

Performance Task Lesson

For the Unit on Coordinate Graphing – Plotting Points

Introduction

Students participate in a performance task created to give them more practice in accurately plotting points on a Cartesian Graph using all four quadrants

Materials needed

- ◇ Performance Task packets and Instructions – one for each team
- ◇ Laptops if available, computer lab time if not. (Internet Access)
- ◇ Rulers
- ◇ Scrap paper
- ◇ Presentation materials – good (resume?) paper, Poster board

Preparation

- ◇ Have the materials ready ahead of time.
- ◇ Reserve laptop cart or time in computer lab.
- ◇ Have materials/samples from previous ELA lesson on business writing – writing a proposal available for review.

G.R.A.S.P.S. Identified:

Goal: to create a proposal for the principal for School Spirit Day

Role: Students play themselves, but for a real-world application

Audience: The principal of the school (or another representative)

Situation: Principal is asking for proposals from students that include four messages to be created by students for an aerial photograph to be used on School Spirit posters.

Performance: Proposal, including the number of students needed, the placement of the students, the message to be created, and the cost of materials.

Standards: Rubrics, check-lists and clearly stated criteria throughout the task are provided.

W.H.E.R.E.T.O. Identified:

Where: outlined in the objective

Hook: Students are shown a video and given a task that is engaging and personal

Equip: Most students should already be equipped to meet the goals of this task, they have already completed prior lessons that taught the skills and understanding needed. This task is intended for reinforcement and to help students connect the concepts and skills they are learning with real-world applications – answering the question: “Why do I need to know this stuff?”

Rethinking, **R**eflection & **R**evision: Students will be reflecting on the processes, peer-editing and creating drafts covering these three critical areas.

Evaluation: The teacher will be making informal evaluations throughout the process through observations of student work and through the group discussions, oral and

written reflections, and make formal assessments at the end of each section of the lesson.

Tailor: There are both natural and created adaptations, modifications and extensions as well as ability to add more as needed.

Organize: The tasks, objectives and processes are organized to promote and reinforce deeper understanding.

Grade Level: Sixth Grade

Time needed: A couple 45 minute sessions over two or three days, plus an hour that can be either homework or an alternate time for the students to work on their reflective narrative essay.

Area(s) of Child Development

- ◇ **Cognitive Development** – students must think, problem solve, refer to previous knowledge and process information
- ◇ **Social and Emotional Development** – students will interact with classmates checking each others' work and providing feedback.
- ◇ **Speech and Language Development** – students will read, write and speak to obtain, apply and demonstrate their knowledge and understanding. They will articulate their answers and reasoning.
- ◇ **Fine Motor Skill Development** – students will draw geometric shapes on graph paper, and use a computer to create a professional-looking proposal
- ◇ **Gross Motor Skill Development** – Students may work together to manipulate twine across a large field – walking, pulling, etc.

Standards

MST Standard #3, Problem Solving Strand

- 6.PS.7 Represent problem situations verbally, numerically, algebraically, and/or graphically
- 6.PS.11 Translate from a picture/diagram to a number or symbolic expression.
- 6.PS.12 Use trial and error and the process of elimination to solve problems
- 6.PS.16 Discuss with peers to understand a problem situation
- 6.PS.17 Determine what information is needed to solve problem
- 6.PS.18 Determine the efficiency of different representations of a problem
- 6.PS.19 Differentiate between valid and invalid approaches
- 6.PS.20 Understand valid counterexamples
- 6.PS.21 Explain the methods and reasoning behind the problem solving strategies used
- 6.PS.23 Verify results of a problem

MST Standard #3, Reasoning and Proof Strand

- 6.RP.6 Develop and explain an argument verbally, numerically, algebraically, and/or graphically
- 6.RP.7 Verify claims other students make, using examples and counterexamples when appropriate

