SOUND

A LITTLE GROUP PROJECT

Read the two articles in this handout: 1. How we listen to music.
2. Deafness and Volume

Get into groups of 3 and discuss the following questions. Record the responses of the group members and decide on a consensus of the group. Make sure everyone has input. Appoint a recorder, a presenter and a discussion leader.

RECORDER: _____
PRESENTER: _____
DISCUSSION LEADER: _____

1. State the meaning of the following words: (6)

   a) Amplitude
   _____
   _____

   b) Dynamics
   _____
   _____

   c) Intensity
   _____
   _____

   d) Audiologist
   _____
   _____

   e) Decibel
   _____
   _____

   f) Acoustics
   _____
   _____

2. What can you do to protect or preserve your hearing? (4)

_____
_____
_____
_____

3. How is sound intensity levels measured? When are sound levels considered dangerous? (2)

_____
_____
_____
_____

4. Explain why mega stereos in vehicles are popular. Why do people like loud music? (2)

_____
_____
_____

5. What are the pros and cons of using headphones? (State 2 reasons for each) (4)

Pro for using headphones	Con for using headphones
1.	1.
2.	2.

- Be prepared to make a 2 minute presentation to the class that states the feelings of the group on questions #3, 4, and 5. (FORM 1) (4)
- Keep your presentation organized and to the point. (1)
- You are also expected to hand in a written report of your group's discussion. (FORM 2) (2)

TOTAL = /25 (group mark)

FORM 1

GROUP PRESENTATION WORKSHEET

NAMES: _____

In point form write down the ideas your group had about the topics of questions 3, 4, and 5. You will be using these ideas to create your 2 minute presentation for the class.

- _____
  _____
  _____
- _____
  _____
  _____
- _____
  _____
  _____
- _____
  _____
  _____
- _____
  _____
  _____
- _____
  _____
  _____

FORM 2

WRITTEN REPORT OF OUR GROUP DISCUSSION

This report can be the formal basis for your presentation to the class. Make sure you do the following when presenting:

- **Stay on topic.**
- **Keep eye contact with your audience.**
- **Keep within the allotted time limit.**
- **Speak in a loud, clear voice.**
- **Present your topic in a confident, knowledgeable manner.**
- **Use appropriate language and proper inflection in your voice.**

HOW DO WE LISTEN TO MUSIC?

Most frequently we listen to music alone, on the radio, the TV, Iphone,a Discman/Walkman, or MP3 player through headphones. This way we can choose what we want to listen to, and through headphones we can keep our listening choices private. With headphones we can create our own musical space and shut out all other elements. We want to be able to hear what is being played whether it is recorded or live.

Many factors determine our ability to hear:

a) The clarity of the sound
b) The intensity (amplitude) of the sound
c) The acoustic properties of the sound
d) How well our ears function

We must remember that our ears are sensitive and can be easily and permanently damaged. Many audiologists have expressed concern over the high volume of the listening activities.

I raise the question, "How do we make musical choices?" Deciding what we like depends upon comparing many aspects of many musical performances. In order to make these comparisons we must be able to hear the music. Decisions are made on many levels, such as: the style of the music, the performer(s), the instrumentation, the quality of the sound, the message the music gives and, in some cases, the visual aspect of a music video. Determining your likes and dislikes is a very personal decision.

DEAFNESS AND VOLUME

How can you save your ears? Simple! Avoid loud noises. If you have to shout to be heard at a concert or if everyone can hear your listening device or if you have to turn up the volume to overcome background noise, you are running the risk of having hearing loss.

Noise becomes more damaging the longer it lasts. If you are exposed to sound levels of 85 decibels, 8 hours a day, 5 days a week you will eventually cause permanent damage. The time it takes to cause permanent damage drops by half each time you add 5 decibels of loudness. The average rock concert achieves around 120 decibels. That means damage is done in less than half an hour. You may not notice the loss now but you will down the road.

Tests have been done by audiologists in remote African tribes on men in their 70's. They live away from the sound of traffic and amplified music. These tribesmen could hear a faint sound at a distance of about 100 yards. Can you?

Comparative tests have been done on 18 year olds from the 30's and 50's. The 50's generation showed signs of hearing loss, some so profound that the loss interfered with their ability to communicate. The 50's, in case you don't know, was the beginning of electrically amplified music.

Sounds of 115 decibels are regularly measured from Walkman/Discman. Some car stereo systems reach 130 decibels.
The point: turn down the volume and "listen". Protect your ears from needless pollution and enjoy "hearing" the future generation----your children.

