New Year's Party

Addison County is sponsoring a special New Year's celebration for its youngsters. It is anticipated that 1,000 students your age will attend the celebration. Grand Union® is willing to donate 1,000 sodas for this special occasion. They need you to place the order.

Conduct an investigation to determine what flavor soda you should order and the quantity of each. Do your best to ensure that all 1,000 kids will get a soda they will like.

Write a letter to Grand Union® thanking them for their contribution, letting them know what your order is and the process you used to ensure that all 1,000 kids would get the soda flavor of their choice.

Grade Levels 3 - 5

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Context

This task was given to students before the new year. They had experience with surveys and sampling, but few had formal instruction with ratios, fractions and percents.

What This Task Accomplishes

This task assesses how well students understand the concept of sampling, collecting, organizing and displaying data, as well as drawing conclusions. It also assesses to what degree students have a concept of ratio.

What the Student Will Do

Students will take a survey of the students in their class (or a sample of their class). Most students will extrapolate the data to 100 or 1,000 to find the solution. Students with a less developed understanding of probability and ratio may focus on the majority of students selected or not consider sample size.

Time Required for Task

2 hours

Interdisciplinary Links

Drug and alcohol education, commercials and advertising, measurement (what is the volume of the liquid donated), holiday celebrations and traditions. It could also lead to a discussion of how airlines and other food services determine the number of different entrees to bring on flights.

Teaching Tips

For students who would be overly challenged by this task, you could simplify the numbers from 1,000 to 100 and/or limit the soda flavor choices. Experience in conducting surveys is essential for students before beginning this problem.

I adapted the task in the following manner for a student in my class with severe special needs:

Mrs. McKegney wants to have a New Year's party for the class. She is planning to buy a special treat for each person in our class. Find out what kind of soda she needs to buy so that each person gets a soda that they like. Write a note that shows how many sodas of each flavor she needs to buy.

Suggested Materials

- Calculators
- Graph paper
- Computers

Possible Solutions

The solutions will vary.

Benchmark Descriptors

Novice
This student was only able to do an adapted version of the task, dealing only with 100 youngsters. The student bases his/her conclusions on popularity and then randomly assigns numbers of sodas. Since orange had the most, the student ordered half orange sodas, even though orange only totaled 30 percent. The student did create an accurate chart in which to organize his/her information, but uses little or no mathematical language.

Apprentice
This student uses an insufficient sample size on which to base his/her decisions (10). The student does not document his/her work, but does create a mathematical representation to communicate his/her solutions. There are some gaps in the student's explanation, such as the conversion of the percentages to 1,000, but the student does make an attempt to solve the task using ratios and percentages.

Practitioner
This student attempts to define sample size and age. In many cases s/he successfully converts data to percentages. S/he creates a mathematical representation to communicate his/her solution and uses a variety of math terms, symbols and notation. S/he also explains his/her reasoning and processes.

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Expert
This student addresses sample size as a component of accuracy, creates a visual representation to communicate a solution and uses percentage, decimals and fractions to find a solution. The student successfully summarizes results of his/her survey and extrapolates data to 1,000 people. The student generalizes experiences with probability and addresses more than three varieties of soda (deals with open-ended student responses).

Exemplars

Novice

	Voted	No kids	No kids	How many
Orange	ⅢⅠ I	0	0	50
Rootbeer	IIII	0	0	15
Coke	IIII	0	0	15
Sprite	II	0	0	5
Pepsi	I	0	0	5
Cream	I	0	0	5
Dr. Pepper	I	0	0	5

> Student records survey results. These columns of the chart are unclear/unnecessary.

When I made this chart I relized that orange soda is the most popular so what I did was got the most orange but got all the other sodas so people could have what they wanted and so I would be fair and so

> Draws some basic conclusions about data, but is unable to extend to 100 students.

they could have a nice christmas party. What I did was I made graph telling the popubashon of soda in or class and decided to order

> Communicates final solution, although not highlighted.

New Year's Party

Novice

50 can of orange 15 Rootbeer 15 coke 5 sprite 5 pepsi and 5 cream and 5 Dr. pepper. why I ordered 15 Rootbeer and 15 coke because they have the same amount of votes.

> Although there is some logic in the Student's solution, it is not mathematically based.

Exemplars

Apprentice

Step # 1   I interviewed 10 children for the soda they like best. I choose 10 because 10 is a factor of 1,000.

