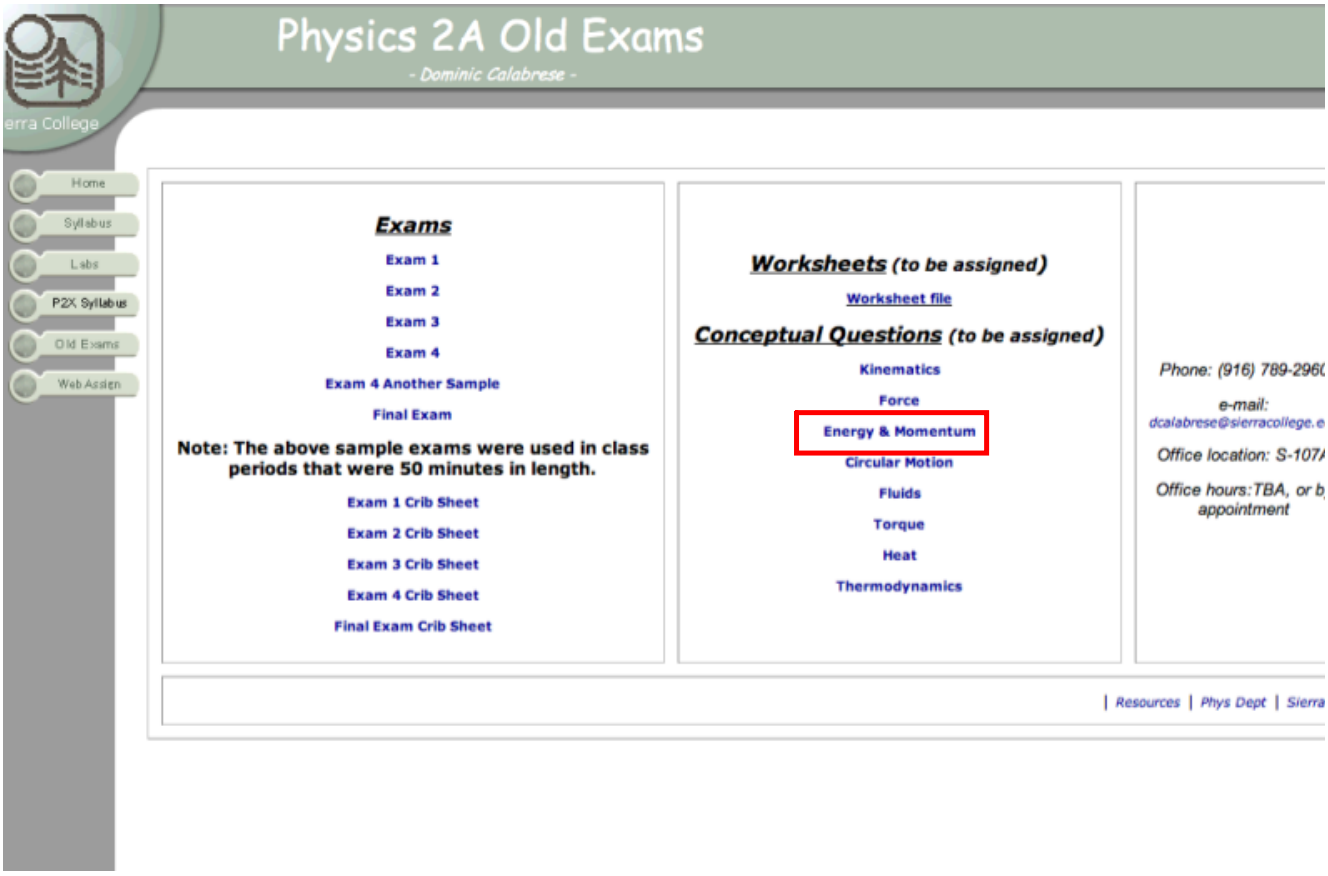
Reminders 10-08-07:
- Next Homework Due 10/14!!!!
- Force Conceptual Questions Due Wed. 10/3.
- Work Worksheet due Wed 10/10.
- Conceptual Quiz Wed. 10/10, Work & Energy.

