WAMC Lab Template

Math Concept(s): Analyzing Graph Details

Developed by: Lisa McConnell E-Mail: lmcconne@cloverpark.k12.wa.us Date: 6/25/24

Attach the following documents:

- Graphing Stories Handout

Short Description (Be sure to include where in your instruction this lab takes place):

- Students will create their own video showing an action over the course of 15-16 seconds that can be graphed as a function of time. This lesson is meant to be instructionally aligned with the definition and representations of function vs. non-functions.

Lab Plan

Lab Title: Graph Your Own Story

Prerequisite skills: Students need to have a base understanding of rate of change (slope) and how that affects the shape of a graphed line.

Lab objective: This lab is designed to get students to think about and analyze the connection between motion and its graphical representation.

Standards: *(Note SPECIFIC relationship to Science, Technology, and/or Engineering)*

Mathematics K–12 Learning Standards:

- 8.F.B.5 Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.

Standards for Mathematical Practice:

- Make sense of problems and persevere in solving them.
- Model with mathematics.
- Use appropriate tools strategically

K-12 Learning Standards-ELA (Reading, Writing, Speaking & Listening):

- SL.8.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 8 topics, texts, and issues, building on others' ideas and expressing their own clearly.K-12 Science Standards

Technology

- 6.c. Students communicate complex ideas clearly using various digital tools to convey the concepts textually, visually, graphically, etc.
- 7.c. Students perform a variety of roles within a team using age-appropriate technology to complete a project or solve a problem.

Engineering

- HS-ETS1-2. Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems.

Leadership/21st Century Skills:

21st Century Interdisciplinary themes (Check those that apply to the above activity.)

☐ Global Awareness ☐ Financial/Economic/Business/Entrepreneurial Literacy ☐ Civic Literacy
☐ Health/Safety Literacy ☐ Environmental Literacy

21st Century Skills (Check those that students will demonstrate in the above activity.)

LEARNING AND INNOVATION
Creativity and Innovation
x Think Creatively
x Work Creatively with Others
☐ Implement Innovations
Critical Thinking and Problem Solving
☐ Reason Effectively
☐ Use Systems Thinking
x Make Judgments and Decisions
x Solve Problems
Communication and Collaboration
☐ Communicate Clearly
☐ Collaborate with Others

INFORMATION, MEDIA & TECHNOLOGY SKILLS
Information Literacy
☐ Access and Evaluate Information
☐ Use and manage Information
Media Literacy
☐ Analyze Media
x Create Media Products
Information, Communications and Technology (ICT Literacy)
x Apply Technology Effectively

LIFE & CAREER SKILLS
Flexibility and Adaptability
x Adapt to Change
x Be Flexible
Initiative and Self-Direction
x Manage Goals and Time
☐ Work Independently
☐ Be Self-Directed Learners
Social and Cross-Cultural
x Interact Effectively with Others
x Work Effectively in Diverse Teams

Productivity and Accountability
☐ Manage Projects
x Produce Results
Leadership and Responsibility
☐ Guide and Lead Others
☐ Be Responsible to Others

Teacher Preparation: (What materials and set-up are required for this lab?)

Materials

- Stop Watch
- Video recording device
- Variety of objects according to availability (balls, weights, jump rope, etc.)
- Place for students to upload video so they can be redistributed/shown to the whole class (Canvas, Google Drive, Teams, etc.)
- Video playlist for examples: https://www.youtube.com/playlist?list=PLDe-CvW870TERO1-IH3CERuyKVFYiFR_Q
- Graphing Stories handout – cut into individual graphs for single example (could be double-sided if two examples done)

Set-Up Required:

- Make sure a variety of objects are available for student use; may be done inside or outside depending on class/school availability.
- During students' planning phase, teacher should act as a producer and check in with each group about their planned "script" to make sure it's safe and appropriate for school and the lesson.

Lab Organization Strategies:

Leadership (Connect to 21st Century Skills selected):

- Students have the chance to work in groups, there will need to be creativity in choosing the activity, communication and collaboration in how to go about shooting it. The student with the camera will act much like a director in a leadership role making sure that acceptable results are produced – good sound, not too blurry, action is visible and discernable, etc. Student shave a lot of freedom here to make their decisions and may need to be flexible as well if initial ideas and planning don't work out.

Cooperative Learning:

- Students will work together in teams of 3-4. 1 person will be the video recorder, 1 person will keep time and count off the seconds during the action while the other 1-2 perform the action on camera.

