LESSON MAKER PRO

Wave Math in Motion

Connect wave speed, frequency, wavelength, and period.

HIGH SCHOOL · PHY.4

PHY.4 "Students will investigate and explore wave properties. Analyze the characteristics and properties of simple harmonic motions, sound, and light..."

NAME _____ **DATE** _____

THE BIG IDEA

Wave speed equals frequency times wavelength: v = f × wavelength. Period is the time for one complete cycle, so T = 1/f. On a displacement-time graph, the time between two neighboring peaks is one period.

WORKED EXAMPLE

A wave on a stretched string travels at 144 m/s and has a frequency of 12 Hz. What is its wavelength?

1. Start with v = f × wavelength.
2. Rearrange: wavelength = v/f.
3. Substitute: wavelength = 144/12 = 12 m.

Answer: 12 m

PRACTICE 6 problems

1 A wave travels at 24 m/s and has a frequency of 8 Hz. Find its wavelength.

ANSWER _____

2 A wave has a wavelength of 2 m and a frequency of 9 Hz. Find its speed.

ANSWER _____

3 A wave travels at 44 m/s and has a wavelength of 11 m. Find its frequency.

ANSWER _____

4 A wave has a frequency of 10 Hz. Find its period.

ANSWER _____

5 A wave has a period of 1/8 s. Find its frequency.

ANSWER _____

6 A wave travels at 48 m/s and has a frequency of 16 Hz. Find its wavelength and period.

ANSWER _____

APPLY IT Show your work

1 At a concert, a bass note has a frequency of 85 Hz. If sound travels at 340 m/s, what is the note's wavelength?

WORK SPACE

ANSWER _____

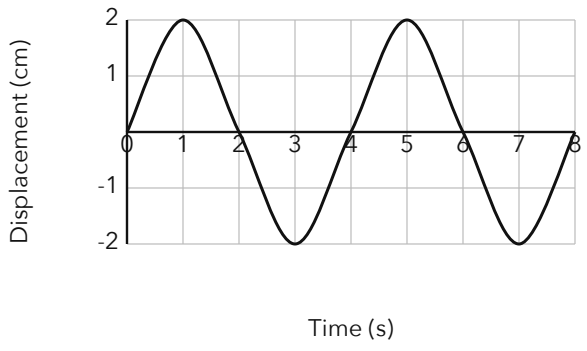
2 You make waves in a swimming pool. The waves travel at 0.8 m/s, and each wave takes 2 s to complete one cycle. How far apart are neighboring wave crests?

WORK SPACE

ANSWER _____

CHALLENGE One step up

The graph shows the displacement of one point as a wave passes. The wave travels at 6 m/s. Find the period and wavelength. Explain how you found the period from the graph.



WORK SPACE AND ANSWER

ANSWER KEY

Wave Math in Motion

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	A wave travels at 24 m/s and has a frequency of 8 Hz. Find its wavelength.	**3 m**
2	A wave has a wavelength of 2 m and a frequency of 9 Hz. Find its speed.	**18 m/s**
3	A wave travels at 44 m/s and has a wavelength of 11 m. Find its frequency.	**4 Hz**
4	A wave has a frequency of 10 Hz. Find its period.	**1/10 s**
5	A wave has a period of 1/8 s. Find its frequency.	**8 Hz**
6	A wave travels at 48 m/s and has a frequency of 16 Hz. Find its wavelength and period.	**Wavelength: 3 m; period: 1/16 s**

PART 2 · APPLY IT

1. **4 m** Divide speed by frequency: 340/85 = 4 m.
2. **1.6 m** The time between crests is one period. Multiply speed by period: 0.8 × 2 = 1.6 m.

CHALLENGE

Period: 4 s; wavelength: 24 m. Neighboring peaks occur at 1 s and 5 s, so the period is 5 − 1 = 4 s. The wave travels 6 × 4 = 24 m in one period.

Accept equivalent decimal answers for fractions of a second. In the challenge, any pair of matching points one complete cycle apart supports a period of 4 s.