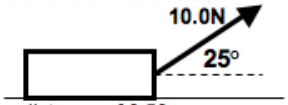
Objectives:
- Newton's Laws Conceptual Questions
- Wed assign Question
- Work and Energy
- Potential Energy
- Conservation of Energy


Physics 2A Old Exams
- Dominic Calabrese -
erra College
Home
Syllabus
Labs
P2X Syllabus
Old Exams
Web Assign
Exams
Exam 1
Exam 2
Exam 3
Exam 4
Exam 4 Another Sample
Final Exam
Note: The above sample exams were used in class periods that were 50 minutes in length.
Exam 1 Crib Sheet
Exam 2 Crib Sheet
Exam 3 Crib Sheet
Exam 4 Crib Sheet
Final Exam Crib Sheet
Worksheets (to be assigned)
Worksheet file
Conceptual Questions (to be assigned)
Kinematics
Force
Energy & Momentum
Circular Motion
Fluids
Torque
Heat
Thermodynamics
Phone: (916) 789-296
e-mail:
dcalabrese@sierracollege.e
Office location: S-107
Office hours:TBA, or b
appointment
| Resources | Phys Dept | Sierra

Work Worksheet

Turn this worksheet in at the beginning of the next lecture.

1. You apply a 10.0N force on a 1.0 kg book as shown
   a. Using the definition of work, calculate the work done by the 10.0N force over a distance of 0.50m.



   b. Using the definition of work, calculate the work done by the gravity over a distance of 0.50m.

   c. Using the definition of work, calculate the work done by the normal force over a distance of 0.50m.

2. Suppose you lift up a 2.0kg book at a constant speed through a distance of 0.75m.
   a. What is the work done by gravity?

   b. What is the work that you do in lifting the book?

3. A string is tied to a 0.50 rock and whirled in a horizontal circular path. If the tension in the string is 40.0N, what is the work done by the string (remember, use the definition of work)?

4. A 1.0kg block is given a push so that it slides up a frictionless hill. The incline of the hill is 15°.
   a. Using the definition of work, what is the work done by gravity after it slides 0.50m up the hill? What does this value imply about its change in speed?

   b. Suppose it heads down the hill. Using the definition of work, what is the work done by gravity after it slides 0.25m down the hill? What does this value imply about its change in speed?

5. SerCP7 4.P.033. [411974] Show Details

A 1000 kg car is pulling a 305 kg trailer. Together, the car and trailer have an acceleration of 2.04 m/s^2 in the forward direction. Neglecting frictional forces on the trailer, determine the following (including sign).

