Frugal Freda's Fruit Foray

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Conduct an investigation to help Freda find out which fruit furnishes the greatest fraction of edible flesh. Once the skins and seeds have been removed, what is the actual cost of a serving of each fruit? What advice would you give Freda?

Grade Levels 6 - 8

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Context

I am always looking for tasks that call students to practice the use of fraction/decimal/percent conversions. We discussed in science class the definition of fruits and in home economics students had been considering smart consumer choices. I thought the students would have a good time with this task and would have the opportunity to practice lots of mathematics skills. I found this to be true.

What This Task Accomplishes

There was an immense amount of mathematical calculations in this task. Students had to find the weight of each fruit, with and without skin. They had to compute the price of each piece of fruit, given the price per pound. Some of the balances were metric and that called for making ounce/gram conversions. Students then had to compare the price per serving of the four fruits, having examined the results of their measurements, as well as those of the other groups. There were many opportunities for decision making throughout this task.

What the Student Will Do

Each group was given a navel orange, tangerine and a banana. Due to the price of cantaloupes, each class had one and had to decide what constituted "a serving" of the melon. They found the mass of the fruits, peeled and seeded them and found the mass of the peeled fruit. They calculated the edible percentage of each fruit and recorded that on the class list. There was a class discussion of the reliability of the data, as well as the range of results. Students were given the price per pound for each fruit, and they had to calculate the cost per serving of the actual amount of edible flesh and compare these costs. Their advice to Freda was interesting. The cost per serving of bananas and oranges was very close, so she should consider factors other than mere cost in making her decisions.

Time Required for Task

We were able to do the actual laboratory aspect of this task in 60 minutes.

It took the students about one-in-a-half to two hours to complete the calculations and do the write-ups.

Interdisciplinary Links

This fits well in a life science plant unit as you study fruits. It is also a good connection to a home economics study of consumer decision making, diet considerations and unit pricing. Getting the health educator to discuss nutritional aspects of these fruits at the same time would ensure that the students could advise Freda with considerations other than simply price alone.

Teaching Tips

Providing students with bowls and plastic knives helps them to hang on to the juice, seeds and scraps, as well as the edible fruit.

Suggested Materials

- Fruit - one of each per group
- Navel oranges (Californian are best), tangerines and bananas
- Melon - one per class
- Bowls and knives - one per group
- Balances - one per group
- Calculators
- Graph paper

Possible Solutions

According to my calculations, the cost per serving of each fruit was:

Bananas = $.057

Oranges = $.059

Tangerines = $.073

Cantaloupe = $.105

Because bananas and oranges are so close, Freda might want to consider Vitamin C or Potassium content of each fruit. She might want to think about calorie content as well. She also might consider whether she will be eating the fruit at home, where she can wash off the juice, or on the road where the banana might be easier to peel and neater to eat.

Benchmark Descriptors

Novice
This student shows no mathematics in this task. The weighing and peeling were done in class in groups and this student seemed to have missed the point. His/her advice to Freda shows no evidence of mathematical reasoning. "Looking and feeling for the greatest amount of flesh" replaces providing mathematical evidence for decision making.

Apprentice
This student missed the fact that all the prices of fruits were posted in the front of the room from the onset of the assignment. S/he never answers the question about what fruit to buy. S/he does not carry out the mathematical procedure needed to advise Freda (getting to a common unit price for the edible portion of fruits). There is some correct notation e.g. %, an attempt at representation. Explanation is incomplete and not clearly presented.

Practitioner
The solution shows that the student has a broad understanding of the problem and the major concepts necessary for its solution. The student uses a strategy that leads to a solution to the problem. There is effective mathematical reasoning. Appropriate mathematical procedures were used. The explanation is clear except on the bottom of page one. The representation is good. There is solid math language used throughout the solution.

Expert
This student identified appropriate mathematical concepts and information necessary for a solution. The strategy is very efficient leading directly to a solution. S/he shows refined reasoning and a succinct presentation. The reader does not need to infer anything as the solution is clearly stated. The representation makes use of technology and clearly communicates the solution. There is precise and appropriate mathematical terminology and notation.

