This print-out should have 10 questions. Multiple-choice questions may continue on the next column or page – find all choices before answering.

Holt SF 12Rev 50
001 10.0 points

A sound wave traveling at 341 m/s is emitted by the foghorn of a tugboat. An echo is heard 3.60 s later.

How far away is the reflecting object?

Piano String
002 10.0 points

A piano string of mass per unit length 0.00482 kg/m is under a tension of 1660 N.

Find the speed with which a wave travels on this string.

Transverse Waves on a String
003 10.0 points

Transverse waves with a speed of 40.5 m/s are to be produced in a taut string. A 5.67 m length of string with a total mass of 0.0522 kg is used.

What is the required tension?

Waves in a Pond
004 10.0 points

A rock dropped into a pond produces a wave that takes 18.9 s to reach the opposite shore, 40 m away. The distance between consecutive crests of the wave is 4.2 m.

What is the frequency of the wave?

Wave Speed
005 10.0 points

For a certain transverse wave, the distance between two successive maxima is 1.75 m and eight maxima pass a given point along the direction of travel every 16.4 s.

Calculate the wave speed.

Wave on Steel Piano Wire
006 10.0 points

A carbon steel piano wire 4.4 m long with a cross-sectional area of 2×10^{-6} m^2 and mass 0.1 kg is stretched 20 mm.

Determine the speed of transverse waves on the string. For carbon steel, Young's modulus is 2×10^{11} N/m^2.

Correct answer: 282.843 m/s.

Waves on a Lake
007 10.0 points

A group of swimmers is resting in the sun on an off-shore raft. They estimate that 3.36 m separate a trough and an adjacent crest of surface waves on the lake. They count 14 crests that pass by the raft in 23.9 s.

How fast are the waves moving?

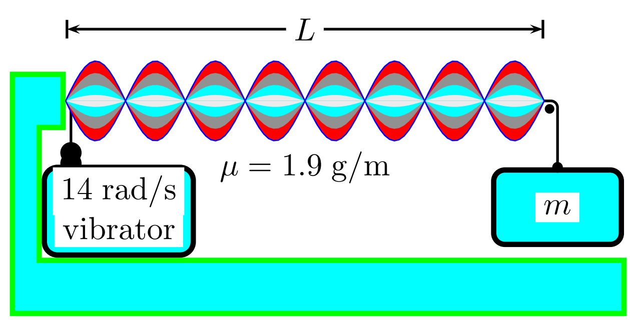
Correct answer: 3.9364 m/s.

Standing Waves 21
008 (part 1 of 3) 10.0 points

A sinusoidal wave in a rope is described by the wave function

$$y = A \sin(k\,x + \omega\,t)\,,$$

where $A = 0.306$ m, $k = 0.903$ m^{-1}, $\omega = 14$ rad/s, x and y are in meters, and t is in seconds.



What is the length of the string? The rope has a linear mass density of 1.9 g/m. The acceleration of gravity is 9.8 m/s^2 .

Correct answer: 27.8325 m.

009 (part 2 of 3) 10.0 points

What is the velocity of the wave?

Correct answer: 15.5039 m/s.

010 (part 3 of 3) 10.0 points

If the tension in the rope is provided by an arrangement like the one illustrated, what is the value of the suspended mass?

Correct answer: 0.0466024 kg.