

# Physics 117 HW #2 Problems

{ Ch 3: Q 18, 40, 59; E: 12, 20, 24;  
 { Ch 4: Q 2, 6; E: 1, 6.

18. Two ropes are being used to pull a car out of a ditch. Each rope exerts a force of 700 newtons on the car. Is it possible for the sum of these two forces to have a magnitude of 1000 newtons? Explain your reasoning.
40. Pat and Chris are pushing identical crates across a rough floor. Pat's crate is moving at a constant 1 meter per second while Chris's crate is moving at a constant 2 meters per second. Compare the net forces on the two crates.
- \*59. If the force exerted by a horse on a cart is equal and opposite to the force exerted by the cart on the horse, as required by Newton's third law, how does the horse manage to move the cart?
12. A salesperson claims a 1200-kg car has an average acceleration of  $4 \text{ m/s}^2$  from a standing start to 100 km/h. What average net force is required to do this?
- \*20. A rope is used to pull a 10-kg block across the floor with an acceleration of  $3 \text{ m/s}^2$ . If the frictional force acting on the block is 50 N, what is the tension in the rope?
- \*24. A mother of mass 50 kg and her daughter of mass 25 kg are ice-skating. They face each other, and the mother pushes on the daughter such that the daughter's acceleration is  $2 \text{ m/s}^2$ . What is the force exerted by the mother on the daughter? What is the force exerted by the daughter on the mother? What is the mother's acceleration?
2. The figure shows a racetrack with identical cars at points A, B, and C. The cars are moving clockwise at constant speeds. Draw arrows indicating the direction of the net force on each car and the instantaneous velocity of each car. In what direction would car A travel if there were an oil slick at point A? Why?
6. A child rides on a carousel at constant speed. In which direction does each of the following vectors point?
- velocity
  - change in velocity
  - acceleration
  - net force
1. Find the size and direction of the change in velocity for each of the following initial and final velocities:
- 5 m/s west to 10 m/s west
  - 10 m/s west to 5 m/s west
  - 5 m/s west to 10 m/s east
6. A fox is chasing a bunny. The bunny is initially hopping east at 8 m/s when it first sees the fox. Over the next half second, the bunny changes its velocity to west at 12 m/s and escapes. What was the bunny's average acceleration (magnitude and direction) during this half-second interval?

