

Name: \_\_\_\_\_

Class Period: \_\_\_\_\_

## Physics: Newton's Laws of Motion Starting Forces – Homework

### Conceptual Question:

1. For a single force, Newton's second law states  $F = ma$ . If we increase the force exerted on an object – what changes (mass or acceleration) and how does it change?

### Calculations with One Force

2. A 6.00 kg object undergoes an acceleration of  $2.00 \text{ m/s}^2$ .
  - A. What is the force exerted on this object?
  - B. If the same force from part A was applied to a 4.00 kg object, what acceleration would this new object have?
3. A car with a mass of  $1.50 \times 10^3 \text{ kg}$  is initially traveling at  $30.5 \text{ m/s}$  and is brought to a stop in a distance of 55.0 m.
  - A. What is the acceleration of the car?
  - B. What is the net amount of force needed to bring this car to a stop?

### Calculations with Multiple Forces

4. A student pushes on a 15.0 kg box with a force  $F_1 = 20.0 \text{ N}$  to the right. Unfortunately, the terrible wind from outside is pushing directly against the box with a force  $F_2 = 12.0 \text{ N}$ .
  - A. Draw a picture of the scenario described above.
  - B. Write a statement for the  $\Sigma F_x$
  - C. Calculate the  $\Sigma F_x$
  - D. What is the acceleration of the box?

5. Four forces act on a hot air balloon as shown from the side.
  - A. If the  $\Sigma F_x = 430 \text{ N}$  to the right, what must be the value of  $F_1$ ?
  - B. If the  $\Sigma F_y = 1070 \text{ N}$  upward, what must be the value of  $F_2$ ?

