

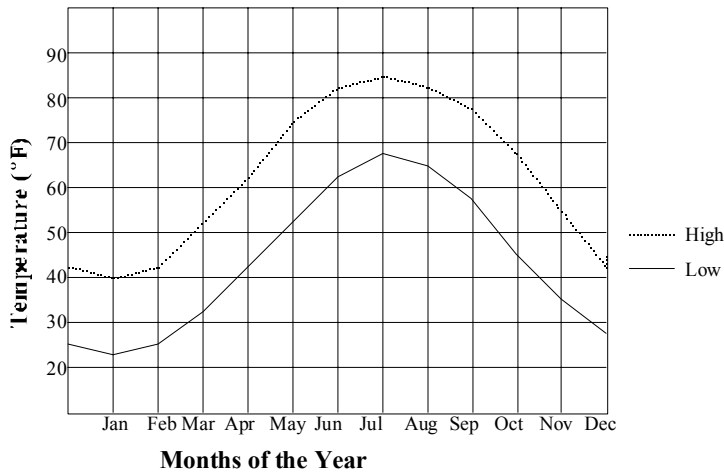
**SAMPLE IPA LESSON PLAN**  
**Standard #2 (Coherence/Continuity)**  
**Grade Five**

**Introduction**

The theories and concepts of this lesson are to review the fundamentals of basic graphs and to familiarize children with what line graphs are and how they can be used to summarize data. Such data could include the animal kingdom and classifications theme that they are currently being taught about. This lesson is meant to not only familiarize student with what an actual line graph is and does, but it is also meant to teach students how to form their own. The use of word problems will aid students in doing this. Beyond that, students will be able to make real-life connections due to the fact that various types of animals that they are familiar with will be integrated into the lesson. For example, wild animals will be discussed as well as farm animals, but most importantly, household animals will be worked into the lesson as a form of leverage since a good amount of children either have their own household animals or have come in contact with someone who does. Though this lesson does in fact focus primarily on plotting points on line graphs based on some species of the animal kingdom and interpreting what those points indicate, students will be informed of the many other valuable uses for line graphs during the discussion through examples.

Background Information of Line graphs: A line graph is used to show trends. Line graphs have a horizontal (X)axis and a vertical (Y) axis. Both axes represent something that can be measured and are labeled to tell what is being measured and the units used to measure. To create a graph, you must decide the range that you will show on each axis and label spots on each axis with specific measurements. As with other graphs there is also a general title. The example graph shows the temperature trends in Philadelphia over one year. The Y axis shows temperature in degrees Fahrenheit with the range shown on the graph of 10 degrees to 100 degrees. The X axis show a one year period of time scaled by months.

**Average High and Low Temperature in Philadelphia, PA**



**Objectives**

1. In this lesson students review the parts of a graph and be able to:  
label a line graph & identify the y-axis and the x-axis
2. In this lesson students will be able to describe the use of a line graph.
3. In this lesson students will practice plotting points on a graph.
4. In this lesson students will interpret line graphs.

**Standards/Benchmarks**

*Standard # 2:* Using Data, Statistics, and Probability - Solve problems by interpreting data and predicting outcomes; make decisions based on the information collected, and clearly communicate the reasoning used to obtain the results.

*Benchmark:* Construct, read, and interpret tables, charts, and graphs incorporating the use of appropriate techniques and technology including line graphs, circle graphs, scatter plots, box and whisker plots, and stem-and-leaf plots.

*Standard # 6:* Problem Solving and Reasoning - Develop the abilities to formulate problems, implement various strategies to find solutions, draw logical conclusions, and clearly communicate procedures and results of the investigation.

*Benchmark #4:* Apply spatial reasoning to proportions and graphs.

*Benchmark #8:* Break a multi-step problem into simpler parts.

*Benchmark #9:* Solve for unknown or undecided quantities using algebra, graphing, sound reasoning, and other strategies.

