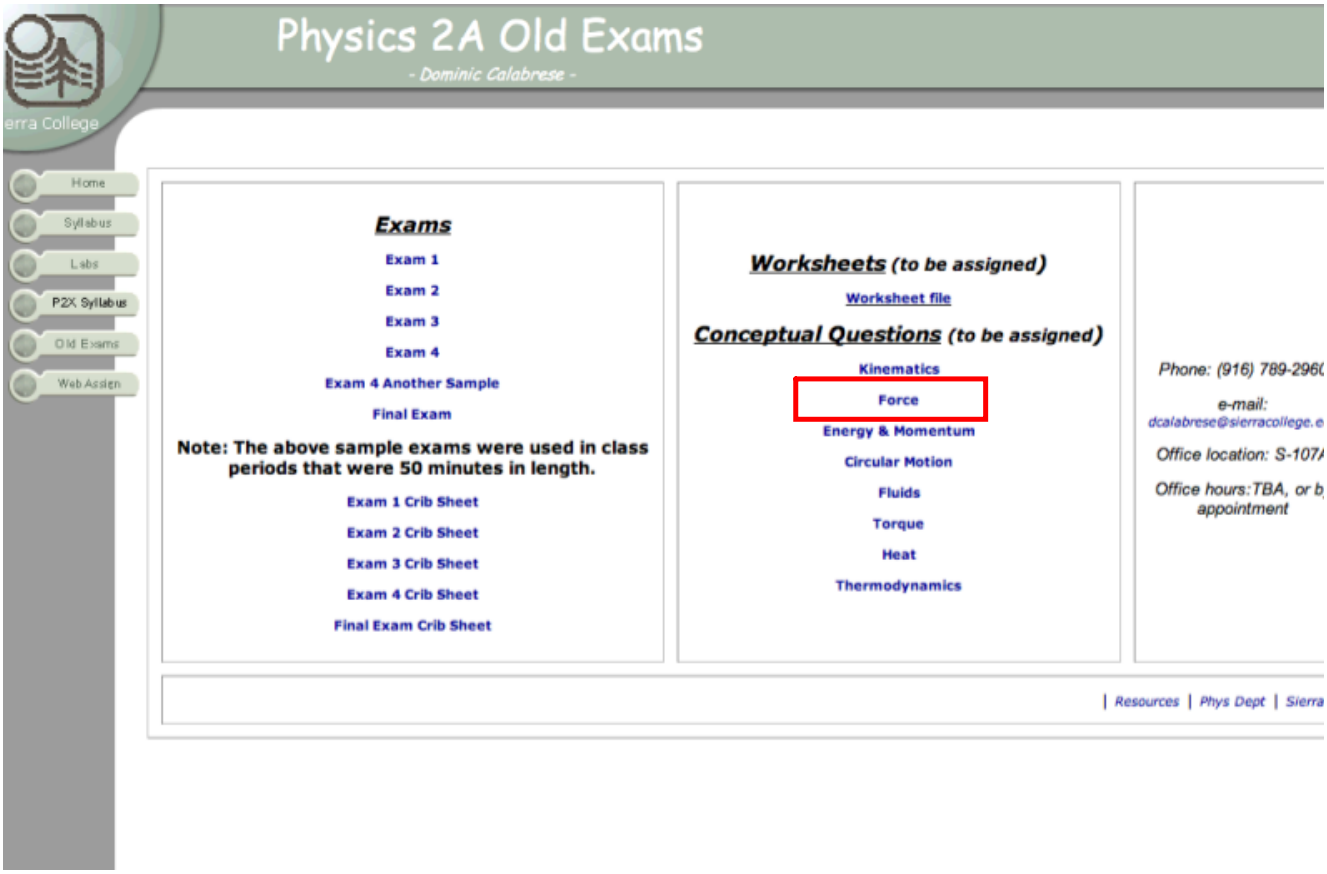
Reminders 9-26-07:
-Exam 1 Average 75%
-Next Homework Due 10/4!!!
-Newton's Laws Worksheet due Monday.
-Force Conceptual Questions Due Wed. 10/3.
-Conceptual Quiz Monday, Newton's Laws.
-Obtain software from desktop of computers in lab.

