Student Teaching Practicum at Worcester Technical High School

Interactive Qualifying Project (IQP)
A- / B-Term 2019

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Abstract

MS. VARADA: An overview of my WPI student teaching practicum, August – December 2019 at Worcester Technical High School in Worcester, Massachusetts.

This portfolio discusses and reflects upon select aspects of my semester-long student teaching practicum as a mathematics teacher at Worcester Technical High School. This program was completed as both an Interactive Qualifying Project (IQP) for Worcester Polytechnic Institute (WPI), and as a capstone project to receive my Massachusetts Secondary Teaching Certificate.

This portfolio indicates the six essential elements of the Candidate Assessment of Performance (CAP) for this program, and analyzes the ways in which I have exhibited proficiency in each. This is supported by documentation and reflection on each aspect, in the form of lesson plans, assessments, projects, worksheets, and homework assignments as well as student feedback survey results. It indicates how my WPI education has supported my transition from theory to practice, as is the WPI motto, as well as the extended personal impact that my time in the classroom has had on my professional and academic skillset as a future educator.

Acknowledgements

MY FAMILY

I could not have even fathomed making it through this journey without the support of my mother, my cousins, and my best friends. They were there for me through the highs and the lows, every single step of the way, just as they always have been and will be. They were the ones that I could express my excitement with over a particularly great lesson plan, or to whom I could cry and depend on when I felt overwhelmed or needed motivation. They inspired me in ways that nobody else could, when nobody else could, and I cannot trade that for anything.

Specifically, I would like to thank a very special friend of mine, Victoria Mercouris. I met Victoria very early in my WPI career, just as she was preparing to embark on this exact journey herself, albeit teaching physics during the latter half of the year at Worcester Tech, rather than math during the former half. I got the see Victoria through her highs and her lows just as my family and my friends saw me, and she has been an endless source of inspiration and encouragement through every step of the way. Victoria called me on the phone all the way from New Orleans, Louisiana during Week 14 of my practicum to not only congratulate and to check in on my progress, but to ask my opinions on some programs and ideas that she is working with at her current high school teaching job and for my input on how she can optimize her practice for her computer science and makers space classes. I see her as an equal and as a close friend, yet I will always look up to her, and I hope that she realizes just how much her guidance and her humor has meant to me since Day 1, August of 2017, until now.

MY ADVISORS

These extraordinary women have seen so much more of me than they signed up for, yet they continued to support me and to share feedback when I needed encouragement or critical action. Each advisor aided me in different ways, all of which were so crucial for me to complete this practicum with my head on straight and with my focus in the right place.

Jackie, my program director, was ever punctual and put up with a lot when I was going through some particularly rough patches. She continuously gave me seasoned, well-earned praise and criticism, all of which I took to heart during my future (even during the following period!) lessons. She gave me patience during my most strenuous, embarrassing trip-ups, including the process of submitting this portfolio.

Katie was very helpful to supporting my well-being and with giving me ideas to continue with my culturally responsive teaching, even taking it to the next level as a career suggestion. She was always a smiling face that I could trust whole-heartedly ... after all, she was the very first person whom I met during my WPI pre-acceptance orientation and she convinced me to come to the school for the TPP!

Finally, Shari has been a beacon of light and assurance throughout this entire process. She feels like a second mother to me. Shari stepped in when times were extremely difficult, for issues ranging from a complete overturn of my semester schedule and sanity, to advice on days when I completely overslept and did not know my next move. This program simply runs on these women, as did I as a "newbie" teacher.

MY MENTOR TEACHERS

The teachers at Worcester Tech are some of the most amazing, understanding individuals that I've met in my academic career, and their advice felt invaluable to me throughout my journey. I was never alone in the classroom, thanks not only to our wonderful Teaching Assistants, Miss Bigelow, Mrs. McKnight, and Mrs. Bonofilio, who always have so much to offer as remarkable, accomplished women who give their all to their students each day, but thanks to two other teachers who impacted my practicum in unexplainable ways.

I cannot even begin to thank Mr. Fitzpatrick. He gave me unparalleled (math pun) expertise, not just on my lesson plans, but on my personal struggles and triumphs throughout my time as his co-teacher. He comforted and reassured me on days when I arrived tardy for my classes or did not show up for them at all, focusing instead on addressing the reasons that I'd missed these classes rather than on the plain fact that I was not available for the students during those times. I learned so much from him, even from the fact that he seemed to learn things from me. I always trusted his opinion and bounced ideas off of him every single day, whether academic or even if I just had a rant that I needed advice on. His students respect him so much, and I don't even need to express how much I do.

I also dearly appreciate Ms. Marini. She and I forged a bond early in the semester, as it was also her first year teaching in Worcester. She is so intelligent and she has a beautiful sense of humor, and I feel very comfortable around her. She even let me observe her class and ask questions, taking both my teaching and my learning seriously, for which I respect her all the greater.

MY STUDENTS

My kids made such an impact on my life, even in the sixteen short weeks that I'd worked with them. I missed their humor when I was not with them, and I enjoyed working with every single one of their rather unique questions, even if they ran my patience a bit thin. Their drive, spirit, and dedication to their shops opened my eyes in ways that I do not even yet realize, and I gained a whole new perspective on post-high school college and career prospects through their inspiration. I will miss my students so much! Make your marks on the world!

Dedicated to the future Mathematicians, Graphic Designers, Electricians, Biologists, Decorators, Culinary Artists, Plumbers, Auto Technicians, and members of the wonderful generation of extraordinary individuals whom I've had the privilege of working with! #livemathlove

Background

MASSACHUSETTS EDUCATIONAL REFORM ACT OF 1993

The Massachusetts Public School System has evolved rapidly over the years, and much of its recent success can be attributed to the 1993 Massachusetts Education Reform Act (MERA). Although the political climate surrounding education has shifted since its implementation, the MERA continues to drive improvements in public education and to live up to its reputation as an initially controversial yet sound document.

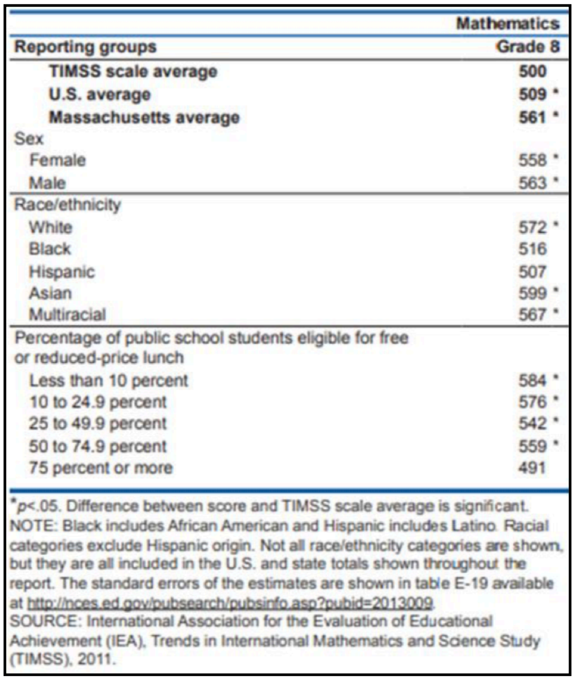
The framework for the MERA was established by the Every Child a Winner report of 1991, where the Massachusetts Business Alliance for Education, or MBAE, "call[ed] for high standards, accountability for performance, and equitable distribution of resources among school districts" (MBAE ECAW). Thus, the MERA required the school system to create a set of standards for each student to meet as a minimum measurement of performance, paving the way for a statewide accountability and assessment system to ensure progress. The MCAS (Massachusetts Comprehensive Assessment System) exam was born.

Public school systems across Massachusetts vary in economic security, so in order to support the statewide implementation this new protocol, the MERA established an improved financial system for schools. Districts were now able to access the resources that were necessary to meet these standards, despite any limited funding. This led to major increases in state financial aid access for public schools.

Districts have since been able to improve their reputations and to provide a platform for administrators and teachers to develop their skills and to properly evaluate their instructional proficiency. Many charter and vocational schools (like Worcester Technical High School) emerged following the implementation of the MERA, supporting the diverse needs and talents of students in the state. Massachusetts has greatly progressed as a leading state in the field of education, thanks to its reborn foundation in the Massachusetts Educational Reform Act.

MASSACHUSETTS PERFORMANCE RELATIVE TO THE INTERNATIONAL COMMUNITY

Reforms from the MERA have brought about progress in Massachusetts, which has led the state to measure significantly well when compared with the remainder of the international educational community. In 2011, eighth grade students from each state participated in the Trends in International Mathematics and Science Study (TIMSS), where students from Massachusetts scored higher than both the U.S. national averages and the actual TIMSS scoring scale. In fact, Massachusetts scored 52 points above the U.S. national average and 61 points above the TIMSS scale average in that year, as shown in Table 1. Generally, across various genders, races, ethnicities, and socioeconomic statuses, eighth grade public school students across all groups in Massachusetts still scored above the TIMSS scale average in 2011.

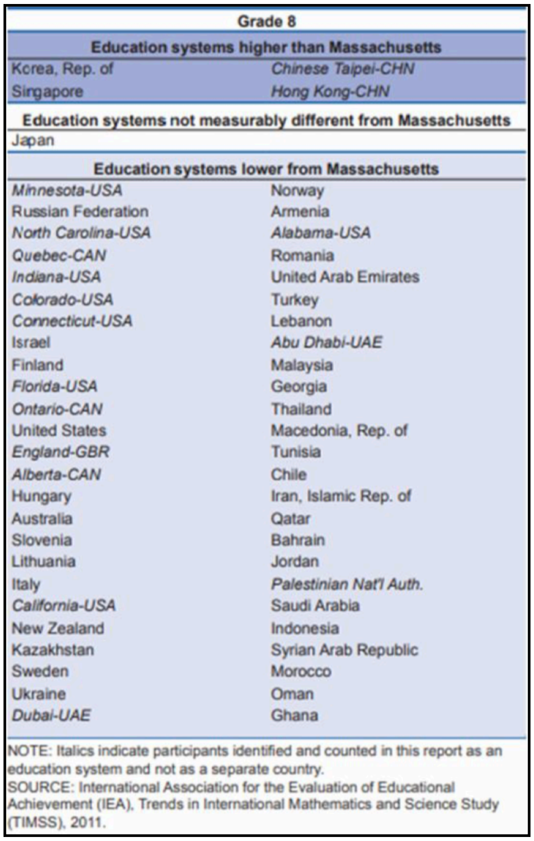


	Mathematics
Reporting groups	Grade 8
TIMSS scale average	**500**
U.S. average	**509 ***
Massachusetts average	**561 ***
Sex	
Female	558 *
Male	563 *
Race/ethnicity	
White	572 *
Black	516
Hispanic	507
Asian	599 *
Multiracial	567 *
Percentage of public school students eligible for free or reduced-price lunch	
Less than 10 percent	584 *
10 to 24.9 percent	576 *
25 to 49.9 percent	542 *
50 to 74.9 percent	559 *
75 percent or more	491

*$p<.05$. Difference between score and TIMSS scale average is significant.
NOTE: Black includes African American and Hispanic includes Latino. Racial categories exclude Hispanic origin. Not all race/ethnicity categories are shown, but they are all included in the U.S. and state totals shown throughout the report. The standard errors of the estimates are shown in table E-19 available at http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2013009.
SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 2011.

Table 1: 2011 Grade Eight TIMSS Scores by Various Socioeconomic Categories in Public Schools in Massachusetts

The 2011 TIMSS was not only administered in the United States, but across various educational systems around the world. When compared and analyzed, Massachusetts only fell short in score to those of Korea, Singapore, Chinese Taipei, and Hong Kong (as represented by Table 2). Remarkably, these four school systems were the only educational systems that scored higher than Massachusetts on both a U.S. national and an international scale.



Grade 8

Education systems higher than Massachusetts

Korea, Rep. of	*Chinese Taipei-CHN*
Singapore	*Hong Kong-CHN*

Education systems not measurably different from Massachusetts

Japan

Education systems lower from Massachusetts

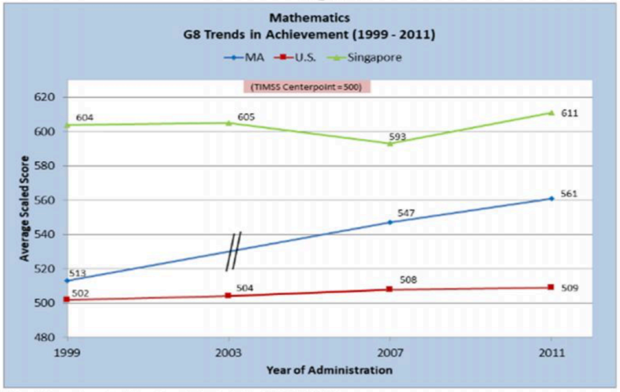
Minnesota-USA	Norway
Russian Federation	Armenia
North Carolina-USA	*Alabama-USA*
Quebec-CAN	Romania
Indiana-USA	United Arab Emirates
Colorado-USA	Turkey
Connecticut-USA	Lebanon
Israel	*Abu Dhabi-UAE*
Finland	Malaysia
Florida-USA	Georgia
Ontario-CAN	Thailand
United States	Macedonia, Rep. of
England-GBR	Tunisia
Alberta-CAN	Chile
Hungary	Iran, Islamic Rep. of
Australia	Qatar
Slovenia	Bahrain
Lithuania	Jordan
Italy	*Palestinian Nat'l Auth.*
California-USA	Saudi Arabia
New Zealand	Indonesia
Kazakhstan	Syrian Arab Republic
Sweden	Morocco
Ukraine	Oman
Dubai-UAE	Ghana

NOTE: Italics indicate participants identified and counted in this report as an education system and not as a separate country.
SOURCE: International Association for the Evaluation of Educational Achievement (IEA), Trends in International Mathematics and Science Study (TIMSS), 2011.

Table 2: 2011 Grade Eight TIMSS Scores in Public Schools in Massachusetts and in Various International Educational Systems

Although the comparative TIMSS scores in Massachusetts with the remainder of its international community positively reflect on the state educational system, the MERA itself had an impact on the performance of students in Massachusetts over a period of time leading up to the 2011 TIMSS, as previously discussed. As shown in Figure 1 and in Figure 2, from 1999 to 2011, eighth grade students in Massachusetts improved their average TIMSS Mathematics scores by 48 points and their average TIMSS Science scores by 34 points. In particular, the Mathematics score increase was the highest of any benchmarked participating country for this period of time. It is possible that other states across the U.S. have thus adopted some components of the Massachusetts Educational Reform Act over time, given these results and positive data, which will only make for a stronger national educational system for years to come (TIMSS 2011).

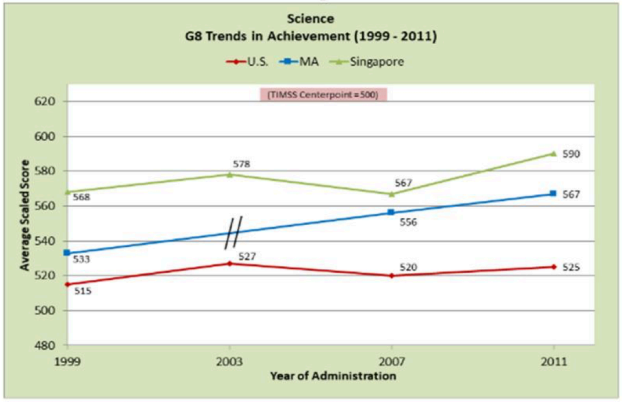
Figure 1



Note: Massachusetts did not participate in the 2003 TIMSS.

Figure 1: 1999 to 2011 TIMSS Grade Eight Mathematics Scores in Public Schools in Massachusetts

Figure 2



Note: Massachusetts did not participate in the 2003 TIMSS.

Figure 2: 1999 to 2011 TIMSS Grade Eight Science Scores in Public Schools in Massachusetts

WORCESTER PUBLIC SCHOOLS

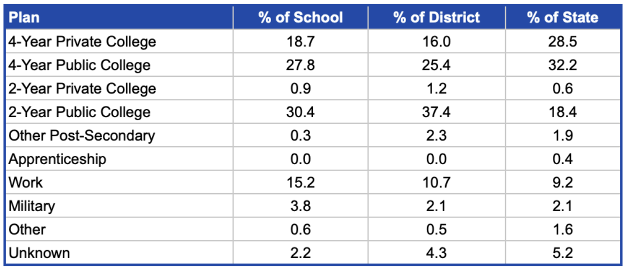
The Worcester Public School district, guided by the success of the Massachusetts school system, strives to meet all of its students' needs and to conduct its instruction and to deliver content using a personalized approach in the classroom. It emphasizes high achievement for each student by providing access to advanced opportunities for holistic education, by focusing on social and emotional learning, and by maintaining rigor in the classroom.

Worcester currently supports administration and teachers across 45 schools. Among these are 7 secondary schools, 4 junior high schools, and 34 elementary schools. The district boasts a student-teacher ratio of 13.7 : 1, which is slightly below the statewide average. Teachers and administrators in the district oversee close to 25,415 students, of whom 57.5% have a first language other than English, speaking over 74 different languages instead. An average of 94.4% of these students attend school near-daily, contributing to an 86.3% four-year graduation rate for 2018, with 82.3% of these students planning on attending some sort of post-secondary educational system (as opposed to joining the work force or the military) following graduation (WPS 2019).

WORCESTER TECHNICAL HIGH SCHOOL

Worcester Technical High School, or WTHS, is located in eastern Worcester and combines hands-on work within 23 different student "shops" with practical education and an alternating vocational-academic schedule. Worcester Tech contains around 1,426 students who are enrolled at a student-teacher ratio of 10 : 1, all of which are exposed to both a standard academic curriculum and to valuable training in a trade of their choice, allowing them the option to enter either the workforce or another post-secondary option after graduation with practical skills and learning tools under their belts.

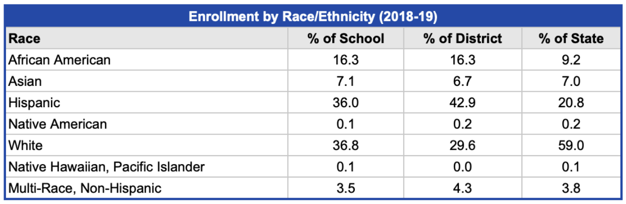
An average of 96% of students attended classes each day as of 2018, and WTHS maintained a remarkably low drop-out rate of 0% during the 2018-2019 school year due to the value that it provides to its students (who have to apply to the school and to maintain satisfactory grades in both their shops and in their regular classes to remain in good standing) and to the district. Table 3 details exact plans that the 97% of students who graduated during this same academic year planned on venturing into post-graduation, including the 77.8% of whom who planned on attending a post-secondary educational option.



Plan	% of School	% of District	% of State
4-Year Private College	18.7	16.0	28.5
4-Year Public College	27.8	25.4	32.2
2-Year Private College	0.9	1.2	0.6
2-Year Public College	30.4	37.4	18.4
Other Post-Secondary	0.3	2.3	1.9
Apprenticeship	0.0	0.0	0.4
Work	15.2	10.7	9.2
Military	3.8	2.1	2.1
Other	0.6	0.5	1.6
Unknown	2.2	4.3	5.2

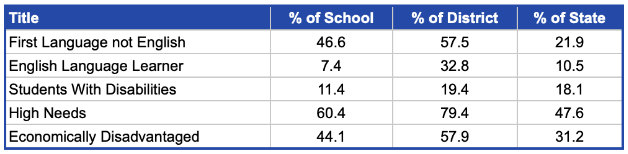
Table 3: Post-Graduation Plans of 2019 Worcester Technical High School Graduates

Demographically speaking, WTHS enrolls students who are comparably as diverse as those in the district as a whole, as demonstrated in Table 4. However, as this table also suggests, the enrollment of hispanic and latinx students at WTHS is significantly greater than that of the Worcester Public School district, with WTHS containing near double the amount of students identifying in this category as the district does. Furthermore, as previously discussed, Table 5 mentions that 46.6% of the students at WTHS speak a language other than English in their homes. This value is more than twice that of the state.



Enrollment by Race/Ethnicity (2018-19)			
Race	**% of School**	**% of District**	**% of State**
African American	16.3	16.3	9.2
Asian	7.1	6.7	7.0
Hispanic	36.0	42.9	20.8
Native American	0.1	0.2	0.2
White	36.8	29.6	59.0
Native Hawaiian, Pacific Islander	0.1	0.0	0.1
Multi-Race, Non-Hispanic	3.5	4.3	3.8

Table 4: 2018-2019 Enrollment by Race / Ethnicity of Worcester Technical High School Students

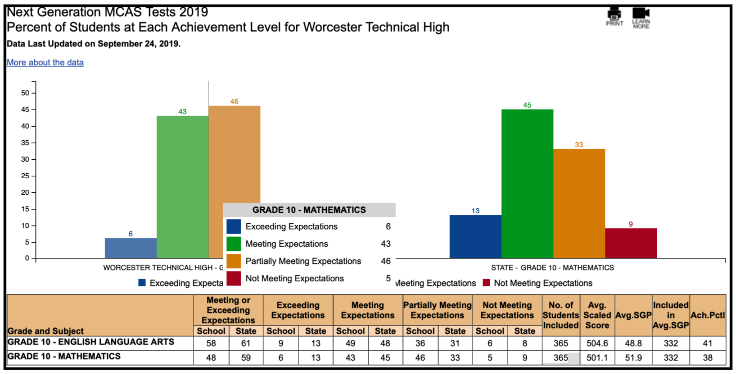


Title	% of School	% of District	% of State
First Language not English	46.6	57.5	21.9
English Language Learner	7.4	32.8	10.5
Students With Disabilities	11.4	19.4	18.1
High Needs	60.4	79.4	47.6
Economically Disadvantaged	44.1	57.9	31.2

Table 5: 2018-2019 Enrollment of Selected Populations of Worcester Technical High School Students

From a personal aspect, I came from a high school that served predominantly White, Asian, and Indian families, where nearly everybody was expected to speak fluent English. The culture at WTHS, both racially and ethnically, presented a challenge for me from the start, with its city-based dynamic and its focus on vocations rather than on attending college as the sole acceptable post-secondary option (this is further discussed in the FINAL REFLECTION section). As expected, the students in my classroom presented barriers and challenges that required for me to adjust my practices based upon their individual and overall performance, not just on where I expected them to be or to progress by their preset district standards.

Worcester Tech often scores comparatively well on MCAS tests, typically producing scores that are above the averages for both the district and the state. According to Results from September 2019, tenth grade Next Generation MCAS takers met and progressed toward expectations at a rate higher than that of the state (see Figure 3 / Table 6) in their English exams and performed comparatively with the state in their Mathematics assessments. Teachers and educators devote a significant portion of class time to preparing for these exams to ensure that the school stays moderately progressing toward targets (WTHS 2018-2019).



Next Generation MCAS Tests 2019
Percent of Students at Each Achievement Level for Worcester Technical High

Data Last Updated on September 24, 2019.

More about the data

Grade and Subject	Meeting or Exceeding Expectations		Exceeding Expectations		Meeting Expectations		Partially Meeting Expectations		Not Meeting Expectations		No. of Students Included	Avg. Scaled Score	Avg.SGP	Included in Avg.SGP	Ach.Pctl
	School	State	School	State	School	State	School	State	School	State					
GRADE 10 - ENGLISH LANGUAGE ARTS	58	61	9	13	49	48	36	31	6	8	365	504.6	48.8	332	41
GRADE 10 - MATHEMATICS	48	59	6	13	43	45	46	33	5	9	365	501.1	51.9	332	38

Figure 3 / Table 6: 2019 Next Generation MCAS Scores for Massachusetts and Worcester Technical High School Students at Each Achievement Level

At Worcester Tech, I taught two Inclusion-level (a mixture of IEPs and 504 Plans) sophomore Geometry classes, one section of English Language Learner (ELL) freshman Algebra I, and a double-period of senior-level Math IV, which counted for dual credit though the local community college and of which I taught two alternating periods, due to shop weeks and academic weeks (see MY STUDENTS). I focused on MCAS improvement and on diverse, responsive activities to promote each element of a successful educator (see ESSENTIAL ELEMENTS OF CAP) to ensure that my classroom stayed true to standards.

STANDARDS

For each lesson plan that I generated, I had to adhere to a specific set of curriculum standards as set forth by the Massachusetts Department of Elementary & Secondary Education (DESE). These standards have been re-established and revised since the MERA sought to improve the educational system in Massachusetts, and they remain a useful resource off of which to base lectures and activities. This maintains accountability for both students and teachers, and as it aligns with the policies set forth by the MERA, adhering to this curriculum increases performance on state assessments (MCF).

Essential Elements of CAP

Well-Structured Lessons

In order to exemplify this element, I must strive to "develop well-structured and highly engaging lessons with challenging, measurable objectives and appropriate student engagement strategies, pacing, sequence, activities, materials, resources, technologies, and grouping to attend to every student's needs" (DESE CAP). I must also aim to model this element.

FIRST ESSENTIAL ELEMENT

A well-planned, logically structured lesson plan is the foundation of any strong daily lesson. Lessons do not always go according to plan, of course, but I always found it particularly useful to have a good course of action going into a day and a few alternative activities in my back pocket. I noticed that on days when I had an especially strong lesson plan, I always felt more confident entering the classroom and focusing on things other than a last-minute adjustment or printing out extra materials, such as conversing with my students and checking in on their homework completion status, their understanding of yesterday's lesson, or their well-being.

I found myself having to adjust my lesson plans almost daily, however, so it was rather difficult to plan them far in advance based upon my expected curriculum. The majority of the classes that I taught, by nature, needed more thought and responsiveness than an average classroom, since ELL and Inclusion students tend to pick up on (or need a reiteration of) material in unpredictable ways. This often required me to alter my lesson plans directly in the moment and to nix certain things that I had planned to cover, at the sake of synthesizing the new information properly and not overwhelming my students. Even the nature of Worcester Tech itself required proactive, near-improvised adjustment in terms of retaining student knowledge and focus while still staying true to the curriculum, with class periods lasting for only 40 minutes a day, with students also in shop during the week, and with the district's tendency to cancel or delay school somewhat frequently due to crazy Worcester weather or many students often walking to school or arriving tardy.

Nevertheless, developing a strong lesson plan involves broad critical thinking and reflection skills, and it is no quick task. In order to develop my lesson plans, I often had to reach back into my own knowledge of the topic and calculate a scope of the subject that could feasibly be attained within a lesson or two. I had to think about my specific students and consider how many days that this would reasonably take for them to process, absorb, and apply to the point where further reiteration (ie., closer to MCAS or during test review) did not require a complete reteach. Once I reached this time balance, I had to break the lesson down into the elements that the kids already may have known as prior knowledge and use them as an introduction to the more novel parts of the subject. I had to chunk these new lesson pieces so that I could describe them in steps or lead into them from the students' perspective. After all, I always valued the power of allowing the students to figure the problem out their own with some light guidance and redirection, as it culturally responds to kids' possible learning gaps and boosts their confidence and problem solving skills. These skills are always an asset to have as a learner and foster a great attitude for students to develop, especially in math class.

MY LESSON PLANS

Many of my students had already worked with a student teacher by the time that I began my practicum, especially my Inclusion Geometry students, so it was an interesting adjustment to enter the classroom. The students had highly regarded their previous student teacher and had rather high expectations for my impact on their learning, so I had to completely rewire my expected approach to their lesson planning (more of a traditional and lecture-based approach, as I had experienced in my own schooling, with a use of iPad note-taking and Schoology submissions rather than chalkboard lessons or creative activities) and teaching goals in order to cater to their expectations and still respond to their needs. All of my students needed much reinforcement to make it through new topics. As such, a lecture each day or a lack of activities and relevant technology (even though the school is not One-to-One) would not suffice to give students the relevant, holistic instruction that they expected.

The students seemed to quickly adapt to my teaching style, which involved a somewhat extensive set of daily problems that reviewed and eventually challenged the prior day's lesson and thus led into our new topic rather smoothly. I began to experience an issue with accountability, however, as my students quickly noticed that they could get away with wasting ten minutes of intended review or opener work and converse with their peers instead, as I would eventually cover all of the problems on the board. I tried a few different methods to alleviate this, such as calling arbitrary students to the board to demonstrate a solution, giving a time limit on the problem to provide them with some urgency, or even collecting the problems for participation points before reviewing them on the board. Eventually, I even noticed myself avoiding formal Problems of the Day altogether and simply jumping straight into the lesson or the first problem of the worksheet. Either way, I attempted several different styles of lesson plans throughout my sixteen weeks, sometimes observing a pattern in my “experimental blocks,” depending on the nature of the lesson itself and on how much actual review or difficulty that it entailed. Even my ELL Algebra I students seemed to appreciate this change-up, as it provided students with different experience or confidence levels (eg., some who enjoyed going to the board vs. submitting work on paper or in their notebooks) to trust my instruction and to open up their minds to the content and to different ways in which they could learn it.

