

Part I

Unit of Instruction and Objectives

In this unit, I will be focusing on the skills of coordinate graphing. Students will be able to plot x and y -coordinates on a 4-quadrant graph. The objective I will be using is listed below:

- Graph points on the coordinate plane to solve real-world and mathematical problems.
CCSS.MATH.CONTENT.5.G.A.1
 - Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates.
 - Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., x -axis and x -coordinate, y -axis and y -coordinate).

Background for the Unit: Define What and Who

School Characteristics

I am currently teaching 5th grade math at an independent, faith-based school. Our school does not have a special education program, but we do accept students with documented learning disabilities. The teachers work closely with the parents and administrators to make sure that student's academic needs are met, given the recommendations from testing and regular parent meetings. The school offers students a smaller and more intimate learning environment as well as a faith-based component. By keeping classes under 20 students in the upper grades and less than 12 in the lower, we (the teachers) get to know our students on an individual basis. In 4th and 5th grade, the students rotate between three core subject teachers daily, but remain with the same

class all day. They receive anywhere from 50 to 70 minutes a day with each content teacher. One teacher covers social studies and science, the second teaches language arts and reading and I teach solely math. The rest of the student's day is filled with 2 specials, which include a rotation of art, science lab, library, Spanish, PE, music and technology, lunch and advisory. My school has identified the importance of social-emotional learning and uses the *Responsive Classroom* program as a guide for our daily advisory sessions. I spend 30 minutes a day with my own homeroom working on understanding and practicing various virtues, which include ideas like grit, perseverance, self-control, empathy, and kindness.

Class Characteristics

At this age, our school does not track students into class levels, so all students, ranging in abilities are in the same classes for all content instruction. Since we don't explicitly provide special education services, my classroom is a general education classroom with no co-teacher. However, given the leveling difficulties within one class, if given warning, my administrator offers support when topics are exceedingly challenging, or I find a need for a co-teach style approach. For the purpose of this unit plan, I am going to focus my lesson on my homeroom. I will not be using the assistance of a co-teacher. The ability level in my homeroom is incredibly broad. I have 5 students who are below-average in their math ability and/or have documented learning disabilities, and in the same class, I have 4 students who are identified gifted and talented. It produces particularly difficult challenges with maintaining involvement and engagement for all students. With such a range, creating a strong, safe, and respectful class community is exceedingly important. Not only for social emotional health impact, getting to know students has benefits when curricular planning. By knowing information such as academic

strengths and weakness, hobbies, interpersonal behaviors and learning preferences, I am able to plan engaging lessons that are designed for my own students (IRIS Center, 2004).

My homeroom has exactly 20 students, 12 girls and 8 boys. My girls are very social, well-liked, and driven. They all get along very well and often take charge in a group activity. Of my 8 boys, 5 of them have learning difficulties of varying degrees and one recently moved from Mexico, so he struggles with language acquisition. These disabilities include, dyslexia, dysgraphia, ADHD, Oppositional Defiance Disorder (ODD) and processing deficits. The boys are also well-liked and social but can be competitive especially since the most “popular” boys are extremely gifted in math. This group is very funny and high energy. They strive on building relationships, creating inside jokes, and moving. They have an affinity for singing and learning songs. My homeroom is motivated extrinsically, by earning house points, but also motivated intrinsically by morals. They want to do things because it is the right thing to do.

The physical classroom is set up in small groups. I have two-person whiteboard tables that allow the students to work directly on their desks. They can also be partnered with another table to make a group of four. I will occasionally move the tables around into different seating arrangements, depending on the activity. However, much of the time, students are sitting in a group of four.

Student Characteristics - K

I will be focusing my unit plan on two male students, K and T (names have been shortened for privacy). K is an 11-year-old 5th grader whose learning disabilities include dyslexia and dysgraphia. K has been at our school since pre-k and his sister is currently in 8th grade. K’s mother and father both work full time and have very demanding jobs. K also has a 2-

