

# A&E Academy Research Project



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### Scientific Research Project Timeline and Check-Off List

Check Off	Date Due	Assignment Title	Points Possible
	9/19	<b>Project Introduction</b> (Ag teacher)	-----
	9/22	<b>Research Contract/Parent Letter</b> due to Ag teacher	50
	9/26	<b>Preliminary Work Up</b> due to Ag teacher (page 4)	50
	9/30	<b>Scientific Method Parts I-III</b> due to Ag teacher (page 5)	50
	9/30	<b>Research Source Cards &amp; Note Cards-</b> due to English Teacher (pg. 9)	50
	10/7	<b>Scientific Method Parts IV-V</b> due to Ag teacher (page 5)	50
	10/7	<b>Begin Experiments and Data Collection</b> (p. 6-8)	-----
	10/14	<b>Scientist/Inventor Biography- FIRST</b> biography draft due to History teacher (on person from the industrial revolution era) (p. 13-15)	75
	10/14	<b>Lab/Field Log Books Due – First check</b> , due to Ag (separate grade)	-----
	10/31	<b>“Introduction”, “Objectives/Hypothesis”, &amp; “Methods &amp; Materials”</b> due to Ag teacher (p.6-7)	50
	11/6	<b>Conclude Experiments</b> – All experiments should be concluded <b>NO LATER THAN THIS DATE</b> (earlier is acceptable)	50
	11/7	<b>Lab/Field Log Books Due– Second check</b> , due to Ag (separate grade)	-----
	11/14	<b>Completed Research Paper- FIRST</b> draft due to Ag (100 points) and English teacher (100 points) ( <i>Print TWO copies!!</i> )	200
	11/16	<b>Graphs and Methods/Materials Chart-</b> due to Math Teachers	100
	11/17	<b>Scientist or Inventor Biography FINAL</b> biography draft due to History	75
	11/29	<b>Final Research Paper- FINAL</b> draft due to Ag (100 points) and English teacher (100 points) ( <i>Print TWO copies...again!!</i> ). All papers must be turned into <b>Turnitin.com</b> prior to giving them to your English Teacher.	200
	12/1	<b>Display Board</b> due to Ag teacher; <b>Oral Presentations</b> begin (random)	100
		<b>Total Points</b>	<b>1100</b>
		<i>Extra Credit based on participation in Annual Agri-science Fair Competition (50 points per competition)</i>	150 pts Max

*A&E Project: Definitions*

Name: \_\_\_\_\_ Date: \_\_\_\_\_ Period: \_\_\_\_\_

Before you begin examining this packet please write definitions for the words given below & keep it handy as a reference.

1. Internal Documentation:
  
2. Hypothesis:
  
3. Statement of Authenticity:
  
4. Writing in 3<sup>rd</sup> Person Past Tense:
  
5. Facts vs. Opinion:
  
6. Credibility:
  
7. **I Proved It!!!!:**
  
8. Literature Cited:
  
9. Tables vs. Graphs:
  
10. Variable:
  
11. Control:

*A&E Project: Preliminary Work- Up*

Name: \_\_\_\_\_ Date: \_\_\_\_\_ Period: \_\_\_\_\_

General Research Area \_\_\_\_\_

Specific Area of Interest \_\_\_\_\_

Take time to think of several ideas or experiments dealing with your specific area of interest. Then **choose a problem**.  
**Use another sheet of paper if needed.**

1. List several problems dealing with the factor you chose to test.
  - Be sure your problems are worded as questions that have limitations and can be answered with a “yes”, “no” or a number.
  - Avoid problems that might involve danger or those areas you would **NOT BE ABLE TO TEST** in a limited amount of time (3 weeks).
  - a. My suggested problems for the project are (list at least 3):
  
2. Develop the problem you consider the best one by answering the following questions (**use additional paper if needed**).
  - a. What problem do you consider the best (the one you wish to do your paper and experiment on)?
  
  - b. What hypothesis would you suggest for this problem?
  
  - c. Describe the steps of an experiment that will supply data to either support or contradict your hypothesis.
  
  - d. What is your experimental variable (you need to keep it to 1).
  
  - e. List the precautions you will take to limit other variables.
  
  - f. What is your experimental control?

