from my teaching practicum as well as express a professional goal that I would set for myself if I were to begin my own practice.

Chapter 1: BACKGROUND

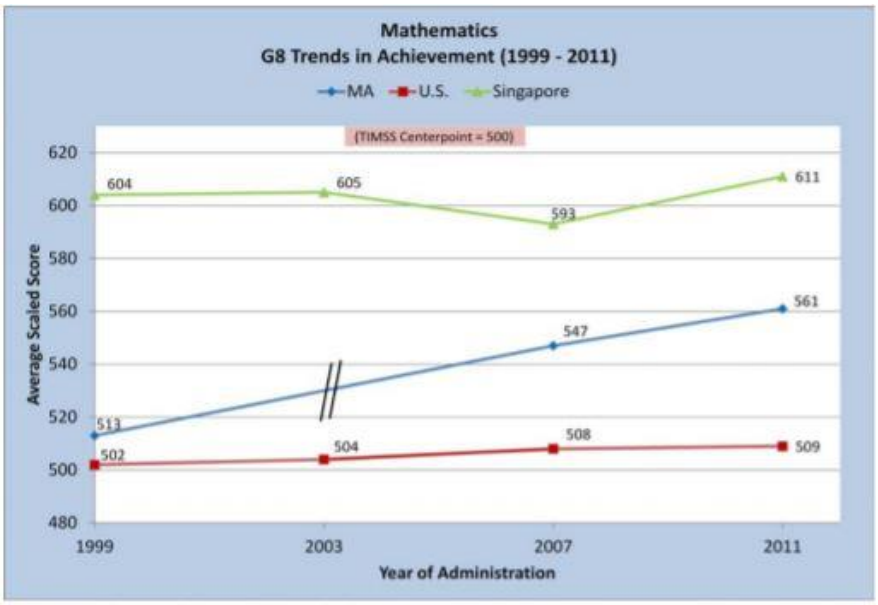
Massachusetts Reformation Act of 1993

The Massachusetts Education Reform Act of 1993 (MERA) is a 25-year-old plan to change and raise the standards of education in Massachusetts. This act's framework was established and created by a group, called the Massachusetts Business Alliance for Education. All change has its pluses and minuses but this act has been able to last for over 20 years. "At its most basic level, the [reform act] required the establishment of high standards that each student would be expected to meet, a statewide assessment system designed to measure progress towards that goal, and an accountability system to hold schools and districts responsible for progress in meeting the new standards" (*Building on 20 Years of Mass. Education Reform,* 2). These standards included everyone who was involved in the education system. The MERA also provided the necessary resources (A.K.A money) for the districts to be able to achieve this goal of reformation. Its lasting consequences is one of the reasons why the school system in Massachusetts is highly regarded nationally and internationally.

Massachusetts Schools among the International Community

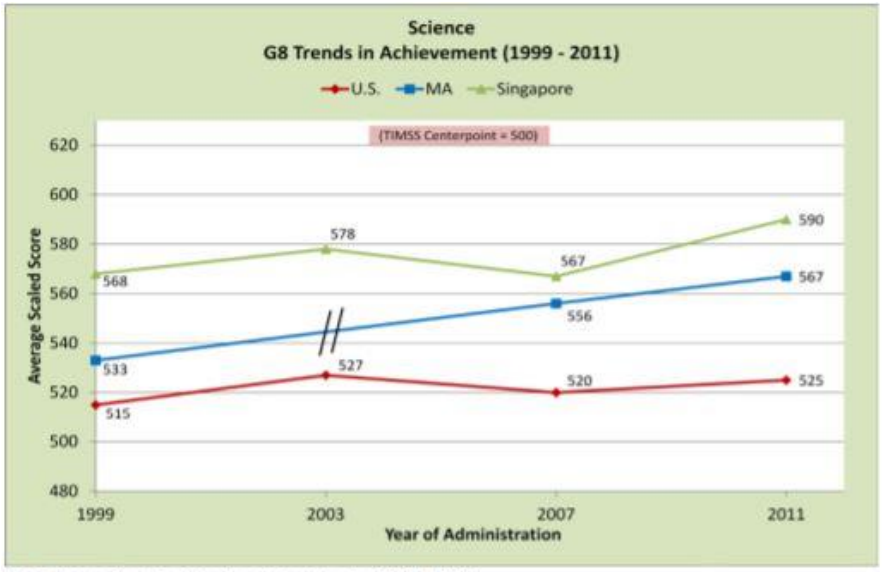
From 1999 to 2011, eighth graders from Massachusetts out-performed all other students surveyed from the United States in the subjects of mathematics and science. These scores were analyzed against the scores of Korea, Singapore, China, and Japan (TIMSS Massachusetts Result Summary, 4). This information was collected by the Trends in International Mathematics and Science Study (TIMSS). With TIMSS, countries are able to reflect on their performances against other countries to improve their education systems. The charts below show that Massachusetts' average score of achievement increased between the years of 1999 and 2011, demonstrating how TIMSS's information and the reform act together make Massachusetts a force to be reckoned

with as this state will only strive to improve the scholarship of its students. These charts are provided by a TIMSS report from 2014.



Note: Massachusetts did not participate in the 2003 TIMSS.

Figure 1: TIMSS Math Report (1993-2011)



Note: Massachusetts did not participate in the 2003 TIMSS.

Figure 2: TIMSS Science Report (1993-2011)

All of this in mind, it is important that this competition and ambition doesn't hinder the little guy from thriving. Students are the focus of the education system puzzle. Massachusetts supports

almost 1,000,000 students yearly; these students are not limited to the ones in the city of Massachusetts with the third largest enrollment of students, Worcester. (*doe.mass.edu)*

Worcester Public Schools

Worcester Public Schools has a mission of creating a scholastic community with a solid core curriculum taught by high-level instructors. By doing this, students are provided with opportunities to grow in their academics, to be exposed to diverse cultures, and to be sent out ready to be an active part of our society. Within this school district, there are 44 schools: 34 elementary schools, four middle schools, six high schools. These 44 schools support about 25,500 students and their families (give or take a couple hundred pupils). With an average student/teacher ratio of 14.2 to 1, the students—in a system where 100% of its classrooms are on the internet—in this district are personally supported by highly qualified educators that help to contribute to a 94% attendance rate. This district also offers enrollment to a highly regarded vocational school known as Worcester Technical High School (WTHS).

Worcester Technical High School

Worcester Technical High School is the school where I completed my teaching practicum. This school has 1,400 students enrolled with a 98% graduation rate, and it provides 22 unique technical areas that prepare students for success immediately after graduation—this school also has an extremely low dropout rate of 0.5%. Below is a graph representing post-high school plans for graduates from the 2016-17 school year, provided by the Massachusetts Department of Education website. These graphs compare WTHS to the district and state populations:

Plan	% of School	% of District	% of State
4-Year Private College	21	16	30
4-Year Public College	35	26	31
2-Year Private College	0	1	1
2-Year Public College	31	45	19
Other Post-Secondary	0	1	2
Work	10	7	9
Military	3	2	2
Other	1	0	1
Unknown	0	1	5

Figure 3: WTHS Post-Grad Plans

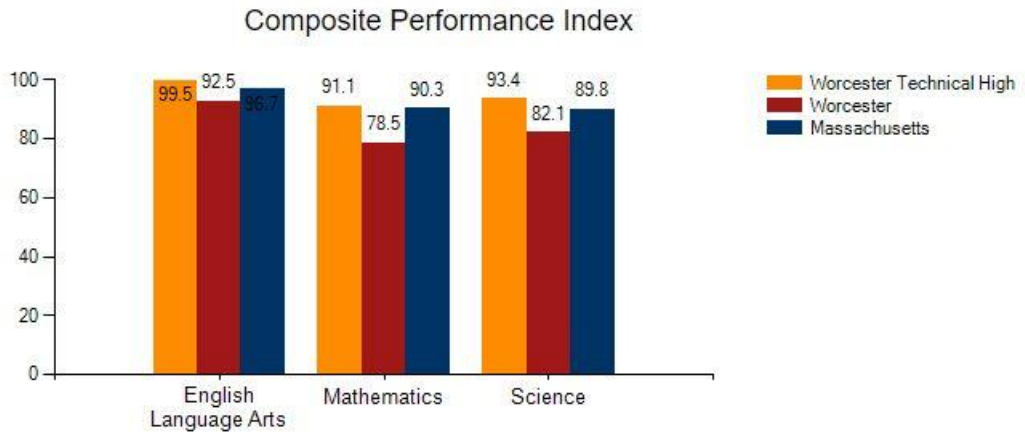
Here are a few of graphs showing the demographic information of Worcester Tech from last school year (2017-18) provided by the Massachusetts Department of Education website:

Enrollment by Race/Ethnicity (2017-18)			
Race	**% of School**	**% of District**	**% of State**
African American	16.3	15.9	9.0
Asian	6.1	7.1	6.9
Hispanic	37.1	42.6	20.0
Native American	0.1	0.2	0.2
White	36.9	30.2	60.1
Native Hawaiian, Pacific Islander	0.0	0.0	0.1
Multi-Race, Non-Hispanic	3.6	4.2	3.6

Enrollment by Gender (2017-18)			
	School	**District**	**State**
Male	631	13,041	489,172
Female	758	12,265	464,753
Total	1,389	25,306	954,034

Figures 4 & 5: WTHS Demographics

In a math department about new MCAS tests meeting, it was discussed that Worcester Tech has performed well on MCAS out-scored the averages of the district and the state. This is how the school performed using a Composite Performance Index in the 2016-17 school year. This graph is provided by the Massachusetts Department of Education website:



	English Language Arts (CPI)	Mathematics (CPI)	Science (CPI)
Worcester Technical High	99.5	91.1	93.4
Worcester	92.5	78.5	82.1
Massachusetts	96.7	90.3	89.8

Figures 7 & 8: WTHS MCAS CPI Report (2017)

As a vocational school, Worcester Tech has a unique schedule. One week, half of the student body is working on their trades in one of the 22 technical shops (A.K.A. shop week); in the meantime, the other half of the student body is in academic classes, working through the Massachusetts established core curriculum (A.K.A. academic week). The academic and shop weeks alternate throughout the school year diversifying the schedules of each student and grade level. During my practicum, I taught three different subsections within the subject of mathematics. Every day, I taught an Algebra I class of freshmen, two Algebra II classes of sophomores, and one double-period Algebraic Reasoning class of seniors (the curriculum maps for my classes are in the Appendix A pg. 35). When faced with the challenge of teaching while having to model the six essential elements *and* to somehow integrate my WPI project-based learning into the classroom, it intimidated me. I thought that the six essential elements were understandable but not realistically attainable—at least not by me. I, however, was surprised by my performance, in which I was able to proficiently model each element and be able to

implement at least one project for my classes in an attempt to integrate real-world learning into my instruction plan.

Chapter 2: WELL-STRUCTURED LESSONS

The first essential element of CAP (Candidate's Assessment of Performance) is Well-Structured Lessons. In this category, a class instructor must be able to develop well-structured lesson plans with challenging and measurable objectives all while using appropriate student engagement strategies, pacing, sequence, activities, materials, resources, technologies, and grouping. This is the model of a proficient performance in this area provided by DESE CAP rubric. Furthermore, this level of achievement is indicated by the instructor's knowledge of the topic and of how their students learn in correlation with their development. These two components contribute to how effective the design of each plan is (Massachusetts DESE CAP 2016).

Lesson plans have the ability to positively impact student understanding and student learning if done well in an organized manner. A teacher uses well-structured lessons to give students a format and to encourage organization. If lessons are disorganized, however, then notes can be jumbled, thoughts can be distracting, new ideas can conflict with other ones, and an unsafe learning environment can be created. Organization is essential for student learning as well as understanding. It also shows students that their teacher cares for them. Showing up every day and improvising a lesson will not cut it if students are expected to care about their own education yet their teacher doesn't even do the same. A lesson plan can be formatted in the same fashion as a paragraph: an opening, a body, and then a conclusion. The opening needs to be able to get the classes' brains up and going. It's like a reboot to get them thinking of what they have already learned, so they are ready to actively apply prior learning. The body of the lesson is the content of the lesson. The objective is addressed, activities are implemented, the lectures are given, the discussions are commenced, and the class is theoretically in full swing. The conclusion of the

lesson is the wind down of the class; it is the part of the class when homework is passed out, when the objective is restated, and when the last question is asked to get students thinking about the following day. This is the way that the perfect class is hoped to proceed. The opening should flow seamlessly to the body, which should connect perfectly to the conclusion to bring the whole class round full circle. But in reality, students will get stuck. They will need further guidance, ask questions, and/or throw out some distracting comment that could avert the class' attention. All of this takes time and it feels like not enough time exists in a classroom with only 43 minutes to teach at Worcester Technical High School.

At the beginning of my practicum, I had very little experience with creating lesson plans. They were ideal and strict, not giving the class instruction any leeway for extra questions or possible confusion to be expounded upon. I thought a strict formula had to be followed. When I first took the wheel in the class, I could tell that my students felt rushed by my pace in teaching. I would turn from the board to see their faces and would realize that almost half of the class had blank stares of boredom and/or confusion. One of my first lesson plans for my Algebra II classes was a bust. I was teaching a new concept of graphing linear inequalities. My lesson plan had example problems but I had assumed what my class had already known instead of giving an assessment to survey what their skill levels were. (Appendix B, pg. 53) I had even gone through the entire lesson only to have confused the class and to have a student give me a slightly rude comment on how I should teach (I'm going to call this student Zee). From a defensive standpoint, it was humiliating to be told what I was doing was wrong and inefficient by a high school student. But it was humbling to hear from a student that I wasn't meeting her needs, let alone the class' needs. Zee told me that it would have been easier for everyone to understand the material if I had explained the process in concrete steps before showing them examples to

expand my explanation. After reflecting back to my high school years—not so long ago—I realized that Zee was right. I took this student's suggestion and used it to improve my lesson plans from there on out. Mathematics, an art of complex formulas and rationally irrational rules, has the ability to be simplified by steps like that of a cooking recipe. There are steps to be followed for the chef to know what to do and to understand how to apply the steps later, whether applying the learned skills to the same recipe or a variation of it.

By the end of this semester, I had learned how to manage questions on the spot to the point where I would be able to use their questions as a segue to the next example problem or even use it as a teaching moment in each class; I strove to not waste time and to make every moment of class valuable. Over time, I began to structure lessons to give a bit of wiggle room for those moments when I would realize that my class had never learned a key concept of the new material that should have been learned a year or five ago. The lessons were short across the board and consisted of the following process: homework review, new material introduction with vocabulary and conceptual steps (if necessary), example problems, homework to start in class, time for in-class assistance on homework or material in general. I showed this method very well in my lesson plan for graphing quadratic inequalities for my Algebra II class (Appendix B, pg. 56). I backtracked the class and reviewed the previously learned skills of graphing a quadratic function and then complimented this with the similar steps we needed to take when graphing linear inequalities. When taught the new material using steps and instructional scaffolding, as suggested, the students responded positively. When someone got stuck, it was very convenient that I was able to refer them back to specific notes that we had already taken in class. Overall, I have grown in my ability to create and execute well-structured lessons.

Chapter 3: ADJUSTMENT TO PRACTICE

The second essential element of CAP is Adjustment to Practice. According to the proficiency description of the CAP rubric, a teacher must organize and analyze results from a variety of assessments to determine progress toward intended outcomes. Further, the instructor must be able to use these findings to adjust their practice and then identify and implement appropriate differentiated interventions and enhancements for students (Massachusetts DESE CAP 2016). All while meeting routine responsibilities consistently, these aspects of proficiency are demonstrated if there is a variety of informal and formal methods of assessment given; to measure students learning, growth, and understanding; to develop differentiated and enhanced learning experiences; to improve future instruction.

Adjustment to practice is essential to the classroom and a teacher's instruction. Not only does it help with the growth of the students but it also helps the growth of the teacher. Classrooms strive with traditions, rituals, and routines, but they could also plummet if these methods of repetition do not work for students over a period of time. Teachers need to regularly reflect on the progress of the class and try implementing other tasks into the class that fit with the learning styles of the students. Because we do not live in the theoretical world, however, it is impossible to please everyone and to satisfy the learning needs of every student. In reality, a teacher's practice is never perfect but is always a work in progress. This is no exception to working on my practice at Worcester Technical High School.

Over the course of the fall semester, I learned to model this second essential element of CAP. It was clear at the beginning how inexperienced I was—and still am. As I created an environment where the students were the focus, I had to change and tweak a lot of my teaching methods frequently because I surveyed the students individually and could tell that my lessons

weren't working for them. For example, in my Algebra I class, I noticed that there was some general confusion when it came to graphing linear equations. I couldn't pinpoint it, so I proceeded with the material. The day after we started this unit, a student asked how to plot a point, and then I realized; some of these freshmen hadn't learned how to plot points. The following two days the entire class were assigned a project of plotting points to trace a surprise picture (Appendix C, pg. 59). This was a big eye-opener for me; I needed to be more aware of what my students knew by using more formative assessments.

In our teaching seminar at WPI, we discussed how students remember things. We learned that mere studying is not as effective as we think. Students actually have a better retention rate when given an assignment that includes and/or involves previously learned material. A bigger challenge for students is for them to be able to apply what they know to realistic situations; having students practice application can also be a beneficial tool for retaining information. So instead of guessing what my students knew and didn't know, I tried jumping ahead of the ball. I assigned my Algebra I class with a stain-glass project like the fun surprise picture project (Appendix C, pg. 64). The purpose of this task was to broaden their understanding of graphing while using the slope-intercept form. Not only did I find out that many students did not get this concept the first time around, but I was certain that they understood the application of this concept after this activity— most of them anyway. Similarly, I assigned a music video project for my Algebra II sophomores so that they had an opportunity to study out a mathematical concept to try to apply it as well as to understand it (Appendix C, pg. 66). This codependent study worked for my students in a way that I can't. These are just two examples of how I have had to learn to adjust and to better my practice. At the end of my practicum, I can say that I have proficiently modeled this essential element of CAP.

Chapter 4: MEETING DIVERSE NEEDS

The third essential element of CAP is Meeting Diverse Needs. To proficiently perform in this element, a teacher must use appropriate and necessary practices to accommodate student differences in culture, learning styles, levels of readiness, abilities, disabilities, and English language levels (Massachusetts DESE CAP 2016). Summarized, the teacher must be able to engage students of all backgrounds and abilities using appropriate and respectful social and academic language and instructing clearly and effectively in a safe, all-inclusive, and challenging learning environment. If these criteria are met ethically and reliably, then the instructor has demonstrated a proficient performance.

Massachusetts, like many coastal states in the U.S., has a particularly high need for teachers to be able to strive in this element of CAP. Teachers need to specifically be able to accommodate English language learners of all levels along with students who have different learning styles, disabilities, abilities, cultures, and levels of readiness. Accommodations include proper verbal, procedural, and instructional scaffolding to help all students in the speaking, listening, reading, and writing domains. Creating a Universal Design for Learning (UDL) classroom helps to meet the diverse needs of students.

