

PIPE ORGAN ACTIVITY

SOCIAL STUDIES: African-American Women in the Arts

SCIENCE: Sound

MATHEMATICS: Analyzing Change

LANGUAGE ARTS: Research Skills

ART: Music

AIM: During a fictional encounter with Mahalia Jackson, a female African-American gospel singer, students discover that sound frequency varies with the amount of air vibrating in a column.

BACKGROUND: Sound travels through means of vibrations, or waves. These waves can pass through air, water, or various other mediums. A sound wave consists of compressions (regions of high pressure) and rarefactions (regions of low pressure). You hear sounds when the pressure change reaches your ears.

Pitch is the sensation of how high or deep a sound is. A sound's pitch is higher if the frequency is greater and the wavelength (the distance between one crest of a wave and the next) is shorter.

Scientists measure waves—and therefore sound—in Hertz (Hz). One hertz is one complete vibration per second. The hertz is named after the German physicist, Heinrich Hertz.



BEFORE PLAYING

Activity: Set four same-size glass bottles in a line. Fill the first bottle with one inch of water, the second with two inches, the third with three inches, and the fourth with four inches. Have students blow gently across the top of each bottle, noting the pitch of each sound. (**Answer:** The more air the bottle contains, the lower its pitch will sound.)

AFTER PLAYING

Writing Prompt: Ask students to imagine that they were alive at the time of the civil rights movement. Have them write about a talent they could have shared to inspire others and give them the strength to fight for freedom. How do they work to inspire others now?

ASSESSMENT: Have students draw a picture of their final pipe organ. (**Answer:** The left-hand pipe should be the tallest, while the others get progressively shorter.)

EXTENSION: Have students perform library research to discover how gospel influenced other types of music, including rhythm and blues and rock and roll.

PIPE ORGAN ACTIVITY

RESOURCES

The Science of Sound and Music, by Shar Levine & Leslie Johnstone (Sterling Publishing Co., 2000, \$19.95, ISBN 0-8069-7183-5). What do you get when you pair an award-winning author with a science teacher? An informative book filled with science experiments that reinforce the concepts of sound. To order, call 1-800-367-9692.

Mahalia Jackson: Queen of Gospel Song, by Leslie Gourse (Franklin Watts, 1996, \$24.00, ISBN 0-531-11228-4). Young adults or advanced younger readers will be fascinated by this biographical journey through Mahalia's life—from tragic childhood events to her rise as the “queen of gospel music.” To order, call 1-800-621-1115.

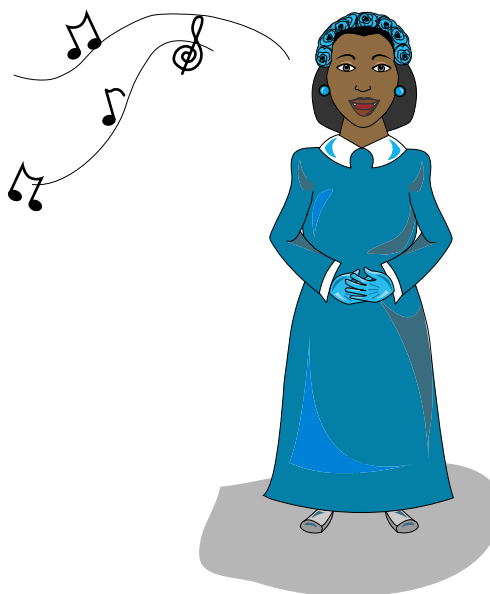
The Best of Mahalia Jackson, cd or audio cassette (Sony/Columbia, 1995, price varies, ASIN B000002AZG). You can't go wrong with this selection of Mahalia's greatest hits! To purchase, visit your nearest music store.

ANSWERS

Queen of Gospel, Worksheet: (1. New Orleans. 2. Gospel. 3. Answers will vary.)

Before Playing, Worksheet: (1. Wave crests should be low and far apart. 2. Wave crests should be high and close together. 3. Low. 4. High.)

After Playing, Worksheet: (1. D—494, a—262, b—330, c—392. 2. B—330, d—494, a—262, c—392.)



PIPE ORGAN ACTIVITY

CONNECT TO YOUR CURRICULUM

This activity can help you meet these National Standards:

Social Studies:

- Individual development and identity
- Civic ideals and practices

Science:

- Change, constancy, and measurement
- Transfer of energy

Mathematics:

- Understand numbers
- Analyze change

CURRICULUM AREAS

Physical Science: sound; frequency.

Social Studies: African-American studies; women's studies; civil rights movement.

Language Arts: writing; library skills; research skills.

Art: music.

Technology: computer science; oscilloscopes; tuning forks.

Math: analyzing change; arranging numbers sequentially.



PIPE ORGAN ACTIVITY



**Queen of Gospel
(Student Article)**

Name: _____

Date: _____

Put your hands together and clap to the tune. That's what people did when they heard the thunderous voice of gospel singer Mahalia Jackson. But Mahalia's music did more than ignite the rhythm within. Her music inspired African-Americans to fight for their freedom.

