

## SHARING GUM

### Performance Standard 8C.H

Solve a problem involving linear inequality and justify the reasoning and procedures.

- *Mathematical knowledge:* Represent problems symbolically;
- *Strategic knowledge:* Solve problem symbolically or graphically to obtain a feasible solution; and
- *Explanation:* Explain completely what was done and why it was done.

### Procedures

1. Provide students with sufficient learning opportunities to develop the following in order to solve problems using systems of numbers and their properties.
  - Solve arithmetic and simple algebraic equations using properties of real numbers, equality, and inequality, and justify the procedures.
2. Provide students with the assessment task worksheet. Have students work individually. Calculators may be used.

Miguel has a bag of bubblegum that contains 105 pieces. He needs to have enough gum tomorrow to give 2 pieces to each of the 27 students (including himself) that are in his class. He wants to share the rest of the gum with 3 of his friends now. How many pieces of gum can each person have now, and still leave Miguel enough gum for tomorrow?
3. Use the standard scoring rubric. Give each student a score in each of the three categories. A score of 4 should indicate completely correct solutions to all parts of the problem, with complete and correct justifications of their reasoning. A three should represent correct or nearly correct solutions to all parts, with only minor computational errors making their solutions inaccurate, their rationale should be sound, but may not be completely explained. A two would indicate that students have some idea about how to answer the questions, but make major errors in computation and or reasoning that effects their answers. A one may have a correct answer for one part, but generally shows little understanding in their rationale for their procedures and processes. A score of zero generally reflects no correct responses and no logical rationale for their procedures and processes.
4. Minor errors in computation include making errors in the actual addition or multiplication, rounding incorrectly. Major errors include using the wrong operations or formulas to relate terms.
5. Students who receive a 4 in mathematical knowledge should realize that to share the bag with three friends it should be split 4 ways since the person doing the sharing should also be included... this would involve solving the linear inequality of  $54 + 4x \leq 105$  which results in a solution of  $x \leq 12.75$ . These students should also realize that you are not going to cut up pieces of the gum to get the  $\frac{3}{4}$  for each person, so the response should be each person could get as many as 12 pieces of gum, and still have enough for the class the next day. If the students do not realize either of these things, they should receive no more than a 3 in mathematical knowledge.

### Examples of Student Work follow

### Time Requirements

- One class period

### Resources

- Copies of the “Sharing Gum” task sheet
- Writing utensil
- Calculators may be used
- Mathematics Rubric

NAME \_\_\_\_\_ DATE \_\_\_\_\_

## **SHARING GUM**

### Student Task Sheet

Solve the following problem, by writing an equation or inequality and then solving it for the unknown. Remember to explain your reasoning and justify the procedures you use.

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## Student Task Sheet

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I know that there are a total of 27 students including Miguel. I also know that each student has to get 2 pieces of gum so I multiply  $2 \cdot 27 = 54$  pieces, that are needed for class tomorrow.

So if he has a total of 105 pieces I would subtract  $\begin{array}{r} 105 \\ - 54 \\ \hline \end{array}$  to

find how many pieces he has to share with his friends after school. That equals 51 pieces.

If he wants to share those pieces with his 3 friends and himself,

I would divide 51 by 4. I would do this because I want to know how many pieces each of the four boys could have and still have enough for class tomorrow.

So  $51 \div 4 = 12.75$ . He obviously

can not share  $\frac{3}{4}$  of a piece of gum so therefore, each of his friends and he gets 12 pieces of gum. Here is how I reasoned:

$$4x + (27 \cdot 2) < 105$$

$$4x + 54 < 105$$

$$(4 \cdot 12) + 54 < 105$$

$$48 + 54 < 105$$

$$102 < 105$$

$$51 \div 4 = 12.75$$

no one can have  
.75 of a piece of gum  
so each boy  
gets 12 pieces.

In the end he only shares 102 pieces out of his original 105 pieces.

Each BOY GETS 12 PIECES!

Solve the following problem, by writing an equation or inequality and then solving it for the unknown. Remember to explain your reasoning and justify the procedures you use.

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$$54 + 4x \leq 105 \quad \leftarrow \text{Total pcs. of gum}$$

↑  
 number of pcs. of gum needed for class tomorrow  
 $2(27) = 54$

↑  
 number of pieces for Miguel plus his three friends to share  
 $(1+3) \cdot x$  pieces

$$105 - 54 = 51 \rightarrow 4x \leq 51$$

$$\frac{51}{4} = 12\frac{3}{4} \text{ or } 12 \text{ R } 3$$

Final Answer:

Miguel will give 12 pieces to each, himself and his three friends, having 54 pieces left for class tomorrow, plus 3 remaining, which he can either eat himself or give to his 3 friends.

I began working on this problem by looking to find what it was I needed to solve. I found that I needed to solve how many pieces of gum could be shared among Miguel and his 3 friends. I also needed to have enough gum leftover for Miguel to share with his class of 27 students, 2 pieces per student. I represented this in an inequality:

$$\begin{array}{r} 54 + 4x \leq 105 \\ -54 \qquad \qquad -54 \end{array}$$

$$4x \leq 51$$

I took 105 and subtracted 54 to get 51.

$$\frac{4x}{4} \leq \frac{51}{4}$$

$$x \leq 12\frac{3}{4}$$

$$x = 12$$

I then took this number and divided it by 4 (myself + my 3 friends). My answer then was 12 pieces for each of us, and 3 pieces remaining.

I then could use the 3 remaining for my 3 friends or keep them.