Step #2   I took the number of people that liked orange, Coke, and Sprite and made the amount into a percentage

Step #3   I wrote a letter to the Grand Union.

Step #4   Made a pie graph.

> Explains reasoning for sample size of 10, but does not explain conversion to 90 or 1000.

> There are no equations to document student work. Probably does not have a complete understanding of 90. Student explains strategy.

Exemplars

Apprentice

Dear Grand Union,

 I've spent the day interviewing 10 kids for the soda that they like best. 30% of the kids liked Coke or Sprite. 40% liked Orange Soda. Therefore I wish to order 300 cans of Sprite and 300 cans of Coke. I would like to order 400 cans of Orange Soda. With your contribution the New Year celebration will be wonderful. Thank you for being willing to donate the sodas.
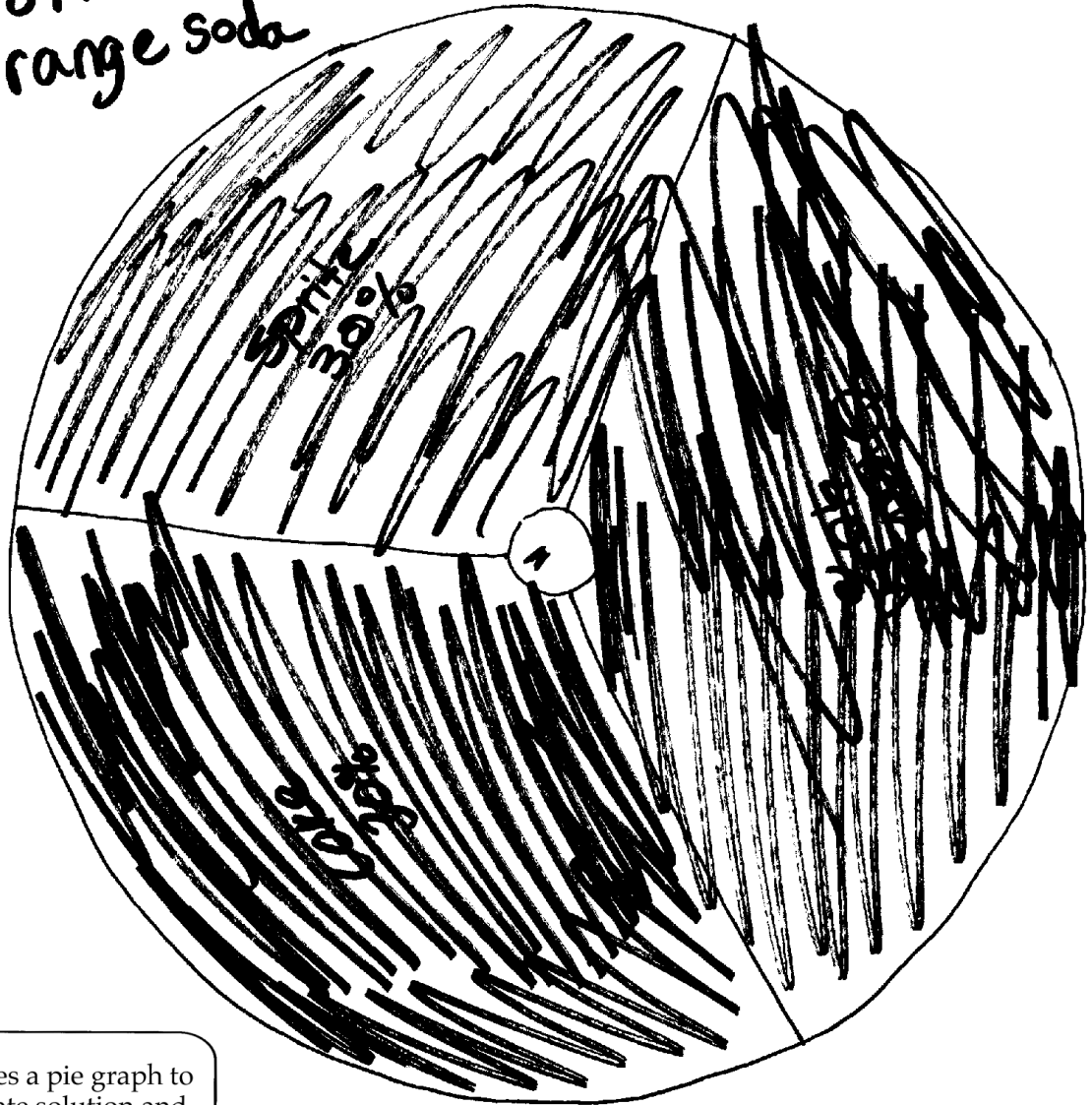
Student creates friendly letter to communicate major components of solution.

