Graphing Practice                                    Name:
AP Biology Summer Packet                             DUE DATE:
Introduction

Graphing is an important procedure used by scientists to display the data that is collected during a controlled experiment. When a graph is put together incorrectly, it detracts the reader from understanding what you are trying to present. Most graphs contain 5 major parts:

a. Title
b. The independent variable (X-axis)
c. The dependant variable (Y-axis)
d. Scale for each variable
e. Legend (or key)

a. **The Title** – depicts what the graph is about. Reading the title gives the reader an understanding about the graph. A good title is closer to a sentence than a phrase and is usually found at the top of the graph.
b. **Independent Variable** – the variable that can be controlled by the experimenter. Common independent variables include time (date, minutes, hours, seconds, years, generations), length/depth (feet, meters, inches, centimeters), or temperature (Celcius) to name a few This variable is put on the X-axis
c. **Dependent Variable** – the variable that is affected directly by the independent variable. It is the result of what happens because of the independent variable. Example: How many oxygen bubbles are produced by a plant located a different depths below water. The number of oxygen bubbles will depend on the depth of the water . This variable is put on the Y-axis.
d. **Scale** – before you can plot your data points, you must figure out how much each box on your graph paper is worth. Scale doesn't always have to start at zero, but is must be consistent. If you start off making each box worth 5cm, each subsequent box must also be 5cm. Always make sure your scale is labeled with what it is and what it is measured in.
e. **Legend** – a short description about the graph's data. Most often used to show what different patterns or colors stand for on your graph.

Q1: The following graph is a fair to good example of a graph. In the t-chart, list what they did well and what they need to fix.

| Good | Bad |
|------|-----|
|      |     |



Crimes Of Robbery
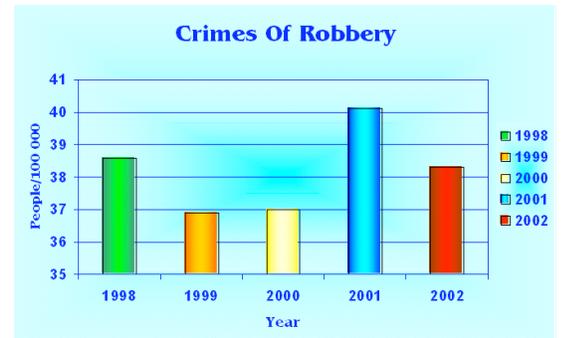
Q2: The graph to the right is a bad graph. What parts is it missing?
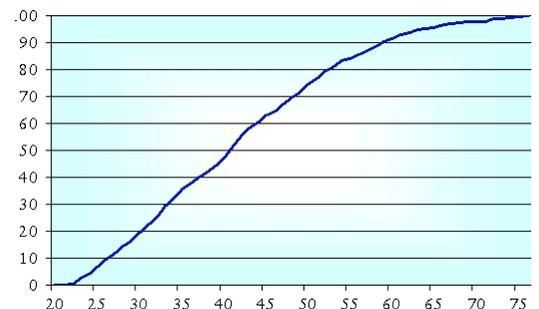
A few rules and tips for graphing

1. Always use a **pencil** to draw your graph!  It's easier to erase pencil.  (or use Excel!)
2. Always draw lines with a **ruler** – do not freehand!  Use the entire piece of graph paper.
3. Make sure your independent variable is on the x-axis and the dependant variable is on the y-axis.
4. Include all the following parts
    a. Title
    b. Axis labels
    c. Legend (or key)
5. If you are graphing multiple subjects, use different colored or patterned lines (and explain what they are in your legend!)
6. Choose an appropriate graph to explain your data.  See examples below.
    a. Line – measuring a change in something over time
    b. Bar – comparing individuals to each other with only one data point, can be used to measure a change over time (but can not show gradual change)
    c. Pie – show percentages that add up to 100% (rarely used)