Expectations:

- Students will be able to connect what they see/do/film with its graphical representation.

Timeline:

- Students will receive instructions and watch one to two videos off the playlist before going off to make their videos which will take approximately 5-7 minutes. Time given in their group to plan a video should be about 10-15 minutes (may vary with class size/composition). Time given to gather materials and film should be about 15-20 minutes. Students should then upload videos to the shared location.

Post Lab Follow-Up/Conclusions:

Discuss real world application of learning from lab

- Teamwork to complete a task, taking a video, distributing roles and producing a product together, following directions.

Career Applications

- Any occupation where working in a team to complete a product is essential.

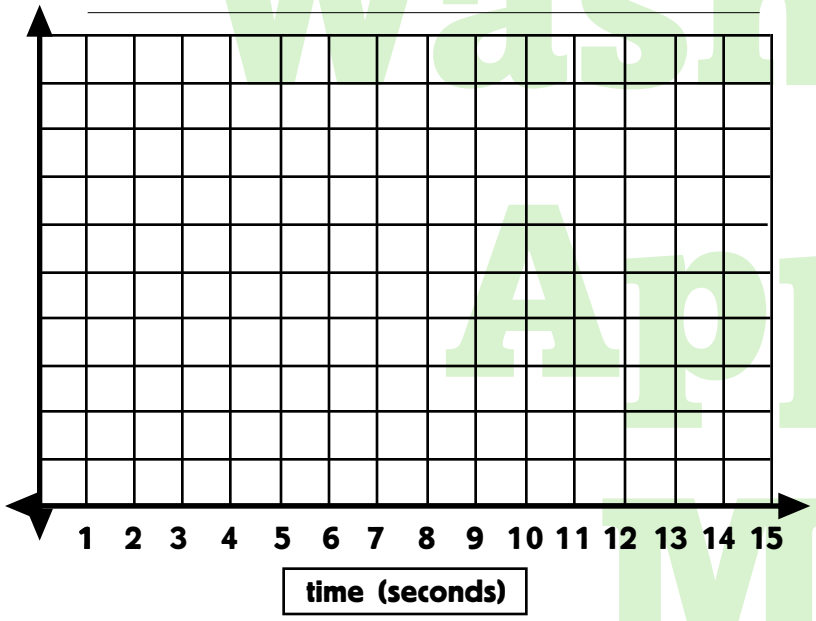
Optional or Extension Activities

- Showing student videos to the class to have them graphed by their peers.

GRAPHING STORIES

_____
(name)

1.



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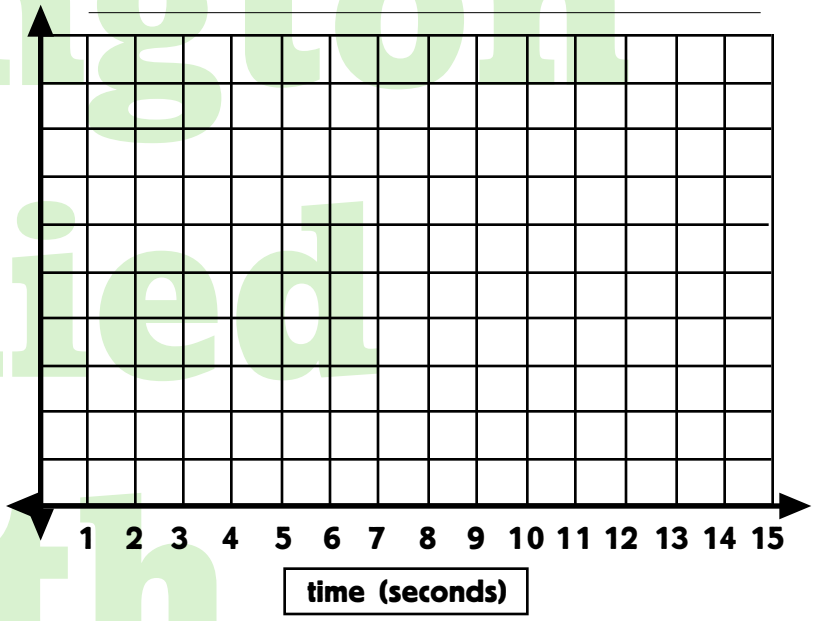

