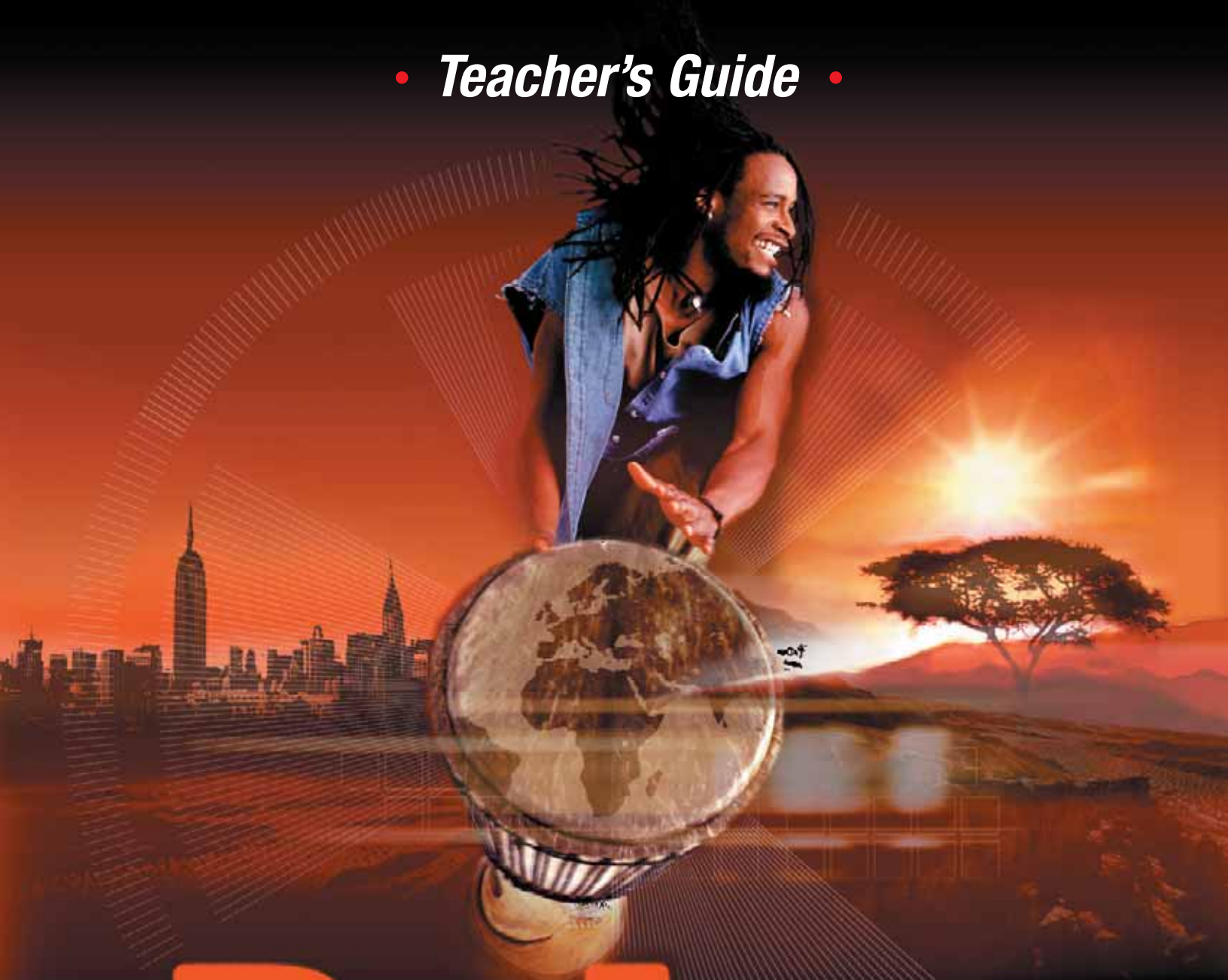
• Teacher's Guide •



Pulse

a STOMP Odyssey

What is Pulse?

Regardless of the differences in where we live or how we look, all human beings share the experience of rhythm and music. PULSE: a STOMP Odyssey takes us on a world tour of music, rhythm and dance.

From the sound of a Native American drum echoing off the canyon walls of New Mexico to the thunderous Kodo drum in Japan, from the percussion of the South African Gumboot Dancers to the grace of Eva la Yerbabuena's flamenco dance, PULSE takes us on a journey of ten thousand miles and five continents, weaving a story of cultural history told in the universal language of music, rhythm and dance.

PULSE transforms our vision to see musical instruments in everyday objects such as trash cans, bicycles, and metal pipes. PULSE enables us to hear music in everyday sounds like a passing train, traffic, or a chattering bird.

What is Stomp?

Wild Child (Keith Middleton) and Fraser Morrison, who appear in the film PULSE: a STOMP Odyssey, are members of the internationally acclaimed performing group STOMP.

For Luke Cresswell and Steve McNicholas, the founders of STOMP, rhythm is the music of life. They hear rhythms in everything. As Steve says, "People running up and down steps, people flicking a newspaper when they read it… I think rhythm can be found anywhere and everywhere." STOMP opens up people's minds and encourages audiences to recognize the rhythms of their lives.

STOMP challenges us to hear rhythms in the sounds of everyday life. For example, the sound of a passing train has a certain rhythm to it as well as the sound of waves crashing on a beach; the sound of rain falling on a tin roof can sound like a drum roll. Whatever we hear around us, STOMP inspires us to let our imaginations hear the world in new ways.

Acknowledgements:

Teacher's Guide developed by Walden Media, LLC.

Special thanks to: Steve Cramer, Ed.M., Sue Stoessel, Science Education Specialist, Vickie Tanner and Jessica Davis, Harvard Graduate School of Education. Additional thanks to Young Audiences.

The Journey

The giant-screen film PULSE: a STOMP Odyssey is a story of how diverse cultures throughout the world communicate through rhythm, dance and song.

The world map below highlights the places we will visit in this guide:

1. Flamenco dancer Eva la Yerbabuena in Granada, Spain
2. A religious festival in Kerala, India
3. Wild Child and STOMP in Los Angeles, California
4. Wild Child in New York
5. The bellringers of Winchester Cathedral, Winchester, England
6. The Kodo drummers on Sado Island, Japan
7. The Timbalada band in Salvador de Bahia, Brazil
8. The Gumboot dancers in Johannesburg, South Africa
9. A tribal gathering of Native Americans from around the U.S.

Using This Guide

This guide was designed for teachers and students to accompany the giant-screen film, PULSE: a STOMP Odyssey. There are ten activities that cover six subjects (music, dance, english, math, science, and social studies). The subjects covered in each activity are marked in the subject column. These activities were designed for students between the ages of seven and fourteen and comply with content standards for K-12 education. Specific grade and difficulty levels are listed on each teacher page.

Each activity includes two pages:
1. a teacher page with helpful web resources, subjects covered, and an explanationof the activity;
2. a student worksheet that can be copied and shared with the class. The "keynote" section can be used for further reflection.

Activity	Subject					
	Music	Dance	English	Math	Science	Social Studies
1. The Rhythm of Life		●		●	●	
2. All Ears					●	
3. The Science of Sound				●	●	
4. Sounds like Fun					●	●
5. The Music Scale	●				●	
6. Building Drums	●			●		●
7: Pass the Beat	●	●				
8. Mining the Web		●			●	●
9. Storytelling		●	●			●
10. How Big is Our World?				●	●	●

For more details on content standards, please see "Activity Connections to National Standards in Science and the Arts" on page 25.

Teacher Page

Grade Level: 3 and up

Subjects Covered: Dance, Math and Science

EVA LA YERBABUENA

Granada, Spain

Activity 1: The Rhythm of Life

Objective:

Students learn to take their pulse and record the effects of exercise on their heart rate.