***A&E Project: Scientific Method of Investigation***

**Name:** \_\_\_\_\_ **Date:** \_\_\_\_\_ **Period:** \_\_\_\_\_

Complete the following steps on another piece of paper.

- I. My scientific problem is:
  
- II. Review of related literature: (You must have at least 5 different sources that support your research project based upon your hypothesis. Make sure you record these in the format described on the page that say “Literature Cited Examples”).
  
- III. My experiment involves..... (write down a general statement describing your project):
  - a. Make sure to identify what the experimental variable is.
  - b. Make sure to write down the steps being taken to limit the variables to one
  
- IV. My hypothesis is:  
If \_\_\_\_\_  
Then \_\_\_\_\_
  
- V. Design your experiment (List every step in extreme detail).
  
- VI. Prepare an experiment proposal (List all equipment and supplies needed).
  
- VII. Collect data and record it in a lab/field book. Photos, tables, and graphs are good ways to collect data.
  
- VIII. Make observations of the successes and the problems encountered while conducting the experiment. Be sure to record these observations in your lab/field book.
  
- IX. Form conclusions and record them through out your lab/field book.

**A&E Project: *SAMPLE of the research paper and its structure***

**\*Research Paper General Requirements:**

- Use MLA format
- Must be typed in Times New Roman or Arial font, size 12
- Write in 3<sup>rd</sup> person, past tense
- Must use internal documentation to site the sources of information

**\*Title Requirements:**

- Should be centered at the top of the paper
- The title of the paper should be written as follows:
  - The Effect of \_\_\_\_\_ on \_\_\_\_\_.

**\*Introduction Requirements:**

- **3 paragraph minimum and 3 of your 5 references should be cited in these paragraphs**
- *First sentence of the introduction should say:*
  - Research has shown there is \_\_\_\_\_ (Johnson & Ford,1972).
- *The last sentence of the introduction should say:*
  - This study was the basis for an experiment in which the effects of \_\_\_\_\_ were tested on \_\_\_\_\_.

**Example of the Introduction Section:**

*(Disclaimer: this is a “real” student example - remember examples aren’t perfect they’re just example!)*

**Introduction**

Scientists have shown there is a special design behind bridges that makes them strong and work properly for their purpose. In today’s society, people use bridges every day to get to work, school, or just out for a drive. Bridges have become an important part of every day society; they connect one city to another and make it possible to travel from one place to another with hardly any stress. With the many different types of bridges now in use, each one was designed for a specific purpose and job. For example, the Girder bridge was design to carry railways more that motorways. However, bridges are not a new invention of the modern world, bridges have be around for many centuries before modern day society.

One of the first bridges made and used was a Timber Bridge. A Timber Bridge is a simple bridge that can be constructed anywhere and moved to a river where it is assembled (V. Ryan). “In the early days of bridges they were made from wood grown locally. Today these types of bridges are still popular but are factory made”(V. Ryan). Meaning that the bridges are made in a factory, then disassembled and transported to area where the bridge is to be used.

Testing the strength of bridge design is import to there success. Most idea’s that a scientist come up with for a better bridge design must be tested and put under a series of trial test to conclude that the design of the bridge it safe enough to be used. This study was the basis for an experiment in which the effects of a well-designed bridge tested for it strength against the pull of gravity and the pressure of the downward push on a bridge as an object passes over it.

### **\*Objective/Hypothesis Requirements:**

- *1 paragraph minimum*
- *The first sentence should be:*
  - The objective of this experiment was to determine the effects of \_\_\_\_\_ on \_\_\_\_\_.
- *The last sentence is the hypothesis in an if/then form:*
  - The hypothesis is if \_\_\_\_\_ then \_\_\_\_\_.

### **Example of the Objective/Hypothesis section:**

#### **Objectives and Hypothesis**

The objective of this experiment was to determine the effects of well-designed bridges and which one was the best design. Each bridge design used was a common bridge that can be found in most places of the world. The testing of the bridges was to determine which bridge design held the most weight. Also observed in the experiment was the bridge design that had the least amount of damage after it was failed in the test. Although this was not a factor in the experiment, it was interesting to see where the bridge design failed and broke under the weight of the sand. If the bridge design with most wood used to the maximum wood available, then it would be the strongest bridge constructed.