year-old little sister, whom he feels a great deal of responsibility for. K is a sweet young man and wants to help and please at any chance. He is so eager to please, that he often rushes through work to help clean up the classroom. In conferences, K's mother identifies that not only is K dyslexic, but so is his older sister and mother. Not only wanting to please, K is extremely sensitive and intuitive. One of the challenges he has faced in previous years is shutting down if he feels as though the teacher is "frustrated" or "annoyed" with him. From my interactions and observations, K is one that benefits from an inclusive and safe classroom. K is the type of student that has been caught in a merry go round of statements like, "he should be able to do this". However, "before we can suggest that someone ought to do something, we first have to know whether he or she can" (Kauffman, 2016). K's biggest hurdle will be building his self-confidence and self-worth. Dr. Rick Lavoie, a leading expert in shame associated with learning difficulties, agrees that many students who struggle feel they have no self-worth. For K, this is extremely true. School is not comforting for him because he has such anxiety about performing academically. K enjoys other aspects of school, such as art, PE, recess and advisory. He is well loved by his peers and has strong interpersonal skills. However, inside the content-based classroom, he becomes withdrawn and anxious.

With the correct, individualized accommodations and strategies, K has made gains in the past few years. K struggles immensely with reading, due to his dyslexia. In math, he has relatively strong basic math sense, but is afraid to take risks. During math instruction, K's biggest struggle is with note taking and memory. K's dysgraphia makes it nearly impossible for him or anyone else to understand his notes or to show his work coherently. Since the writing portion of math is so difficult, I provide K with a copy of the notes we will be taking, with certain words or major pieces of information missing. His job is to highlight, underline or

annotate any important pieces of information we discuss in class and to fill in the missing information. By offering a scaffold for K, he is more in tune to what I am saying and less concerned with keeping up and his handwriting. Any note taking requires students to pay attention, write quickly, and understand what the teacher is saying and at the same time deciding what is valuable (Boyle, Corchelli, & Cariss, 2015). K is also given a laminated multiplication chart to use at any time. I have found that K responds well to having his assessments read to him, while he dictates the answers.

While K's dysgraphia is challenging for math instruction, I believe his struggles with executive function are more of a hindrance of his success in school. Robin Jacob and Julia Parkinson believe that executive functioning directs a multitude of skills, such as organization, avoiding distractions and monitoring one's own progress. K struggles with these particular skills. K and I sit down on a regular basis to organize and clean out his binder, where I inevitably find late or unfinished assignments that he forgot about. To keep him from getting overwhelmed, we break the task into smaller chunks, to get everything completed.

K uses a multitude of strategies to avoid work, particularly in math. K often looks for the quickest way to complete a task and to not get noticed. He will frequently turn in an assignment, unfinished, making sure you are not looking when he turns it in. This year, I have worked with K on improving his memory, which has lessened the number of early turn-in instances. As in any instance that calls attention to himself, we have a limited amount of time to work because he gets overwhelmed. K is a prime candidate for over-learning material and reducing the cognitive load.

Student Characteristics - T

T is also an 11-year-old 5th grader, however his is significantly larger than his peers. His stature makes him easily look like a middle schooler. T has been diagnosed with ADHD, ODD and has partnering issues with executive functioning deficits. T's mother is a second-grade teacher at our school, which poses difficulties with his discipline. He is the middle of three children and his father is extremely high up in the church. He has applied to the school for many years but was finally accepted this year. T came with a lengthy history of defiant and negative behaviors.

T is very artistic and humorous but struggles to relate to his peers. He wants to fit in but can be condescending and judgmental. He makes his peers feel inconsequential and dumb. He enjoys conspiracy theories, dark humor and violent art, which makes his classmates uncomfortable. He has one friend in the class who appreciates him, but T is beginning to strain that relationship. He can become obsessive and domineering with his friend, often not allowing him to play with other classmates.

T has had multiple outbursts in class. He gets most frustrated when he feels he is less than perfect or dumb. He has a self-righteous nature, so he does not handle imperfection well, socially, or academically. When I attempt to correct a computational error, he will begin by arguing that it is not wrong. It eventually escalates to attacks on my intelligence then a total refusal to do work. The mistakes that T makes are developmentally appropriate, but he does not cope well with his perceived imperfection. The very frequent and public outburst do not help him socially, especially since he is much larger than his peers.

