



## Learning Project 2 Rates

### Inquiry Activity 2-1: Multi-step Problems and Rates

(Note: *Italicized portions should be directed to students.*)

#### 1. Identifying the Problem (PA Test item # 7) Calculator allowed Instructor directed.

*Read the question carefully, as you would if taking the actual test.*

7. Electric switches that regularly sell for \$0.69 each are advertised this week at 5 for \$2.75. How much is saved by purchasing 5 switches at the sale price rather than at the regular price?
- (1) \$6.20
  - (2) \$3.45
  - (3) \$2.75
  - (4) \$0.70
  - (5) \$0.14

**Calculator Allowed**



*Here are some problem clarification questions you may want to consider when reading test questions.*

*What words and/or symbols might be important to understand to answer this problem and what are they telling you?*

*What words and/or symbols are unfamiliar and what do you think they mean?*

#### 2. Becoming Familiar with the Problem

*Ask yourself questions like these about the problem. Take note of the ones that were especially helpful so that you can remember to use similar thinking questions when you take the test.*

*Reread the question. What are you being asked to find?*

*Which information in the problem is relevant to what you need to find?*

*What do you know about this kind of situation: determining how much you can save when shopping?*

#### 3. Planning, Assigning and Performing Tasks

*Try to answer the test question any way you can, even if you have to guess, but become aware of the reasoning and operations that you are using. The following directions and questions can be helpful as strategies to use solve test questions.*

##### Planning

*What is the problem asking you to do in terms of mathematics: bringing things together, separating things, or comparing things?*

The intent of this question is to make students aware of the different mathematical operations that certain situations demand. It will help students to know when to add, subtract, multiply or divide.

Finally, this is a comparison situation, comparing the sale versus regular price of 5 items. But it is necessary to 'bring together' the 5 individual costs of \$0.69 before comparing.

*How many steps will it take to find the answer, what is the order of the steps, and what math will you perform at each step?*

Most will see this as a two step problem: 1) multiply the regular cost of one switch (\$.69) to find the cost of 5 switches at the regular price, and then subtract the cost of 5 switches at the sale price from 5 switches at the regular price.

### Doing the Work

*Represent the problem as a mathematical expression or equation that includes the steps and the math required at each step.*

*Estimate an answer – tolerate some fuzziness, but be aware of the steps you took to make the estimate, even if you guessed.*

One of the estimation strategies might be to round the \$.69 to \$.70, and then multiply  $5 \times \$0.70$  which makes it \$3.50. The answer to the second step of subtracting can now be estimated at \$.75.

*Eliminate unreasonable answer choices. Remember the reasoning process you used to eliminate some of the answer choices.*

If they estimated as described above, only one answer choice makes sense. However, to encourage students to use their creativity while estimating and problem solving, we want to hear about their individual strategies in the sharing steps that follow.

*Find the answer.*

*Compare your answer to the estimate.*

*Is your answer reasonable?*

*Be ready to defend your answer and the way you found it.*

### 4. Sharing with Others

***Telling other people what you know helps you to understand the material better. So take this opportunity not only to share the knowledge, but also to learn it more completely.***

**Small Groups:** *Compare your answer to others in the group and explain why and how you found it and why you think yours is correct.*

*Come to an agreement in your group as to the steps you would recommend for solving this problem both with and without a calculator. Write them as step 1, step 2, etc.*

*Write a mathematical expression that shows what your group did to find the correct answer.*

*Write your answer in sentence form.*

I would save \$.70 by buying 5 switches at the sale price of \$2.75, rather than paying \$3.45 for five switches at the regular price of \$.69 each.

**Whole Class:** *Report to the class the steps you decided on to answer this question as well as the mathematical expression that summarizes them.*

*Take notes on any different ways that others used to find the answer.*

Some may have divided the sale price of \$2.75 by 5 to find the price of 1 during the sale (\$.55). They could then subtract that from \$.69 to find the savings per item (\$.14) and finally multiply that by 5 to find the total savings. Using a calculator would make this method a viable alternative.

### 5. Reflecting, Extending and Evaluating

This activity can be an instructor-led discussion or done in pairs or small groups, whatever the learners feel more comfortable with. One underlying generalization to be made is that total cost is found by multiplying the number of items by the price per item. ( $C = np$ ). A second observation is that subtraction is used here to compare the final costs – it provides the answer to “how much is saved?” Since this is the first item from the calculator section of the test that we are studying, this is the time to introduce its use and to explore students’ feelings about using it.



**Reflecting:** *Think about what you learned.* (group activity or instructor led.)

**Here are some questions to start you thinking about the experience you just had. Thinking about what you have learned and experienced is part of the learning process. When the focus is only on the answer, you don't get much time to think about what was learned.**

*Explain the reason why you chose to multiply in solving this problem.*

Mathematically speaking, multiplication is the operation that you use when you combine a number (5) of numbers that are the same (.69 or .14) In this situation, most have multiplied the number of items times the price per item to find the total cost.

*All the methods that were used to solve this problem involved a final step of subtracting as a way to compare the costs. What words in the problem indicated to you that you needed to subtract?*

Subtraction is one of the operations used to compare numbers. Here we want to know how much more one number is than the other (the difference between them) so we used subtraction.

*Which way to solve the problem seems to be the most efficient way to you to solve similar problems when taking a test? Explain.*

This discussion may take many paths, some choosing estimation and some the calculator method. The point should be made that using both in a test-taking situation is probably the safest.

*What method are you most likely to use to solve a similar problem if you are at the store?*

It will be interesting to see how many people in the class would estimate and how many would pull out the calculator.

*Review the instructions for using the calculator supplied in the practice test. What more would you like to know about the use of a calculator for test-taking purposes?*

This item is an example of many in the calculator section of the test that really does not require using it to find the answer. However, there will usually be ways to incorporate its use in justifying your answer or in making sense of the situation.

**Extending:** *Extend what you learned to new situations.*

**In extending, you are being asked to transfer the information presented in the Practice Test question to other information or situations you already know and maybe making new connections to other information.**

*Suppose you need only one electric switch. Is it better to buy one switch at regular price or 5 switches at sale price? Explain, using numbers to support your position.*

*How is your experience with getting the best buy similar to or different from the situation that is presented in this problem? Explain.*

*What math do you use to get the best buy in stores?*

*From your shopping experience, make up at least one test question on comparing products to get the best value. Pass out your question for others in the class to solve.*

*Was there anything that you learned in the previous Learning Project on Graphs that helped you in this problem? Why or why not?*

**Evaluating:** *Assess what you learned and how you learned it.*

*In this last step, you get a chance to review the content of what you learned and the methods used to learn. There are no right or wrong answers to these questions; it is your chance to look more closely at your learning style and the opportunity to state how you benefited or didn't benefit from the content and/or the methods to help you pass the GED test.*

*How does your personal experience with trying to figure out best values for the money help you to solve test-questions like this one? Explain.*

*Are you developing any test-taking strategies yet? Explain.*

*What do you think of the steps for analyzing test questions that is outlined here: (1) Read carefully, (2) become familiar with the problem, (3) estimate an answer, (4) narrow down multiple choice answers, (5) do the work to find an answer, and (6) determine an answer?*

*How did these steps work for you in solving this problem?*