NEW MEXICO
Public Education Department

5.G.A: GEOMETRY

Cluster Statement: Graph points on the coordinate plane to solve real-world and mathematical problems.

Additional Cluster *(Students should spend the large majority of their time (65-85%) on the major work of the grade/course. Supporting work and, where appropriate, additional work should be connected to and engage students in the major work of the grade.)*

Standard Text	**Standards of Mathematical Practice**	**Students who Demonstrate Understanding Can:**
5.G.A.1 Graph points on the coordinate plane to solve real-world mathematical problems. 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).	SMP 6: Students can attend to precision by using clear, specific directions when plotting points on the coordinate plane.	• Graph points in the first quadrant. • Interpret coordinate values of points in real world context and mathematical problems. • Represent real world and mathematical problems by graphing points in the first quadrant. **Depth of Knowledge:** 1,2 **Bloom's Taxonomy:** Apply, Understand
Standard Text	**Standards of Mathematical Practice**	**Students who Demonstrate Can:**
5.G.A.2 Graph points on the coordinate plane to solve real-world mathematical problems. Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane and interpret coordinate values of points in the context of the situation.	SMP 1: Students can make sense of problems and persevere in solving them when considering real-life situations that can be represented by the points they plot on a coordinate plane. SMP 2: Students can reason abstractly and quantitatively by contextualizing graphed points.	• Graph points in the first quadrant. • Interpret coordinate values of points in real world context and mathematical problems. • Represent real world and mathematical problems by graphing points in the first quadrant. **Depth of Knowledge:** 1 **Bloom's Taxonomy:** Apply

Previous Learning Connections	Current Learning Connections	Future Learning Connections
• Connect to plotting points on a number line and constructed perpendicular lines. (4.G.1, 4. MD.4)	• Connect to forming ordered pairs from given rules and graph points on a coordinate plane. (5.OA.3)	• Connect to extending understanding of a coordinate plane to the negative number coordinates. (6.NS.6)

Clarification Statement:
5.G.A.1 and 5.G.A.2: These standards deal with only the first quadrant (positive numbers) in the coordinate plane. Although students can often "locate a point," these understandings are beyond simple skills. For example, initially, students often fail to distinguish between two different ways of viewing the point (2, 3), say, as instructions: "right 2, up 3"; and as the point defined by being a distance 2 from the y-axis and a distance 3 from the x-axis. In these two descriptions the 2 is first associated with the x-axis, then with the y-axis.
5.G.A.2: This standard references real-world and mathematical problems, including the traveling from one point to another and identifying the coordinates of missing points in geometric figures, such as squares, rectangles, and parallelograms.

Common Misconceptions

- Students may think the order in plotting a coordinate point is not important.

Multi-Layered System of Supports (MLSS)/Suggested Instructional Strategies

Pre-Teach

Pre-teach (targeted): *What pre-teaching will prepare students to productively struggle with the mathematics for this cluster within your HQIM?*

- For example, some learners may benefit from targeted pre-teaching that rehearses prior learning when studying graphing points on the coordinate plane to solve real-world and mathematical problems because students must be able to understand domain specific vocabulary and should be able to access prior knowledge learned in previous grade levels.

Pre-teach (intensive): *What critical understandings will prepare students to access the mathematics for this cluster?*

- 3.MD.B.4: This standard provides a foundation for work with graphing points on the coordinate plane to solve real-world and mathematical problems because students should be able to show data by making a line plot, where the horizontal scale is marked off in appropriate units. Without knowledge of the vocabulary and prior knowledge, the students will continue to struggle. If students have unfinished learning within this standard, based on assessment data, consider ways to provide intensive pre-teaching support prior to the start of the unit to ensure students are ready to access grade level instruction and assignments.

Core Instruction

Access

Perception: *How will the learning for students provide multiple formats to reduce barriers to learning, such as providing the same information through different modalities (e.g., through vision, hearing, or touch) and providing information in a format that will allow for adjustability by the user?*

- For example, learners engaging with graph points on the coordinate plane to solve real-world and mathematical problems benefit when learning experiences ensure information is accessible to learners with sensory and perceptual disabilities, but also easier to access and comprehend for many others such as offering alternatives for visual information such as descriptions (text or spoken) for all images, graphics,

video, or animations; touch equivalents (tactile graphics or objects of reference) for key visuals that represent concepts; objects and spatial models to convey perspective or interaction; auditory cues for key concepts and transitions in visual information because it is important to recognize that all students do not learn the same. Students can learn visually, aurally, verbally, physically, logically, socially, and solitary. Learning styles have more influence than you may realize. Your preferred styles guide the way you learn. They also change the way you internally represent experiences, the way you recall information, and even the words you choose.

