BUILD A SKITTLES GRAPH

OUTCOMES
The student will be able to construct a bar graph with a given set of data. The student will also be able to find the ratio and percent of the data.

GED DESCRIPTORS
Language Arts-Reading
Social Studies
Science
Mathematics
Language Arts-Writing

ROLES
Family Worker Community

PROGRAM TYPE
ABE	Urban
GED	Rural
ESOL	Homeless
Family Literacy	Institutional
Workforce	Corrections

LEARNER LEVEL
3-5

KEYWORDS
754: **Math**
417: **Math** > graphs

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TECHNOLOGY INTEGRATION

STANDARD Use Math to Solve Problems and Communicate

COPS	ACTIVITY ADDRESSES COMPONENTS
Understand, interpret, and work with pictures, numbers, and symbolic information.	The students will create and interpret a bar graph using candy as data.
Apply knowledge of mathematical concepts and procedures to figure out how to answer a question, solve a problem, make a prediction, or carry out a task that has a mathematical dimension.	After building the graph, the students will find percent and proportion for each candy color.
Define and select data to be used in solving the problem.	The data will be limited to the number of candies in a packet of skittles.
Determine the degree of precision required by the situation.	Rounding will be used while finding percents so the total of all colors equals approximately 100%.
Solve problem using appropriate quantitative procedures and verify that the results are reasonable.	The students will discuss alternate ways of graphing the data as well as multiple strategies to approach the task.
Communicate results using a variety of mathematical representations, including graphs, chart, tables, and algebraic models.	The students will create a multicolored bar graph representing the colors of candies in their packet.

BUILD A SKITTLES GRAPH

OUTCOMES	**STUDENT GOALS**	MATERIALS
The student will be able to construct a bar graph with a given set of data. The student will also be able to find the ratio and percent of the data.	Information can be presented in multiple visual formats. Adults need to develop and use chart reading skills in their daily lives and in preparation for the GED exam.	Individual packets of Skittles (one per student) *A Rubric for Evaluating Graphs* Chart paper, markers. calculators Overhead projector, overhead markers *Typical Family Budget* Graph (optional) **NRS EFL 3-5** TIME FRAME 1-2 hours

STANDARD	LEARNER PRIOR KNOWLEDGE
Use Math to Solve Problems and Communicate	The student should have prior knowledge of sorting and rounding. They should also be able to use the calculator. Some background knowledge of graphs, charts, tables and maps.

COPS	**BENCHMARKS**	**ACTIVITIES/CURRICULAR RESOURCES [REAL-LIFE APPLICATIONS]**	**ASSESSMENT/EVIDENCE**
Understand, interpret, and work with pictures, numbers, and symbolic information. Apply knowledge of mathematical concepts and procedures to figure out how to answer a question, solve a problem, make a prediction, or carry out a task that has a mathematical dimension. Define and select data to be used in solving the problem. Determine the degree of precision required by the situation. Solve problem using appropriate quantitative procedures	1.3.3, 1.4.2, 1.5.2 1.3.9, 1.4.7, 1.5.8 1.3.11, 1.4.9, 1.5.10 1.3.12, 1.4.10, 1.5.11 1.3.16, 1.4.15, 1.5.15 1.3.18, 1.4.17, 1.5.17 1.3.19, 1.4.18, 1.5.18 1.3.20, 1.4.19, 1.5.19 1.3.21, 1.4.20, 1.5.20 1.3.23, 1.4.22, 1.5.22	Step 1 - Begin class by reviewing how data can be presented visually. Review graphs and charts Explain that the GED exam will present information in multiple visual formats and it is good to build background knowledge. **TEACHER NOTE** *Steck Vaughn GED Mathematics 200,* p. 186 probability, p. 192 tables, charts, and graphs, p. 82 ratio could be used to form the discussion or authentic resources can also be brought in to represent tables, charts or graphs. Step 2 - Explain that today the group will be working together to create a graph using very specific data. Hand out a blank sheet of chart paper to each student and colored markers. Use the overhead and overhead markers to create an identical graph. Have the students lay the paper lengthwise. Draw the horizontal and vertical axis leaving enough room at the side and bottom for labeling. Step 3 - Pass out packets of Skittles to each student. (2.17 oz packets hold about 50 Skittles) Do NOT eat the Skittles until the graph is complete. They will need all of the candies to finish the task. Have the students count the total number of Skittles in their pack. Write the number on their paper. Next, sort the candies into colors. Once they have sorted into piles, begin to build the graph. The vertical axis will be the number of Skittles. The horizontal axis will be the color. Model the first color on the overhead. For example, lay all of your orange Skittles on the graph. Lay them in a straight column. Number 1, 2, 3, 4, 5, etc. up the side of the graph. Label	Creation of a bar graph including the following elements: title, labels on the vertical and horizontal axis, a bar drawn for each candy color, ratio and percent for each color.

