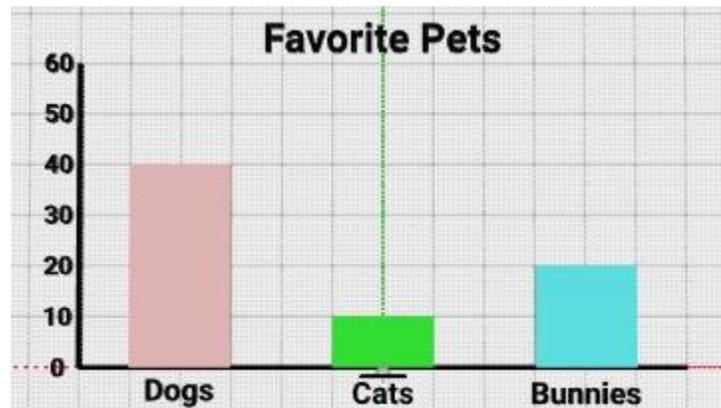




Bar Graphs



Grade 3 Math Alignment

Domain: Measurement & Data

Cluster: Represent and interpret data

Standard: 3.MD.B.3 Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs.

Level 1B CSTA Alignment

Concept: Variables

Standard: 1B-AP-09 Create programs that use variables to store and modify data

Description

Students will examine pre-build **bar graphs** on BlocksCAD and interpret the data presented. They will expand and edit code and adjust existing **variables** to create their own graphs. Students will create new variables for the height of each bar and incorporate them into their code so that their entire bar graph is quickly customizable.

Learning Objectives

- Students will learn to organize and edit existing code
- Students will practice reading bar graphs and putting the data into words and tables
- Students will practice adjusting existing variables and will learn how to create their own variables to make a quickly-adjustable design

Videos

- Working with Code: <https://www.youtube.com/watch?v=YBRaaPGuO2E>
- Variables: <https://www.youtube.com/watch?v=l3OeE52zIns>

Review/Prior Knowledge

Students should have at least briefly worked with a bar graph before so that they are able to read the heights of the bars using a labeled axis. They should be comfortable with simple two-digit addition and subtraction for some of the questions about each graph. Students do not need any BlocksCAD experience, but should be introduced to basic workspace management before beginning so that they can expand/collapse and enable/disable blocks when prompted. They do not need any experience using variables.

Resources

- Student Handout: Bar Graphs → Student guide for activity
- Bar Graphs Student File.xml → BlocksCAD file for students to start with
- Bar Graphs Solution File.xml → File with all variables added in

Teacher Notes

General Introduction: Have students either create or read a simple bar graph on paper so that they are used to reading and interpreting the bar heights. Describe how, if they made a bar graph and then wanted to change the data or the categories, they'd have to redraw the graph. On a computer, however, you can program bar graphs to quickly take any form you want!

BlocksCAD Introduction/Refresher: When students open their BlocksCAD file, orient them to the interface by showing them the menu bar, the workspace, and the render window. Make sure students are comfortable expanding blocks (right click → expand) and then changing things like color in the existing code (using a color block from the Transforms menu). Show students that they can click the brown variables blocks and

change the title and category labels. When students get to Part III, they may need some guidance grabbing variables blocks and creating their new variables, but you do not need to introduce this from the beginning. Encourage students to use the check boxes next to each instruction so that they can keep track of what they have completed.

Exploration: In **Part I** students will examine a bar graph that has already been made in their student file about favorite pets. All instructions that students should follow with an action are **bolded**. Encourage students to use check marks or X's to show which steps they have completed so that they can stay on track. For some classes it may also be worth it to work all together and give verbal cues for each step too.

Answering the questions in their handout will help them get oriented to the layout of the bar graphs in BlocksCAD. They should see that 20 people picked bunnies as their favorite pets, 70 people voted total ($20 + 10 + 40$), and 10 more people voted for dogs than the other two categories combined ($40 - (20 + 10)$).

Students will then disable "Bar Graph #1" and enable "Bar Graph #2". Their handout gives them a new title and categories to type into the variable blocks. They will also expand this code and change the colors of their blocks. Once they have a graph that looks like the one pictured in their handout, they should answer the questions about the graph. They should use the table to show that five people picked hockey, 50 picked basketball, and 30 picked soccer. This means 35 people picked *either* hockey or soccer, and basketball was not quite twice as popular as soccer.

In **Part II** students will enable Bar Graph #3. They will get to pick their own title and categories and will again expand the code to change the colors. They will also get to change the actual data this time by adjusting the y-value of each cube block. Make sure students are changing the green cube block and not the translate block above it! Have students share the graphs they create with a partner or a small group. They can present their graph and describe why they chose the numbers they did.

Once all students have made their bar graph, **Part III** will show them how to create variables for the heights of the bars. The student handout provides written and visual instructions, but it still might be worth either demonstrating on a projector or walking through the first variable with everybody together. Once students have made the new variables they will be able to find the brown variable blocks (as opposed to the "Set variable to..." blocks) from the Variables menu. They can drag these into the y-value spaces, as shown in their handout. Once these three variables are in, students can collapse their code and they should be able to create any bar graph they want just by

typing into the variable fields. The only they would open the code is if they want to change the color! (A problem they could quickly solve with more variables!)

Reflection Questions and Activities

- 1) What are the advantages of presenting data in a bar graph? When might a table or just using words be better?
- 2) What other types of visual representations of data or graphs have you seen?
- 3) Other BlocksCAD activities in the variables progression: Birdhouses, Dinner Robot, Pie Pieces, and Sugar Cubes