### **\*Methods and Materials Requirements**

- *2 paragraphs minimum*
- Remember that the example below is just an example, and current scorecards for the A&E Academy Research Project competition awards more points for a methods and materials section that is written in a paragraph form. Therefore, you will be required to present this section in two formats: a LIST form (like a recipe) that will be due to your Math Teacher, *and* in PARAGRAPH form to your Ag Teacher.

### **Example of the methods and materials section in LIST form (an actual chart/table should be used here:**

#### **Methods and Materials**

The methods used to test the four designs of bridges were:

1. First the four designs of bridges must be constructed with the amount of material available
  - bridges could not exceed a volume of 2 ½" X 3 ½" X 12"
  - two bridges of each design were built
  - each bridge can not exceed four pieces of ¼" by 36" long pieces
2. Once the bridge was complete, it is placed over a gap with the bridge over lapping the edges of the gap by 1"
3. Then an I-bolt was placed through the bridge (from bottom to top and in the center of the bridge), and anchored with a nut and a washer at the top of the bridge with a large metal plate that covered at least the width of the bridge
4. Following that, a bucket would be hung from the hook part of the I-bolt, and was to be filled with sand (using a small cup) until the bridge failed
5. To conclude the experiment, the bucket (before emptied) would be placed on a scale and the weight at which the bridge tested failed would be recorded in a field book

6. After the experiment of one bridge was concluded, the remaining bridges were tested and the weights at which they failed would be recorded
7. After all the bridges had been tested, the weights at which the two bridges of the same design failed would be averaged out to receive a more accurate measure
8. The averages of all four designs would be placed in the Bar graph, Pie chart, and be placed in a chart or graph showing a comparison of all four designs

Materials used in this experiment were:

- 32 pieces of ¼" X ¼" X 36" balsa wood
- 1 I-bolt with nut and washer
- 1 bucket (size did not matter as long as it could hold 20 lbs. of sand)
- 1 large metal plate (larger than 2 ½" X 2 ½")
- 2 pieces of 4" X 4" X 12" wood (at least 4' to 5' off the ground and 10" apart)
- 1 bottle of glue (any kind as long as the same glue is used on every bridge)
- 1 50 lbs. bag of sand that could be used over again for the testing of each bridge
- 1 small cup the size of your average coffee cup

**For the PARAGRAPH form:** Same content as above, but written in paragraph form, similar to a recipe's instructions.

**\*Results and Conclusion Requirements:**

- **3 paragraphs minimum**
- The results paragraph should simply state the actual results that you collected and recorded in your field book
- The conclusion should be two paragraphs.
  - The first paragraph should summarize the introduction.
  - The second paragraph should state that the hypothesis was either supported or rejected by the experiment. There should also be reasons as to why that conclusion was made.

**Example of the Results and Conclusion Section:**

**Results**

The results for this project have shown that in a bridge design, trusses do matter; however, the amount of wood in a design does not matter. Among the four designs of bridges built, the triangle bridge was the strongest. The triangle bridge held an average weight of about 68.5 pounds. Second strongest was the truss bridge with an average weight of about 50.5 pounds. Finally, the weakest design was the square bridge with no trusses in the structural design and with its average weight at about 14.2 pounds.

These results answered the question of whether or not a truss matters in a bridge design. They also have shown the hypothesis to be wrong and that the bridge with the most wood involved was not the strongest build. In the Triangle and Truss Bridges, the designs that included trusses strengthened the structural integrity and made the bridges capable of holding more weight. Because of this, trusses have become the most important element in bridges today. They strengthen the bridge and make it strong enough to hold the heaviest of loads.

**Conclusion**

Over all, bridges are the very bloodlines that continue to connect the world and bring the people together through trade today. They have been used since the dawn of our ancestors and have developed into different sizes and shapes to span what was once

thought to be inconceivable. Each type that has been developed has been put into use with its own purpose. Every one that was developed was built to be bigger and stronger than its predecessor.

Although there is a number of different bridge designs throughout the world today, most of them have been built with the truss in mind. Trusses are the backbone of any bridges they are used in. As the experiment proved, bridges that have trusses in their structure are much stronger than a bridge design without them. They hold more loads and strengthen the bridge entirely. Without the invention of the truss, bridges would not be far along in development, even if they existed. But with the invention of a truss, bridges have gone further, become stronger, and linked our world together ultimately for the benefit of mankind.