MST Standard #3, Communication Strand

- 6.CM.3 Organize and accurately label work
- 6.CM.7 Raise questions that elicit, extend, or challenge others' thinking
- 6.CM.8 Consider strategies used and solutions found by others in relation to their own work
- 6.CM.9 Increase their use of mathematical vocabulary and language when communicating with others
- 6.CM.10 Use appropriate vocabulary when describing objects, relationships, mathematical solutions, and rationale
- 6.CM.11 Decode and comprehend mathematical visuals and symbols to construct meaning

MST Standard #3, Connections Strand

- 6.CN.4 Understand multiple representations and how they are related
- 6.CN.6 Recognize and provide examples of the presence of mathematics in their daily lives

MST Standard #3, Representation Strand

- 6.R.7 Use mathematics to show and understand physical phenomena (e.g., determine the perimeter of a bulletin board)

MST Standard #3, Number Sense and Operations Strand

- 6.N.14 Locate rational numbers on a number line (including positive and negative)

MST Standard #3, Geometry Strand

- 6.G.10 Identify and plot points in all four quadrants

ELA Standard #1,

Key Idea: Listening & Reading to acquire information and understanding involves collecting data, facts, and ideas; discovering relationships, concepts, and generalizations; and using knowledge from oral, written, and electronic sources.

ELA Standard #4,

Key Idea: Listening & Speaking Oral communication in formal and informal settings requires the ability to talk with people of different ages, genders, and cultures, to adapt presentations to different audiences, and to reflect on how talk varies in different situations.

Incorporation of Six Facets of Learning:

(Tomlinson and McTigh, 2006)

Explain: students will thoroughly explain their reasoning in order to justify their process.

Interpret: students will listen to and read the directions and interpret and discern what is being asked for. They will decide as a team the best way to solve the three-phased problem and how to present their findings based on criteria given and personal preference.

Apply: Students will apply their current understanding of mathematical principles and processes to choose multiple strategies for determining the best way to solve the problems and how to present their ideas.

Have perspective: Students will have opportunities to listen to each other's ideas and provide constructive feedback. Also, in a literal sense – students have to have perspective as they will be planning a visual message for a very large area, by creating a scale drawing represented on graph paper, and then as coordinate points that represent the drawing.

Empathize: Students will have opportunities to support and respect fellow classmates' and teammates' differing ideas and levels of ability.

Have self-knowledge: Students will have opportunities to deepen their own self-knowledge by working collaboratively in a group and individually. They will give and receive feedback, be able to explain their understanding of concepts and be able to initiate requests for help from fellow classmates or instructors when they get stuck.

Learning Outcomes

In the first and second lessons on this unit about Cartesian Coordinate Graphing, we focused on accurately identifying and plotting ordered pairs. It was evident that some students were still having difficulty with the concept and reasons why x is plotted before y . Most of the students have been successful in explaining this concept when asked, but in practice, are regularly plotting incorrectly. Whether this is due to carelessness, forgetfulness or worse, not actually understanding the concept but only parroting the ideas, is not clear. Part of this activity will focus on correctly identifying and labeling points in four quadrants of a graph, and then plotting a large number of points on the graph. Hopefully, this opportunity to practice plotting points within the context of a 'real world' application will help to clarify any misunderstandings or misconceptions about the concept and skill of plotting points.

Enduring Understanding

1: (MATH) A series of coordinates written as ordered pairs can represent and be translated to a Geometric shape on a graph using a standard and accepted process or 'code' known as Coordinate or Cartesian Graphing.

2: (ELA) There are many different ways to organize and present information and each is chosen because of the nature of the information, the purpose and the audience for whom it is intended.

Essential Questions identified

1: (MATH) Why is it important to follow the convention of plotting the x coordinate before the y coordinate when plotting points on a graph?

2: (ELA) How is writing a proposal different from writing a research paper?

