

## Cookie Caper

You have been asked to bring chocolate chip cookies to the next school dance. You need to bring between 3 and 4–dozen cookies. Your math teacher suggested that you check out the choices from the local grocery store before you made a purchase. You came back to the class with the following information:

You looked on a yellow cake mix box and found a recipe for 4–dozen chocolate chip cookies. The ingredients listed were:

1 box yellow cake mix	(\$1.49/box)
2 eggs	(\$1.39/dozen)
1 – 6 oz. pkg. chocolate chips	(\$1.39)
1/2–cup oil	(\$1.89/4 cups)

You also located some bags of cookies. The prices were as follows:

Keebler <sup>®</sup> Chips Deluxe 18 oz. package/36 cookies	\$3.29
Generic Chip Cookies 18 oz. package/45 cookies	\$2.59

You also found the Pillsbury<sup>®</sup> Chocolate Chip Slice–And–Bake Cookies for the following price:

18 oz. roll for \$2.49

Each roll makes 18 cookies

Which is the better buy for chocolate chip cookies? Which brand will you bring to the dance? Remember, all the cookies that you sell will be profit toward your fieldtrips this year.

## Cookie Caper

### Suggested Grade Span

Grades 6–8

### Grade(s) in Which the Task Was Piloted

Grade 7

### Task

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## Alternative Versions of the Task

### *More Accessible Version:*

You have been asked to bring chocolate chip cookies to the next school dance. You need to bring 3–dozen cookies. Your math teacher suggested that you check out the choices from the local grocery store before you made a purchase. You came back to the class with the following information:

You looked on a yellow cake mix box and found a recipe for 4–dozen chocolate chip cookies. The ingredients listed were:

1 box yellow cake mix	(\$1.49 / box)
2 eggs	(\$1.39 / dozen)
1 – 6 oz. pkg. chocolate chips	(\$1.39)
1/2–cup oil	(\$1.89 / 4 cups)

You also located a bag of cookies. The price of 36 Keebler<sup>®</sup> Chips Deluxe is \$3.29. Which is the better buy for chocolate chip cookies?

### *More Challenging Version:*

The original task, and...

Let's say you decide to sell all 4 types of cookies, and let the customers choose the one they like best. You decide to sell a dozen of each cookie at 300% of the cost to you. If you sell all of the cookies, how much money will you make for the fieldtrip fund?

## NCTM Content Standards and Evidence

### Number and Operation Standard for Grades 6–8

Instructional programs from Pre–Kindergarten through grade 12 should enable students to...

- Compute fluently and make reasonable estimates.
  - *NCTM Evidence:* Select appropriate methods and tools for computing with fractions and decimals from among mental computation, estimation, calculators or computers, and paper and pencil, depending on the situation, and apply the selected methods.
  - Develop, analyze, and explain methods for solving problems involving proportions, such as scaling and finding equivalent ratios.
- *Exemplars Task Specific Evidence:* This task requires students determine unit prices to find the best buy.

## Time/Context/Qualifiers/Tip(s) from Piloting Teacher

This is a medium to long length task. This task links to the *Mathscape* program “Buyer Beware” unit. This can be used when students are working on finding the price per unit and the best buy.

## Links

This task will link to other fund-raising events. The mathematics involved is similar to several others in this issue of *Exemplars*.

## Common Strategies Used to Solve This Task

Most students will solve the problem by determining the price per cookie. Students will organize their information in a table.

## Possible Solutions

### *Original Version:*

Homemade cookies cost 7 cents each

Keebler<sup>®</sup> cost 9 cents each

Generic cost 6 cents each

Pillsbury<sup>®</sup> cost 14 cents each

Students will recognize that the generic brand is the least cost per unit. Some students will recognize that the homemade cost only 1 cent more per cookie and would choose to bring these cookies because they would sell better at the dance.

### *More Accessible Version:*

Keebler<sup>®</sup> cost 9 cents each

Homemade cookies cost 7 cents each

### *More Challenging Version:*

The original solution and...

Homemade cookies cost 7 cents each  $\times$  300% profit = 21 cents per cookie  $\times$  12 = \$2.52

Keebler<sup>®</sup> cost 9 cents each  $\times$  300% profit = 27 cents per cookie  $\times$  12 = \$3.24

Generic cost 6 cents each  $\times$  300% profit = 18 cents per cookie  $\times$  12 = \$2.16

Pillsbury<sup>®</sup> cost 14 cents each  $\times$  300% profit = 42 cents per cookie  $\times$  12 = \$5.04

Total contribution to field trip fund = \$2.52 + \$3.24 + \$2.16 + \$5.04 = \$12.96

It is assumed that the cost to purchase the cookies is donated by the student.

## Task Specific Assessment Notes

**General Notes:** There are many parts of this task. It is important for students to successfully address all aspects in order to move beyond an Apprentice.

**Novice:** The Novice will have no understanding of how to find the cost-per-unit.

**Apprentice:** The Apprentice will show some understanding of how to calculate the price-per-unit but will achieve an incorrect solution either due to a computation or reasoning error.

**Practitioner:** The Practitioner will show understanding of unit prices and will achieve a correct solution with supporting work, math language and representations.

**Expert:** The Expert will show in detail how the problem is solved using unit prices and will extend the solution by evaluating the answer or by making other mathematically relevant comments or observations that further the solution.

## Author

**Leslie Ercole** is currently a grade 7–8 teacher and K–8 teacher leader for the Lunenburg School District. She has taught for 12 years and is currently implementing the *Mathscape* Program in her school. She is also a teacher leader for the Vermont Department of Education's Mathematics Portfolio Assessment Program.