(a) the net force on the car
[2040] N

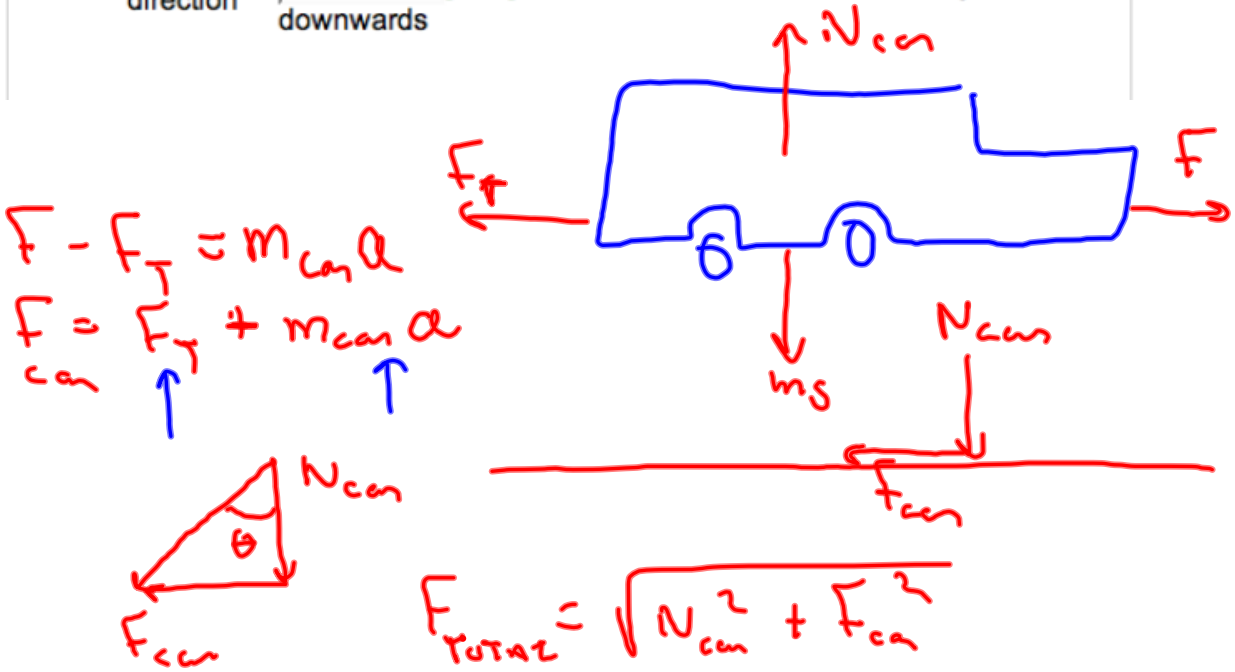
(b) the net force on the trailer
[622] N

(c) the force exerted by the trailer on the car
[-622] N

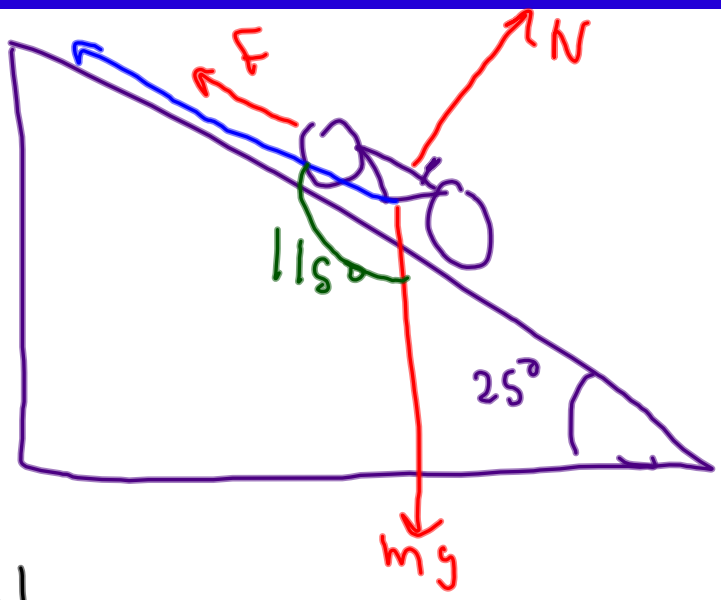
(d) the resultant force exerted by the car on the road

magnitude [10200] N

direction [15.2]° measured from the left of vertically downwards



- A person on a bicycle is riding up a 25° hill a
  3.0m/s. The total mass of the system is 85 kg.
  - How much work is done by gravity after the bicycle travels a distance of 25.0m?



$$W = |\vec{F}||\Delta\vec{x}|\cos\theta$$

$$W_g = (85\,kg)\left(9.80\,\frac{m}{s^2}\right)(25.0\,m)\cos 115^\circ$$

$$= -8800\,N\text{-}m$$

$$W_N = 0 \qquad \vec{N} \perp \Delta\vec{x}$$

- **A person on a bicycle is riding up a 25° hill. The total mass of the system is 85 kg (cont'd).**
  - **How much work is done by the force required to move the bicycle up the hill, if the velocity is constant over the 25.0m distance it travels? What is the magnitude of this force.**
  - **What is the work done by gravity if he/she rides down the hill?**
  - **The force is doubled over the next 10m. Find v_f.**