Within developing effective lessons, the materials and approaches must be able to support students of diverse backgrounds and cultures. Meeting diverse needs at Worcester Technical High School is an art. It was very challenging emotionally to accommodate the unique situations within my classes. I had one class of students completely made up of non-native English speakers. Because my Sheltered English Immersion course simultaneously occurred with my practicum, I was able to efficiently implement scaffolding, specifically supporting students in the speaking domain. My students' languages varied, representing countries and regions from all

over the world. Because of this, I implemented writing vocabulary words through the overhead onto the board, having the entire class repeat after me to teach pronunciation and then showing them how to use the word in a sentence. This strategy of scaffolding tasks is something that I observed in a video that demonstrated the use of verbal scaffolding. This method helped to improve the speaking and writing domains of their language development, developing vocabulary; I hoped that this would improve material comprehension and knowledge transfer in the classroom. This is one of the ways that I strove to create an environment that has UDL.

Universal Design for Learning is an approach to curriculum that minimizes barriers and maximizes learning for all students. This is achieved by showing the information in different ways, allowing students to approach tasks and show their learning in different ways, and offering options for students to get engaged and to keep their interest. UDL makes teaching more broad, detailed, and creative as it makes learning easier and more fair for everyone to understand because everyone learns differently. It is, in a nutshell, a concept of a flexible curriculum. The UDL lessons' design is able to meet the needs of all learners by enabling flexibility for all unique learning styles, including those with or without disabilities. Redesigning lessons for the special cases provides a foundation that helps the class overall. All learners are supported *and* challenged because all possibly limiting bases are covered.

Another way that I have striven to create a UDL environment is by hosting my own help sessions after school. My supervising practitioner would take up the days that I couldn't, so it was a great system to catch the pupils who had fallen behind, had been absent, or learned better one-on-one. It was the perfect time for me to focus in on students individually and to see where I could improve in being more clear in class so that I could prevent students from getting confused.

Teaching every class was a valuable challenge for me. In one of my algebra classes, I had a student that challenged me a lot. I'm going to give this student the name Lee. Lee was a great student, but she had many health difficulties that would take her out of school for days at a time. When Lee would return, she would be very confused about the material and needed serious time to catch up. Because she missed class so often, she would receive poor quiz scores. She was also frustrated by the fact that she wasn't in control of her circumstances. From my perspective, it was very hard for me to answer her questions during class time because, in order for me to answer her questions, I would have had to explain every concept that she missed. Doing this would have inconveniently stalled the class' progress. However, I never turned her questions away. Of course, one student could be asking a question that ten other students have. I learned how to answer her questions and use them to my advantage to give my other students spontaneous review or tips for problem-solving in regards to the relevant work. Even still, this was not enough for her. She needed extra time; we worked together to make sure that she was able to come after school for help on tests or missed material, so she was able to catch up for the most part…until her next episode when she was not able to come to school for another few days. The most difficult aspect of this scenario is Lee's health issues were consistent and unpredictable. Her circumstances held me accountable as I had to be able to provide her missing notes and work for her, and it challenged me to make sure that she did not fall far behind. Lee's situation was a valuable experience that allowed me to be able to practice meeting an individual student's diverse needs.

In a different class from Lee's, I was challenged to meet another student's unique needs. I'm going refer to this student as Dee. This student, in particular, was a special case. It was her first time not being in a remedial classroom and was an English language learner. It was evident

that this student needed assistance with basic math skills but she was even disruptive in class. It was tough to be stern yet calm with her. Her grade in the class was well below average and she didn't do any work in class. It was determined in a meeting—with all of her teachers (including me and my mentor teacher), Dee, Dee's mother, and a translator—that she was failing all of her classes and wasn't doing any of her homework. Her mother had no idea of this behavior. In this meeting, I explained to her and her mother that she would do well in our math class if she took notes, asked questions, participated, and did (at the least tried) all of her homework. I got to see firsthand how getting on a personal level, involving the child's home life and family, can motivate a student to cooperate in the classroom. After this conference, there was a shift in Dee's class as a whole. Dee began asking questions and setting examples for the other students in the class; she had even volunteered to go up to the board to solve problems. Even though her grade still struggled, her effort in the class increased and the disruptive behavior decreased. On my part, I checked in on her at the end of most classes to make sure that she comprehended the material and regularly advised her, along with most of the class, that coming after school is helpful for everyone. With just these examples of meeting diverse needs for Dee and Lee—along with implementing a UDL environment in my classroom—I know that I have been able to (at a minimum) proficiently model this essential element of CAP.

Chapter 5: SAFE LEARNING ENVIRONMENT

The fourth essential element of CAP is Safe Learning Environment. In this element, the focus is the instructor must be able to use rituals, routines, and proactive responses, creating and maintaining 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 (Massachusetts DESE CAP 2016). Further, a candidate is able to reliably and ethically model this element by enforcing an environment in which diversity is valued and students are motivated to challenge themselves.

It really doesn't matter what kind of teacher is needed or where the teacher of the classroom is needed—in Massachusetts at least. For there to be a successful and student-engaged class, the teacher must enforce a safe learning environment. Rituals and routines create and maintain a safe physical and intellectual environment by giving students structure. When teachers are clear of what they expect, students feel secure. Without this kind of structure, students are more inclined to take over the class; this leads to unproductivity and a lack of motivation. An instructor also encourages a safe learning environment by having and setting high expectations for the students inside and outside the classroom. Setting high, attainable standards in the classroom is very beneficial for student learning as opposed to low standards, which can be devastating. Regarding behavior, students are more likely to behave themselves in the presence of their instructor. As a result, they are more likely to behave in their instructor's absence because the class is aware of the classroom expectations and procedures. With this in mind, the expectations must be clear, direct, set early, and regularly enforced. Academically, students respond well to rewards (whether positive or negative) and to consistency, which is enabled when teacher expectations are clear and attainable.

This is the only element that felt natural for me to model since the beginning of the practicum; even still, I had to grow in this component. I didn't want the students to take advantage of me, but I did want them to feel comfortable. Because I am relatively close to their ages, it was easier to relate to them, give them advice about college, and make pop culture references in class without giving away my age. In all of my classes, I used my mentor teacher's syllabus and upheld its standards to run the classes (Appendix B, pg. 51). I also created a community of respect and to make my students aware of their responsibility they have for the material. A community where it is okay to be wrong, it is okay to not know, it is okay to ask questions, it is okay to respectfully correct the teacher, and it is okay to ask for help. Once I got the hang of keeping time in check for lesson planning, I was able to consistently and successfully allocate a productive amount time at the end of class for students to start homework and work with the surrounding peers to jumpstart their thought processes. This gave them time to ask me questions about the material.

Every day the first thing each class did was go over the homework if it was assigned the night prior. About half the time I had students working on the board to go through difficult problems. If they felt like they couldn't do it or they didn't get it correct on the homework, then they had the opportunity to receive my help, the class' help, or a friend's help—I used the term "phoning a friend" like in *Who Wants to Become a Millionaire*. I have had to reassure them consistently that being wrong is okay. For instance, when I introduced operations of radicals and radical expressions to my Algebraic Reasoning class, I stressed the fact that they did not know the exact number (in decimal form) for $\sqrt{2}$ vs $\sqrt{4}$; because of this fact alone, it was crucial that they either simplified the number or kept the prime form of the radical. Ultimately, we know the results of perfect squares off the top of our heads. The ones we don't know need to be calculated

but (in this case) must be simplified or left as prime. This lesson helped the students to admit to what they knew and what they generally didn't know in class—not by much but it helped.

The major belief that I tried to instill in the students is that it is okay to be wrong as long as they learned from their mistakes. I always made mistakes while teaching. I'd say the wrong or write the wrong thing on the board; I'd admit it them to show them where it was easy to make mistakes, how I am human, and why it was important to check over their work. When I showed them where I messed up and explained how I got lost, I demonstrated how to learn from one's mistakes. I explained to them that learning from mistakes decreases the chances of repeating them. However, students have the biggest trouble with learning from their mistakes in regards to taking tests and quizzes. With the help of my supervising practitioner, I combatted this issue through my ability to proficiently model both essential elements of safe learning environment and high expectations.

Chapter 6: HIGH EXPECTATIONS

The fifth essential element of CAP is High Expectations. Candidates can proficiently model this element by effectively demonstrating and reinforcing ways that students can consistently master challenging material through effective effort. Students' misconceptions about innate ability should be challenged. As an indication of proficiency, teachers plan and implement lessons that set clear and high expectations, which are to be accessible for all students (Massachusetts DESE CAP 2016). Although this was the hardest of the elements for me to demonstrate, High Expectations element in my practice improved daily and has been proficiently modeled. I know that this element demonstrates the most growth for me.

On a more in-depth level, the high expectations element is another piece to the puzzle of effectively and efficiently instructing a classroom. If teachers are able to get their students to feel responsible for their own education, the classroom instruction along with student learning becomes more efficient and effective. A part of this is the students' understanding of their natural abilities. Students' beliefs about natural ability can either result in a growth mindset or a static mindset. A static mindset entails the desire for instant gratification. It can be defined as a short-term state of mind—in which failure is to be avoided; an award is to be granted at the instant when something is done right, and the answer is emphasized more than the process. The growth mindset is a mindset in which the process of solving problems is more relevant than just getting the mere answer. Awards are given appropriately and timely and, most importantly, the concept of "yet" is encouraged, letting students know that they will get there and that they did not fail but just need to practice or learn more. The growth state of mind encourages self-motivation and encourages students to learn from their mistakes, not from the wrong answer. Some practical ways to enforce the growth mindset is to let students look through their own work and look

through their processes and steps with a neighbor and try to co-dependently find what they did wrong and to understand independently why it was wrong. This can open up students to numerous ways of solving a problem and to teaching each other, which further enforces solid understanding. Encouraging a growth mindset in the classroom can also help the students to become confident in their answers and understanding.

It was a struggle at first for me to set high expectations in the classroom. In my high school back in Ohio, high expectations included everyone walking the hallways. Of the entire student body, 95% of them just knew what was expected of them. Taking responsibility of one's own education was instilled in me from a young age when I was enrolled in a Montessori school. This concept of responsibility is what I explain to my students and hope that they will take on with them no matter the path they each take. For example, all students of my students have the opportunity to retake their quizzes during after school hours for an average score of the new and old scores. My seniors and freshmen specifically did not take advantage of these opportunities and their grades hurt because of this. Many would assume that they didn't care, but many of my students had difficult and understandable circumstances that got in the way. Sure, there were always exceptions (i.e. lack of motivation or carelessness), but students usually had to work after school or couldn't get a ride. I understood that schedules can be conflicting, but I also didn't let my expectations decrease because of their situations. I started to give my students test correction assignments to combat their after school dilemmas and to make sure they took responsibility for their education (Appendix C, pg. 68). These assignments entailed the tasks of the students figuring out where they went wrong, explaining verbally where they went wrong to me, and solving the problem with new work to show their process. This assignment was also designed to give students an equal opportunity for everyone to save their grades and to learn from his or her

mistakes; there was no excuse for poor grades. For my older students, I would tell them that the class did poorly as a whole and gave their tests back ungraded so that they had to find their mistakes on their own. This trained them to have confidence in their answers as they would have to determine independently if some of their answers were correct. This assignment also happened to encourage the growth mindset in which students will all reach the same goal of the curriculum…eventually. It is a unique journey for everyone in the classroom. It's not a matter of, "students will never understand." It's a matter of, "they will understand it, but they just don't understand it yet."

Chapter 7: REFLECTIVE PRACTICE

The sixth and final essential element of CAP is Reflective Practice. To model this element proficiently, instructors must be able to regularly reflect on the effectiveness of lessons, units, and interactions with students, both individually and with colleagues, and uses insights gained to improve practice and student learning. An instructor indicates reflection by demonstrating the habit to reflect on and improve one's own practice. The educator is able to gather information, analyze data, examine issues, set meaningful goals, and develop new approaches in order to improve teaching and learning. (Massachusetts DESE CAP 2016).

Reflective practice, in my opinion, makes the difference between a good teacher and a great one. Throughout history, society has changed on an international scale, and it only will continue to change as time progresses and people keep making history. Change pertains to community, values, laws, politics, and et cetera—it especially pertains to people. People have changed, yet the styles of teaching have stayed the same generationally. On top of this, people have always been different, learned differently, taught differently, and will always be different. So, why hasn't there been an increase in the variety of how classrooms are run? Basically, true reflective practice is making note of what doesn't work in the classroom and trying other methods to meet diverse needs. Meaningful reflective practice is hard but it definitely pays off.

One of the best aspects of the WPI preparation program is that the teaching candidates have a practicum seminar, which forces us to reflect on our practicum performance together and individually in writing. From the beginning of the semester, I have habitually reflected on my practice. One thing is certain; I was very insecure at the beginning of my practicum, which made me overthink everything that I did and everything that came out of my mouth. I had this mindset that, even though I have help, these students' education was in my hands. This wasn't something

that I could just play around with. Teaching is a serious matter. The announced and unannounced observations were helpful factors for me. At first, I felt overwhelmed by them: I saw these experiences like taking a test. I later realized that my program supervisor had my best interest at hand and it was best for me to hear what I needed to improve on consistently,

From my first observation, my program supervisor (PS) noted how my back was turned to the students too much and this could have caused an interference with my vigilance over the class in general for behavior and for their physical signals of interpretation. To change this, I placed myself at the back of the class to sit among the students. I utilized the ELMO device to project live-written work onto the board. Students had the ability to see my face as they saw fit and I was able to read their body language and their faces. This is how I reflected on the physical instruction of the class. I surveyed the mental instruction of the class from the students' perspective. In the middle of the semester, I made up and delivered a survey that told me a little about them and then requested feedback for the way that I ran things and how they could improve in the class (Appendix C, pg. 81). A couple weeks later I administered an anonymous survey to get more in-depth details to how the students see my teaching. After reviewing each survey, I was able to adjust my practice. I made my lesson plans more attainable to explain the material better in all of my classes by adding in simple steps to make up complicated processes, so my classes were challenged and my expectations remained high; this made my learning environment safer and I was able to meet diverse needs.

Self-reflection on my practice also includes my data measurement of my students' learning, comparing what my students knew when they walked into the class versus when I left. I specifically focused my measurement-of-learning task on my seniors in Algebraic Reasoning. On

the third day of class, I administered a pretest to determine what concepts needed to be taught to them. At the end of October, I administered the posttest and tracked the results.

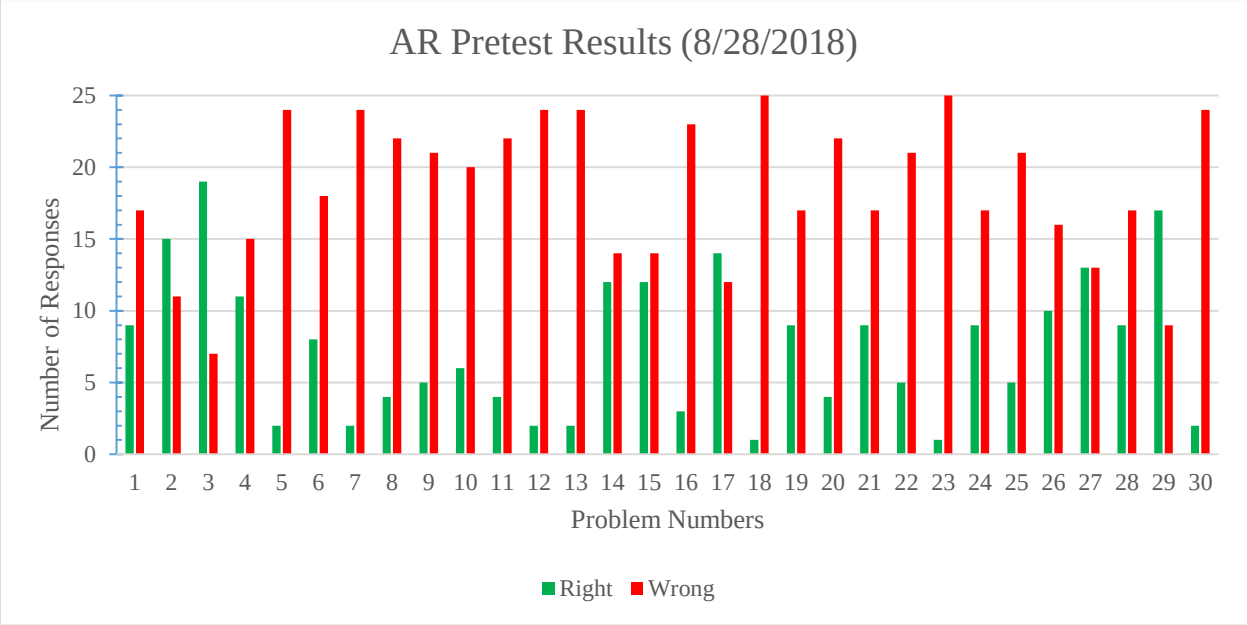


Figure 9: WTHS Algebraic Reasoning Pretest Report

I created the graph above to show how many students got each problem wrong. With this information, I was able to create a plan that would support the students, who responded to the assessment poorly—this included all of them. From this information, the average pretest score of the class was 25%. I concluded that the class needed to work on these concepts: solving systems of linear equations, factorization, rules of exponents, radicals, rational equations and expressions, linear graphs and functions, and reducing complex fractions. After I administered the posttest, these are the results that I acquired:

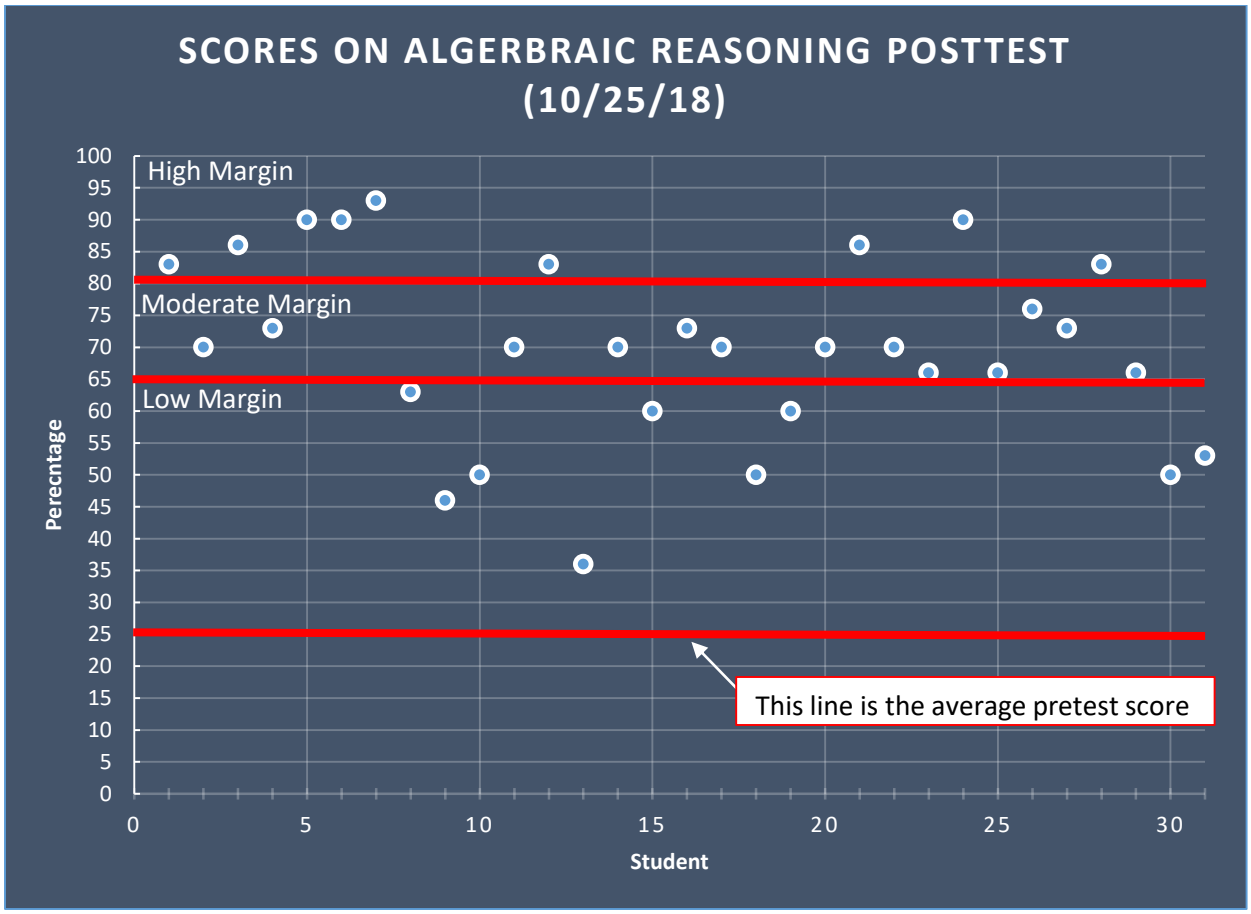


Figure 10: WTHS Algebraic Reasoning Posttest Report

This graph that I created shows how students scored at the end of October after two months of learning. The red horizontal lines represent the breaks between the high, moderate, and low margins of achievement. Out of the 31 students recorded, about a third of the class is in the high margin of anticipated student-learning gains, scoring between 80 and 100 percent on the posttest. Another third of the class is in the moderate margin of anticipated student-learning gains, scoring between 65 and 80 percent. The remaining third is in the low margin of anticipated student-learning gains. There is a possible error factor to take into consideration; students switched into and out of my class in these two months of learning material for the posttest. This means that the pretest average score could have been higher or lower. Regardless, I predicted that the class would achieve such scores with one-fourth of the class being in the high margin, half of the class

in the moderate margin, and one-fourth of the class in the low margin. The margin distribution of students turned out to be equal in all three margins of achievement. I learned from this that the Backward Design method was useful and was also enabled by my reflective practice. In summary, the backward design method is a process of creating a curriculum by identifying goals, determining evidence of learning, and planning class instruction (in this order). With these examples in mind, I was able to proficiently model the CAP element of reflective practice by the end of the teaching practicum.

