Student Activity

Name _____

Date _____

Recycled Sounds: Multiplying Fractions

Focus: Use fractional equivalents to tune bottles

The Problem: How can an eight-note scale be made with 1-liter bottles?

The Facts

- Sounds can be created in a variety of ways. Glass liter bottles can make sounds by striking them with a mallet. Plastic liter bottles can make sounds by blowing across the top of the bottle.
- Filling the bottles with different amounts of water can make different pitches.
- The chart below can help you decide how much water you need to use to fill each bottle to make each pitch by blowing across the opening.

To make this pitch:	Fill the bottle with this much water:
1	Empty
2	$\frac{11}{50}$ liter
3	$\frac{30}{73}$ liter
4	$\frac{12}{75}$ liter
5	$\frac{10}{17}$ liter
6	$\frac{39}{55}$ liter
7	$\frac{24}{31}$ liter
8	$\frac{13}{16}$ liter

Modified from Recycled Sounds, from A World of Mathematics: Activities for Grades 4, 5, and 6 using the TI-15

The Task

1. Your team will create a set of eight tuned bottles. Each bottle will be a different pitch. Your team will then perform a melody on the tuned bottles.

2. Your team will also create a chart showing:
   - *The amount of water in each bottle*
   - *How the amounts were calculated*

3. Each person on the team will write an explanation of the team's solution. This explanation will answer these questions:
   - How did your team calculate the amount of water in each bottle?
   - Did all of the teams use the same method for calculating the amount of water? Why do you suppose that happened?
   - How is the amount of water in the bottle related to the pitch you hear? Why do you suppose that is true?

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Recycled Sounds Songs

Play each numbered bottle in order. The vertical lines divide the music into groups of 3 or 4 bottles. The horizontal lines indicate a note that should shound longer.

On Top of Old Smokey

1 | 1 3 5 | 8 - - | 6- 6 | 4 5 6 | 5 - - | - - 1 | 1 3 5 | 5 - - | 2 – 3 | 4 3 2 | 1 - -

Twinkle, Twinkle, Little Star

1 1 5 5 | 6 6 5 - | 4 4 3 3 | 2 2 1 - | 5 5 4 4 | 3 3 2 - | 5 5 4 4 | 3 3 2 - | 1 1 5 5 | 6 6 5 - | 4 4 3 3 | 2 2 1 -

Joy to the World (simplified version)

8 – 7 6 | 5 - - 4 | 3 – 2 - | 1 - - 5 | 6 - - 6 | 7 - - 7 | 8 - - 8 | 8 7 6 5 | 5 4 3 8 | 8 7 6 5 | 5 4 3 3 | 3 3 3 4 |5 – 4 3 | 2 2 2 3 | 4 – 3 2 | 1 8 - 6 | 5 4 3 4 | 3 – 2 - | 1 - - -

Row, Row, Row, Your Boat

1 - - 1 - -| 1 – 2 3 | 3 – 2 3 - 4 | 5 - - - - - | 8 8 8 5 5 5 | 3 3 3 1 1 1 | 5 – 4 3 2 | 1 - - - - -

A Tisket A Tasket

5 | 5 – 3 6 | 5 – 3 4 | 5 5 3 6 | 5 – 3 3 | 4 4 2 2 | 5 4 3 2 |3 – 1 -

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Things to Consider

Understanding the Problem

Read the *Recycled Sounds* problem page, and then answer these questions.

- *How many bottles do you need to use? How many different pitches do you need to have?*

- *How will you change the pitch?*

Making a Plan

Before you make your plan, answer these questions.

- *What measurements can you use? What tools will you need to make these measurements?*

- *How will you calculate the amount of water needed? Does the measurement chosen make a difference in your calculations? Why do you think so?*

Carrying Out the Plan

Before you begin planning your presentation, answer these questions.

- *What does your presentation have to include? Do you have all of the necessary information? What other calculations do you need to make? Which song will you play?*

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- *What information needs to be displayed? How will you display your information? What other ways could you show the information?*

Evaluating the Solution

- *Did you answer the question? How do you know?*

- *Does your answer make sense? Was your group able to perform the song?*

- *Did everyone in the group write an explanation?*

Using the Calculator

Multiplying Fractions

What happens to a number when you multiply it by a fraction?

Try this:

1 Multiply 12 times $\frac{1}{2}$.

Press	The display shows:
12 × 1 n/d 2 d/n Enter	

Now try this:

2 Multiply 12 times $\frac{1}{3}$.

Press	The display shows:
12 × 1 n/d 3 d/n Enter	

Try one more:

3 Multiply 12 times $\frac{1}{6}$.

Press	The display shows:
12 × 1 n/d 6 d/n Enter	

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A conjecture is a mathematical hypothesis. Write a conjecture about what happens when you multiply by a unit fraction (a fraction with 1 in the numerator). Test your conjecture by trying several more examples.

What do you suppose would happen if you multiplied a number by a fraction other than a unit fraction?

4 Multiply 12 times $\frac{3}{4}$.

Press	The display shows:
12 × 3 n/d 4 d/d Enter	

5 Multiply 12 times $\frac{3}{5}$.

Press	The display shows:
12 × 3 n/d 5 d/d Enter	

6 Multiply 12 times $\frac{4}{5}$.

Press	The display shows:
12 × 4 n/d 5 d/d Enter	

Write a conjecture about what happens when you multiply by a fraction. Test your conjecture by trying several more examples.

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