

# Introduction to Graphing



Level 6-9

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# Introduction to Sorting by Attributes

## Age

5/6 years old

## Direct Aim

Introduce children to sorting by attributes; develop communication skills by defining sets; understand that objects possess multiple attributes.

## Indirect Aim

Provide children with concrete experiences in making sets leading to pictorial representations of sets.

## Materials

The Button Book by Margarett S. Reid, a collection of different buttons

## Procedure

- 1) Read The Button Book and bring out the collection of buttons. Discuss the characteristics of the different buttons, whether they have one, two, three, or four holes, their color, shape, and the material from which it is made.
- 2) Share a random set of buttons with each child and ask them to sort the buttons into several groups. When the children have finished, ask them to describe to their peers why they placed the buttons into that specific category. As you are listening to their descriptions, take one of the buttons from one category (a black button for example) and move it into another group where it could fit (into the three-hole set for example).
- 3) Ask the child if this button will fit in this different set as well. The younger the child, the less likely they are to view the button with multiple characteristics, however, the purpose of the exercise is to extend their mathematical thinking to include multiple attributes. Giving children experiences with this type of activity will allow them to make the “cognitive leap.”

## Follow up

Ask the children to continue sorting the buttons into various groups and share their findings with their peers. As the children become fluent with making different groups, introduce them to recording their information.

# Introduction to Pictographs

## Age

5/6 years old

## Direct Aim

Introduce recording of sets into an organized manner.

## Indirect Aim

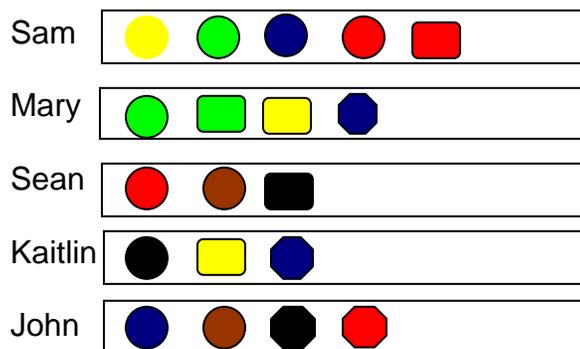
Move children from recording sets in 1 to 1 correspondence, to representational sets.

## Materials

Set of buttons, paper, and colored pencils

## Procedure

1) Ask the children to sort their buttons into their own groups again. As the children vocalize their sets, make a list of commonalities. Ask the children to choose one set that all of them have (buttons with 2 holes for example). On a separate sheet of paper, have the children draw how many buttons are in their set of two holed buttons. As the children finish their drawings, place the separate sheets of paper on display with the child's name or their group name.



2 hole buttons

2) Tell the children that the collection of button pictures that they have just made is called a graph, and this particular graph is called a pictograph (*Latin: pict*, meaning picture and *Greek: graph* meaning writing). It means writing with pictures. We now have a way to show our information to other people without having to take our buttons with us, which is much more convenient.

## Follow Up

- 1) Attribute curriculum
- 2) Task cards for Reading Pictographs.

# Introduction of Representational Data

## Age

6 years old

## Direct Aim

Introduce pictograph where one icon represents several items. Introduce children to using a scale.

## Indirect Aim

Prepare children for bar graphs, line graphs, and pie charts.

## Materials

bubble mixture, bubble wands, stop watch or watch, paper cups, plenty of paper towels

## Procedure

- 1) Pour the bubble mixture into a paper cup and give each child a bubble wand. Tell the children that they are going to blow (and count), as many bubbles as they can in the next two minutes.
- 2) Every child (or partner) needs to keep track of the bubble blown during the two minutes. Blowing slowly makes the counting easier. Tell the children to start and keep time; at the end of the allotted time, ask the children how many each of them blew.
- 3) Discuss how difficult it would be to draw a pictograph with each bubble being represented with one circle. Ask the children if they have any ideas how they can represent their bubble count without drawing each bubble. Introduce the children to using a scale, where each bubble on the chart actually represents 10 or 20 bubbles.
- 4) Draw a pictograph representing the children's data, making sure to show the scale at the bottom of the table.

## Follow Up

Children will prepare class surveys with representational pictographs.

# Moving from Pictographs to Tally Marks

## Introduction

### Age

7 years of age

### Direct Aim

Introduce children to making tally marks, instead of pictures to represent data.

### Indirect Aim

Prepare children for bar graphs, line graphs, and pie charts.