Novice

The conversation about "buying the skin" is irrelevant and adds nothing to the mathematics of this task. There is no math anywhere in this solution.

How I solved this problem is I found out how much the fruit weighed. with the skin and how much it weighed without the skin Then I had to find out whats the price per ounce. I found that out by dividing the ounces by the percentages. I dont think you should be buying the skin to because If the skin wasnt on it. It would be less money for the edible flesh All your doing is throughing the skin out. I think what she should do is when she goes to buy the fruit to look and feel for the greatest amount of edible flesh and even though she is buying the skin to shes really looking for the flesh so she should really look and feel for the greastest amount of edible flesh and get her moneys worth thats what I think she should Do and thats my advice for her. and thats my write up for the friut task.

What percentages is s/he using to divide by? Why?

The weighing and peeling were done as a whole class. I am not sure this student understood why it was weighed before and after the peeling.

Apprentice

This first sentence is a good observation. The rest is not relevant to this task.

My class was asked to find out of navel oranges, tangerines, banana's, and cantaloupe. We did this as a class project. I did not get the prices of the fruit.

The prices of the four fruits have been posted on the classroom flip chart since day 1 of this investigation. Two groups did cantaloupes.

We split up in groups. We had a total of twelve groups. One group did the cantaloupe.

The first thing my group did was weigh the fruit with the skin on the tangerine was 203.5 g. orange 101.2 g, banana 129 g.

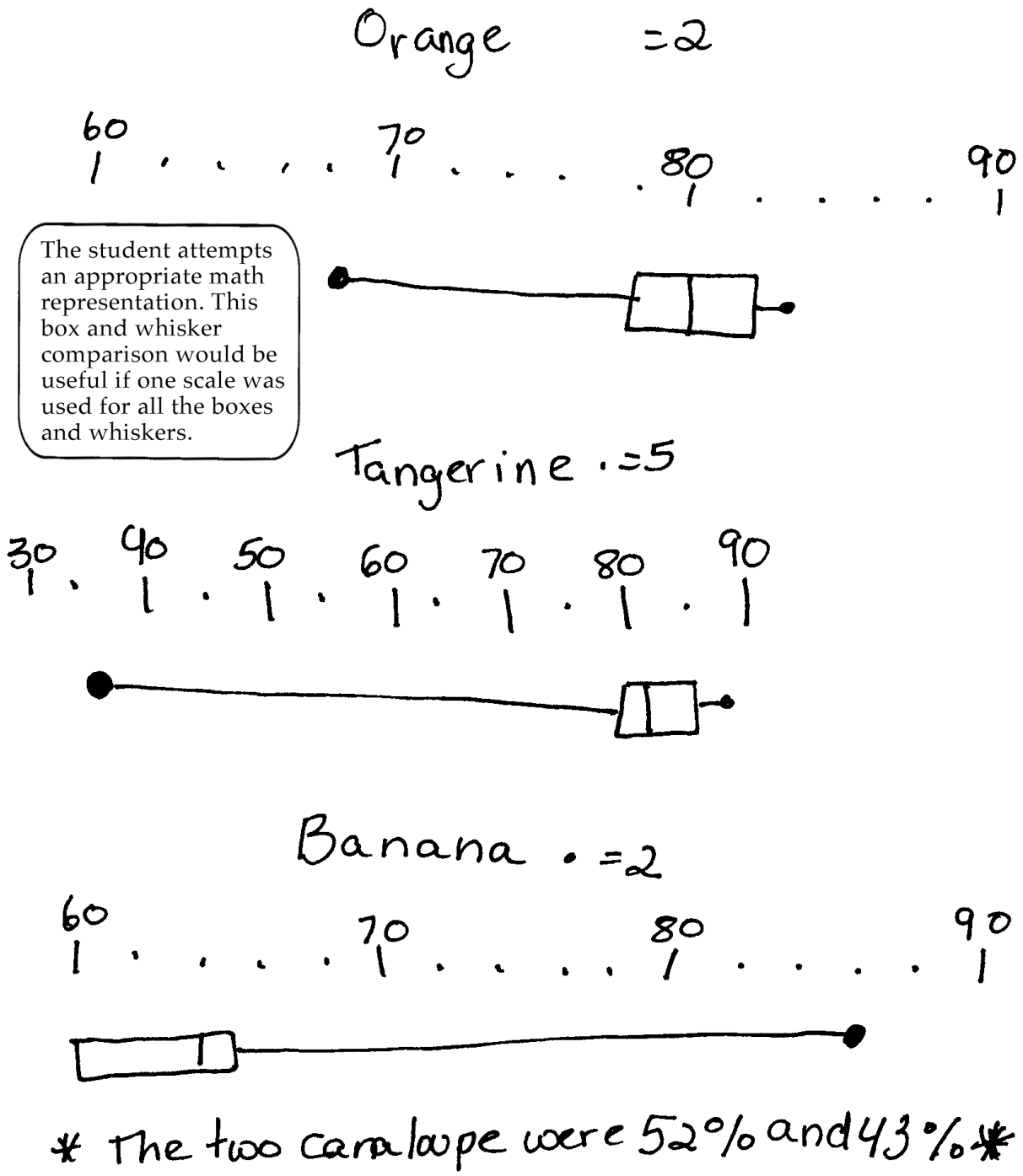
The second thing we did was peel the frut and take out the seeds. The tangerine was 166.9 g, orange 232 g and banana 194 g.

