Shirt Color
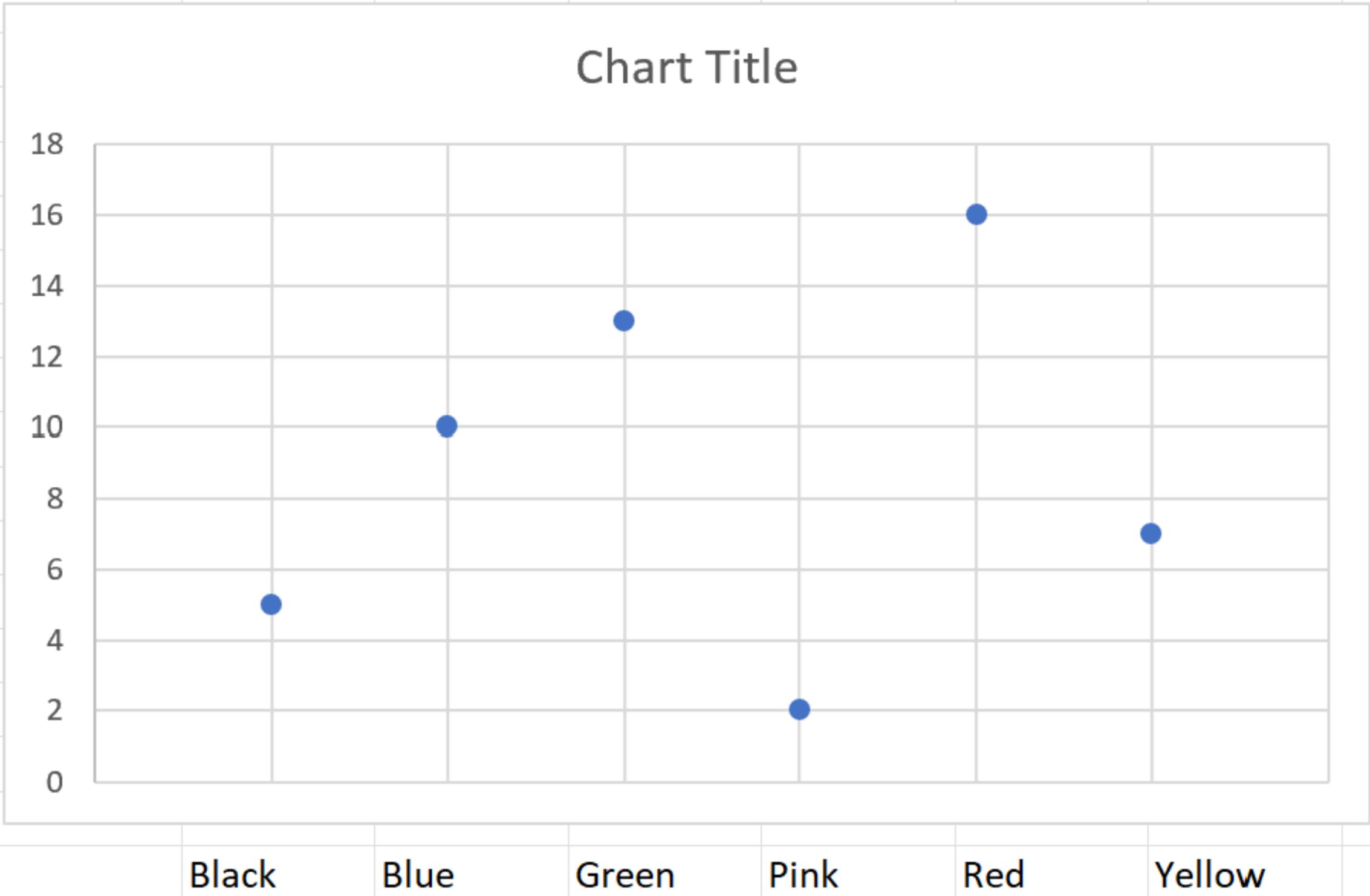
Black	5
Blue	10
Green	13
Pink	2
Red	16
Yellow	7

Chart Title

18					
16				Red	
14					
12		Green			
10	Blue				
8					Yellow
6					
4	Black				
2			Pink		
0					
	Black	Blue	Green	Pink	Red	Yellow

# 2.1 Variables and Data

Definition 2.1: Variables

Variable: A characteristic that varies from one person or thing to another.