For one of my very first lesson plans (Appendix A.I), I made sure to address the topic of the distance formula with a large focus on reinforcing vocabulary and keeping in mind the different questions that the students may have brought up, such as an assumed previous encounter with a pythagorean triple while questioning how to use it. I made sure to measure up to standards for each unit of my lesson, and I even brought some of what I had mentioned in this lesson back to the Quiz (Appendix C.I) and the Exam (Appendix C.II) for this unit, as briefly discussed in my REFLECTIVE PRACTICE section. I also kept my timing in mind, as this was early in my practicum and I critically needed to section out how I would conduct each activity.

For another lesson plan, I had to dig deep to figure out how to approach the topic of Proofs for my Inclusion Geometry students. Although I began the Proofs unit with a basic layout of how to write out basic two-column proofs and how to arrange the steps (see guided notes (Appendix A.II)), I had to lead into the unit with some logic-based worksheets (Appendix A.III) so that the students could accustom themselves to this type of reasoning, especially coming straight out of a heavily calculative angles unit. I strived to use relatable, almost silly examples to help build students' confidence and to introduce them to the reasoning that we were about to apply with the reassurance that they already know what they are doing, they just need to apply it slightly differently and strengthen their skills in doing so. I also directly applied the reasoning from this worksheet (Appendix A.III) to my Proofs Quiz (Appendix C.III) later in the unit as scaffolding.

Adjustments to Practice

In order to exemplify this element, I must strive to "organize and analyze results from a comprehensive system of assessments to determine progress toward intended outcomes and frequently use these findings to adjust practice and identify and / or implement appropriate differentiated interventions and enhancements for individuals and groups of students and appropriate modifications of lessons and units" (DESE CAP). I must also aim to model this element.

SECOND ESSENTIAL ELEMENT

Any great lesson plan has its flaws initially, and students are ever-unpredictable when it comes to processing the lectures that they receive and asking questions that the teacher may have not previously considered. This was especially true for the classes that I taught during my practicum, particularly my Inclusion Geometry courses, not only because I taught the period lecture twice throughout the day, but since the Special Education students had a tendency to pipe up with ideas and curiosities that had never even crossed my mind to address.

My first class period of the day was a type of "test-run" for my later lessons. I could prepare for questions that I may receive in the moment or reconsider for later periods, and I could prepare alternate materials or pop quiz assessments if needed. It helped with both geometry, of course (especially as that was the first class that I picked up in my practicum and it consequently became my main source of pedagogical development, plus it was the class period that was most often observed for my periodic evaluations), and with my overall mood for the day and how I was going to feel and run coming into my lessons. I often grabbed specific markers and organized the board slightly differently per the day, just to keep things interesting, and my first period decisions set the tone for how the day was going to go... assuming that everything was running effectively and did not need any momentary tweaks or major overhauls, that is.

Alas, an efficient day is a suspicious day, and I had to pay consistent attention to how students were taking the material that I was throwing at them. I often conducted my lessons based off of instant feedback from students, having the learners choose the direction in which I led our discussions, yet lightly guiding them to getting the correct answers and building their confidence. For example, a very typical lesson would include something like, "this is the Pythagorean Theorem, I'm glad you guys remembered it. I am going to mark this triangle with an *a*, *b*, and *c*. I know that the length of *a* is—" (waiting for any student to count how many units on the coordinate grid were located between the two plotted points making up side *a* and to tell me the answer aloud) "and *b* is —" (waiting for a different student, as the students knew that I preferred wide participation) "so what does that mean about *c*?" (turning to the class and waiting for someone or a group of students at once to tell me about plugging *a* and *b* into the Pythagorean Theorem and solving for *c*). I am not a big proponent of raising hands or calling on students unless participation begins to grow narrow and more students need recognition or should be encouraged for a chance to speak, so my students knew to speak up when they knew an answer. Thus, if any answers that students shouted out were not necessarily correct, then it helped me to assess and to adapt to my students' participatory moods for the day as well as to address common misconceptions that I may not have foreseen arising when planning lessons.

MY ADJUSTMENTS

In my classroom, students knew that they should openly and honestly participate in their daily lessons as often and as fully as they could. Many of my students respected the fact that I was not hard on them for spending a day just listening or being drowsy from a rough situation at home, although they also knew that I had no issue calling on them specifically if they had spent a few days avoiding input and if I needed to particularly check in on their understanding before moving on. As I mentioned, every question that students asked aided the lesson, and responding to student inquiries gave me invaluable insight into how they were processing the material.

There were often days when I slightly altered pieces of my lessons from earlier in the day when I was presenting them the next period. I looked back at my lesson from the beginning and figured that some small details, such as easier numbers to work with or a change in marker color, would positively affect the lesson and allow for more productive questions later on, if necessary. This applied both on a daily basis (as with my geometry board reorganization) and on a weekly basis (as with my senior classes when a lesson needed a small tweak to be more effective for the other class), but overall, I attempted to scaffold my lessons so that I could easily pinpoint the specific lesson aspect that was tripping up the students. In my Transformations & Transversals Quiz (Appendix C.IV), for example, I made sure to begin with more basic polygonal transformations and with simpler transversal calculations, later quizzing more difficult processes and applying more problem solving skills (I even added a bisection problem, which we had covered in class but not on an assessment, as extra credit). I used these results to hone in on and to evaluate exactly where my students needed further instruction or even problem drills.

Some lessons required a major upheaval, as actually occurred during my third formal observation. Upon noticing that my Problems of the Day were just not engaging or motivating my students enough that they completed them on their own rather than fooling around, even while I circulated the classroom to guide with questions and to control the noise level (using various methods, including proximity, verbal suggestions, and explicit commands to focus on the work at hand rather than talk about the latest TikTok trend), I spoke with my advisor, Jackie, about how she supposed I could get the kids to concentrate and to be willing to do independent work. After all, the students became engaged and worked hard the second that I began to speak and to go over the problem on the board, and they seemed to respect my instruction rather than my direction. She suggested that, during the same class fifth period, I try a "pop quiz"-type approach and collect the problems for participation points before discussing them, simply to aid with accountability and to establish a little bit stronger of a results-based classroom expectation for the future. Thus, even though Jackie was not able to watch the plan go into action, I later gave my students ten minutes to complete the problems on a sheet of paper and collected them before covering them. It was surprisingly less effective than I thought that it would be, as I had to keep prompting the students to work and I collected many half-completed papers... during that particular lesson, at least. In further lessons, however, I actually noticed my students acting more eager and focused to complete their work, as well as finishing their homework worksheets more frequently and completely, both with a small anxiety that I would collect their work and hopefully with a wish that I would see their best work. I tried this tactic (Appendix C.V) with my Algebra I students the following day to gauge if they understood our previous day's work, as shown. I tried to cover any topics that they may have had trouble with and to see how they would work under a time pressure as opposed to my procrastinating geometry students, so I tried to scaffold the expectations and improve upon my usual format.

Meeting Diverse Needs

In order to exemplify this element, I must strive to "use a varied repertoire of practices to create structured opportunities for each student to meet or exceed state standards / local curriculum and behavioral expectations" (DESE CAP). I must also aim to model this element.

THIRD ESSENTIAL ELEMENT

Throughout my practicum, I made sure to attempt to respond to the needs of as many of my students as I could, as often as I could. Many students at Worcester Tech often come from family situations where they spend much of their time outside of school providing for their families and working many jobs, thus they do not always have much time for homework and for projects that take a significant amount of time outside of school. I often had to utilize class time to introduce new online programs and activities, as well as to work on larger assignments or on problems that were out of textbooks. I provided my students with worksheets, packets, and printed textbook assignments as often as I could, both for in-class notes and for homework / practice work. I attempted to culturally respond to students who walked to and from school, who had lower access to resources outside of the classroom (only requiring a pencil, a notebook, and perhaps a binder to succeed in the class), and who had limited "homework" time on their hands and could only afford to spend 20–40 minutes on their homework on most nights. I tried to avoid weekend homework and to work on projects in class, both for individual instruction and to ensure that students stayed on track and could all keep at the same pace (see my Culturally Responsive Teaching Proofs Project analysis in the FINAL REFLECTION section).

I also provided my students with ample attempts (or at least as many as I could) to apply their shop or external subject knowledge to their classroom studies. I used these as opportunities to scaffold my instruction in ways in which the students could apply their previous knowledge to the topic and still lead themselves to the answer (as rather became a trademark of my teaching style). Part of this was inspired by my Sheltered English Immersion (SEI) class from A-Term, where we discussed the consideration of students' possible learning gaps and family or lingual backgrounds in our instruction. Many students came from situations outside of my classroom that I did not fully understand, even with their various shops (Worcester Tech has about 23 vocational options, after all), and as I wished to aid my kids' learning in any way that I possibly could to cause them to synthesize the information effectively, it was a goal of mine to openly provided them with opportunities to demonstrate what they could do. I engaged students by including their names (Appendix A.IV) in my Problems of the Day, and I kept the shops in mind with my extra credit problems and with my self-made worksheets, as well as provided different opportunities for students to express their capabilities and to demonstrate their knowledge, as in the examples discussed below. Scaffolding was the most useful technique that I could put into place to assess and to adjust based upon students' capabilities.

MY DIVERSE RESPONSES

Each day is a new learning experience, and sometimes it takes a new approach for information to truly sink in. Depending on students' situations and on how they need information reinforced, they may or may not synthesize prior knowledge or absorb new information the first few times around. I took full advantage of the concept of scaffolding to reach each of my students as thoroughly as I could. For one, I decided to do a "Multi-Step Proofs" (Appendix B.I) activity with my geometry students so that they could internalize the concept behind finding their own steps for a problem. I took a packet that my mentor teacher had previously used a few weeks earlier with our Algebra I students (and thus which all of our Geometry students had also familiarized themselves with in their prior year's studies) and I tweaked it so that the columns that had previously asked for a description of each arithmetic step to solve a basic algebra problem now requested the Property of Equality that specifically led to their reasoning. I gave the class some modified slips of paper that they could work with their groups to organize into the proper steps rather than generating these themselves, aiding them in breaking down the exact process that they needed in order to fully expand upon a rudimentary algebra topic that they are overly familiar with. I feel as if this activity was critical to solidifying their understanding of proofs after we had briefly introduced them and had discussed logic-based approaches, and I made sure to further quiz my students on problems like this in a two-column format so that they felt confident in generating their own proofs and in applying the skills that they had mastered in previous years to a new concept. Students also had the opportunity during this activity to copy down the steps simply of their own accord or to work with their groups to organize and to lead its progress, as each group member needed to be on the same page before the group could trade its slips in for a new set with a new question.

Similarly, on the final day of my practicum, I wanted to ensure that my Algebra I students could continue their school year strong after I left. I noticed on their recent exam that they had been particularly struggling with the concepts behind linear inequalities and how they behaved when the *x*- and *y*-axes related to tangible object relationships, such as food or clothing correlation. As it was my last day with these students, I decided to bring in treats, and I felt inspired to base my activity (Appendix B.II) on the cookies and snacks that I had purchased, showing my dilemma over how well to treat my kids as a real-world application of the problem-solving methods behind dual-element inequalities and graph shading! I made sure to scaffold each section of the problem thoroughly, using alternative yet practical vocabulary for various aspects of the problem throughout the worksheet. To my surprise, most kids completed this entire worksheet in exactly the class time allotted, and they all seemed very engaged when I asked them to pair up and to eat their sugar while solving a real issue for me. They also seemed very eager to receive their tests back and to re-attempt the related problem that they had near-unanimously missed the day before!

As an established goal of Worcester Tech's math department for the school year is to utilize technology near-daily in the classroom, I made sure to introduce various online platforms and calculative programming tools to my students. In our class, we often used EdCite, which offers benefits for each grade level. It is a great resource for creating online assessments and for tracking grades, difficulties, and mistakes in one place. I created many problems and compilations here, which I often assigned to multiple classes depending on their level of review need. Students learned how to use this program during their freshman orientations, and we completed many exams, review assignments, and MCAS mock questions on the platform in class such that the students had ample opportunity and access, both in and out of class, to our current material. I also utilized DeltaMath, another online hub for assigning problems and for specifying exactly what the students should be focusing on. This program conveniently recorded the number, the details, and the duration of the attempts at each assignment for each of my students, which gave me great insight into how they were viewing the questions' premises (which was especially helpful for my ELLs) as well as how they responded to various challenges that were not necessary analogous in format to those which I had presented in class. I devoted part of a day in class to creating accounts through this program and to instruction on how to use it, increasing inclusivity and giving students a chance to ask questions. In addition to its plethora of useful features, this program conveniently contains a graphing calculator function as well, which I often projected on the board for students to attempt their graphs for the class and to view my input. This paired nicely with our frequent in-class review of calculator usage, where we often passed out graphing calculators in lecture and demonstrated how to perform our current calculations during exams with ease.

Safe Learning Environment

In order to exemplify this element, I must strive to "use rituals, routines, and proactive responses that create and maintain a safe physical and intellectual environment where students take academic risks and play an active role -- individually and collectively -- in preventing behaviors that interfere with learning" (DESE CAP). I must also aim to model this element.

FOURTH ESSENTIAL ELEMENT

Providing a safe learning environment for my students was one of my top priorities throughout my practicum. In order for my students to truly open up and to feel as if they can show me what they have learned without fearing my judgement or that I may correct them, I needed to establish trust and camaraderie in the classroom. This was particularly true for each of my classes in different aspects.

My sophomore Inclusion students were mostly on Special Education IEP and 504 Plans, which often caused them to see themselves as sore thumbs and as easily judged, as well as had spent the prior year learning from my mentor teacher and had spent a few weeks at the beginning of my practicum becoming re-accustomed to his teaching and question response styles. Thankfully, these students had previously had a student teacher for the prior semester during their freshman year, and this was not their first year in high school in general, so I was able to gain some leeway when trying to guide them and to gain a bit of credibility in their eyes. Although each of my two classes of sophomores had vastly different personalities and class sizes (especially as some students switched to honors throughout the semester), they each progressed in their trust of me at a somewhat equal, steady pace. Eventually, students who had not really responded to my quips in class as much as others and who did not always obey or complete their work when I asked them to do something became more comfortable with piping up during class, with volunteering answers or board work, and with complying with my requests when I attempted to steer them and the class back on track (see MY STUDENTS).

My freshman English Language Learner (ELL) students came into the school year with my mentor teacher as their main guide for about half of the practicum. However, I made sure to walk around the room and to help them as often as I could during lectures and during practice activities, as well as constructed a spreadsheet of each of their different home languages and countries so that I could consciously begin to relate to them in as many aspects and experiences as I could throughout the year. I used alternative vocabulary on the board or maybe even made a joke in Spanish (as many of the students in my class hailed from countries that recognize a Latin dialect as their first language) to get a few giggles and to break down some small walls. By the time that I was leaving my students for the year, many of them were asking me questions in class and individually more so than they were asking for help from my mentor teacher, even if they were questions about material that we had covered a long time ago, and there was always laughter and a light spirit in the classroom during even the most complicated lesson.

Both sections of my "it's-day-two-and-they-already-have-senioritis" seniors, as I once described them, seemed to warm up to me more quickly than I expected them to, considering that it was their last year and that they were all budding adults with highly refined skills in their shops and with a bit of a cynicism toward math. The topics that I was teaching to them were all topics that they had seen before, and I myself have a sort of baby face and would often get mistaken for a student in their class, so I had to find a balance between thoroughly teaching them the material and not causing them to see me as condescending or as pompous for my "age" (although all of my students seemed to think that I was 26, even though they knew that I go to WPI, so this did not seem to turn into too much of an issue). I made sure to relate the material that I was discussing with them back to real experiences as much as possible, both to have them see me as credible and as somewhat wise, but also to make them more receptive to the material and thus more likely to question it, to apply it to their shops, and to inquire for advice in how to move from that point forward. Some of my favorite moments were when a senior asked me about college or about applying a new math topic to finances and loans (as I often talked about how my mother is a financial advisor and raised me to think about money) or even just asked about moving around and how to support themselves (as they knew that I am from Chicago, IL and have a lot of travel and Navy Life experience to share with them as they may be preparing to travel post-high school or to join the military). Either way, my seniors seemed to trust my opinion and often listened attentively when I spoke in class or requested that they get to work.

MY LEARNING ENVIRONMENT

Getting students to feel comfortable and trusting in a classroom can seem a much easier task than it is. A teacher's job is not solely to teach. Students come to their instructors for all sorts of issues and situations at home or in school, often confiding in their comfort or asking for advice or simply searching for some assurance and praise. Thus, even remembering a student's name early in the school year or recalling information about their in-class preferences or their activities outside of class can make a student feel welcome and supported, and thus more likely to open up in class and to accept their teacher's offer to help them to learn and to grow each day in new ways.

Early on in my classroom, I made sure to not only learn each student's name by the very first day and to recall where they sat when passing out papers before class even started (to save time), but to make it a mission of mine to call on or to receive a response from at least 75% of my students during each lecture. Over time, this evolved to observing who was less participatory in the class by my own gauge and creating a goal of having at least one or two of the particularly less-open students give some input each day. Each of my lesson plans allowed for question time and kept a backup idea in mind in case I needed to review something that had previously been covered yet not yet absorbed for many students. I did this to show my students how I could respond to their needs and how I would be willing to rework a lesson and even to improvise if that is what they needed to grasp the material. I planned my curriculum flexibly and I made sure to handle each setback or unique learning situation as a growth opportunity.

Several times throughout my practicum, I had to utilize this quite particularly and to refine my patience and four of my main Gallup® Strengths -- Command, Ideation, Individualization, and Strategic -- to guide specific situations back to the lesson effectively without detracting from the power of the comment or the learning moment and to reduce any possible embarrassment or even ridicule on behalf of my students. I kept these in mind whether I was handling a student early in the practicum who would spontaneously shout inappropriate words or references with the hope of receiving an agitated response out of me (to which I sternly told him that that was not appropriate and which I addressed with him after class where his peers could not overhear yet still knew that I was not accepting his outburst or letting it fly), or I was trying to get a group back on track during work time for our Proofs Project (Appendix B.III) (see FINAL REFLECTION) and simultaneously having to keep a straight face and to explain an idiom that I had used but that a student had totally misinterpreted in a comical way, or I was responding to a students inquiry about a supposed "Left Triangle" while smoothly trying to relate it back to our notes on congruence and mentioning that the angles in a triangle can be in any location so long as they are the same (diffusing laughter in the room, especially as this student was already easily embarrassed and somewhat of a challenge to make feel comfortable in the class and was just starting to open up to me when she had peculiar questions -- see MY STUDENTS). I became proud of my growing ability over time to handle situations that could have possibly ended very badly had I responded differently.

High Expectations

In order to exemplify this element, I must strive to "effectively model and reinforce ways that students can consistently master challenging material through effective effort; successfully challenge students' misconceptions about innate ability" (DESE CAP). I must also aim to model this element.

FIFTH ESSENTIAL ELEMENT

Not to necessarily call myself a tough teacher, but I definitely kept my students working and adopted a slightly different outlook on homework and on work ethic than my mentor teacher had previously established when I was just observing. Although I stuck to his tendency to assign worksheets and to keep binders in check as often as possible, as it increased equitable access for students who would otherwise have to bring textbooks home or who generally have issues with taking proper notes and with organization, I was not one to easily allow extra time for quizzes and tests that easily could have been completed in class with slightly more focus (unless there was a special circumstance) or to give answers out when asked. I also readily gave weekend homework, much to my students' dismay who had had my mentor teacher during another year.

Setting high expectations in a classroom involves getting students focused and taking ownership of all of their learning aspects. Each day leads into the next, and if students can relate the information that they have previously learned to what is coming next and even make predictions for how it will challenge them, then they can easily reach their benchmarks and tackle new questions in their every day lives. Of course, in an academic career, problem solving involves reading the question and isolating necessary details as well as the question itself, and relating to prior knowledge (much like a chemistry or a physics question, where it is often helpful to copy the necessary formulas next to the question and to underline pertinent information while reading). Thus, I made sure to always ask my students, "What do we know? Why do we need to know this? What are we trying to find?" with the hope that they could apply these skills and this reasoning when taking assessments or when facing a novel concept or a new twist on an old one.

I also believe that keeping students accountable for their own information and learning involves withholding the answer to an inquiry to the extent that a student can get it themselves with the proper encouragement and by asking good questions. I often led my practice by answering questions with another question, as frustrating as this is often portrayed. This proved quite effective for getting students to think about what they were specifically confused on and about how they could progress from that point. For example, if a student would ask about how to solve a specific triangle problem with variables and an angle given (and flat-out ask, as in "How do I do this? I have no idea how to do this"), I would initiate a guided a series of questions and answers, such as, "What are you trying to find?" "Okay, are you sure you're trying to find *x*?" "Right, you want the measure of the angle itself. So what do you need to know to find that?" "Alright, so write that down in the margin. Now, what information do you already know? Write it down." "Nice, so what formula did we learn that needs all of these pieces? Think back to the other day...." "Great, now plug it in! Remember that you're not just solving for *x*!" I often reinforce the same reasoning of what we have, what we need, and how we are going to get there in guiding my problems, and I encourage that students write everything down. Once I have discussed these ideas at length during a lesson and through practice, I always expect these results and this reasoning to shine through on my students' worksheets and assessments, as they now know what I am looking for.

MY EXPECTATIONS

In order to build off of the concept of reasoning and of connecting previous ideas with new challenges (a higher order thinking skill when utilized critically), I often created ten-minute sets of Problems of the Day (Appendix A.IV) for the beginning of class so that students could work under a timed environment directly when they entered the classroom (although I admittedly left some time for chatter before the bell rang so that students could get their energy out and distract themselves briefly between classes, as they only had four-minute passing periods in a rather large school and were often groggy or in other classes and mindsets all day before coming to mine). These problems began with a review question that came from the homework or from the classwork of the previous day's lesson or which reviewed a pertinent concept to the new lecture. The next problem or two challenged that concept and led into the daily lesson. I always made sure that these latter problems were indeed solvable (to an extent) with the knowledge that the students had already gained, but that they also involved a new concept that was worth a lesson to cover! Even though I often spent a large portion of the class period on my daily problems (to the chagrin of observers and which had to be modified if I had a longer activity in mind), this seemed to be the best method to gauge if I could truly move on from the previous topic and still get information across or if it was imperative that we focus more class instruction on a topic that we had already covered. My students appreciated this approach and tended to ask many more questions the second time around if we decided to halt the further lesson and to step back for a reteach / review.

I wanted to increase autonomous work and reasoning in my classes, which I accomplished in a few ways. During my Proofs Project (Appendix B.III), specifically (discussed more in the FINAL REFLECTION section), I made sure to check in with my students often to see how their group work was going, especially since I was not able to give them as much in-class time to work with their groups as I would have liked to. However, I kept them accountable for their own contribution to the project with their strengths charts and with their rubrics, as well as expected them to apply group work and public speaking skills that they had previously established when presenting and producing the project (although I did not judge them on these when it came to the rubric as much as I looked at effort). Students also had to find the steps for the proofs on their own, autonomously researching which theorems were needed (although they were all given in their notes) and reaching a compromise on how to get the steps done and how to communicate resources, et cetera.

I also often established high expectations in class by assigning online work that could both be completed in class with proper concentration and which could also be accessed at home if needed (with any special exceptions to this worked out privately and equitably, such as the always available option to use Chromebooks for work during lunch or after school, or the resources in the school library). It was up to the students to get their work done outside of class if they could not complete it during school, as I gave them many opportunities to access online work if they were not able to do so at home, but if they were, then I also did not assign much other homework, if any, on nights that I had assigned online work, as well as gave two days to complete this work in general. At one point, I utilized a website that I found called Feromax, which utilizes an online proofs platform to give my Inclusion Geometry students access to the steps that they needed for various types of two-column proofs, at different levels, while letting them know if their solutions were valid. I also dedicated some time in class
to demonstrate how to use this software. I assigned a few proofs (Appendix B.IV) to my students, with the final one as extra credit, and I asked that they completed the proofs online and copied the results / original proof and diagram(s) onto a separate sheet of paper, both proving that they completed the proofs and reinforcing the process of doing so via physical handwriting.

Reflective Practice

In order to exemplify this element, I must strive to "regularly reflect on the effectiveness of lessons, units, and interactions with students, both individually and with colleagues; use and share with colleagues, insights gained to improve practice and student learning" (DESE CAP). I must also aim to model this element.

SIXTH ESSENTIAL ELEMENT

Each day, I looked back at my lesson from my first period of a specific class after I presented it and evaluated how I could improve it, whether this was for my Inclusion sophomores (which I repeated twice a day), my seniors (whom I repeated biweekly), or my freshmen (to whom I often reiterated material for more than a single day). I also focused on what I could learn from it based on what did or did not go necessarily according to plan. During one observation, for example (as every great story of improvisation occurs on an observation day, of course), I originally planned on giving a lesson on new transversal theorems and leading into it with a right angle theorem review as a short Problem of the Day, just to see if my students recalled the material and could apply it later on (as transversals rely on right angles as a special case in many proofs). However, my students did not seem very comfortable with drawing out the right angle theorems and with reiterating them in proofs, and I even had one student sincerely ask me about the mere point behind doing proofs themselves. I had to stop at this moment and reconsider where my lessons were leading and how I was going about my lessons for proofs themselves. Was I simply giving students sentences to spit out in columns on their sheets of paper, or was I conveying the actual concepts behind my proofs? While my students were copying down what I had written for the previous problems, I looked at the remainder of the daily set and evaluated how the rest of the problems were conceptualizing the theorems, such that they made sense logically. I decided to focus on a smaller Problem of the Day that I had extracted from the worksheet, which required diagrams for each theorem, and I invited a group of students up to the board to do it for me. As I suspected, they found it difficult to copy down diagrams to represent each right angle theorem! From then on, I made absolute sure to convey the proofs in a visual light along with their written forms, even though I had originally suspected that a rote memorization approach would be the most effective for these specific students, and I even required visual diagrams as a part of their Proofs Project (Appendix B.III) rubric later in the unit to ensure that this vital component was not surpassed.

It is important for students to internalize each component of a lesson that makes it truly effective, such as visual diagrams like this. I regularly found myself reflecting on each day's lesson and on which part of it made it the most accessible for students, discussing these ideas with my mentor teacher and with a neighboring teacher in the math department. We found that lessons that synthesized previous information and brought it into perspective through multiple formats, such as with visuals, in a written manner, and even with tangible objects, proved to be the most engaging and memorable lessons. I regularly strived to meet these multiple learning styles, often challenging my own beliefs that learning styles are more of a myth for easier categorization of instruction than a set means by which students learn best. Either way, when I applied a different type of learning element to my lesson or even changed the colors of the markers that I used in a specific visual, students seemed more eager to copy the notes down, to directly ask questions, and to engage during my lectures, suggesting a more effective lesson.

MY REFLECTIONS

Throughout my exams and my quizzes, I decided to focus on the elements of my lessons that made them the most palpable for students and to engage these in a written format. I scaffolded the elements of my previous lessons and worksheets, including both theorems and diagrams and even tables of processes, and I included them on unit tests to give a sort of hint for students and to guide their performance.

For my Quiz (Appendix C.I) on the distance formula and the midpoint theorem, I made sure to request the formulas and the processes for each theorem before applying them later on in the assessment. This way, the students felt reminded of the previous material that we had covered in class that would help them on the quiz. I further alluded to this material in my Test (Appendix C.II) for this unit, where I expanded upon the trend with the rest of the material yet I kept the first quiz somewhat intact in its order. I used alternative diagrams in case those appealed to different ways of thinking, and I used a program called Kuta Software to ensure that the problems were legitimate and effective in nature.

I also decided to assess how well my lessons in proofs were going after I initially introduced the topic, especially with the mixed response that the right angle theorems generated. I gave a Proofs Quiz (Appendix C.III) to my Inclusion Geometry classes that built directly off of our units on logic and our notes on basic two-column proofs (see WELL–STRUCTURED LESSONS). Overall, I made sure to scaffold what I had previously taught with what I would like for my students to assess, beginning with logic and working into two-column outlines, eventually working autonomously and labeling the columns themselves. I generated this quiz directly from my original handout (Appendix A.II) on proofs, as previously discussed, and I expected my students to fill in the components as we had done in class. As a result, even some of my toughest students seemed to receive the information well (Appendix B.V) and to respond with they had learned in class for the Proofs Quiz (Appendix C.III) based not only on the examples that they had previously encountered, but logically from the visual aspects that I had included in the assessment. It definitely drove home the idea that reflective teaching is effective teaching.

My WPI Education

My time at Worcester Polytechnic Institute shaped my experience at Worcester Technical High School.