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Level Achieved: _____

Name: _____
Teacher: _____
Date: _____
Course: The Arts, Music

Listening and Hearing

Group presentation and written report

Expectations: C2.1, C3.1

Criteria:	**Level 1** (50% - 59%)	**Level 2** (60% - 69%)	**Level 3** (70% - 79%)	**Level 4** (80% - 100%)
Understanding of Concepts				
understand basic concepts	demonstrates limited understanding of basic concepts	demonstrates some understanding of basic concepts	demonstrates considerable understanding of basic concepts	demonstrates thorough understanding of basic concepts
Critical Analysis and Appreciation				
identify required knowledge	identifies required knowledge with limited success	identifies required knowledge with some success	identifies required knowledge with considerable success	identifies required knowledge with excellent success
Communication				
communicate their thoughts and feelings about music they hear	communicates their thoughts and feelings about music they hear with limited clarity	communicates their thoughts and feelings about music they hear with some clarity	communicates their thoughts and feelings about music they hear with considerable clarity	communicates their thoughts and feelings about music they hear with thorough clarity
use correct musical terminology	rarely uses correct musical terminology	sometimes uses correct musical terminology	often uses correct musical terminology	consistently uses correct musical terminology

- ❑ Student did not meet expectations

COMMENTS:

NEXT STEPS:

HOW IS SOUND PRODUCED?

Acoustics is the science of sound. Sound is a sensation we feel when vibrations in the air touch our eardrums.

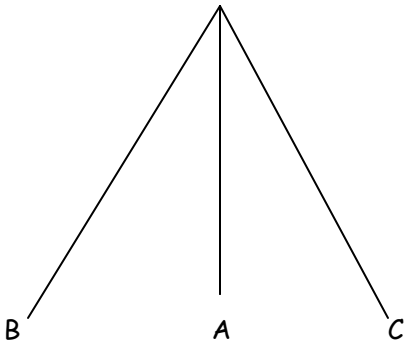
A **vibration** is a to-and-fro action that may be produced by any moveable object. For example, if you drop a brick on the ground the brick and the ground vibrate as does the air around these objects. The waves produced travel to our ears, our eardrums vibrate and we hear the sound of a brick dropping on the ground. Regular and constant vibrations produce sound we call music and irregular vibrations produce sound we call noise.

The **pitch** of a sound relies upon the frequency or quickness of its vibrations. Fast vibrations produce high sounds and slower vibrations produce lower sounds. Other things also affect pitch such as: the size of the vibrating object and the tension (tightness) of the vibrating object.

The volume (loudness) of a sound depends upon the size of the to-and-fro movement of the vibrating object. This is called the **amplitude** of the vibrations. A large to-and-fro motion produces a louder sound than a smaller to-and-fro motion.

Here are some diagrams that may help you understand the concept of sound.

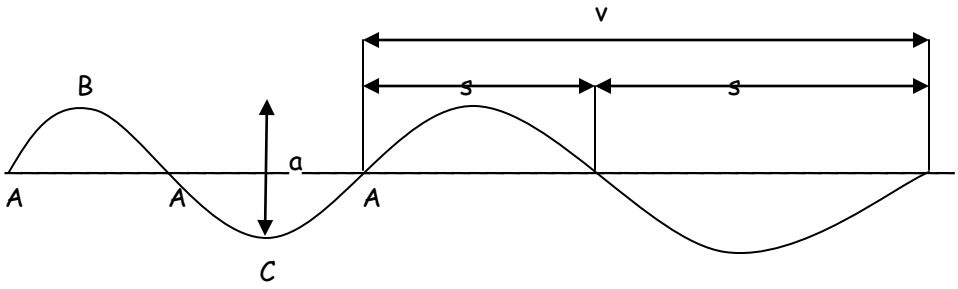
EXAMPLE 1



A = start position
B = initial movement (to motion)
C = reverse movement (fro motion)

A-B-A (or A-C-A or B-A-C is a single vibration
A-B-A-C-A (or B-A-C-A-B-) is a double vibration (cycle)
The distance B-C is the **amplitude**.

EXAMPLE 2:
This is another view of a sound wave.



(a) = amplitude
(v) = double vibration (cycle)
(s) = single vibration

QUIZ

How is sound produced?

NAME: _____ DATE: _____

Circle the letter which best describes each statement.

