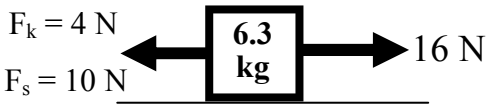
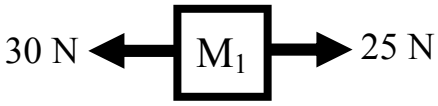
Forces Review

1. A gun shoots a bullet. Which is greater: the force of the gun on the bullet; the force of the bullet on the gun?



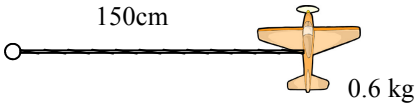
2. Use the mass at the left to answer the following.
   A. Draw a force diagram below the object.
   B. How much force is necessary to start the object moving?
   C. How much force is necessary to keep it moving?
   D. What is the normal force on the object?
   E. If the object starts at rest, does it start to slide?
   F. If it was already moving, calculate its acceleration.



3. Which of the two above objects applies: M_1, M_2, both, or neither?

   A. ____ Could be at rest.
   B. ____ Could be accelerating.
   C. ____ Could be moving to the left.
   D. ____ Has a net force.
   E. ____ Is at constant speed.
   F. ____ Could be moving.
   G. ____ Could be accelerating to the right.
   H. ____ Could be moving up.
   I. ____ Could have a velocity = 0m/s.
   J. ____ Has no net force.

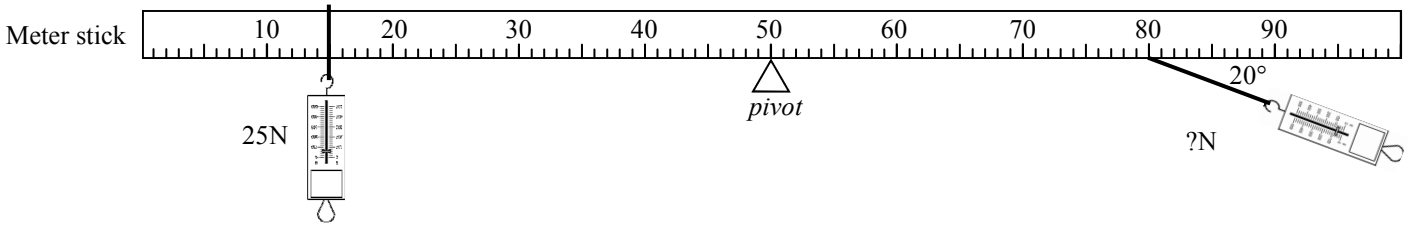
4. A toy plane is attached to a rope, as shown at the left.



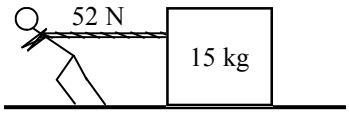
   A. Convert all number to standard units.
   B. Draw the path of the plane.
   C. Label the direction of the acceleration and velocity.
   D. What do we call this kind of acceleration.
   E. If the rope is breaks, which way does the plane go?
   F. If the plane is moving 2m/s, calculate the plane's acceleration.

   G. Calculate the force of tension holding onto the plane.

5. A 120 kg object is on Pluto, which is still quite depressed by its recent astronomical demotion.
   A. What is the mass of the object on the earth?
   B. What is the weight of the object in space?
   C. What is the weight of the object on the earth?
   D. Given Pluto's information ($m=1.31\times10^{22}$kg; $r = 1.161\times10^{6}$), calculate the weight of the object on Pluto.

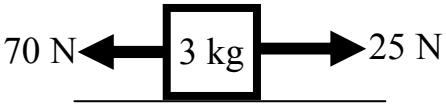


6. A. Calculate the torque provide by the 25N force.
   B. To increase its torque, what would you do?
   C. Which scale gives the greater torque?
   D. Calculate the force on the right of the pivot. (*for regular physics pretend it is pulling straight down).*



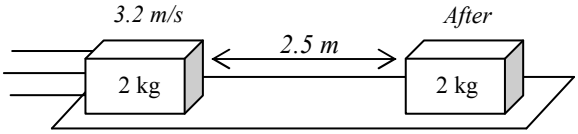
7. Slim Jim pulls with 52 N on a 15 kg box across the floor at constant speed. There is friction between the box and the floor.
   A. Since it is at constant speed, what is its acceleration?
   B. Draw all of the forces on the box.
   C. In the x-direction only, use $\Sigma F = ma$ to find the force of friction on the box.

