You need a graphing Calculator

FST NOTES 1-2
TOPIC: Centers of Data and Weighted Averages
GOAL
Discuss summation notation and the idea of weighted averages.

SPUR Objectives
- **A** Calculate measures of center and spread for data sets.
- **B** Calculate averages with weights, frequencies, and relative frequencies.
- **C** Use Σ-notation to represent a sum or mean.
- **D** Describe relations between measures of center and spread.

We strongly recommend *not* discussing this lesson until students have had an opportunity to read it and try the questions on their own. Reading mathematics may be a new expectation for some students. To be most effective, the reading of mathematics should be an active, not passive, process. Students should read with a pencil in hand and paper to write on, watching for important terms and symbols.

After READING the NOTES
Answer the following:

1) What do I already know?

2) What did I learn?

3) Where will I use it?

VOCABULARY

- mean average
- median middle #
- measures of center, measures of central tendency mean + median
- mode most frequent #
- subscripted variables $x_1\ x_2\ x_3 \ldots x_n$
- Σ, sigma Sum
- index, *i* which subscripted variables are being added
- summation notation, sigma notation, Σ-notation
- weighted average GPA is an average calculated when some elements in the set are assigned a larger or smaller weight
- relative frequency

In 1–3, give the mean, median, and mode of the data set.

STAT #1 (Edit) STAT → CALC #1 1-Var STATS L1 (2nd 1)

1. 0, 10, 15, 20, 20, 25, 30, 30, 30, 40
   mean = 22 median = 22.5 mode = 30
2. 100, 110, 115, 120, 120, 125, 130, 130, 130, 140
   mean = 122 median = 122.5 mode = 130
3. $x, x + 10, x + 15, x + 20, x + 20, x + 25,$ $x + 30, x + 30, x + 30, x + 40$

$\bar{X}$ mean
↓ Med (median)

mean = $X + 22$

median = $X + 22.5$

mode = $X + 30$

$\frac{10X + 220}{10} = \frac{10X}{10} + \frac{220}{10}$

$\frac{2X + 45}{2} = \frac{2X}{2} + \frac{45}{2}$

Example 2 A family-friendly beach resort has a total of 32 family suites. Let g_i = the number of guests who checked into each suite.

a. What does $\sum_{i=1}^{32} g_i$ represent?

b. Use $\sum$-notation to express the mean number of guests per room.

$$\frac{1}{32}\sum_{i=1}^{32} g_i$$

$g_1 + g_2 + g_3 + g_4 + \ldots g_{32}$
the total # of guests that checked in

Weighted Averages

GPA is a weighted average

In a college economics course, suppose that homework counts for 25%, quizzes 10%, tests 45%, and attendance 20% of each student's overall grade. Frances and her friend Adam earned the following scores during the semester. Who received the higher overall course grade?

	Frances	Adam
.25 Homework	89	95
.10 Quizzes	82	90
.45 Tests	87	92
.20 Attendance	100	70

Weighted Avg
x_i = a value in data set
w_i = the weight of value

$$\frac{w_1x_1 + w_2x_2 + w_3x_3}{w_1 + w_2 + w_3 \ldots}$$

By hand:

Frances

$$\frac{.25(89) + .10(82) + .45(87) + .20(100)}{(.25 + .10 + .45 + .20)} = 89.6\%$$

Adam

$$\frac{.25(95) + .10(90) + .45(92) + .20(70)}{(.25 + .10 + .45 + .20)} = 88.15\%$$

Using Calculator:

STAT - EDIT

enter grades: Frances in L1
Adam in L2

enter weights (as decimals) in L3

Frances: L4 = L1 * L3

2ND LIST - MATH -5:sum(L4)

Adam: L5 = L2 * L3

2ND LIST - MATH -5:sum(L5)

frequency - # of times some category occurs.
relative frequency - is the ratio of the frequency of that category to the total frequency in all categories.