Build

Effort and Persistence: *How will the learning for students provide options for sustaining effort and persistence?*

- For example, learners engaging with *g*raphing points on the coordinate plane to solve real-world and mathematical problems benefit when learning experiences attend to students attention and affect to support sustained effort and concentration such as providing feedback that encourages perseverance, focuses on development of efficacy and self-awareness, and encourages the use of specific supports and strategies in the face of challenge because providing feedback helps perseverant students understand the value of hard work, hone their problem-solving skills and take responsibility for their own academic progress. They do not make excuses or blame others for failure.

Language and Symbols: *How will the learning for students provide alternative representations to ensure accessibility, clarity and comprehensibility for all learners? (e.g., a graph illustrating the relationship between two variables may be informative to one learner and inaccessible or puzzling to another; picture or image may carry very different meanings for learners from differing cultural or familial backgrounds)*

- For example, learners engaging with *g*raphing points on the coordinate plane to solve real-world and mathematical problems benefit when learning experiences attend to the linguistic and nonlinguistic representations of mathematics to ensure clarity can comprehensibility for all learners such as making all key information available in English also available in first languages (e.g., Spanish) for English Learners and in ASL for learners who are deaf because students who are presented key information in their first languages (Spanish, ASL, etal) will generally gain a better understanding of the activity being completed. Students learn more by understanding in their primary language before learning it in their second language. By presenting in their primary language it allows for access to prior knowledge and learning experiences.

Expression and Communication: *How will the learning provide multiple modalities for students to easily express knowledge, ideas, and concepts in the learning environment?*

- For example, learners engaging with *g*raphing points on the coordinate plane to solve real-world and mathematical problems benefit when learning experiences attend to the multiple ways students can express knowledge, ideas, and concepts such as providing scaffolds that can be gradually released with increasing independence and skills (e.g., embedded into digital programs because students learn best when they are given step by step instructions. As soon as the students learn the skills or concepts, it is important to pull away any scaffolds in order to ensure that the students are learning the skills or concepts being taught.

Internalize

Self-Regulation: *How will the design of the learning strategically support students to effectively cope and engage with the environment?*

- For example, learners engaging with *g*raphing points on the coordinate plane to solve real-world and mathematical problems benefit when learning experiences set personal goals that increase ownership of

learning goals and support healthy responses and interactions (e.g., learning from mistakes), such as addressing subject specific phobias and judgments of "natural" aptitude (e.g., "how can I improve on the areas I am struggling in?" rather than "I am not good at math") because students need to change their mindset from a fixed mindset to a more growth mindset. Changing one's mindset will only change if the student is willing to approach their fears and do what it takes to tame these fears.

Re-teach

Re-teach (targeted): *What formative assessment data (e.g., tasks, exit tickets, observations) will help identify content needing to be revisiting during a unit?*

- For example, students may benefit from re-engaging with content during a unit on graphing points on the coordinate plane to solve real-world and mathematical problems by clarifying mathematical ideas and/or concepts through a short mini-lesson because confusion by students of key domain specific vocabulary which can cause students to reverse the data being presented. Reteaching key domain specific vocabulary and any prior knowledge will present comprehension of the standard being taught.

Re-teach (intensive): *What assessment data will help identify content needing to be revisited for intensive interventions?*

- For example, some students may benefit from intensive extra time during and after a unit graphing points on the coordinate plane to solve real-world and mathematical problems by confronting student misconceptions because students will be able to identify the difference between horizontal and vertical and its association with the variables x and y on a coordinate grid. Students will be able to distinguish between Horizontal (lying flat) vs Vertical (standing tall) which are commonly reversed.

Extension

What type of extension will offer additional challenges to 'broaden' your student's knowledge of the mathematics developed within your HQIM?