T has strong math fluency and number sense. He understands how numbers are related to each other. He struggles when content is new because his ADHD effects his executive

functioning. He works best when content is broken down into smaller chunks and it can lessen his cognitive load. Many negative behaviors appear when he is overloaded. To keep his attention, when important information is about to be presented, I use proximity and a shoulder tap to alert him. I also reduce the amount of work he is given at one time. If given an entire worksheet, T gets overwhelmed at the amount and doesn't know how to pace himself. He shuts down and completes no work. T is an active student who doesn't like to sit, so many of my activities allow for movement and interaction. I model appropriate peer interactions and coach him during activities.

T is motivated extrinsically, mainly through quality time and self-expression. We created a behavioral plan to eliminate certain unwanted behaviors. Collaboratively, he determined that when his goal was met, he was allowed more freedom to draw in class and allotted time to spend with his parents.

Task Demands

With this unit, students will be identifying parts of a coordinate plane, plotting coordinates then creating their own 4-quadrant graph from start to finish. While this lesson is not difficult in the traditional sense of mathematics and numbers, it does pose difficulties for any students with dysgraphia and/or issues with executive function. This unit is heavy in new vocabulary, requires attention to detail and repetition. According to Nelson, et al., there is value in using precise mathematical vocabulary. They state that when students are able to connect and learn precise mathematical language, it can advance their understanding and long-term retention.

It will be important that as I am working through labeling the graphs, I consistently use precise and mathematical language.

In a blog post by Darren Macey in Cambridge Mathematics, he discusses the difficulties students face in terms of graphing. He believes that many difficulties can be traced back to two specific issues, a lack of instruction about the actual mechanics of graph construction and because graphing seems like a 'simple' topic, therefore, it is undertaught. He states that, "there is an increasing volume of evidence that students' graphical literacy is enhanced by creating and refining their own representations" (Macey, 2019). In addition, McLeskey (2017) from the Council for Exceptional Children has developed a set of high-leverage practices for special education teachers. One practice I will be using throughout my lesson is designing instruction toward a specific learning goal. I will be building the foundational skills to allow for the learning of more complex ideas. I will also be providing intensive instruction. Considering graphing is an undertaught skill, I will need to find multiple opportunities for students to practice with the concept, monitor progress and provide feedback.

As stated before, one of the challenges that students will face throughout this unit is vocabulary. We will be discussing words like axes, coordinates, origin, vertical and horizontal. I suspect that both K and T will have difficulties with the new words and may need some direct instruction or memory tools to help solidify their understanding. Once I have introduced the parts of a graph and the vocabulary that goes along with it, I will provide T and K with labeled graphs for assistance. Students will be alternating through whole group lessons, small group instruction and individual work. This might be increasingly difficult for T, who struggles with attention, memory, and focusing on a task. Given the task of drawing graphs and plotting coordinates requires attention to detail, spatial awareness and fine motor skills, K will need assistance to

cope with his dysgraphia. Accommodations such as larger graph paper may assist in lowering his anxiety. Finally, both T and K impulsively rush through their work, I will provide both of them with a rubric or checklist to ensure a high-quality mindset.

Part II

Overview of Lesson

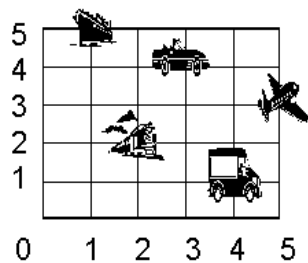
Day One

The lesson will gain student's interest the second they walk into class. The room's normal set-up has been changed. I have moved the desks apart in a U-Shape and created a coordinate plane in the middle of the U with painters' tape. In addition, I have used cardstock to label the origin, the X-axis, and the Y-axis. To prevent chaos, I have written student's names on the desks. As they enter, they are to find their seat and read the instructions on the board. Their warm-up instructions will instruct them to collect an index card, write their name on it in marker, then tape the card on a spot where two lines meet to make a point. Once they have done that, they begin to work on their warmup assignment. To access prior knowledge, their warm-up activity will involve finding objects on a map using latitude and longitude, which is a topic they have discussed in social studies.

