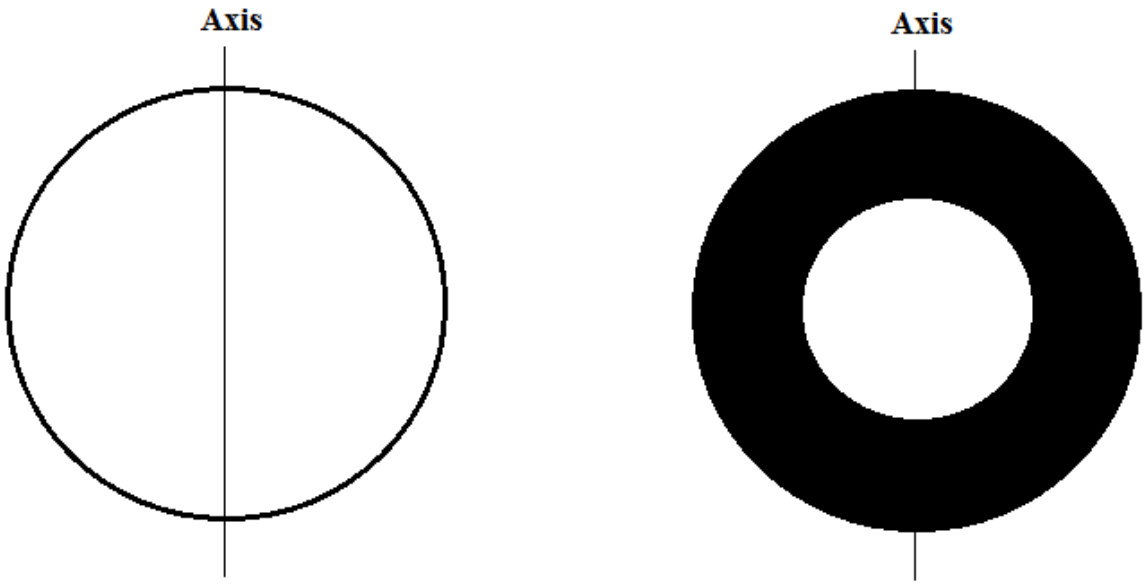
Chapters Sample Test 5



1. The moment of inertia of a thin ring with mass M and radius R rotating about an axis though its center in the plane of the ring (as shown above left) is

$$I = \frac{1}{2}mR^2$$

Find an expression for the moment of inertia of a flat washer-shaped object with uniform area density σ, inner radius R_1 and outer radius R_2 (as shown above right). Your answer can contain the constant σ, R_1, and R_2.

2. A 2.00 kg air-track glider is attached to a spring with spring constant 50.0 N/m. The glider is pulled 0.250 m to the right of the equilibrium position and released at time zero.

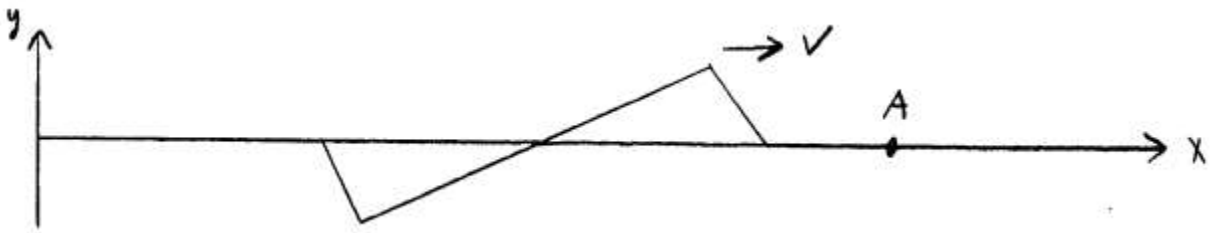
a) Write the values for the following constants to three significant figures. Include units!

k=_____, m=_____, ω=_____, f=_____, T=_____, A=_____, v_{max} = _____,

a_{max} = _____

b) What is the position of the glider at t=1.00 s? (Don't forget to check that you calculator is in radians mode).

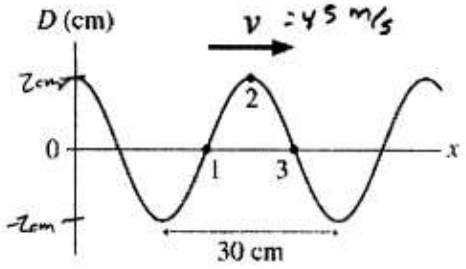
2. The diagram below shows a snapshot graph of a wave on a string that is travelling to the right at time t=0.



Draw a history graph representing the motion of point A. (2 points).

3.

The figure below shows a snapshot of a wave travelling to the right along a string at 45 m/s.



a) Write the equation of motion of the wave (y as a function of x and t). (2 points)

b) At this instant, what is the velocity of points 1, 2, and 3? (Be sure to pay attention to signs). (1 point)

4. The standing wave shown below occurs on a string of length L = 2.00 m and mass 10 g. The tension in the string is 500 N.

a) What is the frequency of the standing wave shown?

b) For the same string with the same tension, what is the frequency of the fundamental (n=1) standing wave?