Be careful how you present your data!
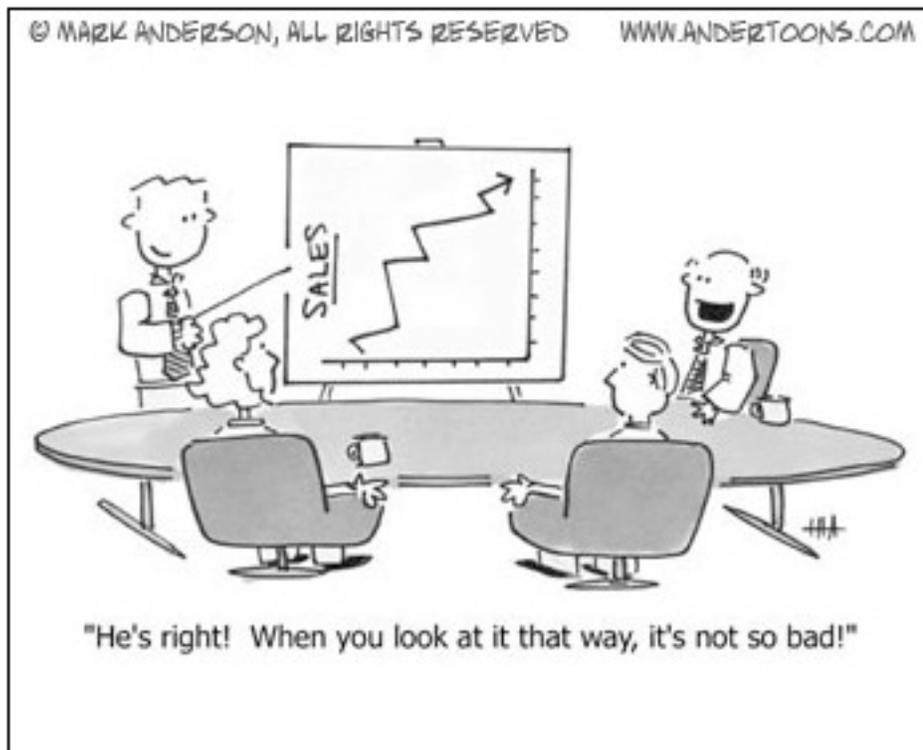
Ready?  Lets Graph!

**Experiment 1 – Use the following data to create an appropriate graph and answer the questions. (graph "paper" on next page)**

Q3:  What is the dependant variable?  Why did you pick that answer?

Q4:  What is the independant variable?  Why did you pick that answer?

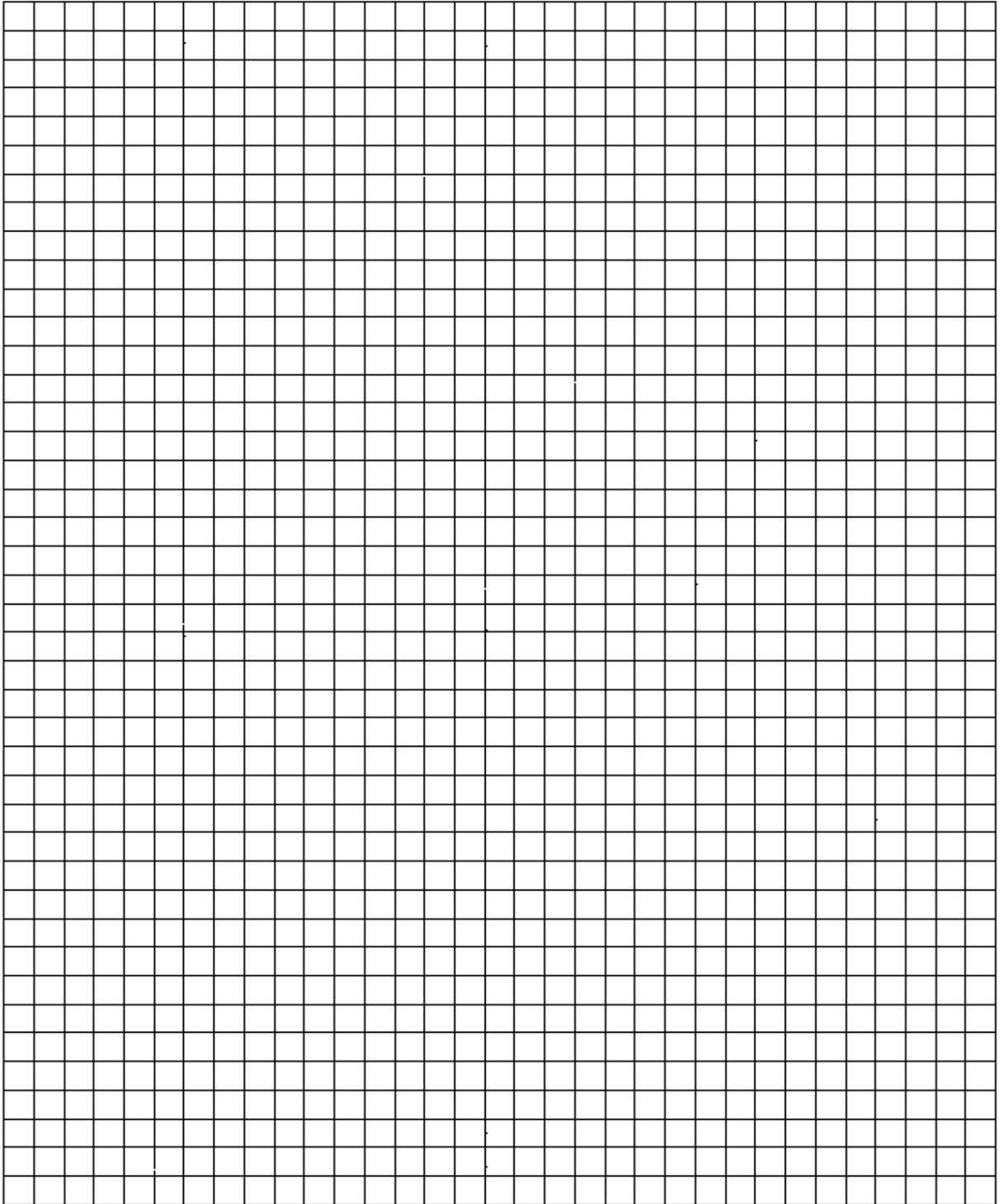| Depth (in meters) | Bubbles per minutes Plant A | Bubbles per minute Plant |
|---|---|---|
| 2 | 29 | 21 |
| 5 | 36 | 27 |
| 10 | 45 | 40 |
| 16 | 32 | 50 |
| 25 | 20 | 34 |
| 30 | 10 | 20 |