Materials:

- A stopwatch or clock with a second hand
- Worksheets (see next page)

Procedure:

- Make copies of the student page (page 5) and hand out.
- Show students how to take their pulse (see diagram) with fingers lightly pressed against wrist just under thumb.
- Time the students taking their pulse for 15 seconds. Have them write down their pulse in Chart 1.
- Explain that multiplying by 4 will allow students to calculate their heart rate per minute. Have students complete Chart 1.
- Instruct the students to run in place for thirty seconds; then repeat the pulse taking procedure outlined above.
- Compare the results. How much faster were the second rates? Older students should be able to calculate the *percent increase* of heart rate.

Eva was born in 1970. She began to study dance at the age of twelve and in 1998, at the age of 28, she founded her own dance company. She has been a guest artist with the National Ballet of Spain. In 2001 she won Spain's highest honor in dance, the National Award of Dance.

Eva is considered one of the most important flamenco dancers today. Flamenco dance originated in southern Spain in an area called Andalucia (see map), and has its roots in the music of the Gypsy people who settled in Andalucia in the 15th century. The musical influences include Arab and Jewish music. Although Eva is accompanied by a variety of musicians, early flamenco was either unaccompanied or accompanied with handclapping or the tapping of a stick.

In PULSE: a STOMP Odyssey, Eva was filmed at the Alhambra Fortress in Granada.

Web Links:

Related web site with information about Eva la Yerbabuena:
www.pulsethemovie.com/spain

Further Study:

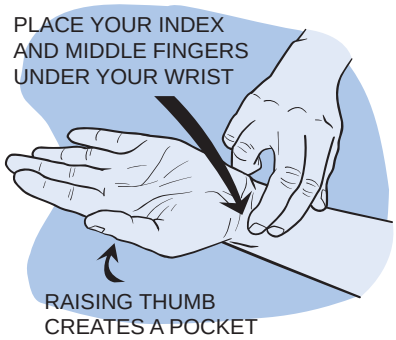
- Play a recording or video of a heartbeat.
- Show students how to listen to their own heartbeats with a stethoscope.
- What musical instruments do you see in this scene?

The Rhythm of Life: Answers to Questions

1. Why does your heart beat faster when you exercise? The more you exercise, the more oxygen your muscles require in order to work. The heart beats faster to deliver more oxygen-rich blood to your muscles.
2. Is exercise the only thing that makes your heart beat faster? No. Fear, excitement or being surprised by a sudden sound or movement can also make your heart beat faster.
3. Do all living things have a heart muscle? Why or why not? No. There are different ways of delivering nutrients that sustain life. Trees, for example, draw water and nutrients from the soil, which moves up through the trunk as the leaves give off water and oxygen.

The Rhythm of Life

How to Take Your Pulse



Heart Rate Charts

Chart 1: at rest

	Number of beats
1. After 15 seconds	
2. Multiply by 4	
3. Total	

My resting pulse is _____ beats per minute.

Chart 2: in motion

	Number of beats
1. After 15 seconds	
2. Multiply by 4	
3. Total	

My pulse after exercise is _____ beats per minute.

Questions

1. Why does your heart beat faster when you exercise?

2. Is exercise the only thing that makes your heart beat faster?

3. Do all living things have a heart muscle? Why or why not?

KEYNOTES

- **How do rhythm, music and dance send messages about emotion? Think of a scene from the movie or some of your favorite pieces of music.**
- **What are rhythm, music and dance like when they are expressing joy? Anger? Sadness?**

A RELIGIOUS FESTIVAL
Kerala, India

Activity 2: All Ears

Objective:

Students learn how ears function in humans as well as other animals.

Materials:

- Copies of the All Ears activity sheet on page 9.

Procedure:

- Review the diagram of the human ear, explaining terms like “frequency” (see glossary).
- Review hearing chart, pointing out the low frequencies of earthquakes and volcanoes. What other sounds might register that low? Thunder or a bass drum, perhaps.
- Answer the questions in the question box.

Wild Child rides an elephant through Pooram, an annual temple festival in Kerala, India. The celebration includes thirty priests, holy men of the Hindu religion, carrying parasols while riding elephants. Thousands of Hindu followers make pilgrimages to the Krishna Temple every year to receive a blessing and to hope for peace and prosperity.

Amid the procession of drums and horns, we see the elephants flapping their massive ears. In this case their ears act as giant fans, cooling their bodies, a well as devices for receiving sound.

In this section we will explore how our ears work so that we can hear the rhythms and music of our world.

Web Links

For detailed information on elephants go to:
www.pulsethemovie.com/india

Sensitivity of Human Ear: Answers to Questions

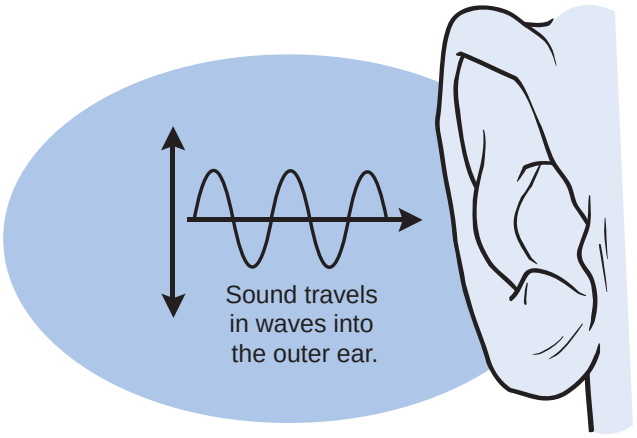
1. What does “Hz” stand for? A. Hertz
2. What does “Hertz” mean? A. A unit of frequency that equals to one cycle per second.
3. What is the difference between ultrasound and infrasound? A. Ultrasound is any sound with a frequency ranging in the upper limits of human hearing (approx. 20,000Hz+). Infrasound is a range of sound waves below a frequency that is perceptible by human ears.
4. Can elephants hear lower frequencies than humans? A. Yes, elephants have infrasonic hearing abilities that allow them to hear sounds at a lower frequency than humans.

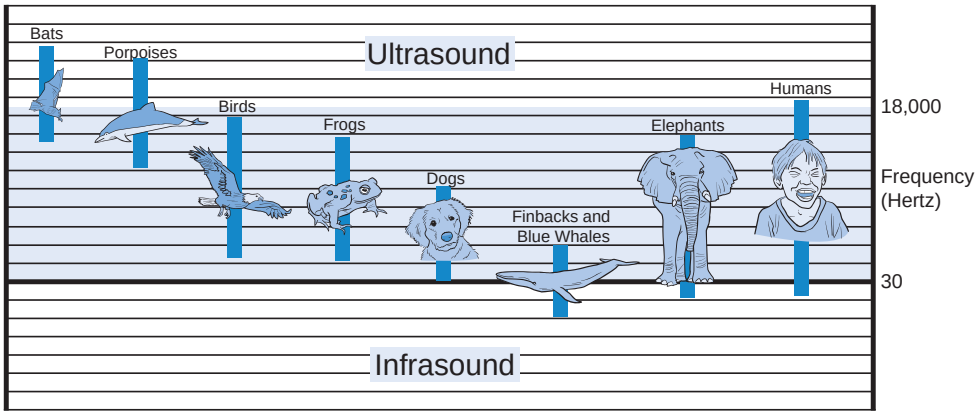
All Ears

Did you hear that?

Ears help the brain collect and process sounds. Sounds are created by waves of vibrations carried through the air and through other objects. The properties of a sound wave are similar to other waveforms; it has an amplitude (height) and wavelength (the distance between crests, or the peaks of each wave). Sounds become louder as the amplitude of a wave becomes higher.

Frequency refers to the number of wavelengths in a given amount of time and is measured in hertz. A hertz is a unit of sound equal to one complete wave cycle from crest to crest. The greater the number of wavelengths that pass in a unit of time results in a higher pitched sound.





Each horizontal line represents one octave

The human ear can respond to minute pressure variations in the air if they are in the audible frequency range, roughly 20Hz – 20,000Hz. Elephants, like those seen in Pulse: A STOMP Odyssey, have the capability of hearing sound waves at frequencies well below that of humans, around a 1Hz –20,000Hz range.

