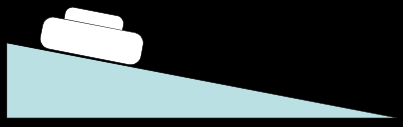
Questions of the Day

Non-Zero Total Force (NZTF)
Newton's 2nd Law

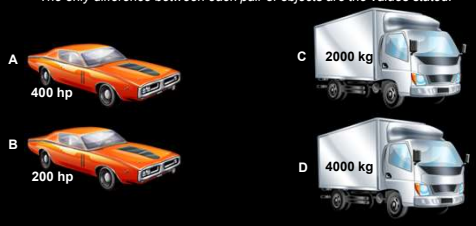
Question of the Day



- Draw a force diagram for the frictionless hover-puck.
- Describe its motion.
- *Answer: F_g and $F_{p\text{-}air,\ puck}$ only, forces are unbalanced, therefore puck will accelerate.*

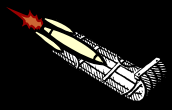
Question of the Day

The only difference between each pair of objects are the values stated.



- Greater acceleration: a or b? …c or d?
- *Answer: a > b, c > d*

Question of the Day



- A rocket powered sled experiences a total force of 100N and has a mass of 20 kg.
  - What will be the rocket sled's acceleration?
  - How fast will it be moving in 3.0 s (v_i = 0)?
- *Answer: $a = \Sigma F/m = 100\ N / 20\ kg = 5\ m/s^2$, $v = at+v_i = (5\ m/s^2)(3.0\ s)+0m/s = 15\ m/s$*

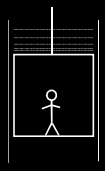
Question of the Day

- You trade in your rocket powered sled for a rocket powered elevator. The rockets give the elevator an upward acceleration of 9.8 m/s^2.
  - Draw a force diagram for a 50 kg person in the elevator, label each force with number values.
- *Answer: downward F_g of 490 N & upward F_N of 980 N for a total upward Force of 490 N.*

Question of the Day

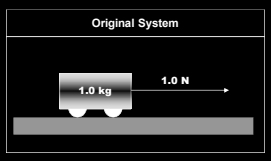
- At the bottom of a 60 kg bungee jumper's fall, their velocity goes from -30 m/s to 0 m/s in 2.0 seconds. What tension in the bungee cord causes this to happen? (Assume constant force.)
- *Answer: $a = \Delta v / \Delta t = (0 - -30\ m/s)/2.0\ s = +15\ m/s^2 \rightarrow \Sigma F = m{\cdot}a = (60\ kg){\cdot}(+15\ m/s^2) = +900\ N$*
- *$\Sigma F = +900\ N$, $Fg = -588\ N$, $F_T = +1488\ N$*

Question of the Day



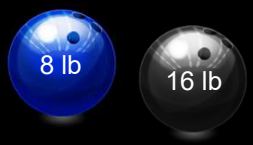
- If the elevator is moving down and slowing to a stop, then the total force on the person is directed:
  a.) up
  b.) down
  c.) zero total force (therefore no direction)
  d.) cannot be determined
- *Answer: "a", up. Since v = - , a = + to slow to a stop.*

Question of the Day



- What would happen to the acceleration if…
  - the pulling force was changed to 4.0 N?
  - the mass was changed to 4.0 kg?
  - the previous two changes were done at the same time?
- *Answer: 4 x the acceleration, ¼ x the acceleration, the two changes would counteract each other → no change*

Question of the Day



- An 8 lb bowling ball and a 16 lb bowling ball have the same acceleration. How must the total force on the two compare?
- *Answer: Since 16 lb ball has 2x the mass, it will require 2x the total force to have the same acceleration.*

Question of the Day

- A 16 g whiteboard marker is launched down a length of PVC tubing. The end of the marker has an area of 2.84 E -4 m^2. A lung-induced pressure of 2.5 psi (17,237 N/m^2) is applied.
  - What total force does the marker receive?
  - What is the resulting acceleration?
  - If the tube is 1.2 m long, how fast will it go?
- *Answer: ΣF = 4.9 N, a = 306 m/s^2 = 31g's*
  - *down 4 ft (1.2 m) tube, v_f = 27 m/s = 60 mi/h*

Question of the Day

- A 500 kg racecar goes from 0 to 30 m/s in 3.5 seconds. What total force must be acting upon the racecar?
- *Answer: ΣF = (500 kg)(8.57 m/s^2) = 4285.7 N*