MY MATHEMATICS COURSES

One comment that I often received after observations was that I seemed to have "no trouble" with the content for the classes that I was teaching, and that I seemed "completely capable" of teaching any course or material that was thrown at me. Now, while I must say that I am highly adaptable and I do not doubt that I am capable of anything that I would like to be capable of... teaching some of my courses was still quite a challenge. Not only had I not seen a lot of the topics that I was to cover since junior high (such as Algebra I or Geometry), but at WPI, if I had relearned the topics, it was in a much more advanced context.

What I was able to bring to my students was the concept of relevance. It is no secret that students are less receptive to learning specific topics when they find them useless. However, I always liked to share my seeds of wisdom with my students whenever I could. I had to teach my seniors about systems of equations, so I related them to real-life issues such as tipping points and phone bill plans and buying a car. The students who were in Financial or Auto Tech shops especially appreciated this, but so did my students who work after school or who provide for their families to the point where this topic is scarily relevant to their lives. I brought in what I'd learned over the years about those systems and some of the word problems that I'd seen in my own math courses in linear algebra, etc. at WPI and combined it with facts that I knew from my mother, who is a financial advisor and has been teaching me about bills and loans since a young age. The students perked up whenever I brought in an application where they may not have seen the math fitting in before I mentioned it. I also liked to encourage students who were thinking of attending college to not be deterred by upper-level math topics, such as calculus. I told them how I was taking a freshman physics course that term at WPI, and integration was just an assumed part of the course, as it was so necessary for the calculations that we were doing. I recalled a tidbit that one of my own high school teachers had mentioned when I was first learning trigonometry, about how he had worked as an engineer and had predicted the weather using matrices and derivatives. Math is everywhere, and I loved to make sure that my kids knew that, especially as they prepared to graduate!

I also had to teach my Inclusion Geometry students how to do proofs. From scratch. I spent my entire practicum working with these kids, so I mostly know how they are wired to think about things, yet they never fail to surprise me or to throw a curveball in what they totally understand or what they still do not get after three weeks of talking about it. At WPI, I've learned about proofs, too! These, however, are much more complicated proofs. I needed to break them down in a way that my students could take in their basic concept and not shrink away from the challenge or from problems that they do not recognize. After all, proofs tend to test the exact reasoning that my Inclusion students are most afraid of: figuring out the steps for how to solve a problem on their own. In fact, I had one student ask me about a month into our proofs unit, "Miss, why does this even matter? Like, are we ever going to use this again after the MCAS?" That prompted me to reach back into my WPI Days of being absolutely lost on the concept of proofs or why we had to memorize theorems, such that I could give her the honest answer that proofs are relevant in daily life because we go through the process of decision-making and the steps of problem solving when we are making even mundane decisions, such as the route to walk to school or whether we would like to grab coffee along the way. Due to my understanding and empathy from standing exactly in her shoes during Real Analysis at WPI and wondering why on Earth any of this even mattered, I came up with an analogy on the the spot that I continued to use when the kids needed an extra example or to check back in with the root concept of proofs. I even reiterated this example in my culturally responsive Proofs Project (Appendix B.III) packet!

I made sure that students kept their notes and their tests, homework, etc. in a binder along with a table of contents. This was my mentor teacher's idea to begin with, and I definitely took it in stride. I know from my first few disorganized years at WPI that keeping everything together is key, so that we can focus on one thing at a time and not be overwhelmed by missing crucial notes or helpful pieces of paper (especially during quizzes, where I allowed students to use their in-class notes!). I noticed about midway into my practicum, when performing a binder check, that students tend to copy things down exactly as I write them on the board, so I took advantage of this when offering worksheets and I told them to model how I was copying something into the blank space of their margins. I also gave out a lot of worksheets rather than textbook work, not only because I knew that many kids walked to school or had limited internet access and would appreciate paper work rather than heavy books or computer work at home, but since I knew from my own education that guidance and worksheets just make homework so much more enjoyable, accountable, and easy to keep track of in terms of skill capability & completion.

MY TEACHER PREP COURSES

Through the Teacher Preparation Program (TPP), I had to complete a series of psychology and pedagogical-based courses in order to make it to where I am today. I knew that I was going to join the TPP when I agreed to attend WPI, so I took my very first TPP-specific course, School Psychology, during A-Term (first quarter) of my freshman year, back in the Fall of 2017. There, I met one of my biggest inspirations in the teaching world, a close friend of mine (and fellow member of my sorority) named Victoria Mercouris. Although Victoria was a Robotics Engineering major, she was preparing to teach physics at Worcester Tech during the following semester, and I got to spend almost every day with her throughout that experience, whether it was proof-reading her upcoming exams, checking homework completion, or sorting through her comic-strip-based Newton's Law poster projects for grading. Victoria currently works as a makers space / computer science teacher in New Orleans, and that goes to show how inspiring she was to me when it came to carving a path for myself and accomplishing such an intimidating task as preparing to take over my own classroom!

The remainder of the Teaching Prep courses gave me such a new perspective on how to lead a classroom and how to be a better student and teacher to everyone that I meet.

I got to bond with a lot of other TPP hopefuls during Psych of Education in D-Term of 2018, where I also learned a lot more about the Assistments software that my students have to work with over the summer, helping me to capture a clearer picture of their technological capacity.

I got to take ID3100, a teaching methods course, during D-Term of 2019 with Mr. John Staley, the assistant principal at Doherty Memorial High School. Mr. Staley taught me all about the concept of an MCAS (as I am from Illinois, where we do not have anything even remotely similar past the eighth grade) and about the standards that schools need to meet before State intervention is required. He also gave a lot of helpful lesson plan feedback. I like to look back at my very first mock lesson presentation that he made us complete for the course, and I sort of laugh and marvel at myself. My board organization was shoddy at best, my lesson plan was all over the place, and I crammed way too much material into a singular lesson, with the lesson sort of falling apart and not really wrapping up very nicely when I could not cover everything in it. Not to mention the fact that my Problem of the Day involved organizing coins into towers, and I did not obtain any coins prior to my presentation, so I resorted to an odd sketch on the board and told my "class" to imagine a stack of coins instead before proceeding to talk about cross-sections (with the entire point of the coins being a tangible representation of a cross-section!). I was able to take the good aspects of my lesson, like my consideration of alternative learning styles and my bravery to tackle an arbitrary topic, and run with it while refining my white-board organization and lesson plan layouts along my actual teaching journey.

Finally, during A-Term of 2019 (and during the first half of my student teaching practicum), I took a Sheltered English Immersion course that integrated so seamlessly into my ELL Instruction. Dr. Boucher-Yip definitely recognized and dispelled my insecurities about working with English Learning students and about making an effective impact on their education. The strategies that I learned in that class helped me to be more inclusive in my lesson planning -- even for all of my classes! -- and opened my eyes to the different ways in which I could get my message across to students, such as individualizing instruction with personal white boards, or with using alternative vocabulary when necessary or possible. I definitely noticed myself implementing these communication and proper modification strategies with any of my students who needed them, as well as being considerate of these gaps when I needed a wake-up call on students' grasp of the material.

MY SPANISH COURSES

I have been taking Spanish since the seventh grade, and as I exited high school with an Illinois Certification of Biliteracy, I entered WPI intending to earn my minor in the language. While that plan did not quite fit into my schedule while still allowing me to graduate in three years, I was able to fulfill my WPI Humanities requirement with six various Spanish language and cultural courses, all of which helped to refresh my memory as I interacted with my students.

Worcester Tech has a rather robust hispanic and latinx demographic, and I particularly had to respond to this when it came to my English Language Learners, or ELLs (although I had to keep my students' backgrounds in mind during all of my classes, when it really came down to it). When I compiled the data during Week 1 about the lingual and locational origins of my ELL students, I noticed that over half of them originated from countries that recognize some dialect of Spanish as their national first language.

Not only did the language barrier prevent the material from being graspable for each student, but some educational gaps existed as well, depending on when the students had joined the American Public School system. While many of these students were Level 4 or Level 5 on the ELL Proficiency Scale, I had students from every Level 1–6, and it was especially my Level 1 student that required a specific type of instruction to make it through my class. However, since I am fluent in Spanish and could at least understand some of her confusion, I was able to communicate some of the topics to her in alternative ways (besides just modifying tests or plainly translating material), both before I took over the class and after I became the teacher of record for my ELL Algebra I students.

My Students

The students at Worcester Tech alternate between "academic" and "shop" weeks. As a result, these students take a single class period of mathematics each week during their former two years (although the specific period of the day may change per a weekly basis), yet they only take a double class period of mathematics biweekly during their latter two years.

As such, the individual class periods at WTHS are labeled as 1–8 during an "A-week" sequence (academic week for some, shop week for others), and as 9–16 during a "Z-week" sequence (where academic and shop weeks switch for each student, based on their specific shop, grade level, and personal schedule).

SOPHOMORE 5–9: INCLUSION GEOMETRY

My fifth-ninth period sophomores were the very first class that I took over during Week 3, following full-time observation of Mr. Fitzpatrick's teaching practices and lesson lay-outs. As such, my mentor teacher had already had a chance to establish a repertoire with the students and had covered his specific classroom expectations with these students just a few weeks prior, making it rather odd to jump in and take over the classroom with little credibility, in the eyes of the students, on my end (other than from the one time on the third day of school when I had substitute taught for a morning using my mentor teacher's lesson plans, rather inorganically).

These students were the first Inclusion students that I had particularly encountered as well, as I had always grown up in rather advanced classrooms and had never seemed to cross paths with students on Special Ed or 504 plans. Additionally, I never actually received a list of all of the students who were on special plans in my class, nor a specific idea of their accommodations. Although this made me rather nervous going into an environment where I could be held personally accountable for students' learning had their parents decided to complain, I adapted as best as I could to the various needs and adjustments that my students presented to me.

I had one student, for example, whom I'll call A, who presented particular challenges, even as I got to know her as both a student and a person. A gets easily distracted when working on individual work, and it is difficult for her to complete more than a single problem or two within a timeframe that is allotted for an entire worksheet or quiz. A had a lot of anxiety in the beginning of the year when it came to asking questions during class, as I suppose that she expected judgement from myself and from her peers. However, I observed A at the Worcester Tech Fall Formal, where I chaperoned, and I noticed that she is actually quite the social butterfly, with many friends and connections. This is when I realized exactly how important peer influence and reverence is to her. From that point, I became extra conscious of my efforts to prevent singling students out, respecting the beauty of error and misunderstanding in enhancing learning that much more. I began to catch myself much sooner when responding to students' inquiries that may have been frustrating given the content that we had just covered (such as an incident where we had just finished covering right triangles, and when I drew two right triangles on the board as mirror images of one another, A herself pointed to the one with the right angle on the left side of the triangle and asked which theorem to use if we encountered a "Left Triangle." I am rather proud of how patiently I handled her question and used it as an opportunity to point out some facts about congruence and orientation, preventing the class from laughing at A or making her feel embarrassed about her question, especially since she had asked it while trusting that I would respond honestly and carefully). I made sure to keep A's peers occupied as she worked in class and to talk to her frequently about the lesson to keep her mind on track. This realization also aided me in owning up to my own mistakes, such that when a student pointed out an acute angle that I had labelled as 110°, or a polygon that I had lettered incorrectly, I was nothing but proud of my students for their reasoning in picking out my mistakes.

SOPHOMORE 1–13: INCLUSION GEOMETRY

My first-thirteenth sophomores were the second class that I picked up, and I did so about two weeks after tackling my first full-takeover. I was expected to teach both of my Inclusion Geometry classes the same topics and lessons each day, and the three most difficult aspects of this were the ever-distinct class sizes, especially as some students switched to honors classes (SO.5–9 only had 12 students by the end of the semester, as opposed to SO.1–13's 18 kids!), the different dynamics of each class period (SO.5–9 was a much rowdier period at the beginning of the year and slowly dwindled into falling extremely quiet, whereas SO.1–13 remained widely participatory and even had a larger range of students asking questions by the end of my practicum), and the flipping periods each week (my two geometry classes were first and fifth each day, with the specific class demographic switching periods each week for their shops). Thus, the earlier periods in the day were always quieter and rarely had energy (although when they felt compelled, it was rather fun to teach at 7am), and it definitely did not help when I had an observation of the other geometry period early in the morning when this class period, both being larger and in the afternoon on those days, consistently ended up receiving better, altered, more responsive (and effective) lessons.

Nonetheless, the students in this class challenged my views towards pacing and expectations behind learning. They also opened my eyes to the different ways in which students can show respect (as with one student, D, whom I thought greatly disregarded me since she was rather guarded, before she became sad that I was leaving and starting asking me a lot more questions, even calling me "amazing"). I had a student, H, who is a brilliant mathematician and who loves a challenge. As the weeks progressed, he started greeting me each day with a smile and updating me on how he felt about yesterday's lesson, even commenting on something that I was wearing or on some detail on the board that I thought negligible. He became a mile-marker for me when I evaluated how the class was grasping material, and when H did not get something, I had to re-evaluate a bit. What surprised me about H, however, was that I could not always expect him to grasp everything immediately. Although sharp, he was still on a SpEd plan, and he occasionally had moments where he completely misconstrued a question or needed an alternate explanation. Through H, I learned to focus strongly on presenting multiple examples and strategies for each problem or lesson, such that I could reach every student equitably (especially with my ELLs, too).

I had another student, F, who was not only the "newcomer" in the class (as in she had not had Mr. Fitzpatrick for Algebra I the prior year), but she had a very specific accommodation (she was legally blind and needed for me to use only blue or black marker on the board) and was very bright once she understood a topic. However, it often took much explaining and practice for her to grasp material, and I could never predict when that lightbulb moment would hit. This taught me patience and made me feel helpful whenever she asked for Chemistry or life advice (she is passionate about BioTech) or simply lit up when she realized that she knew an answer all along. I also knew that my Problem of the Day strategies worked when she completed them, as she often rebelled against this strategy and did not complete problems that she knew that I would cover on the board shortly.

FRESHMAN 2–10: ELL ALGEBRA I

My freshmen were the final class that I took over for most of my practicum, although I did take over all 5 of my mentor teacher's class periods eventually for the final few weeks. These students were my English Language Learners (ELLs), ranging from Levels 1–6 in English Proficiency. Most of these students were from Spanish-dialect-speaking countries, although we had representation from about 13 countries in the 30-student room alone. As this was a large class size for Worcester Tech, when I first observed and aided individual instruction before fully taking over, I especially spent time with my Levels 1 and 2 students in the back of the room, who struggled with the content due to not only a language barrier, but from a content gap. I realized that content gaps are a genuine issue with capable ELLs, especially in a diverse city such as Worcester. One student, E, demonstrated this with her pure character and drive to learn, even though she very often required arithmetic reinforcement, such as with times tables and negatives, even in the ninth grade. She had such courage and focus during each lesson, and she would not rest until she understood a topic, learning barrier and all.

Many of my ELL students, in fact, often had issues in class because they either needed extra help or reiteration with different vocabulary (due to the language barrier -- our Teaching Assistant, Mrs. McKnight, was extraordinarily helpful for individual students in this sense, as were Miss Bigelow and Mrs. Bonofilio in SO.5–9 and SO.1–13, respectively, since Inclusion and ELL students think and process material in very similar ways from their constant barriers), or because they were simply ahead of the pack from outside preparatory instruction upon entering the USA. The disparity was rather large in this sense, and students' varying confidence levels made it rather difficult to isolate those who needed extra help or who just needed more practice, which made parent input all the more useful. During our Parent-Teacher night during Week 6, I got to interact with the mother of one of my students, C, who is a generally soft-spoken student who sits in the corner of the room and who generally goes (I must admit) unnoticed during a regular lesson. His mother was so passionate about his education, however, and was such a champion for his character and intelligence that I felt somewhat guilty for not interacting with C more often! I learned that C even had a twin brother who was at a different mathematical level from him, and I began to see the brothers all over the school and also at the dance that I chaperoned. It gave me a clearer sense of the lives that I was impacting with my work and of the value of individual instruction; I performed a type of experiment during the following weeks and particularly attempted to gather a sense of how C was grasping the material as we progressed. There were times where I glanced at his work and he totally got it, and there were rare occasions where I checked in with him specifically and he asked for help. I feel like I needed that interaction with his mother to open my eyes to how well students can hide difficulty, or to how students may either feel excluded based upon their seating location, or perhaps even enjoy the isolation or lack of obligation for class participation. This may, however, affect the quality of education for that student.

Upon meeting with my mentor teacher following the parent night, I mentioned C and suggested that we rearrange seats more often or make an effort to check in with students who may seem the most assured or even neglected, due to the mere nature of teaching a large class of ELLs (especially for me, as a new teacher). I believe that seating arrangement has a large impact on how students process material or feel connected with their class, and whether they enjoy the isolation of sitting in a back corner or not, they definitely will get more overall attention from the teacher and reassurance in their learning if they experience sitting closer to the action.

SENIOR 6–7, 14–15: MATH IV / QCC MAT–099

This class was designated as a "cover-all" class for seniors who did not wish to retake a prior math course or to step into an Advanced Placement class. It was called "Math IV" by WPS standards, however, Mr. Fitzpatrick not only ensured that it covered all content that would normally follow MAT-099 standards at Quinsigamond Community College, where he used to instruct intermittently, but he encouraged students to take the MAT-099 final exam at the end of our course so that they could sign up for bonafide college credit, free of charge, after simply passing our class! Of course, it was up to the students to seize this opportunity if they so chose.

Even though I did not officially take over these classes until Week 13 of my practicum, I did have the privilege of helping out throughout the prior twelve weeks each day during the "work period" of the classes. Each senior block contained a double-period to make up for shop weeks, so each class was generally split up into a single "teaching" period followed by a single "work" period. We used the teaching period to go through the lessons that we outlined in the packets that we gave to students each week (for organizational purposes and to aid those who had more background in the topic prior to our instruction and who wished to work ahead), and we allowed them to spend the work period completing exercises, group-work sheets, and book problems, all the while answering individual questions and clarifying common issues on the board as they arose. We occasionally switched this format up to allow for a larger group activity during the earlier period, where groups copied their work onto the board and presented it to their peers for solution review, or by assigning online modules on EdCite or as "shop week" work (due as homework).

The seniors were an interesting bunch. Throughout even the first half of the semester, almost half of each class period switched out of the class and was replenished with a new group of students. Some of the students whom I had somewhat bonded with by that point were replaced by students who had no idea who I was to be wandering around their classroom and offering math help and why I looked so young, even during Week 8! However, I strangely formed an even closer bond with some of these students than I had with the previous bunch. One student, Y, I happened to see at an outing for my sorority somewhat early in the practicum, and she got a bit angry that I could not recall her name! She eventually warmed up to me, though, after seeing me in a social setting, especially at one as laid-back as the roller-rink that she worked at. I also enjoyed helping out two students, K and P, who sat right next to each other at the back of the room during Y's same period, 6–7. Both students were far too bright to be in Math IV, in my opinion, but they always respected me, despite my baby face, and very often asked questions. K liked to ask questions about real life (outside of high school) and how my education has applied every day; P and I bonded over the sport of bowling, which we have both loved since a very young age, and I felt so proud the day that I learned that he had bowled a 300 game (a perfect score) and had still finished his homework! My 14–15 class also had two students, G and S, who were rather apprehensive toward me to begin with, yet who were very bright, so as I demonstrated my expertise to them and encouraged questions no matter how small or "dumb," they began to take me more seriously.

STUDENT FEEDBACK SURVEYS

During Week 10 of my practicum, I administered a paper student feedback survey to my SO.5–9, SO.1–13, and FR.2–10 classes to gain some perspective on my performance thus far and on things upon which I could improve within my remaining six weeks. I recorded each response in a spreadsheet, weighing "Strongly Agree" with a 4, "Strongly Disagree" with a 1, and so on, and taking a weighted average in the final column to get a quick overview of my perceived performance in each area, per the students' perspectives. I had only had my FR.2–10 students full-time for two weeks at this point, so it was particularly interesting to see my freshmen's viewpoints on how I handled their class as the teacher of record and not just as an assistant.

Some of the responses contained comments on how I could improve or continue my teaching. From these, I gathered that the students appreciated my help and guidance and that I brought some new ideas and passion for learning into the classroom. However, a few responses told me that I needed to work on my strategies for re-explaining specific topics or for answering individual questions, as I tended to repeat my original lecture thinking that it contained all of the information that I needed to convey, and I did not branch out as much in the ways that I could get a message across. Due to this, I made sure to incorporate more diverse and culturally responsive examples into my lessons and extra help (such as equating a proof example to an everyday application or using physical objects to demonstrate congruence), increasing the number of channels through which students could receive information and process it in their own way. In fact, I actually observed an uptick in student questions and participation, specifically in class, when I adopted this perspective and shifted my teaching methods a bit (Appendix D.IV).

SO. 5–9

My 5–9 Sophomores seemed to near-unanimously agree that I often used a positive tone and that I demonstrated mistakes as an integral part of learning, but they wished to see particular improvement in my tendencies to assess their understanding in-class to summarize what they had learned in a lesson. They also wanted for me to encourage them to work with their peers and to foster increased peer respect in class, which would help with exchanging ideas in the prior category. Although I did already have a habit of asking the students if they had understood something or if they were ready to move on (and thus I suspected that they may have misconstrued the question about "rating their understanding," Question #14, since it is worded in a rather strange manner), I did seek to improve in peer collaboration and evaluation. After all, peer opinion is a large factor in whether students will engage or participate confidently in class and feel comfortable with their personal pace of learning. I began to ask students to correct each other's work during the lesson, and I set them up with a group project in their Proofs unit in an attempt to change things up from my usual "elbow buddy" pairings, which apparently did not successfully allow for peer feedback or reassurance (Appendix D.I).

SO. 1–13

My 1–13 Sophomores gave very similar responses to their fellow Inclusion Geometry students in almost all of the same categories, even though this class is comparably more sizable. These students, however, provided me with more written, specific feedback, and so I was able to use these survey responses to round out my teaching methods for all of my classes, especially with the comments about repeating material too frequently (Appendix D.II).

FR. 2–10

My 2–10 Freshmen received this survey quite shortly into my takeover as their full-time instructor, yet as they had already known me for the former eight weeks as an assistant in the room, they were also able to provide me with some written feedback to build upon and to modify my instructional tendencies. My students believed that I worked fairly well with challenging their potentials and with asking them to work together to process and to synthesize difficult content, yet they wished that I would ask them to summarize their learning and to connect it with related applications more often, rather than just give them the information and have them practice it on paper. They also wished to review each other's work more often in class and to "rate" their understanding more frequently (which, due to the language barrier, may have been an odd question to answer once again, although I did attempt to make it more pointed and obvious when I verbally assessed whether they were satisfied with our current topic or not). I took a similar approach as to my sophomore classes and I put the students in groups, gave related application examples, and encouraged them to grade / discuss their work in greater detail to improve this relation and to increase their quality of learning (Appendix D.III).

Final Reflection

INITIAL THOUGHTS

At the beginning of my practicum, I wondered about what my students would think of me. How would I organize my knowledge and my ideas into steps to convey them properly? Would my students even understand what I wrote on the board, since it was so poorly arranged the last time that I tried presenting a mock lesson? Is it going to be difficult to adapt to the new technology, using Chromebooks and dry erase boards and Smart Projectors rather than iPads, as I had used in my own high school? Will I look too young or will they think that I am too old to relate to them? Will the students even respect me or trust me or like me?

So many questions floated through my head, and I felt the most anxious about teaching my Inclusion Geometry classes. When I had initially spoken with my mentor teacher, he had mentioned that I would be beginning with the students that he had not only taught and gotten to know last year, but who had had a student teacher from WPI for Algebra I, whom both he and his students held in an obviously high regard. Even when I entered the classroom, the students raved about their previous student teacher! I knew that I had some huge shoes to fill, let alone the fact that these students in particular needed Special Education plans, whereas I was accustomed to an advanced, lecture-based curriculum, autonomous notes with minimal in-class activities, and online submissions in high school. Plus, the students at Worcester Tech are also involved in their shops, and many of them do not necessary have the means for or the intention of attending college, instead opting to follow their vocational training and to earn a paycheck immediately post-secondary. This was a drastic transition from my own college preparatory background, which made it seem like college or the military were the only acceptable options after high school. Once I turned this ridiculous standard on its head, it opened my eyes to the different ways in which students can learn and process information. While I of course wanted all of my students to succeed and wanted to share my excitement about college and degree-requiring careers, I completely gained a new insight and perspective when addressing their options.

The schedule at Worcester Tech made it rather difficult to synchronize what I was teaching one class with that of another, especially for my senior classes that flip-flopped each week. However, I found an appreciation for the shop-academic schedule with both these seniors and with my two period of sophomores, who switched between first and fifth period each day. As first period is the beginning of the day around 7am, and fifth period is mid-afternoon and directly before lunch, it was ever-unpredictable whether one, both, or neither class was going to have a plethora of energy and a great participation day during any given lesson... or none at all and nothing of the sort. In any case, I was able to adapt my lessons based upon what worked and on what did not work, and I could provide each set of students with a personalized learning platform while still staying true to my lesson plans, as each of my six total sets of students had such a different personality.

PROOFS PROJECT: CULTURALLY RESPONSIVE TEACHING GOAL

One major piece of the practicum involved creating a set of Culturally Responsive Teaching (CRT) goals and synthesizing them into an assessment that could not only test my ability as a teacher to increase accessibility and inclusivity for all of my students, but to act two-fold and to pair with my CAP Progress Goals to measure the progress of my students from the beginning to the end of my time as their instructor. I began by considering which CRT Goals (Appendix E.I) best matched my aspirations in the classroom, and I decided upon three different ways in which I could best aid my students.

1. I first chose that I would like to "have students share the assets that they bring to the table at the beginning of group work, including those assets that originally appear to be non-academic / outside of academic assets." This involved bringing strengths and weaknesses (or lesser strengths, as I prefer to call them) into the math classroom, even if they did not particularly involve math, such that students could feel like they are contributing to our lesson and placing their own trademark on their work.

2. Another goal of mine was to "review who has a fixed mindset vs. a growth mindset, and actively demonstrate how to grow from failures / mistakes." This goal revolves around knowing and identifying my students, specifically so that I can help them to see their capabilities in math and to not feel like they cannot contribute to an assignment or to a project in their lives if they do not have all of the necessary skills to complete it.

3. Finally, I decided that I would like to "give a problem at the beginning of delivering new content / skills, and have students keep going back to that problem to practice applying content / skills throughout lesson / unit delivery." This was a goal that I applied all the way throughout my teaching practicum, even though I only started thinking about CRT goals specifically around Week 5 or 6. I continuously made sure to bring back concepts from previous lessons into my daily problems, opening with review and leading into the new content with a problem that both synthesized and challenged the content that we had previously discussed. This became a trademark of my teaching style, as I have mentioned.

In order to assess my students' performance and growth thanks to my instruction, I decided to focus on a topic that I had taught the students from the very beginning and thus which I could use as a true gauge as to how much they had learned: proofs. This was a topic that my sophomore Inclusion Geometry students, whom I had taught for the longest amount of time by the end of my practicum, had unanimously never seen before I had introduced it to them early in my take-over process. It was also a topic with which I knew that my students struggled when it came to figuring out their own steps and processes, as well as with grasping the actual concept and the use of a proof itself... so I felt as if it was a perfect topic to assess their progress on in these areas! However, in order to make this my CRT Project, I needed to consider my three goals as well.

In my Proofs Project (Appendix B.III) outline, I specifically made sure to give a fair grading process, thus I included a rubric in my packet for all students that not only laid out exactly how I would be grading the project (along with a list of the exact materials that I would require for a "complete" project), but I included a column that was worth about one-fifth of the grade and that solely focused on individual participation. Nowhere in my rubric did I scrutinize quality of the project or skills utilized or entertainment of the presentation, I simply wanted to see effort from each group member on all parts. I gave plenty of opportunities for students to utilize their strengths for the project, even spending a class day on having the groups work together to determine their combined strengths and what they could assist each other with / which project type would best fit their individual and team dynamic, etc.. I encouraged the students to work together each day, and even though my project schedule / availability for group help in class had to be altered and shifted for MCAS mock testing and for delays before Thanksgiving Break, I still managed to fit in a solid work day to check in with the teams and to make sure that all of them could present soon. I wanted to make sure that students who could not access materials outside of school or could only find work / meeting time with their groups during class hours would have equitable (even if not necessarily equal) accessibility to the project and could still contribute to receive full credit for their efforts. For the sake of transparency and growth, these ideas are outlined in my original CRT goal / project description (Appendix E.II) from Week 5, where I roughly brainstormed a possible project idea and deadlines, yet I later edited the dates and widened the variety of project types that I would like to see.

See Appendix B.VI–XI for student work.

