

## Presents

### Part I:

You have saved your money all year to buy Christmas presents for your family and closest friends. You have a total of \$26,462. You need to buy 4 presents.

Below is a list of gifts from your favorite catalog (they do not charge tax or shipping). What gifts could you buy? You want to spend most of your money and you have to hurry.

(In case, they are out of one or more items please prepare at least two possible lists.)

- Life-Sized Teddy Bear - \$1,256
- Miracle Kitchen Cleaner - \$14,589
- Custom Computer Game - \$10,542
- Picture-tube Telephone - \$7,499
- Fancy Paints and Brushes - \$3,611
- Ski Trip for Two People - \$19,653
- Dinner for Two in Boston - \$15,576
- Big-Screen TV with VCR - \$2,734
- Dessert of the Month Club - \$4,510
- Movie of the Month Club - \$6,500

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## **Part II:**

Describe how you decided on your answer(s). Include your estimating techniques and how you chose them. Be complete and specific. Use pictures, drawings and charts if needed.

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# Exemplars

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## Presents

### Suggested Grade Span

3-5

### Task

#### Part I:

You have saved your money all year to buy Christmas presents for your family and closest friends. You have a total of \$26,462. You need to buy 4 presents.

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(In case, they are out of one or more items please prepare at least two possible lists.)

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- Dessert of the Month Club - \$4,510
- Movie of the Month Club - \$6,500

#### Part II:

Describe how you decided on your answer(s). Include your estimating techniques and how you chose them. Be complete and specific. Use pictures, drawings and charts if needed.

### Alternate Versions of Task

#### More Accessible Version:

You have saved your money all year to buy Christmas presents for your family and closest friends. You have a total of \$25,000. You need to buy 4 presents.

Below is a list of gifts from your favorite catalog (they do not charge tax or shipping). What gifts could you buy? You want to spend most of your money and you have to hurry.

(In case, they are out of one or more items please prepare at least 2 possible lists.)

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- Life-size Teddy Bear - \$1,200
- Miracle Kitchen Cleaner - \$15,000
- Custom Computer Game - \$10,000
- Picture-tube Telephone - \$8,000
- Fancy Paints and Brushes - \$3,500
- Ski Trip for Two People - \$20,000
- Dinner for Two in Boston - \$15,500
- Big-Screen TV with VCR - \$3,000
- Dessert of the Month Club - \$4,500
- Movie of the Month Club - \$6,500

## More Challenging Version:

You have saved your money all year to buy Christmas presents for your family and closest friends. You have a total of \$26,462. You need to buy 4 presents. Below is a list of gifts from your favorite catalog (they do not charge tax or shipping).

### Part I:

What gifts could you buy? You want to spend most of your money and you have to hurry. Describe how you decided on your answer(s). Please include which estimating techniques you used and how you chose them. Be complete and specific. Use pictures, drawings and charts if needed.

(In case, they are out of one or more items please prepare at least 2 possible lists.)

- Life-size Teddy Bear - \$1,256
- Miracle Kitchen Cleaner - \$14,589
- Custom Computer Game - \$10,542
- Picture-tube Telephone - \$7,499
- Fancy Paints and Brushes - \$3,611
- Ski Trip for Two People - \$19,653
- Dinner for Two in Boston - \$15,576
- Big-Screen TV with VCR - \$2,734
- Dessert of the Month Club - \$4,510
- Movie of the Month Club - \$6,500

### Part II:

What is the average cost of the gifts from which you can choose? What is the average cost of the gifts you are planning to purchase? How do the 2 averages differ and why?

## Context

After working on different types of estimation techniques students were asked to develop an idea for a task that assessed estimation of sums and differences. This task was designed from their idea of a real-world application for these skills. Before the assessment was distributed the

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class discussed the types of gifts to be purchased so that the interest in the items would not hinder the accomplishment of the task. The items and prices were chosen because students needed to consider estimation of large numbers. The students were given a limited time (about 15 minutes) to accomplish Part I since the emphasis was not on calculation, but estimation. Part II was not distributed until everyone had finished Part I. They were allowed as much time as needed for Part II (about 30 minutes).

## What This Task Accomplishes

This task shows how students approach estimation of sums and differences. Some students develop possible solutions in systematic ways based on number sense while others simply list the items they want to buy. There is room to see a variety of estimation techniques applied. It gives students the context to show if and how they check for reasonableness of results.

## What the Student Will Do

Some students will list only the items to purchase; others will list only the prices. Some will list both. Most students will make at least one list that will meet the parameters of the problem. Many will either spend too much or too little money. Most will explain their techniques in terms of the steps they took instead of the mathematical reasoning.

## Time Required for Task

45 minutes

## Interdisciplinary Links

This can be used as part of a consumer unit. It is an appropriate task to use around the winter holidays.

## Teaching Tips

It is a good idea to discuss the items so the students are not so fascinated with the big prices and exciting gifts that they forget the mathematics. Students had trouble with the idea in the problem that the catalog company could be out of items, so they were told not to consider that - just make more than one possible list. Future use of this problem would require omitting the italicized phrase.

## Suggested Materials

- Paper
- Pencil

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## Possible Solutions

Computer Game, TV with VCR, Dessert of the Month, Movie of the Month

Telephone, Dinner for Two, TV with VCR, Teddy Bear, Kitchen Cleaner, Paints and Brushes, Dessert of the Month

Teddy Bear, Computer Game, Dessert of the Month, Movie of the Month

There are many more possibilities. Any combination is acceptable as long as it is not significantly over or below \$26,500. "Gifts for two" count as two gifts toward the four gift goal.

## More Accessible Version Solution:

The student's solution should contain gifts for four people that total no more than \$25,000.

There are many possible solutions.

## More Challenging Version Solution:

Computer Game, TV with VCR, Dessert of the Month, Movie of the Month

Telephone, Dinner for Two, TV with VCR, Teddy Bear, Kitchen Cleaner, Paints and Brushes, Dessert of the Month

Teddy Bear, Computer Game, Dessert of the Month, Movie of the Month

There are many more possibilities. Any combination is acceptable as long as it is not significantly over or below \$26,500. "Gifts for two" count as two gifts toward the four gift goal.

The mean average cost of the items from which students may choose is  $\$86,470 \div 10 = \$8,647$ .

You will need to determine the average cost of the items the student chooses, and evaluate the student's reasoning about why the averages differ.

## Task Specific Assessment Notes

### Novice

The solution is partial and does not relate to the task. One list falls short of the limit and the second exceeds it. The strategy selected does not help solve the problem. The explanation is limited and unclear. There are no figures or diagrams to meaningfully explain the process.

### Apprentice

The solution shows that part of the problem was not understood. The list provides gifts for only three people. The lists have sums that are lower than the goal. The strategy is partly useful and

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there is some evidence of mathematical reasoning. S/he attempts to explain how s/he estimated, but the explanation is incomplete and confusing.

## **Practitioner**

The solution shows an understanding of buying for four people, nearing the targeted amount spent, and estimation techniques. The strategy used, rounding, led to the solution of the problem. The explanation is clear.

## **Expert**

The Expert solution exhibits multiple solutions and an understanding of how to approach the problem. While the strategy is not particularly sophisticated, the procedures were applied accurately and the results were verified. The explanation was clear and used correct terminology and notation.