Work that person does in moving the bicycle up the hill is +8800J.

$$W_g + W_{person} = 0$$

$$W_{person} = F \Delta x$$

$$F_{person} = \frac{W_{person}}{\Delta x} = \frac{8800\,J}{25.0\,m}$$

$$F_{person} = 350\,N$$

$$W_{net} = \Delta KE$$

$$W_g + W_{person} = \frac{1}{2} m (v_f^2 - v_i^2)$$

$$mg(10m)\cos 115^\circ + 2f_{person}(10m) = \frac{1}{2} m (v_f^2 - v_i^2)$$

$$mg(10)\cos 115^\circ + 2f_{person}(10m) = \frac{1}{2} m v_f^2 - \frac{1}{2} m v_i^2$$

$$mg(10)\cos 115^\circ + 2f_{person}(10m) + \frac{1}{2} m v_i^2 = \frac{1}{2} m v_f^2$$

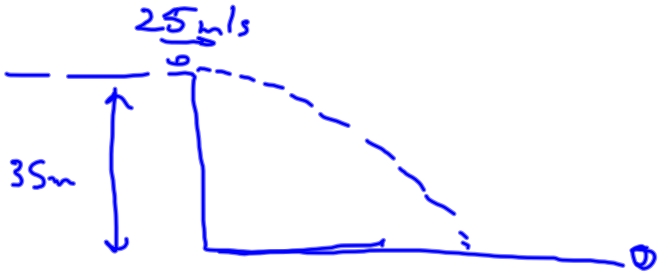
$$\sqrt{\frac{2\left[mg(10)\cos 115^\circ + 2f_{person}(10m) + \frac{1}{2} m v_i^2\right]}{m}} = v_f$$

$$\sqrt{\frac{2\left[(85)(9.80)(10)\cos 115^\circ + 2(350)(10) + \frac{1}{2}(85)(3)^2\right]}{85}} = v_f$$

$$v_f = 8.8 \text{ m/s}$$

- A 125 g rock is hurled horizontally off a 35 m high cliff with an initial velocity of 25 m/s.
  - What is its initial kinetic energy?
  - What is its initial potential energy?
  - What is its total initial energy?
  - What is its final energy just when it hits the ground below?
  - What is its final speed when it hits the ground?