Qualitative variable: A nonnumerically valued variable.

Quantitative variable: A numerically valued variable.

Discrete variable: A quantitative variable whose possible values can be listed. In particular, a quantitative variable with only a finite number of possible values is a discrete variable.

Continuous variable: A quantitative variable whose possible values form some interval of numbers.
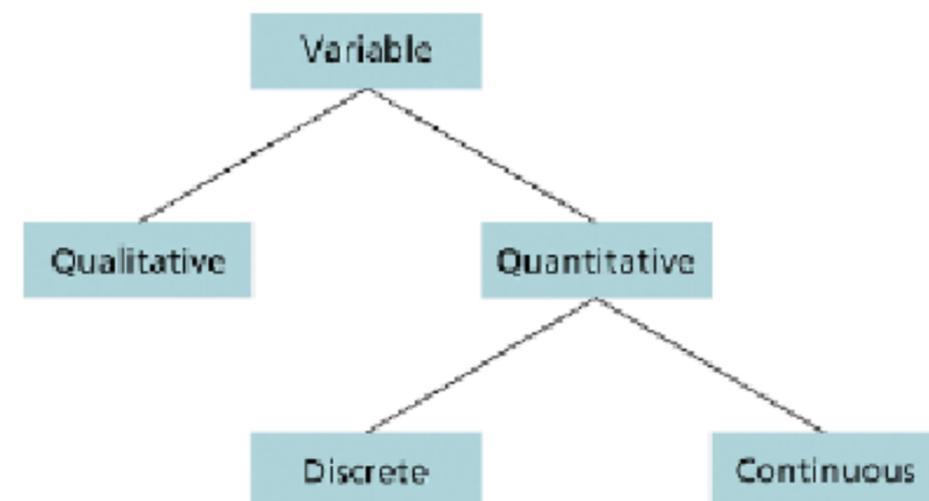
The 118th Boston Marathon At noon on April 21, 2014, about 35,671 men and women set out to run 26 miles and 385 yards from rural Hopkinton to Boston. Thousands of people lining the streets leading into Boston and millions more on television watched this 118th running of the Boston Marathon.

Human Blood Types Human beings have one of four blood types: A, B, AB, or O. What kind of data do you receive when you are told your blood type?

The World's Highest Waterfalls The *Information Please Almanac* lists the world's highest waterfalls. The list shows that Angel Falls in Venezuela is 3281 feet high, or more than twice as high as Ribbon Falls in Yosemite, California, which is 1612 feet high. What kind of data are these heights?

Definition 2.3: Frequency Distribution of Qualitative Data

A **frequency distribution** of qualitative data is a listing of the distinct values and their frequencies.

Procedure 2.1

To Construct a Frequency Distribution of Qualitative Data

Step 1 List the distinct values of the observations in the data set in the first column of a table.

Step 2 For each observation, place a tally mark in the second column of the table in the row of the appropriate distinct value.

Step 3 Count the tallies for each distinct value and record the totals in the third column of the table.

Democratic	Other	Democratic	Other	Democratic
Republican	Republican	Other	Other	Republican
Republican	Republican	Republican	Democratic	Republican
Republican	Democratic	Democratic	Other	Republican
Democratic	Democratic	Republican	Democratic	Democratic
Republican	Republican	Other	Other	Democratic
Republican	Democratic	Republican	Other	Other
Republican	Republican	Republican	Democratic	Republican

D = 13

R = 18

O = 9

____

T = 40

Definition 2.4: Relative-Frequency Distribution of Qualitative Data

A **relative-frequency distribution** of qualitative data is a listing of the distinct values and their relative frequencies.

Procedure 2.2

To Construct a Relative-Frequency Distribution of Qualitative Data

Step 1 Obtain a frequency distribution of the data.

Step 2 Divide each frequency by the total number of observations.

Political Party Affiliations Refer to Example 2.5. Construct a relative-frequency distribution of the political party affiliations of the students in Professor Weiss's introductory statistics class presented in Table 2.1.

$$D = 13/40 = 0.325 \rightarrow 32.5\%$$

$$R = 18/40 = 0.45 \rightarrow 45\%$$

$$O = 9/40 = 0.225 \rightarrow 22.5\%$$

$$T = 40/40 = 1.00$$

Definition 2.5: Pie Chart

A **pie chart** is a disk divided into wedge-shaped pieces proportional to the relative frequencies of the qualitative data.