Objectives:
-Examples, Examples, Examples of Newton's Laws

$$v = \frac{d}{t}$$


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:
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Office location: S-107
Office hours:TBA, or b
appointment
| Resources | Phys Dept | Sierra

Name_____

Newton's Laws Worksheet

Three blocks that are connected by cables (that don't stretch) are pulled across a frictionless surface as shown below. Turn this problem in at the beginning of the next lecture.

a. Draw a free-body diagram treating the three objects as one large object.

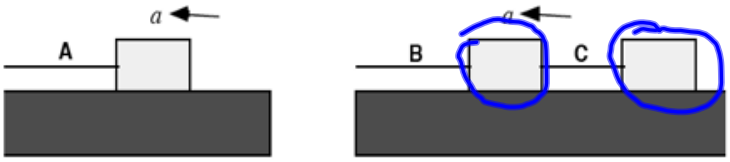
b. Sum the forces on this large object to obtain the acceleration of the system.

c. What would happen if the acceleration of each object were different?

d. Draw a free-body diagram for each object.

The figures below show boxes that are being pulled by ropes along frictionless surfaces, accelerating toward the left. All of the boxes are identical, and the acceleration is the same in each figure. As you can see, some of the boxes are pulled by ropes attached to the box in front of them.

Rank the ropes from greatest to least on the basis of the tension in the rope.

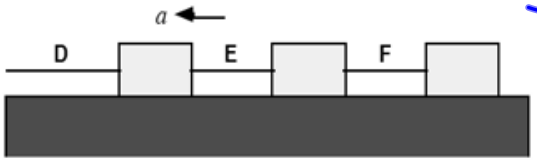


$T_C = ma$

$T_B - T_C = ma$

$T_B = ma + T_C$

$= 2ma$



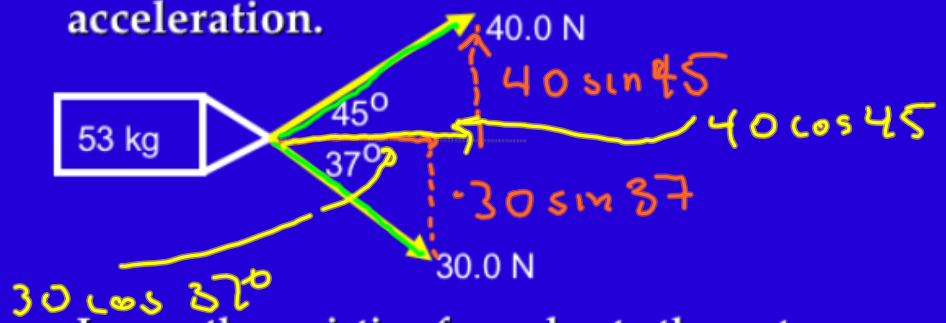
$F = ma$

a same in all cases

Bigger m means bigger F

D, E = B, A = F = C

- Calculate the sum of the forces acting on the boat in water. Also calculate its acceleration.



Ignore the resistive force due to the water.

Ans: 53.3 N 11.0° above horizontal; 1.0 m/s² 11.0°

$$\sum F_x = 40\cos 45 + 30\cos 37^\circ = 52.3\text{N}$$

$$\sum F_y = 40\sin 45 - 30\sin 37 = 5.3\text{N}$$

$$|\vec{F}_{net}| = \sqrt{(52.3)^2 + (5.3)^2} = 53.3\text{N}$$

$$\theta = \tan^{-1}\left(\frac{5.3\text{N}}{52.3\text{N}}\right) = 11.0^\circ \text{ above } +x\text{-axis}$$

$$F_y = ma_y \quad a_y = \frac{F_y}{m} \quad \theta = \tan\frac{F_y/m}{F_x/m}$$

$$F_x = ma_x \quad a_x = \frac{F_x}{m}$$

$$a_y = \frac{5.3\text{N}}{53\text{kg}} = \sqrt{\left(\frac{5.3}{53}\right)^2 + \left(\frac{52.3}{53}\right)^2} = 1.0\frac{\text{m}}{\text{s}^2}$$