$TE_i = TE_f \qquad \Delta TE = 0$



$KE_i = \frac{1}{2} m v_0^2 = \frac{1}{2}(.125\,kg)(25)^2 = 39\,J$

$GPE_i = (.125\,kg)(9.80\,\frac{m}{s^2})(35\,m) = 43\,J$

$TE_i = 82\,J$

$TE_f = 82\,J = 0 + \frac{1}{2} m v_f^2$

$v_f = \sqrt{\frac{2(82)}{.125}} = 36\,m/s$

$36 = \sqrt{25^2 + v_{yf}^2}$

$TE_i = TE_f$

$\frac{1}{2} m v_i^2 + mgy_i = \frac{1}{2} m v_f^2$

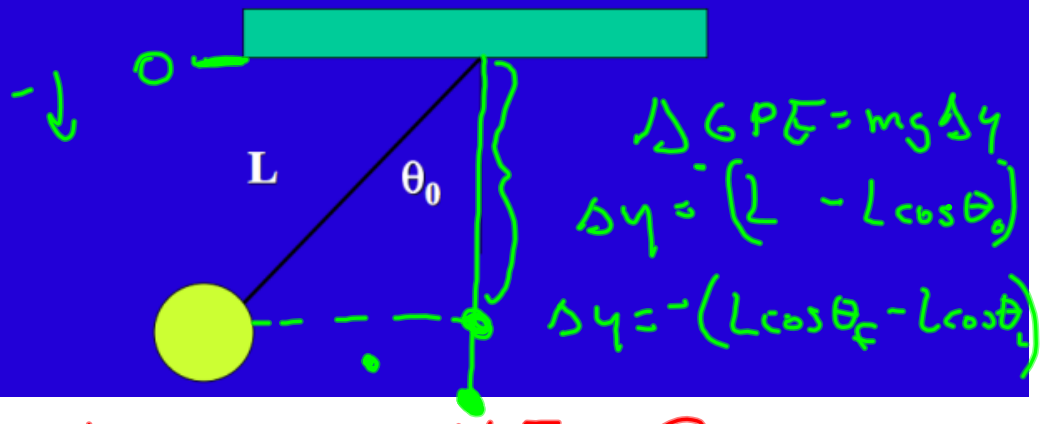
$\frac{1}{2} v_i^2 + g y_i = \frac{1}{2} v_f^2$

$v_i^2 + 2 g y_i = v_f^2$

$v_f = \sqrt{v_i^2 + 2 g y_i}$

Oct 3-6:54 AM

A pendulum of mass m and length 1 m is released from rest at an angle of 30°. What is the speed at the bottom of the arc ?
What is the speed when the angle is 15°?



$$\Delta PE + \Delta KE = 0$$

$$-\Delta PE = \Delta KE$$

$$= \frac{1}{2}mv_f^2 - \frac{1}{2}mv_i^2$$

$$-mg\left[-L - L\cos\theta_0\right] = \frac{1}{2}mv_f^2 - \frac{1}{2}mv_i^2$$

$$v_f = \sqrt{2g\left[L - L\cos\theta_0\right]}$$

$$= \sqrt{2gL(1-\cos\theta_0)} = 1.62\ \frac{m}{s}$$

$\theta_0 = 30°$ $L = 1m$

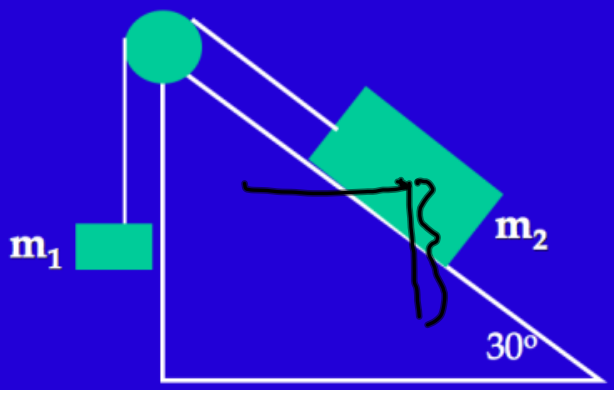
$$v_f = \sqrt{2gL(\cos\theta_f - \cos\theta_0)} = 1.40\ \frac{m}{s}$$

$\theta_f = 15°$

Oct 3-6:54 AM

If m_1=2.0kg and m_2=5.0kg, what is the speed of the masses after m_2 has traveled a distance x=1.25m along the frictionless plane?

Is m_1 moving up or down?



$$\Delta PE + \Delta KE = 0$$

$$\Delta PE_{m_1} = m_1 g (1.25\,m)$$

$$\Delta PE_{m_2} = -m_2 g (1.25\,m) \sin 30^\circ$$

$$m_1 g (1.25) - m_2 g (1.25) \sin 30^\circ = \frac{1}{2} m_1 v_{1f}^2 + \frac{1}{2} m_2 v_{2f}^2$$

$$-(m_1 g - m_2 g \sin 30)(1.25) = \frac{1}{2}(m_1 + m_2) v_f^2$$

$$\sqrt{-2\left[\frac{(m_1 g - m_2 g \sin 30)}{m_1 + m_2}\right](1.25)} = v_f = 1.32\,\frac{m}{s}$$

$$\sqrt{2 a \Delta y} = v_f$$