Name: _____ Date: _____

Why a Guitar Needs an Empty Box

Circle group

A guitar string is thin. By itself, it makes almost no sound. Put one on a block of wood and pluck it. You will hear only a faint buzz. But on a guitar, the same string sounds rich and loud. The hollow body of the guitar is the secret.

A thin string pushes on very little air. So the string passes its shaking to a small piece called the bridge. The bridge is glued to the thin top of the guitar. The top starts to shake too. The top is much bigger than the string. It moves a lot more air. More moving air makes a louder sound.

The empty space inside helps as well. The air in the box shakes with the top. The sound hole lets that air out into the room. Builders shape the top with care. Its thickness and stiffness change which pitches get stronger. That is why two guitars can sound different with the same strings.

The guitar does not make new energy. The sound comes from the plucked string. A loud note fades sooner than a quiet one on solid wood. The string uses up its energy faster when it sends sound into the air.

Questions

1. Why does a guitar string alone make so little sound?

_____

_____

2. What small part passes the string's shaking to the top?

_____

_____

3. What does the sound hole let out into the room?

_____

_____

4. Why is the top louder than the string?

_____

_____

5. Why can two guitars with the same strings sound different?

_____

_____

6. Why does a loud note on a hollow guitar fade sooner?

_____

_____

Words to know

bridge: the small piece that holds the strings up and carries their shaking
pitches: how high or low sounds are
stiffness: how hard something is to bend

Talk together (every group has these)

1. Find one fact that every group read. How did your sheet say it?
2. What did your sheet tell you that you think another group's did not? Ask them.
3. What is one question about this topic that none of the sheets answered?

Name: _____ Date: _____

Why a Guitar Needs an Empty Box

Triangle group

A guitar string is thin, and by itself it makes hardly any sound that you could hear across a room. Stretch one over a block of wood, pluck it, and you will hear only a faint buzz. Yet the same string on a guitar fills a room with a rich tone. The secret is the hollow wooden body, which works as an amplifier without using any electricity.

Because a vibrating string is so thin, it pushes on very little air, and so it passes its vibrations through a small piece called the bridge, which is glued to the thin top of the guitar. The top begins to vibrate too, and since its surface is much larger than the string, it moves far more air, and a bigger push on the air makes a louder sound.

The empty space inside matters as well, because the air in the box vibrates along with the top, and the sound hole lets that moving air escape into the room. Builders shape and brace the top with great care, because its thickness and stiffness decide which pitches are strengthened and which are not, which is one reason two guitars can sound different even when they wear the same strings.

An amplifier of this kind does not create energy. All of the sound comes from the energy of the plucked string. A loud note on a hollow guitar therefore fades sooner than a quiet note on a solid block, because the string's energy is spent faster when it is sent into the air. The hollow body trades a long, quiet note for a short, loud one.

Questions

1. Why does a guitar string alone make so little sound?

_____

_____

2. What small part passes the string's vibrations to the top of the guitar?

_____

_____

3. What does the sound hole let escape into the room?

_____

_____

4. Why does the large top make a louder sound than the string does?

_____

_____

5. Why can two guitars with the same strings sound different?

_____

_____

6. Why does a loud note on a hollow guitar fade sooner than a quiet one on solid wood?

_____

_____

Words to know

vibrate: to move back and forth very quickly
amplifier: something that makes a sound louder
bridge: the small piece that holds the strings up and carries their shaking
pitches: how high or low sounds are
stiffness: how hard something is to bend

Talk together (every group has these)

1. Find one fact that every group read. How did your sheet say it?
2. What did your sheet tell you that you think another group's did not? Ask them.
3. What is one question about this topic that none of the sheets answered?

Name: _____ Date: _____

Why a Guitar Needs an Empty Box

Square group

On its own, a guitar string is so slender that it produces hardly any sound a listener could detect from across a room. Stretch the same string over a plain block of wood, pluck it, and the result is only a faint buzz. Mounted on a guitar, however, that very string fills an entire room with a warm, rich tone. The explanation is the hollow wooden body, which serves as an amplifier without drawing any electricity at all.

Because a vibrating string is so thin, it disturbs only a tiny amount of air. Instead, the string delivers its vibrations through a small piece known as the bridge, which is glued to the thin top of the instrument. The top begins to vibrate as well, and since its surface is far larger than the string, it sets a much greater volume of air in motion. A bigger push on the air produces a louder sound.

The empty space inside the body contributes too. The air enclosed in the box vibrates together with the top, and the sound hole allows that moving air to escape into the surrounding room. Builders shape and brace the top with great care, since its thickness and stiffness determine which pitches are strengthened and which are left weak. This is one reason why two guitars can sound distinctly different, even when they carry identical strings and are plucked in precisely the same manner.

An amplifier of this kind never creates energy, since every bit of the sound comes from the energy of the plucked string, and consequently a loud note on a hollow guitar dies away sooner than a quiet note on a solid block, because the string's energy is used up more quickly when it is sent out into the air. The hollow body, in effect, exchanges a long, quiet note for a short, loud one.

Questions

1. Why does a guitar string by itself produce so little sound?

_____

_____

2. Which small piece delivers the string's vibrations to the top of the instrument?

_____

_____

3. What does the sound hole allow to escape into the room?

_____

_____

4. Why does the large top produce a louder sound than the string alone?

_____

_____

5. Why might two guitars with identical strings still sound different?

_____

_____

6. Why does a loud note on a hollow guitar die away sooner than a quiet note on solid wood?

_____

_____

Words to know

vibrate: to move back and forth very quickly
amplifier: something that makes a sound louder
bridge: the small piece that holds the strings up and carries their shaking
pitches: how high or low sounds are
stiffness: how hard something is to bend

Talk together (every group has these)

1. Find one fact that every group read. How did your sheet say it?
2. What did your sheet tell you that you think another group's did not? Ask them.
3. What is one question about this topic that none of the sheets answered?

For the teacher: Why a Guitar Needs an Empty Box

Each student sheet carries a shape, not a level. The same topic and facts, written three ways.

Circle: Why a Guitar Needs an Empty Box

Easier · 201 words · Flesch-Kincaid grade 2

1. It is thin and pushes on very little air.
2. The bridge.
3. The moving air from inside the box.
4. It is much bigger, so it moves a lot more air.
5. The thickness and stiffness of each top make different pitches stronger.
6. The string uses up its energy faster when it sends sound into the air.

Triangle: Why a Guitar Needs an Empty Box

This passage · 270 words · Flesch-Kincaid grade 8.4

1. It is so thin that it pushes on very little air.
2. The bridge.
3. The moving air from inside the box.
4. Its large surface moves much more air than the thin string can.
5. The thickness and stiffness of each top strengthen different pitches.
6. The string's energy is used up faster when it is sent out into the air.

Square: Why a Guitar Needs an Empty Box

Harder · 310 words · Flesch-Kincaid grade 9.6

1. It is so slender that it disturbs only a tiny amount of air.
2. The bridge.
3. The moving air enclosed in the box.
4. Its far larger surface sets a much greater volume of air in motion.
5. The thickness and stiffness of each top strengthen different pitches.
6. The string's energy is used up more quickly when it is sent out into the air.