To Construct a Pie Chart

Step 1 Obtain a relative-frequency distribution of the data by applying Procedure 2.2⬚.

Step 2 Divide a disk into wedge-shaped pieces proportional to the relative frequencies.

Step 3 Label the slices with the distinct values and their relative frequencies.

Political Party Affiliations Construct a pie chart of the political party affiliations of the students in Professor Weiss's introductory statistics class presented in Table 2.1.

$D \rightarrow 32.5\%$

$R \rightarrow 45\%$

$O \rightarrow 22.5\%$

Definition 2.6: Bar Chart

A bar chart displays the distinct values of the qualitative data on a horizontal axis and

Procedure 2.4

tical axis.

whose

sitioned so

To Construct a Bar Chart

Step 1 Obtain a relative-frequency distribution of the data by applying Procedure 2.2⬚.

Step 2 Draw a horizontal axis on which to place the bars and a vertical axis on which to display the relative frequencies.

Step 3 For each distinct value, construct a vertical bar whose height equals the relative frequency of that value.

Step 4 Label the bars with the distinct values, the horizontal axis with the name of the variable, and the vertical axis with "Relative frequency."

Political Party Affiliations Construct a bar chart of the political party affiliations of the students in Professor Weiss's introductory statistics class presented in Table 2.1.