The infrasound level (less than 20 Hz) is a range of sound waves below the audible span for humans.

To experiment with sound waves visit: www.pulsethemovie.com and click on the Sound Lab.

Questions

1. What does “Hz” stand for?

2. What does “Hertz” mean?

3. What is the difference between ultrasound and infrasound?

4. Can elephants hear lower frequencies than humans?

WILD CHILD AND STOMP
Los Angeles, California:

In the scene where Wild Child and Fraser are riding their bikes, we hear the sounds of bells ringing and cards flapping against spokes. When Wild Child rides off the end of the pier into the water, the medium through which the sounds are traveling changes from air to water.

In this section we will explore how sound is generated, how it travels through a medium like air or water, and how it is received by the amazing apparatus we studied in the last section, the ear.

Activity 3: The Science of Sound

Objective:

Students learn how sound is generated and received, as well as why sound is so important for communication.

Materials:

- A music element (or some other sound generating device)
- A drinking glass

Procedure:

1. Ask your students to take turns reading the Science of Sound description on page 9.
   - Ask them to sit quietly and listen to any sounds that they can hear, both inside and outside the school.
   - Ask them to make a list of sounds they hear, with an arrow pointing in the direction from which they think the sound is coming.
   - After five or ten minutes, make a list on the blackboard of the sounds that the students heard, and where they came from.
2. Wind up the music element and hold it in the palm of your hand as it plays. Can any of your students hear it?
   - Now place it on a desk and let it play. Now can they hear it?
   - Try different surfaces and materials, such as a drinking glass or a plastic cup.

Web Links

For more information about STOMP please visit:
www.stomponline.com

Further study

Underwater acoustics:
How is our hearing different underwater?

Do fish have “ears” and how do they “hear” underwater?

The Science of Sound:
Answer to The Music Element
Q: Which is louder? Listening to the music element in the palm of your hand or on a hard surface like your desk. A: The music element is louder when placed on the desk.

Answers to Source of Sound
Q: Name the animal that makes the lowest frequency sound and the highest frequency sound from the frequency diagram on page 7. A: Lowest frequency – whales; Highest frequency – bats

The Science of Sound

Sound is a form of energy that requires a source, something to travel through (medium), and something to collect and receive it.

The Source

When you stomp your feet, the energy of that stomp causes the molecules of the ground to move back and forth, or vibrate. The force of that vibration keeps moving as a wave from the ground through the air. A large number of waves occurring per second will be heard as high-pitched, or high frequency, sounds. A small number of waves per second will be heard as low-pitched, or low frequency, sounds. The height, or amplitude, of the wave translates into the volume of a sound. Tall waves are heard as louder sounds and low waves are heard as softer sounds. Eventually the vibrations reach your ear where the sound energy is finally translated into electrical energy. In this form, the energy reaches your brain and is heard as a sound.

The Medium

Sounds most commonly reach us through the medium of the air.

Air is not the most efficient medium for sound energy. Water is denser than air and sound travels more quickly and farther through denser materials. Sound is a vibration of molecules, so it makes sense that if the molecules are closer together, the vibration will move more efficiently through the material. Sound travels through water at about five times the speed it travels through the air.

The Collector & Receiver

Human external ears are the most familiar sound collectors. Ever wonder why we have two small ears on the sides of our heads rather than one big one, right in the middle of our forehead? Having two ears on either side of our heads helps us to locate a sound in space. Having a little “distance” between our ears means a sound from a given direction will reach one ear slightly after the other. This allows us to locate a sound’s source.

The Music Element

Some toys contain a wind-up music element, usually made out of metal. They are placed inside the toy so that there is a surface and empty chamber to amplify the sound.

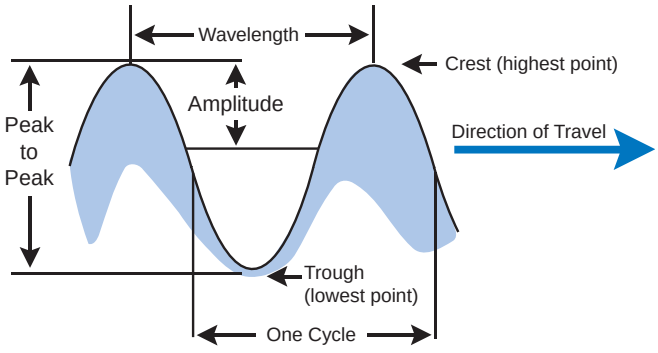
Listen to the music element in the palm of your hand, and then try it on a hard surface like your desk. Which is louder? Try other materials, like drinking glasses, plastic cups, a book, etc.

Who Heard That?

Consult the frequency diagram on page 7 and name the animal that makes the lowest frequency sound and the highest frequency sound you can find.

What Sounds do you Hear?

Listen for five minutes, writing down the name of each sound you hear, and where it is coming from. Examples are: another teacher or student talking in another classroom, footsteps in the hall, the buzz of the overhead lights, traffic, car horns, sirens…



KEYNOTES

Can sound waves travel through a vacuum? Why or why not?

WILD CHILD

New York, New York

Activity 4: Sounds like Fun

Objective:

Students apply the principles of sound by making a bullroarer.

Materials:

Popsicle sticks, hollow eraser heads, rubber bands, index cards, string, stapler, glue.

Procedure:

Staple an index card to a popsicle stick (see diagram). Slide an eraser head on to each end of the popsicle stick. Slide a rubber band lengthwise over the eraser ends of the stick. Tie a string to one end of the stick just below the eraser. Leave about a foot of string to hold on to. Make sure you have enough room to swing the bullroarer over head in a circular motion.

On safety: Make sure there is enough room to safely swing the bullroarer.

Back in the United States, we see Wild Child using two instruments that make sounds when they are spun through the air: the Bullroarer and the Whirly Tube.

It is believed that the bullroarer was first used by the Aboriginal people of Australia. When swung around in the air on a piece of string it sets up sound waves, thus producing a whirring or howling sound. The bullroarer is used in hunting and in traditional ceremonies as a form of blessing. Bullroarers are also used to send animals into ambush, to alert one tribe of another's presence, in rainmaking ceremonies, and for healing (see "The Rhythm of Healing" on this page).

This type of instrument has been used all over the world, including the Maori people of New Zealand, in New Guinea, and in various North American Native cultures.

The Rhythm of Healing

The Maori people of New Zealand use a smaller version of the Bullroarer (known as the 'Porotiti') for healing rheumatism and arthritis. By spinning the Porotiti over the afflicted areas, the sound vibrations massage the joints of the "patient" in a similar way to modern ultrasound.

Web Links

For more activities, go to:
www.pulsethehmovie.com
and build the wind and stringed instrument models.

Sounds like Fun: Answers to Questions

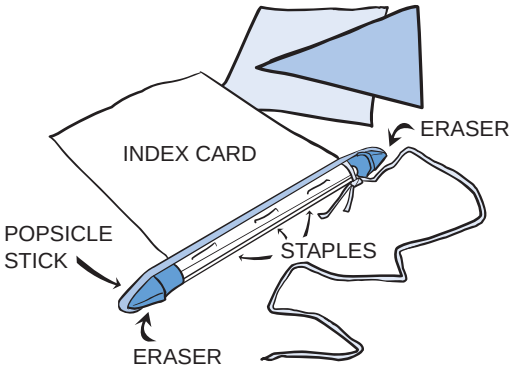
1. What does the bullroarer sound like? A: The bullroar makes a buzzing or whirring sound like a bee or hummingbird.
2. Why does it make that sound? A: Air passing over the rubber band and index card makes them vibrate and emit sound waves.
3. Does spinning the bullroarer faster or slower change the sound? Why or why not? A: Yes: different speeds make the rubber band vibrate slower or faster.
4. What happens when you change the shape of the index card? Does it change the sound of the bullroarer? A: This changes the way air flows over the bullroar.
5. Can you think of other instruments that make a sound when they spin? Can you think of any machines? A: A whirly tube; a helicopter.