**A&E Project: Research Instructions for Ag Academy Projects**

Name: \_\_\_\_\_ Date: \_\_\_\_\_ Period: \_\_\_\_\_

- Remember the 3/5 rule.... This means you cannot get all of your information from the same place. For example, you can use 3 internet sources and 2 books, but not five internet sources or five books.
- The following format was taken from the Holt English textbooks so you may use your textbook for more explanation or examples.
- You may print information off of the internet or take as many notes as you want, **but you must turn in your notes for grading in the following way:**
  1. Using 3 x 5 cards make a source card for each source you are going to collect information from. To make an appropriate source card you need to do the following:
    - a. Assign each source a different number.
    - b. Record full publishing information in the same format you will record it on your Literature Cited page (see the Literature Cited examples in the Science Fair packet for help with the formatting)
    - c. Annotate each source. This means you should write a short description of the important information you are learning from this source
    - d. Write down the call number (for library sources). This will be helpful if you need to find the source again.
  2. Using 3 x 5 cards, record facts and interesting information that you collect from your sources.
    - a. In the top, right hand corner of the 3 x 5 card write down the source number (from your source cards).
    - b. In the top, left hand corner of the 3 x 5 card write down the main idea of your notes.
    - c. Write down the information you want to record
      - i. Information should be summarized in your own words and not copied directly from the source
      - ii. If you get more than one fact from a source (which you probably will) use a separate 3 x 5 card for each fact.
    - d. In the bottom, right hand corner write down the page number where you found the information

**SAMPLE Source Card**

1
Beers, Kyleene. Odell, Lee. Holt Literature and Language Arts. Austin: Holt, Rinehart, and Winston, 2003
This source contains information on the proper way to create source cards and research note cards.
Call Number: Not applicable

**SAMPLE Note Card**

Source Card Structure	1
Source cards are used to keep track of important information regarding each different source a researcher is using. Source Cards are really helpful because they make it so the researcher knows where they got all of their information and what has to go on the Literature Cited page.	
	Page Numbers: 531-537

## Works Cited Examples

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### **A Book with One Author:**

Aaron, Daniel. Men of Good Hope. New York: Oxford University Press, 1980.

### **A Book with Two Authors:**

Johnson, James C. and Ford, Ann. Mayan Numbers. Palo Alto: Dover Book Co., 1987.

### **A Book with an Editor:**

Adams, Robert C.,ed. Chief Pre-Shakespearean Dramas. Boston: Houghton Mifflin,1956.

### **An Encyclopedia Article:**

“Alamo.” The World Book Encyclopedia, Volume1. Chicago: World Book, Inc., 1995.

### **An Interview:**

Fritz, Ted Co-Publisher/Editor. The Bakersfield Californian, Bakersfield, California, Personal interview, May 3, 1999.

### **A Video:**

Paris.(VHS). Houston, Texas: Travelview International, 1992.

### **A Television Program:**

60 Minutes. CBS Television, KERO TV, Bakersfield, California, January 7, 1997.

### **A Pamphlet:**

Tribes of Western America. A pamphlet form the Bureau of Indian Affairs, Washington, DC, 1989.

### **A Newspaper Article:** (if the writer’s name id given, it goes first).

“The Sacrificing of Water for Coal in No Solutieon.” Los Angeles Times, October 4, 1988,Sec. II, P. 8.

### **A Magazine Article:** (If the writer’s given, it goes first).

“The Storming of the Alamo.” American Heritage, Vol. XII, No. 2, (February, 1979), pp.40-44.

### **A Web Cite:** Write the address.

Alphabetize your literature cited by using the top line of information. This will usually be an author’s or editor’s last name. If there is no author or editor, use the first word. Always drop “the”, “a”, and “an” from the title when alphabetizing.

