Reflection, Transmission and Absorption of Sound Waves

Name ______________

Waves interact with different materials by being reflected, absorbed and transmitted. This occurs in both sound waves and light waves. Scientists and engineers have been able to develop technologies that use this idea to improve our lives. Bats and whales do the same thing as they listen to reflected sound waves to locate prey and avoid obstacles. Read the information below and explore the videos and links as you learn about this and look for examples of reflection, absorption and transmission.

Reflection: This occurs when waves bounce off of a surface. If sound bounces off of a smooth, flat surface, an echo may be heard. Echoes are reflected sound waves that bounce from an object back to the listener.

Absorption: This happens when some sound waves don't bounce off of an object. The sound waves are converted into heat energy. Some rooms have drapes and ceiling tiles to absorb unwanted sounds and reduce echoes.

Transmission: Anything that vibrates can create a sound wave. Vibrating particles can cause other nearby particles to vibrate also, allowing the sound wave to move from place to place. Transmission of sound requires a medium, like gas, liquid or solid, which are all composed of particles.

Go to http://www.howaboutscience.com, scroll over Lessons and Units, and choose "Physical Science". Click on "Reflection, Transmission and Absorption of Sound Waves." Explore the videos and answer the questions below.

Read the information above and fill in the blanks.

1. If you put your ear on a metal handrail and someone on the other end strikes it with a hammer, you can hear the sound of the hammer through the metal. This is an example of ____________________ and the metal pipe would be considered a ________________.

2. If you are in a tunnel and yell loudly, you can hear_______________ sound waves, which are also known as ____________.

3. Sometimes builders install insulation between a bedroom and a living room that might have a TV set in it. The insulation helps ______________ sound waves so someone trying to sleep isn't disturbed.
Watch “Echolocation in Bats and Dolphins” and “Echolocation: Living Waters” and answer the questions.

1. What does echolocation allow bats and dolphins to do?

2. Explain briefly and in your own words how echolocation works? Or, draw a labelled diagram.

3. What medium do a bat’s sounds pass through? What medium do a dolphin’s sounds pass through?

4. Is the absorption of sound greater in air or water? How does that affect the distance at which a bat or dolphin can detect objects?

5. What do bats and dolphins use to detect reflected sounds?

6. A dolphin’s echolocation sounds are _________________ through water, and are _________________ off of its prey.

Watch, “SONAR” and answer the questions.

1. What is “SONAR” used for?

2. How does SONAR use reflection to help map the sea floor?

3. Why is SONAR so important?
4. SONAR is used in fish finders. Explain (using words like transmission and reflection) how SONAR would work help a fisherman locate a fish.

Watch the two "Echocardiogram" videos and answer the questions.
1. What does an echocardiogram do?

2. How does an echocardiogram help your doctor?

3. Explain how "echoes" help create an echocardiogram.

4. What media (plural for medium) do the sound waves move through as they pass from the transducer to your heart?

5. If you had an echocardiogram, what would it allow you to do that you normally couldn't?

Watch the two "Fetal Ultrasound" videos and answer the questions.
1. What does ultrasound make possible for doctors?

2. How does ultrasound work?

3. Bones and muscles _____________ sound waves and show up as white.

4. Soft or hollow areas do not reflect or _______________ sound waves and appear dark.

5. Reflections of sound waves from the baby are _______________ back to the monitor.

6. What is the difference between a regular ultrasound and a 3-D ultrasound?
**KEY**

**Reflection, Transmission and Absorption of Sound Waves**

Go to http://www.howaboutscience.com, scroll over Lessons and Units, and choose “Physical Science”. Click on “Reflection, Transmission and Absorption of Sound Waves.” Explore the videos and answer the questions below.

**Read the information above and fill in the blanks.**

1. If you put your ear on a metal handrail and someone on the other end strikes it with a hammer, you can hear the sound of the hammer through the metal. This is an example of **TRANSMISSION** and the metal pipe would be considered a **MEDIUM**.

2. If you are in a tunnel and yell loudly, you can hear **REFLECTED** sound waves, which are also known as **ECHOES**.

3. Sometimes builders install insulation between a bedroom and a living room that might have a TV set in it. The insulation helps **ABSORB** sound waves so someone trying to sleep isn’t disturbed.

**Watch “Echolocation in Bats and Dolphins” and “Echolocation: Living Waters” and answer the questions.**

1. What does echolocation allow bats and dolphins to do?
   
   **LOCATE PREY AND AVOID OBSTACLES**

2. Explain briefly and in your own words how echolocation works? Or, draw a labelled diagram.

   THEY EMIT ULTRASONIC SOUNDS INTO THE ENVIRONMENT AND USE THE ECHOES TO BUILD IMAGES OR PICTURES

3. What medium do a bat’s sounds pass through? What medium do a dolphin’s sounds pass through?

   AIR, **WATER**

4. Is the absorption of sound greater in air or water? How does this affect the distance at which a bat or dolphin can detect objects?