Objectives

In an effort to reinforce the concepts and skills from the previous lessons as well as to eliminate persistent misconceptions or misunderstandings of plotting points:

1. The students will practice their emerging skills and be able to demonstrate their proficiency in plotting points and writing them in proper ordered pair convention

- using all four quadrants of a Cartesian Graph.
2. The students will be able to demonstrate their deeper understanding of the concepts, explain the conventions, and make connections with practical, real-world applications through the general class discussion, through the successful completion of this activity, and through the reflective narrative.
 3. The students will also be able to demonstrate their deductive reasoning and arithmetic skills, literacy and English Language Arts proficiency throughout the activity and written assignments.

Body of the Lesson

Anticipatory Set

Students will watch a short 30 second video showing Virginia Tech. students forming a message on the grounds of the school. Students will then discuss how they think this was accomplished. Brainstorm and note the student's ideas about the process of getting to the finished product: i.e. the people standing in the correct spot to create each letter. (How long did it take? What preparations were needed? How did students know where to stand? etc.)

After several ideas are given, they will be introduced to the performance task. *“For School Spirit Day, Your class has been asked to determine what will be needed to create a message in the front yard of the school using students standing to create the letters. There will be four messages and these messages are to be photographed for a series of ‘School Spirit’ posters. For instance: The message could be: “We Are Family” that is found in the school creed, that is one idea.” You will split into four teams and each team will create a proposal for one of the four messages.*

Procedures and Activities

DAY ONE

- ◇ Before students split into teams, they will be given a mini-lesson to remind them of the aspects and conventions of writing a proposal – introduced in a previous ELA lesson. i.e. Persuasive language, factual data, concise details, graphical representations etc.
- ◇ Ask to begin the discussion: *How is a proposal different from other types of expository writing? What other types of writing or media are similar to a proposal? What other types of writing or media are different? Brochures and advertisements are similar, but there are also differences – what are those differences?*
- ◇ Students will follow the instructions given in the Performance Task handout.
- ◇ While they are working, the teacher will circulate throughout the room, provide direction if needed, assess for student understanding and ensure students are working together and staying on task.
- ◇ The students should be reminded that:
 1. They should be discussing, reviewing and also constructively critiquing each other's work.
 2. They should discuss their processes, their strategies and be making notes on their graphic organizer of this information to include in their final narrative reflection essay.

DAY TWO

- ◇ The students resume their work on this performance task. The students should be starting to organize their presentation. It should be suggested that:
 1. By now they should be deciding what information is relevant to the proposal and what is not
 2. They should be creating their draft proposal
 3. If their draft proposal is done, they should find another team and trade, checking each other's work and suggesting edits
 4. Final edits should be made at this point and then each team will have their spokesperson present to the class a brief description of their proposal. After the presentation, the spokespersons from each team should take their proposals to be combined into one proposal from the entire class for presenting to the principal. (If possible, have the principal come to the classroom for the formal presentation.)
 5. Students should be reminded about the due date for their reflective narrative essay as well.

Differentiations and Extensions:

- ◇ This activity can be differentiated by some students being given only $\frac{1}{2}$ of the school yard to use (this area is basically a square) and other students may be given the entire yard, partly rectangle but with a section that is not usable as it is a driveway. The students will have to factor the odd shape when completing their tasks. A third, natural differentiation is the message the students choose to create – it may be a single word, or a short phrase. Student teams could also be instructed to create other more elaborate messages. Another extension is to have the students predict how many students are required for each of the 26 letters of the alphabet and then using that data, figure out how many students they would need for an additional message without actually plotting on the graph. Then they could determine if there is enough usable space for that message based on the area of the yard, without actually graphing it.
- ◇ The lesson is very visual but can be modified for students with visual impairments by using a grid with pegs. Students can use rubber bands to create their message so that the visually impaired student will be able to get some perspective of what the students are doing and contribute meaningfully.
- ◇ The lesson is already very visual so those with hearing impairments may only need a translator for the discussion part.
- ◇ Some students may also benefit from small-group instruction with more emphasis on understanding the basic concepts.

