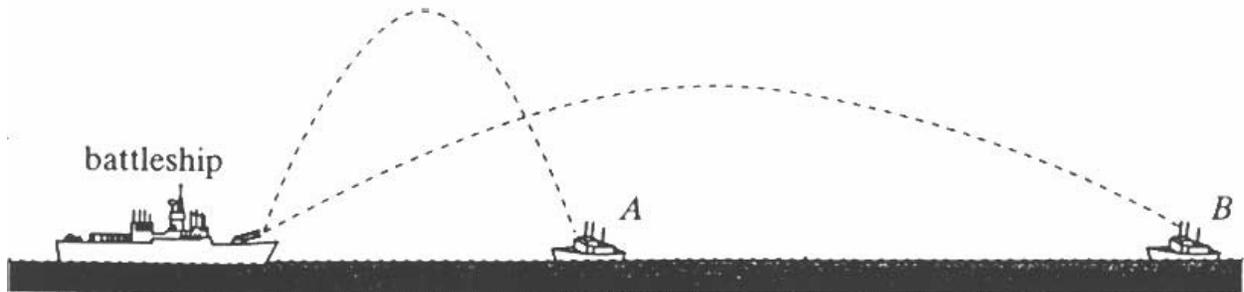


## Dynamics

1. Two students are moving a refrigerator. One pushes with a horizontal force of 200 N, and the other with a horizontal force of 300 N. Is it possible for the total force they exert to be equal to 200 N?
2. A child throws a ball into the air. Why does the ball continue to rise after it leaves the child's hand?
3. Consider a person standing in an elevator that is accelerating upward. How does the upward normal force exerted by the elevator floor compared to the person's weight?
4. Consider a student sitting on a chair. Is the following statement true? "The weight of the student and the normal force exerted by the chair on the student, constitute an action-reaction pair that are equal and opposite."
5. A large wrestler and a small wrestler try to push each other backwards out of the ring. At first they are motionless as they push. Then the larger wrestler moves the smaller one backwards. Compare the forces that the wrestler exerts on each other.
6. Your instructor is leaning against a wall. Why doesn't the wall move?
7. Two blocks are pushed along a horizontal frictionless surface by a 6.0 N. How does the normal force between the blocks compare to the 6.0 N forces?
8. A thick uniform cable, suspended from the ceiling, hangs straight down. How does the tension at top of the cable compare to the tension at the bottom of the cable?
9. An object is held in place by friction on an inclined surface. The angle of inclination is increased until the object starts moving. If the surface is kept at this angle, how will the object move down the plane?
10. A small block, A, sits on a larger block, B, which is at rest on the horizontal frictionless surface. An external force is applied to the lower block B, and the two blocks accelerate together, i.e. there is no slipping of A with respect to B. While the blocks are accelerating, what is the direction of the frictional force exerted on A by B?
11. An object travels on a circular path, centered at the origin, at a constant speed. At  $t = 0$ , it just crosses the  $x$ -axis. What would a plot of  $x$ -component of its velocity look like as a function of time?
12. A roller coaster starts at top of a hill, rolls down into a valley and then climbs back out. Assuming that rolling friction is negligible, what is the direction of the cart's acceleration as it passes through the lowest point?

13. A battleship simultaneously fires two shells at enemy ships. If the shells follow the parabolic trajectories shown, which ship gets hit first?



14. A biologist must fire a tranquilizing dart to hit an injured monkey in a tree. He knows that the “bang” of the rifle will cause the monkey to let go of the tree branch and fall at the instant the dart is fired. If he aims and fires directly at the monkey, does the dart hit or miss the monkey?