GROWTH

My teaching style definitely evolved from the beginning to the end of my practicum. When I first began, especially as I was working mostly with my Inclusion Geometry and with my ELL Algebra I students, I tended to speak at a much slower pace and to cover much less material and review in a single class period. I gave my students Problems of the Day at the beginning of each class period, even if it was a quiz day. I managed to keep a good balance of review and of new material, but I definitely focused just as much time on Problem of the Day #1, Review, as I did on Problem of the Day #2, New Content... and that is all that I would cover in a class period. After my first or second observation, the students did not seem to be able to mirror what I was teaching them as much as verbally reiterate it, indicating that they likely needed more practice on their worksheets and help with completing the problems all the way through. I thus established a goal that I would bridge this balance so that I cover a bit higher of an amount of new content with each lesson, as well as would model my mentor teacher's methods from prior to my takeover and include more practice time at the end of class. This way, the students could begin on their worksheets and on their online work and I could provide them with more individualized instruction and guide / strengthen their problem-solving processes.

Over time, I noticed that my students no longer responded to my Problems of the Day, having no accountability for their actions when I did not collect their work or grade it before discussing the answers in class. I experimented with timing my daily problems, such that the students felt more pressure. Sometimes I collected them on separate sheets of paper for participation grades. This strategy seemed to cause students to take their work a little bit more seriously and to even start completing their homework more often with the suspicion that I may collect that too. I even eventually nixed my Problems of the Day on most days and only brought them out occasionally, almost completely diverging from my original "trademark" teaching style that involved a review-to-challenge process each day. Whenever I put up Problems of the Day on these days, students actually attended to the problem immediately, as it was perhaps something new again at that point.

Admittedly, it took me a rather long period of time to get to this point, with students focusing on my daily problems and not simply goofing off when I gave them something to do that did not have any consequence or reward. Leading up to this point, I definitely felt a little discouraged when I felt that my students did not respect me or see what I had to contribute to their education as significant. However, my advisor mentioned to me during my third observation that while my students did not seem very engaged in my daily problems when they were accustomed to them, they perked up the second I began to speak, suggesting a mutual respect throughout the classroom for my spoken word. I thought about this more deeply and I looked back at my previous lessons: my mentor teacher often seemed to trust me completely with what we were going to do that day, sometimes even asking me directly before a lesson about what I was planning on covering (even though we had a shared Google Sheet that outlined our curriculum and which I updated near-daily) and often printing out my worksheets -- which I had put together the night before -- on the morning of the lessons! I often had to alter my lesson plans during this time to make sure that they aligned with the material that I had altered the day before, as previously discussed (see ADJUSTMENTS TO PRACTICE). I also noticed that my students had grown to trust me in the classroom, and that they revered what I told them, even copying it down exactly as I had covered it. I noticed that my neatness and my marker color variation on the board had grown over time, as opposed to the literal trainwreck that it started out as. Most importantly, I saw actual growth in my students, despite subconsciously believing that they did not absorb what I was telling them. I looked back at my Inclusion Geometry students, whom I had worked with since the very beginning, and how they had started out with no knowledge of geometric proofs. They had issues with the concepts behind the logic and how to organize their theorems. Yet, taking a look at their projects and at their quizzes (Appendix B.V), I saw tangible results and growth in my students from ground zero. I realized that I actually had made a difference in my students' academic careers!

FINAL THOUGHTS

From the very beginning, all of my students seemed open to the idea of accepting a student teacher into their classroom. Although the physical journey from college student to teacher only took a semester, the mental challenge and the amount of work and time that I put into my practicum made it feel like a lifetime. I felt as if I grew not only with my students but through my students, whether in trust, in academics, or in something else. I feel so much more respect for the career of a high school instructor after filling those shoes each day for half of an academic year... both my year and my students', as I was simultaneously attending grad courses, seminars, and undergraduate lectures at WPI throughout my time at Worcester Tech.

I have never been one to shy away from public speaking, and I absolutely love to explain new concepts to people who have not been exposed to them or who simply do not yet understand a small piece of the whole. However, I feel as if I have shed a whole new light on my own perspective while standing in the place of such an active member in so many kids' lives each day. My newfound appreciation reaches beyond the basic planning and grading (which do take a lot of time, yet can be enjoyable depending on the lesson, especially if the work eventually receives praise and fulfills a child's knowledge gap). I never realized exactly how involved a teacher is in a student's and in a school's life and how much they deeply, truly care for each person who walks through the door of their classroom, whether it be a parent, a maintenance person, a fellow colleague, or a student themselves. As the workload grew and my patience ran thin and my stamina in this field became greatly tested throughout this rocky semester, I found myself wishing that someone would intervene in my own life as much as these teachers involve themselves with their students' wellbeing. It was not until my own mentor teacher and advisors stepped in to put me on the right track that I realized not only how much they cared for each member of the school as a living, breathing organism, but how much I had grown and functioned throughout the year and how much stronger I felt following this practicum.

This portfolio took quite an extended time to put together, and it still does not encompass everything that I have accomplished and have given to my students throughout the semester -- all of the countless lesson plans, logged hours, worksheets, grades, sleepless nights, the student work generated and collected, even the nine straight hours of MTEL testing (Appendix E.III) that I endured to prove that I was worthy of contributing to my students' education effectively. It is all sitting in my Google Drive in the case that I need it again someday, but until then, I have the memories of my wonderful, respectful students who continuously surprised me and made me feel as if all of the effort was worth it (which it definitely was). I cannot imagine what a different person that I would be if I had chosen to spend my IQP as a typical WPI student does, in another country or focusing on making a difference in a community other than that of Worcester Tech. If I continue on the path of an educator down the road, even if that is by fulfilling my dream of being a university professor and researcher, I still hope that I can give my kids some ideas, inspiration, and knowledge that they had not previously thought of, such that they can develop a growth mindset and can thrive in each new thing that they learn with a new perspective on the things that they are capable of. I will miss my time at Worcester Tech, but I will be back, especially now that I am legally allowed to substitute teach in Massachusetts and to actually get paid for it!

I. Lesson Plan – Distance Formula

Lesson Plan Title: Midpoints vs. Endpoints
Teacher's Name: Alexis Varada **Subject/Course:** Geometry
Unit: 1.3 - Midpoints vs. Endpoints **Grade Level:** Sophomore (SO. 5–9)

Overview of and Motivation for Lesson:
Students need to determine and calculate the midpoint between two single-plane coordinate points on an (x, y) grid; they must determine these original coordinate points based on given information about the distance between them and their midpoint.

<table>
<tr><th colspan="2">Stage 1-Desired Results</th></tr>
<tr><td colspan="2">Standard(s):
• N.N-CN - B.6
• G-CO - C.9-10</td></tr>
<tr><td colspan="2">Aim/Essential Question:
• How can a formula be applied to a given set of data?
• Which formula is appropriate for a given set of variable values?</td></tr>
<tr><td colspan="2">Understanding(s):
<i>Students will understand that . . .</i>
• ...given a distance <i>d</i> between 2 given Euclidean coordinates, the midpoint is a distance of <i>d</i>/2 from either of these endpoints.
• ...the midpoint formula is a formal way of averaging each x- or y-component of a set of coordinate endpoints to find the exact point that splits this <i>d</i> into 2 pieces.</td></tr>
<tr><td>Content Objectives:
<i>Students will be able to . . .</i>
• recognize & state the midpoint formula.
• ...label the midpoint and endpoints on a diagram / after applying formula.
• ...identify and "plug in" all given components of the midpoint formula.
• ...calculate the arithmetic average of each of the two components of the two coordinate points on a standard axis.</td><td>Language Objectives:
ELD Level 1 – 3. <i>Students will be able to . . . in English</i>
label and state (<i>x</i>, <i>y</i>) coordinates, midpoints, and endpoints in a Euclidean space, for use with formula
ELD Level 4 – 5. <i>Students will be able to . . . in English</i>
locate and specify components of coordinates that can plug into midpoint formula, as well as label endpoints after</td></tr>
<tr><td colspan="2">Key Vocabulary
• formula
• midpoint
• endpoint
• coordinate
• axis
• distance
• add / divide? (halve)</td></tr>
</table>

- [arithmetic] average
- pythagorean theorem?
- pythagorean triple?

Stage 2-Assessment Evidence

Performance Task or Key Evidence

- Staying on task during discussion and/or group activity
- Following instructions and plugging appropriate pieces into correct formula
- Completing homework

Key Criteria to measure Performance Task or Key Evidence

- on-topic discussions during class work
- complete home-/class-work, with formulas references as specified!

Stage 3- Learning Plan

Learning Activities:

Do Now/Bell Ringer/Opener: (10 mins)

1. Find the **distance** between the points **(2, 10)** and **(8, 2)**. (6-8-10 tri. = 10 units)

what's this called again? (a **pythagorean triple**) do you remember the others? (3/4/5, 5/12/13, etc. + you'll learn about 6/8/10 being a multiple of 3/4/5 during ~ tri.s, later).

**draw it out! or use the formula! whichever works best for you … which one seemed to work best *for you* during the homework / yesterday's worksheet?

2. Find the **arithmetic average** of the numbers 6 and 10.

What does this **mean**? (Discuss what an average actually is. Use height or grades as examples.) **How** did you do this? (show the **(6+10)/2** part and **keep** on board throughout remainder of lesson.)

Learning Activity 1: (10 mins)

1. Draw 2 **points** on a half-sheet of notebook paper. What's the **distance** between them? **Fold** paper in half so that endpoints line up through paper. Mark a point at the fold and label it C. Where is it positioned on the line? (**in the middle**).
2. On a grid, draw line with points A (1, 2) and B (5, 2). What point is exactly in the middle of these / splits their distance in two? [(3, 2)]
3. Do the same with D (3, 4) and E (3, -2). What is point F? [(3, 1)]

This point is called the **midpoint**, and it is a **bisector**! (Think of part + part = whole, showing that segAC cong. segAB. Show that this is marked with hatch marks on the line segments, indicating congruency.

Show an example on seg(AB) to solve for x -- make AC = 2x+2 & BC = 5x–1. (x=1)

So how are we going to do this when the points do not have a straight line between them and you cannot just count a certain number of units to the left vs. the right? (Think of / hint at the **pythagorean theorem**.)

Learning Activity 2: (10 - 15 mins)
Have kids **come up to board** and label / **draw 2 points**: (1, 1) and (7, 9).

Draw a line segment that **connects** these. Are you able to count units to visually find the point that splits this line in half? What did you **notice** in Problem of Day (POD) #2 about splitting the x-pieces in half? What about in #3 with halving y-pieces?

It is like the **pythagorean theorem** again! We figured out the distance between the 2 points by subtracting the x-coordinates / y-coordinates to find the distance of each component / piece, which we needed for the pyth. thm. formula.

Here, we need to find the point on both the x- and y-axes that splits their individual pieces in half, so we can find the overall (*x*, *y*) values of the point that splits their distance in half!

Introduce formula for **midpoint** --have kids **write this down** in their notebooks, along with a **picture** for the formula ((x1+x2)/2, (y1+y2)/2). ****model** / write this on board, and **label**/define **midpoints vs. endpoints** on this notes diagram!!a

Is it like the average?? So if I asked for the average of 1 & 7 = ? Or average of 1 & 9? For each problem, there are only 2 points, so you add their x- and y-values and divide by 2. Now let's say that the first problem is our x-values and that the y-values come from the second problem. Once you take their individual averages, then that becomes your coordinate OF YOUR **ENDPOINTS** !!

Application
Hand out worksheet. IF TIME, get in groups (same as yesterday, with elbow buddies x 2) and solve first 2 or 3 (side #1) until class ends. THE REST / BOTH SIDES = HOMEWORK IF UNFINISHED, make this clear!!

WHEN HANDING OUT WORKSHEET, ASK KIDS TO WRITE THE MIDPOINT FORMULA AT THE TOP OF THEIR PAPERS

Summary/Closing
Allow for **independent work** before end of class with new worksheet, side #2. Must **see you working** before you can leave!

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**
- put all work and written notes on board / aloud as a modeling aide - student work on board - write vocab words on the board, separate from their definitions, and keep them visible throughout remainder of lesson thereafter	- pairs, w/ only 1 elbow buddy - give formula at beginning of lesson so know what to look forward to - allow more time for practice, less for derivation - group work on board, not paper!

Homework/Extension Activities:
worksheet (“Midpoint : Endpoint LP”)

Materials and Equipment Needed:
- white board, dry erase markers, worksheet copies
- student-provided: writing utensils

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

II. Proofs – Guided Notes

2-Col. Proofs - Postulates I

Two-Column Proofs - used to show how to get from a piece of Given information to a new conclusion using a logical series of arguments, or *postulates*.

Postulate - a property that is always true, thus which can be used to *prove* an argument.

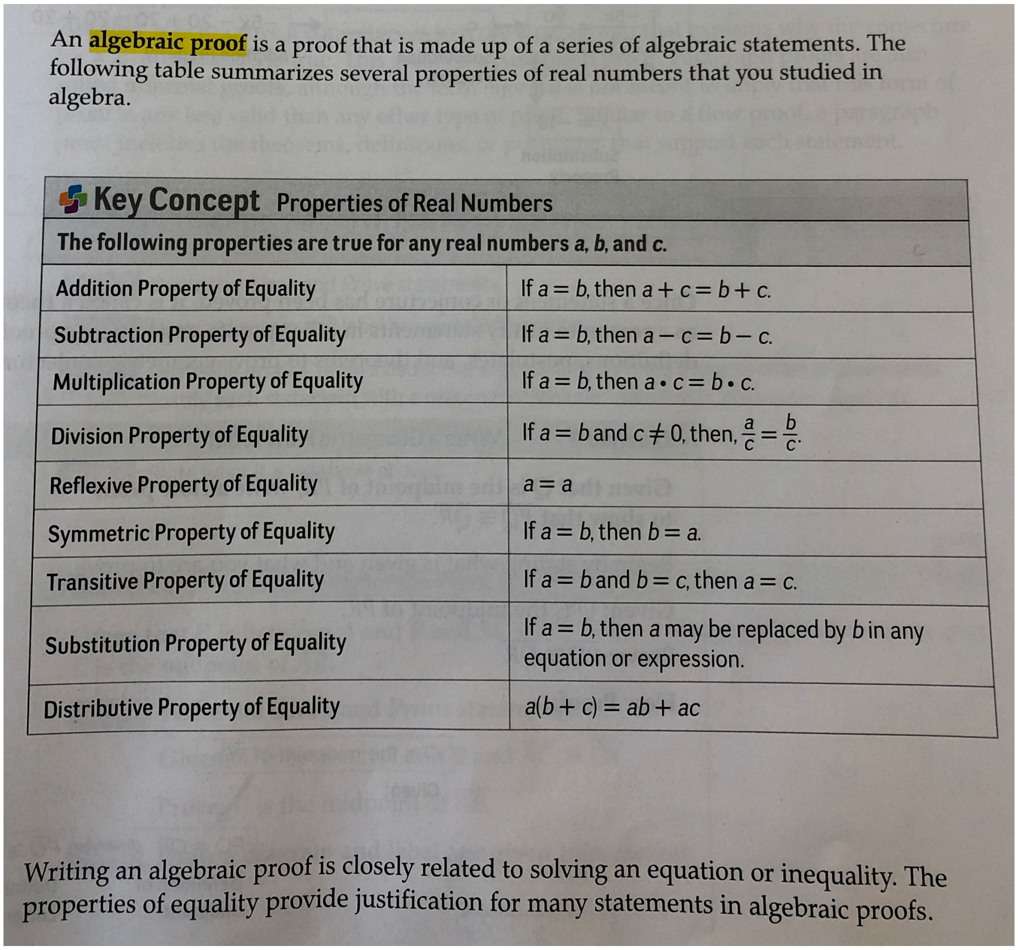
How to Write A Two-Column Proof:
Problems will look like this:

Given: A = B ;
Q = R
Prove: A + Q = B + R

Draw a numbered, two-column "T-Chart," as shown:

Statement	Reason
1. A = B ; Q = R	1. Given
2. A + Q = B + Q (OR A + R = B + R)	2. Addition Property of Equality
3. A + Q = B + R	3. Substitution Property of Equality

These arguments used the following *postulates* to get from a **Given** statement to a **conclusion**:



An **algebraic proof** is a proof that is made up of a series of algebraic statements. The following table summarizes several properties of real numbers that you studied in algebra.

Key Concept Properties of Real Numbers

The following properties are true for any real numbers *a*, *b*, and *c*.

-->	Addition Property of Equality	If $a = b$, then $a + c = b + c$.
	Subtraction Property of Equality	If $a = b$, then $a - c = b - c$.
	Multiplication Property of Equality	If $a = b$, then $a \cdot c = b \cdot c$.
	Division Property of Equality	If $a = b$ and $c \neq 0$, then, $\frac{a}{c} = \frac{b}{c}$.
	Reflexive Property of Equality	$a = a$
	Symmetric Property of Equality	If $a = b$, then $b = a$.
	Transitive Property of Equality	If $a = b$ and $b = c$, then $a = c$.
-->	Substitution Property of Equality	If $a = b$, then a may be replaced by b in any equation or expression.
	Distributive Property of Equality	$a(b + c) = ab + ac$

Writing an algebraic proof is closely related to solving an equation or inequality. The properties of equality provide justification for many statements in algebraic proofs.

PRACTICE

1. **Given:** X = Y ; Y = Z
Prove: X + Y = Z + Z

Statement	Reason
1) X = Y ; Y = Z	1)
2) X = Z	2) Transitive Property of Equality
3) X + Y = Z + Y	3)
4)	4) Substitution Property of Equality

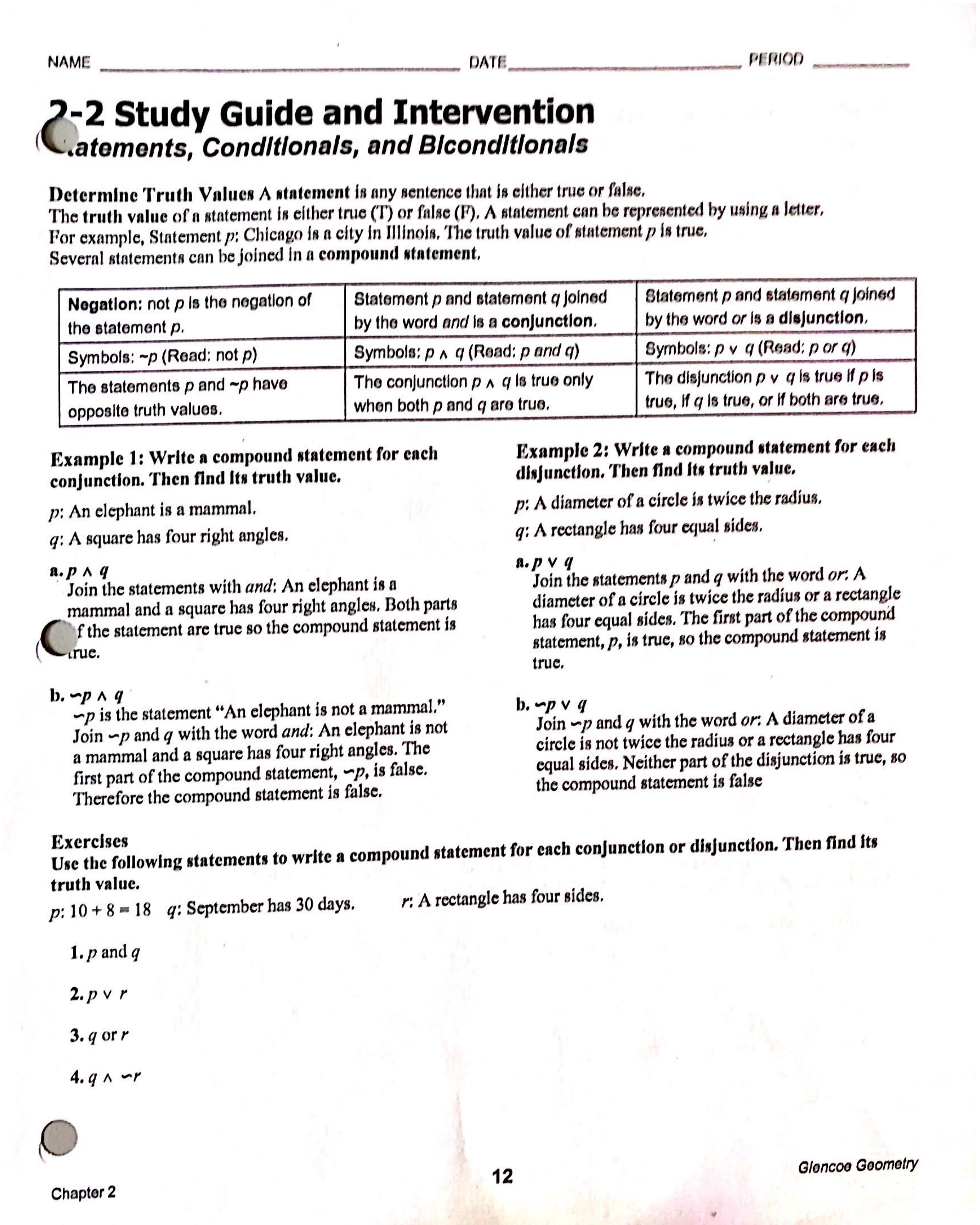
2. **Given:** A + B = C + D
Prove: 2(A + B) = 2(C + D)

Statement	Reason
1)	1) Given
2)	2)

3. **Given:** L = M ; F = G
Prove: M + F = L + G

1)	1)
2)	2)
3)	3)
4)	4)

III. Logic Worksheet



NAME ______________________ DATE ______________ PERIOD ________

2-2 Study Guide and Intervention

atements, Conditionals, and Biconditionals

Determine Truth Values A **statement** is any sentence that is either true or false. The **truth value** of a statement is either true (T) or false (F). A statement can be represented by using a letter. For example, Statement p: Chicago is a city in Illinois. The truth value of statement p is true. Several statements can be joined in a **compound statement.**

Negation: not p is the negation of the statement p.	Statement p and statement q joined by the word *and* is a **conjunction.**	Statement p and statement q joined by the word *or* is a **disjunction.**
Symbols: $\sim p$ (Read: not p)	Symbols: $p \wedge q$ (Read: *p and q*)	Symbols: $p \vee q$ (Read: *p or q*)
The statements p and $\sim p$ have opposite truth values.	The conjunction $p \wedge q$ is true only when both p and q are true.	The disjunction $p \vee q$ is true if p is true, if q is true, or if both are true.

Example 1: Write a compound statement for each conjunction. Then find its truth value.

p: An elephant is a mammal.

q: A square has four right angles.

a. $p \wedge q$
Join the statements with *and*: An elephant is a mammal and a square has four right angles. Both parts f the statement are true so the compound statement is true.

b. $\sim p \wedge q$
$\sim p$ is the statement "An elephant is not a mammal." Join $\sim p$ and q with the word *and*: An elephant is not a mammal and a square has four right angles. The first part of the compound statement, $\sim p$, is false. Therefore the compound statement is false.

Example 2: Write a compound statement for each disjunction. Then find its truth value.

p: A diameter of a circle is twice the radius.

q: A rectangle has four equal sides.

a. $p \vee q$
Join the statements p and q with the word *or*: A diameter of a circle is twice the radius or a rectangle has four equal sides. The first part of the compound statement, p, is true, so the compound statement is true.

b. $\sim p \vee q$
Join $\sim p$ and q with the word *or*: A diameter of a circle is not twice the radius or a rectangle has four equal sides. Neither part of the disjunction is true, so the compound statement is false

Exercises
Use the following statements to write a compound statement for each conjunction or disjunction. Then find its truth value.

p: $10 + 8 = 18$ q: September has 30 days. r: A rectangle has four sides.

1. p and q

2. $p \vee r$

3. q or r

4. $q \wedge \sim r$

NAME ______________________ DATE ______________ PERIOD ________

2-2 Study Guide and Intervention *(continued)*

Statements, Conditionals, and Biconditionals

Conditional Statements An if-then statement is a statement such as "If you are reading this page, then you are studying math." A statement that can be written in if-then form is called a **conditional statement**. The phrase immediately following the word *if* is the **hypothesis**. The phrase immediately following the word *then* is the **conclusion**.

A conditional statement can be represented in symbols as $p \rightarrow q$, which is read "p implies q" or "if p, then q."

If you change the hypothesis or conclusion of a conditional statement, you form **related conditionals**. This chart shows the three related conditionals, *converse*, *inverse*, and *contrapositive*, and how they are related to a conditional statement.

	Symbols	Formed by	Example
Conditional	$p \rightarrow q$	using the given hypothesis and conclusion	If two angles are vertical angles, then they are congruent.
Converse	$q \rightarrow p$	exchanging the hypothesis and conclusion	If two angles are congruent, then they are vertical angles.
Inverse	$\sim p \rightarrow \sim q$	replacing the hypothesis with its negation and replacing the conclusion with its negation	If two angles are not vertical angles, then they are not congruent.
Contrapositive	$\sim q \rightarrow \sim p$	negating the hypothesis, negating the conclusion, and switching them	If two angles are not congruent, then they are not vertical angles.

A conditional statement always has the same truth value as its contrapositive, and the converse and inverse always have the same truth value. If you make a compound statement from a conditional statement and its converse, you can write them as a single **biconditional statement**.

Exercises
Write each statement in if-then form.

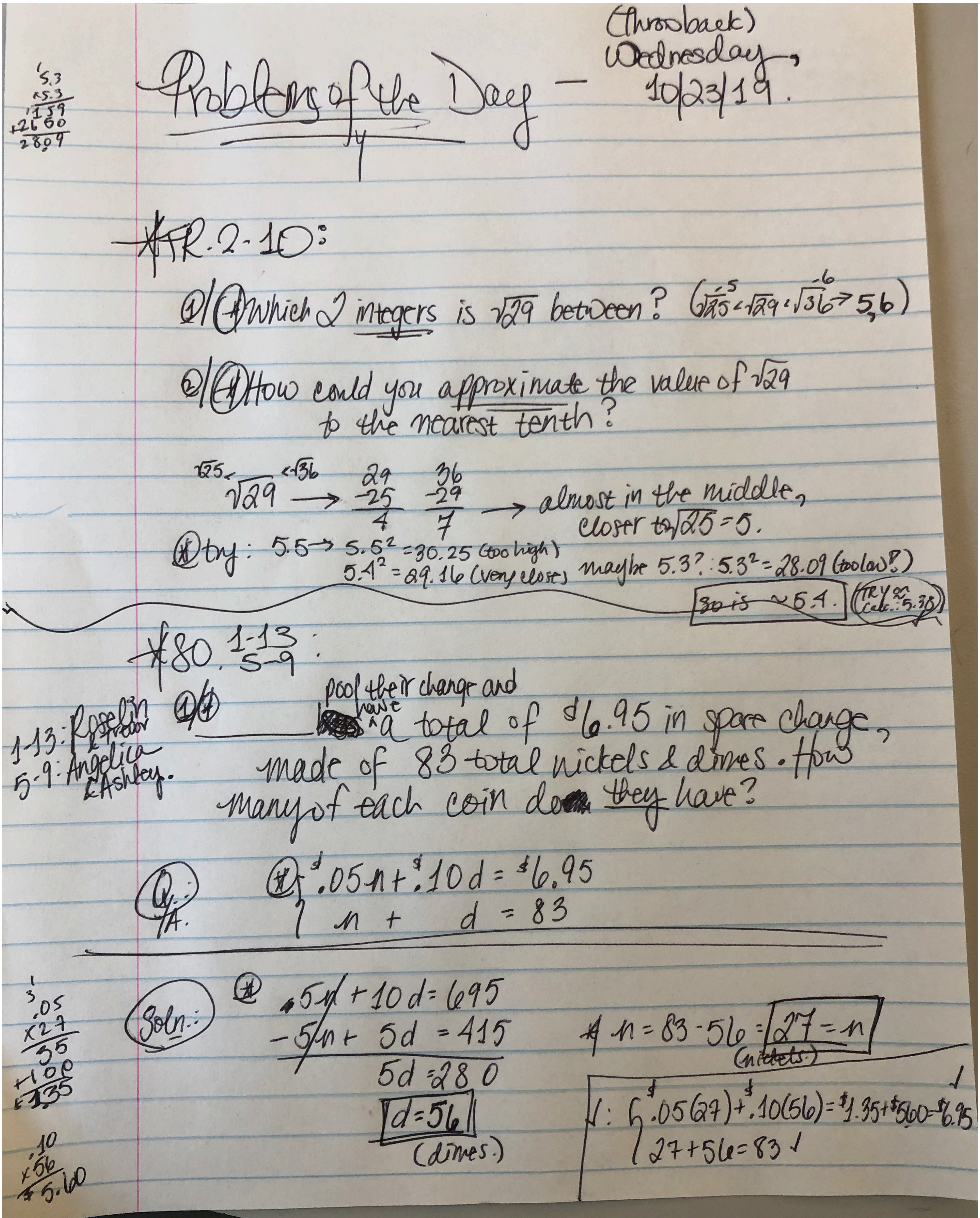
1. All apes love bananas.
2. The sum of the measures of complementary angles is 90.
3. Collinear points lie on the same line.

