CREATING LINE GRAPHS	Student/Class Goal
	A student was concerned that she couldn't help her son with his math homework - constructing a graph. Since she and the other students know there will be these kinds of questions on the GED test, they requested some help with graphs and charts.

Outcome (lesson objective)	Time Frame
Students will relate data to coordinate graphs and plot points on this graph.	2- 40 minute classes

Standard Use Math to Solve Problems and Communicate	NRS EFL 3-4

Number Sense	Benchmarks	Geometry & Measurement	Benchmarks	Processes	Benchmarks
Words to numbers connection		Geometric figures		Solve problems	
Calculation	3.2, 4.2	Coordinate system	3.7	Problem solving strategies	
Order of operations		Perimeter/area/volume formulas		Solutions analysis	
Compare/order numbers		Graphing two-dimensional figures		Calculator	
Estimation		Measurement relationships		Mathematical terminology/symbols	
Exponents/radical expressions		Pythagorean theorem		Logical progression	
Algebra & Patterns	**Benchmarks**	Measurement applications		Contextual situations	
Patterns/sequences		Measurement conversions		Mathematical material	
Equations/expressions		Rounding		Logical terms	
Linear/nonlinear representations		**Data Analysis & Probability**	**Benchmarks**	Accuracy/precision	
Graphing		Data interpretation	3.16, 4.20	Real-life applications	3.27, 4.34
Linear equations		Data displays construction	3.17, 4.21	Independence/range/fluency	3.28, 4.35
Quadratic equations		Central tendency			
		Probabilities			
		Contextual probability			

Materials
Graphs and charts from newspapers, ads, or any print or Internet source
Graph paper
Average Daily Temperature Graph
Table of Minimum Wages Handout
Table or chart of Gasoline Prices
Creating Line Graphs Learning Objects

Learner Prior Knowledge
Students can identify key features (x-axis, y-axis) of simple everyday graphs and charts.

Instructional Activities
Step 1 - Ask students to suggest ways that numerical information can be presented. Use newspapers, ads, or other literature to provide examples of circle graphs, bar charts, line graphs and other pictorial information.

Step 2 - Present a situation with numbers and no explanation, e.g., 1, 2, 4, 16, 32. Help students see that no graph or chart can be made because there is no information relating the numbers. In order to create a graph or chart there must be two types of information: the numbers and information about what the numbers represent

Step 3 – Utilize an overhead transparency blank graph or a chalkboard chart of the coordinate system (blank graph paper).
Collect some data from the class, e.g., the number of students who live in various zip codes. Create an example of a coordinate graph using the zip codes for the x-axis and the numbers of students for the y-axis.

TEACHER NOTE Line graphs are used to show how something changes over time. Line graphs have an x-axis and a y-axis. The x-axis usually has numbers for the time period and the y-axis has numbers for what is being measured. Line graphs can be used when you're plotting data that has peaks (ups) and valleys (downs) or that was collected in a short period of time.

Step 4 - Pass out the *Average Daily Temperature* line graph or make into an overhead. Talk about the parts of this graph including:
    Title, x-axis, y-axis

Look at the label and what is being measured, look at the increments. What conclusions can we draw about the average daily temperature from 2/14 to 2/24? Is the temperature generally on the way up or on the way down?

Step 5 - Distribute the handout with the *Table of Minimum Wages* data listed. For levels 3 and 4 use graph sheets with predetermined years listed on the x-axis. Levels 5 and 6 students should decide how many years or what time intervals to choose for the x-axis (e.g., every 5 years or every 10 years). All four levels choose appropriate money divisions for the y-axis. Each line should be worth $.25 or $.50. Demonstrate plotting a year versus the wage. Students complete the graph.

WRITING STANDARD EXTENSION Predict the next minimum wage. Calculate the earnings for a 40- hour work week. What type of lifestyle could be maintained with minimum wage earnings?

Step 6 **-** Distribute charts of current state averages of gasoline prices or a list of monthly average gas prices for Ohio. See AAA Daily Fuel Gauge Report for a list. Students decide the axis for the data and plot the points. When their graphs are complete, the students share with each other and explain their decisions for the intervals.

WRITING STANDARD EXTENSION Students write paragraphs or essays predicting the changes in gasoline prices. The essays could include reasons for the increases or decreases in prices.

Step 7 - For practice, students should choose another topic of interest and produce a graph to represent the data found in their research.

Assessment/Evidence (*based on outcome*)
Labeled graphs with appropriate intervals for the data

Teacher Reflection/Lesson Evaluation
Not yet completed.

Next Steps
Transfer the graphing skill with real data to graphing ordered pairs. Creating Line Graphs Learning Objects will give students additional practice with interpreting line graphs.

Technology Integration
Wage and Hour Division http://www.dol.gov/whd/minwage/america.htm
AAA Daily Fuel Gauge Report http://fuelgaugereport.opisnet.com/index.asp

Purposeful/Transparent
The activities are selected in order to create a better understanding of graphs. The students can monitor their progress as they plot the points from the data chart.

Contextual
Many of the students earn minimum wage or less and would be interested to see the changes over time. The second graph relates to the high gasoline prices.

Building Expertise
Students have some knowledge of graphs and charts (newspapers, ads, promotional solicitations, etc.) This activity allows them to create one type of graph and could be done in a series of lessons on different kinds of graphs.