Sounds like Fun

Activity 5: Building a Bullroarer

1. Staple an index card to a popsicle stick (see diagram).
2. Slide an eraser head on to each end of the popsicle stick. If the eraser heads are loose, use a drop of glue in each eraser to fasten it to the stick.
3. Slide a rubber band lengthwise over the eraser ends of the stick.
4. Tie a string to one end of the stick just below the eraser. Leave about a foot of string to hold on to.
5. Try cutting the index cards into different shapes before stapling them to the popsicle stick: a circle, a triangle, a square, etc.

On safety: Make sure there is enough room to safely swing the bullroarer.



Questions

1. What does the bullroarer sound like?

2. Why does it make that sound?

3. Does spinning the bullroarer faster or slower change the sound? Why or why not?

4. What happens when you change the shape of the index card? Does it change the sound of the bullroarer?

5. Can you think of other instruments that make a sound when they spin? Can you think of any machines?

KEYNOTES

Many animals, including humans, use sound as a form of communication. Think of some familiar animal sounds.
- **What are they trying to communicate?**
- **Do some animal sounds seem like music to you?**
- **What sounds do we make to communicate these same messages?**
- **Are there ways that humans use sounds that animals do not?**

THE BELLRINGERS OF WINCHESTER CATHEDRAL

Winchester, England

Grade Level: 3 but can be adapted to lower grades.

Subjects Covered: Music and Science

Activity 5: The Music Scale

Objective:

Students study how music notes are made, including pitch,frequency and volume.

Materials:

16 ounce drinking glasses, a measuring cup, water, popsicle sticks, Post-it notes. (Optional: a piano or pitch pipe).

Procedure:

- Divide the class into teams of four students.
- Each of them gets two glasses and two popsicle sticks.
- Set the glasses in a circle and fill them with different levels of water, ranging from empty to full.
- Let the students try playing the glasses in order (like the bellringers in the film) from empty to full, and then from full to empty.
- Suggest some variations: left hand only, right hand only, different order of people.
- Have each team perform its favorite variation for the rest of the class.

Bells are some of the oldest man-made instruments. They have been used throughout the world in religious ceremonies since before the development of a written language.

During early Christianity in Rome, bells were rung at set times throughout the day to let people know when to worship. In this way, bells were used as a way to tell time. In fact, the word "clock" comes from "klok," the Dutch word for bell.

Because of their association with religion, bells from medieval times were closely connected to superstition. They hung in doorways to protect people from spells and spirits, which were said to lurk by the door, waiting to sneak inside. Visitors would ring the bells to drive away the spirits before passing through the door.

The Winchester Cathedral Bells date back to medieval times. King Canute of England donated two bells to the Cathedral in 1035. The fourteen bells in the Cathedral are all tuned to the key of C. The heaviest bell, the tenor, weighs 1.81 tons, or 3620 pounds!

In 1541, Henry VIII wrote a law that detailed the duties and payments of the bellringers. Each ringer would earn around $4.00 per year. Today, ringers get paid almost $4.00 per service and almost $70.00 for ringing on special holidays. There are 28 full members in the band of bellringers. The youngest full member began at the age of 7, while the oldest current member started ringing before World War II.

Sources:
www.winchester-cathedral.org.uk/bellring.html
www.handbells.org.au/genhist.htm

Web Links

For more information about Winchester Cathedral go to:
www.pulsethemovie.com/england

The Music Scale: Answers to Questions

1. Which glass has the highest sound, empty or full? A: Empty.
2. Why? A: More water restricts the vibration of the glass, so that it vibrates more slowly (at a lower frequency), producing a lower note. Compare this to piano strings, which are thicker for lower notes.
3. Did you play any combinations of notes that sounded like a song? A: Student" answers.
4. How do we recognize combinations of notes as "songs" or "melodies"? A: We know melodies by the familiar way that notes go up and down, and the rhythms of those notes. When we add words, like "Happy Birthday," we make a song.

Types of Bells

1. Bicycle bell; 2. Church bell; 3. Cow bell; 4. Door bell; 5. Hand bell

The Music Scale

The Music Scale

You and three other students will form a musical group, like the bellringers we saw in the film. In your group, experiment with the musical scale by gently tapping the different glasses with a popsicle stick.

- Set the glasses up in a circle and number them clockwise.
- Glass #1 is empty. With the measuring cup, add 1 ounce of water to glass #2, 2 ounces of water to glass #3, 3 ounces to glass #4, and continue until glass #8 has 7 ounces.
- Let each performer practice playing the glasses in order both clockwise and counterclockwise.
- As a group, try to imitate a melody you know, like “Happy Birthday to You,” or “Mary Had a Little Lamb.”
- Perform your favorite song for the rest of the class.

Questions

1. Which glass sounds highest, empty or full?

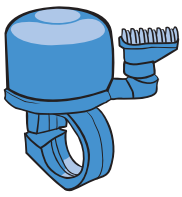
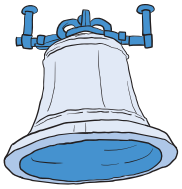
2. Why?

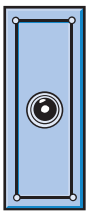
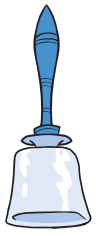
3. Did you play any combinations of notes that sounded like a song?

4. How do we recognize combinations of notes as “songs” or “melodies”?

Along on the bottom of the page are photos of different types of bells. Can you name them? Write the names below:

1. _____ 2. _____ 3. _____ 4. _____ 5. _____

KEYNOTES

- **Why does a wine glass make a sound when you rub your finger along the edge of the glass?**
- **How is the sound produced?**
- **Does the sound change when there is more or less water in the glass?**

THE KODO DRUMMERS
Sado Islands, Japan

The taiko drum, the primary instrument of the Kodo drummers, was originally used in religious festivities and ceremonies in Japan. In the past few decades, taiko drumming has emerged as an art form that is rapidly gaining global awareness. In the United States, cities such as San Francisco, Fort Worth and New York have taiko drumming schools where those with an interest in drumming can learn.

Taiko, in Japanese, is literally translated as "big drum." Drums vary in size from six inches to six feet in diameter. The drum is made out of one piece of wood, which is hollowed out and covered with rawhide on each end. Taikos can be played while seated or standing. Drummers typically use wooden sticks to beat the drum. However with larger drums it is not unusual to see a performer use a baseball bat and a flying leap to beat the drums.

Activity 6: Building Drums

Objective:

Students use different shapes, materials and sizes and examine why instruments sound different from one another. Students also identify everyday items that could be used for percussion.

Materials:

- At least three different size cans (a soup can and different size coffee cans) or glass jars, Pringles™ cans, mailing tubes, or other empty cylinder-shaped items, large balloons, scissors, rubber bands.

Procedure:

- The teacher should prepare the cans beforehand by cutting both ends from the can.
- As a safety measure, the teacher should cover any sharp edges with duct tape.
- Measure the diameter and height of each can.
- Stretch the balloon over the top of each can and fasten in place by stretching a rubber band over the top of the balloon and can.
- Use the chart provided on the student page.

The Kodo drummers of Sado Island, Japan have been performing since their debut in 1981. They have played in over 2500 performances on five continents. Kodo, a Japanese word that means "heartbeat" and "children of the drum" aptly describes the character of the group. They drum for the sheer desire to play with the joy and heart of a child and therefore personify, Kodo – children of the drum.

Web Links:

For more ideas about drum building go to:
www.pulsethemovie.com/japan

Further Study:

Try sprinkling sand or salt on the drum head. Tap the head lightly and observe the patterns produced by the sound waves.

