STEM 101
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Name: _____
Period: _____

UNIT: UKULELE

ACT-BASED SCIENCE: SOUND WAVE VISUALIZATION WITH A TUNING APP

OBJECTIVE:

Analyze **sound waveforms** using a tuning app.

ACT SCORE TARGET: **20-23**

STUDENT DIRECTIONS:

Goal:

Use a tuning app to observe and analyze how frequency, pitch, and waveform relate to sound produced by a ukulele.

Step 1: Set Up Your Tools

Materials Needed:

- Ukulele
- Smartphone or tablet with a tuning app (such as Cleartune, Pano Tuner, or any app that shows waveform and frequency)

Make sure you're in a quiet environment, so background noise doesn't interfere with readings.

Step 2: Play and Record an Open String

1. Choose one open string on your ukulele (e.g., the G string).
2. Use the tuning app to pluck the string and record the following:
    - Pitch name (e.g., G4)
    - Frequency in Hz (e.g., 392 Hz)
    - Waveform shape on the display (draw or describe)

Fill in your notebook like this:

String Played	Pitch	Frequency (Hz)	Waveform Shape/Notes
G string	G4	392	Smooth sinusoidal

Step 3: Compare Different Notes

1. Play a different open string (e.g., A, E, or C) or use the tuning pegs to tune one string higher or lower.
2. Repeat the observation steps for the new note.
3. Compare the waveforms:
    - Does the shape change?
    - Does the frequency increase or decrease?
    - How does the spacing of the waves (wavelength) differ?

Step 4: Analyze and Discuss

Write a brief summary (3–5 sentences) answering these questions:

- What happens to the waveform as the pitch goes higher?
- How do frequency and wavelength relate?
- Why is waveform analysis important for understanding sound?

Use scientific terms like frequency, wavelength, amplitude, and pitch in your explanation.

ACT-STYLE QUESTION:

- What happens to the **wavelength** when a ukulele string is tuned to a **higher frequency**?

    A. Increases
    B. Decreases
    C. Stays the same
    D. Depends on the material