Chapter 8: MY WPI EXPERIENCE

Worcester Polytechnic Institute (WPI) plays a major role in regards to my readiness for the high school classroom; before WPI, however, my elementary and high school educations prepared me for the lecture hall, which made all of the difference. I went from homeschool to Montessori to a performing arts school to Ohio's number one public high school. I have been in situations where my education was my responsibility, and the guidance of the teacher was all that was necessary. Schools where the arts were so strongly valued that it wasn't surprising if MTV showed up one day to begin filming a high school reality TV show or if students randomly broke out in song and dance in the cafeteria. I have gone to schools where I have been in classes with students of all backgrounds, economic statuses, artistic abilities, athletic abilities, disabilities, and academic abilities. Along with this, I have been instructed by numerous teachers with unique teaching styles for each. My education before WPI has prepared me to appreciate the WPI education for what it really is: a place of opportunity.

I had no idea what this school was about when I applied; I knew that it was a STEM school, the kind of school that I have always aspired to attend. I found out about the Teacher Preparation Program (TPP) in my second year at WPI and I was shocked by its existence. It is so unique that this school is with the community in the way that the TPP allows it to be. Sending out teachers, who are more than well-educated in math and science, into classrooms in need of well-prepared teachers is necessary. Sending them out from WPI is a no-brainer.

I have learned so much from being in the classroom as a student teacher while taking WPI's Sheltered English Immersion course. I have seen WPI's motto, "Lehr und Kunst" ("Theory and Practice" in German), come to life. I know the material. I have gone through all of the calculus curricula as well as the AP calculus curriculum. I have had to manage (and still have

to manage) the applications of the real world connection in relevant classes. Even still, no one can be prepared for the students…the classroom is like a box of chocolates. But a strategy that I would learn one day in the SEI course, I would try out the next day in class and would keep doing this until I felt that I had adjusted my practice enough for me and my students to feel comfortable. It is a stretch but in a similar way, WPI has taught me that everything I learn (no matter the class) can be applied in some way, shape, or form in the real world. WPI also has taught me that there is always something to learn if the preceding statement isn't enough for me.

Being able to see your hard work pay off is one thing, but experiencing that moment when you realize that you are applying everything that you once thought useless is a whole ordeal. WPI offers one of the best education plans in the nation. I have been able to see the value in all of the things that I've learned before. In the classroom I have frequently been asked by students, "why is this important?" or "when are we ever going to use this?" With knowing what I know, I can confidently serve them with answers that keep them silent for about two minutes before the next question arises. It's convenient I teach math because it is used in sciences courses, but math is also a useful tool every day. Life is spent on a budget whether of time or money. Either way, society relies on mathematical calculations—even though many will attest for their loathing for the subject. This is what I have told my students in hopes that they understand one day the importance of math in everyday life.

CONCLUSION

Teaching is a *very* challenging career. Being in the shoes of a teacher for just a semester has taught me that I need to have respect for them no matter how difficult it might be from a student's perspective—especially, now that I'm transitioning back into the full-student position. I respect them not only because of all of the work and time that they invest in their students but also because of their abilities to impact students in the classroom and outside of it. Even though I once saw school as a prison, I have come to learn that some students go to school for refuge or for rest because home life is burdensome. Caring and compassionate teachers are needed in the classroom. Often, students just need a trustworthy individual to talk to and/or to confide in. When a teacher is that person, a positive and safe relationship with an adult develops; teachers are then seen as mentors as opposed to disciplinarians. This kind of investment leads to better grades and attitudes because of the positive associations with authority figures and with school. As a professional goal for myself in the classroom, I want to make a bigger impact on my students by being more involved in their community. I believe that family involvement is essential to student accountability and learning; I also believe that teacher and parent collaboration is as equally essential. This is an aspect that I did not get to experience as much as I would have liked. I want all of my students' families to one day feel comfortable enough to walk into my classroom when needing to discuss anything about their student. I would be the one to take the first step and send out something like a newsletter to make sure that caregivers are aware of what is going on in my classroom. In addition to this, I would take advantage of my experience in project-based learning and use projects to reel parents/guardians into their children's academic world. This will enable me to better meet the diverse needs of students on a more personal level while enabling families to help with upholding high expectations.

Community and family involvement holds students accountable for their own performance and academic progress. This way, families have an active role in the classroom instead of being an afterthought. Overall, I have learned many things from this experience that goes beyond the classroom. Careful planning, speaking in front of people, organization, and learning how to communicate as well as to collaborate are just a few essential skills I will take with me as I continue on in life.

ACKOWLEDGEMENTS

First and foremost, I would like to thank Mr. Paul Silverman, my supervising practitioner, for his patience and perseverance working with me and mentoring me to become the best teacher in the classroom that I can be. It was an honor to work with him and I am so thankful that he welcomed me so generously into his classroom. This project would not have been successful without his guidance and support. Dr. Martha Bedrosian, my program supervisor, played a great role in making me a better instructor. Her feedback and insight from her experiences were indispensable for my professional and personal development over the course of this semester. Mrs. Shari Weaver, TPP program director, has patiently put up with my shenanigans for an entire semester of seminar. Above all else, I want to thank her for the support that she gave and the openness that she encouraged. Personally, it kept me grounded on a weekly basis and she helped me to push through the challenges of being in high school all over again. It was amazing learning from her; I look forward to working with her more over the next year and a half. Last but not least, I have to thank my family for being there for me even though they are 800 miles away. Without them, I would not be at WPI nor would I have made it all the way to the end of this teaching experience with my sanity.

APPENDIX A: Classroom Standards

I. ALGEBRA I CURRICULUM MAP

Week:	DATES:	CONTENT TOPICS:	Chapter Sect.
1 & 2	8/29 to 9/9	Order of Operations	1.2
		Add & Subtract Integers	1.3
		Multiply & Divide Integers	1.3
		Distributive Property	1.4
3	9/12 to 9/16	Solve 1 step equations	2.2
		Solve 2 step equations	2.3
		Solve Multi-Step equations	2.3
		Solve equations variable on both sides	2.4
4	9/19 to 9/23	Write & solve ratios and proportions	2.6
		Solve Percent Problems	0.6
		Rewrite equations and formulas	2.7
5	9/26 to 9/30	Solve Inequalities	5.1, 5.2
		Solve Multi-Step Inequalities	5.3
		Solve Compound Inequalities	5.4
		Assistments Unit 1 midterm due by 9/27	
6	10/3 to 10/6	Solve absolute value equations	2.5
		Solve Absolute value inequalities	5.5
7	10/11 to 10/14	Graph Linear functions	3.1
		Find slope and rate of change	3.2 - 3.3
		Graph using slope intercept form	3.4
8	10/17 to 10/21	Graph linear inequalities	5.6
9	10/24 to 10/28	Use linear equations and slope intercept form	5.2
		Write equations of parallel and perpendicular lines	5.5
10	10/31 to 11/4	*Use for extra time	
		*Unit 1 Test	
		*Assistments Unit 1 test	

11	11/7 to 11/10	*Solve systems by graphing	6.1
		*Solve systems by substitution	6.2
12	11/14 to 11/18	*Solve systems by elimination	6.3 - 6.4
13	11/21 to 11/22	*Solve special types of linear systems	6.5
14	11/28 to 12/2	*Solve systems of linear inequalities	6.6
		*Unit 2 Test	
		*Assistments Unit 2 Test	
15	12/5 to 12/9	*Properties of Exponents	7.1
16	12/12 to 12/16	*Properties of Exponents	7.2
17	12/19 to 12/23	*Properties of Exponents	7.3
		*Scientific Notation	

II. ALGEBRA II CURRICULUM MAP

2017-2018			
Algebra 2 Lesson Plans			
Week #1: August 27,2018 to August 31, 2018			
8/28:	***Class Introduction and Review Solving Linear Equations**		
	-Discuss class rules (Lynch's Laws) & Assistments		
	-Discuss Schoology Site and provide codes		
	-Fill out index cards with personal information & book numbers		
	-Notes:	-Examples of Solving Linear Equations (Multi-Step) P.18-19	-Do Guided Practice p.7
	-Do P.9 Check for Understanding #9-18		
	-HW: P.10 #35-42 ODDS		
8/29:	***Students will rewrite and evaluate formulas and equations**		
	-Correct HW: P.10 #35-42 ODDS		
	-Notes:	-Examples of solving for a variable using formulas	
	-Do P.8 Guided Practice with Class		
	-Examples of rewriting formulas w/ 3 variables		
	-Do p. 9 #19-21 Check Your Understanding		
	-HW: P.10 #45-51		
8/30:	***Students will graph & solve linear inequalities**		
	-Correct HW: P.10 #45-51		
	-Notes:	-How to graph & solve 1 step inequalities	
	-How to graph & solve Multi-step inequalities		
	-Do Guided Practice 1,2,3		
	-HW: P.17 #10-21		
8/31:	***Students will be able to find rate of change and slope of a line.**		
	-Correct HW: P.17 #10-21		
	-Notes: What is rate of change? How to calculate (using table) or formulas?		
	-Examples p.21,22		
	-What is slope? Formulas and Table methods		
	-Find slope from graph with coordinates		
	-Do p.24 Check Your Understanding		
	-HW: P.25 #12-21		
9/1:	***Students will write equations of line for different scenarios**		
	-Correct HW: P.25 #12-21		
	-Notes:	-Write equation given slope and point	
	-Write equation given two points		

	-Do p.31 Check Your Understanding #1-7		
	-HW: P.32 #10-24 EVENS		
Week #2: September 4, 2017 to September 8, 2017			
9/4:	***NO SCHOOL LABOR DAY**		
9/5:	***Students will write equations for parallel & perpendicular lines**		
	-Correct HW: P.32 #10-24 EVENS		
	-Notes;	-What are the relationships with slopes of par.&perp. .lines	
			-Examples of writing equations (p.31)
			-Do p.31 #8 &9
	-HW: P.32 #25-30		
9/6:	***Students will continue to graph linear inequalities**		
	-Correct HW: P.32 #25-30		
	-Notes:	-Different boundary lines & Shading	
	-Examples of graphing inequalities		
	-Real life applications of inequalities P.36		
	-Students will do p. 36 #1-5		
	-HW: P. 40 #2-20 EVENS Quiz tomorrow		
9/7:	***Students will rewrite formulas, solve equations and linear inequalities**		
	-Correct HW: P.40 #2-20 EVENS		
	-Take Chapter 1 Quiz		
	-HW: P.37 #12,13		
9/8:	***Students will solve systems of equations**		
	-Correct HW: P.37 #12,13		
	-Notes:	-How to solve systems by graphing (p.43 Example 2)	
	-How to classify systems? Consistent, Dependent, Inconsistent		
	(Example 3 on p.43)		
	-Do p.47 Check Your Understanding #3-9		
	-HW: P. 47 #10-12		
Week #3: September 11, 2017 to September 15, 2017			
9/11:	***Students will solve systems of equations algebraically**		
	-Correct HW: P.47 #10-12		
	-Notes:	-How to solve systems of equations by substitution	
	-Examples of substitution		
	-How to solve systems of equations by elimination		
	-Examples of elimination		
	-Do P.47 #13-27 ODDS only to check for understanding		
	-HW: P.48 #46-58 EVENS		

9/12:	***Students will solve systems of equations algebraically**		
	(NOT IN SCHOOL TODAY)		
	-Do Lesson 1.6 Skills Practice worksheet		
	-HW: Finish worksheet		
9/13:	***Students will solve systems of inequalities by graphing**		
	-Correct HW: P.48 #46-58 EVENS & worksheet		
	-Notes:	-How to graph systems of inequalities?	
	-Examples p.52,53		
	-Real world applications examples p.53 #3		
	-Students will do p. 55 #1-4		
	-HW: P. 55 #8-16 EVENS		
9/14:	***Students will solve systems of linear equations with 3 variables**		
	-Correct HW: P.55 #8-16 EVENS		
	-Notes:	-How to solve systems with one solution 3 variables P. 68	
	-Do Guided Practice		
-How to solve systems with no or infinite solutions P.69			
	-Do Guided Practice p69		
	-Do p.71 #1-2		
	-HW: P.71 #6-8		
9/15:	***Students will review content from Chapter 1**		
	-Correct HW: P.71 #6-8		
	-Create Chapter 1 Review Outline: Cover 1.1 to 1.1.5		
	-Do p. 75 to 76 with class up to 1.5		
	-HW: P. R1 #13-24		
Week #4: September 18, 2017 to September 22, 2017			
9/18:	***Students will finish reviewing content from Chapter 1**		
	-Correct HW: p. R1 #13-24		
	-Finish Chapter 1 Review Outline: Cover 1.6 to 1.8		
	-HW: P.79 #4-24 EVENS		
9/19:	***Students will demonstrate knowledge learned in Chapter 1**		
	-Correct HW: P. 79 #4-24 EVENS		
	-Take Chapter 1 Test		
	-HW: P.86 #1-9		
9/20:	***Students will determine whether functions are one-to-one and/or**		
	onto, and will tell if they are discrete or continuous.		

	-Correct HW: P.86 #1-9		
	-Notes:	-What are One to One and Onto Functions?	
	(Examples of each) Do Example 1 p.87		
	-What is difference between discrete and continuous relations?		
			(Examples of each P. 89)
	-What is the Vertical Line Test?		
	-How to evaluate functions?		
	-HW: P. 91-2 #14-18		
9/21:	***Students will determine whether they have a function or not and be**		
	able to evaluate with function notation.		
	-Correct HW: P.91-2 #14-18		
	-Notes:	-How to Evaluate Functions?	
	(Examples-review exponent rules and PEMDAS)		
	-How to identify discrete or continuous situation?		
			(Examples)
	-Do worksheet 2-1 Practice		
	-HW: P.92 #28-37		
9/22:	***Students ill be able to identify linear & nonlinear functions by**		
	examining equations or graqphs and determine whether they have line		
	or point symmetry.		
	-Correct HW: P.91-2 #14-24		
	-Notes:	-How to determine linear functions by graph or equation?	
	-What is line symmetry? Examples		
	-What is point symmetry? Examples		
	-Do p. 99 #2-8 evens with class		
	-HW: P. 100 #10-23 & ASSISTMENTS		
Week #5: September 25, 2017 to September 29, 2017			
9/25:	***Students will continue to identify the end behavior of graphs**		
	-Correct HW: P.100 #10-23		
	-Notes:	-What does end behavior of a graph mean?	
	-How to describe end behavior of lines? (P.103)		
	-How to describe end behavior of non-linear functions		
	-Do p.107 CYU #1-6		
	-HW: P.108 #9-14		
9/26:	***Students will be able to identify extrema of functions**		
	-Correct HW: P. 108 #9-14		
	-Notes:	-What are extrema of fucntions?	
	-How to identify relative max or min. Examples		

	-How to estimate zeros? Examples		
	-Do P.107 CYU #7,8 with class		
	-HW: P.109 #15-20		
9/27:	***Students will use key features of functions to sketch both linear**		
	and non-linear functions.		
	-Correct HW: P.109 #15-20		
	-Notes:	-How to sketch linear function given key features	
	-Examples		
	-How to sketch nonlinear functions given key features		
	-Examples		
	-HW: P.114 #6-9		
9/28:	***Students will continue to use features of functions to sketch graphs**		
	-Correct HW: P.114 #6-9		
	-Do Lesson 2.4 Practice Sheet in Pairs		
	(Discuss Solutions)		
	-HW: P.117 #2-16 EVENS & Study for Quiz		
9/29:	***Students will demonstrate knowledge learned about functions in**	**Chapter 2 up until this point**	
	-Correct HW: P.117 #2-16 EVENS		
	-Take Chapter 2 QUIZ		
	-HW: P.116 #23-29 & ASSISTMENTS		
Week #6: October 2, 2017 to October 6, 2017			
10/2:	***Students will graph and analyze different step functions**		
	-Correct HW: P.116 #23-29 & ASSISTMENTS		
	-Notes:	-What are piecewise defined functions?	
	-Steps & Examples for graphing piecewise functions		
	-Do p.121 #1,2 with class		
	-HW: P.122 #12-15		
10/3:	***Students will write piecewise function based on graph**		
	-Correct HW: P.122 #12-15		
	-NOTES:	-How to write function based on graph? Examples p.119	
			-Do Guided Practice P. 119 #2A and 2B
	-Do p.CYU p.121 #3,4		
	-HW: P. 122 #16-19		
10/4:	***Students will graph and analyze absolute value functions**		
	-Correct HW: P.122 #16-19		
	-Notes:	-Steps & Examples for graphing A.V. Functions	
	-Do p.121 CYU #8-11		

