Formulas: Net $F = ma$

$a = \frac{\text{change of velocity}}{\text{time}}$

$v = v_0 + at$

$x = v_0 t + \frac{1}{2}at^2$

$v^2 = v_0^2 + 2ax$

Name:

Worksheet : Word Problems involving Force, Mass, Acceleration and Motion

In these problems, assume that all motion is in a straight line. Positive numbers indicate forward motion, negative numbers indicate backward motion. Round any decimals to the nearest tenth.

1) An object with a mass of 15 kg is observed to be accelerating at 3 m/s^2. What must be the net force on the object?

2) An object with a mass of 40 kg is acted upon by a net force of 200 N. What will be acceleration of the object?

3) An object is observed to accelerate at 14 m/s^2 while under the influence of a 370 N net force. What must be the object's mass?

4) An object with a mass 25 kg is acted upon by a net force of 150 N for a time period of 4 seconds. If the initial velocity of the object is 13 m/s, what must be the final velocity?

5) For the object in problem #4, what distance will it travel in that time?

6) An object with a mass of 9 kg is observed to have an initial velocity of 3 m/s. Twelve seconds later, its velocity is 24 m/s. What must be the force acting on the object during that time?

7) For the object in problem #6, if its initial position is 15 m from an arbitrarily chosen reference point, what will be its final position?

8) An object is acted upon by a 95 N net force. It is initially at rest and is observed to travel a distance of 400 m in 6 seconds. What must be the mass of the object?

9) For the object in problem #8, what will be the final velocity of the object?

10) A parachutist is falling under the influence of the Earth's gravity. His mass is 100 kg.

   a) Neglecting air resistance, what will be his acceleration?

   b) What, therefore, is the net force acting on the parachutist? (still neglecting air resistance)

   c) Now he opens the parachute, which provides an additional force in the direction opposite gravity of 400 N. What is the net force acting now upon the parachutist?

   d) With his parachute open, what will the parachutist's acceleration be?

   e) [This is a harder question, but you can do it.] Assume that he had reached a velocity of 20 m/s before he opened the parachute, what will his velocity be after he has fallen another 400 m?

11) For a parachutist with a mass of 150 kg, will you expect his acceleration for part (d) above to be more, less or the same? Repeat #10 using a mass of 150 kg and find out.