Write the converse, inverse, and contrapositive of each true conditional statement. Determine whether each related conditional is *true* or *false*. If a statement is false, find a counterexample.

4. If you live in San Diego, then you live in California.

5. If a polygon is a rectangle, then it is a square.

IV. Problems of the Day with Names



$$\begin{array}{r} 5.3 \\ \times 5.3 \\ \hline 159 \\ +2650 \\ \hline 28.09 \end{array}$$

Problems of the Day – (Throwback) Wednesday, 10/23/19.

TR.2-10:

①/① Which 2 integers is $\sqrt{29}$ between? ($\overset{5}{\sqrt{25}} < \sqrt{29} < \overset{6}{\sqrt{36}} \rightarrow 5, 6$)

②/① How could you approximate the value of $\sqrt{29}$ to the nearest tenth?

$\overset{\sqrt{25}<\quad<\sqrt{36}}{\sqrt{29}} \longrightarrow \begin{array}{r} 29 \\ -25 \\ \hline 4 \end{array} \quad \begin{array}{r} 36 \\ -29 \\ \hline 7 \end{array} \longrightarrow$ almost in the middle, closer to $\sqrt{25} = 5$.

① try: $5.5 \rightarrow 5.5^2 = 30.25$ (too high)

$5.4^2 = 29.16$ (very close) maybe 5.3?: $5.3^2 = 28.09$ (too low?)

$\boxed{\text{~~30 is~~} \sim 5.4.}$ (TRY on calc.: 5.38)

80. 1-13 / 5-9:

1-13: Roselin & Trevor

5-9: Angelica & Ashley.

①/① ______ pool their change and have a total of \$6.95 in spare change, made of 83 total nickels & dimes. How many of each coin do they have?

Q./A.

① $\begin{cases} \$.05n + \$.10d = \$6.95 \\ n + d = 83 \end{cases}$

Soln.:

$$\begin{array}{r} .05 \\ \times 27 \\ \hline 35 \\ +100 \\ \hline \$1.35 \end{array} \qquad \begin{array}{r} .10 \\ \times 56 \\ \hline \$5.60 \end{array}$$

①

$$\begin{array}{r} 5\cancel{n} + 10d = 695 \\ -5\cancel{n} + 5d = 415 \\ \hline 5d = 280 \end{array}$$

$\boxed{d = 56}$ (dimes)

$n = 83 - 56 = \boxed{27 = n}$ (nickels)

✓: $\begin{cases} \$.05(27) + \$.10(56) = \$1.35 + \$5.60 = \$6.95 ✓ \\ 27 + 56 = 83 ✓ \end{cases}$

I. Multi-Step Proofs Packet

Name ________________________ Date __________ Class _________ Assignment #______

Multi-Step Equation Stations … with Proofs :)

Directions: As a **group**, for each station, arrange the puzzle pieces in the correct vertical order to make a complete Multi-Step solution. In the left-hand column, copy down the steps as your proof "Statement." In the right-hand column, name the **postulate** that justifies each step as your "Reason." ***Don't forget to conclude with "QED"!***

Goal: To create an understanding of each step in the Multi-Step equation process and how our proof postulates apply to the things that we already know!

STATION #1

Algebraic Step / Statement	Reason
$3a + 4 = 2a + 15$	1. Given

STATION #2

Algebraic Step / Statement	Reason
$2z - 3 = 6z + 25$	1. Given

STATION #3

Algebraic Step / Statement	Reason
$5w + 2 = 2w + 5$	1. Given

STATION #4

Algebraic Step / Statement	Reason
$p + 5 = 25 – 4p$	1. Given

STATION #5

Algebraic Step / Statement	Reason
$40 + 14j = 2(-4j - 13)$	1. Given

STATION #6

Algebraic Step / Statement	Reason
$2(2g + 3) = \frac{1}{2}(12g + 8)$	1. Given

STATION #7

Algebraic Step / Statement	Reason
$12(r + 3) = 2(r + 5) - 3r$	1. Given

STATION 1

$3a + 4 = 2a + 15$

$3a + 4 = 2a + 15$
$- 2a \qquad - 2a$

$a + 4 = 15$
$- 4 \quad - 4$

$a = 11$

STATION 3

$5w + 2 = 2w + 5$

$5w + 2 = 2w + 5$
$- 2w \qquad - 2w$

$3w + 2 = 5$
$- 2 \quad - 2$

$$\frac{1}{3} \bullet 3w = 3 \bullet \frac{1}{3}$$

$$w = 1$$

STATION 2

$$2z - 3 = 6z + 25$$

$$2z - 3 = 6z + 25$$
$$-2z \qquad -2z$$

$$-3 = 4z + 25$$
$$-25 \qquad -25$$

$$\frac{1}{4} \bullet -28 = 4z \bullet \frac{1}{4}$$

$$-7 = z$$

$$z = -7$$

STATION 4

$p + 5 = 25 – 4p$

$p + 5 = 25 – 4p$
$+ 4p \qquad + 4p$

$5p + 5 = 25$
$- 5 \quad - 5$

$\frac{1}{5} \bullet 5p = 20 \bullet \frac{1}{5}$

$p = 4$

STATION 5

$40 + 14j = 2(-4j - 13)$

$40 + 14j = -8j - 26$

$40 + 14j = -8j – 26$
$+ 8j \quad + 8j$

$$40 + 22j = -26$$
$$-40 \qquad\qquad -40$$

$$\frac{1}{22} \bullet 22j = -66 \bullet \frac{1}{22}$$

$$j = -3$$

STATION 6

$$2(2g + 3) = \tfrac{1}{2}(12g + 8)$$

$$4g + 6 = 6g + 4$$

$$4g + 6 = 6g + 4$$
$$-4 \qquad\qquad -4$$

$$4g + 2 = 6g$$
$$-4g \qquad\qquad -4g$$

$$\frac{1}{2} \bullet 2 = 2g \bullet \frac{1}{2}$$

1 = g

g = 1

STATION 7

12r + 36 = 2r + 10 – 3r

12r + 36 = 2r + 10 – 3r
+ 3r + 3r

15r + 36 = 2r + 10
- 2r - 2r

13r + 36 = 10
- 36 -36

$\frac{1}{13}$ • 13r = -26 • $\frac{1}{13}$

r = -2

II. Scaffolded Dessert Activity

Name: ______________________________ Date: ____________ Period: ________ Assign. # ______

Linear Inequalities Activity — Dessert Edition!

It's Ms. Varada's last day with her Algebra I class, and she'd like to bring in a treat for her students to show her appreciation for all of their hard work and respect throughout the year! The problem is, she can't decide what to bring. It looks like she needs your help!

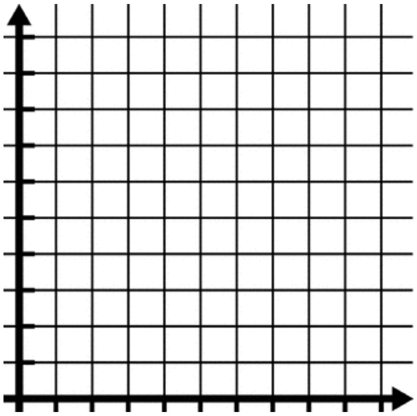
Ms. Varada has **$30** total saved to spend on treats for her students. She heads over to Price Chopper and sees that there are **brownies** on sale for **$3 per carton**, with each carton containing **12 brownies**. She also notices that a **25-pack** of **chocolate-chip cookies** is **$5** per box. *She doesn't necessarily have to spend all of her money*, but she really wants to treat her students! How can you use a ***graph*** to show all of the different ways in which Ms. Varada can spend her savings on brownies and chocolate-chip cookies? How ***many*** treats would this give to her class?

Some ideas to start you off:

1. Think of the *number of brownie cartons* that Ms. Varada can buy as variable **b**.
   Think of the *number of chocolate-chip cookie boxes* that Ms. Varada can buy as variable **c**.
2. Each brownie carton costs **$3**. How can you use this to calculate the *cost* for **b** number of brownie cartons?
3. Each chocolate-chip cookie box costs **$5**. How can you use this to calculate the *cost* for **c** number of chocolate-chip cookie boxes?
4. Now add these together to calculate the *total cost* of **b** number of brownie cartons *and* **c** number of chocolate-chip cookie boxes *combined*:
5. Recall that this total can reach ***up to* $30**. How can Ms. Varada write a *linear inequality* to show the number of brownie cartons and chocolate-chip cookie boxes that she is able to buy while still staying *within (less than or equal to)* her budget?

6. Now that you've found an equation to represent all of the possible combinations of brownie cartons and chocolate-chip cookie boxes that Ms. Varada can buy, we need to put this inequality into ***slope-intercept form*** ***($y = mx + b$)*** so that we can **graph** it! Think of your **b** number of brownie cartons as your "*y*" variable, and your **c** number of chocolate-chip cookie boxes as your "*x*" variable:

7. It looks like we're finally ready to graph! Start by *labeling* your **b** number of brownie cartons on your *y*-axis, and your **c** number of chocolate-chip cookie boxes on your *x*-axis. Go ahead and show Ms. Varada the possible ways in which she can spend her money on treats! Don't forget to graph your *inequality line* and your *shaded portion*:



8. Now that Ms. Varada knows exactly how many *containers* of brownies and chocolate-chip cookies that she can possibly buy, let's think about if she only had *one* treat option to choose from. What is the *maximum* **b** number of brownie cartons that she could buy, given that she doesn't buy *any* (zero) boxes of chocolate-chip cookies? (This is considered your "***y*-intercept**" for the graph.)

9. Now, what is the *maximum* **c** number of chocolate-chip cookie boxes that she could buy, given that she doesn't buy *any* (zero) cartons of brownies? (This is considered your "***x*-intercept**" for the graph.)

10. If Ms. Varada chooses to buy *as many* cartons of brownies *as she can*, then if her class contains ***30 students***, how many brownies will *each person* in her class get? (Recall that a carton of brownies contains **12** brownies.) What about if she *only* buys chocolate-chip cookies instead? (Recall that a box of cookies contains **25** cookies.)

III. Proofs Project

Proofs Project **Name:** ________________________

Due: Tuesday, November 26, 2019 Group Members: ________________________

What We're Doing:

Over the next few days and the weekend, you and your group are going to construct a large proof based upon a set of three smaller proofs. The smaller, "mini" proofs constitute the steps for your larger, "main" proof, which each have their own set of steps as well. It's going to be your job to work with your group and to figure out what these steps are.

You also need to put these steps all together so that you can present them to your class. You can do this in whatever way that you want, as long as you're including each piece of the proof. You need to make it clear how you got from the beginning of each mini proof to the end, as well as the order in which your three mini proofs prove the main one. You're going to <u>present</u> your final project to your peers (and to your teachers) during our class period on **<u>Tuesday, 11/26</u>**.

How It Works:

I am going to provide you with one main proof. It could be on any topic that we've covered in class so far, such as equivalence, congruency, segments, planes, logic....

I will then give you three "mini" proofs, which all work together in some order (which I won't tell you) to make the steps for the main proof. Each of these mini proofs has its own set of steps as well. It is up to <u>you</u> to determine how <u>many</u> steps that is and <u>what</u> these steps are!

Once you've figured out the steps to each of your mini proofs, put your mini steps in order so that they solve the main proof. You need to present <u>all</u> of these steps as a **<u>project</u>** to the class. You can do this in any way that you choose, as long as it gets your message across / your teachers can <u>clearly</u> tell what each step of your proof is!

Feel free to get creative! **<u>PLEASE LIMIT YOUR PRESENTATIONS TO 3-5 MINUTES IN LENGTH</u>**. You can choose to present your proof(s) as a:

- **Poster** or **Diorama** (Try to avoid PowerPoints)
  - Large enough for everyone to see, with each of your proofs clearly separated
  - Feel free to decorate it! Make it look cool / relevant to the topic!
- **Video** or **In-Class Skit / "Lesson"**
  - <u>3-5 minutes</u>, submitted as a YouTube link or as a ".avi" / ".mov" file
  - Can be an entertaining skit OR can just lay out the proof and <u>teach</u> us the steps in some manner (kind of like a daily lesson!), as long as you follow the directions and we can tell what each of the steps are / what order they're in
- **Rap** or **Song**
  - Can be video-taped, submitted as a YouTube link or as a ".avi" / ".mov" file
  - Can be audio-recorded, submitted as a ".wav" / ".mp3" file
  - Can be presented live to the class, along with a <u>written</u> copy of the lyrics!
- **Comic Strip**
  - Preferably the size of a Poster Board so that we can see what you're presenting!
- **Any Other Ideas?**
  - Just ask me, <u>but</u> I have to approve them for your group first....

Rules – What Needs to Be Turned In:

1. **A Written Representation** of your main proof, of the three mini proofs, and of the steps for the three mini proofs, in the order in which they go together. Your final presentation and overall layout can be as creative as you would like, but I need to be able to sit in a classroom and grade the project over the break without your group standing there and presenting it to me. See example below.
2. **An Interesting Way to Present Your Proofs** to the class. I will not accept just a 2-minute speech where your group stands at the front of the classroom and takes turns reading your steps off of a sheet of printer paper or a PowerPoint to a sea of blank faces (and bored teachers). Have fun! Show off your creative side! **PLEASE LIMIT YOUR PRESENTATIONS TO 3-5 MINUTES IN LENGTH.**
3. **A Visual Representation for Any Steps or Diagrams** in your proof that need it. For example, if you're talking about segment $\overline{AB}$, then show me a line segment with points A and B on it. If you're doing a song, then you can draw your diagrams on the board when you present them AND give drawings of your diagrams in the write-up that you include with your song lyrics. In your video, you can point to the diagrams on a piece of paper or on a chalkboard, etc.. The same goes for a comic, a poster, a diorama … include necessary diagrams!!
4. **All Grids and Group Allocation** tasks **completely filled out** (on the next page).

Can You Show Me An Example, Please??

Sure. Here is a possible outline of what your final project could look like (as long as it includes all of the necessary components!) Keep in mind that this is okay for a final write-up if you are submitting a song or performing something live (non-recorded) for the class. However, this is NOT sufficient as your final presentation:

* Insert a **map** of the path from home > Dunks > WooTech library > our classroom *

Getting to School

Main Proof: Get to your classroom with a coffee and a library book

1. Mini-Proof 1: Start walking to school —****this would be a step that's given to you**
    a. Pull up Google maps —****you figure out these steps on your own**
    b. Figure out how to get to school
    c. Grab backpack and shoes
    d. Start walking to school ****this step matches your mini-proof #1 ^^**
2. Mini-Proof 2: Get a coffee —****this step is also given to you**
    a. Search for the nearest Dunks on your phone
    b. Walk to Dunkin' Donuts
    c. Wait in line
    d. Order a fancy macchiato
    e. Get a coffee ****this step matches your mini-proof #2 ^^**

3. <u>Mini-Proof 3</u>: Check out a library book —****step given to you**
    - **a.** Arrive at Worcester Tech
    - **b.** Locate the library (yes, we have a library. It has books in it.)
    - **c.** Walk inside
    - **d.** Choose an intriguing book or magazine
    - **e.** Present the librarian with your ID
    - **f.** Check out a library book ****<u>matches your mini-proof ^^</u>**
4. <u>Main Proof</u>: Get to your classroom with a coffee and a library book

    Q.E.D. <<don't forget the final part of your proof!!

——

Now that you know what to expect, you'll have to meet up with your assigned group either in (during today and Monday) or <u>outside</u> of class to work on this.

Let's talk about some of your strengths and weaknesses as a group. Below, list your own **<u>personal</u>** qualities that you could contribute to this project. **THESE DO NOT NECESSARILY HAVE TO PERTAIN TO MATH** — are you in Painting & Design and really like being artsy? Are you really good at Graphics? Do you like organizing things? Directing things? Stepping up as a leader? Or even just going with the flow? Are you good at building things? What's your favorite way of <u>expressing yourself</u>?

My Strengths: ____

____

Now, what are you not necessarily as good at? What are some things that you think that one of your <u>other</u> group members could probably contribute to this project while you focus on one of the things that you're stronger at / enjoy doing?

My Weaknesses: ____

____

Now get together with your group and **brainstorm** some ideas that you guys could use for your project. Think about your <u>own</u> strengths and your <u>teammates</u>' strengths. Think about your <u>own</u> weaknesses and your <u>teammates</u>' weaknesses. Which projects could your group <u>realistically</u> work on over the next few days / weekend?

In the grid below, list your group's final project idea, which strengths of **<u>yours</u>** could be useful for the project, & how **<u>you</u>** can contribute to the assignment. **YOUR GRADE FOR THIS PROJECT WILL BE DETERMINED BASED ON <u>EQUAL</u> PARTICIPATION AND EFFORT, SO IT IS IMPORTANT THAT <u>EACH</u> GROUP MEMBER CONTRIBUTES TO THE PROJECT IN SOME WAYS. Your contribution could include researching steps, obtaining supplies, decorating, editing, directing, delegating, constructing….** Be **<u>specific</u>** about which <u>skills</u> and <u>actions</u> that you're using to ensure good **<u>teamwork</u>**!

Your Final Group Project Idea	Which Strengths **<u>You</u>** Can Use	How **<u>You</u>** Can Contribute

Rubric

Pts	Organization	Creativity	Visuals	Efficiency	My Contribution
20	Project is submitted on time with both a complete, properly-ordered write-up and a related, ordered presentation.	Project contains an interesting, well-planned presentation and a strong accompanying write-up or written piece.	Project contains all necessary visual supplements, which are directly related to the main topic.	Project followed all directions, specifically and effectively, as stated. All 4 major components included.	All strengths and related contribution tasks are specified in table. Relative contribution is sufficient or outstanding according to remainder of group.
15	Project is submitted on time with a complete write-up OR presentation, the other part less than complete.	Project contains a sufficient write-up and a sufficiently strong, related presentation.	Project contains all necessary visual supplements, although some are only somewhat related to the topic.	Project mostly followed directions, but slightly diverged from topic. All 4 major components included.	All strengths and mostly-related contribution tasks are specified in table. Relative contribution is mostly sufficient according to remainder of group.
10	Project is submitted on time with a less than complete write-up and presentation.	Project contains sufficient write-up or related presentation, although the other part is less than sufficient.	Project contains a few visual supplements, although vaguely related to the topic.	Project followed directions, but a few components distracted significantly from main topic. At least 3 major components included.	A few strengths / somewhat unrelated contribution tasks are specified in table. Relative contribution is less than sufficient according to group.
5	Project is submitted late (after the holiday break) with both components complete.	Project consists of basic write-up and some form of vaguely related supplementary presentation.	Project contains at least 1 vaguely related visual supplement.	Project vaguely followed directions, presentation was only partially related to topic. At least 2 major components included.	A few strengths / unrelated contribution tasks are specified in table. Relative contribution is not sufficient for group.
0	Project is submitted late with less than complete or incomplete components.	Project consists of basic write-up and/or no supplemental presentation or visuals.	Project contains no visual supplements.	Project is off-topic and insufficient. Less than 2 major components included.	Table contains no strengths or contribution tasks. Relative contribution is minimal or nonexistent.

My Total: ________ / 100

Set #2

Main Proof – Y = 0

Mini Proof – X + A = A

Given: X = Z ; Z = 0

Prove: X + A = A

Mini Proof – 2(Y + A) = 2(A + X)

Given: X = Y

Prove: 2(Y + A) = 2(A + X)

Mini Proof – A = 0

Given: X + 2A = 3A + X

Prove: A = 0

Set #3

Main Proof – $\frac{PS}{2} + 2 = PQ + F + F - F$

Mini Proof – $RS + 2 = PQ + 2$

Given: $\overline{PQ} \cong \overline{RS}$

Prove: $RS + 2 = PQ + 2$

Mini Proof – $2 = F + F - F$

Given: $F = 2$

Prove: $2 = F + F - F$

Mini Proof – $RS = \frac{PS}{2}$

Given: $\overline{PR} \cong \overline{RS}$

Prove: $RS = \frac{PS}{2}$

Set #1

Main Proof – Point B lies on both Planes ABC & ABD

Mini Proof – Segment $\overline{AB}$ lies on plane ABC

Given: A, B, and C are non-collinear points

Prove: Segment $\overline{AB}$ lies on plane ABC

Mini Proof – $\overline{BC}$ intersects $\overline{AB}$ at point B

Given: Plane ABC

Prove: $\overline{BC}$ intersects $\overline{AB}$ at point B

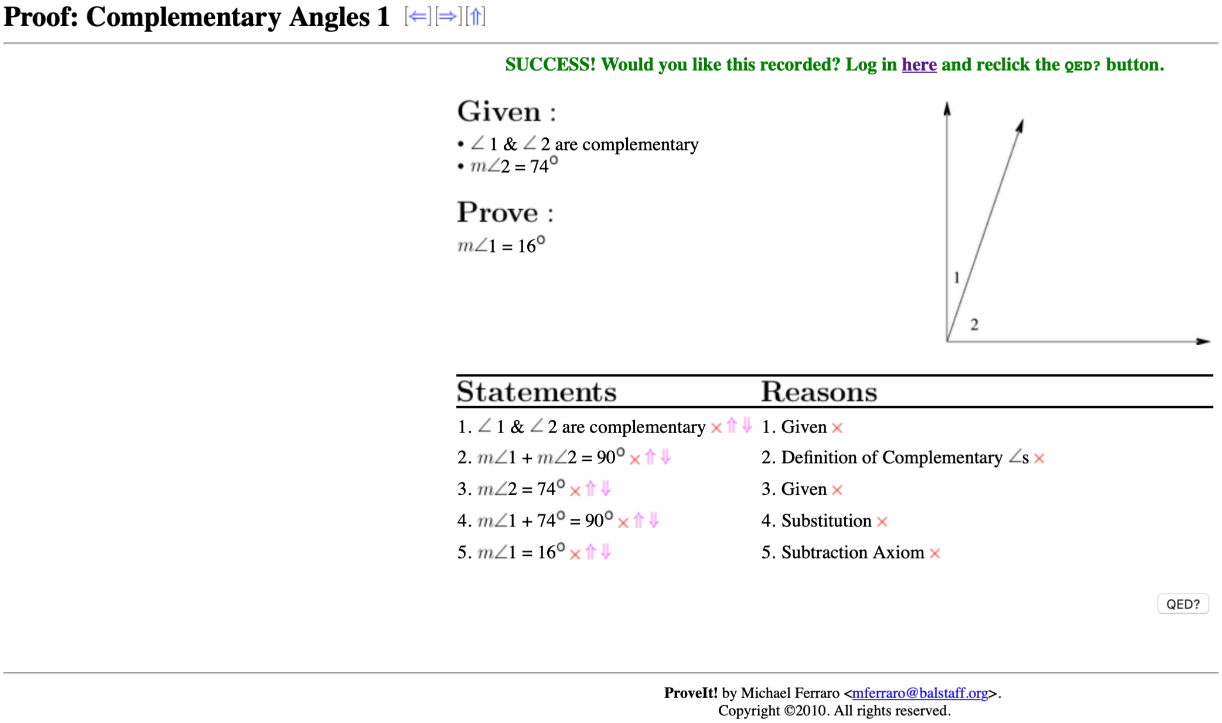
Mini Proof – ABC intersects ABD at $\overline{AB}$

Given: Plane ABD

Prove: ABC intersects ABD at $\overline{AB}$

IV. Feromax Assignments

VARADA 2019 Feromax - Proofs Thm. 2.3–2.13



Proof: Complementary Angles 1 [⇐][⇒][⇑]

SUCCESS! Would you like this recorded? Log in here and reclick the QED? button.

Given :

- $\angle 1$ & $\angle 2$ are complementary
- $m\angle 2 = 74^\circ$

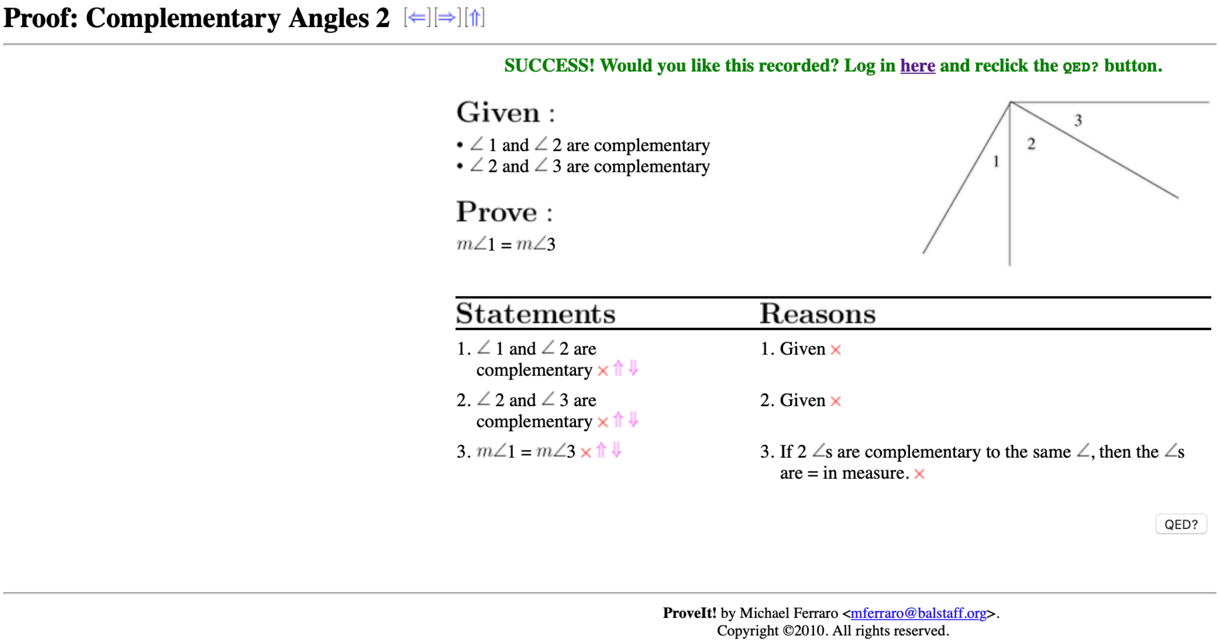
Prove :

$m\angle 1 = 16^\circ$

Statements	Reasons
1. $\angle 1$ & $\angle 2$ are complementary × ⇑ ⇓	1. Given ×
2. $m\angle 1 + m\angle 2 = 90^\circ$ × ⇑ ⇓	2. Definition of Complementary $\angle$s ×
3. $m\angle 2 = 74^\circ$ × ⇑ ⇓	3. Given ×
4. $m\angle 1 + 74^\circ = 90^\circ$ × ⇑ ⇓	4. Substitution ×
5. $m\angle 1 = 16^\circ$ × ⇑ ⇓	5. Subtraction Axiom ×

QED?

ProveIt! by Michael Ferraro <mferraro@balstaff.org>.



Proof: Complementary Angles 2 [⇐][⇒][⇑]

SUCCESS! Would you like this recorded? Log in here and reclick the QED? button.

