

BTU1113 PHYSICS : REVISION 1

Newton's 2nd Law of Motion

1. On a planet far, far away, an astronaut picks up a rock. The rock has a mass of 5.00 kg, and on this particular planet its weight is 40.0 N. If the astronaut exerts an upward force of 46.2 N on the rock, what is its acceleration?
2. In a grocery store, you push a 10.3 kg shopping cart with a force of 12.1 N. If the cart starts at rest, how far does it move in 2.50 s?

Gravitational Force and Weight

3. A newborn baby's brain grows rapidly. In fact, it has been found to increase in mass by about 1.6 mg per minute.
 - a) How much does the brain's weight increase in one day?
 - b) How long does it take for the brain's weight to increase by 0.15 N?
4. At the bow of a ship on a stormy sea, a crewman conducts an experiment by standing on a bathroom scale. In calm waters, the scale reads 182 N. During the storm, the crewman finds a maximum reading of 225 N and a minimum reading of 138 N.
 - a) Find the maximum upward acceleration and
 - b) Find the maximum downward acceleration experienced by the crewman

Newton's 3rd Law

5. A 71-kg parent and a 19-kg child meet at the center of an ice rink. They place their hands together and push.
 - a) Is the force experienced by the child more than, less than or the same as the force experienced by the parent?
 - b) Is the acceleration of the child more than, less than or the same as the acceleration of the parent?
 - c) If the acceleration of the child is $2.6 \frac{m}{s^2}$ in magnitude, what is the magnitude of the parent's acceleration?
6. A force of magnitude 7.50 N pushes three boxes with masses $m_1 = 1.30 \text{ kg}$, $m_2 = 3.20 \text{ kg}$, and $m_3 = 4.90 \text{ kg}$, as shown in figure 1 below. Find the magnitude of the contact force
 - a) Between boxes 1 and 2
 - b) Between boxes 2 and 3

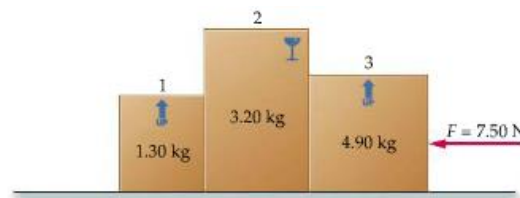


Figure 1 Problem 6

Friction

7. A baseball player slides into third base with an initial speed of 4.0 m/s. If the coefficient of kinetic friction between the player and the ground is 0.46, how far does the player slide before coming to rest?

- Hopping into your Porsche, you floor it and accelerate at $12 \frac{m}{s^2}$ without spinning the tires. Determine the minimum coefficient of static friction between the tires and the road needed to make this possible.