$$a_x = \frac{52.3\text{N}}{53\text{kg}} =$$

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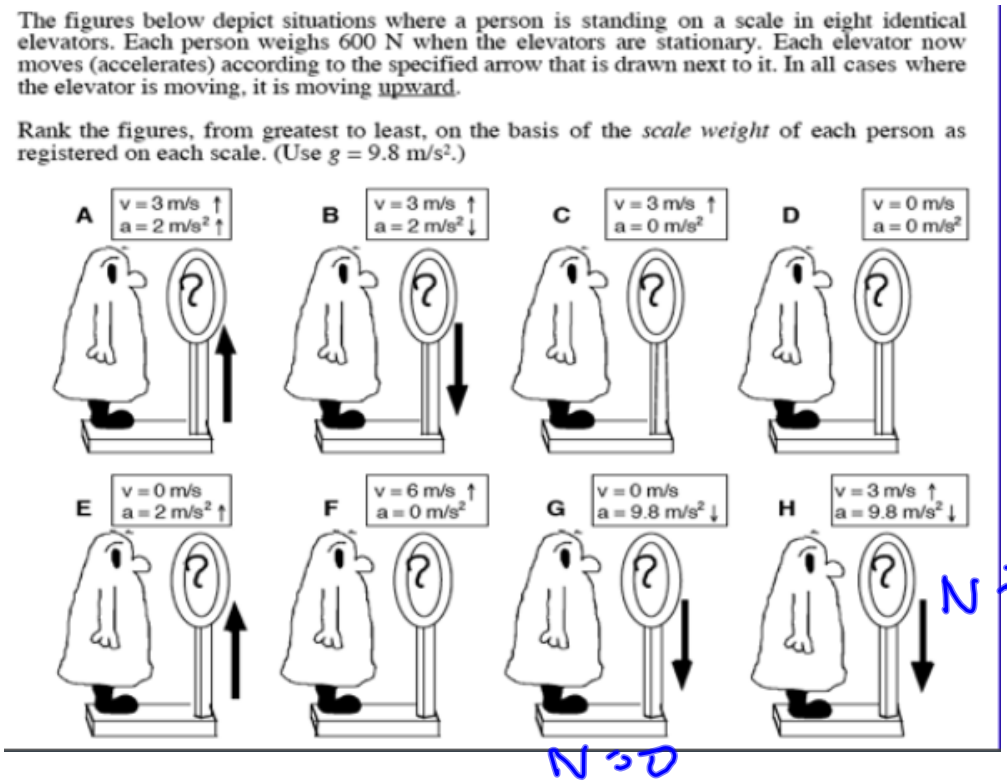
The figures below depict situations where a person is standing on a scale in eight identical elevators. Each person weighs 600 N when the elevators are stationary. Each elevator now moves (accelerates) according to the specified arrow that is drawn next to it. In all cases where the elevator is moving, it is moving upward.

Rank the figures, from greatest to least, on the basis of the *scale weight* of each person as registered on each scale. (Use $g = 9.8$ m/s².)

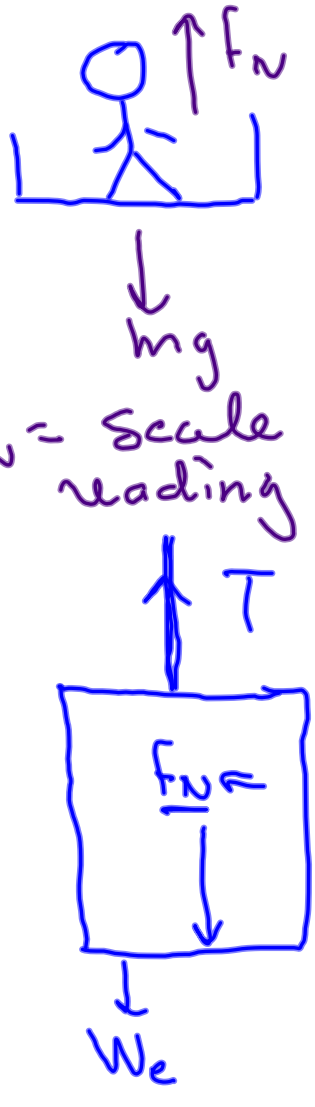


N = 0

N = 0

A = E, C = D = F, B, G = H

- A 100.0 kg person is standing on a spring scale (which reads weight in N) in an elevator. The elevator accelerates upward at 1.2m/s^2. What does he looks down at the scale what does it read? What is the acceleration is 1.2m/s^2 downward?