If the student used a chart for reporting these weights, it would be easier to read and compare.

After we had to figur out the price of edibill food. The tangerine was 74%, orange 82%, and banana 66%. The classes whole percentage is on the other page in box + wisker graphs.

The weighs dependon how you can peel the frut. Also I know that for sherbert you need the skins of - the frut. So you would not throw it away.

Apprentice



The student attempts an appropriate math representation. This box and whisker comparison would be useful if one scale was used for all the boxes and whiskers.

Practitioner

Key
O = Orange
T = Tangerine
B = Banana
C = Cantaloupe

Fruit Foray Write-up

The student shows understanding of what is being asked right away.

The task: Frugal Freda is on a fruit foray in her local supermarket. She wants to find the fresh fruit with the greatest fraction of edible flesh with her feeble funds. She likes navel oranges, bananas, tangerines, and cantaloupe.

I am asked a series of questions. They are: #1 Which fruit furnishes the greatest fraction of edible flesh? #2: Once the skins and seeds have been removed, what is the actual cost of a serving of each fruit? (I used one ounce for my serving size.) #3 What advice would you give to Freda?

One ounce is obviously not a serving. It is a good unit for price comparison.

To solve question number one (which fruit furnishes the greatest fraction of edible fruit) I had to divide the peeled weight by the total weight. Here is a chart that I made.

Percentages

	Total Weight	Peeled Weight	Fractions
O	5.1 oz	3.7 oz	72.5/100
T	8.2 oz	7.1 oz	86.5/100
B	4.3 oz	2.6 oz	60.4/100
C	37.9 oz	16.2 oz	42.7/100

Excellent comparison chart.

The student needs to show work for how this ratio leads to prices in the next chart.

To solve the second question (once the skins and seeds have been removed of a serving of each fruit) I had to cross multiply. Here is a chart and how I set up the cross multiply.

$$\frac{\text{Price per pound}}{\text{class peeled weight}} = \frac{\text{X (= Price Peeled)}}{\text{class unpeeled weight}}$$

Practitioner

Peeled Prices per serving (1 oz.)

	Price Peeled oz.
O	$.059
T	$.081
B	$.056
C	$.090

Student shows broad understanding of task by going beyond what is demanded in the task statement.

