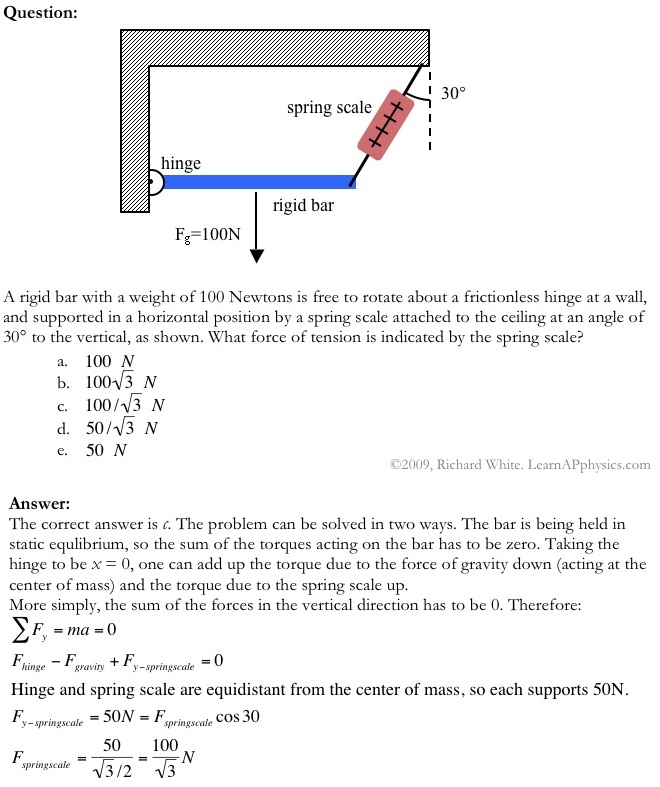
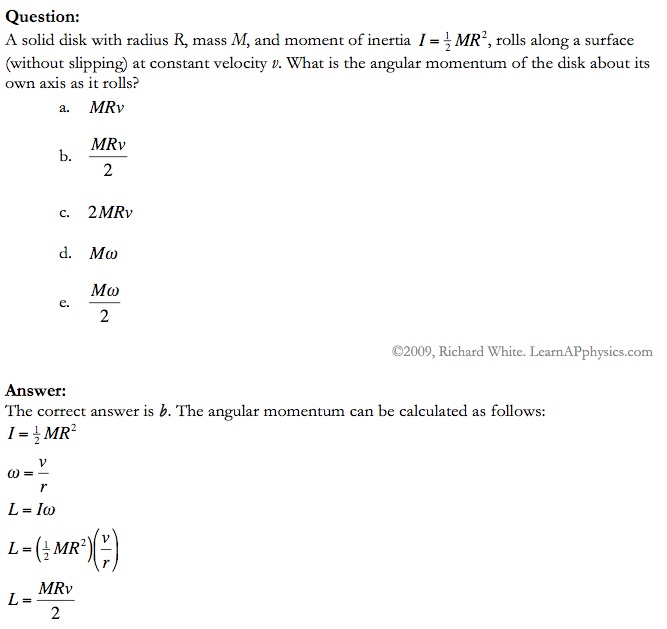
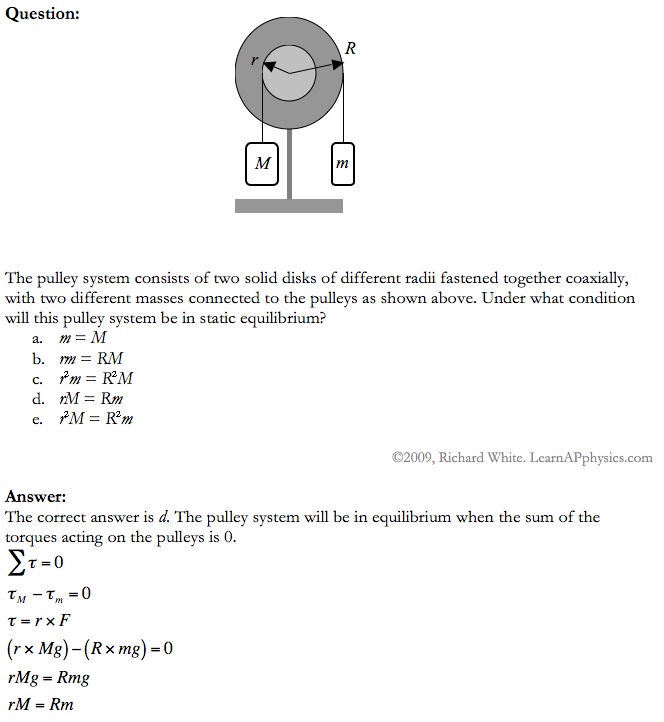
Rotational Motion Test