$\Sigma F_y = F_N - mg = ma$

$F_N = mg + ma$

$= m(g + a)$

$F_{N\,up} = 1100N$

$F_{N\,down} = 860N$

If $a > 0$ $F_N > mg$

If $a < 0$ $F_N < mg$

If $a = 0$ $F_N = mg$

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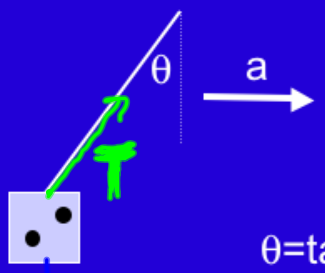
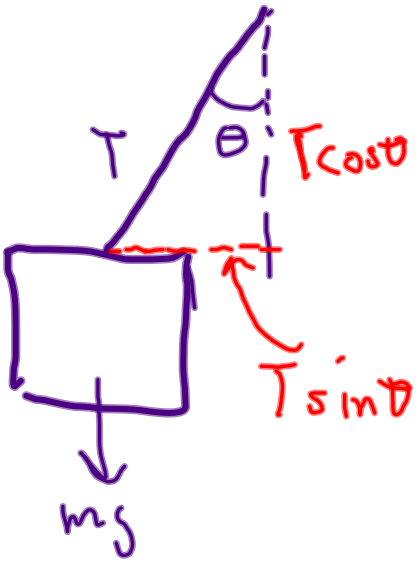
- A pair of fuzzy dice is hanging by a string in your rearview mirror. While you are accelerating from a stoplight from zero to 20.0 m/s (in 5.0 s) what angle does the string make with the vertical?



$\theta = \tan^{-1}(a/g)$

$a = \frac{20\ m/s}{5\ s}$

$= 4.0\ m/s^2$



mg

$\sum F_y = T\cos\theta - mg = 0$

$\sum F_x = T\sin\theta = ma$

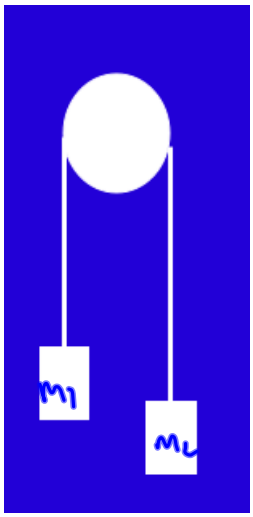
$T\cos\theta = mg$

$T\sin\theta = ma$

$\cot\theta = g/a$

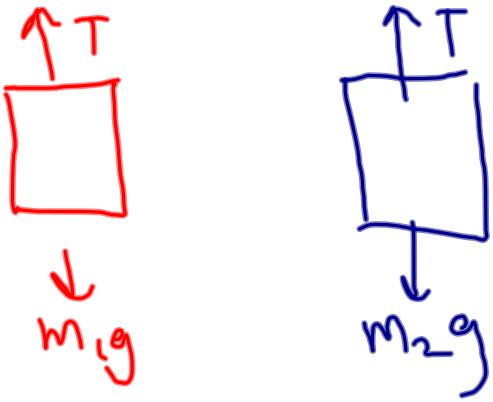
$\tan\theta = \frac{a}{g}$

$\theta = \tan^{-1}\frac{a}{g}$



1) Pulley is frictionless
2) String doesn't stretch
3) String massless
4) Pulley is light