1. Acoustics is:
    a) the science of sensation
    b) the science of sound
    c) the science of noise

2. Irregular vibrations produce:
    a) Music
    b) Volume
    c) Noise

3. A vibration is:
    a) a back and forth action
    b) an up and down action
    c) a down and under action

4. Pitch relies on:
    a) the amplitude of a vibration
    b) the frequency of a vibration
    c) the action of a vibration

5. Slow vibrations produce:
    a) lower sounds
    b) higher sounds
    c) no difference in sounds

6. Pitch may also be affected by:
    a) the colour of the vibrating object
    b) the size of the vibrating object
    c) the feel of the vibrating object

7. Volume depends upon the:
    a) frequency of the vibrations
    b) pitch of the vibrations
    c) amplitude of the vibrations

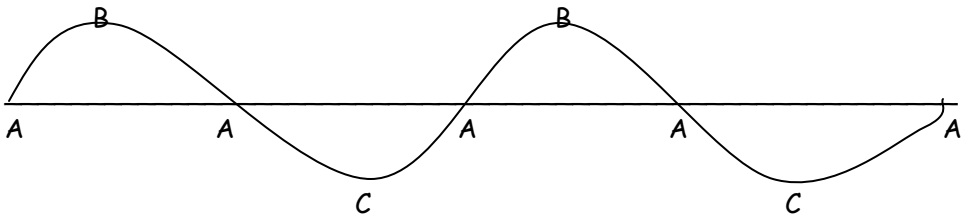
8. A louder sound is produced by:
   a) a larger amplitude
   b) a smaller frequency
   c) neither of the above

2. Identify the following on the diagram below and place the appropriate answer in the blank provided.

Amplitude is the distance _____

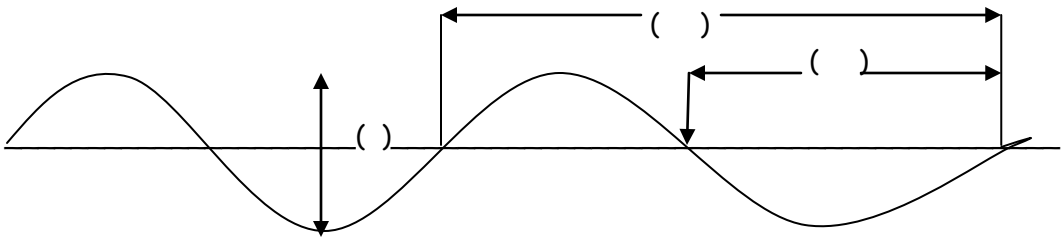
Cycle is the distance _____.

A single vibration is the distance _____.



3. Label the following items on the diagram. Place your answer in the ( ) on the diagram in the appropriate spot. (3)

(a) amplitude (v) cycle (s) single vibration



4. What kind of vibrations produce the sound we call music? (1)

_____

TOTAL = /15

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TEACHER ANSWER SHEET:
How is Sound Produced?

1. **MULTIPLE CHOICE:** **8 marks**

2. **b**
3. **c**
4. **a**
5. **b**
6. **a**
7. **b**
8. **c**
9. **a**

2. Amplitude is the distance **B-C** **3 marks**
   Cycle is the distance **A-B-A-C-A or B-A-C-A-B**
   A single vibration is the distance **A-B-A or A-C-A or B-A-C, or C-A-B**

3. Labeling the diagram: **3 marks**

4. **regular and constant vibrations.** **1 mark**

TOTAL = /15

SOUND ACTIVITY ONE

WHAT'S THAT NOISE?

Your homework tonight is to go home and try to find or make something that makes a sound that will stump your classmates tomorrow.

We are going to test the ability of people to identify several sounds with this game.

The object of the game will be to try to identify each sound that the students created last night.

Choose a partner and have them close their eyes. Demonstrate your 'sound maker'. See if they can guess exactly what the sound is.

Here are some ideas, but I am sure you will have more creative ideas than these.

a) Shaking coins
b) Clap hands
c) Tap pencil on a desk
d) Close a book
e) Crumple up paper
f) Stomp on the floor
g) Tear some paper
h) Close a stapler
i) Bounce a ball.

When you and your partner have shared each sound, combine with a couple of other groups and share your sounds. Remember, don't peek or the game is ruined.

SOUND ACTIVITY TWO

CAN YOU FIND THE MATCHING SOUND?

Prepare 2 'sound makers' that are exactly the same, and thus produce exactly the same sound. **Use the same type of container for all the shakers.** Fill pairs of containers with similar materials. For example, you could fill two containers with sand, 2 other containers with a few pennies, and 2 other containers with marbles. When you shake a container, there will always be one other container that sounds the same.