	-HW: P.122 #24-29		
10/5:	***Students will graph & analyze both step and absolute value functions**		
	-Correct HW: P.122 #24-29		
	-Do Green Practice Workbook sheet on Absolute Value Functions (2-7)		
	-HW: Lesson 2-5 Practice Sheet		
10/6:	**NO SCHOOL TODAY (PROFESSIONAL DEVELOPMENT DAY)**		
Week #7: October 9, 2017 to October 13, 2017			
10/9:	**NO SCHOOL COLUMBUS DAY**		
10/10: *PSAT OVERVIEW AND PREP			
	-Correct HW: Lesson 2-5 worksheet		
	-Overview of PSAT Scoring, Categories		
	-Do sample Math PSAT Questions		
	-HW: NONE		
10/11: *NO CLASS-Students taking PSAT Test			
10/12: *Students will identify the effects on the graphs of functions by doing			
	translations on the function (f(x) + K and f(x- h))		
	-Notes:	-What are parent functions/graphs	
	-How to describe translations as it relates to parent graph?		
	-Examples P.125		
	-How to reflect functions? Examples p.126		
	-Do C.Y.U. p.128 #1-6		
	-HW: P.129 #8-18 EVENS		
10/13:*Students will describe and graph dilations & transformations.			
	-Correct HW: P.129 #8-18 EVENS		
	-Notes: How to Describer & Graph Dilations? Examples		
		How to Identify Transformations?(P.127 Examples)	
	-Do CYU p.128-9 #7-9		
	-HW: P.129 #20-30 EVENS		
Week #8: October 16, 2017 to October 20, 2017			
10/16:*Students will review content learned in Chapter 2			
	-Correct HW: P.129 #20-30 EVENS		
	-Do p.143 “Chapter 2 Practice Test” with students for review		
	-HW: p.R2 #2-18 EVENS		

10/17:*Students will demonstrate knowledge of functions from Chapter 2			
	-Correct HW: p. R2 #2-18 EVENS		
	-Take Chapter 2 TEST		
	-HW: P.146 #1-7		
10/18: *Students will graph quadratic functions			
	-Correct HW: p.146 #1-7		
	-Notes:	-What is standard form?	
	-How to find L.O.S. and X-Coordinate of vertex		
	-How to graph quadratic? Example		
	-Do p. 156 C.Y.U #1-6 with class		
	-HW: P. 156 #12-21		
10/19:*Students will find & interpret max or min of quadratic functions			
	-Correct HW: P.156 #12-21		
	-Notes:	-Review meaning of max or min.	
	-How to find max or min? P. 154		
	-Do p. 156 C.Y.U. #7-11		
	-HW: P. 156 #22-30		
10/20:*Students will solve quadratic equations by graphing			
	-Correct HW: P. 156 #22-30		
	-Notes:	-What are roots/zeros?	
	-Solve by Graphing Examples p. 164		
	-Solutions of a Quadratic: (One, Two, None)		
	-Do p. 167 C.Y.U. #1-11		
	-HW: P. 167 #14-28 EVENS		
Week #9: October 23, 2017 to October 27, 2017			
10/23:*Students will perform operations with pure imaginary & complex			
	numbers		
	-Correct HW: P.167 #14-28 EVENS		
-Notes: -What are pure imaginary numbers? Products of pure imaginary #s?			
	-Solving equations with pure imaginary solutions?		
	-Do C.Y.U p. 176 #1-10 for examples of notes		
	-HW: P. 176 #18-25		
10/24:*Students will perform operations with pure imaginary & complex			
	numbers.		
	-Correct HW: P.176 #18-25		
	-Notes:-	How to equate complex numbers? Examples p. 174	
	How to add/subtract complex numbers		

	How to multiply complex numbers		
	-Do CYU p. 176 #11-17		
	-HW: P. 177 #48-57 Skip 54 & 55		
10/25:*Students will write equations in standard form and begin to solve			
	quadratics by factoring.		
	-Correct HW: P.177 #48-58 Skip 54 & 55		
	-Notes:	-Write equations given the roots. Examples	
	-How to factor the GCF? Examples		
-Do CYU p. 184 #1-4 for practice			
	-HW: P. 184 #17-20		
10/26:*Students will solve quadratics by factoring			
	-Correct HW: P. 184 #17-20		
	-Notes: Perfect squares & Difference of two squares Examples		
	-Factoring trinomials to solve		
	-DO CYU p. 184 #10-16		
	-HW: P. 184 #24-42 EVENS		
10/27:*Students will solve quadratics by factoring			
	-Correct HW: P.184 #21-34		
	-Do 3.4 Practice worksheet		
	-HW: P. 190 #2-22 EVENS / QUIZ MONDAY		
Week #10: October 30, 2017 to November 3, 2017			
10/30:*Students will solve quadratics by graphing or factoring			
	-Correct HW: P.190 #2-22 EVENS		
	-Take Chapter 3 QUIZ		
	-HW: p.185 #50-54 EVENS		
10/31:*Students will solve quadratics by using the square root property			
	-Correct HW: P.185 #50-54 EVENS		
	-Notes:	-How to solve using the Sq.Root Property Examples	
	-Do p. 195 CYU #1-5		
	-HW: P. 195 #14-24 EVENS		
11/1:	***Students will solve quadratics by completing the square.**		
	-Correct HW: P.195 #14-24 EVENS		
	-Notes:	-How to complete the square	
			-Examples
	-Do p.195 CYU #6-13		
	-HW: P. 195 #30-42 EVENS		
11/2:	***Students will solve quadratics by completing the square**		

	-Correct HW: P.195 #30-42 EVENS		
	-Do "3-5 Practice worksheet" with class		
	-HW: P.197 #63-70		
11/3:	***Students will solve quadratic equations using the Quadratic Formula**		
	-Correct HW: P.197 #63-70		
	-Notes:	-What is the quadratic formula	
	-Examples of application (2, 1, or Irrational Roots)		
	-Do p. 204 C.Y.U #1-8		
	-HW: P. 205 #14-19		
Week #11: November 6, 2017 to November 10, 2017			
11/6:	***Students will use the discriminant to determine the number & types of**		
	roots of a quadratic equation.		
	-Correct HW: P. 205 #14-19		
	-Notes:	-What is the discriminant?	
	-How to use the discriminant to determine type & # of roots?		
			-Examples p.203
	-Do CYU P.204 #10-13		
	-HW: P. 205 #22-32 evens		
11/7:	***Students will solve quadratic equations (ANY METHOD**		
	(NOT IN SCHOOL TODAY)		
	-Correct HW: P.205 #22-32 EVENS		
	-Do Green Workbook p. 68 #16-25		
	-HW: P.207 #49-54		
11/8:	***Students will review ALL of the methods for solving quadratics.**		
	-Collect classwork and correct HW P.207 #49-54		
	-Create Chapter 3 Study Outline:		
		3.1	Graphing Quadratics---Do Examples P. 217
		3.3	Complex Numbers---Do Examples p. 218
	-HW: P. R3 #1-7		
11/9:	***Students will review ALL of the methods for solving quadratics**		
	-Correct HW: P.R3 #1-7		
	-Continue Chapter 3 Study Outline:		
		3.4	Solve by Factoring---Do Examples p.218
		3.5	Solve by Completing the Square---Do Examples p. 219
	-HW: P. R3 #9-15		

11/10: NO SCHOOL TODAY (VETERANS DAY)			
Week #12: November 13, 2017 to November 17, 2017			
11/13: *Students will finish reviewing different methods to solve quadratics			
	-Correct HW: P. R3 #9-15		
	-Do Chapter 3 Practice Test p. 221 #1-25 ODDS Only		
	-HW: P. 221 #2-24 EVENS		
11/14:*Students will use different methods to solve quadratic equations			
	-Correct HW: P.221 #2-24 EVENS		
	-Take Chapter 3 TEST		
	-HW: P. 228 #1-10		
11/15: *Students will solve quadratic equations			
	(NOT IN SCHOOL TODAY)		
	-Do Chapter 3-5 Skills Practice EVENS		
	-HW: Finish worksheet 3-5		
11/16: *Students will multiply, divide, and simplify monomials & expressions			
	involving powers.		
	-Correct HW: P. 228 #1-10		
	-Notes:	-Review the Properties of Exponents with class	
-How to simplify monomials (examples p. 230)			
	-How to determine the degree of polynomials		
	-Do P. 233 C.Y.U #1-8		
	-HW: P.233 #16-23		
11/17: *Students will add, subtract, and multiply polynomials			
	-Correct HW: P.233 #16-23		
	-Notes:	-How to simplify polynomial expressions by	
adding, subtracting, & multiplying polynomials			
			-Examples P. 231-232
	-Do C.Y.U. p. 233 #9-14		
	-HW: P. 233 #28-39		
Week #13: November 20, 2017 to November 24, 2017			
11/20: *Students will perform operations with polynomials			
	-Correct HW: P.233 #28-39		
	-Do Lesson 4.1 Practice worksheet in pairs		
	-Discuss solutions		
	-HW: P.234 #52-60		

11/21: *Students will perform operations with polynomials			
	-Correct HW: P.234 #52-60		
	-Take Quiz on operations with polynomials		
	-HW: ASSISTMENTS		
11/22: *NO SCHOOL			
11/23: *NO SCHOOL			
11/24: *NO SCHOOL			
Week #14: November 27, 2017 to December 1, 2017			
11/27: *Students will be able to use Pascal's triangle to expand powers of			
	binomials		
	-Notes:	-What is Pascal's Triangle?	
	-How to use P.T. to expand binomials.? Examples p. 237		
	-How to find combinations with formula or calculator?		
	-How to use the Binomial Theorem? Examples p. 238		
	-Do p. 239 #1-6 with students		
	-HW: P. 239 #14-19		
11/28: *Students will divide polynomials using long division.			
	-Correct HW P. 239 #14-19		
	-Notes: -How to divide a polynomial by a monomial? Examples		
		-How to divide polynomials? Examples p. 242-43	
	-Do p. 247 CYU #1-6		
	-HW: P. 247 #12-23		
11/29: *Students will divide polynomials (HALF DAY One class only)			
	-Do 4-3 STUDY GUIDE AND INTERVENTION #1-9		
	-HW: NONE		
11/30:*Students will divide polynomials using synthetic division			
	-Correct HW: P.247 #12-23		
	-Notes:	-How to use synthetic division to divide polynomials?	
			-Examples P.245-46
	-Do p. 247 CYU #8-11		
	-HW: P. 247 #24-31		
12/1:	***Students will divide polynomials using both long & synthetic division**		
	-Correct HW: P. 247 #24-31		
	-Do Practice 4-3 worksheet #20,22,24		

	-Correct solutions		
	-HW: P.249 #49-55		
Week #15: December 4, 2017 to December 8, 2017			
12/4:	***Students will divide polynomials using both long & synthetic division**		
	-Correct HW: P. 249 #49-55		
	-Finish Practice ws 4-3 ODD problems in groups		
	-Correct solutions		
	-HW: P.248 #36-41		
12/5:	***Students will evaluate function by using symbolic substitution**		
	-Correct HW: P.248 #36-41		
	-Notes:	-What is the Remainder Theorem	
			-What is the Synthetic substitution? Examples P. 288
	-DO C.Y.U P. 290 #1-4		
	-HW: P. 290 #8-16		
12/6:	***Students will determine whether a binomial is a factor of a polynomial**		
	by using synthetic substitution.		
	-Correct HW: P. 290 #8-16		
	-Notes:	-What is the Factor Theorem?	
	-Examples of applying the Factor Theorem?		
	-Do C.Y.U. p.290 #4-7		
	-HW: P. 290 #17-26		
12/7:	***Students will determine factors for a polynomial given a factor.**		
	-Correct HW: P290 #17-26		
	-Do Practice 4-8 worksheet in groups		
	-HW: P.292 #44-54 EVENS		
12/8:	***Students will evaluate polynomial functions**		
	-Correct HW: P. 292 #44-54		
	-Review how to find degree, lead coefficient Examples p. 253		
	-Notes:	-How to evaluate functions for variables & expression	
			-Examples p. 254
	-Do p. 258 C.Y.U #7-10		
	-HW: P. 258 #16-34 EVENS		
Week #16: December 11, 2017 to December 15, 2017			
12/11:	***Students will continue to evaluate polynomial functions**		
	-Correct HW: P.258 #16-34 EVENS		

	-DO 4.4 Skills Practice #1-18		
	-HW: P. 259 #51-54		
12/12: *Students will identify shapes of graphs of polynomial functions			
	-Correct HW: P. 259 #51-54		
	-Notes:	-Review what end behavior is.	
		-Effects of degree & lead coefficient	
		-Determine the number of real zeros	
		-Examples o describing graphs P.256	
	-HW: P.258 #35-40		
12/13: *Students will identify shapes of graphs of polynomial functions			
		(NOT IN SCHOOL TODAY)	
	-Do Practice worksheet 4.4 #1-20		
	-HW: Finish worksheet		
12/14: *Students will begin reviewing content on polynomial functions			
	-Correct HW: Worksheet 4-4		
	-Create Chapter 4 Study Guide:		
	4.1-Operations w/ Polynomials-examples p. 303 #11-16		
	4.2-Powers of Binomials (Pascal's Triangle) P. 303 #17-24		
	-HW: P.R4 #1-7		
12/15: *Students will continue to review content on polynomial functions			
	-Correct HW: P.R4 #1-7		
	-Continue with study guide outline:		
	4.3-Dividing Polynomials Examples p. 304 #25-39		
	-HW: P. R4 #8-13		
		Week #17: December 18, 2017 to December 22, 2017	
12/18: *Students will continue reviewing content from Chapter 4			
	-Correct HW: P. R4 #8-13		
	-Finish Review Outline for Chapter 4		
	4.8: Factor & Remainder Theorem P 306 #54-60		
	4.4-Graphing Polynomials- End behavior & Tables		
			(Examples p. 304 #30-36)
	-HW: P.310 #1-3,5,6,7		
12/19: *Students will finish reviewing Chapter 4 content			
	-Correct HW: P.310 #1-3,5,6,7		
	-Do Chapter 4 Practice Test ODDS p. 307 #1-11,19,23		
	-HW: P.307 EVENS #2-10; 24 EVENS		

12/20: *Students will demonstrate knowledge learned in Chapter 4			
	-Correct HW: P. 307 #2-10;24 EVENS		
	-Take Chapter 4 TEST		
	-HW: P.314 #1-10		
12/21: *Students will perform arithmetic operations with functions			
	-Correct HW: P.314 #1-10		
	-Notes:	-How to add & subtract functions (Examples P.315)	
	-How to multiply & Divide functions P.316		
	-Do p.318 Check Your Understanding #1 & 2		
	-HW: P. 318 #4-10 EVENS		
12/22: *Students will apply arithmetic operations with functions			
	-Correct HW: P.318 #4-10 EVENS		
	-Notes:	-Real World applications of function operations P.317	
	-Do P.318 CYU #3		
	-HW: NONE		

III. CLASS SYLLABUS

Classroom Management Plan
Worcester Technical High School
Mr. Silverman 2018 – 2019

I. Attendance:

A. Attendance is taken at the beginning of class based on the seating plan.

B. Attendance is important, material (including quizzes, tests, homework and in class assignments) missed due to absence is the responsibility of the student. I will not chase you to make up missed work.

II. Tardies:

A. Everyone must be in their seat when class starts based on the published schedules whether or not the bell is heard.

B. If you are tardy, for any reason, do not disturb the class, in any way. Put your pass on my desk and take your seat silently. As soon as I am able I will catch you up to what the class is doing

C. Promptness is important, material (including quizzes, tests, homework and in class assignments) missed due to tardiness is the responsibility of the student. I will not chase you to make up missed work.

III. Academic Expectations:

A. Student will maintain a binder with all work as defined by the teacher on day one.

B. Homework will be assigned almost every day except Fridays and is expected to be completed by the due date.

C. Homework will be collected and graded periodically otherwise it goes into your binder.

D. There will be one or more tests or quizzes every week of class. Test will be announced at least two days ahead of time. Quizzes may or may not be announced ahead of time.

E. Grading Policy:

1. Test and quizzes will account for 50% of your grade.
2. Homework will count for 20% of your grade.
3. Classroom participation will account for 20% of your grade.
4. Final Exam - 10%

IV. Discipline:

A. Behave as if your grade depends on it.

B. Rules to follow:

1. Show respect to teachers and fellow students at all times.
2. Do not talk or interrupt while the teacher is talking.
3. Raise your hand if you wish to speak and the teacher will call on you as soon as is practical.
4. No touching anyone or anything that does not belong to you.
5. No food or drink, other than water, ever.
6. No sleeping or resting your head on the desks.
7. Be prepared with your binder and a sharpened pencil when class begins.
8. Stay away from my desk unless I invite you up.
9. Show TECH Pride and keep the classroom clean. Pick up any trash near your seat and dispose of it properly, whether it belongs to you or not.

C. Consequences for failing to follow rules in part B.

1. Warning to stop inappropriate activity.
2. Warning to stop inappropriate activity.
3. Student will be given a detention.
4. Student will earn a zero test grade.
5. Guardians may be called; student may be written up and/or reported to appropriate administrator.

V. Makeup and Extra Help Time:

A. I am available after school for help or make-up work every Wednesday with or without an appointment.

B. I am available after school for help or make-up work on other days with an appointment.

C. I am available before school for help or make-up work any day with an appointment.

APPENDIX: Lesson Plans

IV. GRAPHING LINEAR INEQUALITIES LESSON PLAN

Lesson Plan Title: Graphing Inequalities

Teacher's Name: Ms. Mitchell
Subject/Course: Algebra II
Unit: Linear Equations (Lesson 1-5)
Grade Level: 10th

Overview of and Motivation for Lesson:
To introduce and explain the process for graphing inequalities and to review how to graph a line.

<table>
<tr><th colspan="2">Stage 1-Desired Results</th></tr>
<tr><td colspan="2">Standard(s):
• A-REI.11
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 polynomial, rational, and logarithmic functions.
Massachusetts Mathematical Framework</td></tr>
<tr><td colspan="2">Aim/Essential Question:
• How can inequalities be graphed on a two-dimensional scale?</td></tr>
<tr><td colspan="2">Understanding(s):
Students will understand that . . .
• Linear inequalities are constraints that can be represented on two dimensional graphs as well as can be applied to real world examples</td></tr>
<tr><td>Content Objectives:
Students will be able to . . .
• Extend their current knowledge of inequalities and apply it to graphing inequalities
• Explain the use of linear inequalities in real world problems, demonstrated through the comprehension of provided word problems</td><td>Language Objectives:
ELD Level 3 Students will be able to . . . in English
• Reflect on previous knowledge of inequalities and be able to summarize the role of a constraint in the terms of inequalities, further demonstrating their comprehension of the material through practice problems involving graphing
ELD Level 4 Students will be able to . . . in English
• Interpret and practice the use of Algebra in the terms of inequalities through solving and demonstrating their understanding of real world practice problems and relating this back to their previously learned material involving inequalities</td></tr>
<tr><td colspan="2">Key Vocabulary</td></tr>
</table>

- Constraint/Boundary
- Inequality/Inequation
- Intercept
- Intersection

Stage 2-Assessment Evidence

Performance Task or Key Evidence

- Graph a linear inequality correctly
- Solve a real-world example of how inequalities can applied

Key Criteria to measure Performance Task or Key Evidence

- The right side of the line is shaded in and the line is properly dashed or solid

Stage 3- Learning Plan

Learning Activities:

Do Now/Bell Ringer/Opener:

Go over last night's assignment and get problems ready to go over

Learning Activity 1:

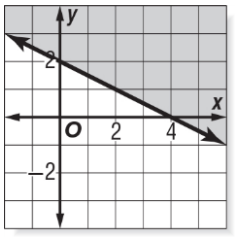
Review Linear Graphing and introduce the difference between a greater than/less than line and a greater than or equal to/less than or equal to line

Example: Graph $x + 2y \geq 4$

The boundary is the graph of $x + 2y = 4$.