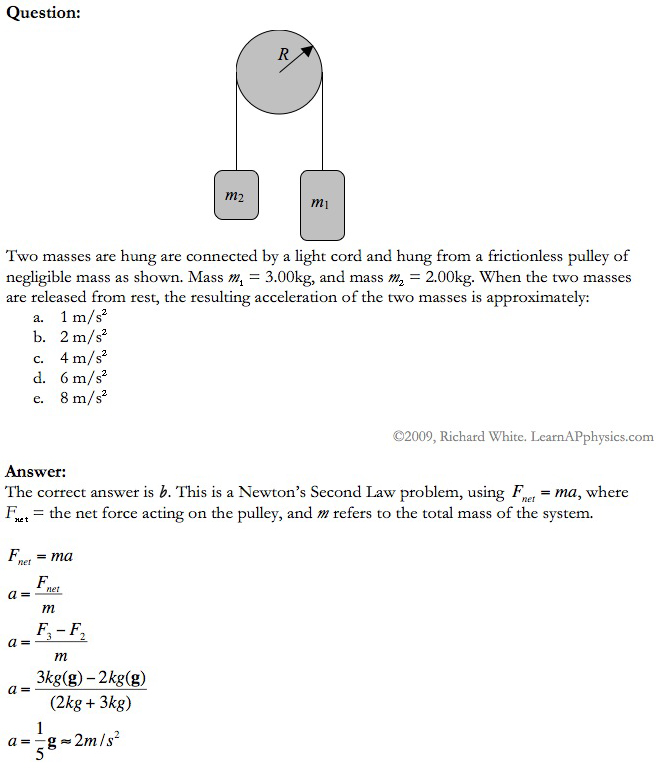
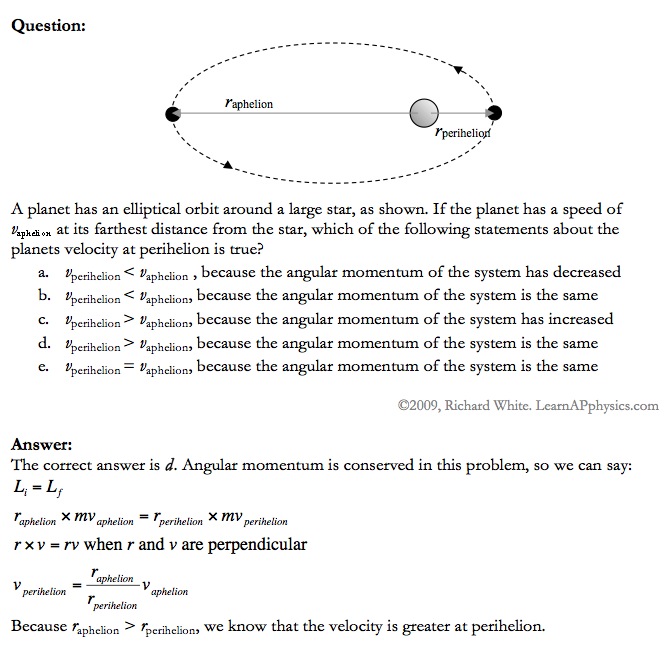
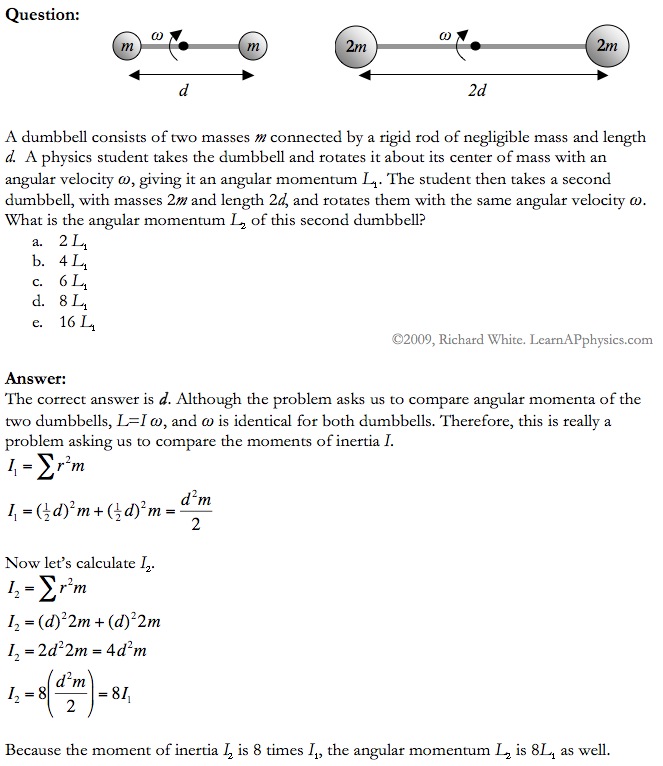
AP Physics 1

