## Force Problems I

- 1. What net force is needed to accelerate a 100 kg bag 2 m/s<sup>2</sup> to the left?
- 2. What is the acceleration of a 2 kg object if the net force on it is 5 N to the right?
- 3. What is the acceleration of a 2 kg object if the net force on it is 5 N straight down?
- 4. A car of mass 1000 kg is accelerating with a constant rate of 1.5 m/s<sup>2</sup>. What is the net force acting on the car?
- 5. An airplane is accelerating down the runway. The mass of the airplane is 15,000 kg. If the engines are producing a net thrust of 45,000 N, what is the acceleration of the airplane?
- 6. There is a net force of 200 N acting on a girl on a skateboard. If her acceleration is  $4 \text{ m/s}^2$ , what is her mass?
- 7. What net force is needed to accelerate a 5 kg object straight up at 3 m/s<sup>2</sup>?
- 8. What is the net force acting on a 1200 kg car that has a constant velocity of 20 m/s?
- 9. An astronaut in space pushes a 2000 kg satellite with a force of 100 N. What is the acceleration of the satellite?
- 10. If a net force of 500 N causes something to accelerate at 15 m/s<sup>2</sup>, what is its mass?

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Now some problems where you have to calculate the acceleration first!

11. What net force is needed for a 1700 kg car to go from 0 m/s to 30 m/s in 6 seconds?

12. What net force is needed if a 60 kg person covers 5 meters in 1.3 seconds, assuming she starts from rest and has a constant acceleration?

13. What net force is needed to accelerate a 4 kg object from 10 m/s to 25 m/s in 5 seconds?

14. What is the net force on a 65 kg person who slides to a stop in a distance of 3.2 meters in 1.5 seconds?

15. You are in your car, mass 1500 kg, traveling down the highway with a speed of 25 m/s. You see traffic ahead and apply the brakes. You slow down to 15 m/s in 4 seconds. What was the net force on the car?

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NAME:

- 16. The velocity vs time graph for a 0.75 kg cart is shown in the diagram to the right:
  - a. What is the net force on the cart at time 0.1 seconds?



- b. What is the net force on the cart at time 0.4 seconds?
- c. What is the net force on the cart at time 0.7 seconds?
- 17. A 0.025 kg steel spheres is launched with a speed of 3 m/s by quickly pushing it 2 cm (0.02 m). a. What is the net force on a steel sphere while being launched?
  - b. Once it is in the air, what is the net force on the steel sphere?

Answers:

| 1) 200 N to the left               |            | 2) 2.5 m/s² to the right |            | 3) 2.5 m/s² down |              |
|------------------------------------|------------|--------------------------|------------|------------------|--------------|
| 4) 1500 N                          | 5) 3 m/s²  | 6) 50 kg                 | 7) 15 N up | 8) 0 N           | 9) 0.05 m/s² |
| 10) 33.3 kg                        | 11) 8500 N | 12) 355 N                | 13) 12 N   | 14) (–)185 N     |              |
| 15) (–)3750 N (& a = (–)2.5 m/s²)  |            |                          | 16. a) 0 N | b) 4.5 N         | c) 0 N       |
| 17. a) 5.63 N b) 0.25 N (gravity!) |            |                          |            |                  |              |