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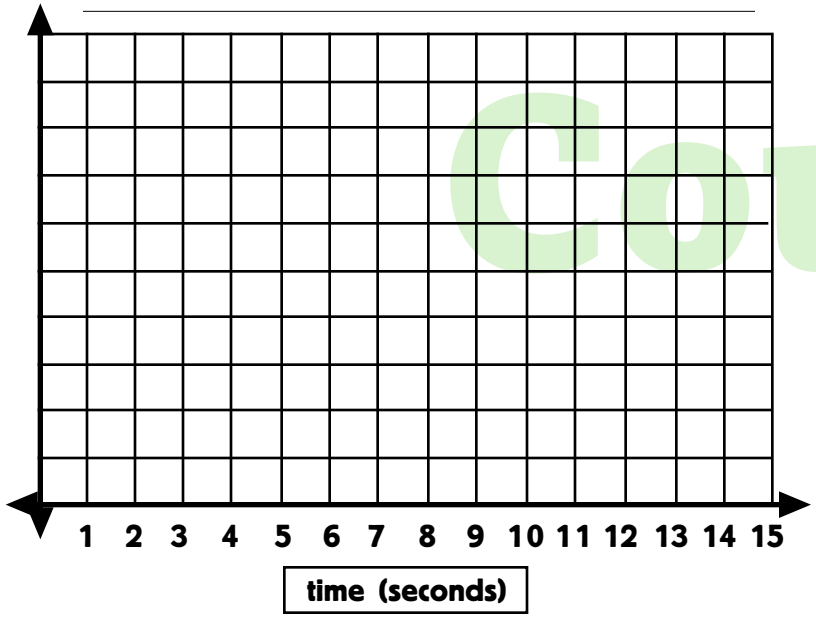

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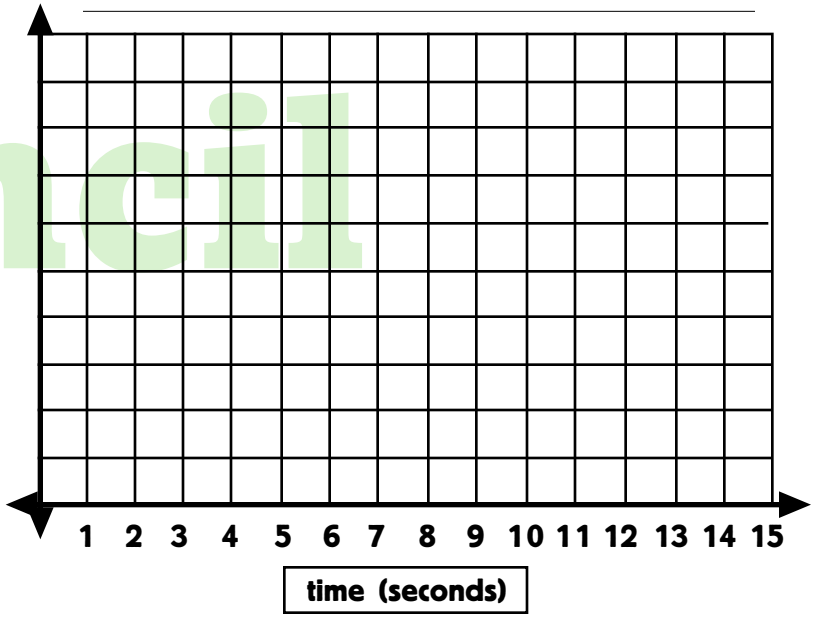

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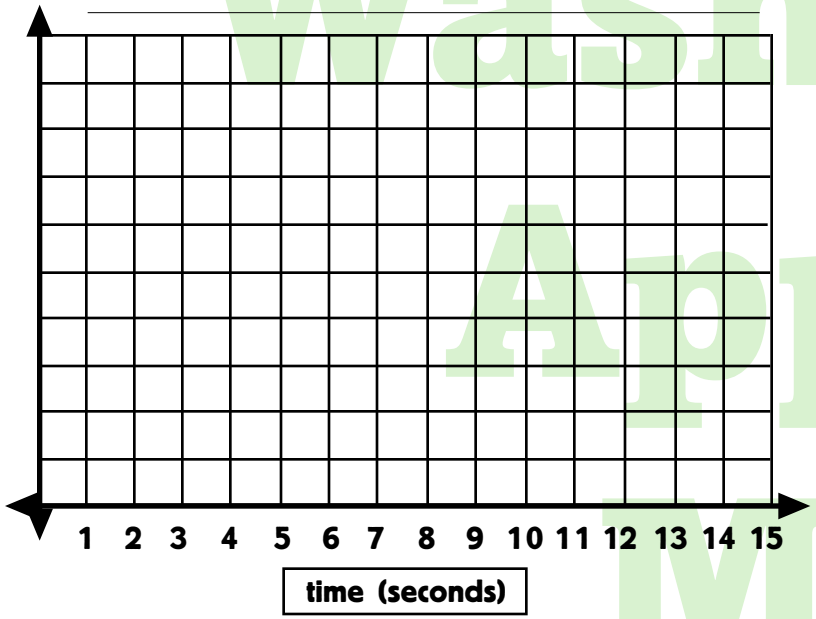