**Procedure****A List of Materials:**

Teacher will need: a copy of the lesson plan, poster boards or chart paper with line graph examples, chalk, markers, chalkboard, color pencils, reward stickers, graph paper exercises, a pointing stick and cut outs/xeroxed copies of different line graphs from the Internet, books, magazines or other sources.  
Students will need: a pencil.

**Classroom Climate:**

The students will remain in their regular seats and work independently. The students will remain this way throughout the lesson unless they are sharing materials such as glue and scissors. Special needs students will be assisted when necessary by their peers, the teacher and the teacher assistants. Instructions will be reiterated loud enough for those who are hard of hearing to hear and if it is necessary, the teacher will go over to the special needs student and repeat the instructions. The instructions will also be written and explained in depth if necessary. To accommodate the visually impaired, all examples will be given out to each student to follow along. The teacher will have a large line graph on the board or chart paper. In addition to that, the group graphs will be done on large poster board so that everyone can see the graph clearly and have space to rectify mistakes.

**Motivation:** (The teacher gives information about the day's lesson and asks a series of engaging open-ended questions and gets feedback).

The teacher asks: "Raise your hand if you have pets at home?"

Students respond: About half the class raised their hands.

Teacher asks: Who has been to the Philadelphia zoo before?

Students respond: I've been to the zoo before.

Teacher says: Well I see that a lot of us have been to the zoo before. Isn't the zoo a great place to go to see and to learn about animals that people don't usually have as pets at home right? Like elephants and bears and monkeys? Well tell me what some of your favorite animals are, like animals that live in the plains areas or on farms or even the ones that live at home?

Students respond: I like cats. I like polar bears. I like dogs etc.

Teacher says: Well today we are going to learn some interesting things about some of those animals and we are going to plot points on line graphs out of the information that we have in the word problems about the animals. This way we will be able to interpret the data we see and answer the animal questions. Now later you are going to work in independently. I'm going to give each one of you a sheet of graph paper with a picture of the animal you choose on it, color pencils, and a word problem about your animal to help you fill in your graph with the plotted points. So, since each one of you will make a line graph about one particular animal that you choose there are going to be some of you that do a cheetah graph, and some of you that will do an elephant graph and some of you that will do a cat graph. Doesn't that sound like a fun way to learn about line graphs and animals?

Students respond: Yeah.

Teacher says: Well, okay I know you guys like animals a lot but let's talk about line graphs for a second. I'm going to pass out some copies of line graphs that I have found in different places so that you can look at them and can become familiar with them. Who can tell the class about something you know about line graphs, like where have you seen them or what do you think they do?

Student Responds: Umm like that could be in a math book and they measure things.

Teacher responds: Yeah, they do measure things and you can see them in math books, but you could also see them in say, a newspaper, but what do they measure?

Students Respond: They could measure like test scores or somebody could use them for selling stuff in stores.

Teacher Responds: Yep, they sure could be used to measure test scores or to measure things that a store owner sells over time or they could even measure how many people have read the paper in 12 months. See, that's what line graphs do, they help you monitor something that happens over time like, you could measure how many times you hiccup in a five minute period and actually make a line graph about it.

Students Respond: Laughter.

Teacher responds: Okay, so now we know a little bit about line graphs and if you do a great job at making your line graphs you will receive whatever laser animal sticker that you choose. And maybe, if they turn

out really good, Mrs. Lambersky will let you put them on display so everyone can see them. Okay, so before we begin with the graphs who can tell me some more interesting things about the animals that we're going to deal with today? Like, for example, who can tell me where cats usually live?

Students respond: A lot of times they live in people's houses as pets or even outside.

Teacher responds: Great! But what about an lion or a cheetah?

Students respond: I think they live in the wild, like in the Savannah in India and Africa.

Teacher responds: Yes they do. Where do you think the cow lives, don't some people have cows for house pets in Philadelphia? Students respond: No, cows live on farms? Teacher responds: Oh, yeah, I think your right. That makes sense. Well, it seems like you guys know a lot of good things about some of the animals that we are going to deal with today for our lesson so let's hurry up and review some cool information about graphs in general and then work on our animal line graphs about the a couple of the animals that we just talked about.