Once all have followed the warm-up instructions and completed the task, I will begin class by calling a student by name (Student A). Student A will find their card on the coordinate plane and stand on it. I will place myself on the big "0" that represents the origin. I will ask the class, "*What do I need to do to reach Student A?*" I will refer to their warm-up to engage their prior knowledge with latitude and longitude. Once we discuss, using correct vocabulary, I will state, "*To reach Student A, I need to walk 3 units across the X-Axis (x as across because the lines cross) and 5 units up the Y-Axis (y is in the sky).*" According to Regina Richards of LDOnline, it is important and valuable for educators to understand how memory works and teach


vocabulary in a meaningful and specific way to guarantee retention. She states that, “the use of strategies plays a very critical role in structuring input to help it move into long-term memory in a meaningful and memorable format. To establish a more durable memory, we need to prevent incoming information from being "dumped." We accomplish this by associating it meaningfully with knowledge that already exists (Richards, 2008).” To help with the confusion between the X and Y-axis, I will teach a few rhyming techniques as well as repetitious practice. After Student A sits down, I ask for volunteers to try another example. For Student B’s turn, I begin with the same questions, “*What do I need to do to reach Student B? Which way do I move first? Which way do I move second? When you move side to side, which axis are you on? When you move up, what axis are you on?*” As the students answer, I will encourage correct vocabulary use by modeling precise content language every time. The use of sustained engagement and interaction is essential for learning. The repetitive walk through of the activity with consistent vocabulary will increase competence. Increased competence will lead to motivation to continue with the lesson which in turn, supports student achievement (Irvin, Meltzer, and Dukes, 2007). Before students leave, they will complete the following exit ticket (Greg’s Graphs):

Now let's help Greg find his way around the Museum of Transportation.





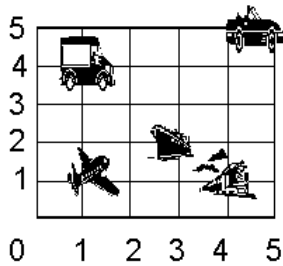








Next to the ordered pairs type in the correct answer. Use these words - train, plane, truck, car, boat.



1. (1,4)
2. (1,1)
3. (4,1)
4. (3,2)
5. (5,5)



Day Two

Day two will begin with student engagement because I will be wearing a sailor's hat as the students enter the room. We will start the class with a review discussion of yesterday's activity. We will walk through the questions I asked repeatedly (*"Which way do I move first? Which way do I move second? When you move side to side, which axis are you on? When you move up, what axis are you on?"*) and then go over the vocabulary (origin, X-axis, Y-axis and coordinates). After our discussion has finished, and I feel comfortable enough to move on, I will have the following announcement on the board, as I read it aloud, dramatically, "It was a quiet day on the USS Pi R. Squared. The water was calm, and the sky was blue. Suddenly, a fire was heard from the not so far distance. Instantly, the Captain's voice came over the loudspeaker. "Red alert! All hands on deck! Everyone report to their battle stations. We are under attack! I repeat, everyone report to their battle stations." At this point, I will play a soundtrack of bombs and chaos, to set the mood. As students get excited about the lesson for the day, I will transition into the activity's instructions.

The class will be participating in a game of coordinate graphing battleship, a play on the original game. Some students will have familiarity with the game, but many will not, so I will

[explain how the game is played](#). I will hand out boards to every student and, using my document camera, we will walk through how to number each axis together. As mentioned before, the hardest part for K & T will be neatness and attention to detail. After the graphs have been numbered, students will come to me one-by-one so I may check their numbering to see if they completed the task correctly. For any student who is really struggling with writing out the numbers, I will provide pre-numbered graphs. This will alleviate some of the stress for students like K & T. Next, as a whole group, we will walk through placing our ships on the board. Again, as students complete, they will come to me for approval. If any students struggle with the task, I can provide assistance or even a completed card. Before letting the students begin, I will model *how* to play the game and use the cards. We will discuss collaborative efforts. While winning is fun, the learning and accuracy is more important. Students will be encouraged to double check with each other that the points are being placed in the correct spots. Once I feel comfortable enough, students will arrange their desks so that they are facing their partner. We will play the game to the completion of the class period. By incorporating the “I do, we do, you do” strategy, I gradually release control to the students (Levy, 2007).

Day Three

The final day of this unit will tie all learning together in a summative assessment. Upon entering the class, students will collect a blank Frayer model. We will work collaboratively to fill it out. While it may vary from [my example](#), I will guide student questions and answers to something similar. The use of a Frayer model develops student’s higher order thinking. They are tasked with determining what is important to know and predict where errors in their thinking may occur. When completed correctly, a Frayer model is a great source of reference (Dunston and Tyminski, 2013).