Q5:  What type of graph would be best for this data?  Why did you pick that answer?

Q6:  What title would you give this graph?

Q7:  What information would you include in the legend of your graph?

Q8:  What will you label the X-axis with?

Q9:  What will you label the Y-axis with?

Experiment 2: **Use the following data to create an appropriate graph and answer the questions. (questions on next page)**

Diabetes is a disease affecting insulin producing glands of the pancreas. If there is not enough insulin being produced by these cells, the amount of glucose in the blood will remain high. A blood glucose level above 140 for an extended period of time is not normal. This disease, if not brought under control, can lead to severe complications and even death.

| Time after eating (in hours) | Glucose in mg/dL Person A | Glucose in mg/dL Person B |
|---|---|---|
| 0.5 | 170 | 180 |
| 1 | 155 | 195 |
| 1.5 | 140 | 230 |
| 2 | 135 | 245 |
| 2.5 | 140 | 235 |
| 3 | 135 | 225 |
| 4 | 130 | 200 |
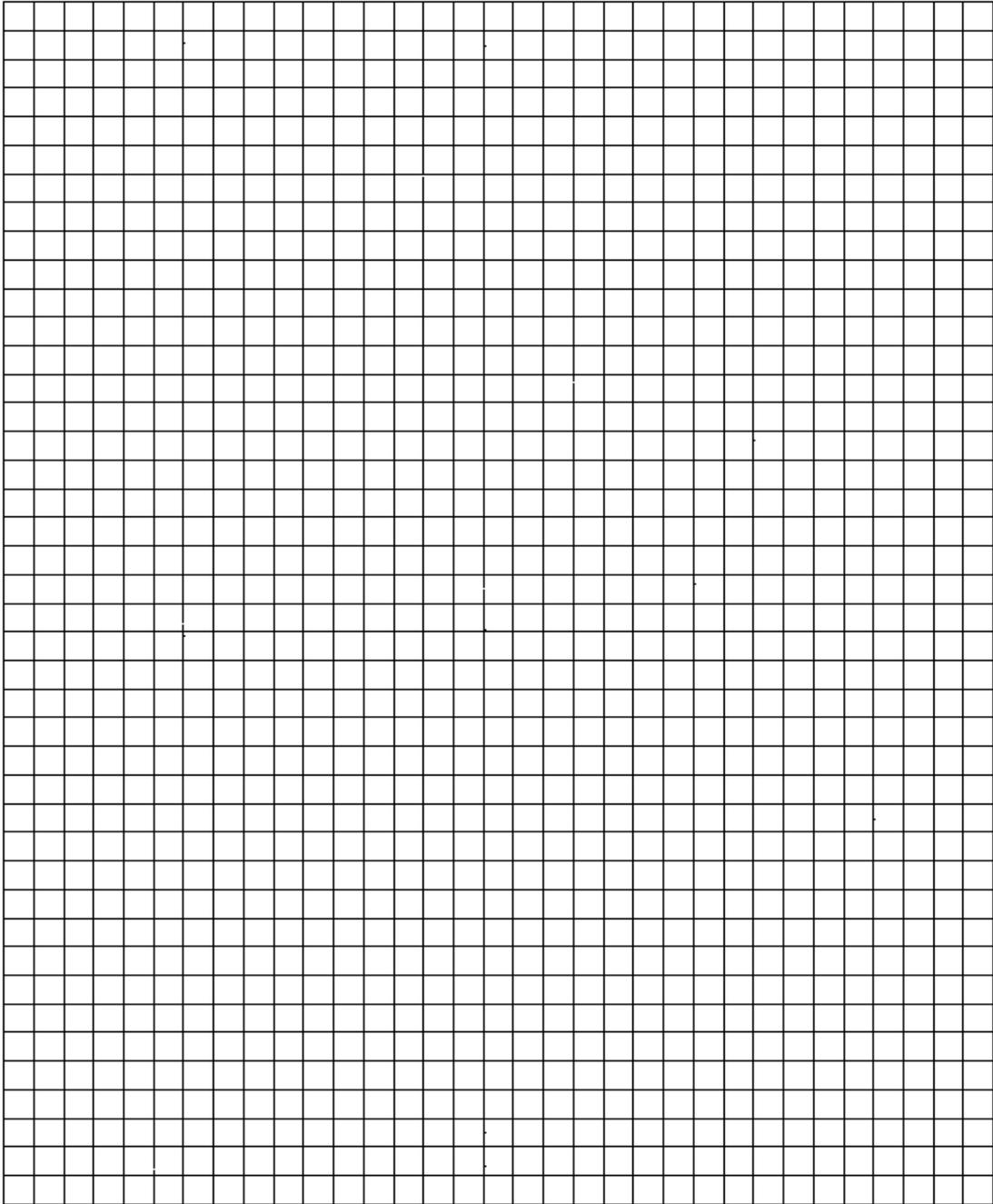
Q10: Which individual would you potentially diagnose as a diabetic?

Q11: What evidence do you have that supports your answer to #10?

Q12: If the time period was extended to 6 hours, what would be the expected blood glucose level for

Person A _____, Person B_____ (asume they do not eat again)

