

Name _____

UNIT 2 PROBLEM SET

1. A 70 kg object is accelerated by a force of 20 N. Calculate the acceleration.
2. A 500 kg boat starts from rest and accelerates over a distance of 270 m in 12 seconds. Assuming uniform acceleration, calculate the force applied by the engine on the boat.
3. An 800 kg dragster is uniformly accelerated from rest by a force of 12,000 N.
 - a. Calculate the dragster's velocity after 3 seconds.
 - b. How far does the dragster travel during this time?
4. A 65 kg high diver dives down from a 10 m high board.
 - a. Calculate the diver's velocity when he enters the water.
 - b. If the diver comes to a stop 2 m below the water surface, calculate the net force exerted by the water on the diver to bring him to a stop.
5.
 - a. Determine your own weight in Newtons.
 - b. A large crate has a mass of 30 kg. Determine its weight in Newtons.
6. An astronaut who weighs 700 N on Earth takes a trip to planet Thrae where the gravitational acceleration is 3.7 m/s^2 . Calculate the astronaut's weight on planet Thrae.

7. The space shuttle has a total mass of 2.0×10^6 kg. At liftoff, the engines exert a total thrust of 35×10^6 N.

a. Calculate the shuttle's weight.

b. Calculate the shuttle's acceleration at liftoff.

c. If the acceleration averages 13 m/s^2 over the first 10 minutes, what velocity does it attain?

8. The maximum force a grocery sack can withstand and not rip is 250 N. If 20 kg of groceries are lifted from the floor to a table with an acceleration of 5 m/s^2 , will the sack hold or break?

9. A student conducts a physics experiment by standing on a bathroom scale in an elevator. The scale reads 836 N when at rest.

a. As the elevator starts to go up, the scale reading increases to 936 N before returning to 836 N. Calculate the acceleration as the elevator speeds up.

b. Later, as the elevator approaches the floor above and slows down, the scale reading drops to 736 N before returning to 836 N when the elevator stops. Calculate the acceleration as the elevator slows down.

10. A force of 30 N is needed to slide a 12 kg crate across the floor at constant velocity. Calculate the coefficient of kinetic friction between the crate and floor.