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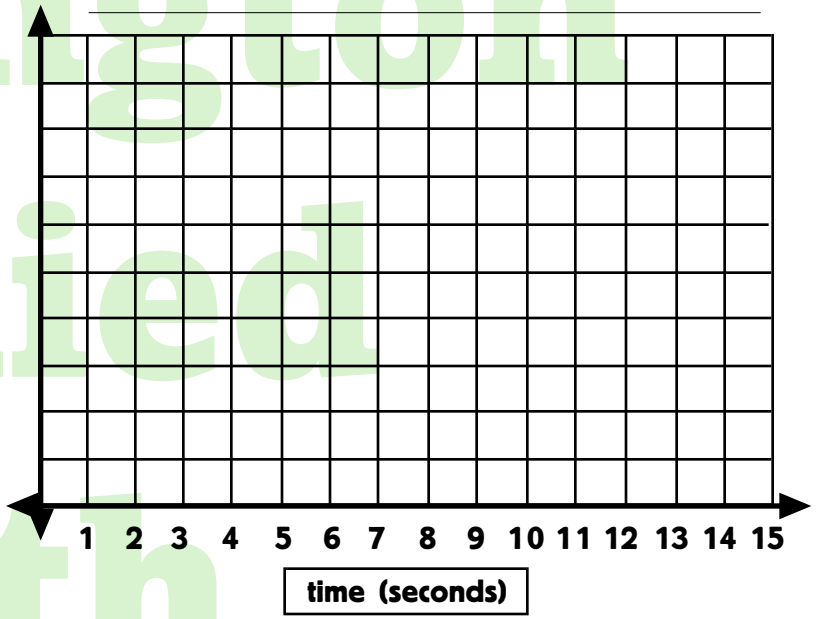

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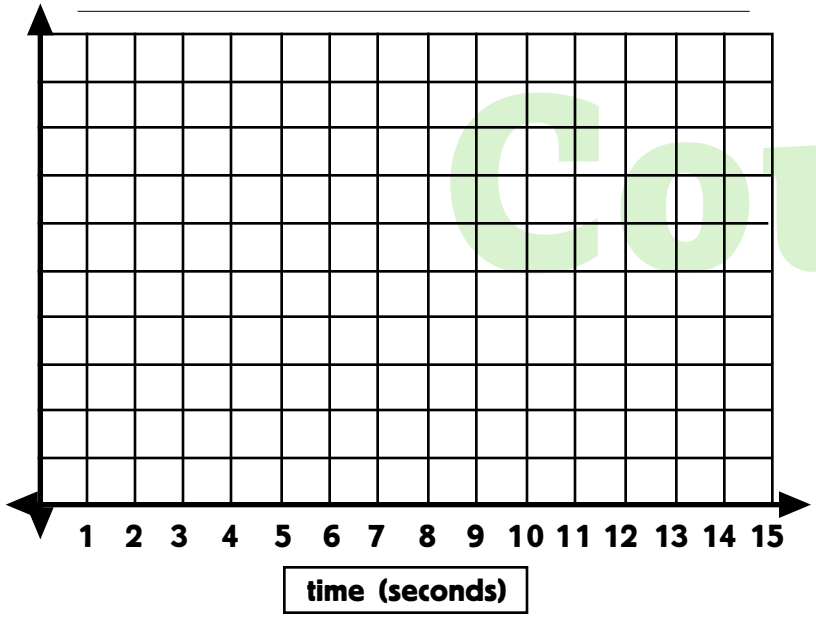