Summary of both graphs.

Q13:  What conclusion can you make about the data and graph for experiment 1?

Q14:  What evidence did you use to support your conclusion?

Q15:  What conclusion can you make about the data and graph for experiment 2?

Q16:  What evidence did you use to support your conclusion?

Q17:  What other type of graph could you have created for experiment 1?  For experiment 2?

Interpretting Graphs

In addition to being able to draw a graph based on data collected, you will also need to interpret data given to you in graph form.  Answer the following questions based on the graphs presented.  NOTE – most of these are NOT examples of great graphs, they are for interpretation practice only!

Identify the graph that matches each of the following stories:

1. _____ I had just left home when I realized I had forgotten my books so I went back to pick them up.
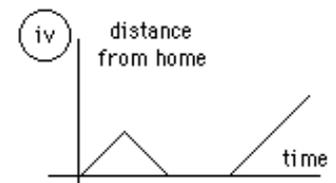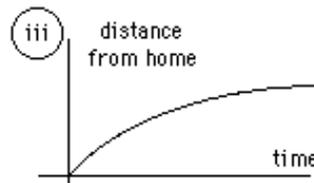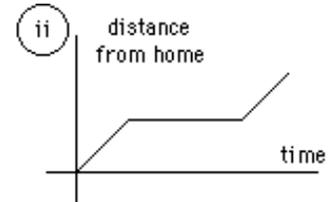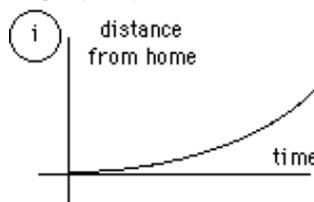
2. _____ Things went fine until I had a flat tire.

3. _____ I started out calmly, but sped up when I realized I was going to be late.

The graph at the right represents the typical **day** of a teenager. Answer these questions:

4. _____ What percent of the day is spent watching TV?

