
Six math clues · answer key

How Speakers Turn Waves Into Sound

Age 8 / Grade 2 math. Trade 10 ones for 1 ten in addition, or 1 ten for 10 ones in subtraction.

Math 1 · 63

$7 + 6 = 13$ ones: 1 ten and 3 ones. Add $2 + 3 + 1$ tens to get 63.

Math 2 · 36

64 is 5 tens and 14 ones. Subtract 2 tens and 8 ones to get 36.

Math 3 · 83

$8 + 5 = 13$ ones: 1 ten and 3 ones. Add $3 + 4 + 1$ tens to get 83.

Math 4 · 26

72 is 6 tens and 12 ones. Subtract 4 tens and 6 ones to get 26.

Math 5 · 75

$6 + 9 = 15$ ones: 1 ten and 5 ones. Add $4 + 2 + 1$ tens to get 75.

Math 6 · 34

91 is 8 tens and 11 ones. Subtract 5 tens and 7 ones to get 34.

Age 8 / Grade 2 math. Three additions and three subtractions all require regrouping. Numbers are story counts, not measurements of speaker motion.

Reading & writing · answer key

How Speakers Turn Waves Into Sound

Reading · 1

The coil pushes and pulls near the magnet. Its attachment passes that back-and-forth motion to the cone.

Reading · 2

Both reveal vibration. A moving surface makes rice hop; arriving pressure waves make an eardrum vibrate.

Reading · 3

Faster wiggles make a higher pitch. Bigger wiggles make a louder sound.

Writing

Accept a spoken, dictated, drawn, or written command. Example: "Hum near the bowl, then draw how the rice moved."

Keep Big beside you, sounds gentle, and rice on the table, away from mouths and ears. Leave devices closed; use no wall power or soldering, and let Big hold any magnet. Rice may not move with a gentle voice; a light tap on the bowl's side is a reliable next step. The model slows and enlarges motion and does not play audio. Air particles move locally back and forth while the pressure pattern travels. The electric signal stays in the speaker circuit; sound through air is mechanical vibration. The coil's magnetic interaction with a fixed magnet moves the attached cone. Pure tones are sinusoidal; speech and music combine more complex motions. At a fixed pitch and distance, greater vibration amplitude generally sounds louder. The inner ear changes the eardrum's arriving vibration into signals for the brain. The cup phone carries mechanical vibration along its taut string.

Welcome speaking, dictation, drawing, or writing. One command is enough. Example: "Hum near the bowl, then draw how the rice moved."

Four stops for a wiggle

How Speakers Turn Waves Into Sound

Quiz 1. What moves the cone in a speaker?

The changing electric signal makes the coil push and pull near the magnet, moving the attached cone.

Quiz 2. What travels through the air from the cone?

Pressure waves carry a pattern of squeezed and spread-out air toward the ear.

Quiz 3. What makes a note higher in pitch?

Faster wiggles make a higher pitch; bigger wiggles make a louder sound.

Quiz 4. Why can rice hop on a drumhead?

The drumhead vibrates beneath the rice and gives it little pushes upward.

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