

First Exam: Chapters 1-4 (mainly 2-4)

Wednesday, October 4. 2-2:50 PM. SCI-115 (here).

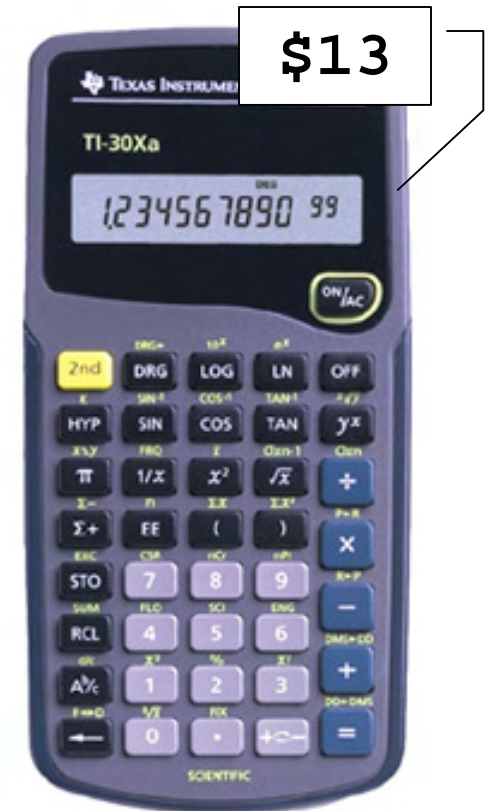
Practice Exam in lecture Monday

Recommendation: study for the practice exam as though it were the real exam.

Four problems:

1) 2 to 4 conceptual questions like the discussion quizzes and “Quick Quizzes” in the book

2-4) Multi-part problems like the homework problems and “Examples” in the book



Calculator allowed.

Recommendation:
Keep it simple!
Sin, Cos, Tan,
1/x, Square Root.

You will have these formulas

Your Name _____

PY132 Physics of Motion

First Exam (**Practice**)

Monday, October 2, 2006

This is a closed book exam, with no notes allowed. You may use (but not share) a calculator. Do not talk or otherwise communicate with the other students. If you have a question about the interpretation of a question on the exam, raise your hand and ask the proctor; he will come over to you. He will answer only if appropriate.

Show the mathematical steps that lead you to your answers. Without them, a “right” answer is unjustified. With them, a “wrong” answer may be worth partial credit.

Some equations and constants that you might need to be reminded of:

$$x(t) = x_0 + v_0 t + \frac{1}{2} a t^2$$

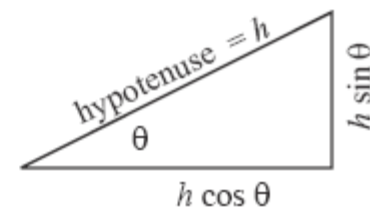
$$\sum \vec{F} = m \vec{a}$$

$$v(t) = v_0 + at$$

$$|f| = \mu |N|$$

$$g = 10 \text{ m/s}^2$$

$$\tan \theta = \frac{\textit{opposite}}{\textit{adjacent}} = \frac{\sin \theta}{\cos \theta}$$



How to Study for a PY132 Physics Exam



(yes)

checklist

Study Guide

Read Notes
Equations and Concepts
Suggestions, Skills & Strategies
Review Checklist

Textbook

Summaries
Tips

Do all Quick Quizzes

Check your homework - Where did you lose points? Even if you didn't lose points, do you understand it? Also check the discussion quizzes. See online solutions.



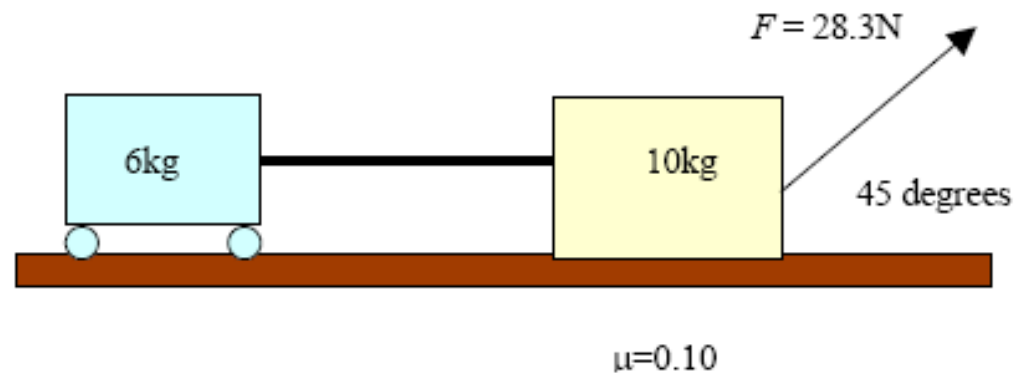
Work boxed problems in book/study guide as exam practice (formula sheet only).



A practice problem from last year's exam

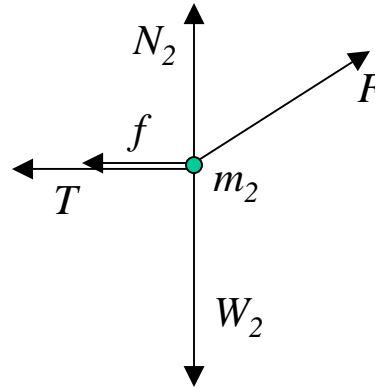
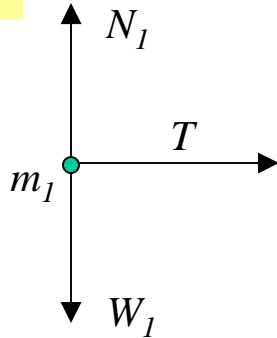
Problem 3. [25 points] Pulling two masses.

Two blocks, resting on a horizontal surface, are connected by a string. A force of 28.3N is applied upward at an angle of 45 degrees to the 10-kg block. The 10-kg block slides with a coefficient of friction of $\mu=0.10$. The second block has a mass of 6 kg and rolls on frictionless wheels.



- Draw proper free body diagrams for each mass (when the system is moving). Show all forces.
- Calculate the acceleration.
- Calculate the tension in the string (when the system is moving).

solution



From formula sheet:

$$\sum \vec{F} = m\vec{a}$$

$$|\vec{f}| = \mu |\vec{N}|$$

Newton's 2nd Law in component form:

$$m_1 a_x = T$$

$$m_1 a_y = N_1 - W_1 = N_1 - m_1 g = 0$$

$$m_2 a_x = F \cos \theta - T - f$$

$$m_2 a_y = N_2 + F \sin \theta - W_2 = N_2 + F \sin \theta - m_2 g = 0$$

$$F_x = F \cos \theta = \frac{28.3N}{\sqrt{2}} = 20N = F_y$$

Solve for N_2 and substitute in formula for $m_2 a_x$

$$m_2 a_x = F \cos \theta - T - \mu N_2 = F \cos \theta - T - \mu(m_2 g - F \sin \theta)$$

$$m_2 a_x = F \cos \theta - m_1 a_x - \mu m_2 g \quad \text{solve for } a_x$$

$$a_x = \frac{F \cos \theta - \mu(m_2 g - F \sin \theta)}{m_2 + m_1} = \frac{20N - 0.1(100N - 20N)}{16kg} = 0.75 \text{ m/s}^2$$

$$T = m_1 a_x = 6kg \cdot 0.75 \text{ m/s}^2 = 4.5N$$

The monkey and the hunter:

The monkey hangs from the tree and as soon as it sees the puff of smoke it lets go. Where should the hunter aim?