Given :

- $\angle 1$ and $\angle 2$ are complementary
- $\angle 2$ and $\angle 3$ are complementary

Prove :

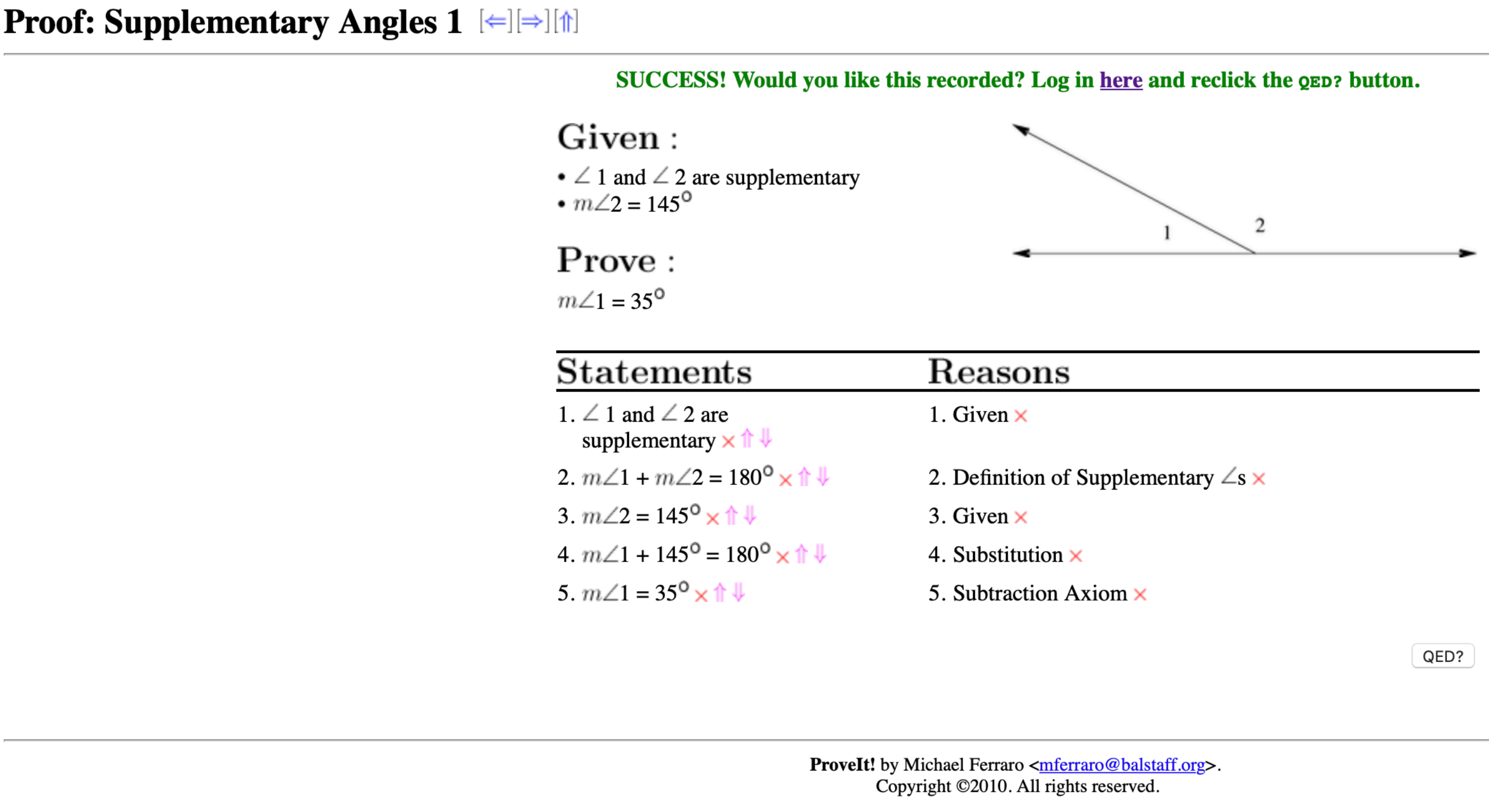
$m\angle 1 = m\angle 3$

Statements	Reasons
1. $\angle 1$ and $\angle 2$ are complementary × ⇑ ⇓	1. Given ×
2. $\angle 2$ and $\angle 3$ are complementary × ⇑ ⇓	2. Given ×
3. $m\angle 1 = m\angle 3$ × ⇑ ⇓	3. If 2 $\angle$s are complementary to the same $\angle$, then the $\angle$s are = in measure. ×

QED?

ProveIt! by Michael Ferraro <mferraro@balstaff.org>.

http://feromax.com/cgi-bin/ProveIt.pl?task=getproofslist



Proof: Supplementary Angles 1

SUCCESS! Would you like this recorded? Log in here and reclick the QED? button.

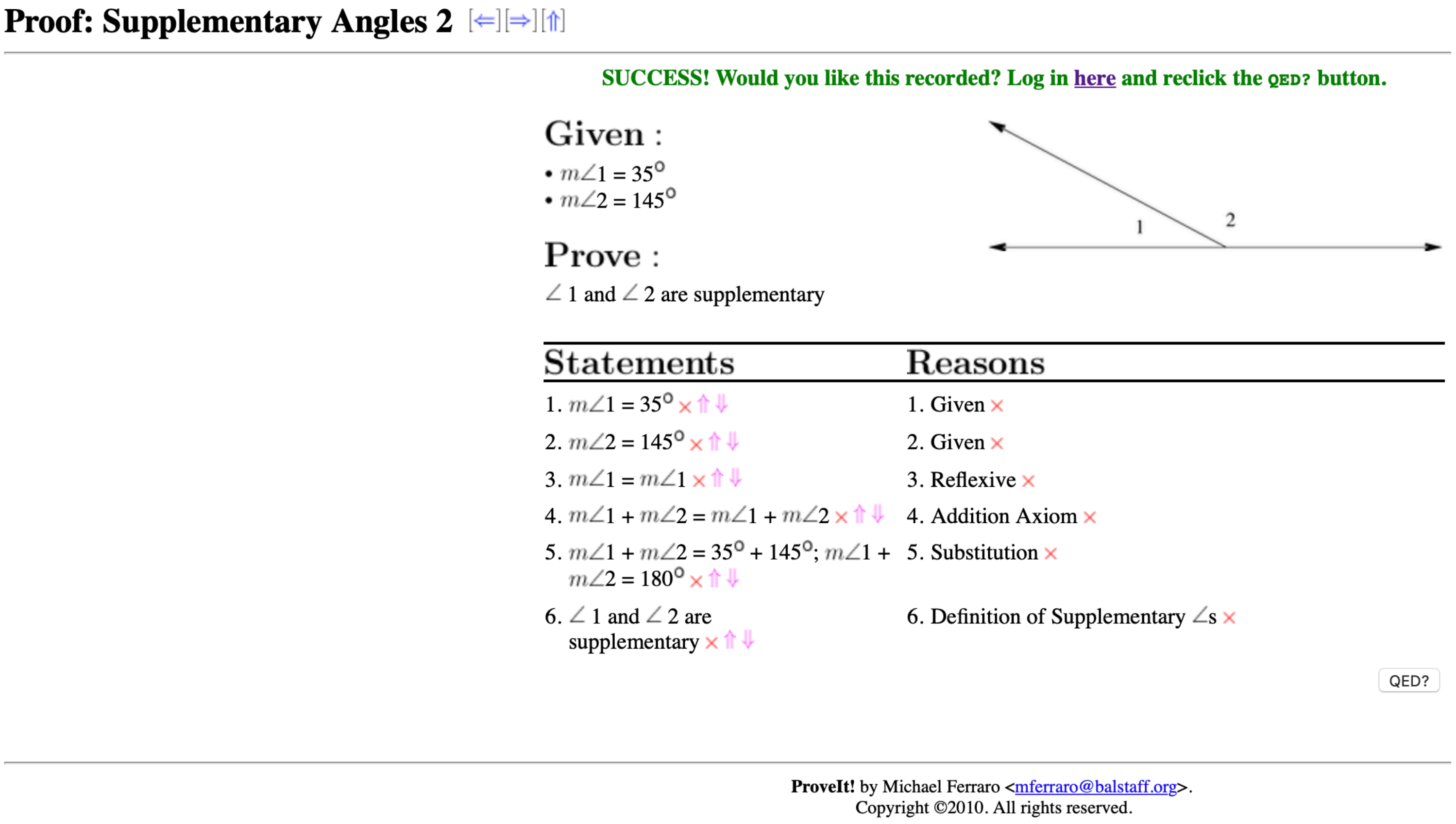
Given :

- ∠ 1 and ∠ 2 are supplementary
- $m\angle 2 = 145^\circ$

Prove :

$m\angle 1 = 35^\circ$

Statements	Reasons
1. ∠ 1 and ∠ 2 are supplementary × ⇑ ⇓	1. Given ×
2. $m\angle 1 + m\angle 2 = 180^\circ$ × ⇑ ⇓	2. Definition of Supplementary ∠s ×
3. $m\angle 2 = 145^\circ$ × ⇑ ⇓	3. Given ×
4. $m\angle 1 + 145^\circ = 180^\circ$ × ⇑ ⇓	4. Substitution ×
5. $m\angle 1 = 35^\circ$ × ⇑ ⇓	5. Subtraction Axiom ×



Proof: Supplementary Angles 2

SUCCESS! Would you like this recorded? Log in here and reclick the QED? button.

Given :

- $m\angle 1 = 35^\circ$
- $m\angle 2 = 145^\circ$

Prove :

∠ 1 and ∠ 2 are supplementary

Statements	Reasons
1. $m\angle 1 = 35^\circ$ × ⇑ ⇓	1. Given ×
2. $m\angle 2 = 145^\circ$ × ⇑ ⇓	2. Given ×
3. $m\angle 1 = m\angle 1$ × ⇑ ⇓	3. Reflexive ×
4. $m\angle 1 + m\angle 2 = m\angle 1 + m\angle 2$ × ⇑ ⇓	4. Addition Axiom ×
5. $m\angle 1 + m\angle 2 = 35^\circ + 145^\circ$; $m\angle 1 + m\angle 2 = 180^\circ$ × ⇑ ⇓	5. Substitution ×
6. ∠ 1 and ∠ 2 are supplementary × ⇑ ⇓	6. Definition of Supplementary ∠s ×

http://feromax.com/cgi-bin/ProveIt.pl?task=getproofslist

Proof: Straight Angle 1 [⇐][⇒][⇑]

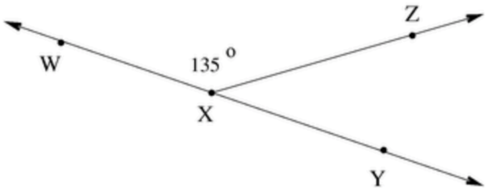
SUCCESS! Would you like this recorded? Log in here and reclick the QED? button.

Given :

- line WXY
- $m\angle WXZ = 135^{\circ}$

Prove :

$m\angle ZXY = 45^{\circ}$



Statements	Reasons
1. line WXY × ⇑ ⇓	1. Given ×
2. $m\angle WXZ = 135^{\circ}$ × ⇑ ⇓	2. Given ×
3. $m\angle WXY = 180^{\circ}$ × ⇑ ⇓	3. If the sides of an ∠ form a straight line, then the ∠ is a straight ∠ w/measure 180°. ×
4. $m\angle WXY = m\angle WXZ + m\angle ZXY$ × ⇑ ⇓	4. For any segment or ∠, the measure of the whole is = to the sum of the measures of its non-overlapping parts. ×
5. $180^{\circ} = 135^{\circ} + m\angle ZXY$ × ⇑ ⇓	5. Substitution ×
6. $45^{\circ} = m\angle ZXY$ × ⇑ ⇓	6. Subtraction Axiom ×

QED?

ProveIt! by Michael Ferraro <mferraro@balstaff.org>.

Proof: Vertical Angles 1 [⇐][⇒][⇑]

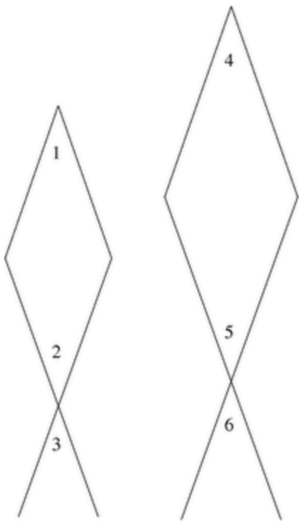
SUCCESS! Would you like this recorded? Log in here and reclick the QED? button.

Given :

- $m\angle 1 = m\angle 3$
- $m\angle 4 = m\angle 6$
- $m\angle 1 = m\angle 4$

Prove :

$m\angle 2 = m\angle 5$



Statements	Reasons
1. $m\angle 1 = m\angle 3$ × ⇑ ⇓	1. Given ×
2. $m\angle 2 = m\angle 3$ × ⇑ ⇓	2. Vertical ∠s are = in measure. ×
3. $m\angle 1 = m\angle 2$ × ⇑ ⇓	3. Transitive/Substitution ×
4. $m\angle 4 = m\angle 6$ × ⇑ ⇓	4. Given ×
5. $m\angle 5 = m\angle 6$ × ⇑ ⇓	5. Vertical ∠s are = in measure. ×
6. $m\angle 4 = m\angle 5$ × ⇑ ⇓	6. Transitive/Substitution ×
7. $m\angle 1 = m\angle 4$ × ⇑ ⇓	7. Given ×
8. $m\angle 2 = m\angle 5$ × ⇑ ⇓	8. Substitution ×

QED?

V. Proofs Completed Quiz

Name: [redacted] **Date:** 11/5/19 **Period:** _______ **Quiz #**_____

Two-Column Proofs - Properties of Equality, Points (2.1 – 2.7), Line Segment Congruence

1. State whether each sentence is *always*, *sometimes*, or *never* true. If it is not always true, then give a *counterexample*:

a. The sky is blue right now. sometimes – Is the sky blue at 12:00 pm Est

b. If I hate apples, then I love oranges. Sometimes – I hate apples but I can also hate oranges but like bananas

c. A square is a rectangle. always

2. State the postulate that proves each statement true (give the *entire* postulate and its name).

a. If A = B, then A + 1 = B + 1. True – Addiation Property of Eavality

b. If $A \cong B$ and $B \cong C$, then $A \cong C$. True – Transitive Property of ~~Eavality~~ Congruence

-1

c. If Y is the midpoint of $\overline{XZ}$, then $\overline{XY} \cong \overline{YZ}$. – midpoint thereom

d. 6(*x* + 4) = 6*x* + 24. – Distriputive P.O.E. Property of Equality!

e. If 10 = *x*, then *x* = 10. – Symmeric P.O.E Property of Equality

3. **Given:** A = B ; B = C
Prove: A + C = B + B

Statement	Reason
1) A = B ; B = C	1) given
2) a = c a = c	2) Transitive Property of Equality
3) A + B = B + C	3) addiction Property of Eavality
4) A + C = B + B	4) Substitution Property of Equality

4. **Given:** $6 = 4x - 2$
Prove: $x = 2$!!?

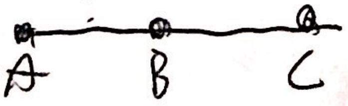
Statement	reason
1) $6=4x-2$	1) given
2) $6 = 4x - 2$ $+2 \quad +2$	2) Addiotion property of Equality
3) $\frac{8}{4} = \frac{4y}{4}$	3) Division Property of Equality
4) $2 = x$	4) reflexive P.O.E
5) $x = 2$	5) symmetric POE

5. **Given:** Y is the midpoint of $\overline{XZ}$
Prove: XY = YZ (**these are *lengths*, not *segments*!)

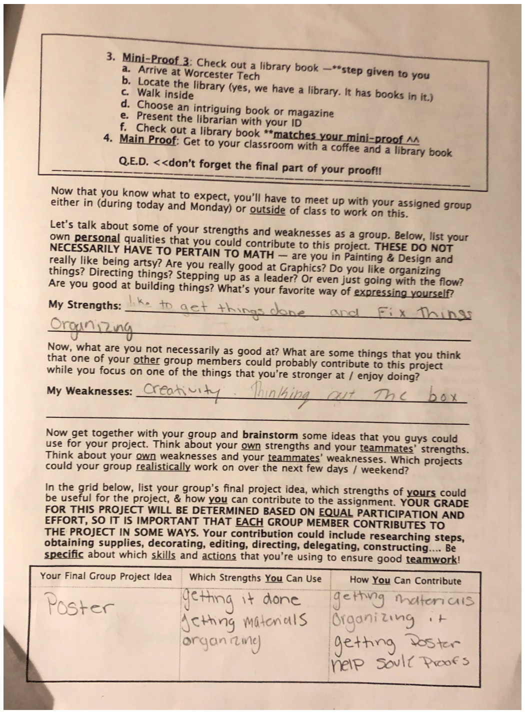
Statement	reason
1) Y=midpoin	1) given
2) $\overline{XY} \cong \overline{YZ}$	2) midpoint theoram
3) XY=YZ	3) Definition of conruence

6. **Given:** *A*, *B*, and *C* are non-collinear points
Prove: $\overline{AB}$ and $\overline{BC}$ intersect in plane *ABC*

Statement	reason
1) A B, C noncollinear	1) given
2) A B and make ABC plane	2) Post. 2.2 - through any 3 non-collinear points (A, B, C), there is exactly one plane (ABC)
3) A & B make $\overline{AB}$	3) 2.1 —
4) B and c make $\overline{BC}$	4) Same as above
5) $\overline{AB}$ lies in plane ABC	5) 2.5 —
6) $\overline{BC}$ lies in plane ABC	6) Same as above
7) $\overline{AB}$ $\overline{BC}$ intersect in plane ABC	7) Postulate 2.6 - $\overline{AB}$ and $\overline{BC}$ intersect, so their intersection is exactly one point (B)



VI. – XI. Student Proofs Project Work



3. **Mini-Proof 3**: Check out a library book —**step given to you**
   a. Arrive at Worcester Tech
   b. Locate the library (yes, we have a library. It has books in it.)
   c. Walk inside
   d. Choose an intriguing book or magazine
   e. Present the librarian with your ID
   f. Check out a library book **matches your mini-proof ^^**
4. **Main Proof**: Get to your classroom with a coffee and a library book

Q.E.D. <<don't forget the final part of your proof!!

Now that you know what to expect, you'll have to meet up with your assigned group either in (during today and Monday) or outside of class to work on this.

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My Strengths: like to get things done and Fix Things Organizing

Now, what are you not necessarily as good at? What are some things that you think that one of your other group members could probably contribute to this project while you focus on one of the things that you're stronger at / enjoy doing?

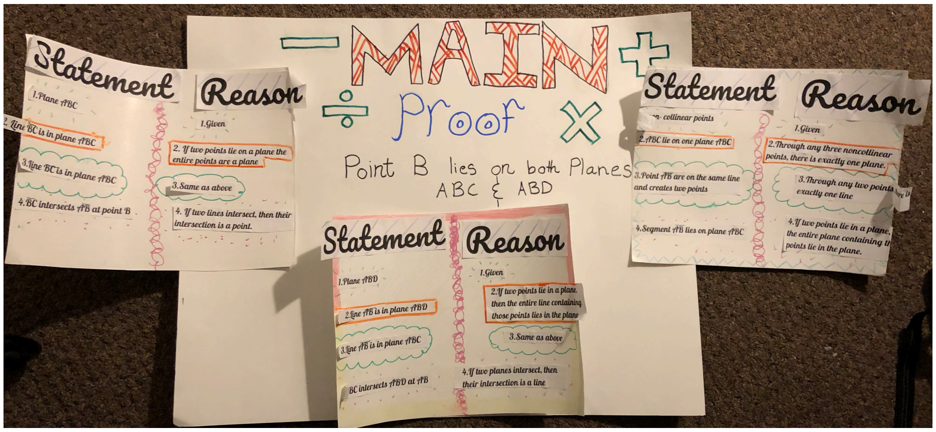
My Weaknesses: Creativity. Thinking out The box

Now get together with your group and **brainstorm** some ideas that you guys could use for your project. Think about your own strengths and your teammates' strengths. Think about your own weaknesses and your teammates' weaknesses. Which projects could your group realistically work on over the next few days / weekend?

In the grid below, list your group's final project idea, which strengths of **yours** could be useful for the project, & how **you** can contribute to the assignment. **YOUR GRADE FOR THIS PROJECT WILL BE DETERMINED BASED ON EQUAL PARTICIPATION AND EFFORT, SO IT IS IMPORTANT THAT EACH GROUP MEMBER CONTRIBUTES TO THE PROJECT IN SOME WAYS. Your contribution could include researching steps, obtaining supplies, decorating, editing, directing, delegating, constructing….** Be **specific** about which skills and actions that you're using to ensure good **teamwork**!

Your Final Group Project Idea	Which Strengths **You** Can Use	How **You** Can Contribute
Poster	getting it done getting materials organizing	getting materials Organizing it getting Poster help soulc Proofs

---

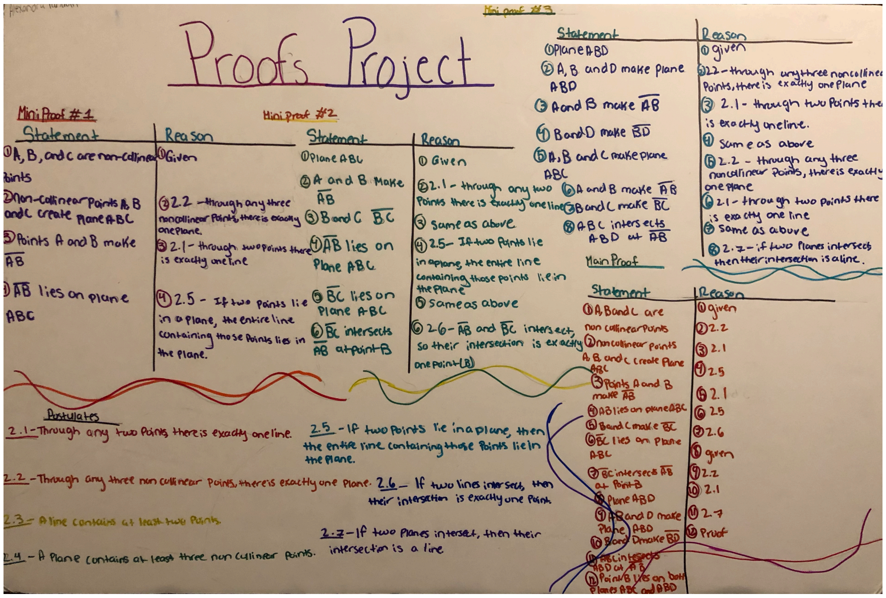


Point B lies on both Planes ABC & ABD

Statement	Reason
1.Plane ABC	1.Given
2. Line BC is in plane ABC	2. If two points lie on a plane the entire points are a plane
3.Line BC is in plane ABC	3.Same as above
4.$\overline{BC}$ intersects $\overline{AB}$ at point B	4. If two lines intersect, then their intersection is a point.

Statement	Reason
1.Plane ABD	1.Given
2.Line AB is in plane ABD	2.If two points lie in a plane, then the entire line containing those points lies in the plane
3.Line AB is in plane ABC	3.Same as above
BC intersects ABD at AB	4.If two planes intersect, then their intersection is a line

Statement	Reason
n- collinear points	1.Given
2.ABC lie on one plane ABC	2.Through any three noncollinear points, there is exactly one plane.
3.Point AB are on the same line and creates two points	3.Through any two points, there is exactly one line
4.Segment $\overline{AB}$ lies on plane ABC	4.If two points lie in a plane, the entire plane containing th points lie in the plane.



Alexandra

Proofs Project

Mini Proof #1

Statement	Reason
① A, B, and C are non-collinear points	① Given
② non-collinear points A, B and C create plane ABC	② 2.2 – through any three noncollinear points, there is exactly one plane.
③ Points A and B make $\overline{AB}$	③ 2.1 – through two points there is exactly one line
④ $\overline{AB}$ lies on plane ABC	④ 2.5 – If two points lie in a plane, the entire line containing those points lies in the plane.

Mini Proof #2

Statement	Reason
① Plane ABC	① Given
② A and B make $\overline{AB}$	② 2.1 – through any two points there is exactly one line
③ B and C $\overline{BC}$	③ same as above
④ $\overline{AB}$ lies on Plane ABC	④ 2.5 – If two points lie in a plane, the entire line containing those points lie in the plane
⑤ $\overline{BC}$ lies on Plane ABC	⑤ same as above
⑥ $\overline{BC}$ intersects $\overline{AB}$ at point B	⑥ 2.6 – $\overline{AB}$ and $\overline{BC}$ intersect, so their intersection is exactly one point (B)

Mini proof #3

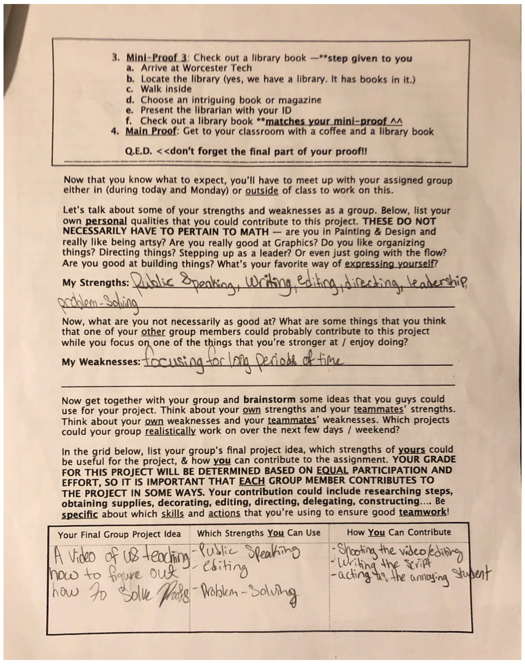
Statement	Reason
① Plane ABD	① given
② A, B and D make plane ABD	② 2.2 – through any three noncollinear points, there is exactly one plane
③ A and B make $\overline{AB}$	③ 2.1 – through two points there is exactly one line.
④ B and D make $\overline{BD}$	④ same as above
⑤ A, B and C make plane ABC	⑤ 2.2 – through any three noncollinear points, there is exactly one plane
⑥ A and B make $\overline{AB}$	⑥ 2.1 – through two points there is exactly one line
⑦ B and C make $\overline{BC}$	⑦ same as above
⑧ ABC intersects ABD at $\overline{AB}$	⑧ 2.7 – if two planes intersect then their intersection is a line.

Main Proof

Statement	Reason
① A, B and C are non collinear points	① given
② non collinear points A, B and C create Plane ABC	② 2.2
③ Points A and B make $\overline{AB}$	③ 2.1
④ AB lies on plane ABC	④ 2.5
⑤ B and C make $\overline{BC}$	⑤ 2.1
⑥ $\overline{BC}$ lies on Plane ABC	⑥ 2.5
⑦ $\overline{BC}$ intersects $\overline{AB}$ at Point B	⑦ 2.6
⑧ Plane ABD	⑧ given
⑨ A B and D make Plane ABD	⑨ 2.2
⑩ B and D make $\overline{BD}$	⑩ 2.1
⑪ ABC intersects ABD at $\overline{AB}$	⑪ 2.7
⑫ Point B lies on both Planes ABC and ABD	⑫ Proof

Postulates

2.1 – Through any two points there is exactly one line.
2.2 – Through any three non collinear points, there is exactly one plane.
2.3 – A line contains at least two points.
2.4 – A plane contains at least three non collinear points.
2.5 – If two points lie in a plane, then the entire line containing those points lie in the plane.
2.6 – If two lines intersect, then their intersection is exactly one point.
2.7 – If two planes intersect, then their intersection is a line.



3. **Mini-Proof 3**: Check out a library book —**step given to you**
   a. Arrive at Worcester Tech
   b. Locate the library (yes, we have a library. It has books in it.)
   c. Walk inside
   d. Choose an intriguing book or magazine
   e. Present the librarian with your ID
   f. Check out a library book **matches your mini-proof ^^**
4. **Main Proof**: Get to your classroom with a coffee and a library book

Q.E.D. <<don't forget the final part of your proof!!

Now that you know what to expect, you'll have to meet up with your assigned group either in (during today and Monday) or outside of class to work on this.

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My Strengths: Public Speaking, Writing, editing, directing, leadership, problem-Solving

Now, what are you not necessarily as good at? What are some things that you think that one of your other group members could probably contribute to this project while you focus on one of the things that you're stronger at / enjoy doing?

My Weaknesses: focusing for long periods of time

Now get together with your group and **brainstorm** some ideas that you guys could use for your project. Think about your own strengths and your teammates' strengths. Think about your own weaknesses and your teammates' weaknesses. Which projects could your group realistically work on over the next few days / weekend?

In the grid below, list your group's final project idea, which strengths of **yours** could be useful for the project, & how **you** can contribute to the assignment. **YOUR GRADE FOR THIS PROJECT WILL BE DETERMINED BASED ON EQUAL PARTICIPATION AND EFFORT, SO IT IS IMPORTANT THAT EACH GROUP MEMBER CONTRIBUTES TO THE PROJECT IN SOME WAYS. Your contribution could include researching steps, obtaining supplies, decorating, editing, directing, delegating, constructing….** Be **specific** about which skills and actions that you're using to ensure good **teamwork**!

Your Final Group Project Idea	Which Strengths **You** Can Use	How **You** Can Contribute
A Video of us teaching how to figure out how to Solve Proofs	- Public Speaking - editing - Problem-Solving	- Shooting the video/editing - Writing the Script - acting as the annoying Student

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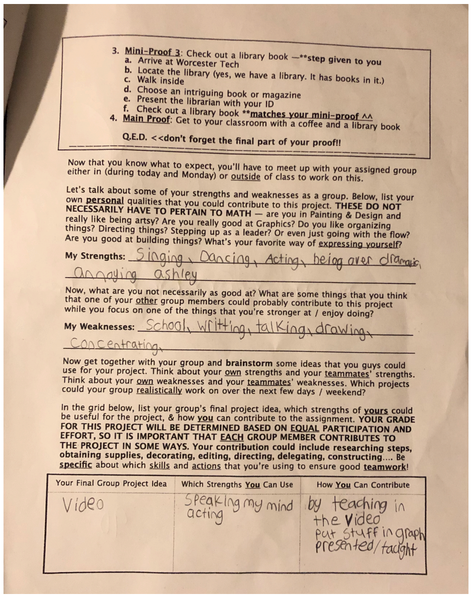

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   d. Choose an intriguing book or magazine
   e. Present the librarian with your ID
   f. Check out a library book **matches your mini-proof ^^**
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My Strengths: Singing, Dancing, Acting, beiag over dramatic, annoying ashley

Now, what are you not necessarily as good at? What are some things that you think that one of your other group members could probably contribute to this project while you focus on one of the things that you're stronger at / enjoy doing?