and verify that the results are reasonable. Communicate results using a variety of mathematical representations, including graphs, chart, tables, and algebraic models.	1.3.24, 1.4.23, 1.5.23	the color (orange) under the column. Once the orange Skittles are placed on the graph, trace around them with an orange marker or make a box around them to form a bar. Repeat with the remaining colors. **TEACHER NOTE** Statistics is the science of manipulating raw data into usable information, of organizing and summarizing polls, samples and measurements - the first step is called a *distribution.* Distributions begin as lists of numbers. Once the numbers are organized, generalizations can be made. One way to visualize a distribution is to represent it with a bar graph or pie chart. Step 4 - As the students are working on their graph, circulate through the room and check individual progress. This is a good time to take anecdotal notes about behaviors and skills. Once everyone is finished discuss what the name of the graph should be. Make sure to write the name or title at the top of the page. Emphasize that sometimes the GED exam question can focus on the title. When the graph is complete and the bars are drawn, the students should be able to remove the Skittles and still have a graph on the paper. They may want to color in each bar as they eat the candies. Step 5 - The next step is to find the ratio of each color of candy to the whole amount in the packet. Model for the students how to find the ratio of their first color (orange). If the packet had 52 candies and 12 of them were orange, the ratio is 12 out of 52. It can be written with the words 12 out of 52 or it can be written 12:52. I usually stop here; however, if your students are able and depending on the numbers they are working with, you could reduce the ratios. For example, 12:52 is equal to 3:13. This will work for some of the colors but may not work for all. Continue to find the ratio for all of the colors. Be sure the students are writing them on the graph. This reinforces the skill and gives documentation for the portfolio. Step 6 - When ratios are complete, begin finding the percent of each color out of the whole in the packet. The students will need the calculators to help with this step. Model again the first color for the students. If we found 12 out of 52 Skittles were orange, we divide 12 by 52 (part divided by whole) to find what percent of the Skittles are orange. With the calculator, put in '12 divided by 52 shift equals." Your answer should be 23.076. If we round, 23% of the Skittles in the pack are orange. Continue to find the percent of each color. To check their answers, the total of all the colors should equal 100. When rounding, keep in mind that the total may not be exact.	

