

Technology for the K-12 Classroom

Using Microsoft Excel for Teaching Math

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Introduction

What will we be doing?

- Introduction to Excel
- Data collection in Excel
- Basic statistical analysis in Excel
- Graphing algebraic functions in Excel
- Miscellaneous topics – if time

Sources of Data

For projects & assignments where students need to find their own data:

- Sports
 - Baseball, Basketball, Football, Golf, Hockey, Soccer
- The Data and Story Library <http://lib.stat.cmu.edu/DASL/>
- National Institute of Standards & Technology
<http://www.itl.nist.gov/div898/education/datasets.htm>
- CHANCE Project Datasets
http://www.dartmouth.edu/~chance/teaching_aids/data.html
- FEDSTATS <http://www.fedstats.gov/>
- Baby Names <http://www.ssa.gov/OACT/babynames/>

Student Data

One way to engage students is to have them collect data on their classmates or the teacher conduct a student survey

- Year in school
- Eye color
- Hair color
- Number of siblings
- Length of commute (in miles)
- Are you right- or left-handed?
- Amount spent on textbooks?
- Height (in inches)
- Shoe size
- Gender
- Smoker?

Frequency Distribution

Let's say we have 20 students in a class:

Junior	Senior	Senior	Sophomore	Freshman
Freshman	Junior	Sophomore	Senior	Senior
Sophomore	Junior	Freshman	Freshman	Sophomore
Junior	Sophomore	Sophomore	Freshman	Sophomore

Enter **Class Level** in cell A1 and the data in cells A2 through A21

Frequency Distribution

- In cell B1, type the label **Class Level**
- In cells B2 through B5, type labels for class levels:
Senior, Junior, Sophomore, Freshman
- In cell C1, type the label **Frequency**
- Select cells C2 through C5
- Type **=COUNTIF(A2:A21,B2:B5)**
- Hold down **Ctrl** and **Shift** keys at the same time and press **Enter**

Class Level	Frequency
Senior	4
Junior	4
Sophomore	7
Freshman	5

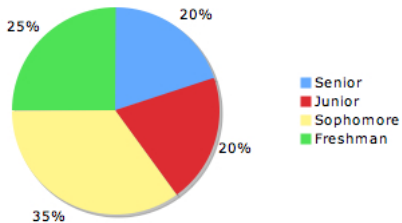
Pie Chart

To make a pie chart for these data

- Highlight cells B1:B5 and C1:C5
- Click on **Chart Wizard**, select **Pie**, and **Next**
- Select **Series in Columns** and **Next**
- Change chart title to whatever you want
- Choose chart location
- Double click on a slice and select **Data Labels**

Pie Chart

Number of Students From Each Class

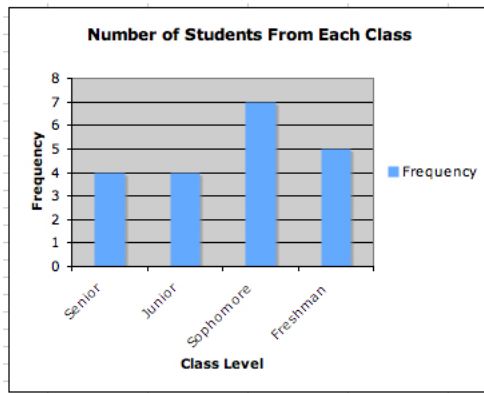


Bar Chart

To make a bar chart for these data

- Highlight cells B1:B5 and C1:C5
- Click on **Chart Wizard**, select **Column**, and **Next**
- Select **Series in Columns** and **Next**
- Change chart title, category axis, and value axis to anything you want
- Choose chart location

Bar Chart



Numeric Data

Let's start with 20 data values

42	18	32	35	29
25	19	31	44	22
37	39	16	29	40
28	38	41	19	40

Enter **Data** in cell A1 and the data in cells A2:A21

Use 16-20, 21-25, 26-30, 31-35, 36-40, and 41-45 as the classes

Use 15.5-20.5, 20.5-25.5, 25.5-30.5, 30.5-35.5, 35.5-40.5, and 40.5-45.5 as the class boundaries

