Analyzing Graphs – Lisa Manhard

Grade Level: 7

Technology: CBR2, Graphing Calculator & Cords, Overhead Projector, & Overhead Unit for Calculator

Materials: Student Worksheets (3)

Objectives
• Evaluate what the data means between points on a graph
• Analyze data using graphs
• Write / verbalize “stories” shown in various graphs

State Standards
Content Strands
Algebra
Patterns, Relations, and Functions
7.A.7. Draw the graphical representation of a pattern from an equation or a table of data
7.A.8. Create algebraic patterns using charts/tables, graphs, equations, and expressions

Statistics and Probability
Analysis of Data
7.S.6. Read and interpret data represented graphically (pictograph, bar graph, histogram, line graph, double line/bar graphs, or circle graph)
Predictions from Data
7.S.7 Identify and explain misleading statistics and graphs

Process Strands
Problem Solving Strand
7.PS.6 Represent problem situations verbally, numerically, algebraically, and graphically
7.PS.11 Work in collaboration with others to solve problems

Reasoning & Proof Strand
7.RP.4 Provide supportive arguments for conjectures
Communication Strand
7.CM.1 Provide a correct, complete, coherent, and clear rationale for thought process used in problem solving
7.CM.6 Analyze mathematical solutions shared by others
7.CM.9 Increase their use of mathematical vocabulary and language when communicating with others

Connections Strand
7.CN.3 Connect and apply a variety of strategies to solve problems

Representation Strand
7.R.1 Use physical objects, drawings, charts, tables, graphs, symbols, equations, or objects created using technology as representations

NCTM Standards
Content Strands
Algebra Strand
• Understand patterns, relations, and functions
• represent, analyze, and generalize a variety of patterns with tables, graphs, words, and, when possible, symbolic rules
• Use mathematical models to represent and understand quantitative relationships
• model and solve contextualized problems using various representations, such as graphs, tables, and equations.

Process Strands
Problem Solving
• monitor and reflect on the process of mathematical problem solving.

Communication Standard
• organize and consolidate their mathematical thinking through communication;
• communicate their mathematical thinking coherently and clearly to peers, teachers, and others;
• analyze and evaluate the mathematical thinking and strategies of others;
• use the language of mathematics to express mathematical ideas precisely
Connections Standard
• use connections among mathematical ideas
• understand how mathematical ideas interconnect and build on one another to recognize and produce a coherent whole
• recognize and apply mathematics in contexts outside of mathematics.

Resources

Analyzing Graphs Worksheet (Launch)
Connected Mathematics 2: Variables and Patterns © 2006
Author(s): Glenda Lappan, James T. Frey, William M. Fitzgerald, Susan N. Friel, & Elizabeth Difanis Phillips
Publisher: Pearson / Prentice Hall

Reflection Questions Worksheet (Summarize)
URL: http://www.mste.uiuc.edu/presentations/motionStory.htm
Title: Motion Story
Author: None given

Homework Sheet
URL:
Title: Position-Time Graph "Story" Combinations
Author: Catharine H. Colwell

Launch (10 Minutes)

Worksheet: Analyzing Graphs – show on overhead and complete the three questions as a whole class. Have a student come up to the overhead to give their answer and explain why it makes sense.
(From: Connected Mathematics 2: Variables and Patterns © 2006)
**Explore (20 Minutes)**
Display a graph on the board using a CBR. Discuss the graph and analyze it. What variables are we using? How do we know? Explain that the distance (m) is the distance away from the motion detector (CBR2). What's happening?

Have a student volunteer try to "match the graph" as another student (coach) helps explain what the student walking should do. If necessary, have another pair of students try to match the same graph based on how well / what the first group accomplished.

Repeat with a new graph.

**Summarize (10 Minutes)**
Reflection Questions Worksheet:

When "matching the graphs" by walking, how did we know if the person walking had to walk faster or slower?

When "matching the graphs" by walking, how did we know if the person walking had to walk toward or away from the CBR?

Draw a graph for the following story:

A person who walks two blocks at a moderate speed, waits at an intersection for a short time until the "walk" light turns "green," then walks the next block more slowly, and finally runs the final two blocks very rapidly.


Have a student come up to the overhead to draw their graph. Have them then explain it to the class.

**Homework**
Worksheet: Graph Stories
(From: http://www.mste.uiuc.edu/presentations/motionStory.htm)
Analyzing Graphs Worksheet

Investigation 2: Analyzing Graphs

1. Which graph below could match the situation described?

A car traveling at 0 mi/h accelerates to 25 mi/h over the first 5 seconds. It maintains that speed for the next 5 seconds, and then accelerates to 48 mi/h during the next 5 seconds.

a. [Graph A]

b. [Graph B]

c. [Graph C]

d. [Graph D]
2. Select a graph for the situation. You wait for the express bus for 30 minutes, get on and ride the bus non-stop for 3 miles, and then walk another mile to your home.

a.

b.

c.

d.

3. Which graph most likely describes the distance a person walks in a 24-hour period? Why?

- Graph II
- Graph III
- Graph IV
- Graph I

a. Graph II 
   b. Graph III 
   c. Graph IV 
   d. Graph I

Connected Mathematics 2: Variables and Patterns © 2006
Reflections Questions Worksheet

Name _______________________________  HR __________  ID# ________
Math  Date ____________________________

1. When "matching the graphs" by walking, how did we know if the person walking had to walk faster or slower?
   ___________________________________________________
   ___________________________________________________
   ___________________________________________________
   ___________________________________________________

2. When "matching the graphs" by walking, how did we know if the person walking had to walk toward or away from the CBR?
   ___________________________________________________
   ___________________________________________________
   ___________________________________________________
   ___________________________________________________

3. Draw a graph for the following story:

   A person who walks two blocks at a moderate speed, waits at an intersection for a short time until the "walk" light turns "green," then walks the next block more slowly, and finally runs the final two blocks very rapidly.

   http://www.mste.uiuc.edu/presentations/motionStory.htm
Which story goes with which graph? Match the stories with three of the graphs in below and write a story for the remaining graph.

(a.) I had just left home when I realized I had forgotten my books, so I went back to pick them up.

(b.) Things went fine until I had a flat tire.

(c.) I started out calmly, but sped up when I realized I was going to be late.

(d.)