   D. Challenge: Find the coefficient of friction of the floor.



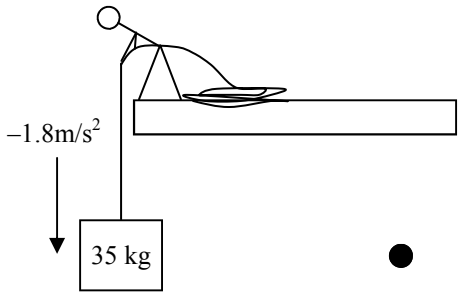
8. Find the acceleration of the object.

9. A box moving 3.2m/s stops in 2.5m.
   A. Use a kinematic equation to find the acceleration of the object.

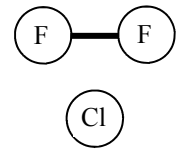


   B. Find the force of friction that stopped the object.

10. A 6kg mass has an acceleration of $8.2 m/s^2$. What net force caused this?

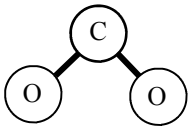


11. Slim Jim is lowering a 35kg mass with an acceleration of $-1.8\ m/s^2$.
    A. On the dot, draw a force body diagram.
    B. Find the tension in the rope.

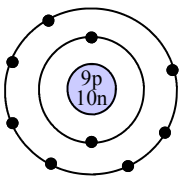


TAKS PREP

12. In the diagrams at the left how many Atoms? Molecules? Compounds? Elements?



13. A. What element is shown?
    B. Is it a neutral atom?

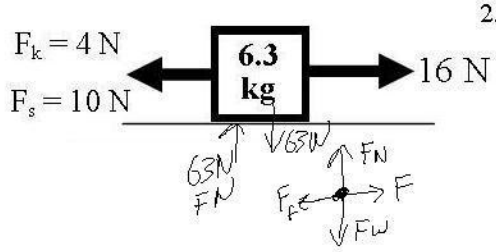


14. Protons, Neutrons, or Electrons?
    A. ____ Are positive
    B. ____ Are in the nucleus
    C. ____ Are neutral
    D. ____ Are in the orbits
    E. ____ Attract electrons
    F. ____ Are negative
    G. ____ Tell you the element
    H. ____ Tell you the isotope
    I. ____ Cause bonding

15. Element, Isotope, Ion?
    A. Changes when you change the number of neutrons.
    B. Changes when you change the number of protons.
    C. Changes when an atom gains or loses electrons.

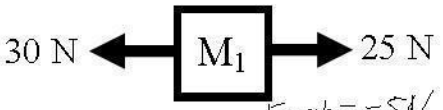
2009 Forces Review

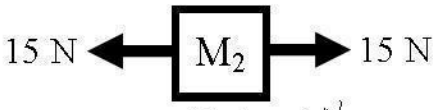
1. A gun shoots a bullet. Which is greater: the force of the gun on the bullet; the force of the bullet on the gun?
they are the same.



2. Use the mass at the left to answer the following.
   A. Draw a force diagram below the object.
   B. How much force is necessary to start the object moving? 10N
   C. How much force is necessary to keep it moving? 4 N
   D. What is the normal force on the object? 63 N
   E. If the object starts at rest, does it start to slide? yes 16>10
   F. If it was already moving, calculate its acceleration.

$\Sigma F = ma$ $\quad 16 - 4 = 6.3a$ $\quad 12 = 6.3a$ $\quad a = 12/6.3 = 1.9\ m/s^2$





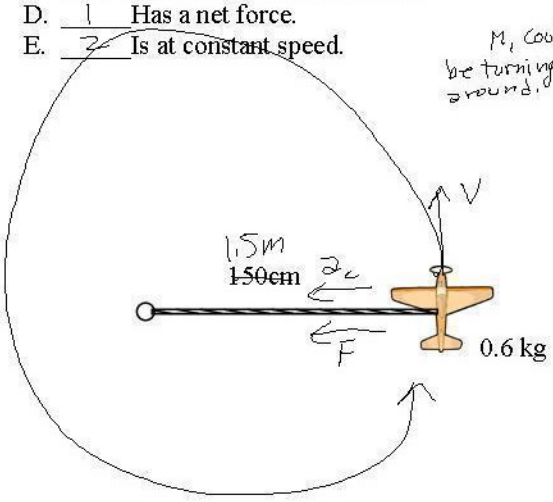
3. Which of the two above objects applies: M_1, M_2, both, or neither?

