

Activity 2

Objectives

- Use the copy and paste features of the CellSheet™ Application
- Use the CellSheet App to write a formula to find the weighted mean
- Use the CellSheet App to determine the missing value in a weighted mean

What Is Your Grade? (Part 2)

Introduction

Your final grade for a marking period may not be based on tests alone. Other assignments, such as homework, quizzes, portfolios, and projects, may be included in your final grade. Many teachers will have some assignments count more than others. For example, a test might be worth two quiz grades or homework might be worth 10% of your final grade. What does this weighting of assignments mean for your final grade? In this exploration, you will examine weighted averages.

Here is an example of a weighted average. Suppose that you are in charge of getting pizzas for your after-school club. All 20 people in the club will contribute the same amount of money for the pizzas no matter what kind they eat or how many slices they eat. You order two extra cheese, three pepperoni, one veggie, and one “the works” pizzas.

Pizza	Price
extra cheese	\$8.99
pepperoni	\$10.99
veggie	\$9.99
“the works”	\$13.99

Now you need to figure out how much each person in the club needs to contribute.

$$\begin{aligned}
 & ((2 \times \$8.99) + (3 \times \$10.99) + (1 \times \$9.99) + (1 \times \$13.99)) \div 20 \\
 & = (\$17.98 + \$32.97 + \$9.99 + \$13.99) \div 20 \\
 & = \$74.93 \div 20 \\
 & = \$3.75 \text{ each}
 \end{aligned}$$

Each person will pay \$3.75 for the pizzas.

Problem

The end of the marking period is rapidly approaching. You have only one more test in science before grades close. Your science teacher weights the different assignments as follows:

Homework/Quiz:	13%
Portfolio:	17%
Project:	20%
Tests:	50%
TOTAL	100%

Your grades for the term are as follows:

Homework/Quiz Average:	70%
Portfolio:	80%
Project:	75%
Test 1:	76%
Test 2:	80%
Test 3:	80%

To find out how much each assignment counts in your final grade, you multiply your grade by the weighted value. Homework/quiz average accounts for 9.1 points in the final grade because the homework/quiz average is 70% and its weighted value is 13% ($70 \times 0.13 = 9.1$). If the homework/quiz average were 100%, then homework/quiz would account for 13 points of the final grade ($100 \times 0.13 = 13$). To find out how much the tests count, you will find the average of the four tests and then multiply by 0.5, the weighted value of tests.

What score do you need to earn on this test to have a 78% average for the marking period?

Exploration

1. Create a new spreadsheet in the CellSheet™ App and name it **GRADES2**. In cell A1, type "**HWQ**". In cell A2, type "**PORT**". In cell A3, type "**PROJ**". In cell A4, type "**TESTS**".

GRAD	A	B	C
1	HWQ		
2	PORT		
3	PROJ		
4	TESTS		
5			
6			
AS:			[Menu]

- Enter the scores in column B next to the appropriate text. Enter the 3 test scores in cells B5, C5, and B6, leaving cell C6 blank for the fourth test score.
- Enter a formula in cell B4 that will compute the test average from the four scores in cells B5, C5, B6, and C6.

What formula will you use to find your test average? (Don't forget to press **STO▶** before entering the formula.) _____

GRAD	A	B	C
1	HWQ	70	
2	PORT	80	
3	PROJ	75	
4	TESTS		
5		76	80
6		80	
B4: =(

Remember you have entered only three test scores. That is why the test average is only 59. You want to find out what score you need on the fourth test to get the average you want for the term.

- In column C, enter the weight of each assignment. For example, type **0.13** in cell C1.

GRAD	A	B	C
1	HWQ	70	.13
2	PORT	80	.17
3	PROJ	75	.2
4	TESTS	59	.5
5		76	80
6		80	
C6: [Menu]			

- Column D will show the weighted value of each assignment in the final grade. In cell D1, type the formula **=B1*C1**. This shows that the homework and quiz average accounts for 9.1 points in the final grade.

GRAD	B	C	D
1	70	.13	
2	80	.17	
3	75	.2	
4	59	.5	
5	76	80	
6	80		
D1: =B1*C1			

6. a. Move to cell D1. Press $\boxed{Y=}$ to access the **Cut** and **Copy** options.
- b. Select **Copy** by pressing \boxed{ZOOM} .

