

PHY I - Newton's Second Law  
Problem Set

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$$F = ma$$

$$a = (v_1 - v_0) / t$$

$$a_g = 9.8 \text{ m/s}^2$$

$$d = \frac{1}{2} at^2 \quad [ \text{assuming } v_0 \text{ and } d_0 = 0 ]$$

$$v_1^2 = v_0^2 + 2a(d_1 - d_0)$$

$$1 \text{ kg} = 2.2 \text{ lbs.}$$

Solve for F

1. What is the net force applied to a 1.5 kg mass if it accelerates at 15 m/s<sup>2</sup>?

2. What is the net force a 50 kg barbell exerts on the floor? What is the barbell's weight in pounds?

Solve for m

3. An athlete exerts a force of 150N on a shot put giving it an acceleration of 20 m/s<sup>2</sup>. What is the mass of the put?

4. An automobile weighs in a 9800 N. What is its mass?

Solve for a

5. A net force of 25 N is applied to a 10 kg mass. What is the acceleration of the mass?

6. A 16 N force is applied to a 2 kg mass. At what rate will it accelerate?

Multiple step - involving  $F_{net}$

7. Suppose a surface resists a desk's motion with a force of 5.0 N. What is the acceleration of the 10 kg table if given a 25N push?

8. A car located on a level highway has a mass of 550 kg. The friction force opposing the motion of the car is 750 N. What acceleration will a force of 2250 N provided by the engine produce?

Multipstep - involving kinematic equations

9. A race car has a mass of 700 kg. It starts from rest and travels 120 m in 2.0 s. Assuming constant acceleration, what is the force of thrust provide by the engine?

10 A car weighing 9800 N travels at 30 m/s – what force must by applied by the brakes to bring the car to rest in 100 m?

11. A car with a mass of 1000 kg is moving at 18.0 m/s. The brakes are applied and the car travels 50.0 m while coming to a stop.

- a. What is the acceleration of the car while stopping?
- b. What is the force applied by the brakes?

12. If the speed of the car were half (9 m/s– would the breaking distance be halved?