A. 2 Could be at rest.
B. 1 Could be accelerating.
C. both Could be moving to the left.
D. 1 Has a net force.
E. 2 Is at constant speed.
F. both Could be moving.
G. none Could be accelerating to the right.
H. both Could be moving up.
I. both Could have a velocity = 0m/s.
J. 2 Has no net force.

M_1 would turn to left

M_1 could be turning around.

M_2 could be at const. speed

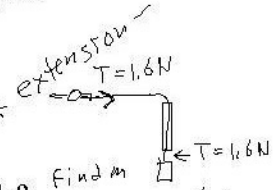


4. A toy plane is attached to a rope, as shown at the left.
   A. Convert all number to standard units.
   B. Draw the path of the plane.
   C. Label the direction of the acceleration and velocity.
   D. What do we call this kind of acceleration. centripetal
   E. If the rope is breaks, which way does the plane go? straight
   F. If the plane is moving 2m/s, calculate the plane's acceleration.

$a_c = \frac{(v_t)^2}{r} = \frac{2^2}{1.5} = 2.66\ m/s^2$

   G. Calculate the force of tension holding onto the plane.

$F = ma = .6(2.66) = 1.6\ N$



Find m

$T - F_w = m(0)$

$T = F_w = mg$

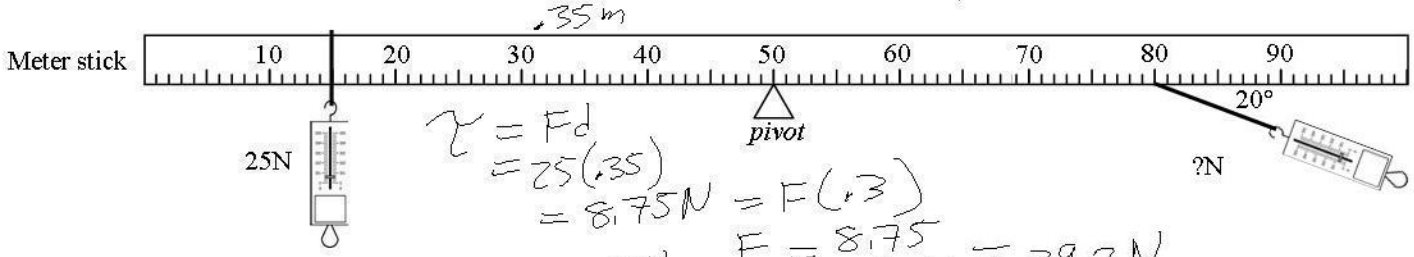
$m = \frac{1.6}{10} = .16kg$

5. A 120 kg object is on Pluto, which is still quite depressed by its recent astronomical demotion.
   A. What is the mass of the object on the earth? 120 kg
   B. What is the weight of the object in space? 0N
   C. What is the weight of the object on the earth? 1200N
   D. Given Pluto's information ($m = 1.31\times10^{22}$ kg, $r = 1.161\times10^{6}$), calculate the weight of the object on Pluto.

$F_g = G\frac{m_1 m_2}{r^2} =$

$= 6.673E\text{-}11 * 120 * 1.31E22 / 1.161E6^2$

$= 77.8\ N$



$\tau = Fd$

$= 25(.35)$

$= 8.75N = F(.3)$

$F = \frac{8.75}{.3} = 29.2\ N$

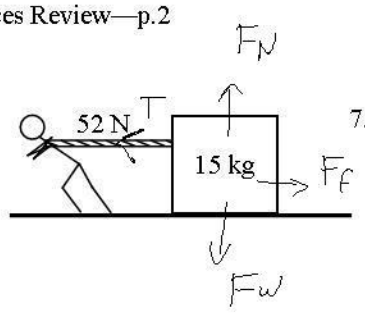
6. A. Calculate the torque provide by the 25N force. 8.75N
   B. To increase its torque, what would you do? more F, more D
   C. Which scale gives the greater torque? same
   D. Calculate the force on the right of the pivot. (for regular physics pretend it is pulling straight down).