GRAD	B	C	D
1	70	.13	9.1
2	80	.17	
3	75	.2	
4	59	.5	
5	76	80	
6	80		

Cut Copy Menu

- c. Move to cell D2, and then press $\boxed{Y=}$ to select the range over which the formula will be copied. Move to cell D4, highlighting the field over which the formula in cell D1 will be copied. Notice that the range D2:D4 is shown in the locator bar at the bottom of the cellsheet.

GRAD	B	C	D
1	70	.13	9.1
2	80	.17	
3	75	.2	
4	59	.5	
5	76	80	
6	80		

D2:D4 Paste Menu

- d. Select **Paste** (press \boxed{TRACE}) to paste the formulas into those cells.

Look at the formulas pasted in cells D2, D3, and D4. Notice that the pasted formulas have changed so that the *relative position* of the operations is still the same. In cell D1, the formula is $=B1*C1$, the two cells on the same row and to the left of cell D1. The formula in cell D4 is *relatively* the same thing; $=B4*C4$, the two cells on the same row and to the left of cell D4.

Four components make up your final grade for the term. If you add the weighted values, you will get a total out of 100, which is your final grade. To add the four values, you could type the formula $=D1+D2+D3+D4$ in cell D5. However, the **sum** function is a built-in function and may be used as well.

7. a. Move to cell D5. To find the *sum* of a string of data using the **sum** function, press $\boxed{STO\blacktriangleright}$ to insert the equals sign.
- b. Press \boxed{GRAPH} to bring up the **FUNCTIONS Menu**.
- c. Select **sum**(. Enter **D1:D4**, since these are the cells you want to sum. Close the argument by inserting a right parenthesis $\boxed{)}$, and then press \boxed{ENTER} .

Again, the sum is low, because you have not yet taken the fourth test.

GRAD	B	C	D
1	70	.13	9.1
2	80	.17	13.6
3	75	.2	15
4	59	.5	29.5
5	76	80	
6	80		

D5: =sum(D1:D4)

8. a. Add a fourth test score in cell C6 to get an idea of what score is needed to obtain a final grade of 78%. Enter the value 60 in cell C6.

Is a score of 60 on test four sufficient? Explain your answer.

GRAD	B	C	D
2	80	.17	13.6
3	75	.2	15
4	74	.5	37
5	76	80	74.7
6	80	60	
7			
C7:			[Menu]

- b. Enter a score of 80 in cell C6.

Is a score of 80 on test four sufficient? _____

What is the final grade with an 80% on the fourth test? _____

GRAD	B	C	D
2	80	.17	13.6
3	75	.2	15
4	79	.5	39.5
5	76	80	77.2
6	80	80	
7			
C7:			[Menu]

- c. Enter a score of 90 in cell C6.

With a score of 90 on test four, is your final grade above 78%? _____

What is the lowest score that will result in a final grade of 78%? Enter other scores until you find the lowest value that will result in a final grade of 78%.

GRAD	B	C	D
2	80	.17	13.6
3	75	.2	15
4	81.5	.5	40.75
5	76	80	78.45
6	80	90	
7			
C7:			[Menu]

Student Worksheet

Name _____

Date _____

Navigating the CellSheet™ Application

1. You know that when typing a formula in the CellSheet App, you must begin with the ____ sign by pressing _____. You have learned that you can copy formulas using the _____ key, and paste the formulas with the _____ key.

Solving the Problem

2. The component of the final grade that is weighted the most is the _____ average, and the component that is weighted the least is the _____ average.
3. In order to obtain a final grade of 78%, you need to earn at least _____ on the fourth test.
4. Complete the table with the data after you find the lowest grade on the fourth test that results in a final grade of 78%.

Components of the Final Grade	Average	% of Final Grade	Points in Final Grade
Homework/Quizzes			
Portfolios			
Projects			
Tests			

Analyzing the Data

5. Using the original data, determine the final grade for the different scores on test four.

If your score on test four is	50	60	70	80	90
Your final grade will be					

Explain the pattern of change in the overall average as the test four score increases by 10 points.