Closure

Open up the floor for discussion about the process. Ask: *Are there other ways this could have been done? What other applications can they think of where using a grid and points would be useful?*

Assessment/Evaluation

There will be group and individual assessments for this lesson based on class participation, teamwork, their oral and written responses; the notes and reflections the students make; and their drafts and final presentation of their activity. A rubric will be used to grade the performance task. The reflective narrative essay will be graded based on grammar and organization.

Group Scoring Rubric:

| Assessment area | Total Possible points | Developing | Accomplished | Exemplary |
|--|-----------------------|---|---|--|
| Accurate plotting of points on a graph using proper form and conventions | _____ out of 30 pts | Coordinates are not written in proper form, points are improperly labeled, there is apparent confusion with x and y axes or quadrants. Message is not in two or more quadrants. (0-35 points) | Points are plotted correctly, a message is drawn to specifications, coordinates are written in proper form, understanding of basic graphing/ x&y axes and quadrants concepts is apparent (36-66 points) | Points are plotted and labeled correctly, message is complex with multiple points in multiple quadrants, understanding of basic graphing/ x&y axes and quadrants concepts is apparent (67-70 points) |
| Teamwork and collaboration | _____ out of 20 pts | Students are working independently and not discussing or evaluating together | Students are attempting to share responsibilities, treat each other respectfully, and asking and giving input | |
| Proposal – understanding of underlying concepts in ELA. | _____ out of 25 pts | Basic understanding of underlying concepts in ELA are not present | Students demonstrate basic understanding of purpose of a ‘Proposal’ and appropriate conventions of writing as well. | Students shows deep understanding and demonstrate proficiency in purpose and conventions for writing a proposal |
| Proposal – understanding of underlying concepts in Math. (cost of twine) | _____ out of 25 pts | Basic understanding of underlying concepts in Math are not present Answer incorrect, process incorrect. | Students demonstrate basic understanding of mathematical processes in a multi-step problem (some minor errors) | Students demonstrate proficiency in, and understanding of mathematical processes in a multi-step problem |
| Total Points: | _____ out of 100 pts | | | |

Individual student scoring rubric (participation and reflective narrative essay):

| Assessment area | Total Possible points | Developing | Accomplished | Exemplary |
|--|-----------------------|--|---|---|
| Reflection on Process: | _____ out of 25 pts | Basic understanding of underlying concepts in ELA are not present | Students demonstrate basic understanding of purpose of a 'Proposal' and appropriate conventions of writing as well. | Students shows deep understanding and demonstrate proficiency in purpose and conventions for writing a proposal |
| Reflection on Experience: | _____ out of 25 pts | Basic understanding of underlying concepts in Math are not present Answer incorrect, process incorrect. | Students demonstrate basic understanding of mathematical processes in a multi-step problem (some minor errors) | Students demonstrate proficiency in, and understanding of mathematical processes in a multi-step problem |
| Organization and grammar | _____ out of 25 pts | Reader has difficulty following or identifying main ideas, improper sentence structure and more than 15 grammatical/ spelling errors | Thoughts and main ideas are identified and organized. Between 4 and 14 grammatical/ spelling errors. | Thoughts and main ideas are well organized and clear, expressive and complex. Less than 4 grammatical/ spelling errors. |
| Level of student participation in activities and discussions | _____ out of 25 pts | Student is not engaged, even after prompting (0-9 points) | Student is engaged, offering to participate and answering questions (10-25 points) | |
| Total Points: | _____ out of 100 pts | | | |

REFERENCES

Mertler, Craig A. (2001). Designing scoring rubrics for your classroom. *Practical Assessment, Research & Evaluation*, 7(25). Retrieved April 3, 2008 from <http://PAREonline.net/getvn.asp?v=7&n=25>

GOOGLE Maps, Satellite map of School 39 school yard