### Materials

Simple reading books, alphabet tally chart

### Procedure

- 1) Tell the children that you read the other day that the letter "E" was the most widely used letter in the English language and you want their help in testing out this information. Also, you wonder, what is the second-most used letter in the English language?
- 2) Hand out the simple readers and the alphabet tally chart to each child, or group of children. Explain that it would be very tiring to write each letter down and then count them up; there is an easier way.
- 3) Introduce the children to tally marks, with 4 vertical slash marks and the fifth crossing diagonally to make a set of 5. Tell the children to count the reoccurrence of each letter for 3 pages (you may make the number of pages more or less depending on the attention of your group or the length of the pages of the reader).
- 4) When the children have collected their data, have the children write the most frequently used letter, the secondly most used letter, and the least used letter at the bottom of their sheet. Combine the individual information on one master alphabet sheet to see, as a class, what the second-most used letter is.

### Follow Up Activities

- 1) Provide activities for children to take class surveys, or school wide surveys, using tally marks.

# Alphabet Tally Sheet

a		n	
b		o	
c		p	
d		q	
e		r	
f		s	
g		t	
h		u	
i		v	
j		w	
k		x	
l		y	
m		z	

# Introduction to Bar Graphs

## Age

7 to 8 years old

## Direct Aim

Introduce bar graphs concretely.

## Indirect Aim

Prepare children to analyze information from bar graphs, line graphs, and pie charts. Introduce range, median, and mode.

## Materials

Some children of different heights and a few that are of the same height, yarn, paper for labels, measuring tape

## Procedure

- 1) Inform the children that today you are going to use a different type of graph. On a large space on the floor layout a horizontal piece of yarn. Beneath the yarn, place the names of the children used in the demonstration. To the left of the horizontal yarn, lay a vertical piece of yarn.
- 2) Ask each child to lie on the floor above their name tag. Measure the height of each child with the measuring tape and record the height on a separate label. Place the height labels, chronologically from least to greatest on the vertical axis. Tell the children that each of their bodies is like a "bar" and if you look at the whole graph, you can read information about each of the heights of the children. A bar graph shows information by the use of colored bars. They are used to compare pieces of information. Show the children the nomenclature.
- 3) Ask the children if you were to measure the length of their arms, what information would remain the same in the bar graph (the names of the children) and what would change? (the measurement of their arm length) In a bar graph, the information that remains the same is often on the horizontal line and we name it the dependent variable ( $x$ ). The information that changes is usually on the vertical axis and is named the independent variable ( $y$ ). Label each axis and show children the nomenclature for these terms. Ask the children the following questions.
- 4) Are there any children who are the same height? How many are there?
- 5) Which child is the shortest? Which child is the tallest? Which child is in the middle?

## Follow up

Provide children with activities to interpret bar graphs and to make their own.

# Introduction to Pie Charts

## Age

7 to 8 years of age

## Direct Aim

Introduce children to the use and construction of a pie chart.

## Indirect Aim

Prepare children for work with ratios and decimal fractions.

## Materials

Package of small colored candy (Skittles, M&M's, Reese's pieces, etc.) 2 inch diameter circles sectioned into 10 equal parts.

## Procedure

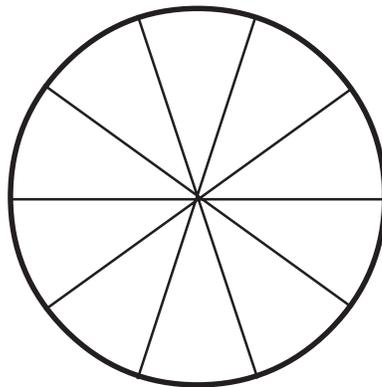
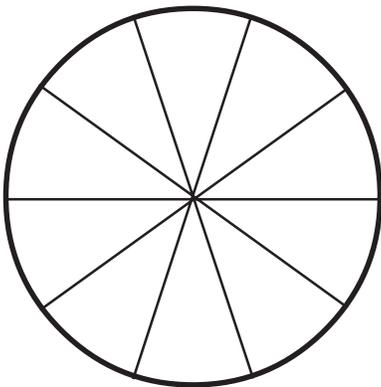
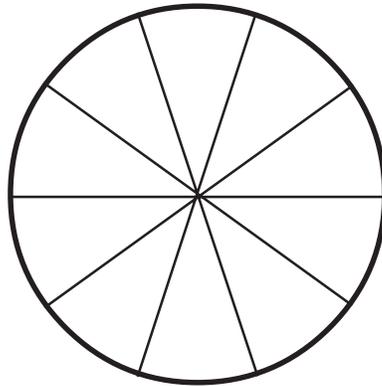
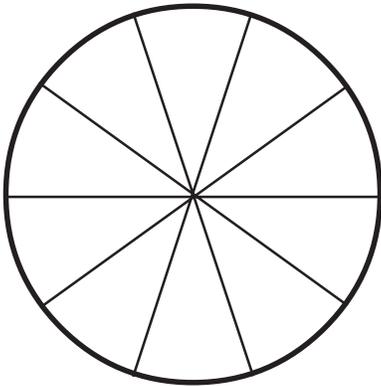
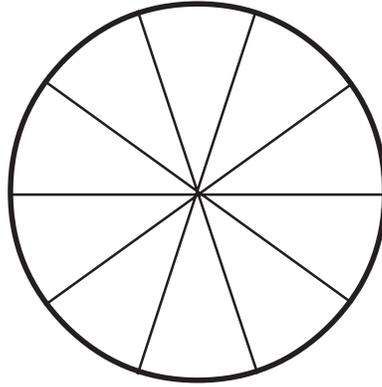
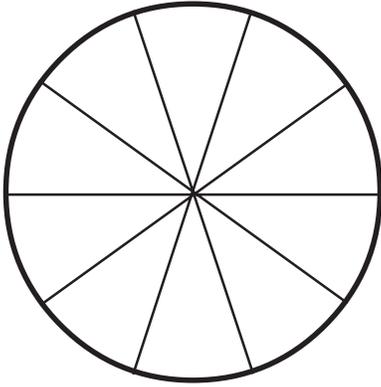
1) Share 10 skittles with each child and have them separate them into the 5 color groups. Ask the children to count how many they have of each color and color the corresponding number of sections in each of their circles. Ask the children to state how many they have of each color. As they call out their amounts, record the number as a ratio. For example, 3 of the 10 are red.  $\frac{3}{10}$