6. Huan Jin's homework average was 72%, her portfolio score was 62%, her project score was 65%, and her test scores were 87%, 84%, 79%, and 86%. What is her final grade for the term? _____

7. Eduardo wants to earn a final grade of 94% in the course. His homework average was 94%, his portfolio was 95%, his project was 97%. His scores on the first three tests were 97%, 94%, and 90%. What score does he have to earn on the fourth test to have a 94%? _____

Extending the Activity

1. Mo was upset that his test average counted only 50%. He thought he would have earned a better final grade if the test average were weighted 60% instead of 50%. How much would his final grade improve if the test average were weighted 60%, the homework and portfolio average only 10%, and the project average stayed at 20%?

Create a new template using the grading scheme that Mo would like. Find the final grade for Mo using both schemes if his scores were as follows:

Homework/Quiz Average: 70

Portfolio Score: 59

Project Score: 68

Tests (4 tests): 88, 82, 87, 83

Components	Average	Current Distribution		Mo's Distribution	
		% of Final Grade	Points in Final Grade	% of Final Grade	Points in Final Grade
Homework/Quizzes					
Portfolios					
Projects					
Tests					
Final Grade					

2. A distributor buys gasoline from four different sources for four different prices. Since all the gasoline is stored in one location, the distributor wants to sell the gasoline at the weighted average price plus 20%, the profit. Find the weighted average of the price per gallon and the selling price per gallon if the following data represents the gasoline bought by the distributor.

Source	Quantity (in gallons)	Cost/gallon
#1:	1,200	\$1.25
#2:	1,000	\$1.22
#3:	1,450	\$1.33
#4:	1,350	\$1.34

Teacher Notes



Activity 2

What Is Your Grade? (Part 2)

Objectives

- Use the copy and paste features of the CellSheet™ Application
- Find the weighted mean of a set of values
- Determine the missing value in a weighted mean

Materials

- TI-84 Plus/TI-83 Plus

Time

- 60 minutes

Preparation

Review with students the example in the introduction to help them understand weighted averages. Ask students why a weighted average is a fair way to determine how much each student should pay. What might be another way to determine how much each student should pay?

Elicit Questions

Propose a second example of weighted averages to make sure students are comfortable with the concept. A 2-pound can of mixed nuts is made using $\frac{1}{2}$ pound of cashews that cost \$5 per pound, 1 pound of peanuts that cost \$3 per pound, and $\frac{1}{2}$ pound of almonds that cost \$8 per pound. What is a fair price for the 2-pound can of mixed nuts?

Management

Have students discuss weighted values in grading schemes. Students may want to propose weights for different assignments for the course. Student should be expected to defend their weighting of assignments.

Answers to Exploration Questions

3. $=(B5+C5+B6+C6)/4$
8.
 - a. No, a score of 60 is not sufficient since the final grade is 74.7%.
 - b. No. 77.2%.
 - c. Yes. The lowest score is 87%.

Answers to the Student Worksheet

Navigating the CellSheet™ Application

1. =; [STO▶]; [Y=]; [TRACE]

Solving the Problem

2. Test, homework/quiz.
3. 87%.

4.

Components of the Final Grade	Average	% of Final Grade	Points in Final Grade
Homework/Quizzes	70	13	9.1
Portfolios	80	17	13.6
Projects	75	20	15.0
Tests	80.75	50	40.4

Analyzing the Data

5.

If your score on test four is	50	60	70	80	90
Your final grade will be	73.45	74.7	75.95	77.2	78.45

The test average will increase by $\frac{1}{4}$ -point for every one-point increase in a test.

Thus, a 10-point increase will result in a 2.5-point increase in the test average. The test average is only 50% of the entire grade, which means that only 50% of 2.5 points will go toward increasing the final average. 50% of 2.5 is 1.25 points for a 10-point increase in the test average.

6. Huan Jin's final grade is 74.9%.
7. Eduardo will need to score an 89 on the fourth test to obtain a final grade of 94%.

Extending the Activity

1.

Components	Average	Current Distribution		Mo's Distribution	
		% of Final Grade	Points in Final Grade	% of Final Grade	Points in Final Grade
Homework/Quizzes	70	13	9.1	10	7
Portfolios	59	17	10.03	10	5.9
Projects	68	20	13.6	20	13.6
Tests	85	50	42.5	60	51
Final Grade		100	75.23	100	77.5

2. The weighted average is \$1.2915. Thus, the selling price is $1.2915 + (0.20)(1.2915) = 1.5498$ or approximately \$1.55 per gallon.