My Weaknesses: School, writting, talKing, drawing, concentrating,

Now get together with your group and **brainstorm** some ideas that you guys could use for your project. Think about your own strengths and your teammates' strengths. Think about your own weaknesses and your teammates' weaknesses. Which projects could your group realistically work on over the next few days / weekend?

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Your Final Group Project Idea	Which Strengths **You** Can Use	How **You** Can Contribute
Video	SpeakIng my mind acting	by teaching in the Video put stuff in graph presented/taught

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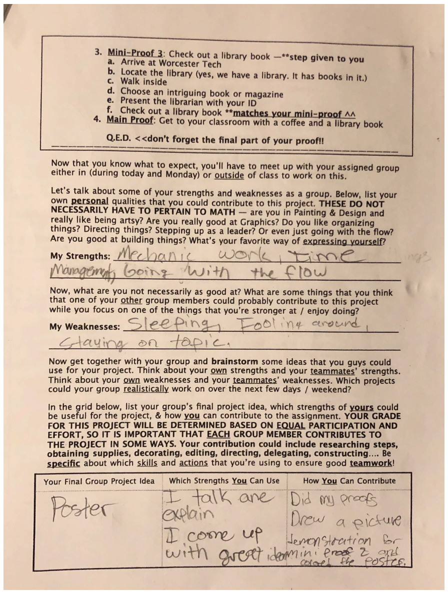

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My Strengths: Mechanic work, Time Management, Going with the flow

Now, what are you not necessarily as good at? What are some things that you think that one of your other group members could probably contribute to this project while you focus on one of the things that you're stronger at / enjoy doing?

My Weaknesses: Sleeping, Fooling around, staying on topic.

Now get together with your group and **brainstorm** some ideas that you guys could use for your project. Think about your own strengths and your teammates' strengths. Think about your own weaknesses and your teammates' weaknesses. Which projects could your group realistically work on over the next few days / weekend?

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Your Final Group Project Idea	Which Strengths **You** Can Use	How **You** Can Contribute
Poster	I talk and explain I come up with great ideas	Did my proofs Drew a picture demonstration for mini proof 2 and colored the poster.

I. Quiz – Distance Formula

GEOMETRY: SO. 1–13, 5–9 Name________________________________ ID: 1

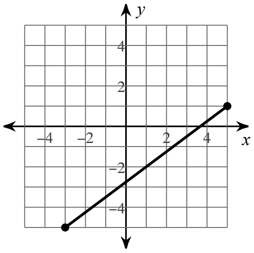
QUIZ 1.3 – 1.5

Date________________ Section____ Quiz #______

1) The distance formula is:

Find the distance between each pair of points. Give both EXACT and APPROXIMATE values.

2)

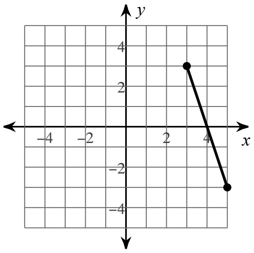


3) $(-1, -1),\ (-5, 3)$

4) The midpoint formula is $(xm, ym) =$

Find the midpoint of each pair of points.

5)



6) $(-2, 12),\ (7, 1)$

Given an Endpoint G and the Midpoint M, find the other Endpoint H for each segment GH.

7) Endpoint: $G(7, -3)$, Midpoint: $M(8, -3)$

8) Endpoint: $G(5, 1)$, Midpoint: $M(6, 8)$

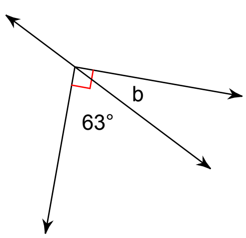
Draw and label the angle described.

9) a straight angle, $\angle LMN$

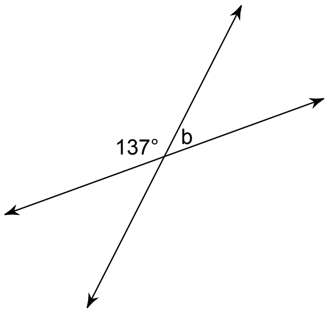
10) an acute angle, $\angle CDE$

Find the measure of angle b.

11)

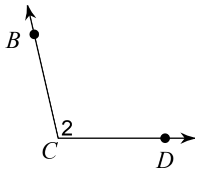


12)

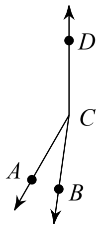


Label the angle at least 3 different ways.

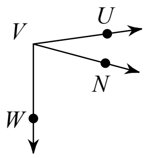
13)



14) Find $m\angle ACD$ if $m\angle BCA = 22°$ and $m\angle BCD = 172°$.



15) $m\angle UVW = 98°$, $m\angle NVW = x + 85$, and $m\angle UVN = x + 33$. Find $m\angle NVW$.



II. Exam – Distance Formula

GEOMETRY: SO. 1–13, 5–9

Name____________________________________ ID: 1

TEST 1.1 – 1.6

Date________________ Section____ Exam #______

1) The distance formula is:

2) The midpoint formula is $(xm, ym) =$

3) Find the distance between AB:
A$(-1, -1)$, B$(-5, 3)$

4) Find the Midpoint, M, of CD:
C$(-4, 10)$, D$(-12, -12)$

5) Given: Line segment GH,
Endpoint G$(2, 7)$, Midpoint M$(8, 1)$

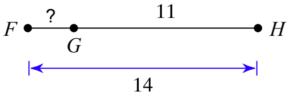
Find: the other Endpoint, H

~ Key Vocabulary: Midpoint, Endpoint ~

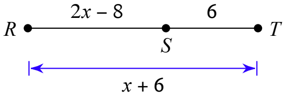
Find the missing lengths. What are the NAMES of these missing line segments?

~ Key Vocabulary: Line Segment (naming), Addition Postulate ~

6)



7)



Draw and LABEL the figure described. What do you KNOW about the points?

~ Key Vocabulary: Acute, Obtuse, Right, Straight, Angle (naming), Plane, Coplanar ~

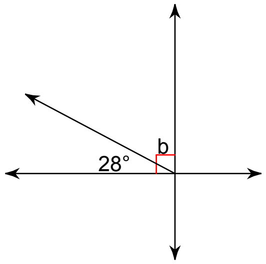
8) a right angle, $\angle TUV$

9) Plane ABC

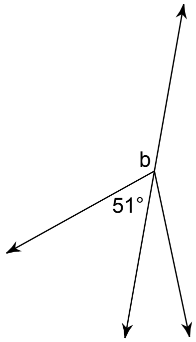
Find the measure of angle b. Which KINDS of relationships are represented?

~ Key Vocabulary: Complementary, Supplementary, Vertical Pairs, Linear Pairs ~

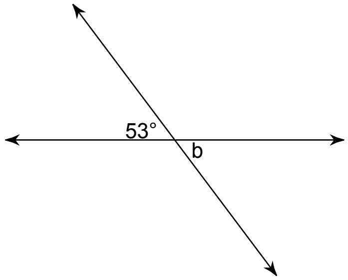
10)



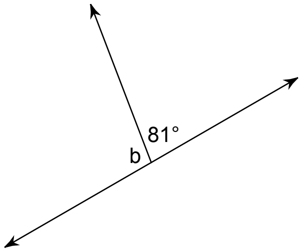
11)



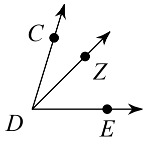
12)



13)



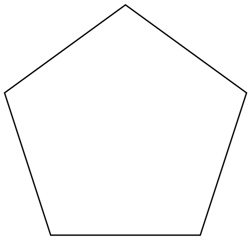
14) $m\angle CDE = 8x - 7$, $m\angle CDZ = 28°$, and $m\angle ZDE = 5x - 5$. Find $m\angle ZDE$.



Is this polygon regular? Name & ANNOTATE it and state its properties.

~ Key Vocabulary: Regular, Equiangular, Equilateral, Concave, Convex ~

15)



III. Proofs Quiz

Name: ______________________________ Date: __________ Period: _______ Quiz #_____

<u>Two-Column Proofs</u> - Properties of Equality, Points (2.1 – 2.7), Line Segment Congruence

1. State whether each sentence is *always*, *sometimes*, or *never* true. If it is not always true, then give a *<u>counterexample</u>*:

a. The sky is blue right now.

b. If I hate apples, then I love oranges.

c. A square is a rectangle.

2. State the postulate that proves each statement true (give the *entire* postulate <u>and</u> its name).

a. If A = B, then A + 1 = B + 1.

b. If $A \cong B$ and $B \cong C$, then $A \cong C$.

c. If *Y* is the midpoint of $\overline{XZ}$, then $\overline{XY} \cong \overline{YZ}$.

d. 6(*x* + 4) = 6*x* + 24.

e. If 10 = *x*, then *x* = 10.

3. **Given:** A = B ; B = C
Prove: A + B = C + C

Statement	Reason
1)	1)
2)	2) Transitive Property of Equality
3) A + B = C + B	3)
4)	4) Substitution Property of Equality

4. **Given:** $6 = 4x - 2$
Prove: $x = 2$

1)	1)
2) $6 = 4x - 2$ $+2 \quad\quad +2$	2)
3)	3) Division Property of Equality
4) $2 = x$	4)
5)	5)

5. **Given:** Y is the midpoint of $\overline{XZ}$
Prove: XY = YZ (**these are *lengths*, <u>not</u> *segments*!)

1)	1)
2) $\overline{XY} \cong \overline{YZ}$	2)
3)	3)

6. **Given:** *A*, *B*, and *C* are non-collinear points
Prove: $\overline{AB}$ and $\overline{BC}$ intersect in plane *ABC*

1)	1)
2)	2) <u>Post. 2.2</u> - through any 3 non-collinear points (A, B, C), there is exactly one plane (ABC)
3) A & B make $\overline{AB}$	3)
4)	4) Same as above
5) $\overline{AB}$ lies in plane ABC	5)
6)	6) Same as above
7)	7) <u>Postulate 2.6</u> - $\overline{AB}$ and $\overline{BC}$ intersect, so their intersection is exactly one point (B)

IV. Transversals & Transformations Quiz

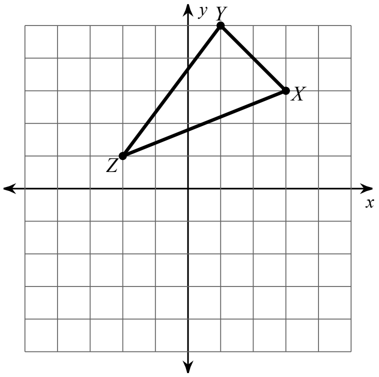
Geometry Name__________________________________ ID: 1

QUIZ - Transformations, Transversals

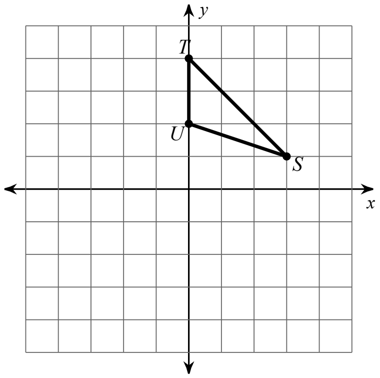
Date________________ Period____ Quiz #______

GRAPH the image of the figure using the transformation given.

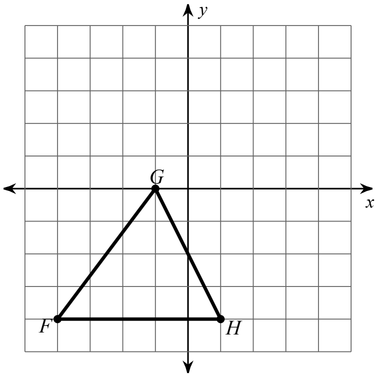
1) rotation 180° about the origin



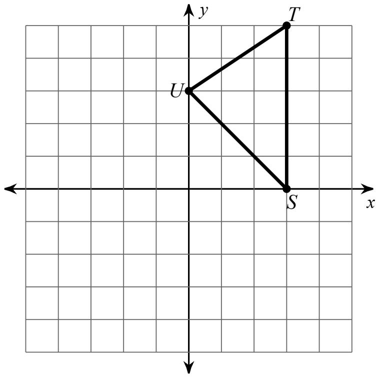
2) reflection across $x = 2$



3) translation: 2 units right

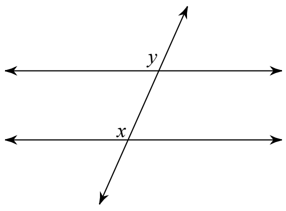


4) reflection across the y-axis

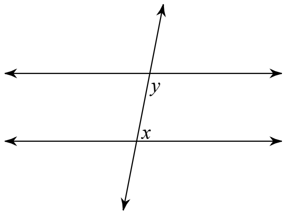


IDENTIFY each pair of angles as corresponding, alternate interior, alternate exterior, vertical, or consecutive interior. Is each pair CONGRUENT or SUPPLEMENTARY?

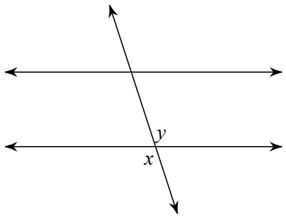
5)



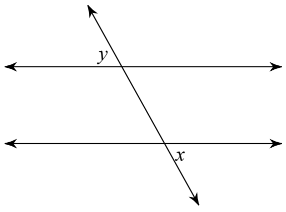
6)



7)

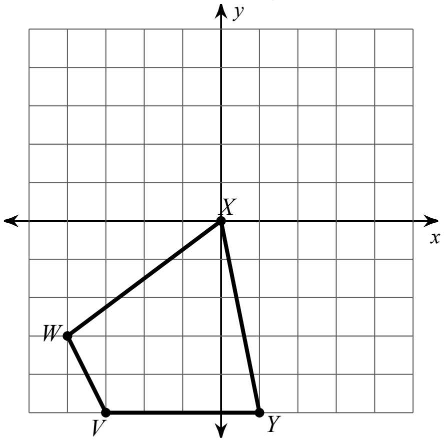


8)

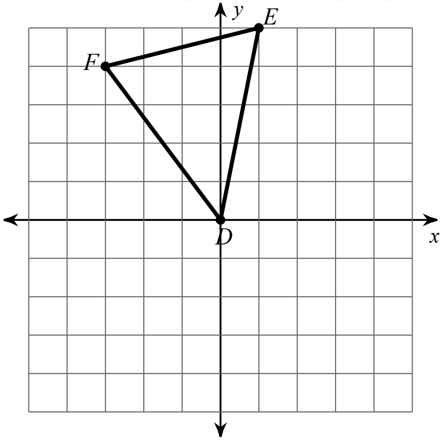


LIST THE COORDINATES of the vertices of each figure after the given transformation.

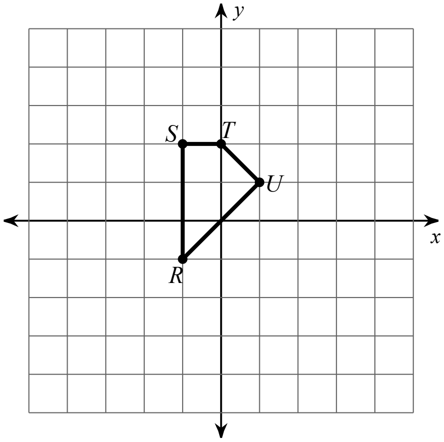
9) reflection across the y-axis



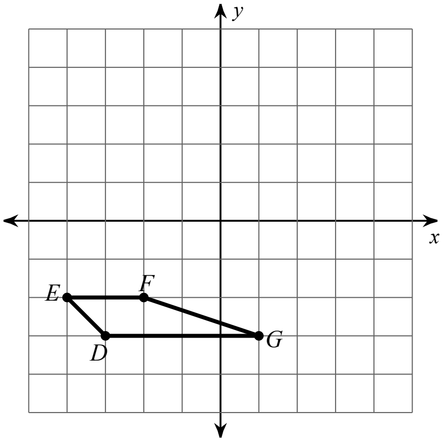
10) translation: 2 units left and 5 units down



11) dilation of 2 about the origin

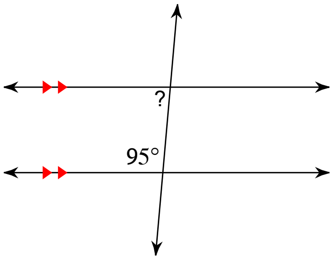


12) rotation 180° about the origin

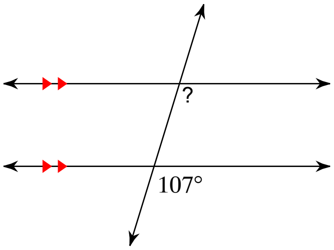


Find the MEASURE of EACH MISSING ANGLE (do NOT just solve for x!).

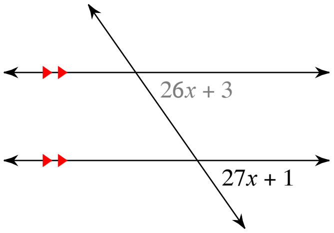
13)



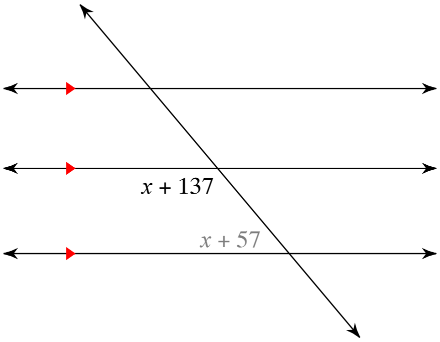
14)



15)



16)



V. Algebra I Radicals Pop Quiz

Name: ______________________________ Class: _______ Date: ________ Quiz #_____

Pop Quiz - Approximating Radicals

1. Find the closest *integers* to $\sqrt{11}$

$\_\_\_\_\_\_ < \sqrt{11} < \_\_\_\_\_\_$

2. Find $\sqrt{11}$ to the nearest tenth

3. Find $2\sqrt{11}$ to the nearest tenth

4. Find $\frac{4+2\sqrt{11}}{2}$ to the nearest tenth

5. Find $\sqrt{140}$ to the *nearest whole number*

Name: ______________________________ Class: _______ Date: ________ Quiz #_____

Pop Quiz - Approximating Radicals

1. Find the closest *integers* to $\sqrt{11}$

$\_\_\_\_\_\_ < \sqrt{11} < \_\_\_\_\_\_$

2. Find $\sqrt{11}$ to the nearest tenth

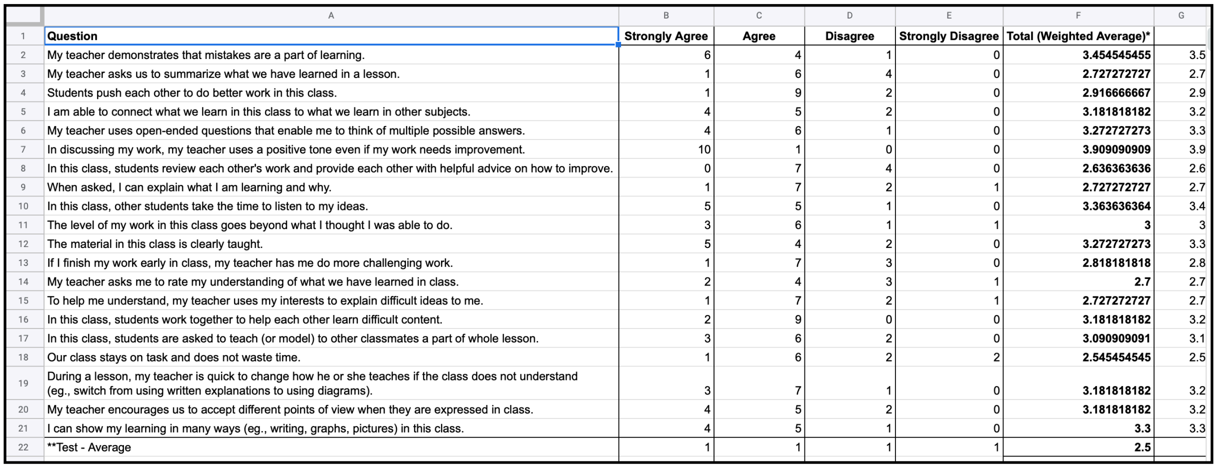
3. Find $2\sqrt{11}$ to the nearest tenth

4. Find $\frac{4+2\sqrt{11}}{2}$ to the nearest tenth

5. Find $\sqrt{140}$ to the *nearest whole number*

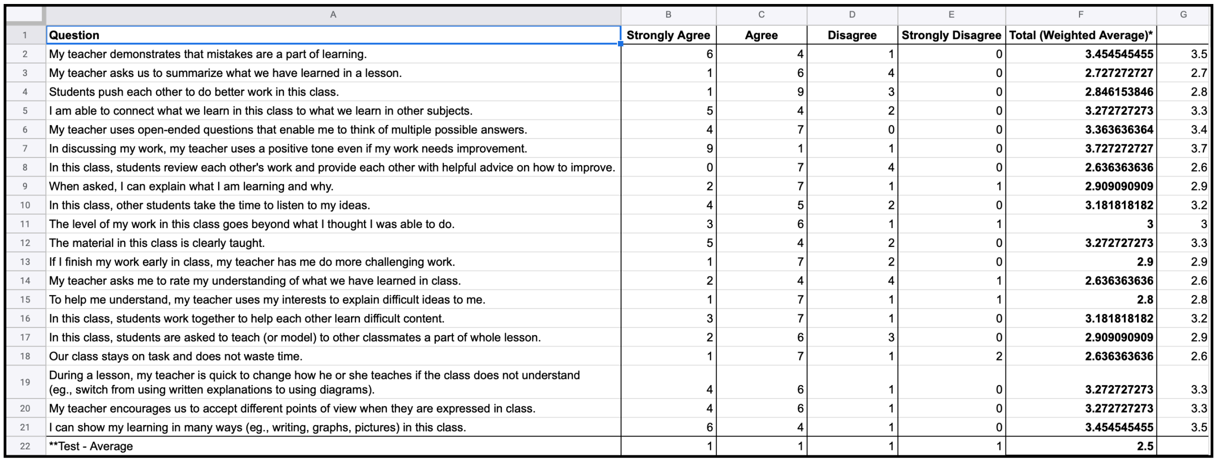
Appendix D

I. SO. 5–9



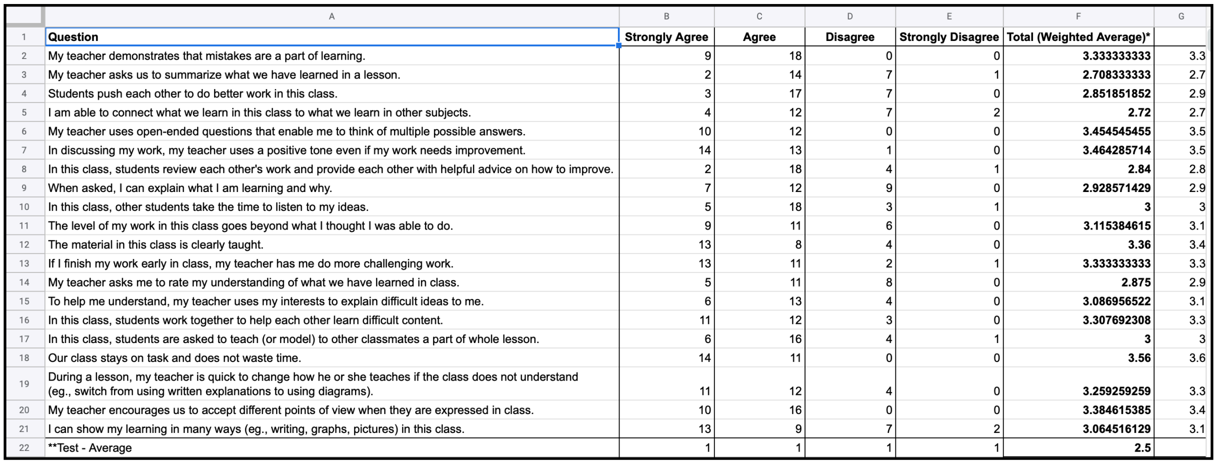
	A	B	C	D	E	F	G
1	**Question**	**Strongly Agree**	**Agree**	**Disagree**	**Strongly Disagree**	**Total (Weighted Average)***	
2	My teacher demonstrates that mistakes are a part of learning.	6	4	1	0	**3.454545455**	3.5
3	My teacher asks us to summarize what we have learned in a lesson.	1	6	4	0	**2.727272727**	2.7
4	Students push each other to do better work in this class.	1	9	2	0	**2.916666667**	2.9
5	I am able to connect what we learn in this class to what we learn in other subjects.	4	5	2	0	**3.181818182**	3.2
6	My teacher uses open-ended questions that enable me to think of multiple possible answers.	4	6	1	0	**3.272727273**	3.3
7	In discussing my work, my teacher uses a positive tone even if my work needs improvement.	10	1	0	0	**3.909090909**	3.9
8	In this class, students review each other's work and provide each other with helpful advice on how to improve.	0	7	4	0	**2.636363636**	2.6
9	When asked, I can explain what I am learning and why.	1	7	2	1	**2.727272727**	2.7
10	In this class, other students take the time to listen to my ideas.	5	5	1	0	**3.363636364**	3.4
11	The level of my work in this class goes beyond what I thought I was able to do.	3	6	1	1	**3**	3
12	The material in this class is clearly taught.	5	4	2	0	**3.272727273**	3.3
13	If I finish my work early in class, my teacher has me do more challenging work.	1	7	3	0	**2.818181818**	2.8
14	My teacher asks me to rate my understanding of what we have learned in class.	2	4	3	1	**2.7**	2.7
15	To help me understand, my teacher uses my interests to explain difficult ideas to me.	1	7	2	1	**2.727272727**	2.7
16	In this class, students work together to help each other learn difficult content.	2	9	0	0	**3.181818182**	3.2
17	In this class, students are asked to teach (or model) to other classmates a part of whole lesson.	3	6	2	0	**3.090909091**	3.1
18	Our class stays on task and does not waste time.	1	6	2	2	**2.545454545**	2.5
19	During a lesson, my teacher is quick to change how he or she teaches if the class does not understand (eg., switch from using written explanations to using diagrams).	3	7	1	0	**3.181818182**	3.2
20	My teacher encourages us to accept different points of view when they are expressed in class.	4	5	2	0	**3.181818182**	3.2
21	I can show my learning in many ways (eg., writing, graphs, pictures) in this class.	4	5	1	0	**3.3**	3.3
22	**Test - Average	1	1	1	1	**2.5**	