1-2 FST Notes continued

Example 4
To celebrate the opening of a new branch, a clothing store advertised that the first 200 customers would randomly receive free gift cards valued a $5, $15, $50, or $100. An internal memo to the new store manager contained the following sentence: There will be **5** $100-dollar cards, **10** $50-dollar cards, **35** $15-dollar cards, and the rest will be $5-dollar cards.

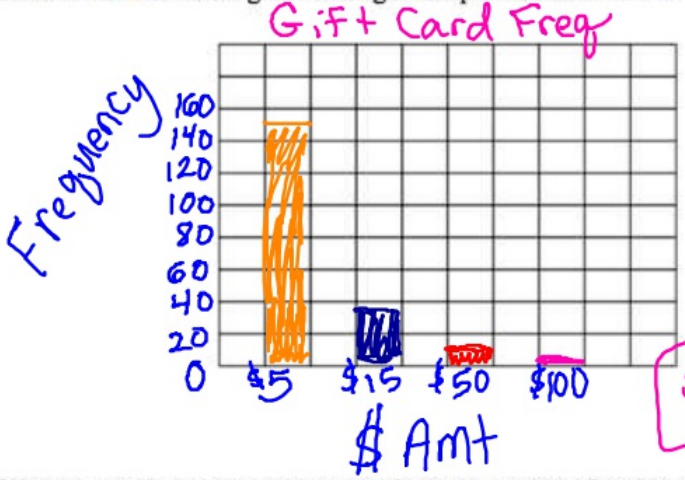
$200 - 5 - 10 - 35 = 150$ cards left

a) Calculate the total dollar value of the gift cards.

$5(100) + 10(50) + 35(15) + 150(5) = \$2275$

b) Create a frequency table and calculate the weighted average. Graph the table in a bar chart.

$Amt	freq
5	150
15	35
50	10
100	5



Weighted Avg

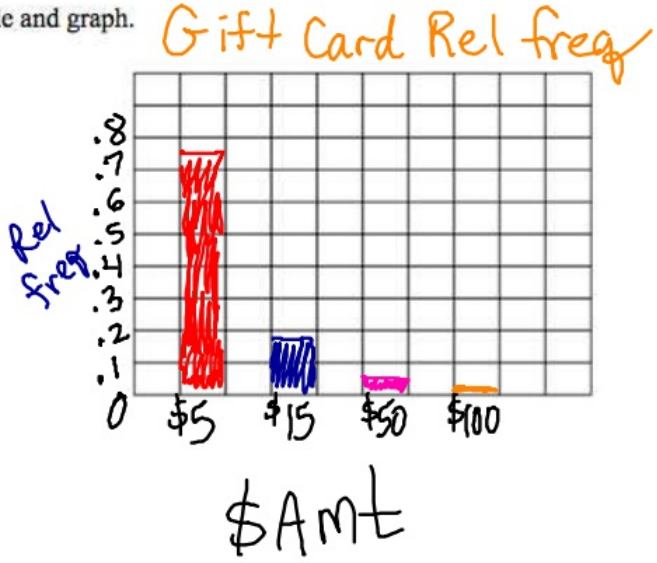
$\frac{2275}{200} =$

$11.375

Relative Frequency –
The ratio of the number of times a number or event occurs to the total number of numbers or events

c) Create a relative frequency table and graph.

$Amt	freq	rel freq
5	150	150/200 .75
15	35	35/200 .175
50	10	10/200 .05
100	5	5/200 .025



d) Compute the weighted average using the relative frequency values and compare that result to the one in Part a.

$$5\left(\frac{150}{200}\right)+15\left(\frac{35}{200}\right)+50\left(\frac{10}{200}\right)+100\left(\frac{5}{200}\right)$$

$$= \$11.375$$

e) If there were an equal number of each gift card, what would the average be?

$Amt	rel freq
5	50/200
15	50/200
50	50/200
100	50/200

$$5\left(\frac{50}{200}\right)+15\left(\frac{50}{200}\right)+50\left(\frac{50}{200}\right)+100\left(\frac{50}{200}\right)$$

$$= \$42.50$$