MATERIALS:

- Plastic containers like yogurt cups or plastic bottles
- Glue or tape to seal the top of the containers (if necessary)
- Fillings like rice, sand, marbles, coins, and uncooked beans. Make sure you choose a filling that will make a noise that can be heard from a distance.

Mix up the containers once they are completed. Each student should choose one container.
Students should shake their containers and hunt around the room trying to find their matching noisemaker by listening to the sound of the other noisemakers.

Once you find your matching container, describe with your partner the sound that you hear when you shake the containers.

_____
_____
_____
_____
_____
_____

SOUND ACTIVITY THREE

CAN YOU FIND IT?

You hear the ringing of the phone in the middle of the night, but you can't find it. You can hear it, but you can't see it. Where is that thing?

How good is the ability to find things using only the sense of hearing?
Blindfold a person, but only if they are willing. Have him/her cover one ear.
Using a clock that ticks loudly, ask the blindfolded student to tell you when he/she hears some 'ticking'. Approach the blindfolded person from several different angles and record the distance when the subject says 'I can hear the ticking'.
Keep track of the angles and the distances

Repeat the same experiment with the student's other ear closed.
Repeat it again with both of his/her ears open.

Questions and Comparisons:

1. What are the distances when using the different ears?
2. Was there a difference in distance when using both ears or using only one ear?
3. What was the best angle for detecting the ticking sound?
4. What was the worst angle for detecting the ticking sound?
5. Was there a difference in performance when another subject did the experiment?

MATERIALS:

- A clock that ticks loudly
- Blindfold

SOUND ACTIVITY FOUR

ARE TWO EARS ARE BETTER THAN ONE?

Try this activity to show the importance of two ears.

Make an 'X' on the floor with tape or chalk. Measure distances in a straight line in increments of 1.5m from the 'X' and label each of these points with the distance it is from the X (1.5m, 3m, 4.5m etc.)

Now for the test.

Place a blindfolded student on the 'X' and you stand on one of the points away from the 'X'.
Say the student's name and have the blindfolded student tell you which line you are standing on. Try this when the blindfolded student is using one and both ears.

To make it harder try setting shorter distances from the 'X'.

Are two ears better than one in judging distance?

_____

_____

MATERIALS:

- Tape or chalk
- Blindfold

NOTE:
For most people, it will be easier to judge distance using two ears. Our brains use the loudness of sounds and the differences in time for sound to reach each ear to make accurate determinations of sound locations.

SOUND ACTIVITY FIVE

LET'S MAKE AN EARDRUM!

We are going to make a model of the eardrum (also called the 'tympanic membrane') to see how sound travels through the air.

Stretch a piece of plastic wrap over a large bowl or pot (any container with a wide opening will work. Make sure the plastic wrap is stretched tightly over the container. The plastic represents the eardrum.

Place about 20-30 grains of uncooked rice on the top of the plastic wrap.

Find a noisemaker. A tin cookie sheet or baking tray works well. Hold the cookie sheet close to the plastic wrap. Hit the cookie sheet to create a 'big bang' noise and watch the rice grains jump.

The 'big bang' produces wound waves (changes in air pressure) that cause the plastic sheet to vibrate which causes the rice grains to move. Sound waves vibrate the eardrum in much the same way.

MATERIALS:

- Plastic wrap
- Container with a wide opening
- Uncooked rice (any other small grain will work)
- Tin cookie sheet (or other noise maker)

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TEACHER ANSWER SHEET FOR A LITTLE GROUP PROJECT

1. State the meaning of the following words: (6)

   a) Amplitude
   - the size of the to-and-fro movement of a vibrating object

   b) Dynamics
   - the volume of a sound

   c) Intensity
   -the density of the sound/the amplitude

   d) Audiologist
   - a person who treats hearing disorders

   e) Decibel
   - a unit of measurement to determine the degree of noise

   f) Acoustics
   - the science of sound

2. What can you do to protect or preserve your hearing? (4)
Student answers will vary.

3. How is sound intensity levels measured? When are sound levels considered dangerous? (2)
The intensity of the sound is measured by using a decimeter. Sound levels are considered dangerous when you listen to something over 85 decibels for a long period of time.

4. Explain why mega stereos in vehicles are popular. Why do people like loud music? (2)
Student answers will vary.
5. What are the pros and cons of using headphones? (State 2 reasons for each) (4)

Pro for using headphones	Con for using headphones
1.	1.
2.	2.

Student answers will vary for the chart above.