Finally, students will be given the option of 3 different [monster pictures](#) (Pink Cat Studios, 2012) to draw using coordinate planes. I will explain extensively that the different pictures vary in intensity and complexity. I will encourage students to choose pictures that will show their level of understanding. I will reiterate that this is a summative assessment, so I value the understanding of the graphing, not the impressiveness of the coloring. Students will have the remainder of the class to complete and decorate the picture. I will provide every student with rulers and they will only use pencils during the assignment, to assist in mistakes. Students will also be allowed to move from level to level as they see fit. If one is above or below their ability level, they can move to another. I will collect the finish products and use them as classroom decorations.

Maximize Learning for All – Universal Supports

The Universal Design for Learning (UDL) considers the needs of *all* students, not just those with a learning disability. UDL starts with a basis of using best practice techniques and providing high quality lessons (CAST, 2018). In this section, I will provide a more in depth description of universal supports I offered and how those supports will benefit all students within my class.

One support I provide my students on a regular basis is flexible workspaces. For most assignments, I allow students the option of how and where they will complete their work. Students can choose to work independently, partnered or with a small group. This allows students to develop interpersonal skills, but also provides peer-support, if needed. I also allow a variation of places to work. Students are able to stay in their desk areas to work, work in the ‘bean bag area’, or sprawled out along the floor. Those who choose to work independently are

able to use headphones to block out noise. Student K, from Part I, often chooses to work alone and with the use of headphones plugged into a computer to play the Harry Potter soundtrack. Flexible seating provides autonomy for the student within the classroom space, but also has been shown to improve student work (Edutopia, 2015).

Another universal support I provided throughout this lesson was frequent, formative feedback. From the first day of the lesson, students were immediately given feedback through their exit ticket. I was able to circle back to students who showed a gap in understanding by the end of the first day. On the second day, students were expected to check-in with the teacher after each step of creating a Battleship board. This provided me opportunities to give instantaneous feedback, but also to identify those who may need additional support. By connecting with students regularly, they are less likely to “fall through the cracks”.

Specially Designed Instruction

It is important and valuable that during any unit, teacher’s plan specially designed instruction for those students with learning difficulties. In my case, I planned specifically for K & T.

Given K’s diagnosis of dyslexia and dysgraphia, I predicted that this unit would be especially difficult in terms of fine motor skills: lining up numbers on graphs, organizing the data and using a ruler to connect the dots. For this reason, I provided K with a graph that was pre-numbered. This accommodation allowed for him to attend to my teaching, rather than worrying about his writing. For T, he worked along with me, numbering the axes, but I provided him my neater example when it came time to plot coordinates. For both students, this reduces their cognitive load and allows them to attend to the lesson.

Both K & T struggle with long term memory and retention. The universal support of rhyming techniques and word association given during explicit instruction on day 1 (*To reach Student A, I*

need to walk 3 units **across** the X-Axis (*x as across because the lines cross*) and 5 units up the Y-Axis (*y is in the sky*)), may not been enough for full mastery. When participating in the Battleship game, both students will have a '[cheat sheet](#)' I created to help them remember which coordinates are plotted in what order. The use of a visual aid will not only reduce their cognitive load when tackling something new, but it gives them an organized way to view the information.

Assess and Refine

The exit ticket assessment from day one will give me an understanding of how I need to make changes to my subsequent lessons. Exit tickets provide me with immediate feedback as to who has a grasp on the understanding and who may need some small group instruction. The exit ticket will not be taken as a grade but rather used in data-driven instruction.

The summative assessment for this unit was creating a monster given a set of coordinates. I differentiated the assignment by offering students level of comfortability: one-quadrant vs four-quadrant graphing, numbers vs. not numbers coordinate graphs, and varied amounts of coordinates. The varying degree of difficulty allows students to show me what they know and to what degree. Offering the student a choice about their learning plays into the circle of motivation, engagement and achievement. Students learn more when they are motivated and less overwhelmed. Providing options allows students to self-differentiate and find their own appropriate challenge and thus enter their Zone of Proximal Development. In addition, student choice increases intrinsic motivation through ownership of their choice. This helps build apathy and interest in the class (Anderson, 2016). As for measuring student understanding, as stated in Part I, I will be using a provided [rubric](#) to grade their work. Students will have the rubric available to them as they work through their monster pictures. Rubrics are particularly beneficial for students with learning disabilities because

it lays out the expectations and gives them a check list to monitor their progress. For Student T, this alleviates many arguments in terms of the subjectivity of grades.