Building Drums: Answers to Questions:
Explanation: the larger diameter emits a larger wave of sound (vibrating air molecules) that vibrates at a slower frequency, which sounds lower to our ears. To demonstrate this difference in sound waves, open the lid of a grand piano and examine the strings inside. The longer piano strings emit a lower tone when struck.

Building Drums

How to Make Your Drum

1. Measure the diameter of the can.
2. Measure the height of the can.
3. Cut the neck off the balloon and stretch it over the can. Fix it in place with a rubber band if needed.
4. Play the drum with your hand.
5. Compare the sound of the drum with other larger or smaller drums.

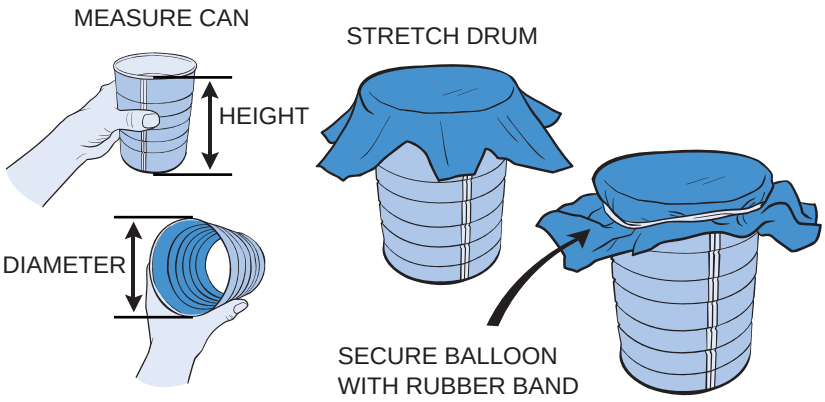


Chart: different drums, different sounds

	Soup can	Coffee can 1	Coffee can 2
Height			
Diameter			

Questions

Notice that the tension of the balloon (the drumhead) can also affect the sound that the drum makes. Why?

KEYNOTES

Cultures all over the world have traditions of rhythm, music and dance.
- **What about these traditions seems the same or familiar in every culture?**
- **Are there things that seem very different or unfamiliar?**

Cultures all over the world use native materials to build their drums and musical instruments.
- **What materials are native to your area that could influence the way musical instruments are made?**

Teacher Page

Grade Level: 4 and up

Subjects Covered: Music and Dance

TIMBALADA
Salvador de Bahia, Brazil

Activity 7: Pass the Beat

Objective:

Students learn to listen and imitate rhythms by handclapping and counting.

Materials:

No materials needed.

Procedure:

Find a space where the class can stand in a circle. Follow the different suggestions on the activity sheet on page 17, beginning with "An Introduction to Conversation". Then begin by counting to four and clapping along. More challenging rhythms can be introduced depending on the ability level of the class.

Note: It might be helpful to co-teach this activity with a music teacher.

Timbalada music is a modern creation rooted in the history of Brazil – especially Salvador de Bahia, the Brazilian city physically and culturally closest to Africa. A true melting pot, Salvador has seen waves of Portuguese colonists, African slaves, and other immigrants contribute to a music and culture that draws heavily on an African heritage, but that is uniquely Brazilian. Timbalada music takes traditional Afro-Brazilian drumming and adds a modern beat to create a music that is vibrant, passionate and rooted in the culture of Brazil. Timbalada takes its name from the timbal drum – a wooden hand-drum.

The Timbablada drum corp in the Pulse movie was organized by Carlinos Brown – a Brazilian percussionist and composer. The over 200 drummers, drawn largely from low-income families, have a unique opportunity to participate in a neighborhood organization dedicated to education and support for the most disenfranchised youth of Brazil.

The Timbalada perform at festivals throughout the year. The biggest festival is Carnival – held every year just prior to Lent. The Timbalada drummers play to enormous crowds from all over the world who come to Salvador to hear this unique musical tradition. Timbalada music, in the words of Carlinos Brown "will cross borders, because it is a music open to the world, open to everyone."

Source: www.rootsworld.com/rw/feature/brown.html

Web Links

For more information on Brazilian music go to: www.pulsethemovie.com/brazil

Pass The Beat

A Rhythmic Conversation

An Introduction to Conversation

We can have a "conversation" in music just like we can have a conversation in words. If someone says a few words to us, like, "How are you?", we might answer: "Fine, thanks. How are you?" We are able to answer the people who speak to us by listening, recognizing words, repeating those words, and adding our own.

In this activity we will learn to hear and repeat rhythms, and to make up our own rhythms.

Count and Clap

1. Stand in a circle and listen carefully to your teacher.
2. Your teacher will count to four and then clap a simple rhythm.
3. Your teacher will "pass" the rhythm to the person to the left (we will take turns going clockwise around the circle).
4. Each new person begins on the first count (when the count starts at "one.")
5. Once the rhythm has been passed around the circle a couple of times, your teacher will change the rhythm, and then pass that rhythm on to the next person.

- Remember to keep counting at the same speed as everyone else, either out loud or to yourself. It is very important that everyone counts the same numbers at the same time.

Call and Response

This game is used by STOMP to end their performances.

1. Arrange yourselves in a horseshoe (semicircle) facing your teacher.
2. Your teacher will begin by clapping a simple rhythm, which you and your classmates answer by clapping the same rhythm back.
3. The teacher then claps out a new rhythm, slightly varied from the first. The class answers back. The rhythm becomes more varied as the game continues.

Point and Solo

If the class wants to "solo," the teacher can point to the student who will answer the rhythm. That student then points to the next person who will "solo." This can be played using the same rhythm or by adding to the rhythm each time.

Further Study

1. Using your feet and hands, try to imitate a familiar rhythm ("Happy Birthday" for example), and then teach it to others until a group can play the same rhythm together.

2. Using the drums we built in Activity #6, play a rhythm and ask another drummer to imitate your rhythm and then add on to it.

KEYNOTES

- **What are some of the "rhythms of celebration" in your school? How is the music at a graduation ceremony different from the music at a football game?**

THE GUMBOOT DANCERS
Johannesburg, South Africa

Activity 8: Mining the Web

Objective:

Using the web as a resource, students research the culture and economics of the mining industry in which the Gumboot Dancers work.

Materials:

- A computer lab with web access.

Procedure:

- Make copies of the Student Activity worksheet on page 19.
- Pair students into teams of two – one to use the computer, and the other to read the questions and record the answers.
- Students may need help navigating the MBendi site. They will need to select the mining industry link, and then the link to South Africa.
- Reconvene the class to report the results of their web research.

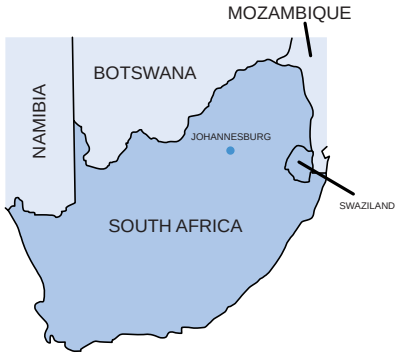
Filmed at a mine head in Johannesburg, South Africa, the Gumboot Dancers wear their work clothes: hard hats, overalls, and Wellington boots (nicknamed "gumboots").

Gold is a valuable commodity in the world marketplace. How valuable? How expensive to find? In this section we will "mine the web" for answers.

The Rhythm of Work

Gumboot dancing began with a group of South African miners as an expression of the hardships of mining. Both living and working conditions have been dangerous for miners. Often located miles from cities, workers' housing is usually supplied by the mining company. Living conditions of workers in the mining industry are largely sub-standard and unhealthy.

Forbidden to speak while they worked, laboring in near darkness and sometimes wading through knee-deep water, the mineworkers developed a way to communicate with each other non-verbally and entertain themselves in the evenings after work. Their creation, gumboot dancing, became a unique cultural tradition involving rhythmic boot slapping, coordinated steps, call and response chants and traditional folk songs. Bred of creativity in the midst of adversity, it is at once an expression of joy and resistance.