2) Introduce the children to the term "pie chart" as another way to represent information in a graph. Pie charts show a part of a whole, and in this case, the different colors of skittles were part of the whole set of skittles that each person received. Present nomenclature to the children.

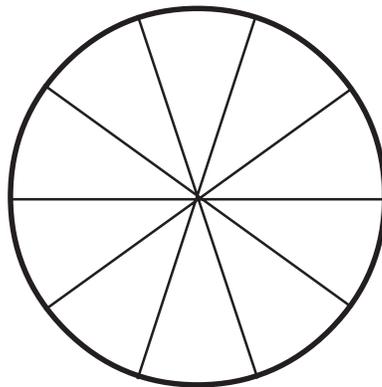
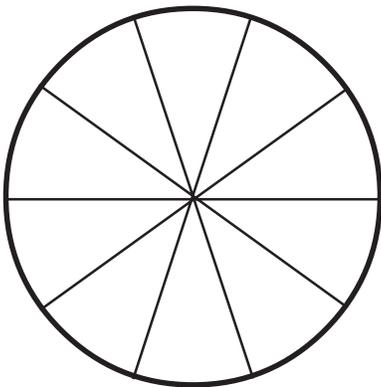
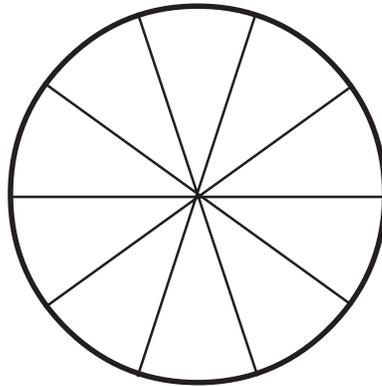
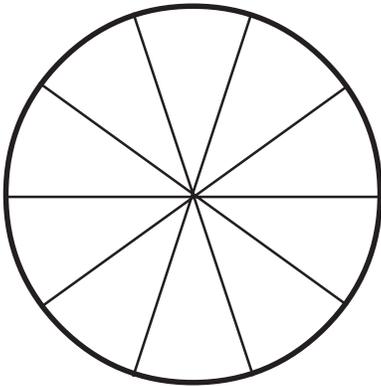
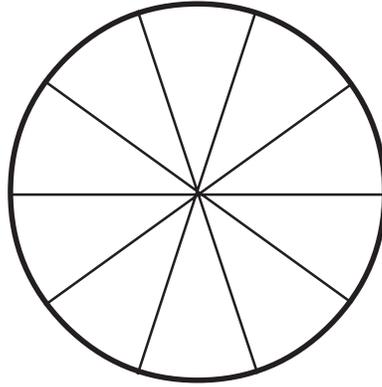
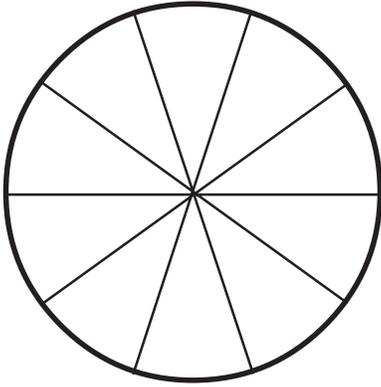
## Follow Up

1) Allow children to continue working with pre-designed task cards.  
**\*\*\*Note\*\*\*** have the children do only the first three task cards and then introduce the bar graph lesson. Resume cards 4- 8 for pie charts after this lesson.

# Circles for Pie Charts



# Circles for Pie Charts



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