

6 N

25 N

3 kg

 $\mu_s = 0.22$  $\mu_k = 0.16$ 

## 2009 Forces 6

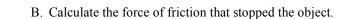
1. Slim Jim makes a giant slingshot that can provide 60N of force. He launches three objects: 1 kg; 2 kg; 4 kg.

4 kg

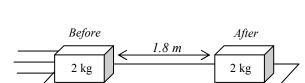
- A. Calculate the acceleration for each mass. 1 kg 2 kg
  - B. Which mass has the smallest acceleration?
  - C. Which mass has the largest acceleration?
- 2. Slim Jim is also a cave explorer (known as a spelunker). A mining company asks our famous spelunker to explore part of their gold mine. Slim Jim is a slim 60 kg and the bucket is a hefty 980 kg.
  - A. On the dot at the left, draw all of the forces acting on the bucket.
  - B. What is the total mass of Jim and the bucket?
  - C. What is the total weight of Jim and the bucket?
  - D. Calculate the tension in the rope when he begins to accelerate downward at  $-1.5 \text{ m/s}^2$ .

From the "Surface Friction" notes:

- 3. A. What is the weight of the 3 kg mass?
  - B. What is the normal force pushing up on the mass?
  - C. Calculate the forces of static and kinetic friction acting on the mass.
  - D. If the object starts at rest, is the 25N force enough to start it moving?
  - E. If it is moving, calculate the acceleration of the object.
- 4. A 2 kg box slides to a stop in 0.65 seconds.
  - A. Use a kinematic equation to calculate the acceleration of the object.

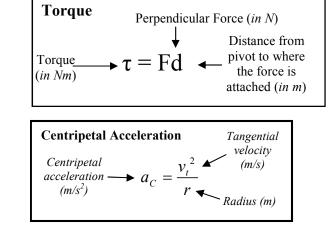


- C. Since it was sliding, was this kinetic or static friction?
- D. What is the normal force acting on the object?
- E. Calculate the coefficient of friction of the surface.



## Forces 6—p2

- (Using "Gravity Notes" and the table on the last homework.) A 14 kg object is moved from the Earth to Mars.
  A. What is its weight on the Earth?
  - B. What is the mass of the object on Mars?
  - C. If the mass of Mars is  $6.4 \times 10^{23}$  kg and the radius of Mars is  $3.39 \times 10^{6}$  m calculate the force of gravity of the 14 kg object on Mars.
  - D. If the object's mass were doubled, how would the force of gravity change?
  - E. If the distance to the center of Mars was doubled, how would Fg change?
- 6. A 280kg go-cart is moving 12 m/s as it moves around a circular track that has a radius of 35m.
  - A. Which way does the centripetal acceleration point?
  - B. What force provides the centripetal force that keeps the cart moving in the circle?
  - C. Calculate the centripetal acceleration of the cart.
  - D. Calculate the force keeping the cart in the circle.



10 20 30 40 50 60 70 80 90 15 N 25 N

pivot

- 7. A 15 N force is hanging at 15 cm on a meter stick.A. How far is the mass from the pivot point (in meters)?
  - B. Calculate the torque caused by the 15N force.
  - C. Where would you need to put a 25N force to make the meter stick balanced?
- 8. How many protons does carbon have?
- 9. How many protons does chlorine have?
- 10. What is the atomic number of Silicon?
- 11. If I take away 1 proton from Oxygen, what element do I create?
- 12. If I add 1 neutron to carbon, what element do I have?
- 13. If two atoms have the same number of protons, but different number of neutrons, what do we call them?
- 14. If you add electrons to a neutral atom, it becomes a negative \_\_\_\_\_.
- 15. Is this atom neutral, positive, or negative?

6	7	8	F
C	N	O	
12.011	14.007	15.999	18.998
Carbon	Nitrogen	Oxygen	Fluorine
14	15	16	<u>18</u>
Si	P	S	Cl
28.086	30.974	32.066	35.453
Silicon	Phosphorus	Sulfur	Chlorine