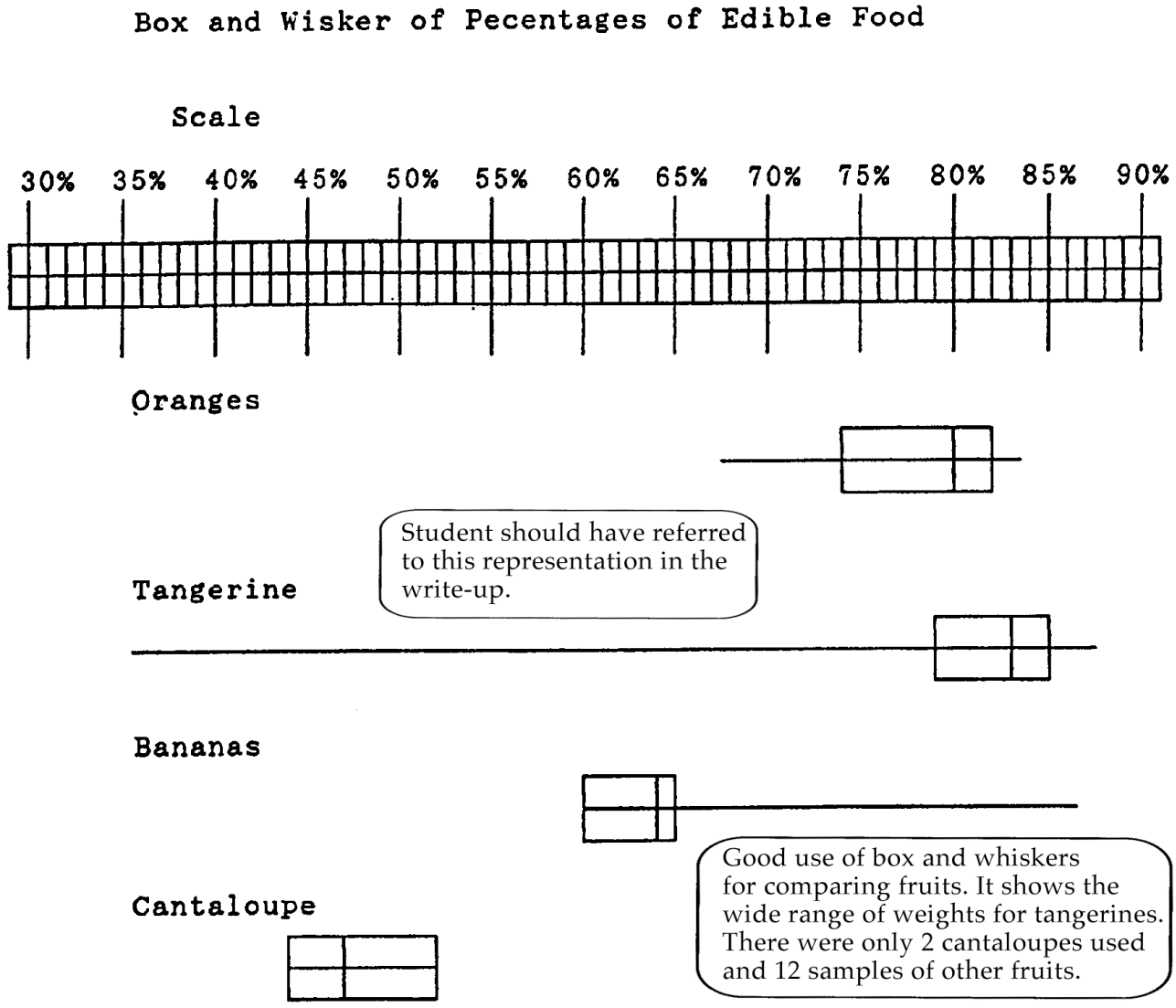
The advice I would give to Freda is to buy bananas because they are the cheapest in both price per pound (unpeeled) and price peeled.

To extend this problem I chose to consider the calories per ounce because Freda would want the best price and the calories combined because she is poor. I made a chart to show calories per ounce and another chart that shows price per calorie. If one of the fruits were on sale, example 20% off, you can consult my price per calorie chart to see if the sale is enough to change my buying decision. If you were not poor unlike Freda you could do a price per chart using a different factor like vitamins.