## Novice

The approach used is unclear and shows no understanding of unit pricing.

### Cookie Caper

1. I think that the generic brand is the best buy for the dance if I compare Kebblar to Generic there is a 70¢ difference of prices
2. I will bring generic because there is more cookies and a lower price
3. These are the prices for all brands

Generic \$7.77      Kebblar \$9.87

Brand	Prices	Price per cookie	Price per dozen
Generic	\$2.59	\$5.7	\$7.77
Kebblar	\$3.29	\$9.1	\$9.87
Roll	\$2.49	\$13.8	\$7.47

The student demonstrates little or no mathematical reasoning.

# Apprentice

Some understanding of the task is demonstrated.

The procedure used is correct, but the student is unable to interpret the decimal solutions correctly.



Well first what I did to solve this problem is to find the price per cookie for each one of the brand names.

How I did that is I was I did the number of cookies divided by the price and that would give me the price per cookie.

For example the Keebler chips deluxe was \$3.29 for 36 cookies So I did 3.29 divided by 36 cookies and that gave me 9 cents per cookies.

After I did all that to each one of them this is what I got for price per cookies.

Brand names	Price per Cookie
Keebler	.9 per cookie
Yellow cake mix	.7 per cookie
Pillsbury	.14 per cookie
Generic	.6 per cookie

So what I think the best buy is the generic brand because it is the lowest price per cookie.

The conclusion is correct, but the work to support it is incorrect.

Practitioner

Communication is well organized and labeled. Math language and representation assist in showing an awareness of an audience.

Cookie Caper

My class and I are having a school dance and we need to have 3 to 4 dozen cookies for the dance. We need to find the best buy out of all the cookies that we have.

I got each one of my answers by using the price per unit procedure. The procedure is cost per item divided by number of items = price per unit.

Item	Cost	Cost per unit	Total cost
Yellow cake mix box	(\$1.49)	\$1.49	\$1.49
Two eggs	(\$1.39/12)	\$.12	\$.24
Chocolate chips	(\$1.39)	\$1.39	\$1.39
Cups of oil	(\$1.89/4 cups)	\$.47/cup	\$.24

Total \$3.36

$\$3.36/48$  cookies = \$.07 per cookie (homemade)

Brand of cookies	Number of cookies	Price per package	Price per cookie
Homemade	48	\$2.49	\$0.07
Keebler	36	\$3.29	\$0.09
Generic	45	\$3.36	\$0.06
Pillsbury	18	\$2.59	\$0.14

I think that Generic chips are the best buy because it has the least price and a good amount of cookies and it is the least price per cookie. This is good for the dance because they need 3 to 4 dozen and this one has almost three and a half dozen cookies.

A correct answer is achieved. Work is shown to support the solution.

THE END.

Expert

Cookie Caper

- 1 box of yellow cake mix= \$1.49 per box
- 1 dozen eggs= \$1.39;  $\$1.39/12 = \$.12$ ;  $.12 \times 2 = \$.24$
- 1-6 oz. Package chocolate chips= \$1.39
- 4 cups of oil= \$1.89;  $\$1.89/4 = \$.47$ ;  $\$.47/2 = \$.24$

The awareness of audience is evident in the well-documented, organized solution.

Item	# of cookies it makes	Ounces	Regular Price	Price per cookie
Keebler	36	18 oz.	\$3.29	\$.09
Generic	45	18 oz.	\$2.59	\$.06
Slice and Bake	18	18 oz.	\$2.49	\$.14
Cake Cookies	48	Not listed	\$3.36	\$.07

The way I solved my problem was.... First I found out that 1 box of yellow cake mix would make 48 cookies, the cake mix cost \$1.49 total, but that's only the mix. Then you need to buy 1 dozen eggs, 6 oz. package of Chocolate Chips, and 4 cups oil. 1 dozen eggs cost \$1.39; you will only need 2 eggs to make the cake cookies though.  $\$1.39/12 \text{ eggs} = \$.12$ ;  $\$.12 \times 2 \text{ eggs} = \$.24$  for 2 eggs. The Chocolate Chips cost \$1.39 and we will be using all 6 oz. for the cookies. 4 cups of oil cost \$1.89;  $\$1.89/4 \text{ cups} = \$.47/2 = \$.24$  for a half a cup. A half a cup of oil is all we will be using.

Then I had to add all of those together to find the total price to make the cake cookies.  $\$1.49 + \$.24 + \$1.39 + \$.24 = \$3.36$ . Then to find the price per cookie you need to divide \$3.36 by 48 cookies, which equals \$.07.

The student evaluates all possibilities and chooses the "best".

A correct solution is achieved and supported.

## Expert cont.

To find the price per cookie for the Keebler Chips Deluxe you have to divide the total price of the cookies, which is \$3.29 and the total amount of cookies, which is 36.  $\$3.29/36 \text{ cookies} = \$.09$ .

Then you have to find the price per cookie for the Generic Chip Cookies.  $\$2.59/45 \text{ cookies} = \$.06$  for the price per cookie.

Finally it's the Pillsbury Chocolate Chip Cookies to find the price per pound for,  $\$2.49/18 \text{ cookies} = \$.14$  is the price per cookie.

The best buy out of all the cookies would be the Generic Chip Cookies, that's only \$.06 per cookie. The cookies that I would bring is probably the cake cookies because they probably taste better and it's only 1 cent more per cookie.

This problem will help my parents and me for when we go shopping, now we can find a better buy.