**Activity 1:** Review of a Basic Graph with Lines Representing Both the X and Y Axis's (Part 1) Reviewing Graph Structure (10 minutes)

Teacher will explain to students the many uses for line graphs when one needs to represent data such as when a person needs to show the temperature in Philadelphia over a matter of days or if one wants to know how many people are riding the Septa bus at different times of day. He or she will also ask students if they can think of some other possible uses for line graphs.

Step One: Teacher shows students a large picture of a blank graph on chart paper with only the x-axis and the y-axis labeled.

Step Two: Teacher points out the y-axis on the graph and tells students that the y-axis is always the vertical line on a line graph. Teacher then commences to point out all the vertical lines on the graph and verbally identifies them as lines on the y-axis.

Step Three: Teacher picks volunteers to come up to the large blank graph on the chart paper and pick a colored marker to identify by tracing lines that fall on the x-axis. Teacher repeats this step with other volunteers for the y-axis.

Step Four: Teacher points out the x-axis on the graph and tells students that the x-axis is always any horizontal line on a graph. Teacher then commences review what students have done by randomly pointing out all the horizontal lines on the graph and asks students to verbally identify them as lines on the x-axis or y-axis. To clarify this by other means, the teacher will ensure that students comprehend axes by using two intersecting pencils to give an example of axes. The teacher will hold up one pencil vertically to indicate the y-axis and will place one pencil horizontally to indicate the x-axis. Teacher also will have students emulate this procedure themselves with their own two pencils for reinforcement purposes. If a student does not have access to two pencils he or she can use their index finger and thumb to make the shape of an "L".

Step Five: Once the lines on the graph have been reviewed, teacher will then explain to students that the place where two lines intersect is where a point is marked.

**Activity 2:** Familiarizing students with components of a graph (10 minutes)

Step One: Teacher puts up a new piece of chart paper up with a graph that is labeled with the word "title" at the top, the words "time measurement" below the x-axis and the words "numbers about data that is being studied" on the side of the y-axis but has no points are plotted.

Step Two: Teacher explains that the number 0 is usually placed at the left lower corner of a line graph. Then the teacher explains that the amount of time that is being measured always gets written horizontally below the x-axis and that the data (whatever is being measured) is written on the left-hand side next to the y-axis.

Step Three: Teacher reviews what has just been taught by drawing two connecting lines in an L shape. The teacher then asks what part of the line figure is the x-axis and what part of it is the y axis. After students have responded and clarifications have been made, teacher will ask where the title of the graph goes. Teacher will then ask where would the units of time go (on the x-axis or the y-axis). Then the teacher will ask students where would the numbers for the data being measured go (on the x-axis or the y-axis).

**Activity 3:** Plotting points on a line graph (10 minutes)

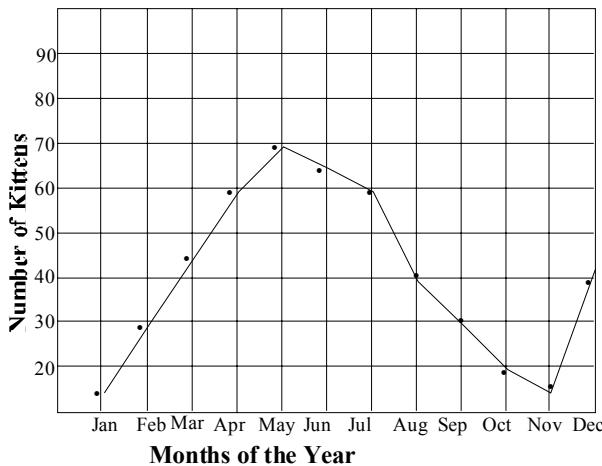
Step One: Now that students have seen and examined an actual line graph upon the guidance of the

teacher, he or she will now tell students that he/she will need volunteers to come up to the graph in front of the class to help him/her label and plot points a graph based on the information in the word problem because this is what they will be doing in independently. Teacher will then put up a blank graph on chart paper as well as another sheet of chart paper with the Carmen the Cougar word problem on it.

