



Overview

Students will create an altered melody by dividing fractions. This activity requires a certain level of music knowledge. Team teaching the lesson with a music teacher is recommended.

Grade Levels: 4–6




Concepts

- Fractions
- Computation
- Problem solving



Materials

-  TI-15 Explorer™ calculators
- Melody page
- Blank staff page
- Keyboard or other musical instrument
- Student activity sheet



Assessment

Throughout the activities, questions are included for formative assessment. Student work samples should be used as a check for understanding. Have the students use the TI-15 Explorer™ to show their calculations.



Introduction

- Show students several examples of written music that include a time signature. Have them discuss the numbers shown in the time signature.
- Ask students what numbers are called when they appear in a vertical arrangement like a time signature. Discuss with them how a fraction definition might make sense for a time signature. For example, the time signature $\frac{3}{4}$ means three quarter notes or their equivalent occur in each measure.
- Discuss with students how the time signature is used to determine the fractional value of each measure. In essence, the time signature creates a division problem: all of the notes in a song are divided into equivalent fraction groups by the time signature fraction. A measure of $\frac{3}{4}$ time could contain $\frac{1}{2} + \frac{1}{4}$, $\frac{1}{4} + \frac{1}{4} + \frac{1}{4}$, or $\frac{1}{2} + \frac{1}{8} + \frac{1}{8}$. All of these add up to $\frac{3}{4}$. Refer to the sample melodies to show how this is used in music.

First Things First

For students not ready for the open-ended problem, start with the *First Things First* activity page.

Presenting the Problem

Discuss with students the problem on the *Dividing Notes* activity page. Make sure they understand the parameters of the final product they are to produce.

Review the note values shown in the chart. Note heads for quarter notes and eighth notes need to be filled in. Note heads of half notes and whole notes are left empty.

Evaluating the Results

After the presentations have been made, have the students determine how their melodies are similar and different.

Ask them to evaluate each melody. Does each measure have the correct fractional total? Are all of the measures complete?

Have groups discuss how they used the TI-15 to help solve the problem.



SOLUTIONS



Name _____

Date _____

Dividing Notes: First Things First



Focus: Using division in music

The Problem

What do fractions have to do with music? Answer: they define the value of the notes.

Look at the music called *Waltz in C*. What fraction do you see at the beginning? Answer $\frac{3}{4}$

This fraction is called the *time signature*.

Waltz in C



In this music, $\text{half note} = \frac{1}{2}$, $\text{quarter note} = \frac{1}{4}$, $\text{eighth note} = \frac{1}{8}$, and $\text{two eighth notes} = \frac{2}{8}$.

Working the Problem



1. A conjecture is mathematical hypothesis. Make a conjecture about how these fractions relate to the time signature. Answers will vary. Possible answer: the fractions tell the value of the notes in each measure.
2. Using the fraction values for each note, add up all of the notes. What is the total?

Answer: 12

3. Divide the total by the time signature. What number do you get?

Answer: 16

4. Count the number of vertical lines in the music. These are called bar lines. They separate the music into measures. How many measures are there in the music?

Answer: 16

What is the fractional value of each measure?

Answer: $\frac{3}{4}$

5. Write a statement about the relationship of the time signature and the total note values.

Answers will vary. Possible answer: The total note value is the product of the top and bottom number in the time signature.

6. Look at the conjecture you wrote. Does the information you have now support your conjecture?

Student answers will vary.

If your conjecture is not supported, write a new conjecture about the relationship between the time signature and the note fractions.



7. Look at the music *March*. What is the time signature for *March*?

March

8. Using the fraction values for each note, add up all of the notes. What is the total?

Answer: 16

9. Divide the total by the time signature. How many measures should there be? What is the fractional value of each measure?

Answer: 4 measures with fractional value of 4 each.

10. Based on the fractional value of each measure, draw the bar lines.

Answer: See above.

11. How did the fraction of the time signature help you draw the bar lines?

Answer: Answers will vary. Possible answer: IT let me know the value that should be in each measure.

Dividing Notes

The Problem: How can division with fractions help solve a music problem?

In the second part of the activity, students will create a display to show a melody and provide an explanation of the fractional value of each note in the melody.

Answers will vary as students make presentations.



Dividing Notes: Using the TI-15

1 $\frac{n}{2}$ 2 $\frac{d}{4}$ +

1 $\frac{n}{4}$ 4 $\frac{d}{4}$ Enter

$$\frac{1}{2} + \frac{1}{4} = \frac{3}{4}$$

1 $\frac{n}{4}$ 4 $\frac{d}{4}$ +

1 $\frac{n}{4}$ 4 $\frac{d}{4}$ +

1 $\frac{n}{4}$ 4 $\frac{d}{4}$ Enter

$$\frac{1}{4} + \frac{1}{4} + \frac{1}{4} = \frac{3}{4}$$

1 $\frac{n}{2}$ 2 $\frac{d}{8}$ +

1 $\frac{n}{8}$ 8 $\frac{d}{8}$ +

1 $\frac{n}{8}$ 8 $\frac{d}{8}$ Enter

$$\frac{1}{2} + \frac{1}{8} + \frac{1}{8} = \frac{5}{8} \quad \frac{N}{D} + \frac{n}{d}$$

Simp

Enter

$$\frac{5}{8} \text{ Sp} \quad \frac{5}{8}$$