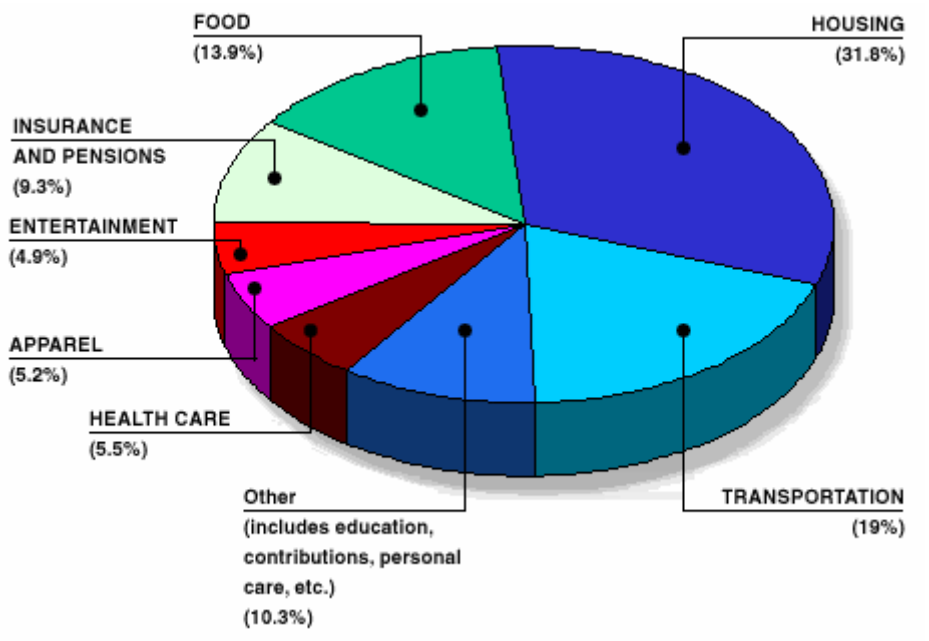
		Step 7 – Students can present their final graphs to the class before collecting the finished graphs to be placed in portfolios. Use *A Rubric for Evaluating Graphs* for the class to peer edit the graphs. **CIRCLE GRAPHS EXTENSION** Introduce circle graphs (pie charts) if students are ready. Transfer each colored bar from the Skittles graph to graph paper (1 sq = 1 cm). Turn the data into circle graphs by cutting the colored bars apart and taping them together, end-to-end into a long strip. Create a circle by connecting the two ends. Find a solid circular form to put this shape around and trace a circle. Mark the colored segments on the circle circumference and draw the pie chart sections from the center of the circle. Color these sections to coordinate with the bar graph segments. Students should discover the connection between bar and pie graphs during this activity. Circle graphs are used to show percentages of a whole and represent percentages at a set point in time. They do not show changes over time. Talk about the parts of this graph including: Title, source, what this graph represents Pass out the *Typical Family Budget* pie graph. Do the percentages of the pie graph add up to 100? This should always be the case and affects the way the data is represented. For example, what percent of the family budget is typically spent on food? Since the pieces total 100%, 13.9% is spent on food. If we know this information we can calculate the food expenses of a typical family if their monthly household budget equals $4000. We would multiply 13.9 times 4000, which equals $556.00. We can do the same for each budget category.	
REFLECTION/EVALUATION *not yet completed* NEXT STEPS You can easily turn the bar graph into a line graph by putting a dot at the top of each bar and connecting the dots. This is also a great lesson for introducing mean, median, and mode. Usually, the higher level learners catch on to this easily. Lower level learners may need another lesson on a different day.		PURPOSEFUL & TRANSPARENT The students should find the task of making the graph easy. This should transfer to the GED in that the hands on and ease of this lesson makes reading and interpreting other graphs less challenging. The skill is also useful in science and social studies. Teacher models the learning process, making instruction very explicit. CONTEXTUAL The student could use these skills to graph personal data about others in the class. How many children do they have, eye color, hair color, etc. BUILDING EXPERTISE The students can use the basic act of sorting and now extend it to creating a graph. They needed basic calculator skills to find percent. The lesson added the ability to use the calculator to begin finding percents.	

A Rubric for Evaluating Graphs

Name **Date** **Program Site**

	Beginning (1 point)	Developing (3 points)	Accomplished (5 points)	Score
Overall Visual Appeal	Does not use color. The graph, labels and title are not placed appropriately. Graph is messy, title and labels are missing.	Uses color but not in a meaningful way. The graph is centered or placed appropriately on the document. Graph is not as neat or clear as it could be.	Color is used in a meaningful way on the document. The graph is centered or placed appropriately on the document. Graph is neat, colorful, and eye-catching.	
Labels and Title	Title and labels are inappropriate, placed incorrectly or missing. X and Y axis are not indicated correctly.	Title is appropriate to the topic of the graph. Title and most labels are placed appropriately on the document. X and Y axis may not be clear.	Title is appropriate to the topic of the graph. Title and all labels are neatly written and placed appropriately on the document. X and Y axis are clear.	
Accuracy of Data	Little or no data is present. Graph is not sufficient.	Data may not be sufficient or missing to show a well defined graph.	All data is sufficient and clear. Data is correct and precise.	
Interpretation	Extremely difficult or impossible to interpret.	Difficult to interpret.	Clear and easy to interpret.	

Observations



TYPICAL BUDGET FOR A U.S. FAMILY
Pie Chart Source: The Mint http://www.themint.org

Do the percentages of the pie chart add up to 100%?

What is the largest expense in a household budget?

What is the smallest expense in a household budget?

Food equals what percentage of the total budget?

Transportation equals what percentage of the total budget?

If your household budget totaled $4000 for a month, what amount would be spent on food according to the pie chart?

4000 X 13.9 = 556.00

What amount would be spent on housing?

4000 X 31.8 = 1272.00