Web Links:

For information on gold mining in Africa, go to the MBendi web site at: www.mbendi.co.za/index.htm

Mining the Web: Answers to Questions

3. How much money does the mining industry make in South Africa? A: $9 billion
How many people are employed by the mining industry? A: over 500,000 people
4. How deep can a South African gold mine be? A: 3.8 km
How far is that in miles? A: 2.4 miles
Because the mines are so deep, it costs more to mine for gold. How much more does it cost per ounce to mine gold in South Africa than in the U.S.? A: Production cost per ounce (S.A.): ($222/oz Production cost per ounce (U.S.): ($189/oz)

Mining the Web

Why Is Gold So Valuable?

Gold is valuable because of its attractive appearance, scarcity, and its usefulness. Many of gold's characteristics are unique.

Gold is nearly indestructible. It is what chemists describe as inert, meaning non-reactive. Gold atoms pack together in tight geometric formation, making it very strong. Unlike other metals, gold does not tarnish, corrode or rust, making it ideal for jewelry-making. Ancient gold, submerged in the sea for centuries, will have the same brightness and luster as freshly-minted gold.

South Africa's 300-mile long Witwatersrand Reef produces two-thirds of the western world's gold supply. These gold fields were created 2700 million years ago. This area of South Africa is a *subduction zone*, a place where two of the Earth's great plates grind together, one riding over the other. Upwelling magma, melted rock in the earth's crust, created gold-filled mountains that eventually eroded away and were covered by the sea.

This gold is now buried so deeply that miners must travel three miles below the surface to get it. In other areas of the world, gold can be sifted or "panned" from streams and rivers, but this form of gold-mining requires tremendous effort. The gold is embedded in rock, which miners call ore. The ore must be blasted and drilled out by the miners and then crushed. It takes about four tons of ore to extract one ounce of gold. The rock and the gold are dissolved in cyanide, a toxic chemical which is harmful to the environment and dangerous to miners. The rock and gold "pulp" is then filtered, refined, melted and formed into rough gold bars that are 88% gold, 10% silver and 2% other metals such as copper, lead and zinc. These bars are re-melted further refined until they are over 99% pure gold and weigh 27.4 pounds each.... the "gold standard" of international commerce.

Mining the Web

1. Go to the MBendi web site (http://www.mbendi.co.za/index.htm)

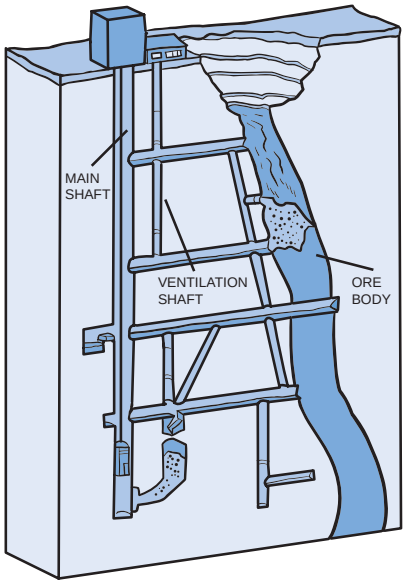
2. Under **industries** select **mining**.

3. In the Overview section, find the link to **South Africa**.
   - How much money does the mining industry make in South Africa?
   - How many people are employed by the mining industry?

4. In the **More on this Industry** section, select **gold mining**.
   - How deep can a South African gold mine be?
   - Because the mines are so deep, it costs more to mine for gold. How much more does it cost per ounce to mine gold in South Africa than in the U.S.?

Gold Fact

Gold is the softest and most workable (malleable) of all metals. It is so soft and strong that a piece of gold the size of a pea could be stretched into a 50-mile-long thread thinner than a human hair. The same piece could also be flattened into a thin sheet that could cover a king-size bed!



KEYNOTES

- **What are some of the major industries where you live?**
- **Can you think of other examples of songs and rhythms we use to help us work?**

THE AMERICAN INDIAN DANCE THEATER
North America

Activity 9: Storytelling

Objective:

Students participate in a theatrical play and discover the importance of preserving cultural history through performance.

Materials:

Make copies of The Cherokee Legend on page 21.

Procedure:

- Instruct the students that they are going to act out a story from American Indian history. The teacher should be the Narrator.
- Assign a student to each animal listed in bold type: the Woodpecker, the Owl, the Opossum, the Buzzard, the Sun Person, and the Spider. The rest of the class can play other Sun people. Be creative with props for each character to hold or wear, and others such as the ceramic bowl, the "fire" (a candle), etc.

An integrated company of dancers, singers and musicians from various Native American tribes, the American Indian Dance Theater (AIDT) represents tribes such as Comanche and Creek (Oklahoma), Cherokee (North Carolina), Menominee/Potawatomie (Wisconsin), Navajo (New Mexico), Southern Ute (Colorado), Cree (Montana), Sioux (the Dakotas), Nez Perce (Idaho), and Zuni (New Mexico).

In the Traditional Dances, the actors portray how their ancestors led their day-to-day lives - how they hunted and gathered food.

In the Traditional Hoop Dance, the dancers create the shapes of a butterfly, a turtle, an eagle, a snake and flowers to proclaim that all beings are interdependent on each other, and that we need every aspect of nature to evolve. To represent the interconnectedness of human beings with the world (that all human actions affect the world), the dancers also create the shape of a globe out of a few hoops.

The Rhythm of Culture

The American Indians (also called Native Americans) tell stories of heroic battles and hunting through their dancing, accompanied by singing, chanting and drumming. When the Elders teach these stories to younger members of the tribe, the history and culture of the tribe is preserved. Much of our learning in school – in music, dance, English literature, math, science, and social studies – is intended to preserve our culture and to study the cultures of other nations so that we might understand each other. When we have a common language like rhythm and music, we are able to play and work together.

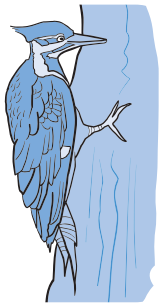
Web Links

Web site: for more information go to: www.pulsethemovie.com/northamerica

For more information on Native American hoop dancing, visit: www.hoopdancing.com

The Cherokee Legend of How We Got Fire

Narrator: Long ago the Cherokee people lived in a dark world. They had no Sun or Moon or light of any kind. It was so dark that the animals, birds, and insects kept bumping into each other. One day the animals called a meeting to see what could be done.



Woodpecker: I've heard that people on the other side of the world have light. Maybe if we go there, they will give us some.

Owl: I'll go, I can see in the dark.

Opossum: No, I should go. If they are stingy with their light, I'll steal some and hide it under my bushy tail.

Narrator: They all agreed, so Opossum started at once. As he headed East, the world grew lighter. Soon he had to squint to keep from being blinded, but he kept going until he found the Sun. Carefully he placed a small piece of it under his tail. He set out for home as fast as his short legs would go, but that piece of Sun was so hot it set his tail on fire.

Sun Person: We demand that you return the piece of Sun you took.

Opossum: Ok. But now I have to squint, and my fine bushy tail is ruined.

Narrator: Poor Opossum. But the animals still had no light. They called another meeting.

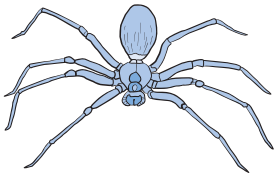
Buzzard: I volunteer. I can fly far and fast. I can bring back the light in no time. I will fly East and stay up high so the Sun People won't see me.

Narrator: Buzzard flew off, then dove down, snatched a piece of the Sun, and hid it on top of his head. But as he was flying away, his beautiful head feathers caught on fire. Buzzard dropped the piece of Sun, but his head had turned bright red and was completely bald, just as it is today.

Narrator: The animals met once more.

Owl: What shall we do now? We must have light!

Spider: You big creatures have done all you can. Perhaps a smaller creature could do better.



Owl: You'll get burned up!

Spider: Maybe not.

Woodpecker: We need light, let's let Spider go and try.