Step Two: Teacher will read the word problem: "Cougars can jump up to 18 feet high. Carmen is a baby cougar who wants to jump up as high as her big sister. Label the graph by writing the words "Age in Months" at the bottom of the graph below the x-axis under the time scale. Write the words "Height that Carmen jumps in Feet" on the left side of the graph beside the y-axis next to the numbers scale. Answer the following questions by plotting the points on the graph.

1. Plot a point where Carmen jumps up 2 feet in the air at 2 months of age
2. Plot a point where Carmen jumps up 8 feet in the air 4 at months of age
3. Plot a point where Carmen jumps up 12 feet in the air at 6 months of age
4. Plot a point where Carmen jumps up 14 feet in the air 8 at months of age
5. Plot a point where Carmen jumps up 16 feet in the air at 10 months of age
6. Plot a point where Carmen jumps up 17 feet in the air at 12 months of age
7. Plot a point where Carmen finally jumps up to 18 feet in the air at 14 months of age
8. Does the line on the graph go upward or downward? Answer: Upward,
9. What does this mean? Answer: It means that Carmen was able to jump higher as she got older and now Carmen can jump as high as her big sister.

Number of Kittens Sold at Bob's Pet Store



Step Three: Teacher now asks if anyone has any questions and commences to the next activity.

**Activity 4:** Providing Experience with Line Graphs: interpreting a line graph (15 minutes)

Step One: Teacher removes old graph and puts up a new graph with titles and labels and points.

Step Two: Teacher reads question and demonstrates how to plot points that correspond with information on both the x-axis and the y-axis. (See graph)( Y-axis indicates # of kittens sold, X axis indicates time frame).

Question posed by Bob's owners to worker: About

how many kittens did Bob's sell in January? February? March? April?

Answer: Student responds to the questions posed about each month's kitten sales by referring to and pointing to the graph

Step Three: Teacher has the students (Bob's owners) ask the one student (the Bob's kitten salesman) other comparison questions about the number of kittens that were sold.

**Activity 5:** Students work individually to complete line graphs (Time 20)

Students will be given a choice of 3 types of graphs, farm animal graphs (Elvin the Elephant), wild animal graphs (Chelsea the Cheetah) or household animal graphs (Matt the Cat). Once they have made their choice, they will be given a worksheet with word problems on it and a graph that consists of everything except for the plotted points and the, x-axis and y-axis labels which they are responsible for filling in. To enhance the fun of doing line graphs, the teacher will also give students a big sheet of paper with a picture of the animal that corresponds with their graph on it for them to stick their line graph and word problem on with glue once it is completed. (See 3 Attached worksheets).

**Activity 6:** Closure, Peer Review and Future Plans for Line Graphs

After teacher(s) visit students' desks to ensure that everyone understands the directions and are on task, the lesson will come to an close by having 3 students (one from each animal group Matt the Cat, Elvin the Elephant and Chelsea the Cheetah) come up to the front of the class. Each of the three volunteers will read to the class their word problem and show their completed line graph on the animal background paper. He or she will tell the

class how the connected points on their line graph sloped (upward or downward) and what the direction of their line indicates about their animal's problem. After the students have shared/reviewed their work with the class, they will discuss what their future plans for utilizing line graphs are.

**Assessment**

Students will be assessed on this lesson based upon how well they follow directions and based on how well they have displayed their understanding of how to plot points on a line graph. The worksheets will serve as a way to assess how well they comprehended the word problems. In addition to that, students will be asked questions throughout the lesson and asked to volunteer to show how well they have grasped the content taught in each part of the lesson.

