EXPLORATIONS

Activity 9

Dividing Notes

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.

Focus

- 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 activity, 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 fraction total? Are all of the measures complete?

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

Activity 9

Dividing Notes: First Things First

The Problem

What do fractions have to do with music?

Look at the music called *Waltz in C*. What fraction do you see at the beginning? This fraction is called the *time signature*.

Waltz in C

In this music, $\mathcal{J} = \frac{1}{2}$, $\mathcal{J} = \frac{1}{4}$, $\mathcal{J} = \frac{1}{8}$, and $\mathcal{J}\mathcal{J} = \frac{2}{8}$.

Working the Problem

1. A conjecture is a mathematical hypothesis. Make a conjecture about how these fractions relate to the time signature.

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

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

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?
    What is the fractional value of each measure?

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

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

    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 titled *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?

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

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

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

Activity 9

Dividing Notes

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

Oscar Semiquaver, the forgetful composer, has written a new melody. Unfortunately, he left off all of the note stems and the bar lines. In fact, he made all of the notes look like whole notes, but he only wanted one whole note in the melody. Your team has been asked to fill in the note heads of the notes that should be filled in, add the stems to the notes that need them, and add the bar lines to his melody.

The Facts

♦ The time signature is a fraction. This fraction indicates the total value of notes in each measure.

♦ The value of each note is a fraction. This chart shows the fractional value of each note.

| Name	Symbol	Value
Whole note	𝅝	$\frac{4}{4}$
Half note	𝅗𝅥	$\frac{1}{2}$
Quarter note	𝅘𝅥	$\frac{1}{4}$
Eighth note	𝅘𝅥𝅮	$\frac{1}{8}$
Eighth notes (written as two eighth notes)	𝅘𝅥𝅮𝅘𝅥𝅮	$\frac{2}{8}$

♦ Bar lines are used to divide the notes into measures.

♦ Complete measures have exactly the same fractional value as the time signature. If the value of each note in a measure is added, it equals the fraction of the time signature.

♦ Incomplete measures are allowed as the first and last measures of the music. These two incomplete measures must add up to the value of a complete measure.

♦ Adding values to the note heads is adding the rhythm to the music. The note heads indicate the pitches only.

♦ Only one whole note can be used in the melody. Whole notes are often used as the last note, but they can be anywhere in the melody.

♦ Half notes, quarter notes and eighth notes can be used in many different combinations to make up a measure of music.

The Task

1. Your team will create a chart or display.

   – The display will show the new melody with stems added to the note heads and bar lines added to the music. Each measure must contain the same value as the time signature. Every measure in your melody must be a complete measure. Make sure that the fractional values in each measure add up to the value of the time signature.

   – The display will also include a title and the fractional value of each note. If you have someone from your group who can play the melody, have them play it for the class. If not, an adult will perform your melody.

2. Each person on the team will write an explanation of the team's solution. This explanation will answer the following questions:

   – How did your team decide to add the stems to the notes? How did your team decide what value each note would have?

   – How did your team check to make sure each measure is complete? How did you use the TI-15 in this process?

   – Name two different ways you can change the rhythm of the melody and still have complete measures. How do you know these two ways will work?

   – What would happen to the melody if you changed the time signature to 5/4? What would you need to do to each measure and to the bar lines? Would there still be the same number of measures? How do you know?

The Stemless Tide
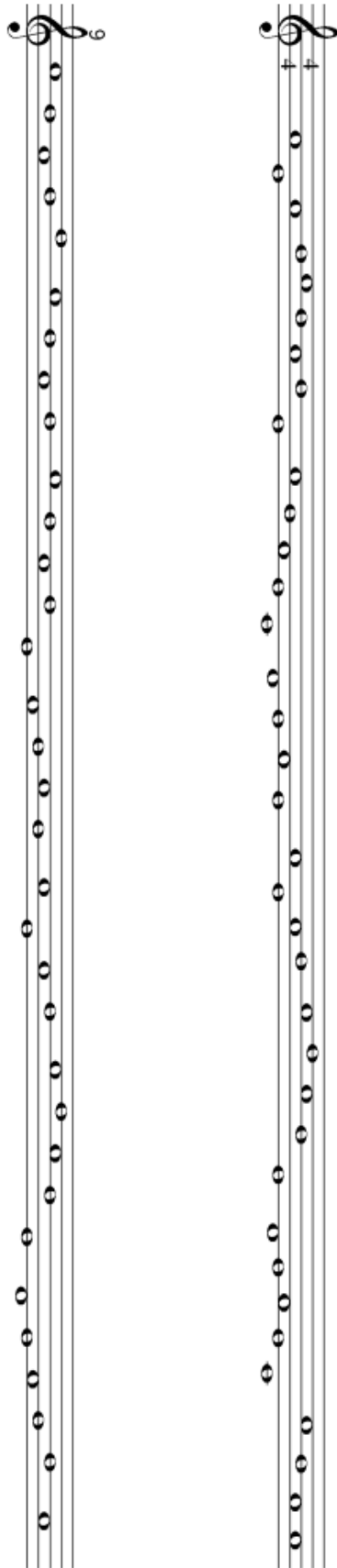
Using the TI-15

Activity 9
Dividing Notes

1 $\boxed{\text{n}}$ 2 $\boxed{\overline{\text{d}}}$ $\boxed{+}$
1 $\boxed{\text{n}}$ 4 $\boxed{\overline{\text{d}}}$ $\boxed{\text{Enter}}$

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

1 $\boxed{\text{n}}$ 4 $\boxed{\overline{\text{d}}}$ $\boxed{+}$
1 $\boxed{\text{n}}$ 4 $\boxed{\overline{\text{d}}}$ $\boxed{+}$
1 $\boxed{\text{n}}$ 4 $\boxed{\overline{\text{d}}}$ $\boxed{\text{Enter}}$

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

1 $\boxed{\text{n}}$ 2 $\boxed{\overline{\text{d}}}$ $\boxed{+}$
1 $\boxed{\text{n}}$ 8 $\boxed{\overline{\text{d}}}$ $\boxed{+}$
1 $\boxed{\text{n}}$ 8 $\boxed{\overline{\text{d}}}$ $\boxed{\text{Enter}}$

$$\frac{1}{2} + \frac{1}{8} + \frac{1}{8} = \overset{\frac{N}{D} \to \frac{n}{d}}{\quad} \frac{6}{8}$$

$\boxed{\text{Simp}}$ $\boxed{\text{Enter}}$

$$\frac{6}{8} \text{ S}\blacktriangleright \qquad \frac{3}{4}$$