5. _____ How many hours are spent sleeping?

6. What activity takes up the least amount of time?

7. What activity takes up a quarter of the day?

8. What two activities take up 50% of the day?

9. What two activities take up 25% of the day?

17% Talking on telephone

25% Going to school

4% Studying

33% Sleeping

8% Eating

Watching TV
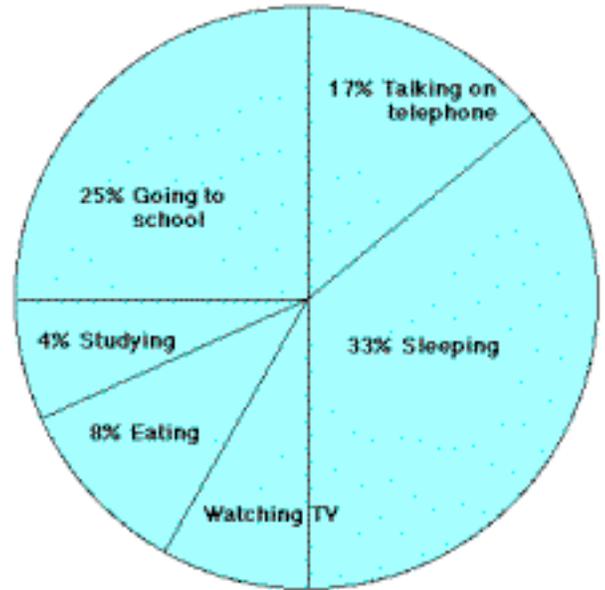
Answer these questions about the graph on the right:

10. How many total miles did the car travel?

11. Describe the motion of the car between hours 5 and 12?

12. What direction is represented by line CD?
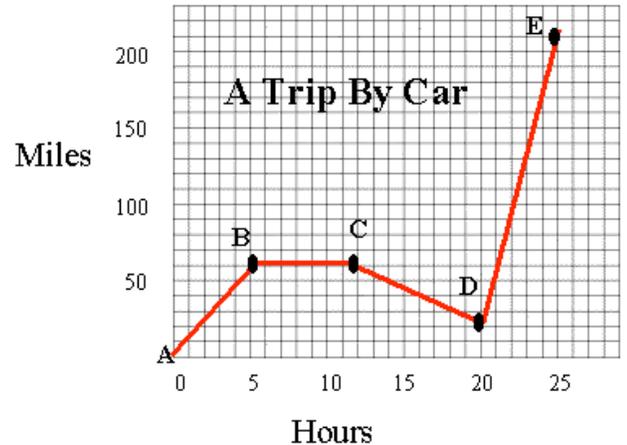
13. How many miles were traveled in the first two hours of the trip?

A Trip By Car

Miles

Hours

The bar graph at right represents the declared majors of freshman enrolling at a university. Answer the following questions:

14. What is the total freshman enrollment of the college?

15. What percent of the students are majoring in physics?

16. How many students are majoring in economics?

17. How many more students major in poly sci than in psych?

Enrollment

Chem   Physics   Econ   Poly Sci   Psych

Introductory Courses
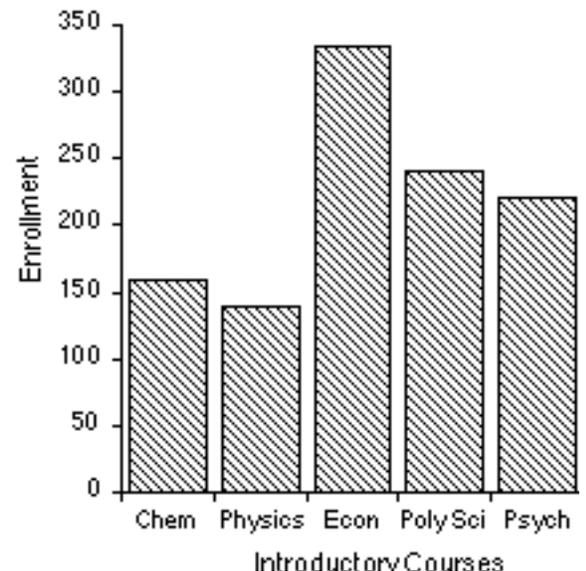
Answer these questions about the graph below:

18. How much rain fell in Mar of 1989?

19. How much more rain fell in Feb of 1990 than in Feb of 1989?

20. Which year had the most rainfall?

21. What is the wettest month on the graph?