Multiple Choice – 2pts each

1. 

1. 



1. 
2. 
3. 

L2=L1

L2=2L1

L2=4L1

L2=8L1

L2=16L1

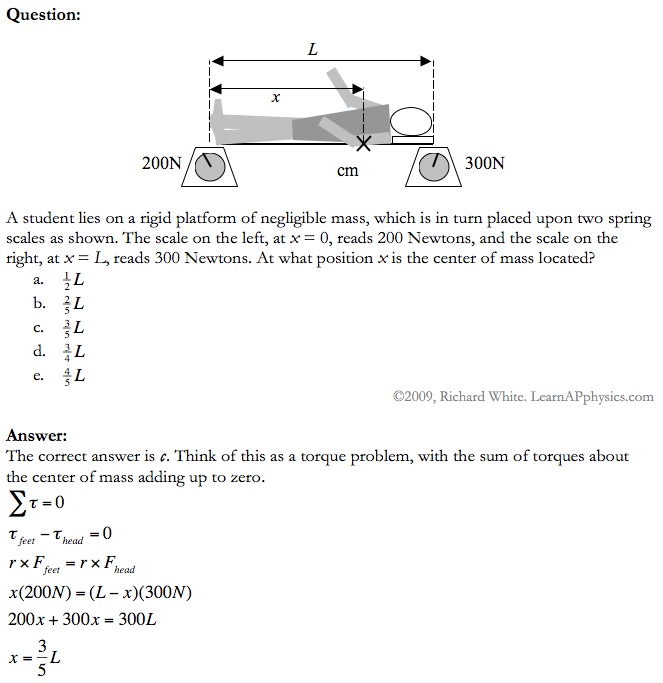
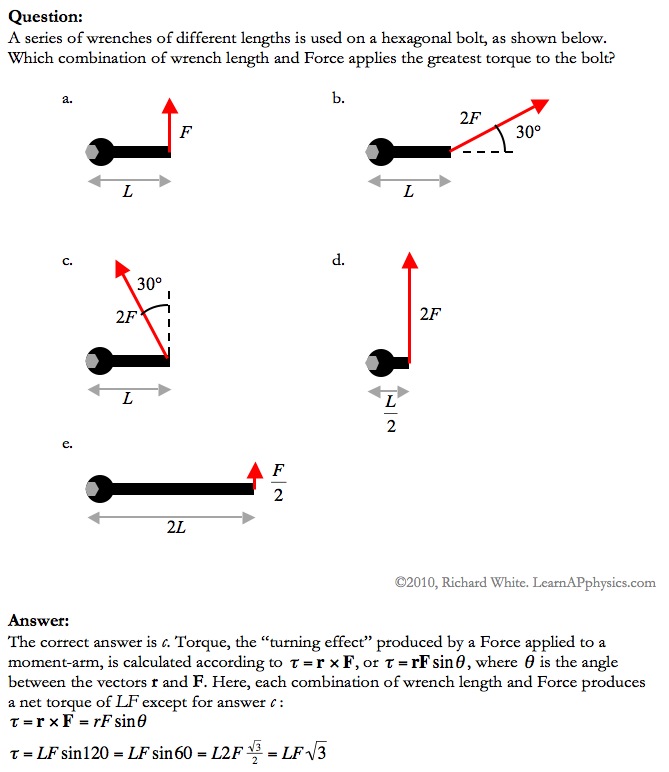
*m*