Thanks again,

Apprentice

■ = Sprite
■ = Coke
■ = Orange soda

Sprite 30%

Coke 30%

Student uses a pie graph to communicate solution and include key.

Exemplars

Practitioner

Dear Grand Union,

I interviewed 10 children under the age of 12 and above the age of 8 what kind of soda they liked best. I found that the majority of the 10 people in our 4/5 class likes Coca Cola the most. 30% liked Orange soda. Root Beer had the least amount of voters, it had 20%. And last but not least Sprite, nobody out of the 10 I asked Sprite had none. I would like to order 400 Orange sodas, 200 Root Beers, 300 Cokes and 100 sprites. I would like to thank you very much for donating this wonderful item. I am sure they will be injoyed.

Sincerely,

The conclusions do not match the data collected orange = 40%.

Ordering 100 Sprites is inconsistent with conclusions. Zero percent wanted Sprite. Does not articulate reasoning for this decision.

Exemplars

Practitioner

Samples
Orange
RB
Coke
Coke
Orange
Orange
Orange
Coke
Coke
RB

I noticed that 40% of the ten I interviewed prefer Coca Cola. 30% pefered Orange. Root Beer had only 20%. Out of the ten people I interviewed none liked Sprite.

Successfully converts data (total 10) to 90 for 3/4 of the soda flavors.

Orange 30%
RB 20%
Coke 40%
Sprite 0%

Practitioner

In the prossess

The first thing I did was interviewing 10 people. I made a graph to show my data. I decided to make a second graph (a pie chart). I noticed that 10 is a factor of 1,000. It just so happend that the pie chart paper was twenty and 10 goes into twentey 2 times. So I doubled the number. (2 triangle = 10%). I thought this was a really good problem.

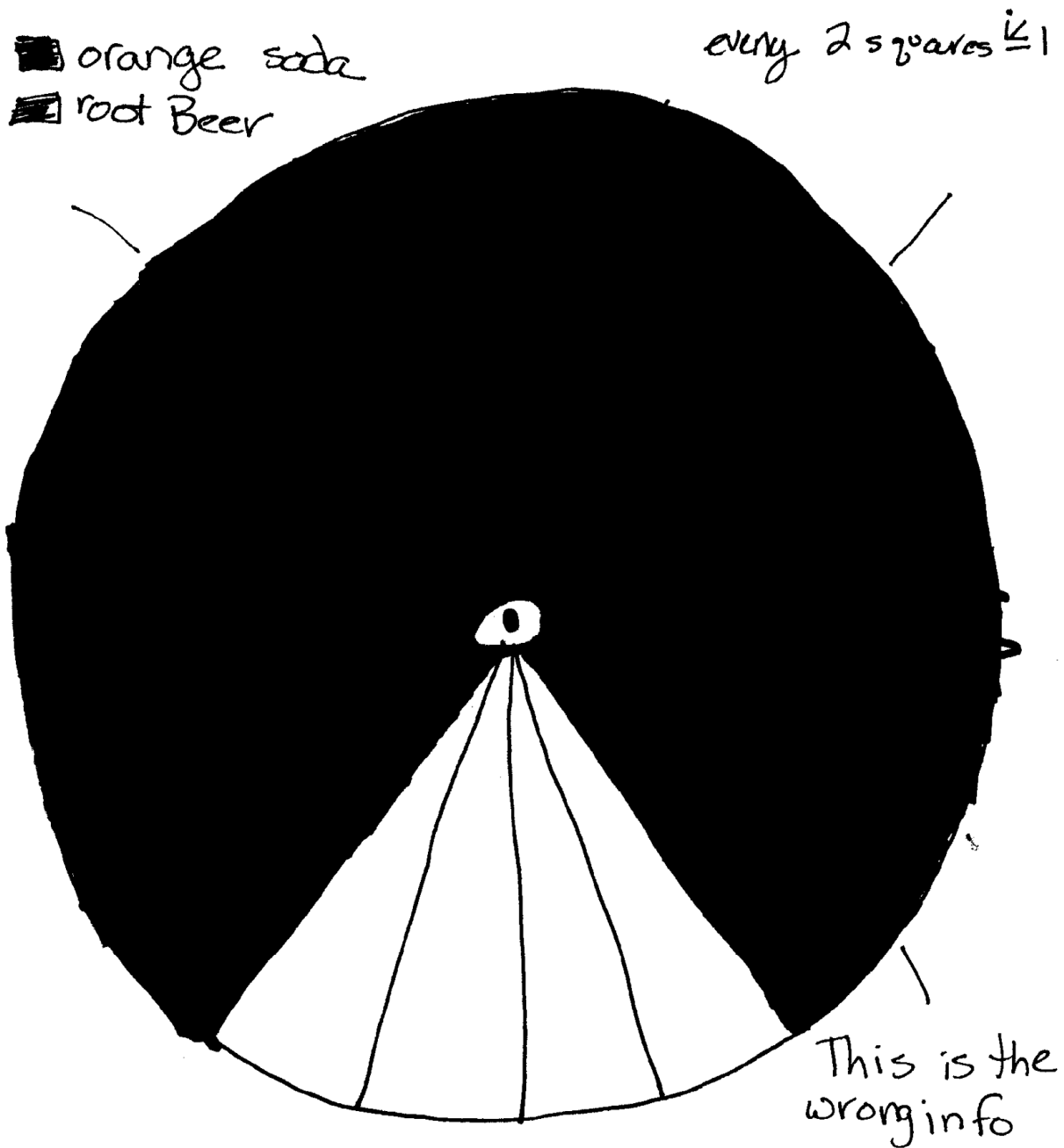> Uses appropriate math language in his/her explanation of the process.