Use the slope-intercept form, $y = -\frac{1}{2}x + 2$, to graph the boundary line.

The boundary line should be solid.



Test the point (0, 0).

$0 + 2(0) \stackrel{?}{\geq} 4$ $\qquad$ $(x, y) = (0, 0)$

$0 \geq 4$ $\qquad$ false

Shade the region that does *not* contain (0, 0).

(Glencoe Algebra 2 Book)

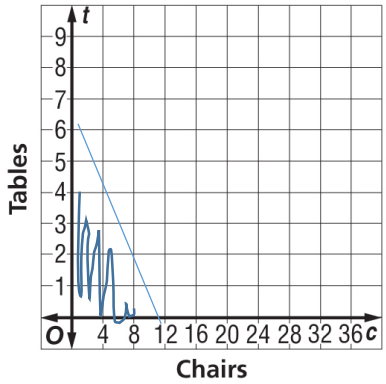
Learning Activity 2:

Apply linear inequalities to real-world scenarios.

ON BOARD: A **constraint** is a condition that the solution of a problem must satisfy

Example:

A delivery crew is going to load a truck with tables and chairs. The trucks weight limitations are represented by the inequality $200t + 60c < 1200$, where t is the number of tables and c is the number of chairs. Graph this inequality.



(Glencoe Algebra 2 Book)

LA 3:
Students work together in pairs if there is time left.

Application
Linear Inequalities can be applied and are useful in relevant situations

Summary/Closing
How can you use what you've learned or reviewed thus far to complete your assignment?
Make sure you are always prepared to take a quiz!

Multiple Intelligences Addressed:

☒ Linguistic	☒ Logical-Mathematical	☐ Musical	☐Bodily-kinesthetic
☐ Spatial	☒ Interpersonal	☐Intrapersonal	☐Naturalistic

Student Grouping
☒ Whole Class ☐ Small Group ☒ Pairs ☐ Individual

Instructional Delivery Methods

☒ Teacher Modeling/Demonstration	☒ Lecture	☒ Discussion
☐ Cooperative Learning	☐ Centers	☒ Problem Solving
☐ Independent Projects		

Accommodations	Modifications
• Remind the class about taking notes and practicing what's on the board • Check over shoulders for notetaking and putting people back on track	x

Homework/Extension Activities:
Lesson 1-5 Assignment

Materials and Equipment Needed:
- White Board and Markers
- Lesson Plan

Adapted from Grant Wiggins and Jay McTighe-*Understanding by Design*

V. GRAPHING QUADRATIC INEQUALITIES LESSON PLAN

Lesson Plan Title: Graphing Quadratic Inequalities

Teacher's Name: Ms. Mitchell **Subject/Course:** Algebra II

Unit: Quadratic Functions (Lesson 3-7) **Grade Level:** 10th

Overview of and Motivation for Lesson:

To introduce and explain the process for graphing and solving quadratic inequalities and to review how to graph a parabola.

<table>
<tr><th colspan="2">Stage 1-Desired Results</th></tr>
<tr><td colspan="2">Standard(s):
A.CED.1
Create equations and inequalities in one variable and use them to solve problems.

A.CED.3
Represent constraints by equations or inequalities, or by systems of equations and/o inequalities, and interpret solutions as viable or nonviable options in a modeling context.</td></tr>
<tr><td colspan="2">Aim/Essential Question:
• How can inequalities be graphed on a two-dimensional scale?</td></tr>
<tr><td colspan="2">Understanding(s):
Students will understand that . . .
• Quadratic inequalities, like linear inequalities, are constraints that can be represented on two dimensional graphs as well as can be applied to real world examples</td></tr>
<tr><td>Content Objectives:
Students will be able to . . .
• Extend their current knowledge of inequalities and apply it to graphing quadratic inequalities
• Explain the use of quadratic inequalities in real world problems, demonstrated through the comprehension of provided word problems</td><td>Language Objectives:
ELD Level 3 Students will be able to . . . in English
• Reflect on previous knowledge of inequalities and be able to summarize the role of a constraint in the terms of inequalities, further demonstrating their comprehension of the material through practice problems involving graphing
ELD Level 4 Students will be able to . . . in English
• Interpret and practice the use of Algebra in the terms of inequalities through solving and demonstrating their understanding of real world practice problems and relating this back to their previously learned material involving linear inequalities</td></tr>
<tr><td colspan="2">Key Vocabulary
• Constraint/Boundary
• Quadratic inequality</td></tr>
</table>

- Minimum/Maximum
- Vertex

Stage 2-Assessment Evidence

Performance Task or Key Evidence

- Graph a parabola for a quartic inequality
- Solve a real-world example of how inequalities can applied

Key Criteria to measure Performance Task or Key Evidence

- The inside or outside of the parabola is shaded and the constraint is properly dashed or solid

Stage 3- Learning Plan

LEARNING ACTIVITIES:

Do Now/Bell Ringer/Opener:

Go over last night's assignment and get problems ready to go over

REVIEW:

Review graphing parabolas and the rules of graphing inequalities

Example: Graph $x^2 + 3x + 2 \geq$ f(x)

New Content:

Graph Quadratic Inequalities: To graph a quadratic inequality in two variables, use the following steps:

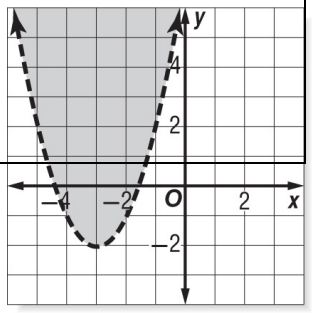
Graph the related quadratic equation, $y = ax^2 + bx + c$.

1. Make sure your equation is in standard form
2. Find the vertex: $x = \frac{-b}{2a}$ to find your x-coordinate of the vertex and the axis of symmetry
3. Determine if this function has a minimum or a maximum (+a→ min; -a→max)
4. Find the y-intercept, where x=0
5. Use factoring, completing the square, or the quadratic formula to find the functions' roots
6. Use axis of symmetry or a table of values to complete the parabola SHADED AREA
7. Use a dashed line for < or >; use a solid line for ≤ or ≥.
8. Test a point inside the parabola. If it satisfies the inequality, shade the region inside the parabola; otherwise, shade the region outside the parabola.

Teacher will say, "Try this example."

Example: Graph the inequality $y > x^2 + 6x + 7$.

First graph the equation $y = x^2 + 6x + 7$. By completing the square, you get the vertex form of the equation $y = (x + 3)^2 - 2$, so the vertex is (–3, –



2). Make a table of values around x = –3, and graph. Since the inequality includes >, use a dashed line. Test the point (–3, 0), which is inside the parabola. Since $(-3)^2 + 6(-3) + 7 = -2$, and $0 > -2$, (–3, 0) satisfies the inequality. Therefore, shade the region inside the parabola.

LA 3:
Students work together in pairs if there is time left for homework.

Application
Quadratic Inequalities can be applied and are useful in relevant situations

Summary/Closing
How can you use what you've learned or reviewed thus far to complete your assignment? Make sure you are always prepared to take a quiz! You will see parabolas in science.

Multiple Intelligences Addressed:

☒ Linguistic	☒ Logical-Mathematical	☐ Musical	☐Bodily-kinesthetic
☐ Spatial	☒ Interpersonal	☐Intrapersonal	☐Naturalistic

Student Grouping
☒ Whole Class ☐ Small Group ☒ Pairs ☐ Individual

Instructional Delivery Methods

☒ Teacher Modeling/Demonstration	☒ Lecture	☒ Discussion
☐ Cooperative Learning	☐ Centers	☒ Problem Solving
☐ Independent Projects		

Accommodations	**Modifications**
• Remind the class about taking notes and practicing what's on the board • Check over shoulders for notetaking and putting people back on track	x

Homework/Extension Activities:
Lesson 3-7 Assignment

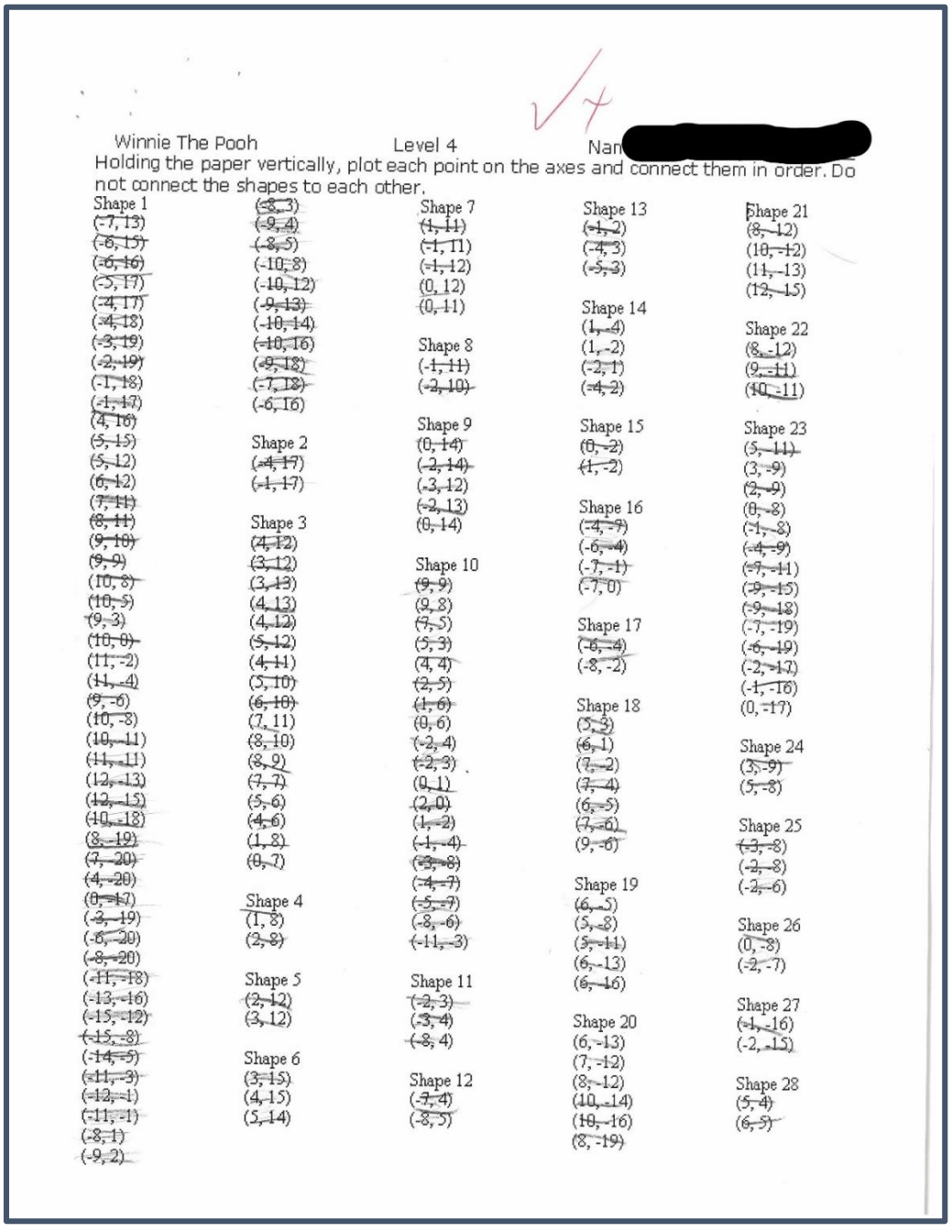
Materials and Equipment Needed:
- White Board and Markers
- Lesson Plan

Adapted from Grant Wiggins and Jay McTighe-*Understanding by Design*

APPENDIX: Student Work, Projects, and Surveys

VI. PLOTTING PROJECT

STUDENT EXAMPLE 1:



Winnie The Pooh Level 4 Nam[redacted]

Holding the paper vertically, plot each point on the axes and connect them in order. Do not connect the shapes to each other.

Shape 1
(-7, 13)
(-6, 15)
(-6, 16)
(-5, 17)
(-4, 17)
(-4, 18)
(-3, 19)
(-2, 19)
(-1, 18)
(-1, 17)
(4, 16)
(5, 15)
(5, 12)
(6, 12)
(7, 11)
(8, 11)
(9, 10)
(9, 9)
(10, 8)
(10, 5)
(9, 3)
(10, 0)
(11, -2)
(11, -4)
(9, -6)
(10, -8)
(10, -11)
(11, -11)
(12, -13)
(12, -15)
(10, -18)
(8, -19)
(7, -20)
(4, -20)
(0, -17)
(-3, -19)
(-6, -20)
(-8, -20)
(-11, -18)
(-13, -16)
(-15, -12)
(-15, -8)
(-14, -5)
(-11, -3)
(-12, -1)
(-11, -1)
(-8, -1)
(-9, 2)

(-8, 3)
(-9, 4)
(-8, 5)
(-10, 8)
(-10, 12)
(-9, 13)
(-10, 14)
(-10, 16)
(-9, 18)
(-7, 18)
(-6, 16)

Shape 2
(-4, 17)
(-1, 17)

Shape 3
(4, 12)
(3, 12)
(3, 13)
(4, 13)
(4, 12)
(5, 12)
(4, 11)
(5, 10)
(6, 10)
(7, 11)
(8, 10)
(8, 9)
(7, 7)
(5, 6)
(4, 6)
(1, 8)
(0, 7)

Shape 4
(1, 8)
(2, 8)

Shape 5
(2, 12)
(3, 12)

Shape 6
(3, 15)
(4, 15)
(5, 14)

Shape 7
(1, 11)
(1, 11)
(1, 12)
(0, 12)
(0, 11)

Shape 8
(-1, 11)
(-2, 10)

Shape 9
(0, 14)
(-2, 14)
(-3, 12)
(-2, 13)
(0, 14)

Shape 10
(9, 9)
(9, 8)
(7, 5)
(5, 3)
(4, 4)
(2, 5)
(1, 6)
(0, 6)
(-2, 4)
(-2, 3)
(0, 1)
(2, 0)
(1, -2)
(-1, -4)
(-3, -8)
(-4, -7)
(-5, -7)
(-8, -6)
(-11, -3)

Shape 11
(-2, 3)
(-3, 4)
(-8, 4)

Shape 12
(-7, 4)
(-8, 5)

Shape 13
(-1, 2)
(-4, 3)
(-5, 3)

Shape 14
(1, -4)
(1, -2)
(-2, 1)
(-4, 2)

Shape 15
(0, -2)
(1, -2)

Shape 16
(-4, -9)
(-6, -4)
(-7, -1)
(-7, 0)

Shape 17
(-6, -4)
(-8, -2)

Shape 18
(5, 2)
(6, 1)
(7, -2)
(7, -4)
(6, -5)
(7, -6)
(9, -6)

Shape 19
(6, -5)
(5, -8)
(5, -11)
(6, -13)
(6, -16)

Shape 20
(6, -13)
(7, -12)
(8, -12)
(10, -14)
(10, -16)
(8, -19)

Shape 21
(8, -12)
(10, -12)
(11, -13)
(12, -15)

Shape 22
(8, -12)
(9, -11)
(10, -11)

Shape 23
(5, -11)
(3, -9)
(2, -9)
(0, -8)
(-1, -8)
(-4, -9)
(-7, -11)
(-9, -15)
(-9, -18)
(-7, -19)
(-6, -19)
(-2, -17)
(-1, -16)
(0, -17)

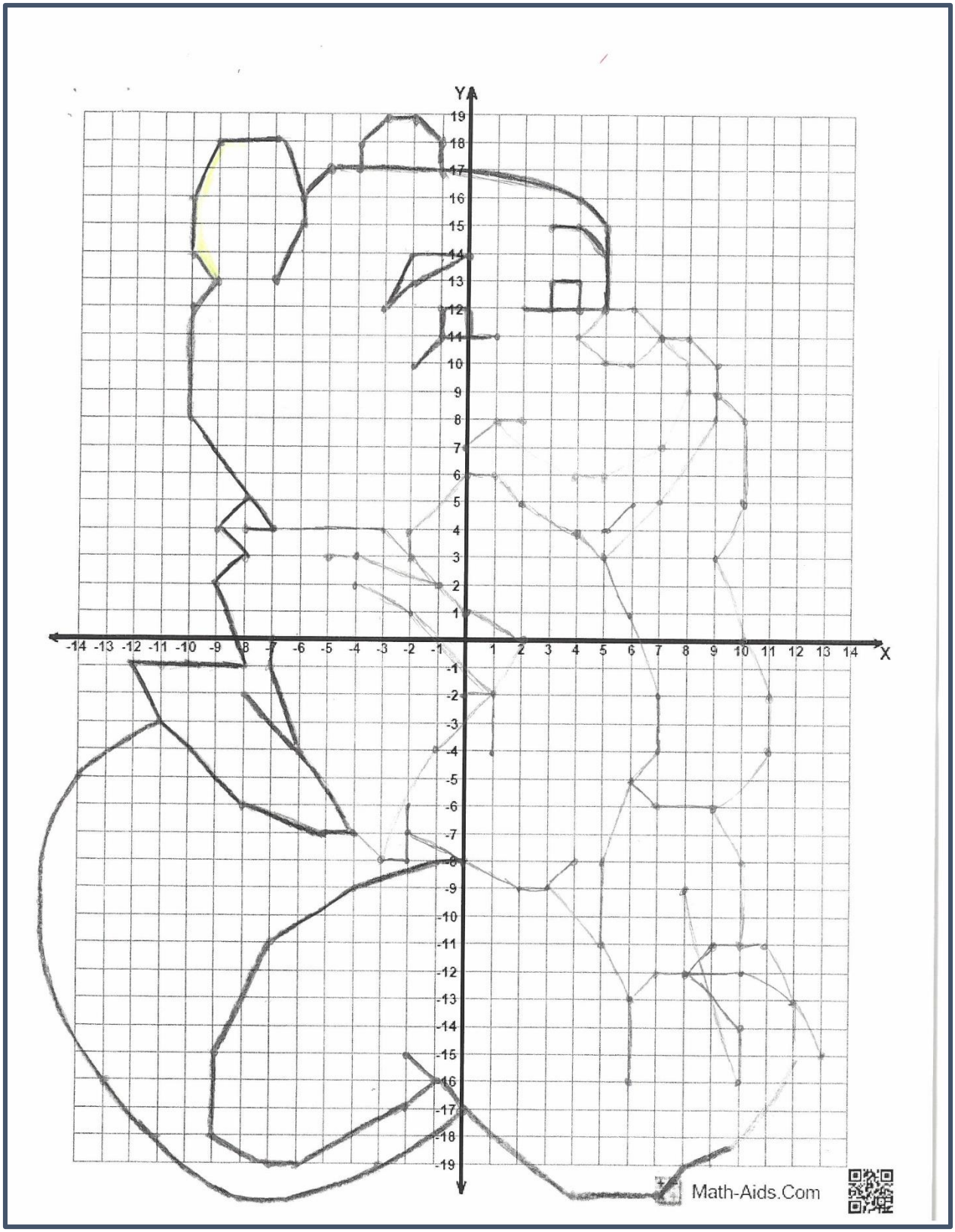
Shape 24
(3, -9)
(5, -8)

Shape 25
(-3, -8)
(-2, -8)
(-2, -6)