References

- Anderson, M. (2016). Chapter 1. The Key Benefits of Choice. In *Learning to Choose, Choosing to Learn: The Key to Student Motivation & Achievement*. Alexandria, VA: ASCD. doi:<http://www.ascd.org/publications/books/116015/chapters/The-Key-Benefits-of-Choice.aspx>
- Boyle, J. R., Forchelli, G. A., & Cariss, K. (2015). Note-Taking Interventions to Assist Students With Disabilities in Content Area Classes. *Preventing School Failure: Alternative Education for Children and Youth*, 59(3), 186–195. doi: 10.1080/1045988x.2014.903463
- Center for Applied Special Technology. (2019, December 18). 5 Examples of Universal Design for Learning in the Classroom. Retrieved June 21, 2020, from <https://www.readingrockets.org/article/5-examples-universal-design-learning-classroom>
- Dunston, P. J., & Tyminski, A. M. (2013). What's the Big Deal about Vocabulary? *Mathematics Teaching in the Middle School*, 19(1), 38. doi:https://www.nctm.org/Publications/mathematics-teaching-in-middle-school/2013/Vol19/Issue1/What_s-the-Big-Deal-about-Vocabulary_/
- Edutopia. (2015, August 04). Flexible Seating Elevates Student Engagement. Retrieved June 20, 2020, from <https://www.edutopia.org/practice/flexible-classrooms-providing-learning-environment-kids-need>
- Greg's Graphs. (n.d.). Retrieved June 21, 2020, from <http://www.beaconlearningcenter.com/WebLessons/GridGraph/default.htm>
- Irvin, J. L., Meltzer, J., & Dukes, M. S. (2007). Chapter 1. Student Motivation, Engagement, and Achievement. In *Taking action on adolescent literacy an implementation guide for school leaders*. Alexandria, VA: Association for Supervision and Curriculum Development.
- Jacob, R., & Parkinson, J. (2015). The Potential for School-Based Interventions That Target Executive Function to Improve Academic Achievement. *Review of Educational Research*, 85(4), 512–552. doi: 10.3102/0034654314561338
- Kauffman, J. M., & Badar, J. (2016). It's instruction over place — not the other way around! *Phi Delta Kappan*, 98(4), 55–59. doi: 10.1177/0031721716681778
- Levy, E. (2007). Gradual Release of Responsibility: I do, We do, You do. Retrieved October 12, 2015, from <http://www.sjboces.org/doc/Gifted/GradualReleaseResponsibilityJan08.pdf>
- Macey, D. (2019, January 31). The Trouble with Graphs. Retrieved from <https://www.cambridgemaths.org/blogs/the-trouble-with-graphs/>

Mcleskey, J., Billingsley, B., Brownell, M. T., Maheady, L., & Lewis, T. J. (2019). What Are High-Leverage Practices for Special Education Teachers and Why Are They Important? *Remedial and Special Education, 40*(6), 331–337. doi: 10.1177/0741932518773477

Nelson, G., Pfannenstiel, K. H., & Edmonds, R. Z. (2019). Examining the Alignment of Mathematics Instructional Practices and Mathematics Vocabulary between Core and Intervention Materials. *Learning Disabilities Research & Practice, 35*(1), 14-24. doi:10.1111/ldrp.12210

Richards, R. (2008). Making It Stick: Memorable Strategies to Enhance Learning. Retrieved June 21, 2020, from <http://www.ldonline.org/article/5602/>

Rick Lavoie - Advocate for Children with Learning Differences and Special Needs. (2018, August 29). Retrieved from <https://childrenofthecode.org/interviews/lavoie.htm>

Rodger, M. (2012). Pink Cat Studio – Fun Educational Games and Activities. Retrieved June 21, 2020, from <https://www.pinkcatstudio.com/>

The IRIS Center. (2004). Content Standards: Connecting Standards-Based Curriculum to Instructional Planning. Retrieved from <https://iris.peabody.vanderbilt.edu/module/cnm/cresource/q2/p06/>