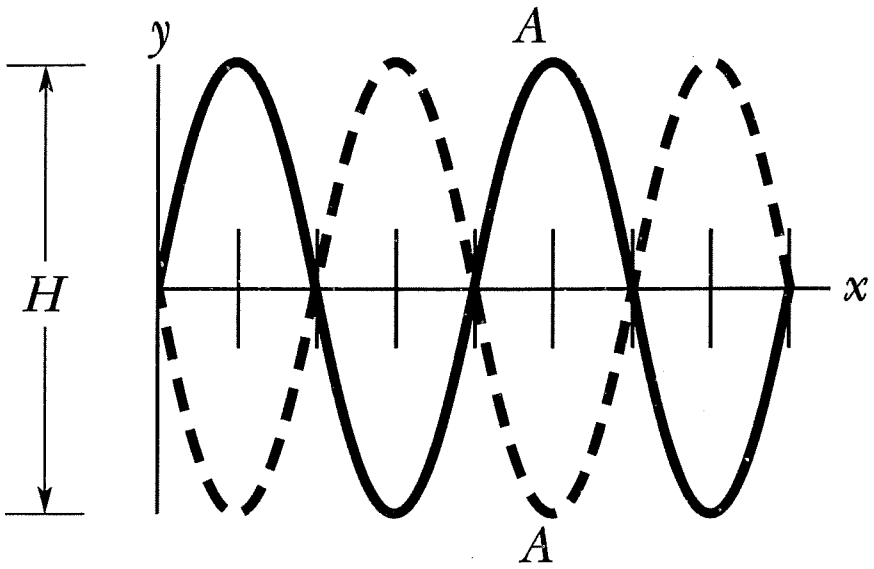
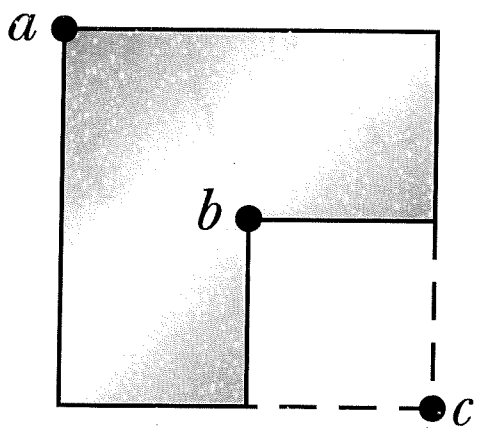
1. Two sinusoidal waves with the same amplitude and wavelength travel through each other along a string that is stretched along an *x*-axis. Their resultant wave is shown below. The antinode A travels from an extreme upward displacement to an extreme downward displacement in 6.0 ms. The tick marks along the axis are separated by 10 cm. the height H is 1.8 cm. Let the equations for one of the two waves be of the form

$$y(x,t) = y_m \sin(kx+\omega t).$$

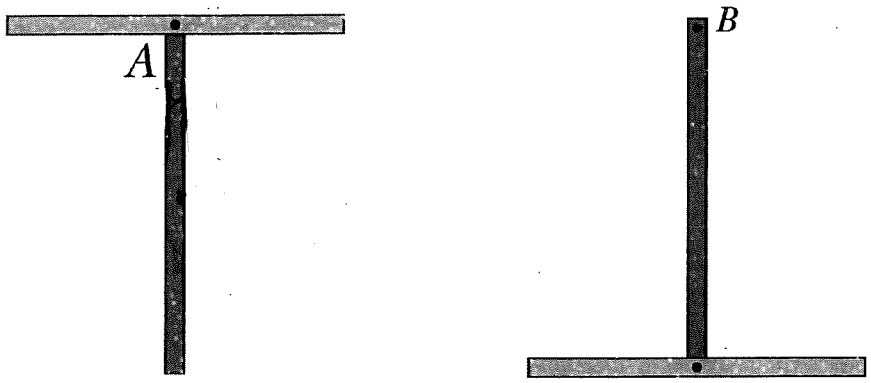


In the equation for the other wave what are
(a) y_m
(b) k
(c) ω
(d) the sign in front of ω

2. The figure shows a uniform metal plate that was square before 25% of it was snipped off. Three lettered points are indicated. Rank, from largest to smallest, the rotational inertia of the plate if it pivots around a perpendicular axis through each point.



3. A horizontal vinyl record of mass 0.1 kg and radius 0.1 m rotates freely about a vertical axis through its center with an angular speed of 4.7 rad/s. The rotational inertia of the record about its axis of rotation is 0.0005 kg m2. A wad of wet putty of mass 0.02 kg drops vertically onto the record from above and sticks to the edge of the record. What is the angular speed of the record immediately after the putty sticks to it?



4. A physical pendulum consists of two meter-long sticks joined together as shown. What is the pendulums period of oscillation about a pin inserted through point A at the center of the horizontal stick? What is the period of oscillation if the pin is inserted through point B at the end of the vertical stick?

5. The length of a bicycle pedal arm is 0.152m and a downward force of 111 N is applied to the pedal by the rider. What is the magnitude of the torque about the pedal arm's pivot when the arm is at angle

(a) 30° ?
(b) 90° ?
(c)180° ?

6. What are (a) the lowest frequency, (b) the second lowest frequency and (c) the third lowest frequency for standing waves on a wire that is 10.0 m long, has a mass of 100 g and is stretched under a tension of 250 N?