Spider: I will find some damp clay and roll it into the shape of a bowl. It will dry slowly as I travel in the dark. That way it won't crack. As I travel, I will spin a trail of thread to find the way home.

Narrator: When Spider came to the place of the Sun people, she quickly took a piece of the Sun. She dropped it into her bowl and covered it. Then she quietly followed her thread-trail back home. When the animals uncovered Spider's bowl, they could hardly believe their eyes. The first light they had ever seen shot out its rays. Even today, the spider's web is shaped like the rays of the Sun. From that time on, not only did the Cherokee people have light, but pottery making became honored work among them.

Source: http://www.y-indianguides.com/ pfm_st_howgotfire.html

A World Tour

Activity 10: How Big is Our World?

Objective:

Students learn about time zones and calculate how far our journey has taken us.

Materials:

- Make copies of the student activity sheet on page 23.
- Access to the web in the computer lab or library.

Procedure:

Time Zone Activity

Locate the time zone for Los Angeles. Mark the time. For each new zone to the east, add one hour to your current time. Locate the time zones of each city on the list. To check your answers, visit www.worldtimezone.com.

Distance Activity

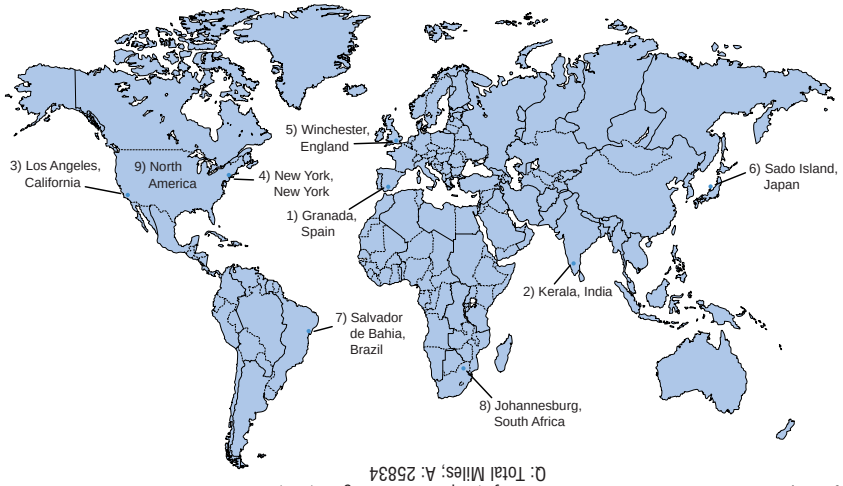
Visit http://www.indo.com/distance and type in the cities on the list.

Although we have visited seven countries in this guide, we visit even more in the film PULSE: a STOMP Odyssey.

There are currently 190 nations – called "member states" – in the United Nations today.

How big is our world? If we were to follow the equator around the earth for one complete circle, we would travel 24,901 miles and cross 24 time zones. In our next activity we will figure out how to read a time zone map and we will calculate the distance between the countries we have visited in this guide.

What are some of the rhythms of your world? In "Rhythms of the World" section on this page, we will discuss how circadian rhythms – the repeating patterns of our days – inspire us to live and learn.



How Big is Our World?
Q: Tokyo, Japan; A. 2am
Q: New Delhi, India; A. 10pm
Q: Madrid, Spain; A. 6pm
Q: Johannesburg, South Africa; A. 7pm
Q: London, England; A. 5pm
Q: New York, US; A. 12pm Noon

Answers to Time Zone Questions
Q: Los Angeles, CA to New York, NY; A: 2462 miles
Q: New York, NY to London, England; A: 3470 miles
Q: London, England to Madrid, Spain; A: 783 miles
Q: Madrid, Spain to Johannesburg, South Africa; A: 5010 miles
Q: Johannesburg, South Africa to New Delhi, India; A: 5003 miles
Q: New Delhi, India to Tokyo, Japan; A: 3628 miles
Q: Tokyo, Japan to Los Angeles, CA; A: 5478 miles
Q: Total Miles; A: 25834

Answers to Distance Between the Cities

Rhythms of the World

Sunrise, sunset, the phases of the moon, high tide and low tide… our world moves in circadian rhythms.

What are the rhythms of your day and your world? Do these rhythms and rituals help you to meet each day with purpose and curiosity?

Web Links

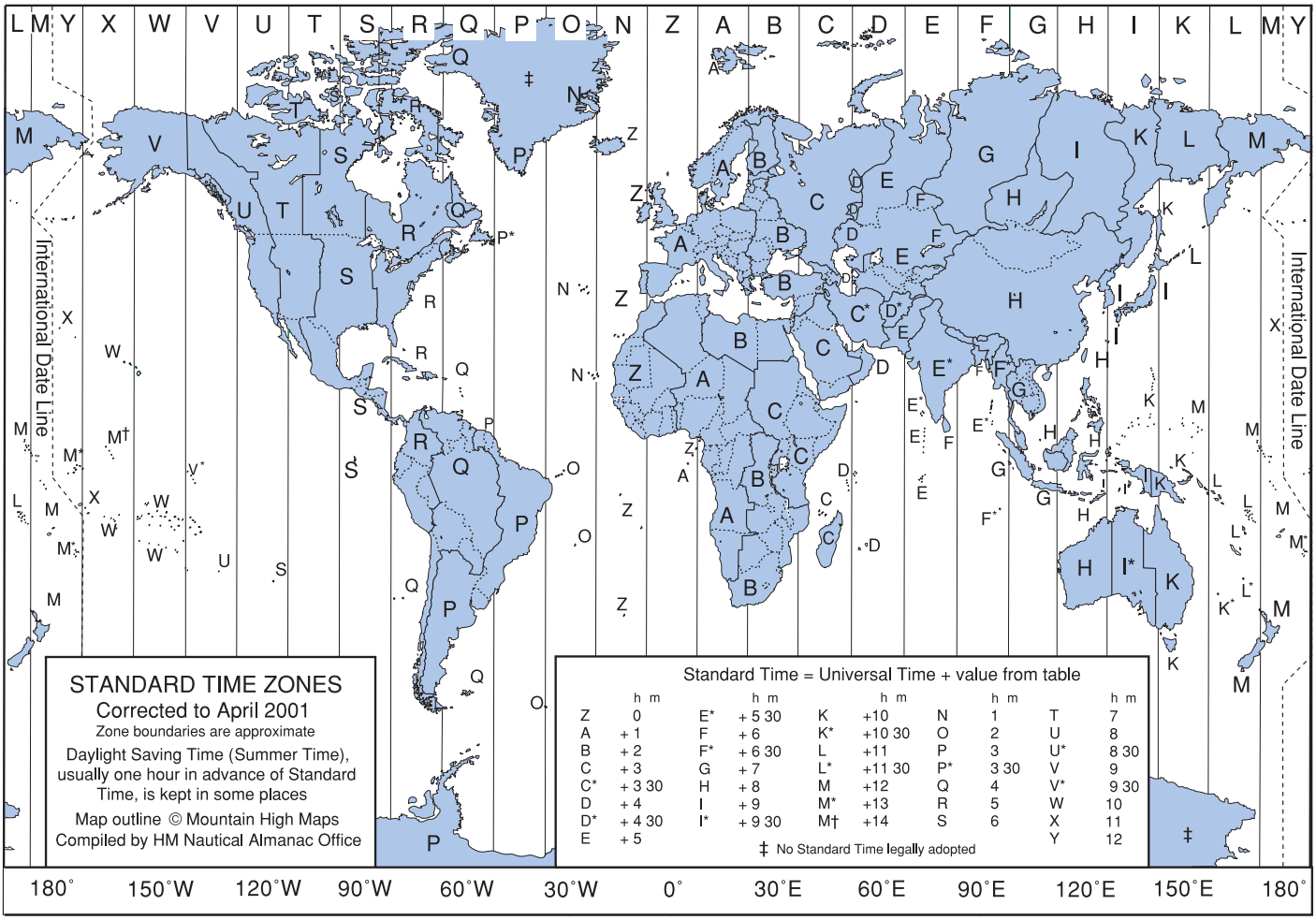
To find your own maps of countries we have visited in this guide, go to: www.pulsethemovie.com/maps

For more information about the United Nations, visit: www.pulsethemovie.com/un

More planet facts at: www.pulsethemovie.com/planet

More information on time zones at: www.pulsethemovie.com/timezones

How Big is Our World?