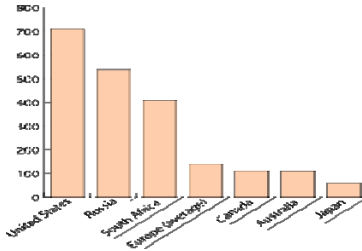
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**A&E Project: Instruction and Requirements on Charts and Graphs (Math)**

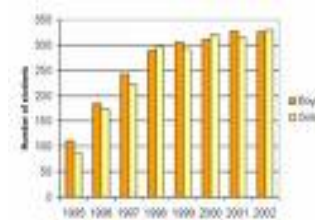
Name: \_\_\_\_\_ Date: \_\_\_\_\_ Period: \_\_\_\_\_

There are several different types of graphs that can be made to show data or relationship and you can use any of these graphs to show a comparison. Make sure that okay all graphs with your math teacher and/or your agriculture teacher before you the time developing them. Remember: you must have one *Bar Graph* or *Circle Graph/Pie Chart* and one graph that shows a comparison. Your third “graph” will be the Methods and Materials chart.

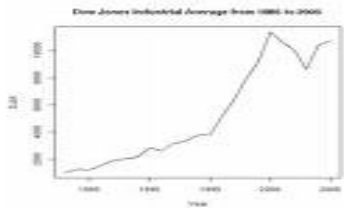
**BAR GRAPH** (Used to compare amounts)



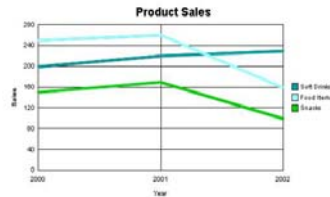
**DOUBLE BAR GRAPH** (show comparisons)



**LINE GRAPHS**(Shows changes over time)

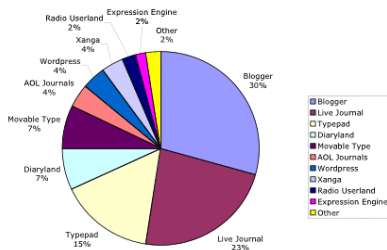


**DOUBLE/MULTIPLE LINE GRAPHS**



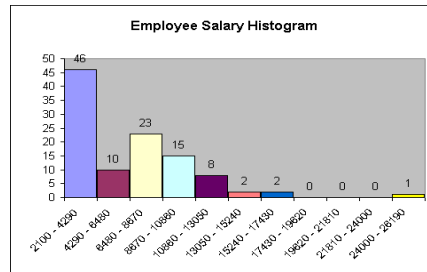
**CIRCLE GRAPHS/ PIE CHARTS**

(use % to represent parts of a whole)



**HISTOGRAMS**

(bars show frequency of data.)



**For all graphs:**

1. Make sure that you choose an appropriate scale so that the graph is neither too big for your paper/ screen nor too small to read.
2. Check to see that you have labeled each variable in the graph (in other words, both axes must be labeled with its corresponding title).
3. If a legend is required (i.e. in comparison graphs), it must be present and labeled.
4. Pie charts are strongly NOT recommended for comparison graphs.
5. Finally: Make sure your graph is relevant to the research you are doing and that each graph represents what you say it represents!
6. For instruction on how to create a graph in excel, use the following steps. For more information, contact Miss Mellen or any other teacher trained in excel graphing!

## Steps to creating charts & graphs in Excel:

**Step 1 - Launch Excel** - If Excel is already open on your workstation open a new Excel workbook. There are three ways to do that.

1. Go to the Standard toolbar. Click on the **New Workbook**



2. Go to the **File** menu. Select **New**:



3. Use a keyboard combination: on a Macintosh use **Command + N** and on a Windows computer use **Ctrl + N**

**Step 2 - Enter the data to be graphed.** For the purpose of this lesson you will use data from a Favorite Fruit Survey. Enter it as you see below:

	A	B
1	Fruit	Number
2	Apple	8
3	Orange	4
4	Banana	3
5	Grapes	5
6	Peach	3
7	Pear	1

	A	B
1	Fruit	Number
2	Apple	8
3	Orange	4
4	Banana	3
5	Grapes	5
6	Peach	3
7	Pear	1

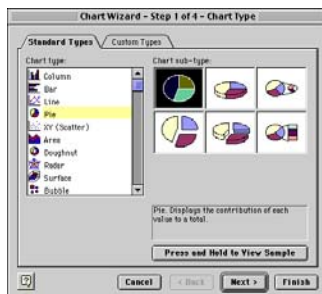
**Step 3 - Highlight data to be graphed.** Do not include the row with heading titles, only the names of fruit and the numbers. If your worksheet looks like the one above; put your cursor in cell A2, click hold the mouse button down and drag to cell B7. Highlighted data should look like the data above right. *Note: Cell A2 is selected, the select color extends around the cell*

**Step 4 - Select the Chart Wizard.** That is done by going to the **Insert** menu and selecting **Chart**. You can also click on

the **Chart Wizard** button on the Standard toolbar.



