Chapter Problem Wrap-Up

Student Text Page
345

Suggested Timing
15–30 min

Tools
- access to graphing technology

Related Resources
- BLM 5–13 Chapter 5 Problem Wrap-Up Rubric

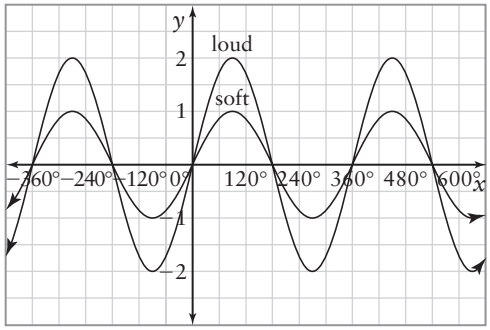
Summative Assessment
- Use **BLM 5–13 Chapter 5 Problem Wrap-Up Rubric** to assess student achievement.

Using the Chapter Problem Wrap-Up

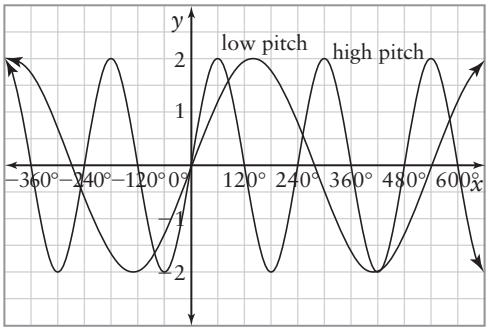
- If you have had students complete the Chapter Problem questions as they worked through the chapter, they will now be in a position to complete the Chapter Problem Wrap-Up.
- If you have chosen to use the Chapter Problem as a summative task or assessment, you will have told students that at the beginning of the chapter. Frequent reminders as students work through the sections are helpful. Students will need access to graphing calculators or *The Geometer's Sketchpad*® to work through the questions throughout the chapter.

Level 3 Sample Response

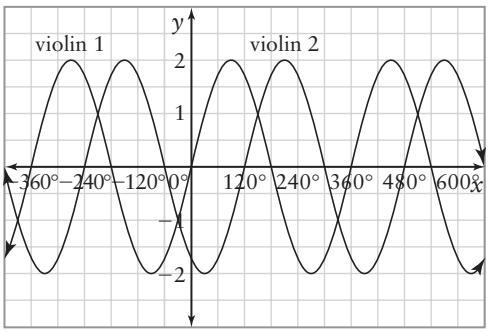
a) The amplitude of the modelling function is related to the loudness of the sound that you hear. The greater the amplitude of the waves, the greater the loudness of the sound. Sound waves from a guitar played softly will have a smaller amplitude than the sound waves from a guitar played loudly.



b) The period of the modelling function is related to the pitch of the sound that you hear. The longer the period, the lower the pitch. The sound waves from a low-pitch instrument, such as a bass guitar, will have a longer period than the sound waves from a high-pitch instrument, such as a flute.



c) Phase shift is most apparent when two instruments of the same kind play the same note. For example, two violins playing the same note sound like two violins, not like one violin played twice as loud. This is due to a difference in phase shift between the notes from the two violins.



The songs sung by a choir sound like a multitude of voices, not like one loud voice. Each member of the choir produces a sound that differs from the others due to a phase shift. In music synthesis, it is possible to mimic two instruments such that there is no phase shift. The sound from the two instruments is perceived as a sound twice as loud. However, such a process is not interesting to the human ear. Engineers who design synthesizers introduce a phase shift such that the synthesizer sounds like two instruments. The effect produced is called *chorus*.

Level 3 Notes

Look for the following:

- References to real instruments that match the concept under discussion are mostly evident
- Sample graphs illustrating a difference in amplitude, a difference in period, and a difference in phase shift are mostly correct

What Distinguishes Level 2

- References to real instruments are absent, or references do not match the concept under discussion
- Sample graphs are missing, or graphs do not properly illustrate a difference in amplitude, a difference in period, and a difference in phase shift

What Distinguishes Level 4

- Provides a demonstration of an online or real synthesizer that illustrates the amplitude, period, and phase shift as they apply to music
- Includes sample graph of the sum waveform when the two instruments are in phase contrasted with the sum waveform when there is a phase shift