Sincerely.

> Explains processes in creating graph, but does not say why s/he abandoned the graph.

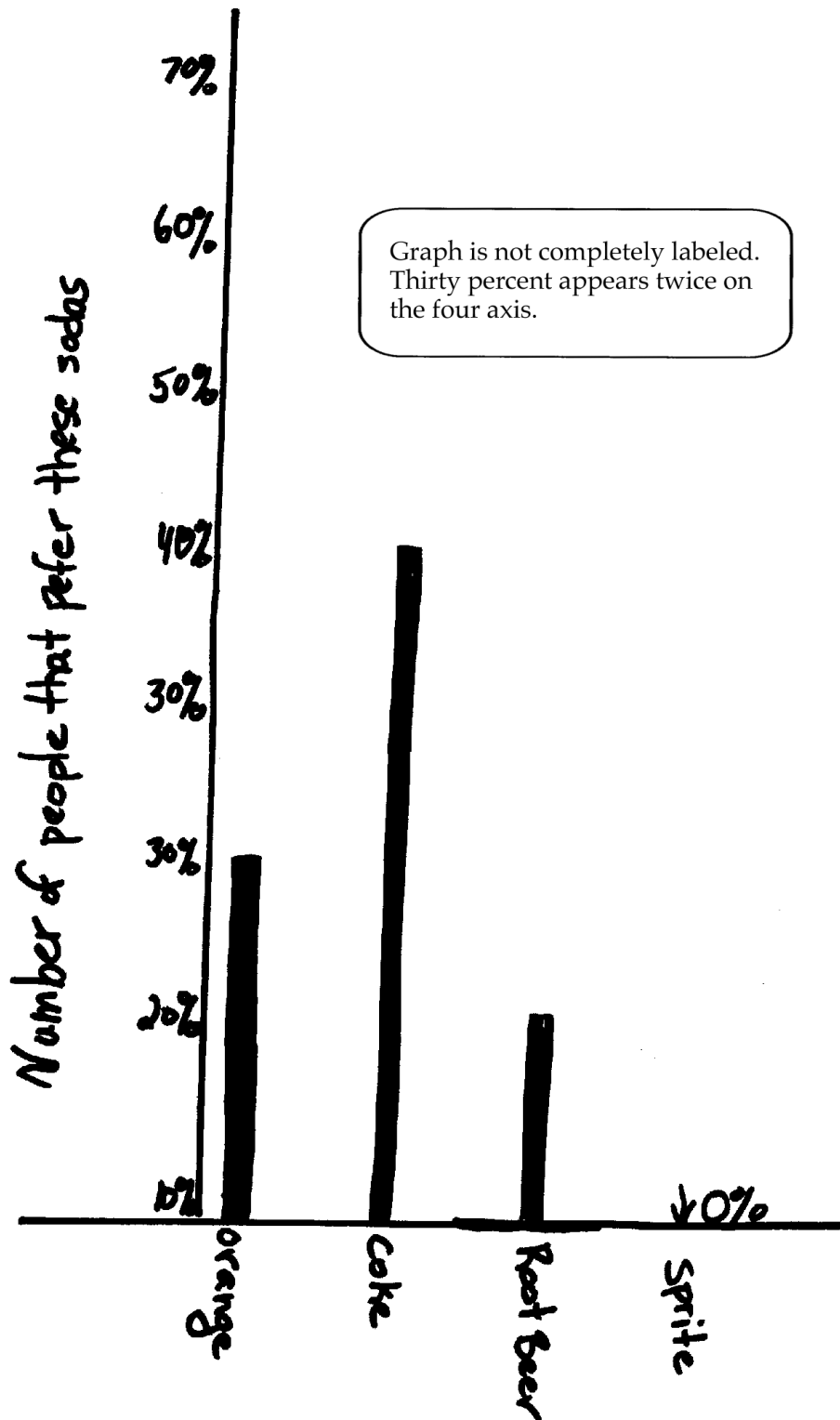P.S. Miss Amico could you make more problems like this?