Shape 26
(0, -8)
(-2, -7)

Shape 27
(-1, -16)
(-2, -15)

Shape 28
(5, -4)
(6, -5)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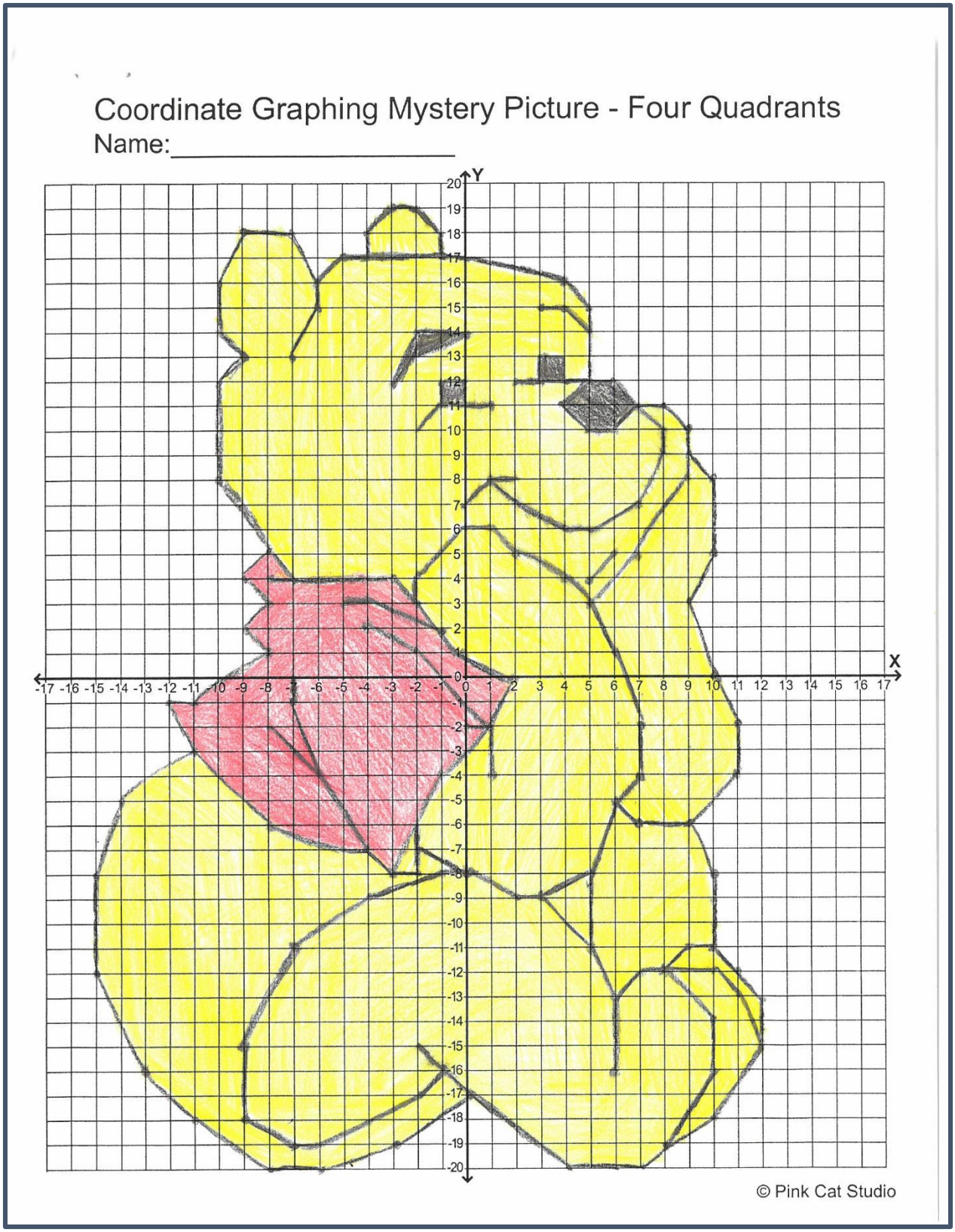
Coordinate Graphing Mystery Picture - Four Quadrants
Name:_____
Y
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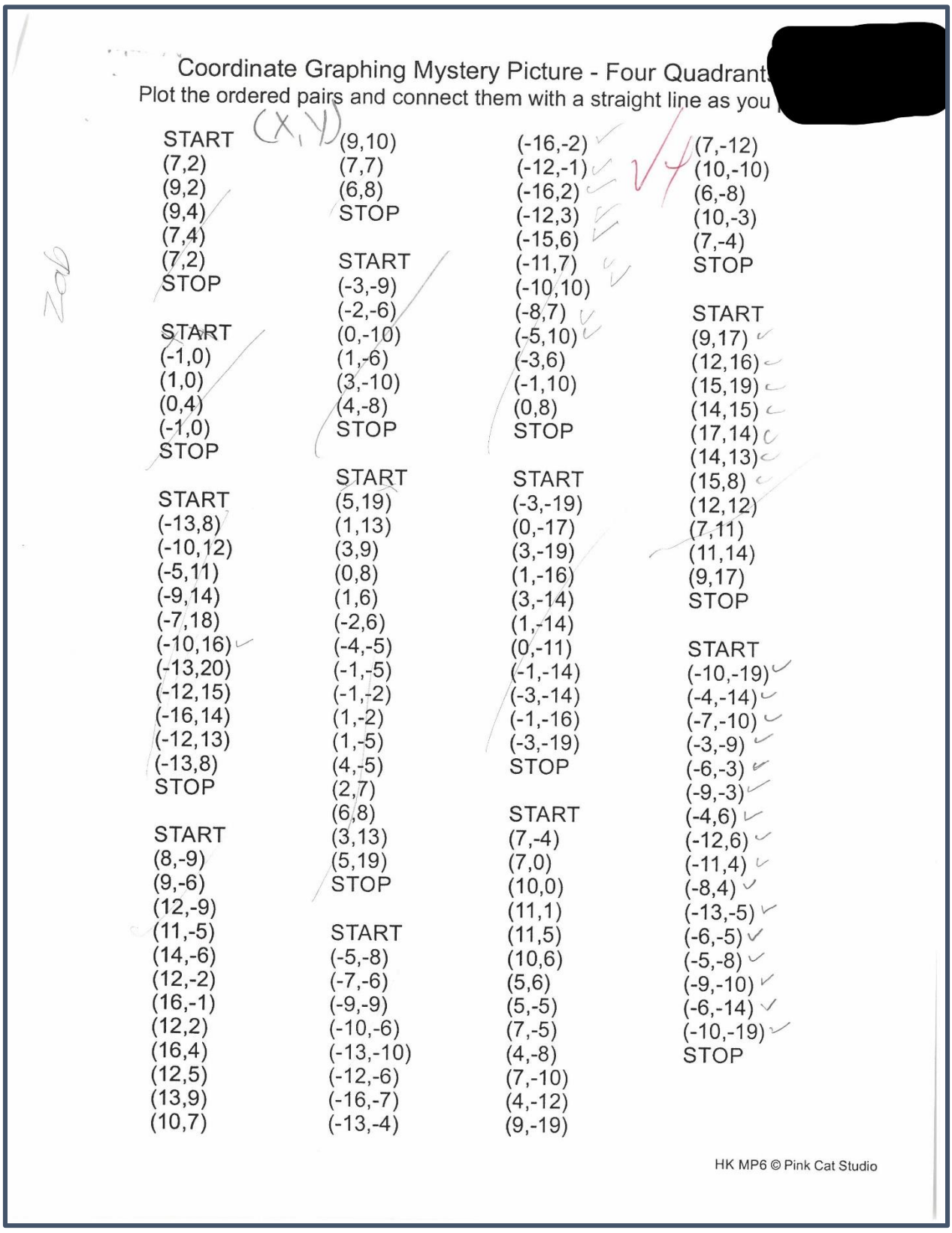
STUDENT EXAMPLE 2:



Coordinate Graphing Mystery Picture - Four Quadrant

Plot the ordered pairs and connect them with a straight line as you

START
(7,2)
(9,2)
(9,4)
(7,4)
(7,2)
STOP

START
(-1,0)
(1,0)
(0,4)
(-1,0)
STOP

START
(-13,8)
(-10,12)
(-5,11)
(-9,14)
(-7,18)
(-10,16)
(-13,20)
(-12,15)
(-16,14)
(-12,13)
(-13,8)
STOP

START
(8,-9)
(9,-6)
(12,-9)
(11,-5)
(14,-6)
(12,-2)
(16,-1)
(12,2)
(16,4)
(12,5)
(13,9)
(10,7)

(9,10)
(7,7)
(6,8)
STOP

START
(-3,-9)
(-2,-6)
(0,-10)
(1,-6)
(3,-10)
(4,-8)
STOP

START
(5,19)
(1,13)
(3,9)
(0,8)
(1,6)
(-2,6)
(-4,-5)
(-1,-5)
(-1,-2)
(1,-2)
(1,-5)
(4,-5)
(2,7)
(6,8)
(3,13)
(5,19)
STOP

START
(-5,-8)
(-7,-6)
(-9,-9)
(-10,-6)
(-13,-10)
(-12,-6)
(-16,-7)
(-13,-4)

(-16,-2)
(-12,-1)
(-16,2)
(-12,3)
(-15,6)
(-11,7)
(-10,10)
(-8,7)
(-5,10)
(-3,6)
(-1,10)
(0,8)
STOP

START
(-3,-19)
(0,-17)
(3,-19)
(1,-16)
(3,-14)
(1,-14)
(0,-11)
(-1,-14)
(-3,-14)
(-1,-16)
(-3,-19)
STOP

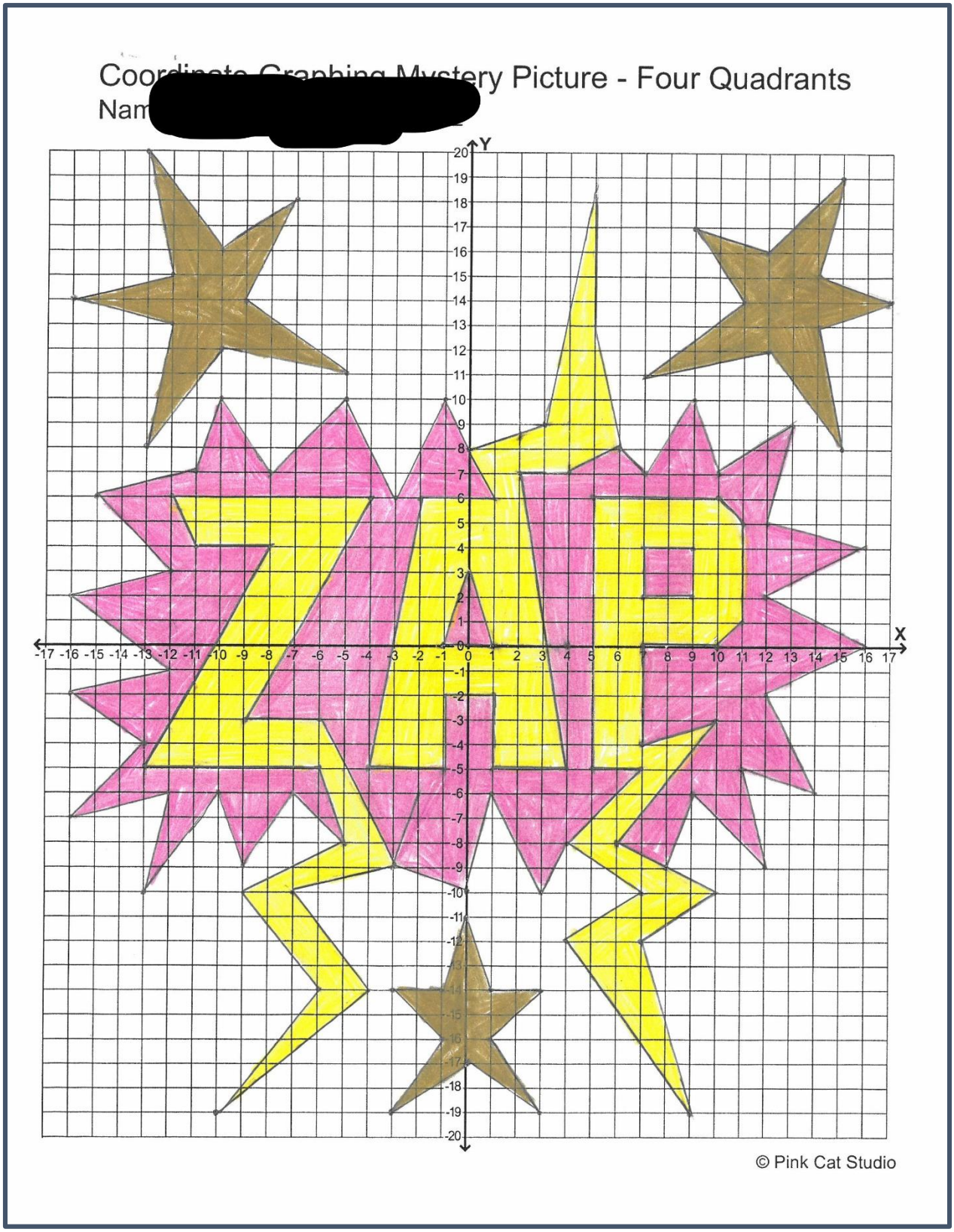
START
(7,-4)
(7,0)
(10,0)
(11,1)
(11,5)
(10,6)
(5,6)
(5,-5)
(7,-5)
(4,-8)
(7,-10)
(4,-12)
(9,-19)

(7,-12)
(10,-10)
(6,-8)
(10,-3)
(7,-4)
STOP

START
(9,17)
(12,16)
(15,19)
(14,15)
(17,14)
(14,13)
(15,8)
(12,12)
(7,11)
(11,14)
(9,17)
STOP

START
(-10,-19)
(-4,-14)
(-7,-10)
(-3,-9)
(-6,-3)
(-9,-3)
(-4,6)
(-12,6)
(-11,4)
(-8,4)
(-13,-5)
(-6,-5)
(-5,-8)
(-9,-10)
(-6,-14)
(-10,-19)
STOP

HK MP6 © Pink Cat Studio


Coordinate Graphing Mystery Picture - Four Quadrants
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Y
X
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VII. STAIN GLASS PROJECT

DESIGN YOUR OWN STAINED GLASS

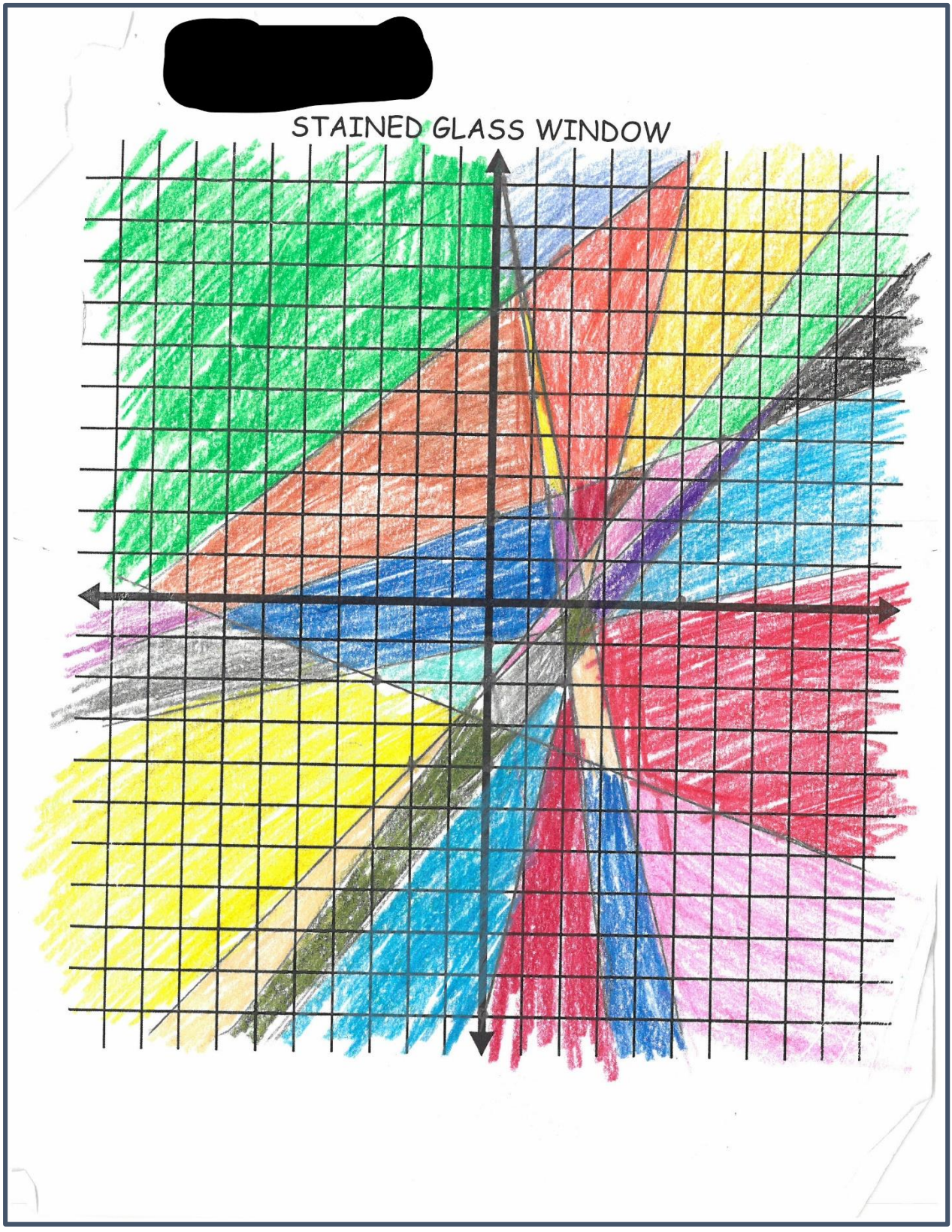
1. Create your own stained glass design, using at least 10 equations.
2. Create a list of the equations you used.
3. Graph and color your design.

SOME POINTERS:

- ✓ Changing signs will reflect your design, for instance…
  - Changing $y = \frac{1}{2}x + 3$ to $y = -\frac{1}{2}x + 3$ will reflect the line across the y-axis. (Opposite sign for the slope)
  - Changing $y = \frac{1}{2}x + 3$ to $y = -\frac{1}{2}x - 3$ 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) $Y = \frac{3}{4}X + 7$ ✓
2) $Y = 5X + 10$ ✓
3) $Y = \frac{8}{2}X - 10$ ✓
4) $Y = -\frac{8}{2}X + 10$ ✓
5) $Y = -\frac{5}{4}X - 2$ ✓
6) $Y = \frac{2}{6}X - 4$ ✓
7) $Y = -\frac{1}{5}X - 1$ ✓
8) $Y = \frac{2}{6}X + 2$ ✓
9) $Y = -2X - 2$ ✓
10) $Y = -3X - 3$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STAINED GLASS WINDOW

VIII. MUSIC VIDEO PROJECT

Algebra II Music Video Project

During this semester so far, you have learned a variety of topics and material pertaining to Algebra II. Each of you will be in a group of 2-4 students (from the same period) and you may choose your own groups, but be cautious of your fellow members. This is a group graded assignment, so everyone must contribute equally. As a group, you must pick a topic from one of the units covered thus far that you will make a music video about, which explains all the important information about that topic. If you would rather do something else to show your knowledge of a topic creatively, come to Ms. Mitchell or Mr. Silverman and present your idea.