US MINIMUM WAGE RATES 1938-PRESENT

YEAR	WAGE $	YEAR	WAGE $
1938	.25	1972	1.60
1939	.30	1973	1.60
1940	.30	1974	2.00
1941	.30	1975	2.10
1942	.30	1976	2.30
1943	.30	1977	2.30
1944	.30	1978	2.65
1945	.40	1979	2.90
1946	.40	1980	3.10
1947	.40	1981	3.35
1948	.40	1982	3.35
1949	.40	1983	3.35
1950	.75	1984	3.35
1951	.75	1985	3.35
1952	.75	1986	3.35
1953	.75	1987	3.35
1954	.75	1988	3.35
1955	.75	1989	3.35
1956	1.00	1990	3.80
1957	1.00	1991	4.25
1958	1.00	1992	4.25
1959	1.00	1993	4.25
1960	1.00	1994	4.25
1961	1.15	1995	4.25
1962	1.15	1996	4.75
1963	1.25	1997	5.15
1964	1.25	1998	5.15
1965	1.25	1999	5.15
1966	1.25	2000	5.15
1967	1.40	2001	5.15
1968	1.60	2002	5.15
1969	1.60	2003	5.15
1970	1.60	2004	5.15
1971	1.60	2005	5.15
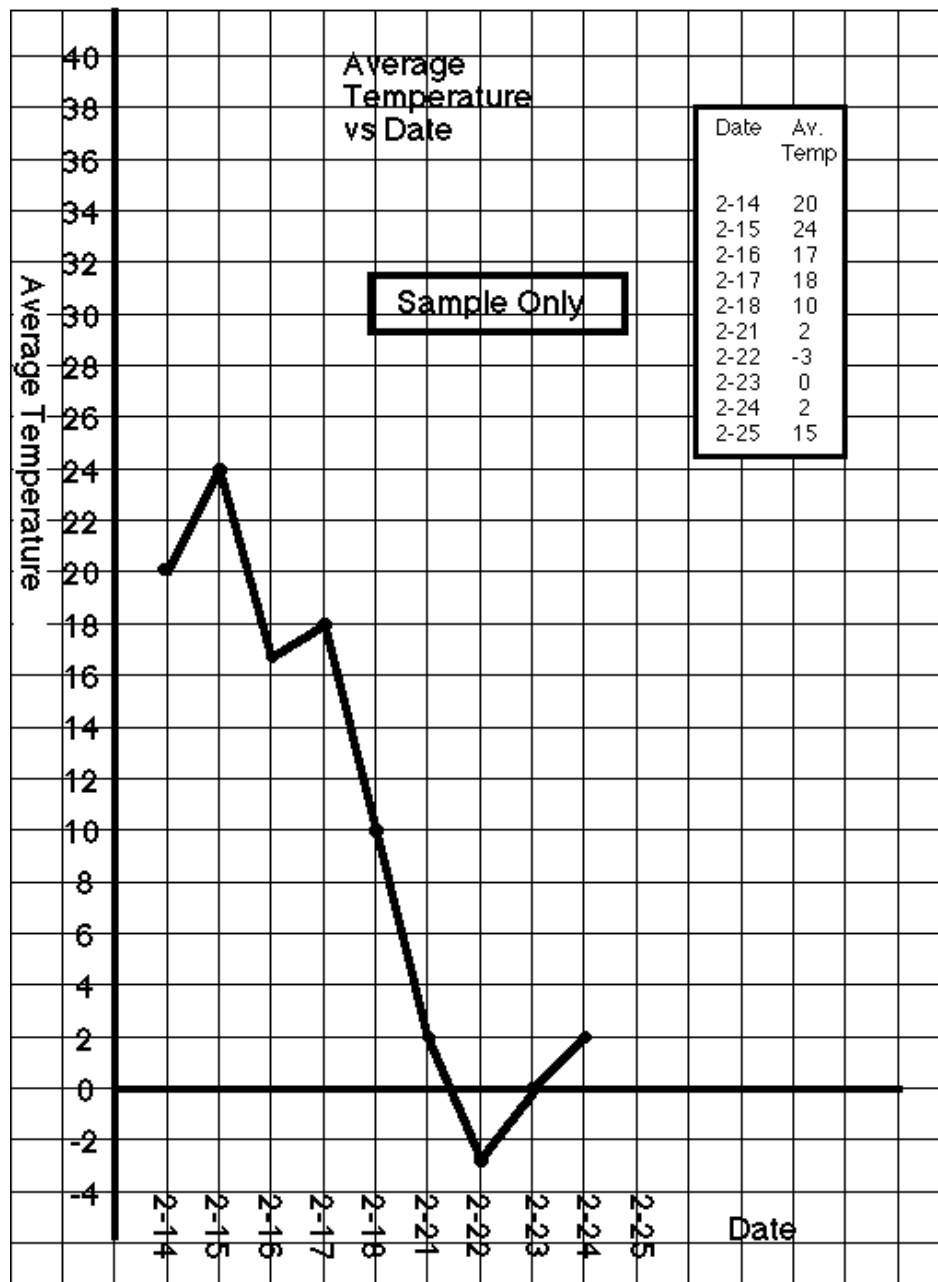
This line graph shows the daily temperature for a period of nine days. The x-axis represents the dates and the y-axis represents the temperature in degrees.

What day was the coldest? The warmest?

What is the average temperature during this ten day period?

Are temperatures in general increasing or decreasing?

What geographic location could these temperatures represent or not represent?

***Average Daily Temperature* Line Graph**

Line Graphs
Author: Barbara Laedtke
School: Fox Valley Technical College **Date:** 9/16/2002
Description: Learners read an explanation of line graphs and demonstrate their knowledge of the parts of a graph in an interactive exercise.
http://www.wisc-online.com/objects/index_tj.asp?objID=SOC302

Interpreting Line Graphs
Author: Barbara Laedtke
School: Fox Valley Technical College **Date:** 4/19/2002
Description: Students analyze line graphs and answer questions about the information shown.
http://www.wisc-online.com/objects/index_tj.asp?objID=SOC702

Creating Line Graphs Learning Objects