**Assignment** (Make a line graph of Philadelphia's daily Temperature for the week starting with the day of this lesson)

Students will receive a blank graph sheet of paper to take home. They will be instructed to watch the news once everyday to record the high temperature in Philadelphia for seven days and make a line graph consisting of labels for both axes (a time scale at the bottom and a temperature scale on the left side) and plotted points that have been connected. They will be told that they can watch the weather any time of day as long as they record the high daily temperature. They will be told of several channels that they can obtain the weather from, This assignment will be due a week from the day this lesson take place.

**Bibliography**

www.phila.k12.pa.us www.animals.com Charles, Randall I. Math. Addison Wesley Longman Inc. 1999.

**Chelsea the Cheetah**

A cheetah can run at a speed of 60 miles per hour (mph) for a distance of 200-300 yards. Chelsea is a cheetah who is on a hunting trip. Use the line graph below to graph Chelsea's speed runs

1. Label your graph. Write the words "Time (In Hours)" at the bottom of your graph below the x-axis under the time scale. Write the words "Yards that Chelsea Runs" on the left of your graph beside the y-axis next to the number scale.
2. Plot the point where Chelsea is moving at 10 mph at 8:00 am.
3. Plot the point where Chelsea is moving at 10 mph at 8:10 am.
4. Plot the point where Chelsea is moving at 3 mph at 8:20 am.
5. Plot the point where Chelsea is moving at 3 mph at 8:30 am.
6. Plot the point where Chelsea is moving at 0 mph at 8:40 am.
7. Plot the point where Chelsea is moving at 60 mph at 8:50 am.
8. Plot the point where Chelsea is moving at 0 mph at 9:00 am.
9. Make a line connecting the points. Does the line go upward or downward?
10. What can you determine from the way the line is going? What do you think happened?

**Elvin the Elephant**

Some elephants weigh more than 6 tons. When Elvin was born he weighed 250 pounds. He wants to weigh 6 tons like the rest of the elephants so he starts eating and eating and eating. Use the line graph below to show how fast Elvin is able to gain weight over the years.

1. Label your graph by writing the words "Time in Years" at the bottom of your graph below the x-axis under the time scale. Write the words "Weight in pounds" on the left side of your graph beside the y-axis next to the number scale.
2. Plot the point: Elvin weighs in at 250 pounds in 1990 when he is born.
3. Plot the point: Elvin weighs in at 4000 pounds in 1992 when he is 2.
4. Plot the point: Elvin weighs in at 6000 pounds in 1994 when he is 4.
5. Plot the point: Elvin weighs in at 7000 pounds in 1996 when he is 6.
6. Plot the point: Elvin weighs in at 7500 pounds in 1998 when he is 8.
7. Plot the point: Elvin weighs in at 7800 pounds in 2000 when he is 10.
8. Plot the point: Elvin weighs in at 7900 pounds in 2002 when he is 12.
9. Plot the point: Elvin weighs in at 8000 pounds in 2004 when he is 14.
10. Make a line that connects the points. Does the line go upward or downward?
11. What can you determine from the way the line is going? When does he gain weigh fastest? From birth to age 4 or from age 4 to age 8?

**Matt The Cat**

Matt the Cat has been living with the Dude Family in their Philadelphia home for 5 years starting in 1997. Matt has run away from the Dude Family several times but they always find him and bring him right back. Use the graph to show how many times Matt has escaped from the Dude's over the last 5 years.

1. Label your graph by writing the words "Time (in Years)" at the bottom of your graph below the x-axis under the time scale. Write the words "Amount of times Matt ran away" on the left of your graph beside the y-axis next to the number scale.
2. Matt ran away 2 times in 1997. Plot this point on the graph.
3. Matt ran away 4 times in 1998. Plot this point on the graph.
4. Matt ran away 6 times in 1999. Plot this point on the graph.
5. Matt ran away 8 times in 2000. Plot this point on the graph.
6. Matt ran away 10 times in 2001. Plot this point on the graph.
7. Matt ran away 12 times in 2002. Plot this point on the graph.
8. Make a line connecting the points on the graph.
9. Does it appear that Matt has run away more or less since the first year he lived with the Dude's?
10. Why? Based on your graph do you think that Matt likes living with the Dude family?

