Mathematics: The Language of STEM
Data and Graphs Project
Tanya Kempton

CONTENT AND TASK DECISIONS

Grade Level(s): 7th grade (variations of this for 6th or 8th grade could be used)

Description of the Task: Students will take a survey of the class and model their findings with a frequency table, circle graph and pie graph. Students will find the measures of central tendencies and present their findings to the class. This project will take approximately 5 days in about a 50 minute class period.

Indiana Mathematics Content Standards: 7.DSP.3 Find and interpret measures of central tendency for numerical data from a random sample; 7.C.6 use proportional relationships to solve ratio and percent problems; 7.C.7 Compute with rational numbers fluently

Indiana Mathematics Process Standards: PS.4 - Model with mathematics (students will be graphing a circle graph and a bar graph) PS.5 - Use appropriate tools strategically (students will be using a protractor and compasses to construct their circle graphs) PS.6 - Attend to precision (students will need to be precise with their calculations on finding the pie sectors) (graphs need to be even increments and measured precisely) (findings of the central of measure tendencies need to be accurate)

Mathematics Content Goals: State your specific mathematics goals for students' learning in this lesson. Goal #1- For students to be able to make a circle graph with the proper formula and properly use a protractor. Goal #2 - To review the proper way to make bar or line graphs with a frequency table and proper increments. Goal #3 - To review the measures of central tendency. Goal #4 – To understand a random sampling

Language Objectives: Students will understand the meaning of a frequency table. Students will understand the purpose and meaning of a survey. Students will understand the meaning of mean, median, mode and range.

Materials: Classroom list, Poster Board, white or colored printer paper, colored pencils, markers, glue, protractor, ruler.

Data and Graphs project by taking a Survey of the class and displaying their findings on a poster board

Before:

- **Activate prior knowledge -** Ask the students these questions and discuss their answers together with the class; How many have ever taken a survey? How many have every made a bar graph or a line graph? How many have used a frequency table to make a graph? How many have used a protractor? How many know the meaning of measures of central tendency?

- **Be sure the problem is understood -**Tell the students that they will be taking a survey of the class and displaying and presenting their findings to the class. The survey that the students will be conducting; will be chosen by the student and their partner. The question that the student comes up with needs to be answered with a number. The question will need to be approved by the teacher before conducting the survey. The teacher will provide several mini-lessons at the beginning of three classes. The first min-lesson will be on making a frequency table and making a bar graph from that data. The second mini-lesson will be on measures of central tendency. And the third mini-lesson will be on making a pie graph from a set of data. (I usually take my own survey of each class and then go through the steps of what they will be doing on their project) I also have example projects from the previous year to show them.

- **Establish clear expectations** Let the students know that they will be finding the mean, median, mode and range of their data. They will also be making a frequency table of their data. The student will then be using their frequency table to make a bar graph and a circle graph. All of this information will be checked by the teacher before making their final draft. The rough draft will be turned in with the final draft on the back of the poster. After they have finished their poster they will be presenting their findings to the class.

During:

- **Let go- 1st day -** Pass out the Graph and Project data description to each student. Have them get with their partners to decide what question they will be asking on their survey. (There are suggestions of topics on the description sheet) Once they come to an agreement on a topic/question they are to come to the teacher to get it approved and make sure the question has a number answer and is appropriate. (no group may have the same topic) When they are approve the student will get a class list from the teacher and the students will be asking each student the question and writing down each person's answer next to his/her name. This part will probably take a class period.

  2nd day – At the beginning of the next class period the teacher will provide a mini lesson making a frequency table and making bar graphs from the data. Once they have the data then they can work on the rough draft. The first item they will be making is the frequency table. The increments might be going up by one or every five, depending on the range of their data set. This is important that they get the right increments and the numbers are even and do not overlap. They should have their frequency table checked before they start making their bar graph.

  3rd day- At the beginning of class provide a min-lesson on measures of central tendency; mean, median, mode and range. The students may then get with their partners and continue with their left off from yesterday.

  4th day- At the beginning of class provide a mini-lesson on making a pie chart from the data set. The frequency table should be used not only the bar graph but for the pie chart also. Show them how to calculate the number of tally's into a percentage and then multiply by 360 to get the degree angle of the pie sector. Show them how to use a compass to get the measure of the angle. Then have them get with their partners and continue working on their project.

  5th day- Have them get with their partners right away and work the whole period. Teacher needs to be walking around the room helping students with their questions. Many students will need individual help with the pie graphs.

6th day- Students will start right away working with partners. They should have everything approved on their rough draft and should be working on their final draft.

7th day- Students will start right away working with partners. They should be finish up their projects and talk about what they will say to the class when they present their findings.

- **Listen actively-** Teacher will be actively walking around the room listening to students and answering student's questions.

- **Provide appropriate support** - Some specific questions that the teacher might ask to help students that are stuck; What is the range of your set of data? How many bars do you think would be eye-appealing for the graph? What would be your labels? How many degrees does a circle make? Does that make sense? What do you think would be good intervals for your set of data?

- **Provide worthwhile extensions**- If students get finished early they could look up on the internet if there is any other data on this same particular question that they have asked the class. Or could have the students who finish early make another type of graph from their data set.

After:

- **Promote a mathematical community of learners-** Students will present their findings to the class. Other students will be able to ask questions to the presenters when they are finished presenting their project.

- **Listen actively without evaluation** - Listen to each pair of students as they present their projects. Have students clap when they are finished.

- **Make connections-** Ask questions of the students after they are finished presenting their projects. Try to make connections to real-life meaningful situations that pertains to their data set.

- **Summarize main ideas-** After everyone is finished presenting the teacher will ask the students what they have learned through this whole project. The teacher will then talk about the importance of graphs and the correct way to display information.

ASSESSMENT

Observe: The teacher will be walking around the room observing students and gathering specific evidence of mathematical understanding as she asks questions and answers questions. This will be happening every day as the students start progressing in their project.

Ask:

- How are you going to come up with your intervals for your bar graph?
- What are the measures of central tendency?
- What calculations do you use to get the degrees of the pie sector?
- How do you make a frequency table and what is the importance of a frequency table?
- What do you use to make your bar graph and your pie graph?

Data + Graph Project

Kempton's Class

1. You and your partner are to conduct a poll of all your classmates.
2. Arrange the information in a frequency table.
3. Make two graphs of the information. One of the graphs needs to be a circle graph with correct calculations. The other one a bar graph, line graph or pictograph.
4. Find the mean, median, mode and range of the data.
5. Make a rough draft with pencil before using colored pencils and colored paper. The rough draft is to be approved by the teacher before starting the final draft. The rough draft will be taped on the back of the poster when finished.
6. Create a display of #2, #3, and #4 on the front of the poster board.
7. Present your findings to the class.

Your topic is: _____

Names in Group: _____

Suggestions for topics:

1. Height
2. Age of one of the parents
3. # of hours you watch TV/week
4. # of people in your household
5. # of hours you sleep per night
6. # of states you have visited
7. # of cans of soda you consume per week
8. # of hours you do homework per week
9. # of hours you exercise per week
10. # of hours you read per week

You may submit your own idea for a topic to the teacher for approval.

This project will be worth 30 points. You will be graded on neatness, accuracy, creativity, completeness and presentation. Each category is worth 6 points each.