You may use the textbook, homework, your teachers, and/or your notes as a resource. Once your group has decided on a topic, you must inform Ms. Mitchell and she will approve you to go on to further steps. Once your topic is approved, your group must come up with lyrics explaining your topic in some sort of musical form. These will also be approved by Ms. Mitchell before advancing to any other steps. Once lyrics have been approved, your group must record your mathematical musical masterpiece on some sort of device that can be uploaded to a computer. If no one in your group can obtain some sort of recording device (digital camcorder, digital camera, phones, etc.) that has enough memory or can be uploaded to a computer by USB, let Ms. Mitchell know and she will do the best she can to accommodate your recording needs. This project will count as a midyear final, so be sure to take its content very seriously, but don't forget to have fun!

RESTRICTIONS: There will be absolutely **NO** profanity (if you think it might be an inappropriate word… it is!), inappropriate material (alcohol, tobacco, etc.), or inappropriate innuendos (do not use ANYTHING of sexual nature) of any kind in these videos. If any of these items are present, an immediate "0" will be given for the entire group and further write-ups will ensue. Students are free to use any music genre they choose (rap, rock, country, emo, jazz, etc.), except for hardcore, screamo, nu-metal, type of music (because of how hard it is to understand). Essentially, your music must be easily understood by anyone. Students can use other music as a guide or create their own melody.

REQUIREMENTS: Every member of the group must participate in some sort of the lyrics portion of the music video (everyone has to sing/rap). The video should look as professional as possible. The video should not be shaky or having random outbursts/giggle fits by students in mid-song. Students are free to use any editing software they choose, but are not required to by any means. The content of the video should be very clear and informative about your math topic. The mathematical information you are presenting is the most important portion. The video must be at least 2 minutes and 30 seconds long and no longer than 5 minutes and finalized, typed lyrics must be turned in by Monday, December 10th, 2018.

PROJECT DUE DATE: _____

SUGGESTIONS: Use props or costumes to make your music video look more legit. Do a few practice runs of your music before your group tries to record it. Get organized with your group members early about working on specific parts of the project and about possible out of school meetings. Do NOT waste class time or wait until the last minute. Make sure all your math information is accurate and makes sense. Most of all, HAVE FUN!!!

CATEGORY	EXCEEDS EXPECTATIONS	MEETS EXPECTATIONS	NEEDS IMPROVEMENT	BELOW EXPECTATIONS
1) **Algebra II Concept/Lyrics** Is the concept explained well and are the lyrics easily understood?	Algebra II concept is clearly communicated and includes formulas and includes strong use of vocabulary **(4)** The lyrics fit the rhythm of the song very well **(4)**	Algebra II concept is clearly communicated and includes some detail, no formulas, an average use of vocabulary **(3)** The lyrics fit the rhythm of the song for the most part **(3)**	Algebra II concept is somewhat communicated **(2)** The lyrics do not fit the rhythm of the song well **(2)**	Algebra II concept is unclear **(1)** The lyrics do not fit the rhythm of the song at all **(1)**
2) **Creativity / Audience Engagement** Shows effort, time dedicated to planning. Follows assignment instructions.	The song lyrics were original and showed creative effort/Music was included/ Pleasing sound/ Audience was engaged **(4)**	Lyrics were somewhat original but music was not included/Sound was somewhat pleasing/ Audience was mostly engaged **(3)**	Lyrics were not original but credit was given to originator/ sound was acceptable/ Audience was engaged somewhat **(2)**	Lyrics were not original and no credit was given/sound below acceptable/ Audience was minimally engaged if at all **(1)**
3) **Audio/Visual** Quality of audio and visual. Props, wardrobe, etc...	Audio/Visual quality is quite good. Clear props for present progressive and costumes add to understanding of song **(4)**	Audio/Visual of good quality, help understanding of song. Props for present progressive and costumes enhance the video **(3)**	Audio/Visual help with understanding of song. Some props or wardrobe were used to enhance the video **(2)**	Audio/Visual is difficult to see or understand. No props or wardrobe were used **(1)**
4) **Content** Interesting, educational, entertaining, student behavior. School appropriate	The content was extremely interesting, educational and entertaining. Student behavior was appropriate. School appropriate **(4)**	The content was interesting, educational and entertaining. Student behavior was appropriate. School appropriate **(3)**	The content was somewhat interesting, educational and entertaining. Student behavior was fair. School appropriate **(2)**	The subject is not interesting, educational, or entertaining. Students did not behave professionally on camera. It was not school appropriate **(1)**
5) Group Engagement Was everyone in the group engaged?	Everyone in the group showed great involvement in the production **(5)**	Most of the members in the group were involved **(4)**	Only one person did all of the work **(2)**	There was a lack of effort from the entire group **(1)**

IX. TEST CORRECTION

STUDENT EXAMPLE 1:

[redacted] DATE November 19, 2018 PERIOD A-5

Chapter 3 Test, Form 2C

SCORE _____

1) Vertex = (1,5)
AoS = x = 1
y-int = (0,0)

1. Graph $f(x) = -5x^2 + 10x$, labeling the y-intercept, vertex, and axis of symmetry. y-intercept: (0,0) origin $-5(1)^2 + 10(1) = f(x)$ $-5 + 10 = 5 = y$

$AoS = \frac{-10}{2(-5)} = \frac{-10}{-10} = 1$

vertex = (1,5)

2) maximum = (1,4)

2. Determine whether $f(x) = -3x^2 + 6x + 1$ has a maximum or a minimum value and find that value. $AoS = \frac{-6}{2(-3)} = 1$ $-3(1)^2 + 6(1) + 1$ $-3 + 6 + 1$ 4 (1,4)

3. Solve $x^2 = 6x - 8$ by graphing. If exact roots cannot be found, state the consecutive integers between which the roots are located.

$-x^2 + 6x - 8$ or $x^2 - 6x + 8$ $AoS = \frac{+6}{2(1)} = \frac{6}{2} = 3$ $(3)^2 - 6(3) + 8$ $9 - 18 + 8$ $-9 + 8$ -1 vertex = (3, -1)

roots: $x = 4$ $x = 2$

4. Solve $5x^2 + 13x = 6$ by factoring. $5x^2 + 13x - 6 = 0$ $x = \frac{2}{5}$ $x = -3$

5. **GEOMETRY** The length of a rectangle is 7 inches longer than its width. If the area of the rectangle is 144 square inches, what are its dimensions?

5
L = 16 inches
W = 9 inches

6. **ELECTRICITY** The total impedance of a series circuit is the sum of the impedances of all parts of the circuit. Suppose that the first part of a circuit has an impedance of $6 - 5j$ ohms and that the total impedance of the circuit was $12 + 7j$ ohms. What is the impedance of the remainder of the circuit?

6 $6 + 12j$

$(12 + 7j) - (6 - 5j) = 6 + 12j$

7. **ELECTRICITY** In an AC circuit, the voltage E (in volts), current I (in amps), and impedance Z (in ohms) are related by the formula $E = I \cdot Z$. Find the current in a circuit with voltage $10 - 3j$ volts and impedance $4 + j$ ohms. $I = \frac{E}{Z}$ $I = \frac{10 - 3j}{4 + j}$

7

8. Write a quadratic equation with -6 and $\frac{3}{4}$ as its roots. Write the equation in the form $ax^2 + bx + c = 0$, where a, b, and c are integers. $(x + 6)(x - \frac{3}{4})$ $(x - p)(x - q)$ $x^2 + 6x - \frac{3}{4}x - \frac{18}{4} \rightarrow y = x^2 + \frac{21}{4}x - \frac{18}{4}$

8 $4x^2 + 21x - 18$

For Questions 9 and 10, solve each equation by using the Square Root Property. → Complete the Square

9. $x^2 + 6x + 9 = 25$ $(x + 3)^2 = 25$ $x + 3 = \pm 5$ $x = -3 \pm 5$

9 $x = 2$ $x = -8$

10. $x^2 + 16x + 64 = 90$ $(x + 8)^2 = 90$ $x + 8 = \pm\sqrt{90} < \frac{9}{10}$ $x + 8 = \pm 3\sqrt{10}$ $x = -8 \pm 3\sqrt{10}$

10 $x = -8 \pm 3\sqrt{10}$

NAME _____ DATE _____ PERIOD ____

Chapter 3 Test, Form 2C *(continued)*

For Questions 11 and 12, solve each equation by completing the square.

11. $x^2 + 4x - 9 = 0$

12. $2x^2 + 3x - 2 = 0$

For Questions 13 and 14, solve each equation by using the Quadratic Formula.

13. $x^2 + 6x + 4 = 0$

14. $5x^2 = 3x - 2$

For Questions 15 and 16, find the value of the discriminant for each quadratic equation. Then describe the number and type of roots for the equation.

15. $9x^2 - 12x + 4 = 0$

16. $4x^2 + 1 = 9x - 2$

17. PHYSICS The height h (in feet) of a certain rocket t seconds after it leaves the ground is modeled by $h(t) = -16t^2 + 48t + 15$. Find the maximum height reached by the rocket.

18. Graph $y < x^2 + 6x + 9$.

For Questions 19 and 20, solve each inequality algebraically.

19. $3x^2 + 14x + 8 \leq 0$ EC

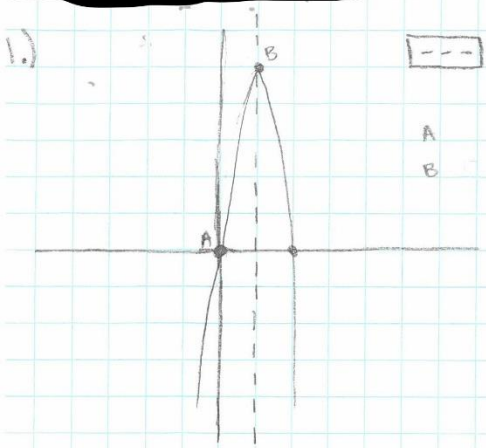
20. $2x^2 - 5x - 3 \geq 0$ EC

Bonus Write a quadratic equation with roots $\pm\frac{\sqrt{7}}{3}$. Write the equation in the form $ax^2 + bx + c = 0$, where a, b, and c are integers.

[redacted]

November 19th, 2018

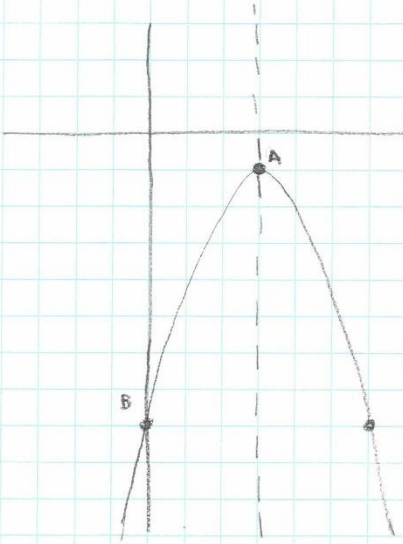
1.)



--- = axis of symmetry (x=1)
A = y-intercept (0,0)
B = vertex (1,5)

2) maximum = (1,4)

3)



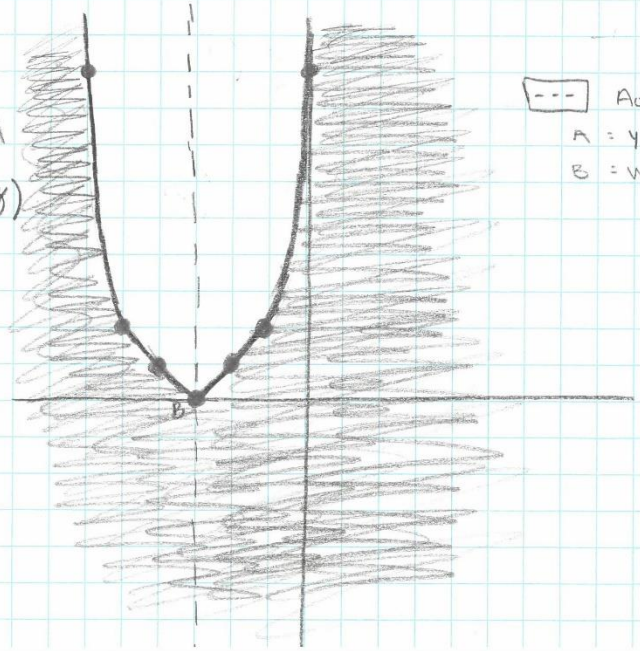
---- : Axis of symmetry (3, y)
A = vertex (3, -1)
B = y intercept (0, -8)

No roots found

corrected graph on back →

7) $L = 7 + w$
$144 = L \cdot w$
$144 = (7+w)w$
$144 = w^2 + 7w$
$0 = w^2 + 7w - 144$
$0 = (w+12)^2$
$\pm 0 = w + 12$
$-12 \pm 0 = w$
$-12 = w$

18)



--- AoS = (x=-3)
A = y-int = (0,8)
B = vertex = (-3,0)

[redacted] Chapter Three Test Corrections

3) Correct Answer :
My Answer : No roots found

(GO TO LAST ATTACHED PAGE)

4) Correct Answer : $x = \frac{2}{3}$ $x = -3$
My Answer : — (I originally skipped over it)

Originally I skipped the problem because I wanted to keep it until the end but I ran out of time and I couldn't finish but now I can do the problem.

Work $5x^2 + 13x = 6$

$5x^2 + 13x - 6 = 0$

$5x^2 + 15x - 2x - 6 = 0$

$5x(x+3) - 2(x+3) = 0$

$(5x-2)(x+3) = 0$

a·c : $-30 \leq \frac{-2}{15}$

$5x - 2 = 0$ $5x = 2$ $x = \frac{2}{5}$

$x + 3 = 0$ $x = -3$

5) Correct Answer : $W = 9$ & $L = 16$ inches
My Answer : $w = -12$ $L = -12$ (so 12 & 12)

My answer doesn't actually make any sense, but I couldn't really figure out what I did wrong. Okay, so what I didn't realize at first was that the equation isn't a perfect square trinomial since -144 doesn't have a root, so I factored it out and got the answer below.

$L = w + 7$

$144 = w \cdot (w+7)$

$144 = w^2 + 7w$

$0 = w^2 + 7w - 144$ → $w^2 + 16w - 9w - 144$ → $w(w+16) - 9(w+16) = 0$

$0 = (w-9)(w+16)$

$w = 16$ $w = 9$

$16 + 7 = 23$ $9 + 7 = 16$

$L = 16$ $W = 9$

[redacted]

7) Correct Answer:
My Answer: — (Initially skipped)

So, again, I had initially skipped this question mostly because I didn't want to deal with variables and plugging numbers in at the time but now that I look at the problem I probably would've gotten confused plugging the numbers in their respective places and THEN dividing or multiplying it out. It would be easier to change the formula before plugging the numbers in.

$E = I \cdot Z \rightarrow I = \frac{E}{Z}$ $\quad I = \frac{10 - 5j}{4 + j}$

I = current =

12) Correct Answer: $\boxed{X = \frac{1}{2} \quad X = -2}$
My Answer: $X = \frac{-3 \pm \sqrt{13}}{2}$

The value of "C" that I found using "$\left(\frac{b}{2a}\right)^2$" was incorrect. I believe this was because I accidentally confused the Axis of Symmetry with the equation to find "C", which resulted in the value of "C" being wrong.

$C = \left(\frac{b}{2a}\right)^2$
$C = \left(\frac{3}{2(2)}\right)^2$
$C = \left(\frac{3}{4}\right)^2$
$C = \frac{9}{16}$

$2x^2 + 3x - 2 = 0$
$2x^2 + 3x = 2$
$x^2 + \frac{3}{2}x = 1$
$x^2 + \frac{3}{2}x + \frac{9}{16} = 1\frac{9}{16}$
$\left(x + \frac{3}{4}\right)^2 = 1\frac{9}{16}$
$\left(x + \frac{3}{4}\right) = \pm 1\frac{1}{4}$
$x = -\frac{3}{4} \pm 1\frac{1}{4}$

$x = -\frac{3}{4} + 1\frac{1}{4} = x = \frac{1}{2}$
$x = -\frac{3}{4} - 1\frac{1}{4} \quad x = -2$

STUDENT EXAMPLE 2:

[redacted]

21/30 (20)

[redacted]

DIRECTIONS: A 30-question Answer Sheet is on the back side of the cover page and 2 blank sheets of scrap paper at the end of the exam. You may write on this exam. Please write answers on the answer sheet FIRST, and then copy your answers to the scantron card. Make sure your name, your instructor's name, and exam version are written on the scantron card.
NO cell phones, notebooks, notecards, textbooks, graphing calculator, and unofficial scrap paper will be allowed.

N[redacted] 10-25-18

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Factor out the greatest common factor.

1) $64m^9 + 128m^7 - 144m^2$ 1) C

A) $8m^2(8m^7 + 16m^5 - 18)$ B) no common factor (except 1)
C) $16m^2(4m^7 + 8m^5 - 9)$ D) $m^2(64m^7 + 128m^5 - 144)$

Factor by grouping.

2) $32 - 8t - 4s + ts$ 2) D

A) $(4 + t)(8 - s)$ B) $(4 - t)(8 + s)$ C) $(4 + t)(8 + s)$ D) $(4 - t)(8 - s)$

Factor completely.

3) $x^2 - 5x - 36$ 3) B

A) $(x - 6)(x + 6)$ B) $(x + 4)(x - 9)$ C) $(x - 12)(x + 3)$ D) $(x - 4)(x + 9)$

Factor as completely as possible. If unfactorable, indicate that the polynomial is prime.

4) $8z^2 + 6z - 9$ 4) C

A) $(8z + 3)(z - 3)$ B) $(2z - 3)(4z + 3)$ C) $(2z + 3)(4z - 3)$ D) Prime

5) $15x^2 - 65x - 50$ 5) D

A) $5(3x - 2)(x + 5)$ B) $(15x + 10)(x - 5)$ C) Prime D) $5(3x + 2)(x - 5)$

Factor completely.

6) $x^4 - 16$ 6) B

A) $(x^2 - 4)(x + 2)(x - 2)$ B) $(x^2 + 4)(x^2 - 4)$
C) Prime D) $(x^2 + 4)(x + 2)(x - 2)$

Write the rational expression in lowest terms.

*7) $\frac{3x + 12}{4x^2 + 21x + 20}$ 7) D

A) $\frac{3x}{4x + 5}$ B) $\frac{3x + 4}{4x + 21}$ C) $\frac{3x + 12}{4x^2 + 21x + 20}$ D) $\frac{3}{4x + 5}$

Multiply. Write the answer in lowest terms.

8) $\frac{3z^3}{5} \cdot \frac{35}{z^2}$ 8) D

A) $\frac{21z^2}{z^3}$ B) $\frac{z}{21}$ C) $\frac{21}{z}$ D) $21z$

7/8

[redacted]

9) $\frac{3r-9}{6r^2+12r} \cdot \frac{3r+6}{18-6r}$ 9) A

A) $-\frac{1}{4r}$ B) $\frac{1}{4}$ C) $\frac{r-3}{4r(3-r)}$ D) $-\frac{3}{4(3-r)}$

Divide. Write the answer in lowest terms.