WORLD MAP OF TIME ZONES

Questions

If the time in Los Angeles, California is 9 AM, what is the time in:

New York, U.S.? _____

London, England? _____

Johannesburg, South Africa? _____

Madrid, Spain? _____

New Delhi, India? _____

Tokyo, Japan? _____

To check your answers, visit: www.worldtimezone.com

Distance Between the Cities

Starting in Los Angeles, California, we are going to fly to each of the countries we have visited in this guide by the route listed below, returning to Los Angeles again. Using http://www.indo.com/distance as a reference tool, find the distance between the cities on the list. Add up the total mileage to discover how far we have traveled in this guide.

Los Angeles, California to
New York, New York _____

New York, New York to
London, England _____

London, England to
Madrid, Spain _____

Madrid, Spain to
Johannesburg, South Africa _____

Johannesburg, South Africa to
New Delhi, India _____

New Delhi, India to
Tokyo, Japan _____

Tokyo, Japan to
Los Angeles, California _____

TOTAL MILES _____

Activity Connections to National Standards in Science and the Arts

Activity 1: The Rhythm of Life

- **Unifying Concepts**
  - Change, constancy & measurement (K-12)
- **Life Science Content**
  - Characteristics of organisms (K-4)
  - Structure & function (5-8)
  - Organization in living systems (9-12)
- **Dance**
  - Understanding dance as a way to create and communicate meaning (K-12)

Activity 2: All Ears

- **Unifying Concepts**
  - Form & Function (K-12)
- **Life Science Content**
  - Characteristics of organisms (K-4)
  - Structure & function (5-8)
  - Matter, energy, & organization in living systems (9-12)
- **Physical Science Content**
  - Transfer of energy (5-8)
  - Interactions of energy & matter (9-12)

Activity 3: Science of Sound

- **Music**
  - Describe ways in which the principles and subject matter of other disciplines taught in the school are interrelated with those of music (5-8)
- **Unifying concepts**
  - Evidence, models & explanation (K-12)
  - Form & Function (K-12)
- **Life Science Content**
  - Structure & Function (5-8)
- **Physical Science Content**
  - Properties of objects & materials (K-4)
  - Transfer of energy (5-8)
  - Interactions of energy & matter (9-12)

Activity 4: Sounds Like Fun

- **Music**
  - Identify the sounds of a variety of instruments (K-4)
- **Unifying Concepts**
  - Evidence, models & explanation (K-12)
  - Form & Function (K-12)
- **Physical Science Content**
  - Motions & Forces; Transfer of energy (5-8)
  - Interactions of energy & matter (9-12)

Activity 5: The Music Scale

- **Music**
  - Echo short rhythms; improvise “answers in the same style to given rhythmic and melodic phrases (K-4)
  - Play by ear simple melodies on a melodic instrument (5-8)
  - Compose short pieces with specified guidelines (5-8)
- **Unifying Concepts**
  - Form & function (K-12)
  - Change, constancy & measurement (K-12)
  - Evidence, models & explanation (K-12)
- **Physical Science Content**
  - Properties of objects & materials (K-4)
  - Transfer of energy (5-8)
  - Interactions of energy & matter (9-12)

Activity 6: Building Drums

- **Music**
  - Compare, in several cultures of the world, functions music serves, roles of musicians, and conditions under which music is typically performed (5-8)
- **Unifying Concepts**
  - Form & function (K-4)
  - Change, constancy & measurement (5-8)
  - Evidence, models & explanation (9-12)
- **Physical Science Content**
  - Properties of objects & materials (K-4)
  - Transfer of energy (5-8)
  - Interactions of energy & matter (9-12)

Activity 7: Pass the Beat

- **Music**
  - Echo short rhythms; improvise “answers in the same style to given rhythmic and melodic phrases (K-4)
  - Unifying Concepts Form + Function (k-4)

Activity 8: Mining the Web

- **Unifying concepts**
  - Evidence, models & explanation (K-12)
- **Science in Personal and Social Perspectives Content**
  - Risks, benefits & hazards (5-8,9-12)

Activity 9: Storytelling

- **Theatre**
  - Imagine and clearly describe characters, their relationships, and their environments (K-4)
  - Demonstrate acting skills to develop characterizations that suggest artistic choices (5-8)
- **Dance**
  - Understanding dance as a way to create and communicate meaning (K-12)

Activity 10: How Big Is Our World?

- **Geography**
  - Knows the basic elements of maps and globes (3-5)
  - Knows how maps help to find patterns in space and time (6-8)

Glossary

Acoustics: the behavior of sound in a particular space

Amplifier: a device that makes a sound louder

Amplitude: the height of a peak of a wave above an imaginary line through the middle of the wave

Chord: three orf more pitches sounded at the same time

Circadian: occurring or recurring about once per day

Cochlea: The fluid-filled part of the inner ear. Contains hair cells which change vibrations into electrical nerve signals

Eardrum: Part of the inner ear. A stretchy skin-like membrane which vibrates when struck by sound waves

Echo: a reflected sound

Frequency: the number of waves that pass a particular point per second

Fundamental: the lowest harmonic of a musical tone

Harmonics: a series of partial vibrations that combine to form a musical tone

Hertz: a unit of measurement that is used to express the frequency (pitch) of a sound in vibrations per second

Infrasound: very low frequency sound, below the range of human hearing usually between 0.1 and 10 Hertz

Noise: an irregular pattern of sound waves consisting of unrelated frequencies

Octave: a set of 8 musical notes

Pitch: a measure of the frequency of a sound, for example high frequency sound has a high pitch

Resonance: a condition that occurs when an object is vibrated at a frequency that matches one of its own natural vibrations

Reverberation: the echo of a sound produced several seconds earlier

Rhythm: a repeating pattern of sound with a regular timing

Sonar: a method of locating objects by reflection of sound waves. Letters stand for "SOund Navigation And Ranging"

Ultrasound: very high frequency sound, above the range of human hearing usually between 20,000 and 100,000 Hertz

Vibration: a back and forth movement, or oscillation

Wave: a disturbance in a medium such as air or water that occurs at regular intervals

Wavelength: the distance between the peaks or valleys (troughs) of two adjacent waves

Special Thanks:

Jennifer Tuxen, *Program and Theater Director, Sci-Port Discovery Center*
Salinda Barnard, *Outreach and Volunteer Coordinator, Sci-Port Discovery Center*
M. Al-Najjar, *Vice President of Programs and Exhibits, Sci-Port Discovery Center*
Michelle Bozeman, *Education Coordinator, Sci-Port Discovery Center*
Brandon Lee, *Part Time Demonstrator, Sci-Port Discovery Center*
Kristyne Keyes, *Director, Science Content Development, Science Museum of Virginia*
Eric Melenbrink, *Theater Manager, Science Museum of Virginia*
Lori Lauver, *Director of Education, Whitaker Center*
Joseph Kleiman, *Head of IMAX Programming, Whitaker Center*
Bill Watson, *Education Manager, Gulf Coast Exploreum Science Center*
Jennifer Thomson, *IMAX Theater Manager, Gulf Coast Exploreum Science Center*
Jennifer Ernisse, *Director of Exhibit and Group Programs, Exploris*
Pam Hartley, *VP of Programs, Exploris*

Pulse

a *STOMP* Odyssey

In association with
Walden Media
Yes/No Productions

A large format film by
Giant Screen Films
Stern Productions
Leve Productions

Created and directed by
Luke Cresswell
Steve McNicholas
the creators of ***STOMP***

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