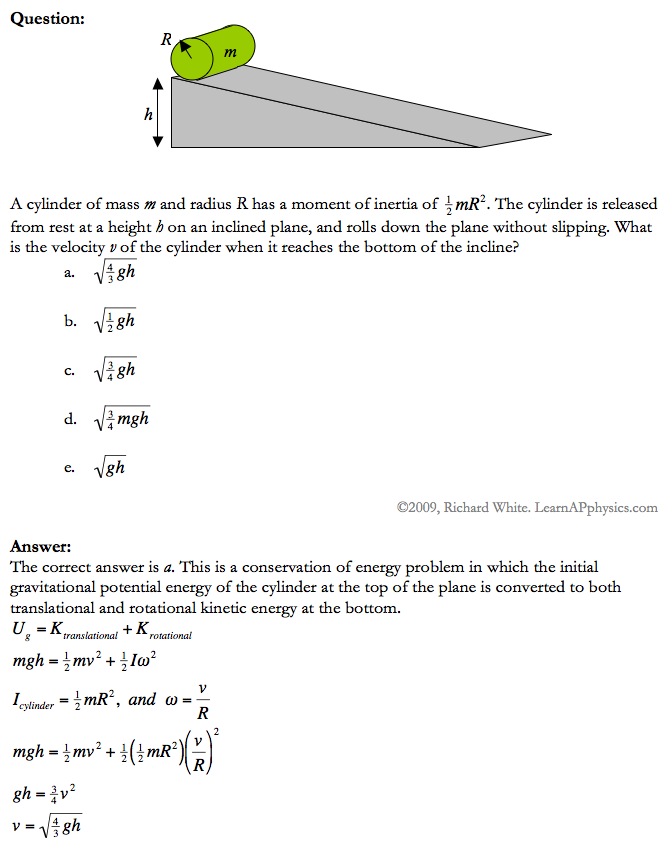
*m*

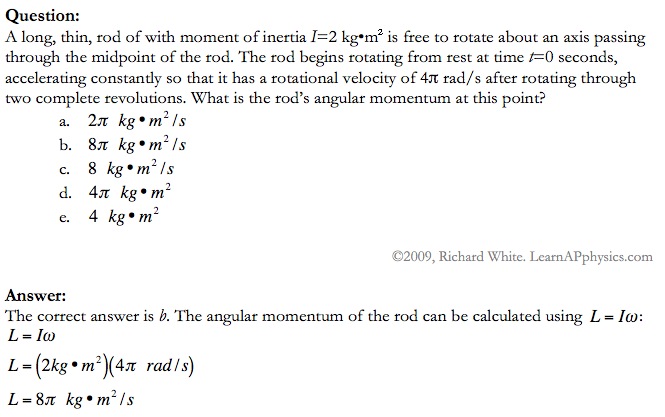
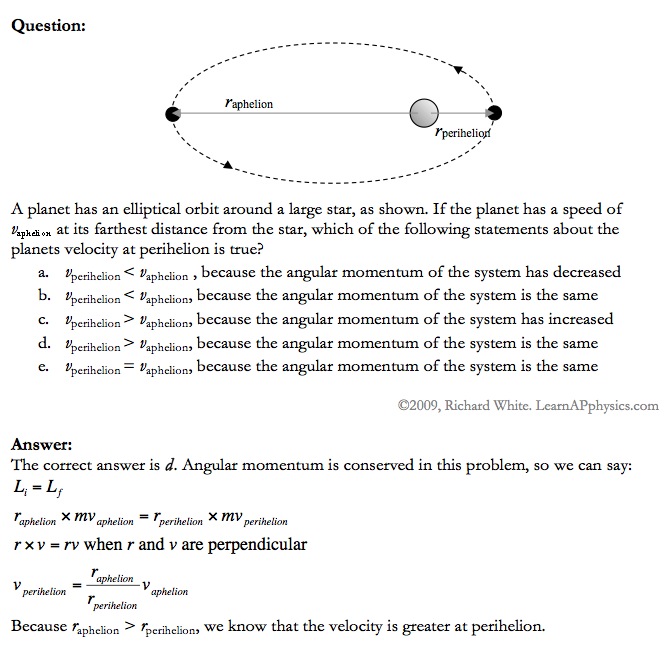
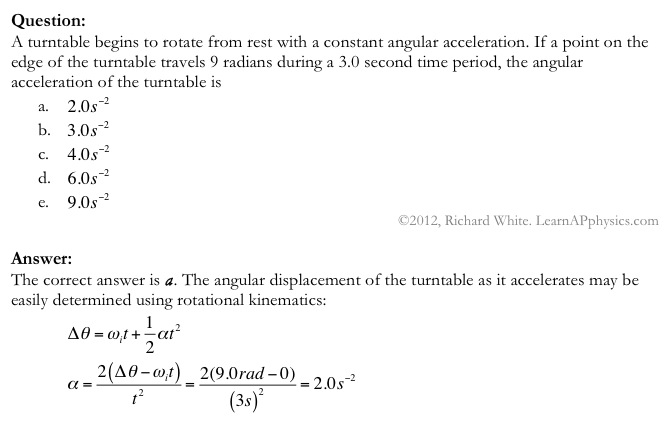
*m*