II. SO. 1–13



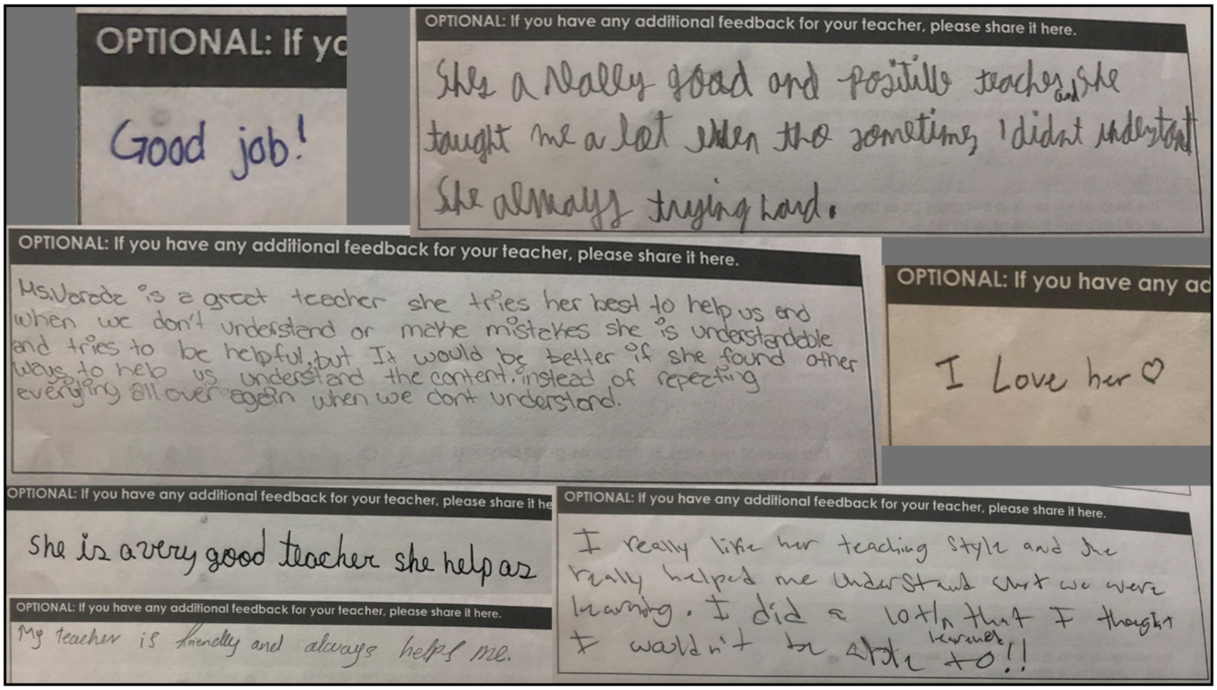
	A	B	C	D	E	F	G
1	**Question**	**Strongly Agree**	**Agree**	**Disagree**	**Strongly Disagree**	**Total (Weighted Average)***	
2	My teacher demonstrates that mistakes are a part of learning.	6	4	1	0	**3.454545455**	3.5
3	My teacher asks us to summarize what we have learned in a lesson.	1	6	4	0	**2.727272727**	2.7
4	Students push each other to do better work in this class.	1	9	3	0	**2.846153846**	2.8
5	I am able to connect what we learn in this class to what we learn in other subjects.	5	4	2	0	**3.272727273**	3.3
6	My teacher uses open-ended questions that enable me to think of multiple possible answers.	4	7	0	0	**3.363636364**	3.4
7	In discussing my work, my teacher uses a positive tone even if my work needs improvement.	9	1	1	0	**3.727272727**	3.7
8	In this class, students review each other's work and provide each other with helpful advice on how to improve.	0	7	4	0	**2.636363636**	2.6
9	When asked, I can explain what I am learning and why.	2	7	1	1	**2.909090909**	2.9
10	In this class, other students take the time to listen to my ideas.	4	5	2	0	**3.181818182**	3.2
11	The level of my work in this class goes beyond what I thought I was able to do.	3	6	1	1	**3**	3
12	The material in this class is clearly taught.	5	4	2	0	**3.272727273**	3.3
13	If I finish my work early in class, my teacher has me do more challenging work.	1	7	2	0	**2.9**	2.9
14	My teacher asks me to rate my understanding of what we have learned in class.	2	4	4	1	**2.636363636**	2.6
15	To help me understand, my teacher uses my interests to explain difficult ideas to me.	1	7	1	1	**2.8**	2.8
16	In this class, students work together to help each other learn difficult content.	3	7	1	0	**3.181818182**	3.2
17	In this class, students are asked to teach (or model) to other classmates a part of whole lesson.	2	6	3	0	**2.909090909**	2.9
18	Our class stays on task and does not waste time.	1	7	1	2	**2.636363636**	2.6
19	During a lesson, my teacher is quick to change how he or she teaches if the class does not understand (eg., switch from using written explanations to using diagrams).	4	6	1	0	**3.272727273**	3.3
20	My teacher encourages us to accept different points of view when they are expressed in class.	4	6	1	0	**3.272727273**	3.3
21	I can show my learning in many ways (eg., writing, graphs, pictures) in this class.	6	4	1	0	**3.454545455**	3.5
22	**Test - Average	1	1	1	1	**2.5**	

III. FR. 2–10



	A	B	C	D	E	F	G
1	**Question**	**Strongly Agree**	**Agree**	**Disagree**	**Strongly Disagree**	**Total (Weighted Average)***	
2	My teacher demonstrates that mistakes are a part of learning.	9	18	0	0	**3.333333333**	3.3
3	My teacher asks us to summarize what we have learned in a lesson.	2	14	7	1	**2.708333333**	2.7
4	Students push each other to do better work in this class.	3	17	7	0	**2.851851852**	2.9
5	I am able to connect what we learn in this class to what we learn in other subjects.	4	12	7	2	**2.72**	2.7
6	My teacher uses open-ended questions that enable me to think of multiple possible answers.	10	12	0	0	**3.454545455**	3.5
7	In discussing my work, my teacher uses a positive tone even if my work needs improvement.	14	13	1	0	**3.464285714**	3.5
8	In this class, students review each other's work and provide each other with helpful advice on how to improve.	2	18	4	1	**2.84**	2.8
9	When asked, I can explain what I am learning and why.	7	12	9	0	**2.928571429**	2.9
10	In this class, other students take the time to listen to my ideas.	5	18	3	1	**3**	3
11	The level of my work in this class goes beyond what I thought I was able to do.	9	11	6	0	**3.115384615**	3.1
12	The material in this class is clearly taught.	13	8	4	0	**3.36**	3.4
13	If I finish my work early in class, my teacher has me do more challenging work.	13	11	2	1	**3.333333333**	3.3
14	My teacher asks me to rate my understanding of what we have learned in class.	5	11	8	0	**2.875**	2.9
15	To help me understand, my teacher uses my interests to explain difficult ideas to me.	6	13	4	0	**3.086956522**	3.1
16	In this class, students work together to help each other learn difficult content.	11	12	3	0	**3.307692308**	3.3
17	In this class, students are asked to teach (or model) to other classmates a part of whole lesson.	6	16	4	1	**3**	3
18	Our class stays on task and does not waste time.	14	11	0	0	**3.56**	3.6
19	During a lesson, my teacher is quick to change how he or she teaches if the class does not understand (eg., switch from using written explanations to using diagrams).	11	12	4	0	**3.259259259**	3.3
20	My teacher encourages us to accept different points of view when they are expressed in class.	10	16	0	0	**3.384615385**	3.4
21	I can show my learning in many ways (eg., writing, graphs, pictures) in this class.	13	9	7	2	**3.064516129**	3.1
22	**Test - Average	1	1	1	1	**2.5**	

IV. Comments



OPTIONAL: If yo

Good job!

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

Shes a really good and positive teacher and she taught me a lot even tho sometimes I didnt understand She always trying hard.

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

Ms.Varada is a great teacher she tries her best to help us and when we don't understand or make mistakes she is understandable and tries to be helpful, but It would be better if she found other ways to help us understand the content. instead of repeating everyting all over again when we dont understand.

OPTIONAL: If you have any ac

I Love her ♡

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

She is a very good teacher she help us

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

My teacher is friendly and always helps me.

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

I really like her teaching style and she really helped me understand what we were learning. I did a lot learned that I thought I wouldn't be able to!!

I. CRT Goal Ideas

STEM
Education
Center

STEM for ALL PD
Strategy Suggestions

Adapted from Culturally Responsive Teaching & the Brain by Zaretta Hammond

Helping Students to Become Independent Learners

1. Students track their own progress towards learning
2. Give students tools to check and correct their own work
3. Make sure there is a space at school students can keep tracking documents
4. Develop space in school for students to process/debrief how they best learned/struggled with new content/skills
5. Make sure feedback is usable/actionable without being prescriptive
6. Review who has a fixed mindset vs. a growth mindset and actively demonstrate how to grow from failure/mistakes
7. Call out times that students demonstrate academic mindsets in class
8. Make sure topics students are struggling with are taught in class not just as homework (ex. Vocabulary)

Deepening Community in Class

1. Regularly tell students they belong in your STEM class (we are a team, learning together)
2. Have students share the assets they bring to the table at the beginning of group work including those assets that originally appear to be outside of academic assets
3. Help students interrupt negative self-talk
4. Share pieces about your life
5. Get to know your student interests and regularly use those interests in problems/highlight when you use those interests in problems
6. Engage the community/parents/families as role models in learning and as sources for information

Teaching Practices

1. Share instructional responsibility
2. Flipped classrooms (content at home, practice and process during the day)
3. Build in processing time during the delivery of new content/skills (not just after) by:
    a. Having students relate content/skills to their own worlds and contexts
        i. 5 minute discussions about content throughout delivery
        ii. Build more intentional word problems
    b. Use and encourage students to use stories, songs, movement, spoken word, chants, rituals, and dialogic talk to deepen the brain's engagement with content/skills
    c. Use a series of questions each time new content/skills is delivered to help students learn to internalize (think cross cutting concepts)
        i. How is this new material connected to what I already know?
        ii. What are the natural relationships and patterns in the material?
        iii. How does it fit together? What larger system is it part of?
        iv. Whose point of view does it represent? How does it connect to the real world and/or my world?

4. Read diverse authors and show diverse images. Call out when textbooks are heavily filled with white male stories and images
5. Activate students' brains before delivering new content/skills in ways that engage feeling and visuals. For example:
    a. Call and response
    b. Music that indicates new content/skills is coming
    c. Provocations such as challenging puzzles, outrageous quotes, powerful images, emotional videos and stories
6. Redefine what it means to be good in STEM
7. Redefine STEM careers (to include making a difference) and expand what is considered a STEM career
8. Story-ify – help students create a narrative about the topic or process being presented
9. Game-ify (especially useful when reviewing information) Ex: Quick competitions
10. Socialize – organize learning so students rely on each other
11. Hands-on experiences
12. Increase the use of visuals
13. Explain content/skills using some metaphors and analogies to connect content/skills to real world/student lives
14. Use wordplay and humor
15. Connect content/skills to everyday life
16. Give a problem at the beginning of delivering new content/skills and have students keep going back to that problem to practice applying content/skills throughout delivery
17. Talk about sociopolitical connections with content/skills/frame real world problems in a sociopolitical lens
18. Develop academic rituals that promote learning
    a. Start each class with a mindful minute to regroup
    b. Start each new content/skills area with a TED talk
    c. Bring in community wisdom moments from students' communities (ask parents for topics and read and discuss)
19. Teamwork where all are accountable for what is learned
    a. Have students share assets and help them redefine what is a strength
    b. Have students know they all have to be able to demonstrate competency in work
20. "Helping Trios" – students work in teams of three to share work/where they're at/their understanding and get feedback
21. "Chalk Talk" – silently students respond to essential questions around the room (written), building off each other
22. "World Café" – have students rotate through tables discussing essential questions and writing down pieces of the discussions
23. Regularly reflect on how you are having students access new content/skills through oral and written strategies
24. Regularly reflect on how you are having students access new content/skills through individual and collective work time
25. Purposely ensure that students have the opportunity to work with all students (group work).

II. My CRT Goals – Outline

Pick three to five teaching strategies informed by culturally responsive teaching and/or our work and learning around implicit bias that you want to implement on a regular basis in your teaching. Tell me what they are and how you plan to 1) implement them and 2) self-evaluate progress.

Identify what you want to do for your larger culturally responsive teaching goal. This should include what strategy you want to use (for example, making new content into a project), what content you want to insert this strategy into, what you would otherwise do to teach that content, and about when in the year this will occur.

First strategy:
(Deepening Community in Class); Have students share the assets that they bring to the table at the beginning of group work, including those assets that originally appear to be non-academic / outside of academic assets.
This strategy helps students to think about their previous experiences and things that they do all of the time that could help them to scaffold their own learning. They can think about how their own skills build on each other and apply to new ideas / concepts, not just mathematically.

1) **How I plan to implement it**: I can prepare a worksheet for group activities and / or edit the homework worksheet so that it includes one or two preliminary, individual questions about each student's view of their own strengths ("what they are good at"), which may not necessarily be math-related. I could also ask a question to get them thinking about future applications, such as about how they could apply these strengths to ideas that our lesson brought up. Even if I omit this secondary question, at least the students are in a better, more positive mental state and are more confident / prepared to learn & interact with their peers with a boosted mood / self-esteem throughout the remainder of the day / lesson / worksheet / activity / homework / project / application.
2) **Self-evaluation of progress:** If I notice that students are more interactive with one another or are even *designating* specific calculative / explaining / thinking / recording roles to their peers (which could also be a question on the worksheet, considering how this could possibly best be done, if at all), then I will have at least accomplished my job and made my students change the way that they approach and/or think about the assignment / group & participation / contribution aspect of the activity.

Second strategy:
(Helping Students to Become Independent Learners); Review who has a fixed mindset vs. a growth mindset, and actively demonstrate how to grow from failures / mistakes.
This strategy hones students in on exactly how to learn, allowing them to watch out for their own closed- / open-mindedness as well as to observe that of others. They can realize that gaining

knowledge relies heavily on *wanting* to gain knowledge, not just subconsciously absorbing or absentmindedly “listening to” / watching the lesson unfold; mistakes fuel our path to finding something that works, and trial and error only reach success when we stay determined & persistent, never giving up because we feel like it will not take us anywhere.

1) **How I plan to implement it**: I do not want students to waste their time doing problems that they do not know how to solve or doing them incorrectly, but I want to encourage practice. Thus, I can actively (and strongly / consistently) encourage that students ask for help, ask questions, and compare / confer with their peers when they are confused or unsure about how they are solving a problem. They can also come in for extra help with a teacher, especially after receiving a poor test score and/or noticing errors on their exams without understanding the corrections. Try to come in each day with the desire to understand, not just write things down or skim your way through our remaining assessments / wait it out until lunchtime! Math always builds upon itself and is always useful, even after the original lesson / unit assessment has passed!
2) **Self-evaluation of progress:** If I see that the students are asking questions of either myself or of their peers more often and/or are coming in / asking for extra help, and if I see that they are actively changing their mistakes that have been corrected on paper / during help sessions, or are at least attempting to alter their approach to changing things when they do not align with what I am mentioning in class or otherwise, then we are on the *path* to success! And to a new way of thinking & learning!

Third strategy:
(Teaching Practices); Give a problem at the beginning of delivering new content / skills, and have students keep going back to that problem to practice applying content / skills -- throughout lesson / unit delivery.
This strategy helps the students to visualize the scaffolds to multiple-step problems and to realize that they have actually learned something throughout the lesson, especially if they initially had no idea how to solve any of the steps for the problem (broken down), let alone the entire issue at once.

1) **How I plan to implement it**: I can give the students problems that are laid out step-by-step, with some of the basic step skills already covered a long time ago on their educations and/or in previous units, some of the skills up for review / previously learned yet covered in this unit, and with some of the final parts of the question to be covered in this lesson, and then applied to the worksheet. I can also do this overall with the questions in the worksheet, keeping them all related in general topic yet building upon each other in this manner.
2) **Self-evaluation of progress:** If students are easily applying their skills to the first few questions / parts and are somewhat solid on the middle pieces, yet definitely questioning the final parts, then I will know that they are able to complete the worksheet in the order intended. If they are able to complete the worksheet after the lesson, or are at least asking the teacher / their peers about it, then I have successfully scaffolded them up

until the point of new learning application! As long as their homework is actually completed the next day and they have gotten all of their questions out in class, as this is a layered activity that should fit with the lesson timely.

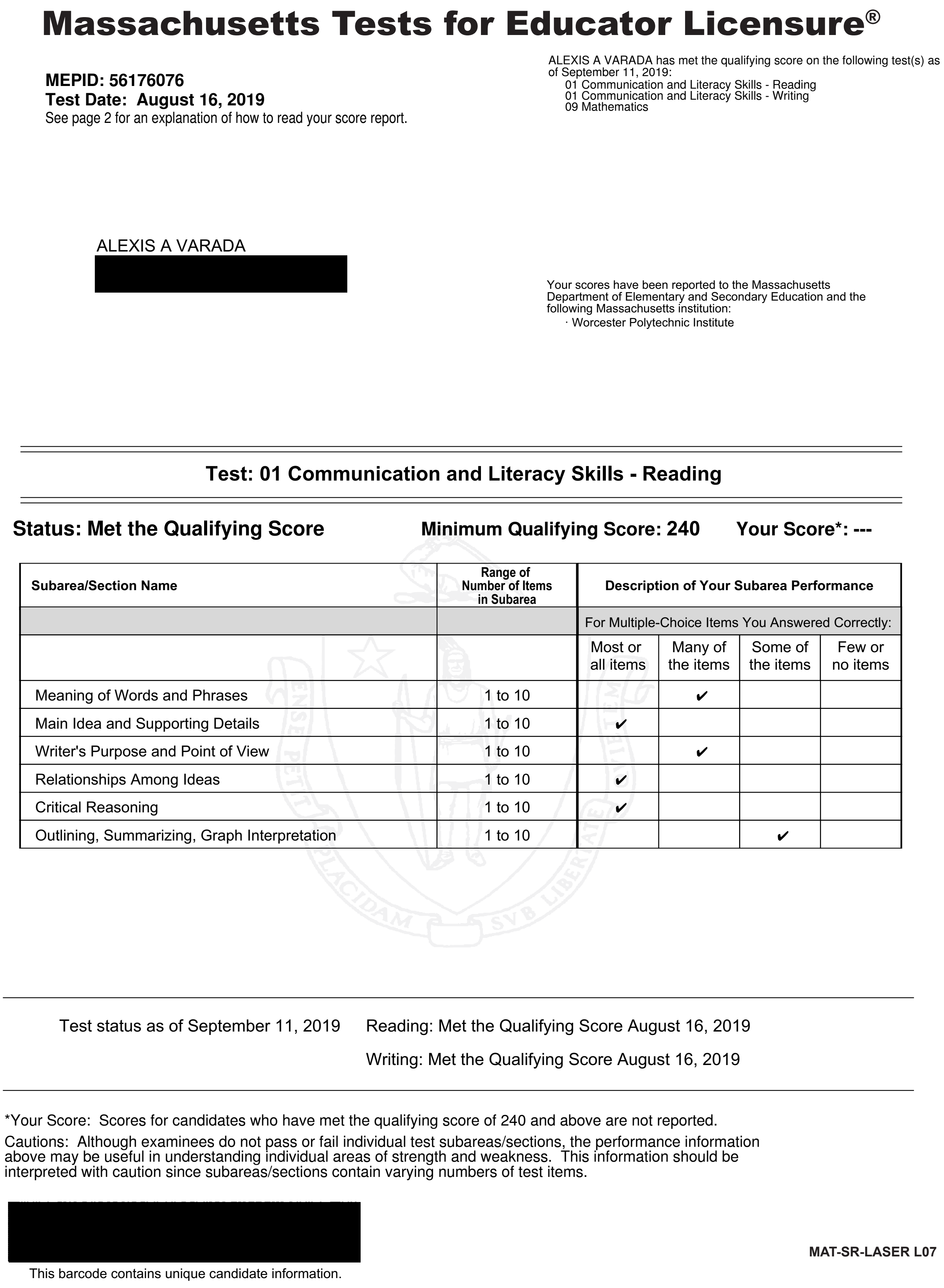
For my larger culturally-responsive teaching goal, I would like to include all three of these strategies into a content-based project. I want to incorporate this strategy into my proofs unit, for my two geometry classes. Normally, I would teach this by giving out sheets of paper with steps and doing a mini-activity where students need to order the steps (or even identify missing ones) in order to solve a proof.

I can modify this and “step” it up by making the students research their own steps for a couple of mini-proofs and putting them into one column on a poster board, and then using these separate proof facts (in order) to prove a larger, more complicated theorem in the other column of their poster paper -- I will give them each of the mini-proofs and the final proof, so that they can determine the orders of these to prove the larger one, but I may or may not tell them how many steps belong to each mini-proof, and it is up to them to determine what each mini-proof’s own steps are! We can spend each class day working on the project, with the first day focusing on group assignments and strengths / lesser strengths (I like these better than weaknesses), both related and unrelated to the lesson, as this group will be working together for a week or more. The students’ peers provide encouragement and support to persevere throughout the project and to grow from it, even when the steps get difficult (especially as they are required to autonomously search for the theorems both online and in the textbook, which they have 3 or 4 days of in-class time to do, unless they are moving rapidly and I just extend the rest of the time for decorating / finalizing on their own time and move on with my lessons, leaving the due date in place to be nice). It should be a week-long project (4 days after the day of team-making and strengths collaborating), and I will give them the syllabus during the prior FRIDAY when I assign groups (in case they want to designate / acquire supplies over the weekend) -- but I will also give them the week to acquire supplies on their own time, as long as they have them at least **two days** before the project is due, for assembly (they can designate one or multiple members to obtain each of these supplies, depending on availability / resources, as well as who will be designing the actual project format according to handwriting, etc.). I will make the project mostly do-able within class time for accessibility, but outside-of-class work may be required. I will make them record on their syllabus sheet WHO did each of the actions (obtaining supplies, physical writing, step ideas, researching in textbook, fill in more) so that there is somewhat-even participation, as your grade depends on both group collaboration and on your individual effort / input (this is why we use both class- and outside-of-school time opportunities for participation evaluation).

I may decide on two different project approaches and split these evenly amongst four or five groups (each with around 3/4/5 students), so that some groups may compare their completed results, yet they will not be *all* be working on the exact same thing. I’ll use the same two projects for both periods, for simplicity’s and for class vs. class comparison’s sake (on the Monday after the project is due), s.t. I have 4 or 5 of each project version in the end, total.

This will most likely occur during end of the unit as a good wrap-up, so closer to Week 9 or 10 of my practicum (around anywhere between October 21st and November 1st, most likely due November 1st or the following Friday (during Week 11), November 8th), depending on how long I decide to cover proofs for and on how in-depth we decide to go. After all, proofs are not on the MCAS, but the concept behind proofs and the literal scaffolds that this provides for any other types of reasoning, even at a fundamental level, is crucial for real-world success -- as are even the facts behind the simple steps (such as calling AB a radius because A is the center of a circle and B is a point on the outside of the circle, and line segment AB connects A to B, thus it is a radius, by definition), which are fundamental and helpful for the rest of the year in geometry!

III. My MTEL Results



Massachusetts Tests for Educator Licensure®

MEPID: 56176076
Test Date: August 16, 2019
See page 2 for an explanation of how to read your score report.

ALEXIS A VARADA has met the qualifying score on the following test(s) as of September 11, 2019:
01 Communication and Literacy Skills - Reading
01 Communication and Literacy Skills - Writing
09 Mathematics

ALEXIS A VARADA
[redacted]

Your scores have been reported to the Massachusetts Department of Elementary and Secondary Education and the following Massachusetts institution:
· Worcester Polytechnic Institute

Test: 01 Communication and Literacy Skills - Reading

Status: Met the Qualifying Score **Minimum Qualifying Score: 240** **Your Score*: ---**

Subarea/Section Name	**Range of Number of Items in Subarea**	**Description of Your Subarea Performance**			
		For Multiple-Choice Items You Answered Correctly:			
		Most or all items	Many of the items	Some of the items	Few or no items
Meaning of Words and Phrases	1 to 10		✔		
Main Idea and Supporting Details	1 to 10	✔			
Writer's Purpose and Point of View	1 to 10		✔		
Relationships Among Ideas	1 to 10	✔			
Critical Reasoning	1 to 10	✔			
Outlining, Summarizing, Graph Interpretation	1 to 10			✔	

Test status as of September 11, 2019 Reading: Met the Qualifying Score August 16, 2019
Writing: Met the Qualifying Score August 16, 2019

*Your Score: Scores for candidates who have met the qualifying score of 240 and above are not reported.

Cautions: Although examinees do not pass or fail individual test subareas/sections, the performance information above may be useful in understanding individual areas of strength and weakness. This information should be interpreted with caution since subareas/sections contain varying numbers of test items.

[redacted]

This barcode contains unique candidate information.

MAT-SR-LASER L07

About Your Score Report

General Information. This score report provides your test results for the Massachusetts Tests for Educator Licensure® (MTEL®) that you took on the test administration date indicated on the report. For each test you took, the report indicates whether or not you met the qualifying score, your total test score if you did not meet the qualifying score, and your approximate performance in each subarea or section of the test. Please keep this score report for your records.

Test Status. Your test status is reported as "Met the Qualifying Score" or "Did Not Meet the Qualifying Score." Each test or subtest on which you have met the qualifying score is listed in the upper right. Score reports for the Communication and Literacy Skills and the Vocational Technical Literacy Skills Tests will include, at the bottom of the report, test status for each subtest (reading and writing) attempted as of this date.

Your Test Score. Your total test score is based on all subareas/sections of the test and is reported on a scale of 100 to 300, with a scaled score of 240 representing the minimum qualifying (passing) score. If you did not meet the qualifying score, your numeric total test scaled score is reported. If you met the qualifying score, your total test scaled score is not reported.

Range of Number of Items in Subarea. The range of the number of items in each subarea/section is indicated for both multiple-choice and open-response items. Individual subareas/sections contain varying numbers of items and, therefore, contribute differently towards your total test score.

Description of Your Subarea Performance. Your approximate performance on each subarea/section is indicated for both multiple-choice items and open-response items. There are no passing scores for individual subareas/sections. Passing status is based on your total test score only.

Multiple-Choice Information. Performance on the multiple-choice section is based on the number of questions answered correctly. Points are not deducted for incorrect answers. Each multiple-choice question counts the same toward the total test score.

Open-Response Information. Scorers judge the overall effectiveness of each response using a performance score scale and a set of performance characteristics. Refer to the Test Information Guide in the Prepare section of the MTEL Program website (www.mtel.nesinc.com) for more information.

Reporting. The test results indicated on this report are for the purpose of educator licensure only. These results have been reported directly to the Massachusetts Department of Elementary and Secondary Education and will automatically be added to your licensure application file. Candidates who wish to retake a test or subtest must wait 45 or more calendar days before retaking it.

More detailed information on understanding your test results is available in the Score Report Explanation in the Scores section of the MTEL Program website (www.mtel.nesinc.com).

Evaluation Systems, Pearson, P.O. Box 226, Amherst, MA 01004

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[redacted]

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- · Worcester Polytechnic Institute

Test: 01 Communication and Literacy Skills - Writing

Status: Met the Qualifying Score **Minimum Qualifying Score: 240** **Your Score*: ---**

Subarea/Section Name	Range of Number of Items in Subarea	Description of Your Subarea Performance			
		For Multiple-Choice Items You Answered Correctly:			
		Most or all items	Many of the items	Some of the items	Few or no items
Establish and Maintain a Main Idea	11 to 20	✔			
Sentence Construction, Grammar, Usage	1 to 10	✔			
Spelling, Capitalization, Punctuation	1 to 10	✔			
Revise Sentences Containing Errors	1 to 10	✔			
		For Open-Response Items Your Responses Were:			
		Thorough	Adequate	Limited	Weak
Summary Exercise	1			✔	
Composition Exercise	1	✔			

Test status as of September 11, 2019
Reading: Met the Qualifying Score August 16, 2019
Writing: Met the Qualifying Score August 16, 2019

*Your Score: Scores for candidates who have met the qualifying score of 240 and above are not reported.

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Subarea/Section Name	Range of Number of Items in Subarea	Description of Your Subarea Performance			
		For Multiple-Choice Items You Answered Correctly:			
		Most or all items	Many of the items	Some of the items	Few or no items
Number Sense and Operations	11 to 20	✔			
Patterns, Relations, and Algebra	21 to 30	✔			
Geometry and Measurement	11 to 20	✔			
Data Analysis, Statistics, & Probability	11 to 20	✔			
Trig, Calculus, and Discrete Mathematics	11 to 20	✔			
		For Open-Response Items Your Responses Were:			
		Thorough	Adequate	Limited	Weak
Integration of Knowledge and Understanding	2	✔			

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References and Links

View this full portfolio online at: avarada17.wixsite.com/tpp2019

MBAE ECAW:

“Every Child a Winner.” *Massachusetts Business Alliance for Education*, https://www.mbae.org/every-child-a-winner/.

TIMSS 2011:

“Trends in International Mathematics and Science Study (TIMSS), 2011: Summary of Massachusetts Results.” *Massachusetts Department of Elementary and Secondary Education*, http://www.doe.mass.edu/mcas/natl-intl/timss/2011timssSummary.pdf.

WPS 2019:

“School and District Profiles: Worcester: General.” *Massachusetts Department of Elementary and Secondary Education*, http://profiles.doe.mass.edu/general/general.aspx?topNavID=1&leftNavId=100&orgcode=03480000&orgtypecode=5.

WTHS 2018-2019:

“School and District Profiles: Worcester Technical High: General.” *Massachusetts Department of Elementary and Secondary Education*, http://profiles.doe.mass.edu/general/general.aspx?topNavID=1&leftNavId=100&orgcode=03480605&orgtypecode=6

MCF:

“Massachusetts Curriculum Framework – 2017: Mathematics, Grades Pre-Kindergarten to 12.” *Massachusetts Department of Elementary and Secondary Education*, http://www.doe.mass.edu/frameworks/math/2017-06.pdf.

DESE CAP:

“ESE Security Portal.” *Mass.gov: Mass Edu Gateway*, https://gateway.edu.state.ma.us/cap/.

EdCite:

“EdCite: Home.” *EdCite*, https://www.edcite.com.

DeltaMath:

“DeltaMath: Login.” *DeltaMath*, https://www.deltamath.com.

Feromax:

“ProveIt! Two-Column Proofs Practice Tool.” *Feromax*, http://feromax.com/cgi-bin/ProveIt.pl.

Kuta Software:

“Test and Worksheet Generators for Math Teachers.” *Kuta Software*, https://www.kutasoftware.com.

Google Sheet:

https://docs.google.com/spreadsheets/d/1EzXnaoaooBRLdL1kBrYhhBlzyipP6giBN61PiuDr-0A/edit?usp=sharing

Google Drive:

https://drive.google.com/open?id=1CqeWgQrlKdlO6dznMcdWKJ1ruoX3qJ3d