

Survey & Graph

A graph is also worth 1000 words!

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CONCEPT: Statistics **GRADES:** 5–7

SKILLS: Conceptualizing a survey, collecting data, and creating a poster-graph

MATERIALS: Student Activity Sheet of sample picture graphs (page 55), poster paper, colored markers, construction paper, and miscellaneous poster making materials

DESCRIPTION

In this project, students pose a question that is interesting to them, then design a survey to collect data regarding their questions. Students then organize, analyze, and portray their data to draw a conclusion (answer) to their question, then create a poster-sized, eye-catching, and persuasive graph from their data.

DIRECTIONS

Surveys, and the graphs representing their data, are an essential tool for all businesses—if you want to know, you have got to ask! We are sold products and services daily based upon surveys, and frequently we are convinced to buy those products by informative, often interesting, visual graphs and graphics that portray survey data.

The study of statistics is not complete without some excursion into surveys and graphs. These early statistical learning experiences should happen when students are most interested in the process of polling other students on issues of interest to them, then using that data to “convince” others of a certain position. Though students from the grades 4–8 can do and enjoy this project, the middle school level—6th, 7th, and 8th grade—is when students are most interested in what their peers think about all sorts of things, so this is an ideal age to do surveys and graphs.

Since the Survey & Graph activity tends to be a long term project, it is best to break the project into steps, and have students check in periodically with a parent as they progress. Here are the steps in completing a successful Survey & Graph project:

1. The best way to introduce projects in Survey & Graph is to show students multiple examples on many different topics, especially those that are most interesting to them at their age. The Student Activity Sheet contains a variety of sample graphs from surveys. Since a graph is meant to both inform and convince, these graphs are good examples since their attention-getting pictorial nature do just that. Hopefully these examples will inspire your students to be equally creative (and convincing) in their graphs. For example, *Figures 1* and *2* invite the viewer to process the information and answer the questions based upon the graphs’ data.