- For example, some learners may benefit from an extension such as the application of and development of abstract thinking skills when studying graphing points on the coordinate plane to solve real-world and mathematical problems because students will be able to develop an understanding of why coordinate grids are listed as x-axis, y-axis) and explain in full detail what would happen if mixed around.

Culturally and Linguistically Responsive Instruction:

Validate/Affirm: How can you design your mathematics classroom to intentionally and purposefully legitimize the home culture and languages of students and reverse the negative stereotypes regarding the mathematical abilities of students of marginalized cultures and languages?
Build/Bridge: How can you create connections between the cultural and linguistic behaviors of your students' home culture and language the culture and language of school mathematics to support students in creating mathematical identities as capable mathematicians that can use mathematics within school and society?

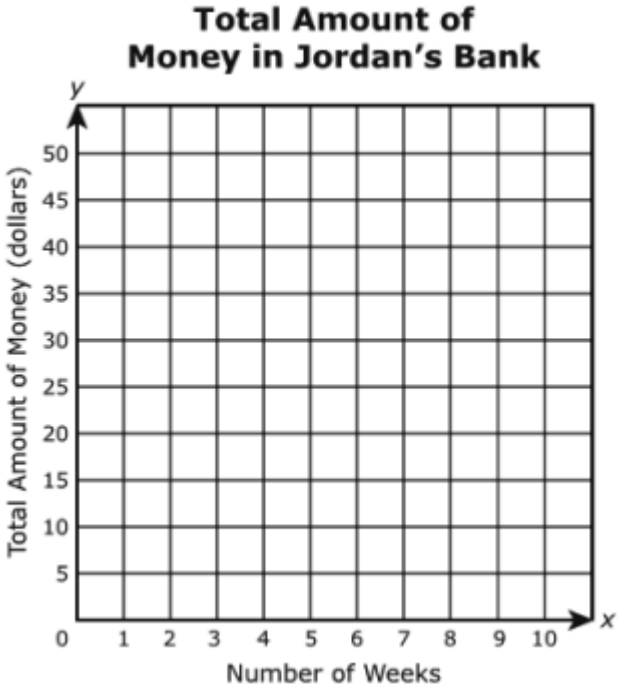
When planning with your HQIM consider how to modify tasks to represent the prior experiences, culture, language and interests of your students to "portray mathematics as useful and important in students' lives and promote students' lived experiences as important in mathematics class." Tasks can also be designed to "promote social justice [to] engage students in using mathematics to understand and eradicate social inequities (Gutstein 2006)." For example, when studying graphing points on the coordinate plane to solve real-world and mathematical problems the types of mathematical tasks are critical because when students are given problems that they can relate to their everyday lives, they tend to develop a strong understanding of the concept or skill that is being taught. By allowing the students to have a part in developing the problem, it gives them ownership of the problem and it allows them to perform successfully on the task. The teacher should only provide the framework and allow the students to fill in the remaining information that is needed to complete the problem.

This allows the students to use their personal and real-life situations to create more meaningful tasks that will allow for more success.

Standards Aligned Instructionally Embedded Formative Assessment Resources:

*Source***:** PARCC Released Item 2017

Jordan has $10 in the bank. Jordan earns $5 each week for doing chores and puts the money in the bank. After a certain number of weeks of doing chores, Jordan has $35. A graph is set up so Jordan can record the total amount of money in the bank after putting in $5.



Part A

Which ordered pair represents the amount of money Jordan has in the bank before doing any chores?

A. (0, 10)
B. (0, 35)
C. (10, 0)
D. (35, 0)

Part B

Which ordered pair represents the amount of money Jordan has after 4 weeks of doing chores?

A. (4, 20)
B. (4, 30)
C. (20, 4)
D. (30, 4)

Answer Key

Part A: A Part B: B

Relevance to Families and Communities:	**Cross-Curricular Connections:**
During a unit focused on graphing points on the coordinate plane to solve real-world and mathematical problems, consider options for learning from your families and communities the cultural and linguistic ways this mathematics exists outside of	STEM: Plot on a coordinate system. For example: Plot stars, planets, moons, asteroids, and other celestial bodies on a diorama of the solar system. Plot stars of a constellation on a coordinate system. Identify the location of stars on a system map using ordered pairs.

school to create stronger home to school connections for students, for example, families and communities can create different charts and graphs to analyze various types of fundraiser sales to determine which items would be more efficient in selling during community events.	