Born on October 26, 1911 in New Orleans, Mahalia Jackson came to be hailed as the queen of gospel music. She grew up singing gospel in her family's Baptist church, and soon added her own flair to the hymns: clapping her hands, shaking her body, and sometimes even dancing down the church aisles.

Although Mahalia grew up listening to rhythm and blues, she never sang to the tunes—she promised herself that she would only sing songs that praised the Lord. Mahalia became famous among African-American churchgoers, but soon white audiences flocked to hear her sing at concerts. Her fame spread quickly.

In the 1950s, African-American ministers called upon Mahalia to sing for the civil rights movement, the fight for equal rights. During the summer of 1963—before Martin Luther King, Jr. made his famous speech beginning, "I have a dream..."—Mahalia sang "I Been 'Buked and I Been Scorned." The crowd of about two hundred thousand people clapped along, joining her in this song about how they would one day tell God that they had been abused for too long.

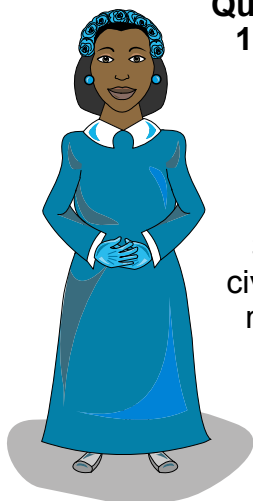
Nine years later, at age sixty, Mahalia Jackson had a heart seizure at a Chicago hospital and died. The world mourned, but they knew: The queen of gospel would live on in the music she had created, the spirits she had lifted, and the freedom that she had helped to win.

Questions:

1. Where was Mahalia Jackson born?

2. What type of music did she sing?

3. How do you think Mahalia's songs helped to inspire people during the civil rights movement?



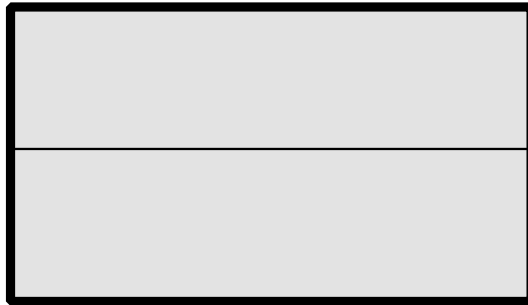


PIPE ORGAN ACTIVITY (Before Playing)

Name: _____

Date: _____

1. Click on a pipe and lengthen it until its frequency reads close to 350 Hz (Hertz; the unit of sound). In the box below, draw the blue wave pattern that you see—this wave graphs the sound the pipe makes at this length.



2. Shorten the pipe until the frequency reads close to 550 Hz. Draw the blue wave pattern that you see.



Complete the following:

3. When the pipe is long, is the frequency high or low?

4. When the pipe is short, is the frequency high or low?



PIPE ORGAN ACTIVITY (After Playing)

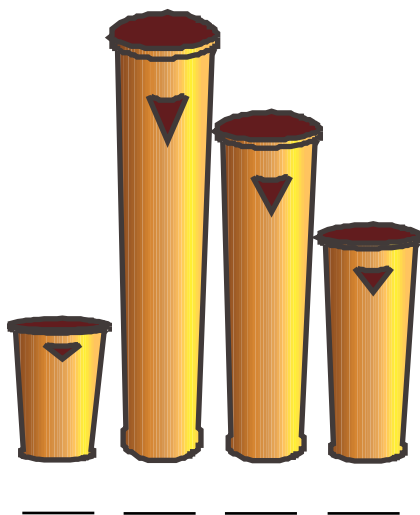
Name: _____

Date: _____

Use the following frequencies to complete the questions below.

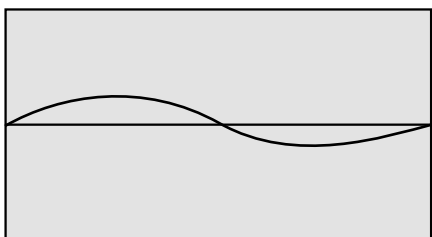
- a. 262 Hz
- b. 330 Hz
- c. 392 Hz
- d. 494 Hz

1. On the blanks provided, write the letter of the frequency that each pipe would produce. (**Hint:** Do long pipes play at high or low frequencies?)

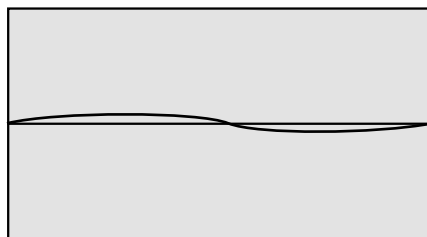


2. On the blanks provided, write the letter of the frequency that each sound wave describes. (**Hint:** Does a pattern with high peaks show a high- or low-frequency sound?)

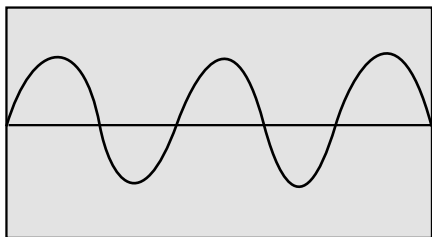
1



2



3



4