   AIR, **SINCE DOLPHINS LIVE IN WATER THEY CAN DETECT OBJECTS FROM A FURTHER DISTANCE, BECAUSE WATER DOES NOT ABSORB SOUND ENERGY AS MUCH AS AIR DOES**

5. What do bats and dolphins use to detect reflected sounds?

   **BATS USE THEIR EARS, DOLPHINS RECEIVE SOUND WAVES THROUGH FAT IN THEIR LOWER JAWS, WHICH IS TRANSMITTED TO THEIR EARS AND THEN TO THEIR BRAIN.**

6. A dolphin’s echolocation sounds are **TRANSMITTED** through water, and are **REFLECTED** off of its prey.
Watch, “SONAR” and answer the questions.

1. What is “SONAR” used for?

SONAR IS USED TO MAP THE OCEAN FLOOR. THIS ALSO HELPS US KNOW HOW ANIMALS ARE USING THESE AREAS.

2. How does SONAR use reflection to help map the sea floor?

SOUND WAVES ARE BOUNCED OFF OF THE SEA FLOOR AND REFLECTED BACK TO THE SHIP

3. Why is SONAR so important?

DETAILED MAPS OF THE SEAFLOOR HABITAT CAN BE CREATED, WHICH ALLOW US TO KNOW WHY FISH ARE LOCATED IN CERTAIN LOCATIONS, SONAR ALSO HELPS SHIPS CHOOSE THE BEST ROUTES AND EVEN HELPS US LOCATE SHIPWRECKS

4. SONAR is used in fish finders. Explain (using words like transmission and reflection) how SONAR would work help a fisherman locate a fish.

A SOUND WAVE (PING) IS TRANSMITTED THROUGH THE WATER, STRIKES A FISH AND IS REFLECTED BACK THE BOAT, WHERE AN IMAGE IS CREATED

Watch the two “Echocardiogram” videos and answer the questions.

1. What does an echocardiogram do?

USES SOUND WAVES TO MAP OUT THE SHAPE AND SIZE OF YOUR HEART

2. How does an echocardiogram help your doctor?

ALLOWS YOUR DOCTOR TO SEE HOW WELL YOUR HEART PUMPS BLOOD AND LOOK FOR ABNORMALITIES OF THE HEART VALVES AND CHAMBERS

3. Explain how “echoes” help create an echocardiogram.

SOUND WAVES BOUNCE OFF OR ARE REFLECTED OFF YOUR HEART AND THE ECHOES ARE RECEIVED BY THE TRANSDUCER AND CHANGED INTO AN IMAGE. DIFFERENT PARTS OF YOUR HEART REFLECT SOUND WAVES DIFFERENTLY AND THAT HELPS DOCTORS SEE THINGS MORE CLEARLY.

4. What media (plural for medium) do the sound waves move through as they pass from the transducer to your heart?

THE GEL AND DIFFERENT PARTS OF YOUR BODY

5. If you had an echocardiogram, what would it allow you to do that you normally couldn’t?

SEE YOUR HEART BEATING AS WELL AS YOUR HEART VALVES OPENING AND CLOSING
Watch the two “Fetal Ultrasound” videos and answer the questions.

1. What does ultrasound make possible for doctors?

DOCTORS CAN MONITOR A BABIES DEVELOPMENT, THEY CAN SEE DEFECTS IN THE HEAD, SPINE, CHEST AND LIMBS, DIAGNOSE SERIOUS CONDITIONS, AND SEE IF THE MOTHER IS CARRYING TWINS.

2. How does ultrasound work?

IT USE SOUND WAVES WHICH BOUNCE OFF OR ARE REFLECTED OFF OF STRUCTURES IN THE BODY TO CREATE AN IMAGE

3. Bones and muscles REFLECT sound waves and show up as white.

4. Soft or hollow areas do not reflect or ABSORB sound waves and appear dark.

5. Reflections of sound waves from the baby are TRANSMITTED back to the monitor.

6. What is the difference between a regular ultrasound and a 3-D ultrasound?

REGULAR ULTRASOUNDS ARE 2D, WHICH SHOWS FLAT LOOKING IMAGES. 3D ULTRASOUND INCLUDES LENGTH, WIDTH AND HEIGHT AND SHOW A MUCH MORE REALISTIC IMAGE