PHYS 1020 Final Exam

Monday, December 17, 6 - 9 pm

The whole course, **including ch. 14, sections 1 and 2**
30 multiple choice questions
Formula sheet provided

Seating for Final Exam

A - SIM: Brown Gym

SIN - Z: Gold Gym

Welcome to Physics 1020!

Instructors	Required Materials	Schedule	Policies/Evaluation	Suggested Problems	Formula Sheet
Answers to Even-Numbered Problems			Answers for tutorial test problems		
Answers for midterm test			Answers for final exam		
Marks files					

Mastering Physics Assignment #5
Due Monday, December 3 at 11 pm

Information on "Mastering Physics"

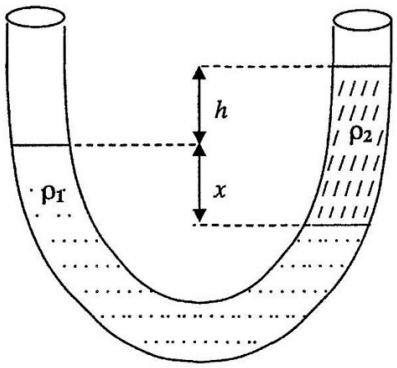
→ **Mastering Physics Survey** ←

6.54: A 3 kg model rocket is launched straight up. It reaches a maximum height of 100 m above where its engine cuts out, even though air resistance performs –800 J of work. What would have been this height if there had been no air resistance?

6.61: The motor of a ski boat generates an average power of 75,000 W when the boat is moving at a constant speed of 12 m/s. When the boat is pulling a skier at the same speed, the engine must generate an average power of 83,000 W. What is the tension in the tow rope that is pulling the skier?

Q25, Final 2006

A U-shaped tube contains two liquids of densities ρ_1 and ρ_2 as shown in the diagram. The difference in the heights of the columns is h and the side with density ρ_1 rises to a height x above the interface between the two fluids on the other side. What is the ratio of densities of the fluids ρ_1/ρ_2?



(a) $(x+h)/x$

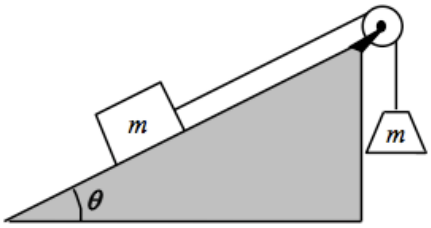
(b) $x/(x+h)$

(c) $(x-h)/x$

(d) One of the densities must be known.

(e) n.o.t.

Q15/55, 2007 Midterm: A block is at rest on a rough inclined plane and is connected to an object with the same mass. The rope is massless and the pulley may be considered to be frictionless. The coefficient of static friction between the block and the plane is μ_s. What is the magnitude of the static friction force acting on the block?



(a) mg sin θ

(b) mg cos θ

(c) mg(1 - sin θ)

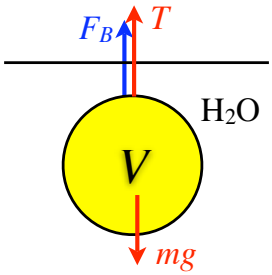
(d) mg(1 - cos θ)

(e) mg

Q4, 2005 Final: A ball is thrown vertically and has an upward velocity of 18 m/s when it reaches one-fourth of its maximum height above its launch point. What is the initial velocity of the ball?

8.25: A spinning wheel in a fireworks display is initially rotating in a counterclockwise direction. The wheel has an angular acceleration of -4 rad/s^2. Because of this acceleration, the angular velocity of the wheel changes from its initial value to a final value of -25 rad/s. While this change occurs, the angular displacement of the wheel is zero. Find the time required for the change in angular velocity to occur. (Note similarity to that of a ball being thrown vertically upward, coming to a momentary halt, and then falling downward to its initial position).

12.34/36: A solid Al sphere has a radius of 0.5 m and a temperature of 75°C. The sphere is completely immersed by suspending it in a large pool of water at 25°C. The sphere cools, the temperature of the water remains the same. The sphere is weighed in the water while it is still at 75°C and when it has cooled to 25°C (think Archimedes). Which weight is larger? What is the difference in the weights?



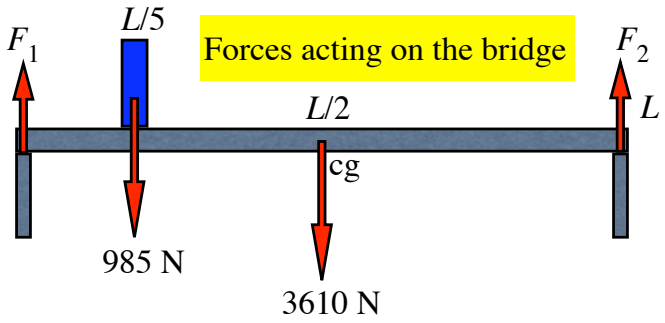
The buoyancy force is equal to the weight of displaced water.

The sphere has a larger volume and displaces more water when it is at the higher temperature, so the buoyancy force is greater and the apparent weight is less.

The difference in buoyancy force, and therefore the difference in weight, is equal to the difference in the weight of displaced water:

$$\Delta W = \Delta V \times g\rho_{H_2O}$$

9.14: A hiker, weight 985 N, crosses a uniform bridge, weight 3610 N. He stops 1/5 of the way across. What forces do the supports at either end exert on the bridge?

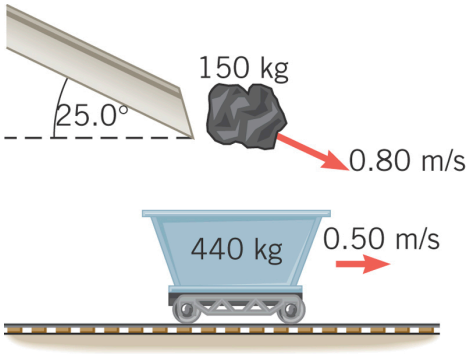


6.75/51: A basketball of mass 0.6 kg is dropped from rest from a height of 1.05 m. It rebounds to a height of 0.57 m.

a) How much mechanical energy was lost during the collision with the floor?

b) A basketball player exerts a constant downward force on the ball from a height of 1.05 m for a distance of 0.08 m to compensate for the loss of mechanical energy at each bounce. If the ball now bounces to a height of 1.05 m, what is the magnitude of the force?

7.34: A mine car rolls at 0.5 m/s on a horizontal track. A lump of coal falls into the car. Find the speed of the car after the coal has landed in it.



The coal is flying freely through the air and so v_x of the coal is constant while it is in the air.

There are no forces in the horizontal direction so the momentum of coal plus car is conserved.

car coal car + coal

That is: $(440 \times 0.5) + (150 \times 0.8\cos 25^\circ) = (440 + 150)v_f$

$v_f = 0.56$ m/s