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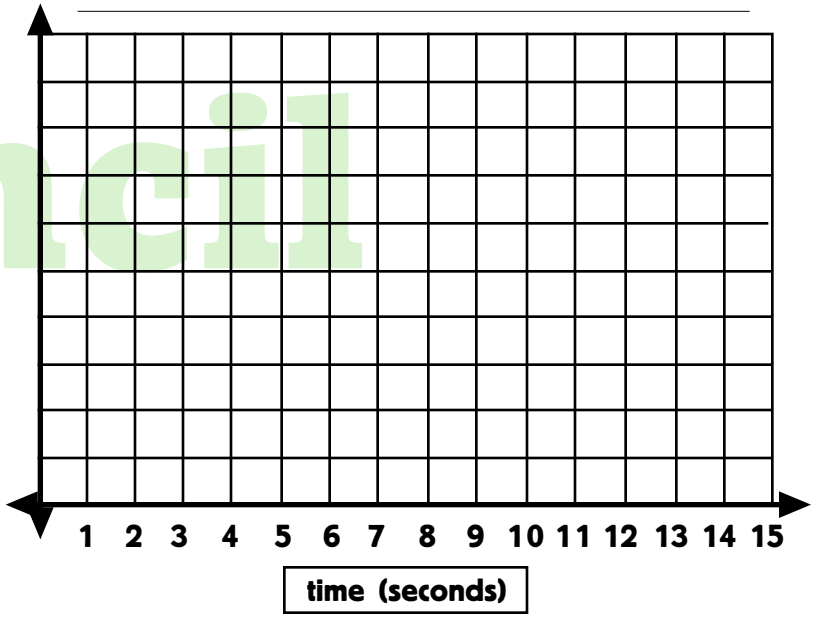

WAMC Lesson Plan

Name(s): Lisa McConnell
Email Address: lmcconne@cloverpark.k12.wa.us
Lesson Title: Graph Your Friends' Stories
Date:06/25/24
Text: None STEM Correlation: Lesson Length: 50 Min

Big Idea (Cluster):	
Mathematics K–12 Learning Standards: • 8.F.B.5 Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.	
Mathematical Practice(s): • Model with mathematics.	
Content Objectives: • Be able to model a distance over time action on a graph while correctly identifying key features such as increase, decrease, and static movement.	Language Objectives (ML): • Multi-lingual learners will be paired with a partner that speak the same language if available and appropriate, shown hands on examples of how to distinguish and identify the types of lines, and allowed to use translation software. Most of the lab is visual and drawing so little writing.
Vocabulary: • Slope, vertical, horizontal, origin	Connections to Prior Learning: • Students need to know how to label a graph, and understand how the rate of change affects the steepness of a line/curve.
Questions to Develop Mathematical Thinking: • If two people were doing the same activity, how could you tell one was doing it faster than another? • What does a horizontal line mean? • What does a vertical line mean? • What happens to the line when the action heads back to the origin?	Common Misconceptions: • A line going up (increasing) always means "going up the hill" • The x-axis can be defined as the origin or the goal • A vertical line means jumping up and down.

Assessments:

Formative:
- While students are graphing I will circulate through the room to different students and groups to check in with developing questions as well

Summative:
- Students will turn in their graphing stories worksheets filled out with their graphs.

Materials:
- Video Website to Show Examples https://www.youtube.com/playlist?list=PLDe-CvW870TERO1-IH3CERuyKVFYiFR_Q
- Graphing Stories Worksheet (double-sided)

Instruction Plan:

Introduction: 5-7 min Students will be reminded of the video they did previously and will have an opportunity to graph one together as a class to practice and ask any lingering questions.
Explore: 35-45 min Students should then be accessing the shared database with the uploaded videos (assignment on Canvas, Teams, shared Google Drive, etc.) and will be watching them while graphing the movement of the action they see. They should try to get 7 videos watched and graphed in this time.
When I observe students: I expect to see students watching the videos and discussing movement, times, speed of the action as well as shapes of the lines. They will likely have to watch each video multiple times as well as stop/start and even slow it down to be able to graph it as accurately as possible.
Questions to Develop Mathematical Thinking as you observe: What are the clues in the video that led you to draw that line? How did you determine what the shape would be? What would the graph look like if [detail in video] was changed?
Answers to Questions Above: Answers will vary based on what the students record and what is happening in the video. Sample clues could be movement going quickly then slowly, standing up versus sitting down, going down stairs, lifting a chair, carrying a glass, clapping hands getting closer/father apart.
Summarize: Students will be able to use context clues to create a graph and have a better understanding of what the shapes of the lines look like/mean on a graph to better be able to analyze and draw conclusions about their meaning when not given an explanation.

Career Application(s):

- Any career dealing with graphical analysis, mathematicians, scientists, teachers, logistics, financial.

Leadership/21st Century Skills:

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