Honors only: $\tau_L = \tau_R$

$25(.35) = F(.3)\sin 20^\circ$

$F = 85.3\ N$

Looking at the angle you see that most of the right force pulls parallel and provides no torque at all. This is why F has to be so big.



7. Slim Jim pulls with 52 N on a 15 kg box across the floor at constant speed. There is friction between the box and the floor.
   A. Since it is at constant speed, what is its acceleration? $0\ m/s^2$
   B. Draw all of the forces on the box.
   C. In the x-direction only, use $\Sigma F = ma$ to find the force of friction on the box.

$F_f - T = 15a$ $\quad F_f = 52N$
$F_f - 52 = 15(0)$

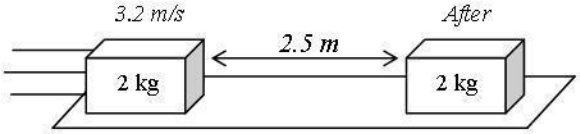
Any time an object has no acceleration, the forces must be balanced. If only 2 forces, they are equal.

   D. Challenge: Find the coefficient of friction of the floor.

$F_f = \mu F_N$ $\quad F_f = 52N$ $\quad F_N = 150N$
$52 = \mu(150)$
$\mu = \frac{52}{150} = .35$

$\Sigma F = ma$
$-70 + 25 = 3a$
$-45 = 3a$
$a = -15\ m/s^2$

8. Find the acceleration of the object. above
9. A box moving 3.2m/s stops in 2.5m.
   A. Use a kinematic equation to find the acceleration of the object.

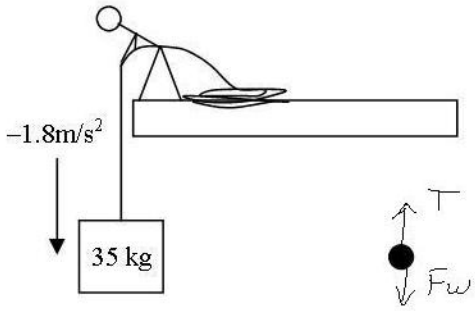


$V_i = 3.2\ m/s$ $\quad \Delta x = 2.5m$
$V_f = 0\ m/s$ $\quad t$ is not used
$a =$ ____

$V_f^2 = V_i^2 + 2a\Delta x$
$0 = 3.2^2 + 2a(2.5)$
$0 = 10.24 + 5a$
$-10.24 = 5a$
$\frac{-10.24}{5} = a$
$a = -2.05\ m/s^2$

   B. Find the force of friction that stopped the object.

$\Sigma F = ma$
$-F_f = 2(-2.05)$
$F_f = 4.10N$

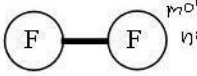


$6(8.2) = 49.2N$

10. A 6kg mass has an acceleration of $8.2m/s^2$. What net force caused this?
11. Slim Jim is lowering a 35kg mass with an acceleration of $-1.8\ m/s^2$.
    A. On the dot, draw a force body diagram.
    B. Find the tension in the rope.

$T - F_W = 35(-1.8)$
$T - 350 = -63$
$T = 350 - 63 = 287N$

If the object was just hanging (at rest), then T = Fw = 350 N. If Jim accel it up (a is +), then T > Fw. If at constan velocity, then a=0 and T =Fw. Since it is accelerating down (-a), T<Fw. If it is in freefall, then a = -9.8 and T = 0.



molecule not a compound

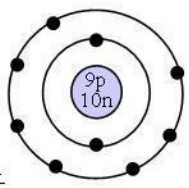
TAKS PREP

12. In the diagrams at the left how many Atoms? Molecules? Compounds? Elements?

not a molecule just an atom — Cl

both a compound + a molecule — C, O, O

3 $\quad$ 1 $\quad$ 4 (F, Cl, C, O)



13. A. What element is shown? Fluorine
    B. Is it a neutral atom? yes #of p = #of e

14. Protons, Neutrons, or Electrons?
    A. P Are positive
    B. P, N Are in the nucleus
    C. N Are neutral
    D. E Are in the orbits
    E. P Attract electrons
    F. E Are negative
    G. P Tell you the element
    H. N Tell you the isotope
    I. E Cause bonding

15. Element, Isotope, Ion?
    A. Changes when you change the number of neutrons. Isotope
    B. Changes when you change the number of protons. element
    C. Changes when an atom gains or loses electrons. Ion