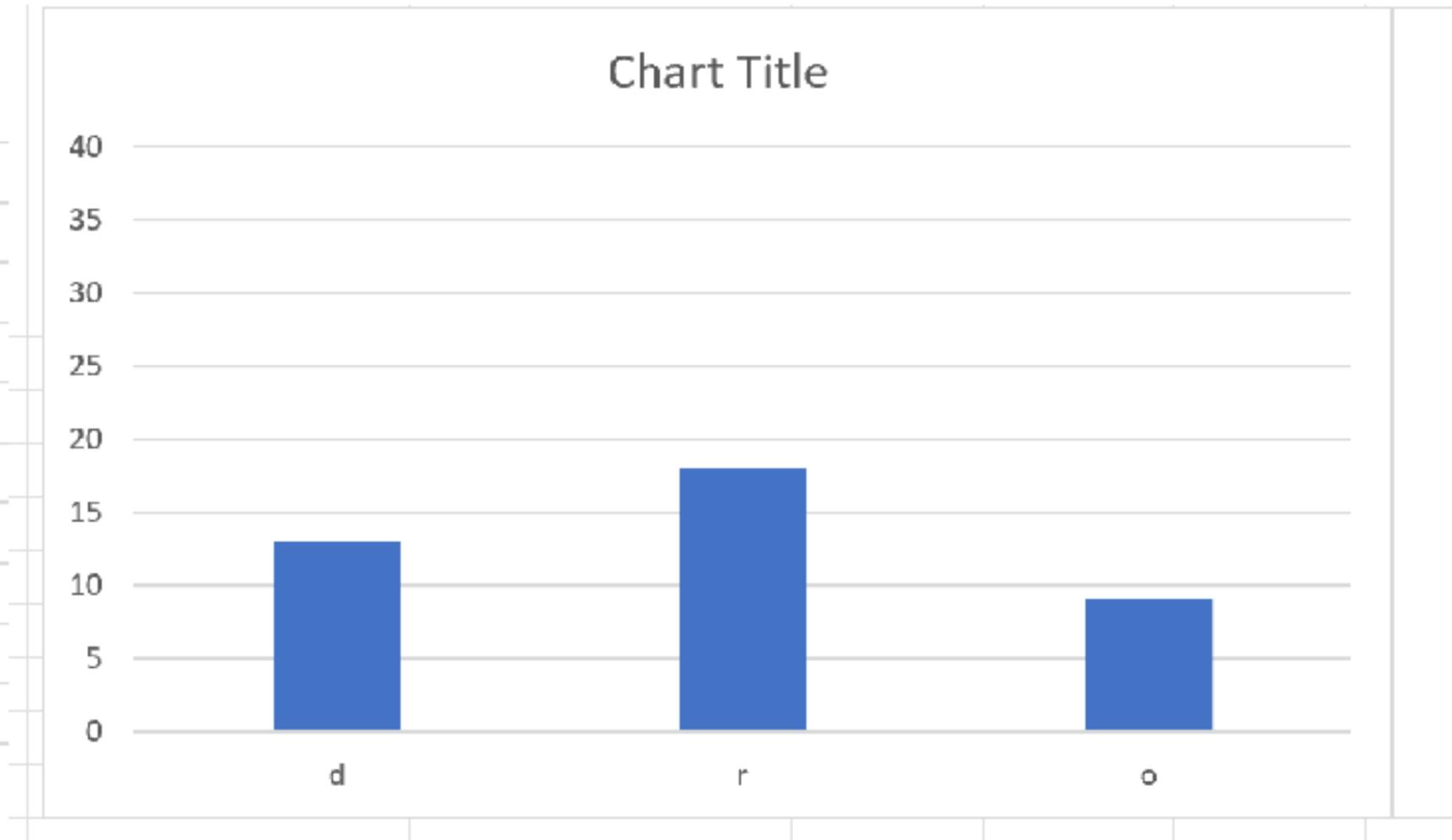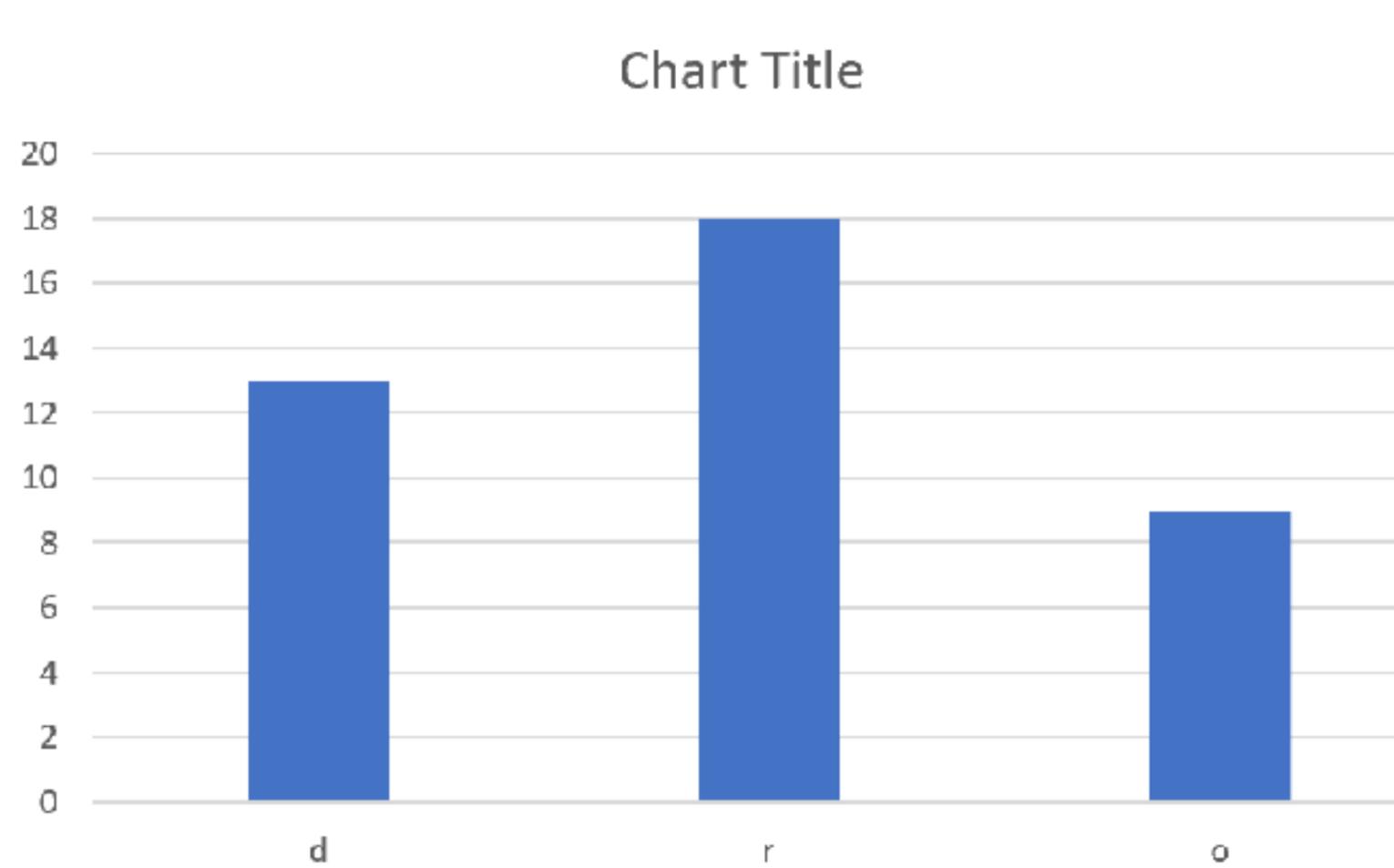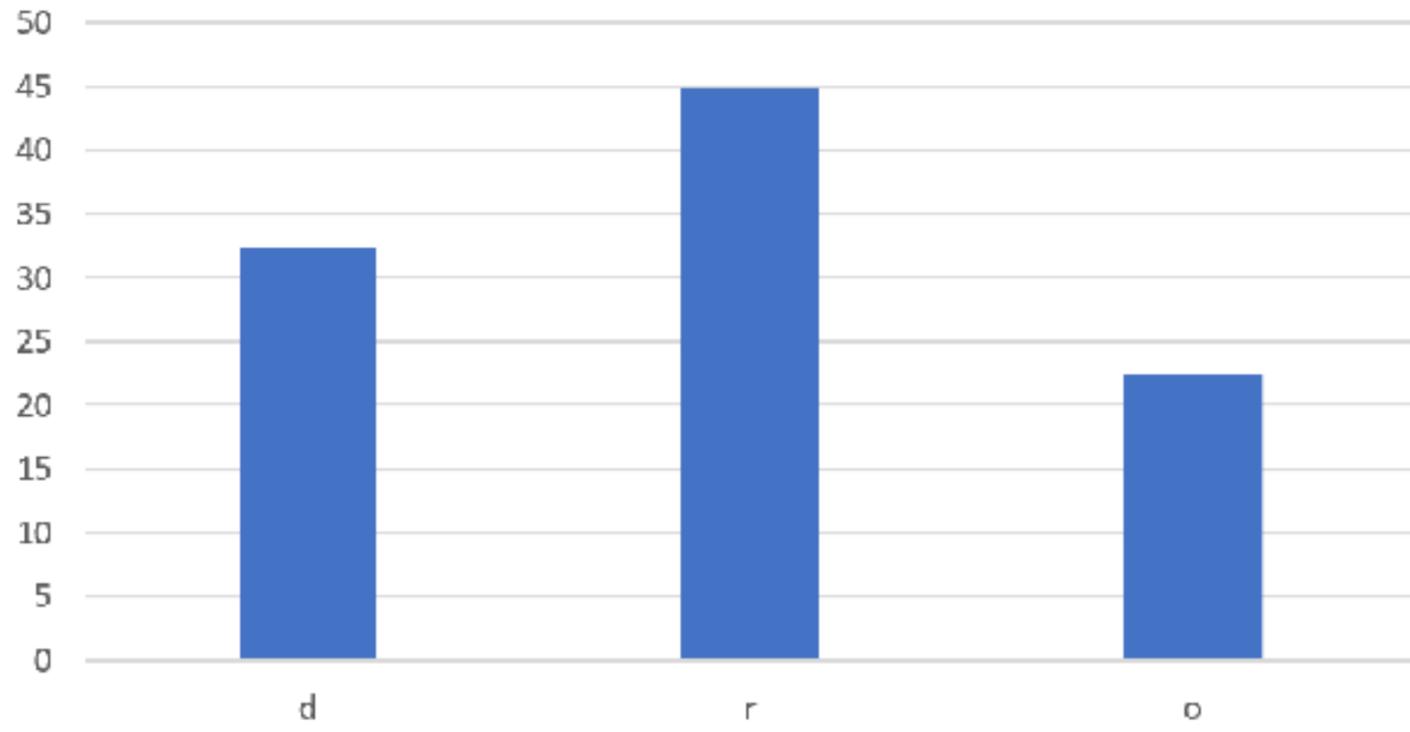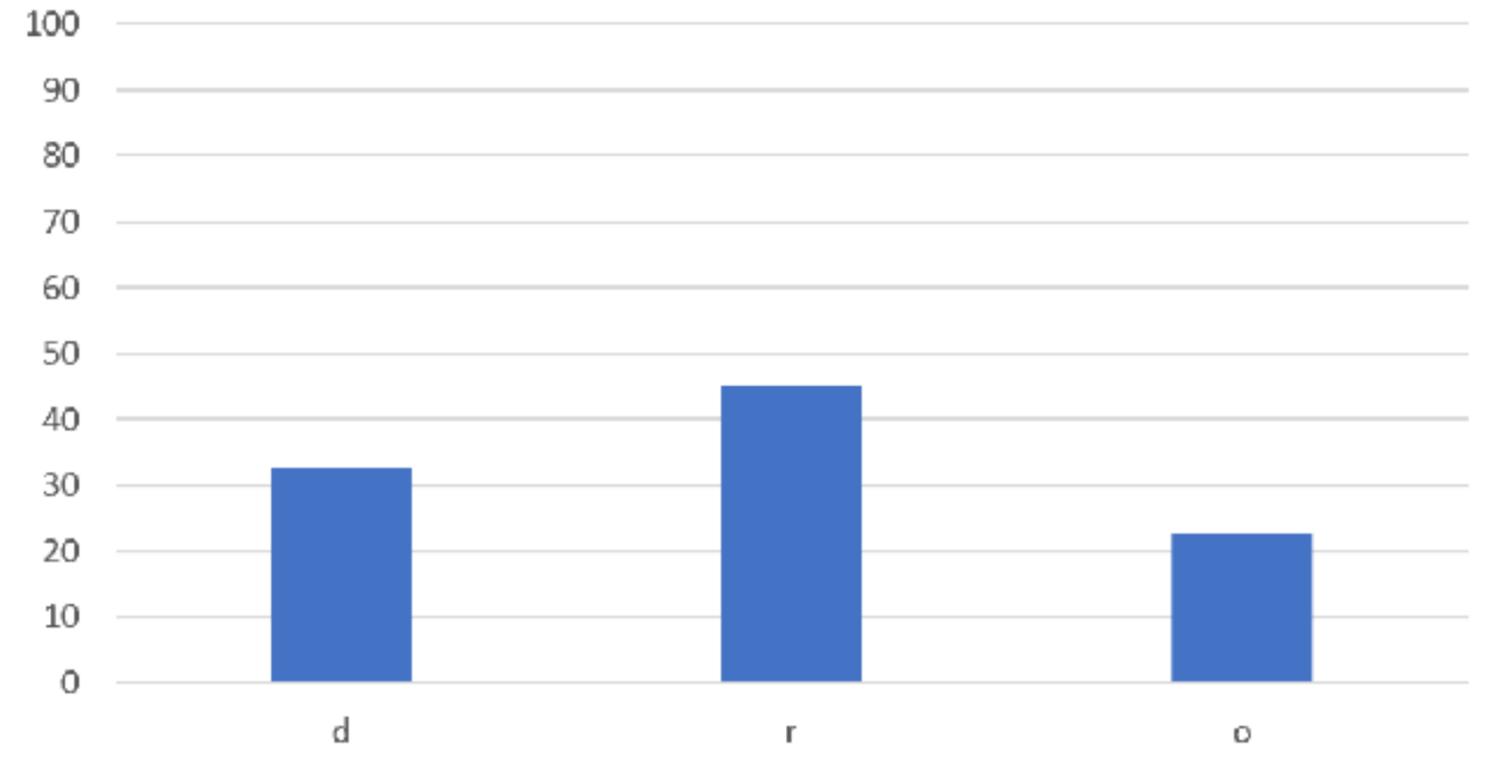
Chart Title

Chart Title

F	F	Tu	Tu	F	Su	F	F	Tu	F
Tu	Sa	Sa	F	Sa	Tu	W	W	Th	Th
Th	Sa	M	Tu	Th	Su	W	Th	W	Tu
Tu	F	Th	Th	F	W	F	Th	F	Sa
F	W	W	F	Tu	W	W	Th	M	M
F	Su	Tu	F	W	Su	W	Th	M	Tu
F	W	Th	M	Su	Sa	Sa	F	F	

Day	Frequency	Relative frequency
Sunday	5	0.072
Monday	5	0.072
Tuesday	11	0.159
Wednesday	12	0.174
Thursday	11	0.159
Friday	18	0.261
Saturday	7	0.101

Road Rage

Road Rage