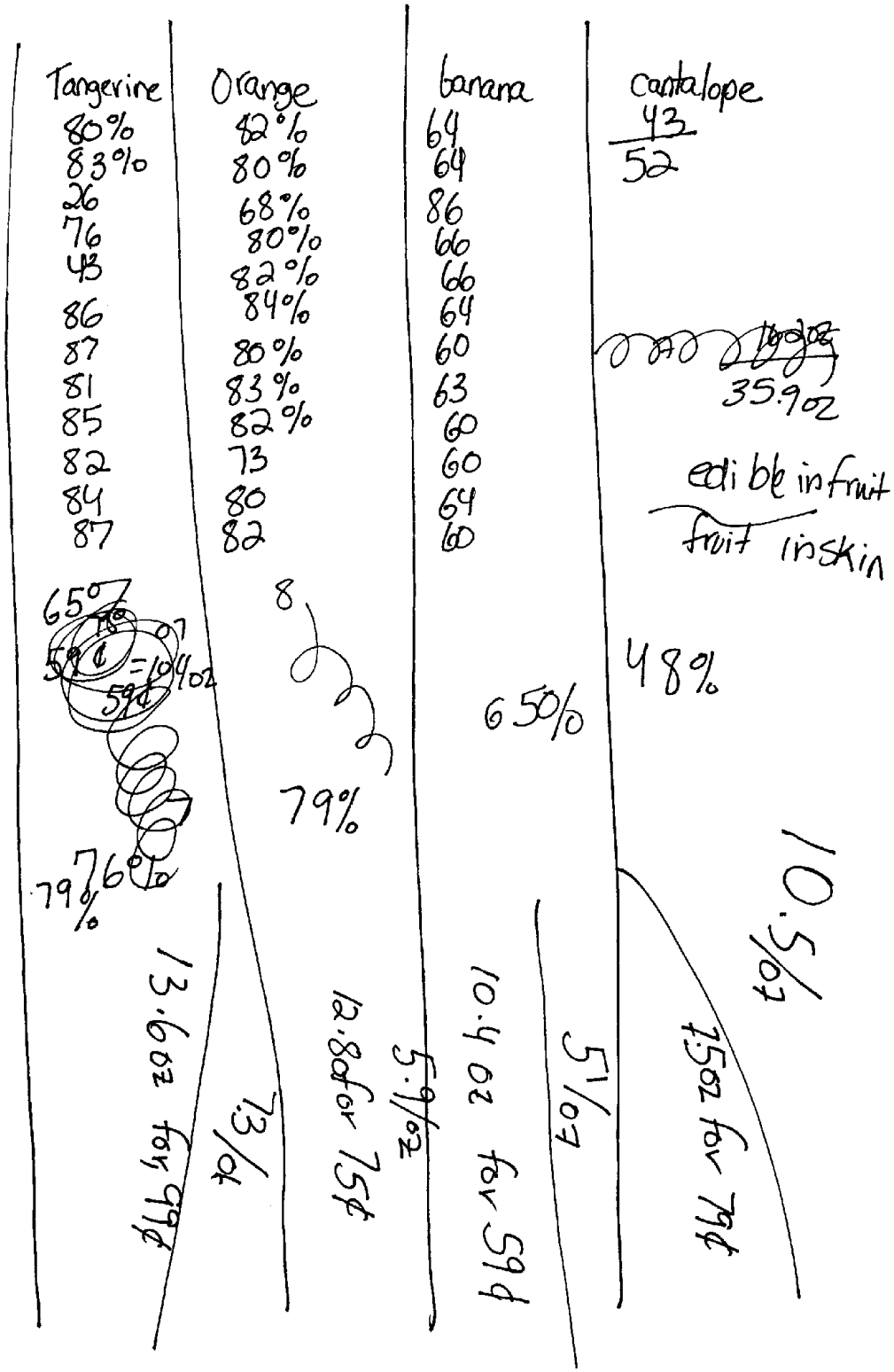
	Calories Per Ounce
O	13.5
T	4.5
B	28
C	5

	Price Per Calorie
O	.43 cents
T	1.8 cents
B	.2 cents
C	1.8 cents

Practitioner



Practitioner



Expert

Summarizes findings clearly. Makes clear comparisons.