Frequency Distribution

To make a Frequency Distribution

- Enter the label **Class Boundaries** in cell B1. Enter **Greater than** the lower boundary in cells B2:B7. Enter **to** in cells C2:C7. Enter the upper class boundaries in cells D2:D7. (*Note — Excel counts the number of observations that are greater than the lower boundary and less than or equal to the upper boundary*)
- In cell E1, enter the label **f** or **Frequency**
- Select cells E2:E7
- Type **=FREQUENCY(A2:A21,D2:D7)**
- Hold the **Ctrl** and **Shift** keys and press **Enter**

Frequency Distribution

Class Boundaries			Frequency
Greater than 15.5	to	20.5	4
Greater than 20.5	to	25.5	2
Greater than 25.5	to	30.5	3
Greater than 30.5	to	35.5	3
Greater than 35.5	to	40.5	5
Greater than 40.5	to	45.5	3

Histogram

To make a “proper” histogram in Excel:

- Select the data in column D2:D7 and E2:E7
- Go to **Chart Wizard**, choose **XY (scatter)**, and select **Chart sub-type** that does NOT have lines connecting the dots
- Name the axes whatever you want
- Right click one of the dots, select **Chart Type**, select **Column**, and click **OK**
- Right click one of the bars, click **Format Data Series**
- Under the **Patterns** tab, click on **Borders**, select **Make Borders Automatic** option.
- Under the **Options** tab, change **Gap Width** to 0

OR go to **Tools, Data Analysis, and Histogram**

Descriptive Statistics & Bivariate Data

Descriptive Statistics This can be used for univariate & bivariate data

- Go to **Tools, Data Analysis, and Descriptive Statistics**
- OR use **=AVERAGE()** for the mean, **=STDEV()** for the standard deviation, **=VAR()** for the variance, **=MEDIAN()** for the median, **=MODE()** for the mode, **=QUARTILE(,1)** for the first quartile, **=QUARTILE(,3)** for the third quartile, **=MAX()** for the maximum, **=MIN()** for the minimum

Scatterplots

- Use **Chart Wizard** and **XY (Scatter)**

Regression

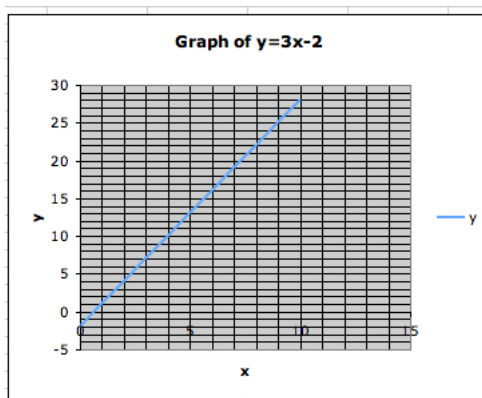
- Go to **Tools, Data Analysis, and Regression**

Graphing Algebraic Functions

To draw the graph of $y = 3x - 2$ in Excel:

- In cell A1 type **x** and in cell B1 type **y**
- To obtain whole numbers from 0 to 10 in column A:
 - Type **0** in cell A2, type **=A2+1** in cell 3
 - "Fill down" the values to cell A12 (the result in this cell should be **10**)
- in cell B2, type **=3*A2-2**
- "Fill down" the values from cell B3 to cell B12
- Highlight all cells, go to **Chart Wizard**, XY(Scatter), select the last graph (with data points connected by lines without markers)
- Change chart titles to what you wish and click **Gridlines** tab to insert gridlines in graph

Graphing Algebraic Functions



More Algebraic Functions

Create the following functions in Excel:

Function	x values	Value in A2
$y = 5x$	0 to 10	0
$y = \frac{1}{2}x + 3$	0 to 10	0
$y = 5 - 2x$	0 to 5	0
$y = x^2$	-4 to 4	-4
$y = 3x^2$	-4 to 4	-4
$y = x^2 + 3$	-4 to 4	-4
$y = \frac{1}{x}$	0.2 to 5	0.2
$y = \frac{2}{x}$	0.2 to 10	0.2