10) $\frac{2x^2}{4} \div \frac{x^3}{32}$ 10) A

A) $\frac{16}{x}$ B) $\frac{16x^2}{x^3}$ C) $\frac{x}{16}$ D) $\frac{64x^2}{4x^3}$

11) $\frac{z^2+12z+35}{z^2+16z+63} \div \frac{z^2+5z}{z^2+17z+72}$ 11) A

A) $\frac{z+8}{z}$ B) $z+8$ C) $\frac{z}{z^2+16z+63}$ D) $\frac{z+8}{z^2+9z}$

Perform the indicated operation and simplify.

12) $\frac{3m}{m-2} + \frac{-6}{m-2}$ 12) C

A) 0 B) $\frac{3}{m-2}$ C) $\frac{3(m+2)}{m-2}$ D) 3

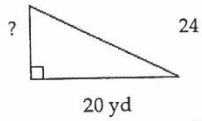
Simplify the complex fraction.

13) $\frac{\frac{1}{k+2}}{\frac{5}{k^2-4}}$ 13) A

A) $\frac{k-2}{5}$ B) $k-2$ C) $\frac{k+2}{5}$ D) $\frac{5}{k-2}$

Solve the problem. Give the answer to the nearest thousandth if necessary.

14) The diagram below shows a rope connecting the top of a pole to the ground. The rope is 24 yd long and touches the ground 20 yd from the pole. How tall is the pole? 14) D



A) 88 yd B) 22 yd C) 6.633 yd D) 13.266 yd

Simplify the radical.

15) $\sqrt{539}$ 15) C

A) $11\sqrt{7}$ B) 23 C) $7\sqrt{11}$ D) 77

[redacted] [redacted]

[redacted]

8/15

and simplify.

16) $6\sqrt{7} \cdot 5\sqrt{21}$

A) $35\sqrt{3}$ B) $42\sqrt{3}$ C) $30\sqrt{3}$ D) $210\sqrt{3}$ 16) D

Use the product and quotient rules, as necessary, to simplify the radical expression.

17) $\frac{32\sqrt{35}}{4\sqrt{5}}$

A) $8\sqrt{7}$ B) 56 C) $4\sqrt{7}$ D) $8\sqrt{5}$ 17) A

Simplify the radical. Assume that all variables represent nonnegative real numbers.

18) $\sqrt{196m^{21}n^8}$

A) $14m^{10}n^4\sqrt{m}$ B) $14m^{11}n^5$ C) $14m^9n^4\sqrt{m}$ D) $14m^{10}n^4$ 18) A

Simplify the radical.

19) $\sqrt[4]{64}$

A) 2 B) 4 C) $2\sqrt[4]{8}$ D) $2\sqrt[4]{4}$ 19) C

Solve the equation.

20) $9k^2 - 53k - 6 = 0$

A) $\frac{1}{53}, -\frac{1}{9}$ B) $-\frac{1}{9}, 6$ C) $-9, 6$ D) $-\frac{1}{9}, 9$ 20) B

21) $64k^2 - 36 = 0$

A) $\frac{4}{3}, -\frac{3}{4}$ B) $\frac{3}{4}, -\frac{3}{4}$ C) $\frac{4}{3}, 0$ D) $6, 0$ 21) C

Solve the equation. Express radicals in simplest form.

22) $(r + 3)^2 = 10$

A) $-3 + \sqrt{10}, -3 - \sqrt{10}$ B) 7

C) $3 + \sqrt{10}, 3 - \sqrt{10}$ D) $\sqrt{10}, \sqrt{10}$ 22) A

23) $3x^2 = -7x + 1$

A) $\frac{-7+\sqrt{37}}{6}, \frac{-7-\sqrt{37}}{6}$ B) $\frac{7+\sqrt{61}}{6}, \frac{7-\sqrt{61}}{6}$

C) $\frac{-7+\sqrt{77}}{6}, \frac{-7-\sqrt{77}}{6}$ D) $\frac{-7+\sqrt{61}}{6}, \frac{-7-\sqrt{61}}{6}$ 23) D

Solve the equation.

24) $\frac{x}{14} - \frac{3}{7} = \frac{x+6}{7}$

A) -15 B) -12 C) -9 D) -18 24) D

25) $\frac{2}{y+5} - \frac{5}{y-5} = \frac{13}{y^2-25}$

A) -16 B) No solution C) 48 D) 16 25) A

[redacted]

Find the slope of the line.

26) $3x - 5y = -29$

A) $\frac{5}{3}$ B) $\frac{3}{5}$ C) $-\frac{3}{5}$ D) $-\frac{5}{3}$

Find the slope of the line through the pair of points.

27) (-7, -3) and (6, 4)

A) $\frac{7}{13}$ B) -2 C) $-\frac{1}{2}$ D) $\frac{13}{7}$

27) A

Determine whether the two lines are parallel, perpendicular, or neither parallel nor perpendicular.

28) $4x - 3y = 6$
$4x + 3y = -13$

A) Parallel B) Perpendicular C) Neither

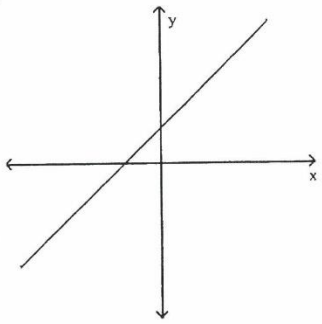
28) C

Match the equation with the graph that would most closely resemble its graph.

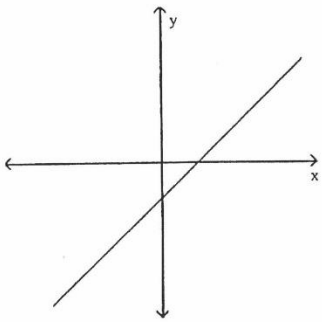
29) $y = -\frac{1}{3}x + 4$

29) C

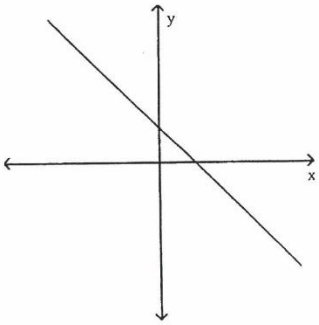
A)



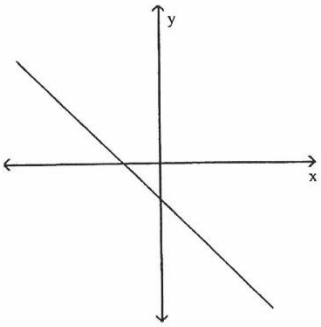
B)



C)



D)



Solve the system by the elimination method.

30) $x - 7y = 39$
$-2x - 8y = 32$

~~A)~~ No solution B) (4, -5) ~~C)~~ (-4, -4) ~~D)~~ (3, -4)

30) B

[redacted]

[redacted]

27

Corrections

[redacted]

6.) I got it wrong because I didn't factor completely. To get the right answer I need to factor one more step.

x^4-16

$(x^2+4)(x^2-4)$ Answer is D.

$(x^2+4)(x+2)(x-2)$

12.) I got the answer wrong because I guessed. The get the answer right I need to perform the indicated operation and simplify.

$\frac{3m}{m-2} + \frac{-6}{m-2} =$

19.) I got the answer wrong because I didn't answer the question. To get the answer right I need to simplify the radical.

$\sqrt[4]{64}$

8 8

4 2 2 4

2 2 2 2

Take four out to match the exponent. $2\cdot2\cdot2\cdot2 = 2\sqrt[4]{4}$

Answer on quiz is D.

[redacted]

21.) I got it wrong because I didn't answer it. To get it right I need to solve the equation.

$64k^2 - 36 = 0$

$(8k - 6)(8k + 6)$

$8k - 6 = 0$ $\quad +6 \quad +6$ $\qquad 8k + 6 = 0$ $\quad -6 \quad -6$ $\qquad$ Answer on quiz is B.

$\frac{8k = 6}{8} \qquad \frac{8k = -6}{8}$

$k = \frac{6}{8} \to \frac{3}{4}$ or $k = -\frac{6}{8} \to -\frac{3}{4}$

23.) I got it wrong because I didn't answer it. To get it right I need to solve the equation and express radicals in simplest form.

$3x^2 = -7x + 1$

[redacted]

24.) I got it wrong because I didn't answer it. To get it right I need to solve the equation.

$$\frac{x}{14} - \frac{3}{7} = \frac{x+6}{7}$$

25.) I got it wrong because I didn't answer it. To get it right I need to solve the equation.

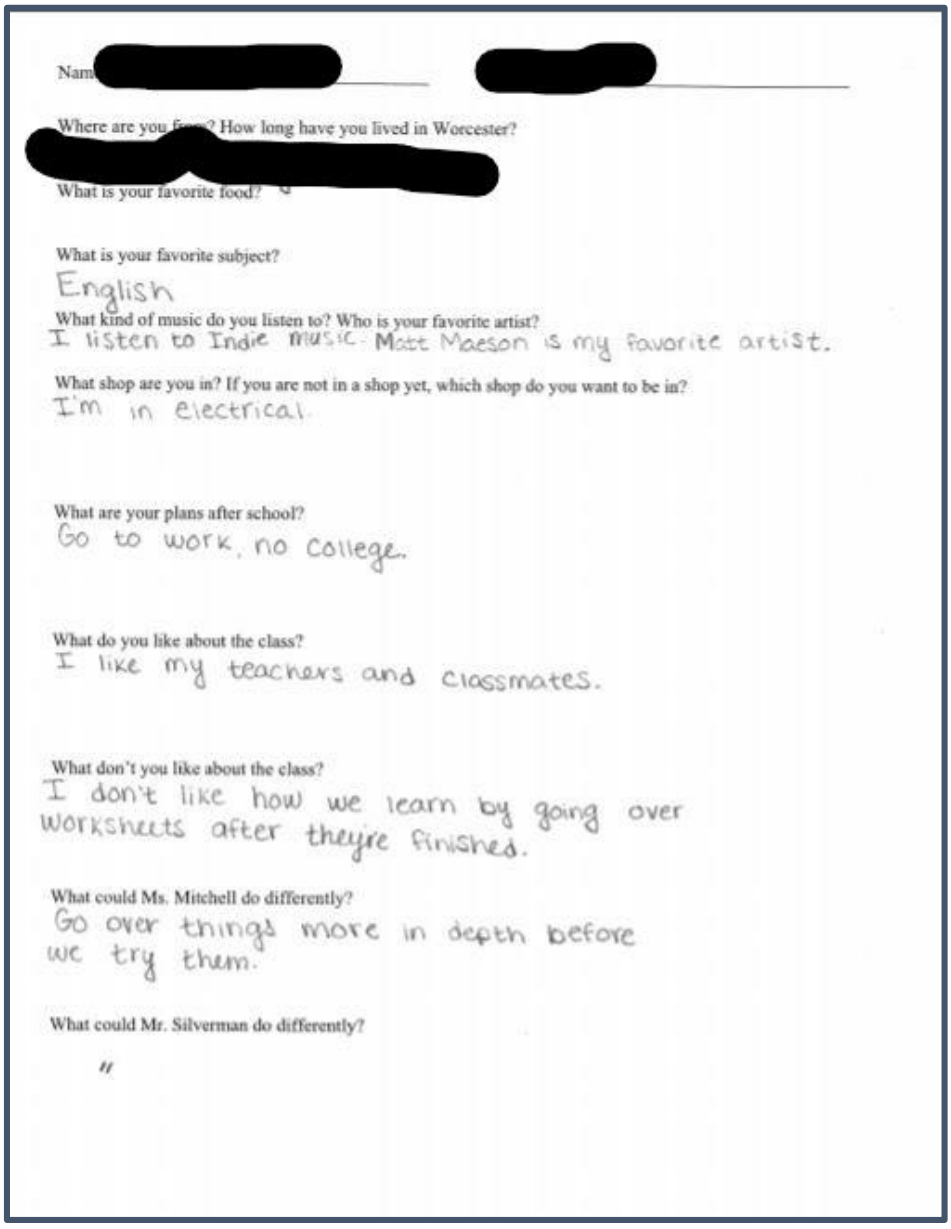
$$\frac{2}{y+5} - \frac{5}{y-5} = \frac{13}{y^2-25}$$

26.) I got it wrong because I didn't answer it.
To get it right I need to find the slope of the line.
$3x-5y=-29$

28.) I got it wrong because I didn't answer it.
To get it right I need to determine whether the two lines are parallel, perpendicular, or neither.
$4x-3y=6$
$4x+3y=-13$

X. STUDENT SURVEY

STUDENT EXAMPLE 1:



Nam[redacted]

Where are you from? How long have you lived in Worcester?

[redacted]

What is your favorite food?

What is your favorite subject?

English

What kind of music do you listen to? Who is your favorite artist?

I listen to Indie music. Matt Maeson is my favorite artist.

What shop are you in? If you are not in a shop yet, which shop do you want to be in?

I'm in electrical.

What are your plans after school?

Go to work, no college.

What do you like about the class?

I like my teachers and classmates.

What don't you like about the class?

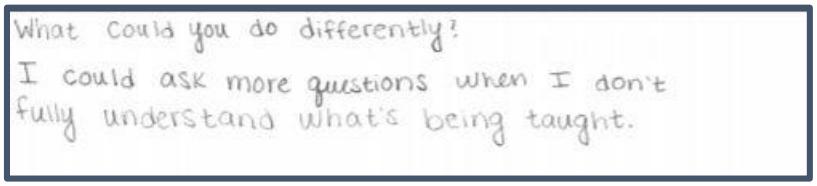
I don't like how we learn by going over worksheets after they're finished.

What could Ms. Mitchell do differently?

Go over things more in depth before we try them.

What could Mr. Silverman do differently?

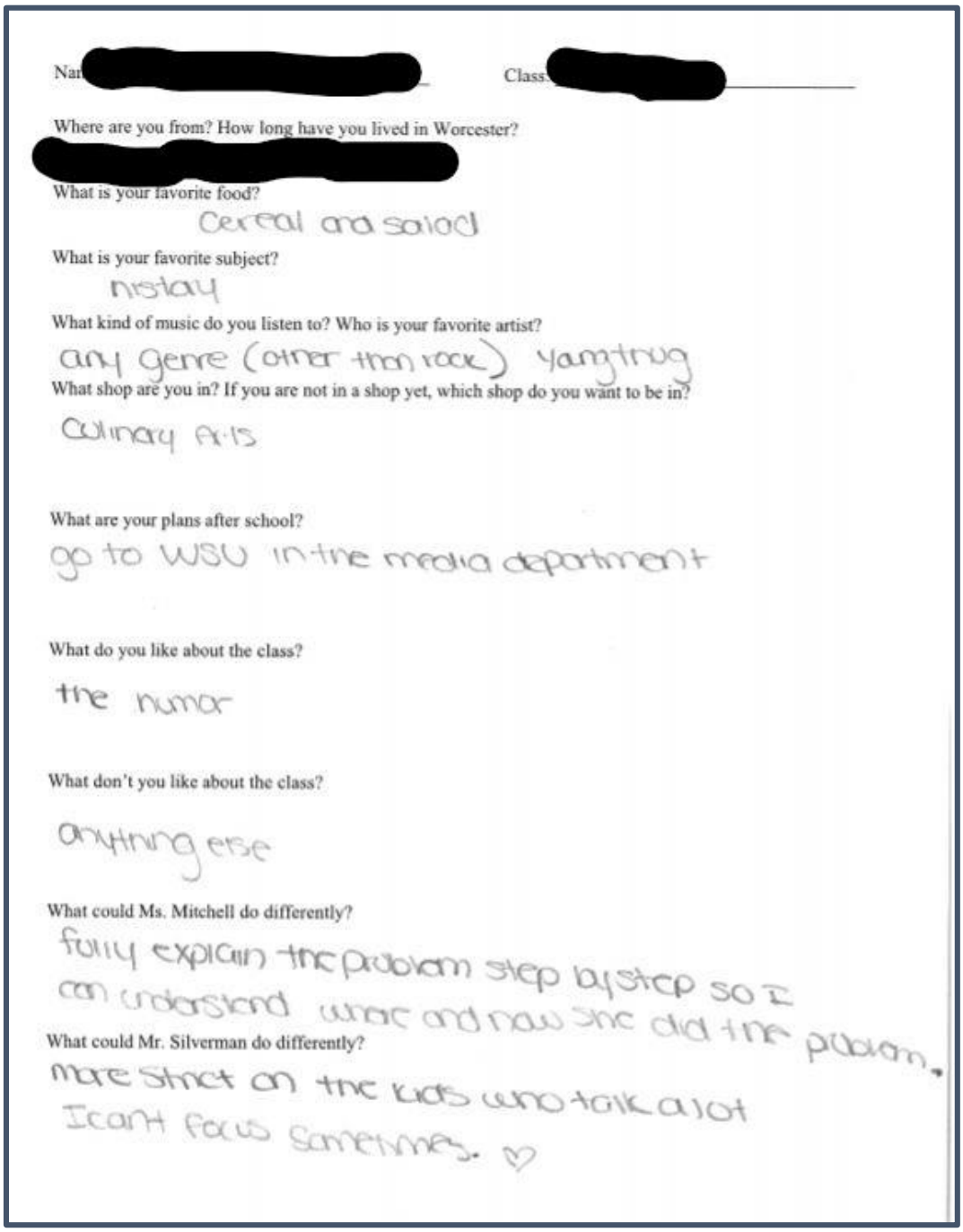
"



What could you do differently?

I could ask more questions when I don't fully understand what's being taught.

STUDENT EXAMPLE 2:



Nam[redacted] Class[redacted]

Where are you from? How long have you lived in Worcester?

[redacted]

What is your favorite food?

Cereal and salad

What is your favorite subject?

history

What kind of music do you listen to? Who is your favorite artist?

any genre (other than rock) Yungtrug

What shop are you in? If you are not in a shop yet, which shop do you want to be in?

Culinary Arts

What are your plans after school?

go to WSU in the media department

What do you like about the class?

the humor

What don't you like about the class?

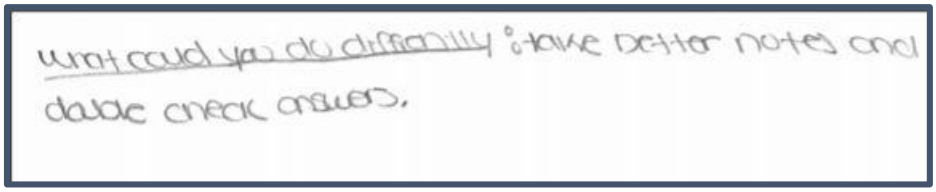
anything else

What could Ms. Mitchell do differently?

fully explain the problem step by step so I can understand what and how she did the problem.

What could Mr. Silverman do differently?

more strict on the kids who talk a lot I can't focus sometimes. ♡



What could you do differently? have better notes and double check answers.

APPENDIX: Noteworthy References & Links

1. Chester, Michael D. *Building on 20 Years of Mass. Education Reform*. Massachusetts Department of Elementary and Secondary Education, 2014.
2. Massachusetts Curriculum Frameworks

   http://www.doe.mass.edu/frameworks/
3. Massachusetts Department of Elementary and Secondary Education
   a. Pages of Interest
      i. ELAR login
      ii. District, school, and educator preparation program
      iii. TIMSS
   b. http://www.doe.mass.edu/
4. Worcester Public Schools

   http://www.wpsweb.com/default2.asp
5. WPI Teacher Preparation Program

   www.wpi.edu/+teach