$m_1 > m_2$



$$\Sigma F_{y m_1} = T - m_1 g = -m_1 a$$

$$\Sigma F_{y m_2} = T - m_2 g = m_2 a$$

$$-m_1 g + m_2 g = -m_1 a - m_2 a$$

$$(-m_1 + m_2) g = a(-m_1 - m_2)$$

$$(m_1 - m_2) g = a(m_1 + m_2)$$

$$a = \frac{(m_1 - m_2) g}{m_1 + m_2}$$

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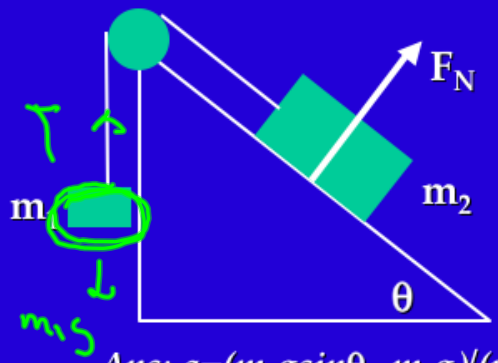
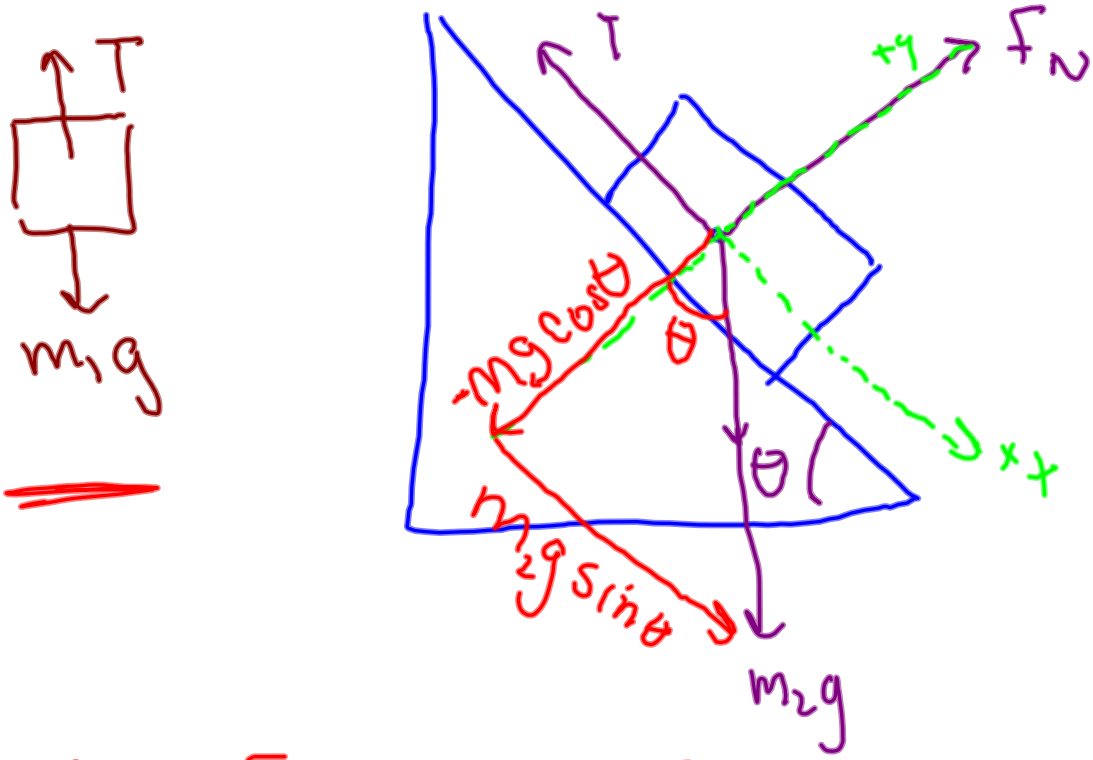
- What is the acceleration of this frictionless system?



Ans: $a=(m_2g\sin\theta - m_1g)/(m_1+m_2)$



$$\Sigma f_{y_{m_2}} = f_N - mg\cos\theta = 0$$

$$\Sigma f_{x_{m_2}} = m_2g\sin\theta - T = m_2a$$

$$\Sigma f_{y_{m_1}} = T - m_1g = m_1a$$

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$$\Sigma F_{x_{m_2}} = m_2 g \sin\theta - T = m_2 a$$

$$\Sigma F_{y_{m_1}} = T - m_1 g = m_1 a$$

$$-T + m_2 g \sin\theta = m_2 a$$

$$T - m_1 g = m_1 a$$

$$m_2 g \sin\theta - m_1 g = (m_1 + m_2) a$$

$$a = \frac{g(m_2 \sin\theta - m_1)}{m_1 + m_2}$$

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