

NAME _____

DATE _____

Scenario 1

Carlos has a guitar, an instrument with strings of specific tension and length. He plucks a string, which causes a fundamental standing wave of initial frequency f_i , wavelength λ_i , and wave speed v_i to form on the string. He then turns a knob to tighten the string without changing its length. When Carlos plucks the string again, the fundamental standing wave on the string has final frequency f_f , wavelength λ_f , and wave speed v_f .

Argumentation**PART A:** Mark each correct relationship:

☐ $v_f > v_i$ ☐ $v_f = v_i$ ☐ $v_f < v_i$

☐ $\lambda_f > \lambda_i$ ☐ $\lambda_f = \lambda_i$ ☐ $\lambda_f < \lambda_i$

☐ $f_f > f_i$ ☐ $f_f = f_i$ ☐ $f_f < f_i$

Explain your choices.

Scenario 2

Dominique plays a trombone, an instrument where the length can be made longer or shorter to be able to play different fundamental frequencies. When she plays the trombone, it causes a fundamental standing wave of initial frequency f_i , wavelength λ_i , and wave speed v_i to form in the air inside the instrument. She then extends the trombone slide so that the entire length of the instrument increases. When Dominique plays the trombone again, the fundamental standing wave in the air has final frequency f_f , wavelength λ_f , and wave speed v_f .

PART B: Mark each correct relationship:

- | | | |
|--|--|--|
| <input type="checkbox"/> $v_f > v_i$ | <input type="checkbox"/> $v_f = v_i$ | <input type="checkbox"/> $v_f < v_i$ |
| <input type="checkbox"/> $\lambda_f > \lambda_i$ | <input type="checkbox"/> $\lambda_f = \lambda_i$ | <input type="checkbox"/> $\lambda_f < \lambda_i$ |
| <input type="checkbox"/> $f_f > f_i$ | <input type="checkbox"/> $f_f = f_i$ | <input type="checkbox"/> $f_f < f_i$ |

Explain your choices.

Scenario 3

Angela uses a special type of speaker to play a single tone underwater. The tone has frequency f_i , wavelength λ_i , and wave speed v_i . When the sound wave leaves the water and enters air, it has a frequency f_f , wavelength λ_f , and wave speed v_f .

PART C: Mark each correct relationship:

- | | | |
|--|--|--|
| <input type="checkbox"/> $v_f > v_i$ | <input type="checkbox"/> $v_f = v_i$ | <input type="checkbox"/> $v_f < v_i$ |
| <input type="checkbox"/> $f_f > f_i$ | <input type="checkbox"/> $f_f = f_i$ | <input type="checkbox"/> $f_f < f_i$ |
| <input type="checkbox"/> $\lambda_f > \lambda_i$ | <input type="checkbox"/> $\lambda_f = \lambda_i$ | <input type="checkbox"/> $\lambda_f < \lambda_i$ |

Explain your choices.