*m*

*m*

1. 
2. 



1. 
2. A sphere with mass *m* rotates around a central mass in an elliptical orbit. The radius of the orbit is three times larger at the aphelion than at the perihelion. What is the angular velocity, ωa, at the aphelion in terms of angular velocity at the perihelion, ωp?  
     
   1. ωp = ωa
   2. ωp = 3ωa
   3. ωp = 6ωa
   4. ωp = 9ωa
   5. ωp = 27ωa
3. 
4. If a wheel turns with constant angular speed then:
   1. Each point on its rim moves with constant velocity
   2. Each point on its rim moves with constant acceleration
   3. The wheel turns through equal angles in equal times
   4. The angle through which the wheel turns in each second increases as time goes on
   5. The angle through which the wheel turns in each second decreases as time goes on

1. The angular speed in rad/s of the second hand of a watch is:
   1. π/1800
   2. π /60
   3. π /30
   4. 2 π
2. A wheel starts from rest and has an angular acceleration of 4.0 rad/s2. The time it takes to make 10 revolutions is:
   1. 0.50 s
   2. 0.71 s
   3. 2.2 s
   4. 2.8 s
   5. 5.6 s

Open Ended – 70pts

1. (10pts) Delilah (mass 80kg) wishes to play see-saw with her younger brother. The see saw has a total length of 6 meters and a fulcrum, or pivot point in the center.
   1. If Delilah’s younger brother has a mass of 45kg and sits as far away as possible from the fulcrum, how far from the fulcrum should Delilah sit so that the see-saw will be balanced?
   2. If Delilah’s baby cousin (mass 15kg) sits on her brother’s lap, now where does Delilah need to sit to balance the see-saw?
2. (15pts) A 10kg bowling ball with a radius of ten centimeters is rolled *up* a ramp and comes to a stop at a vertical displacement of 1.4m.
   1. What was the initial tangential velocity of the ball?
   2. What was the initial rotational velocity of the ball?
   3. A smaller ball has the same mass but a radius of 0.05m. This ball is rolled up the same ramp and also reaches a vertical displacement of 1.4m. What is the rotational velocity of this ball (ω2) in terms of the original ball (ω1)? Your answer should start ω2= \_\_\_\_\_
3. (15pts) A mass-pulley system consists of a 6kg mass, a 3kg mass and a 14kg pulley with a radius of 0.25m.
   1. What is the velocity of each mass after the pulley has completed 2 rotations?

.25m

14kg

* 1. What is the rotational velocity of the pulley after this time?

3kg

6kg

* 1. What is the angular acceleration of the pulley?

1. (15) A man stands on a scaffold (mass 150kg) hanging from two wires as shown in the picture below.
   1. Find the tension in each wire.

T1

30°

T2



1/3L

1/4L



65kg 70kg

1. (15pts) A 70kg metal pole is attached via a hinge perpendicularly to a wall. A metal wire connects the far edge of the bar to the ceiling at an angle of 70° above the horizontal. A very fat 50kg emu sits ¾ down the bar away from the hinge.
   1. Find the tension in the wire

T

70°

* 1. Find the horizontal force exerted by the hinge
  2. Find the vertical force exerted by the hinge.

3/4L