Name: _____ Date: _____

Why a Concert Hall Is Built Like a Shoebox

Circle group

Walk into a good concert hall and you may notice how plain it looks. Many of the best halls are tall, narrow rectangles, like a shoebox. The plain shape is no accident. People thought hard about how sound acts indoors.

Sound spreads in waves. The waves bounce off walls, ceilings and floors. A listener hears the sound that comes straight from the stage. A moment later, the listener hears it again after it bounces. This lingering is called reverberation. With too little, music seems dry and flat. With too much, the notes smear together and the tune is hard to follow.

A narrow room helps because the side walls are close. Sound that bounces off them reaches the audience a tiny bit after the direct sound. This makes the music seem fuller. A tall ceiling gives the sound room to spread and linger.

Designers also think about surfaces. Bumpy decorations, carved panels and statues scatter sound in many directions. So the waves mix more evenly. Soft things like heavy curtains and thick cushions soak up sound. A designer must balance them. A full audience also soaks up sound and changes the room.

So orchestras often practice in a hall when it is empty and again when people are there. The goal is for every seat to sound good, not only the front.

Questions

1. What shape are many of the best concert halls?

_____

_____

2. What is reverberation?

_____

_____

3. What happens when a room has too much reverberation?

_____

_____

4. What do bumpy decorations and carved panels do to sound?

_____

_____

5. Why does a narrow room make music seem fuller?

_____

_____

6. Why might a hall sound different when the audience arrives?

_____

_____

Words to know

reverberation: the echo-like lingering of sound in a room

scatter: to spread out in many directions

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 Concert Hall Is Built Like a Shoebox

Triangle group

Walk into a good concert hall, and the first thing you may notice is how ordinary the room looks. Many of the most admired halls are tall, narrow rectangles, shaped almost like a shoebox. The plain shape is no accident. It is the result of careful thinking about acoustics, which is how sound behaves indoors.

Sound spreads through a room in waves, and those waves bounce off walls, ceilings and floors. A listener hears the sound that comes straight from the stage, and then a moment later hears the same sound again after it has bounced. This lingering effect is called reverberation. Too little, and music seems dry and flat. Too much, and notes smear together until the melody is hard to follow.

A narrow room helps because the side walls are close. Sound that bounces off them reaches the audience a fraction of a second after the direct sound, which makes the music seem fuller and wrapped around the listener. A tall ceiling gives the sound room to spread and linger, and it keeps the lingering sound from feeling squeezed.

Designers also pay attention to the surfaces. Bumpy decorations, carved panels and statues scatter the sound waves in many directions, so that they mix more evenly. Soft materials such as heavy curtains and thick seat cushions soak up sound. A hall designer must balance them carefully, since a full audience also absorbs sound and changes the way the room responds.

Because of this, orchestras often test a hall by rehearsing in it empty and then again with people present. The goal is to make every seat sound good, not only those near the front.

Questions

1. What shape are many of the most admired concert halls?

_____

_____

2. What is reverberation?

_____

_____

3. What happens when a room has too much reverberation?

_____

_____

4. What do bumpy decorations and carved panels do to sound?

_____

_____

5. Why does a narrow room make music seem fuller?

_____

_____

6. Why might a hall sound different when the audience arrives?

_____

_____

Words to know

reverberation: the echo-like lingering of sound in a room
acoustics: the way sound behaves in a space
scatter: to spread out in many directions
absorb: to soak up instead of bouncing back

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 Concert Hall Is Built Like a Shoebox

Square group

Step into a fine concert hall, and the first thing you may notice is how unremarkable the room appears. Many of the most admired halls are tall, narrow rectangles, shaped almost like a shoebox. The unassuming form is no accident. It is the outcome of painstaking thought about how sound behaves indoors.

Sound travels through a room in waves, and those waves rebound from walls, ceilings and floors. A listener hears the sound that arrives directly from the stage, and then, a moment later, hears the same sound again after it has bounced. This lingering effect is called reverberation. If there is too little, music seems dry and flat. If there is too much, the notes smear together until the melody becomes difficult to follow.

A narrow room is beneficial because its side walls are close. Sound that rebounds from them reaches the audience a fraction of a second after the direct sound, which makes the music seem fuller and seems to wrap around the listener. A lofty ceiling gives the sound space in which to spread and linger, and it prevents the lingering sound from feeling cramped.

Designers also attend closely to the surfaces. Bumpy decorations, carved panels and statues scatter the sound waves in countless directions, so that they blend more evenly. Soft materials such as heavy curtains and thick seat cushions soak up sound. A hall designer must balance these features carefully, since a full audience also absorbs sound and alters the way the room responds.

For this reason, orchestras frequently test a hall by rehearsing in it empty and then again with people present. The aim is to make every seat sound wonderful, not merely those near the front.

Questions

1. What shape are many of the most admired concert halls?

_____

_____

2. What is reverberation?

_____

_____

3. What happens when a room has too much reverberation?

_____

_____

4. What do bumpy decorations and carved panels do to sound waves?

_____

_____

5. Why does a narrow room make music seem fuller?

_____

_____

6. Why might a hall sound different once the audience arrives?

_____

_____

Words to know

reverberation: the echo-like lingering of sound in a room
scatter: to spread out in many directions
absorb: to soak up instead of bouncing back

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 Concert Hall Is Built Like a Shoebox

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

Circle: Why a Concert Hall Is Built Like a Shoebox

Easier · 222 words · Flesch-Kincaid grade 4.6

1. A tall, narrow rectangle, like a shoebox.
2. The lingering of sound bouncing around a room.
3. Notes smear together and the tune is hard to follow.
4. They scatter sound in many directions so it mixes more evenly.
5. The close side walls send sound to the listener just after the direct sound.
6. People soak up sound, which changes the room.

Triangle: Why a Concert Hall Is Built Like a Shoebox

This passage · 275 words · Flesch-Kincaid grade 7.2

1. A tall, narrow rectangle, like a shoebox.
2. The lingering effect of sound bouncing around a room.
3. Notes smear together and the melody is hard to follow.
4. They scatter the sound waves in many directions so they mix more evenly.
5. The close side walls send sound to the listener just after the direct sound, wrapping around them.
6. People absorb sound, which changes how the room responds.

Square: Why a Concert Hall Is Built Like a Shoebox

Harder · 283 words · Flesch-Kincaid grade 8.1

1. A tall, narrow rectangle, shaped almost like a shoebox.
2. The lingering effect of sound rebounding around a room.
3. The notes smear together and the melody becomes difficult to follow.
4. They scatter the waves in many directions so that they blend more evenly.
5. The close side walls send sound to the listener just after the direct sound, wrapping around them.
6. People absorb sound, which alters the way the room responds.