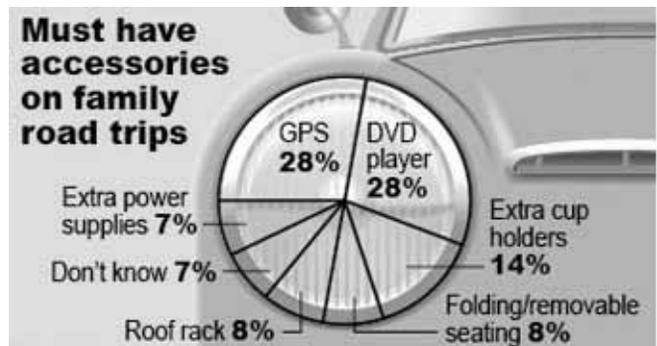


Figure 1

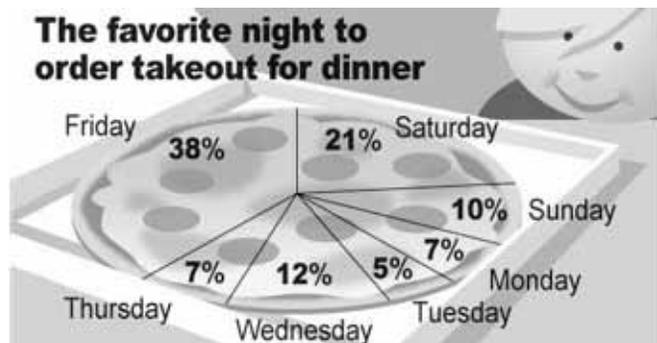


Figure 2

2. It is best to give some careful thought to topics students choose for their initial surveys. After showing students as many examples as possible, do a whole-class brainstorm of possible topics for their surveys. Try to generate and list 20 or more topics on the whiteboard or overhead. This process has two effects: first, students are more likely to get excited about their survey and graph project if they are allowed to choose the topics. Second, this will give you, the teacher, an opportunity to suggest to students which topics will make good surveys and graphs, and which will not, for some (but not all) of the following reasons:
 - Topic is too personal to ask individuals to share or inappropriate for a middle school setting (why are you laughing?)
 - Topic has too few choices (a minimum of three possible survey answers are necessary for a good survey and graph)
 - Survey topic has too many possible responses, which will make creating a good graph difficult
 - Topic is generally not interesting to middle school students
3. This is a great activity for two students to work together to generate the survey design, take the survey and gather data, and then portray that data in creating a graph.
4. Students choose a survey topic, either from those generated during the topic brainstorm, or independently. At the middle school level, all topics chosen by students should be approved personally by the parent!
5. Students then create their survey design: the title of their chosen topic (usually a simple question, e.g. What Is Your Favorite Fast Food Restaurant?); the categories, or questions, they will be asking students to choose from (three to 8 questions or categories max to simplify graphing the data); the number of individual students they will ask for their sample; and the process they will use to take their survey (just their class, multiple classes, at recess, by phone, etc.)
6. Data gathering and survey taking can often best be done outside of class, but if this path is taken, it is best to give students a few days to gather their data. However, at the end of that term, in order to keep students at about the same place in the project, the teacher can ask that students present a brief statistical report of the data they have collected. This can be as simple as the survey sheets the students used to collect their data, to a full data report and statistical analysis. Depending on what you ask students to complete at this step, you may need to give additional instruction in statistical analysis, such as mean, mode, and median.
7. The best graphs are not just meant to portray data but to catch the eye; to entice people to read and interpret them. Students must give some thought to how they will make others want to look at their graph! Have students sketch out a rough graph or diagram of what they think their finished poster-sized graph may look like. This sketch need not be statistically or numerically accurate, but should get students to start thinking about how they will present their survey data interestingly and convincingly. Depending on your students, you may choose to skip this step.
8. Since creative graphs may not all be the same size or shape, you may want to give students the minimum and maximum size they may make their poster-sized graph. Keeping in mind that creativity can involve different shapes, sizes, colors, and even textures, you may want to give your students some limits, and those limits may be tied closely to the materials you can provide to students to make their graphs. You may also want to give students guidelines in the use of color (there is nothing more boring than an all black and white graph).
9. Set some basic requirements for ALL graphs—creativity has its limits. You may want to tell students in advance what their graphs must include. Here are some suggested inclusions:

- The graph's title should be prominent and must be all or part of the major question that was asked in the survey (with some editorial license), along with appropriate scales, labels, etc.
 - A minimum of three categories, hopefully related to the questions asked in the survey, must be displayed in the graph.
 - If you have taught percent, you may require that students indicate the percentage of respondents in each category. If they do not add up to 100%, there should be an explanation provided on the graph.
 - If you have explained about mean, median, and mode (and those measures are appropriate for the graphs), you may require students to list each prominently somewhere on their graph.
 - Students should draw a conclusion from their graph and data, and write that prominently on their graph: "We found that. . ." Depending on the sophistication of your students, there are simple conclusions, as well as conclusions that require higher-level thinking. For example, in the sample graph, Favorite Night for Takeout, a simple conclusion is that the highest percentage of takeout happens on Fridays, whereas a higher-level conclusion might be that more people get takeout on Friday and Saturday because it is a way to celebrate the end of the week!
10. Your completed student graphs should be posted prominently for everybody to see and read. Long-term projects, such as Survey & Graph, take a lot of time and work to complete successfully; displaying them prominently is one way to reward that effort.
11. And last, to get every bit of learning possible out of your classes' Surveys and Graphs, give your students time to walk around and study all their classmates' graphs. To focus their observations, give them a list of questions to answer or a specific goal in their perusal of each graph. You may want to ask them which graph they found most interesting and why, and

which graph they found least interesting and why (a written response). If you wish to push your students a bit, ask them to draw a higher-level conclusion, different from the one written on each graph, for at least five of the graphs they observe.

Survey & Graph is the kind of project that takes a lot of time and work, but includes a great deal of very useful learning. It is a project students will remember! 

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**Survey and Graph:
Sample Graphs**
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