**Step 5 -** From the Chart Wizard box that opens select Chart type. For this activity, I selected pie. (But you can select bar, line, double bar, etc)



After you have selected the Chart type, click and hold your mouse pointer down on the **Press and Hold...** button to see what your data looks like in the chart type you selected. If you do not like the look, select another chart type. After you have selected the chart type you will have two options:

- Select Next and let Chart Wizard show you a series of options to make changes to your chart.
- Select Finish and Chart Wizard puts your completed chart on the spreadsheet. [You can see the finished product below.](#)

The second step taken by Chart Wizard is to verify the range of data being used for this chart. The Data range displayed below is read "all cells from A2 to B7."

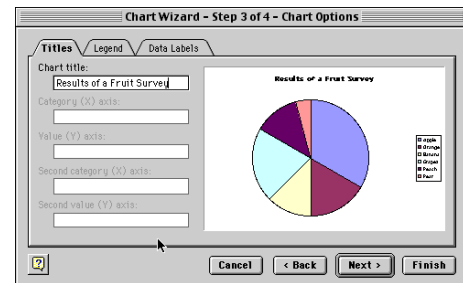


Notice where the cursor is located in the dialog box above. It is pointing to the small box at the end of the line where the Data range is displayed. If the data range should be changed, click on the box.



The dialog box shrinks allowing you to see your entire spreadsheet. You can edit the data range in this small window. When you are finished, click the same box at the end to restore the window.

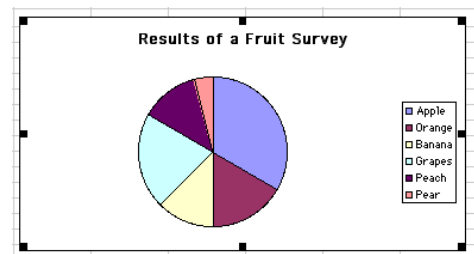
Select **Next** to go to the dialog box below. This box allows you to add a title to the chart, make changes on the legend, or make changes on the data labels.



Select **Next** to move to the final dialog box which allows you to see the chart as a new sheet or place it on one of the sheets in your workbook.



If you let the Chart Wizard finish your chart after the first dialog box, or work through each of the four steps, your chart will look something like the one below.



## Historical Biography

For your history portion of the Agricultural Science Semester Project, you will be responsible for doing a one and a half page paper on an inventor or scientist who is relevant to your particular Science Fair Project. For instance, if you are doing a science fair project that deals with vaccinations you might want to do a report on the scientist Louis Pasteur or if you are doing a project that deals with electricity you may want to use the inventor Thomas Edison.

***Your report should include 5 separate segments about the individual, the first of which will be his or her background.*** You will start your first paragraph off with a leading sentence that should grab your readers attention that can be in the form of a question, could be an interesting fact about your person, or even a quote that they made. (Example of this would be: “Abraham Lincoln once described himself as an ordinary man with an extraordinary story.”) ***In the rest of this paragraph you will go on to describe why this person is important and finally in the last sentence you will give us your thesis statement, which will basically lay out what your essay is all about.***

***Your next paragraph will be about the early life of this individual.*** Answering such questions as date and place of birth, what was their family life like, and if they had any early influences or traumatic or important events happen at this time.

Then in ***the third paragraph you will discuss their how much education they received if any at all.*** What they chose to study while attending school. Who were they motivated by and what were some of their major interests at the time.

In the ***fourth paragraph we will deal with any major contributions and achievements they’ve made.*** You need to discuss any significant findings that they have made in or outside of their field and what were some of the long lasting effects of their inventions or scientific developments.

And in the ***last and final paragraph you will summarize basically what your essay was all about.*** You will simply repeat some of the key points you made in your paragraphs and in your final sentence you will sum up your overall statement for the essay.

***Your essay must be a total of at least 5 paragraphs with at least 3-5 sentences in each paragraph and should follow the format given above. The first draft will be due on the 15<sup>th</sup> of October and the final draft on the 9<sup>th</sup> of November.***