Practitioner

■ orange soda
■ root Beer

every 2 squares ≛ 1

This is the wrong info

Student recognizes error.

Practitioner

Graph is not completely labeled. Thirty percent appears twice on the four axis.

(Y-axis label: Number of people that prefer these sodas)

Y-axis values: 70%, 60%, 50%, 40%, 30%, 30%, 20%, 0%

X-axis categories: Orange, Coke, Root Beer, Sprite (↓ 0%)

Exemplars

Expert

Matt st — orange

Kevin — RB

Joanna — RB

Justin — Coke

Bethany — orange

Stephany — Orange

Andy — Dr. Pepper

Carin — orange

Alexa — orange

Cordynn — coke

Thomas — coke

Bill — orange

Tommy — coke

Chanda — coke

Lindsy — RB

Katie — Sprite

Matt S. — sprite

Orange — 6   35⅗ X=6

Sprite — 2   12% X=2

Coke — 5   20% X=5

Dr. Pepper — 1   6% X=1

Root Beer — 3   18% X=3

to get % X ÷ 17 * 100 = □%

Expert

Out Of 1,000

Orange - 350   35%

Sprite   - 120 12%

Coke   - 290   29%

Root Beer - 180   18%

Dr. Pepper - 60   6%

> Student summarizes his/her solution.

> Student explains his/her process. Reflects on accuracy limitations based on sample size.

Dear Grand Union,

    We dearly thank you for your contribution of 1000 sodas. I am writing to inform you of how many of what kind of sodas that you should send us. I surveyed my class to see what sodas they liked. I then took the percentage of 17 that the numbers were. Then I changed the percentages of 17 to the percentages of 1000. These digits are the numbers that I tell you here. These are my results; 350 Oranges, 290 Cokes, 120 Sprites, 180 Root Beers, and 60 Dr. Peppers. These are not the most acurate results. I could make them more acurate by using a bigger sample size. I hope this helps you!
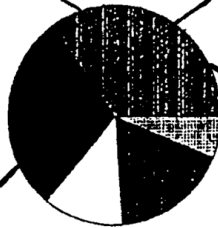
                            Sincerely,

New Year's Party

Expert

	A	B	C	D
1	Soda Types	Number	Percentage	X=___ (for equation)
2	Orange	350	35%	X=6
3	Coke	290	29%	X=5
4	Root Beer	180	18%	X=3
5	Sprite	120	12%	X=2
6	Dr. Pepper	60	6%	X=1
7				
8				
9			Equation: X/17*100=N	

Student records data on a spreadsheet.

↑
# of people in our class
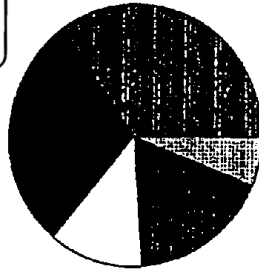
Of Soda Types To Buy

Student crosses this out since it was not labeled.

New Year's Party

Expert

Of Soda Types To Buy

Uses spreadsheet to create
a pie chart of results.

■ Orange
■ Coke
□ Sprite
■ Root Beer
⊞ Dr. Pepper

Student uses spreadsheet to
create appropriate correctly
labeled bar graph.

Of Soda Types To Buy

types of sodas

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