Freda's Fruit Foray

I was asked to conduct an investigation to find out which fruit furnishes the greatest percent of edible flesh, the cost of serving each fruit, and to give Freda some advice as to which is the better deal. I know that I am supposed to investigate a banana, orange, tangerine, and cantaloupe. I also know that the bananas are $.59 a pound, the oranges are $.75 a pound, the tangerines are $.99 a pound, and the cantaloupes are $.79 a pound. I know that there are 28.35 grams in an ounce and 16 ounces in a pound.

I had to figure out for each fruit the price per ounce, the percent of edible fruit, the weight before and after peeled, and the price per ounce of edible fruit.

First, I weighed the fruit. Then I peeled and took out the seeds and weighed the fruit. Then I took the weight of the banana in grams and divided it by 28.35 (grams/ounce) and wrote it down. I did the same with all of the fruits, so I had their weight before and after being peeled in ounces. I wanted to use ounces because it is hard to convert the price/lb to price/gram, and three out of four fruits weighed less than a pound. Next, I figured out the price/ounce. To do this I just divided all of the prices/lb by 16. Next I figured out (on the back of the sheet) the percent that is edible. To do this I divided the peeled weight by the un-peeled weight and then moved the decimal to the right two times. I did this with all of the fruits. The whole class did this, so I took everyone's data and found the mean, the mode, the median, and the range. I decided to use the mean as the average. Then to figure out the price per serving I multiplied the price/ounce by the weight. I did this with all but the cantaloupe. Since the cantaloupe is bigger, one serving is only a quarter of it. So after the first step I divided it by four, to get the price of one serving, or one quarter.

Explains that cantaloupe is more than one serving.

To organize my data I made a table. The rows are labeled banana, orange, tangerine, and cantaloupe. The columns are labeled price/lb, price/oz., % edible, weight of edible fruit, total weight of fruit, price/ounce of edible fruit, and price/serving.

I also figured out the price/ounce of edible fruit to compare. To do this I changed the average percents of edible fruit back to decimals. Then I multiplied the decimal by 16 ounces/pound. Then I took the price/pound and divided that by the number from the previous step. I did that with all of the fruits.

I found that the bananas are $.26 a serving, the orange is $.35 a serving, the tangerine is $.47 a serving, and the cantaloupe is $.48 a serving. You throw away the most with the cantaloupe and the least with the orange, but the banana is the cheapest/serving.

Does a good job of documenting decision to use mean as average.

Good justification for decisions made.

Expert

FRUIT

	A	B	C	D	E
1		price\lb.	price\oz.	% of edible fruit	edible fruit weights oz.
2	Banana	$.59	$.04	64.6	4.2
3	Orange	$.75	$.05	85.6	5.6
4	Tangerine	$.99	$.06	75.8	6.4
5	Cantaloupe	$.79	$.05	42.5	19.6
6		price\serving			
7	1 whole banana	$.26			
8	1 whole orange	$.35			
9	1 whole tangerine	$.47			
10	1/4 of a cantaloupe	$.48			

FRUIT

	F	G
1	total fruit weights oz.	price\oz. of edible fruit
2	6.5	$.06
3	7.0	$.05
4	7.8	$.08
5	38.2	$.12
6		
7		
8		
9		
10		

Expert

	price/lb	price/oz	% edible	edible weights oz	total weight oz
banana	59¢	4¢	64.6	4.2	6.5
orange	75¢	.5¢	85.6	5.6	7
tangerine	99¢	6¢	75.8	6.4	7.8
cantaloupe	79¢	5¢	12.5	19.6	38.2

	price/serving
1 banana	26¢
1 orange	35¢
1 tangerine	47¢
¼ cantaloupe	98¢