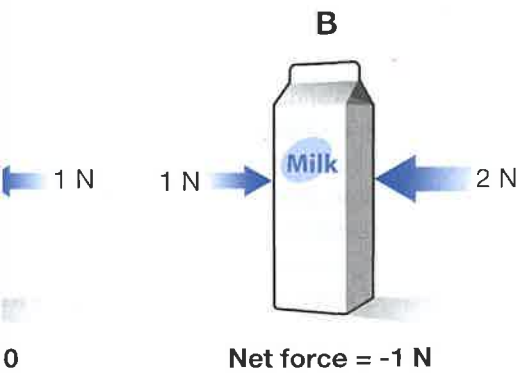


n to cool off and reduce excess heat. Vacuum cleaners
ow they work—air passes over the mechanical parts
i. Cars remove heat in a variety of ways—coolant, oil,
parts helps to remove heat.

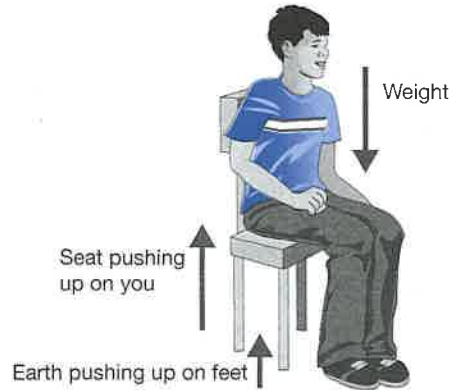
friction: It would be hard to walk because feet or
slip. Objects would be more likely to fall off of
s with too much friction: More muscle energy would
objects. More energy would be required to get a car
f the excessive friction between the tires and the road.

e can be assigned as an individual or group project.
wn favorite shoes to get ideas for what kinds of
be useful in their newly designed shoe.

bject are balanced forces then the net force on the



3. No, an accelerating object can have a positive or negative net force but never a zero net force. An acceleration object is either changing its velocity or direction so it is never in equilibrium.
4. The normal force supplied by the table would be 5 newtons.
5. net force = sum of all forces = $9\text{ N} + 6\text{ N} - 6\text{ N} = 9\text{ N}$
6. a
7. Both forces are in the same direction: $150,000\text{ N} + 25,000\text{ N} = 175,000\text{ N}$. The train's engine needs to produce 175,000 N in the opposite direction (uphill) for the train to be in equilibrium.
8. Diagram:



9. b
10. Each rope supports 1/2 the child's weight, so one rope has a tension of 100 N.

Connection

1. A person freely falling in an elevator feels weightless because the person accelerates downward at the same rate as the elevator. As a result, there is no support force on his or her feet, and the body feels weightless.
2. Astronauts in orbit are not truly weightless. Earth's gravity still pulls on their bodies. Astronauts are in free fall around the Earth. The spacecraft and astronauts fall with the same acceleration, so there is no support force, and the astronauts feel weightless.
3. Parabolic flights are used to train astronauts, to conduct scientific experiments, and for recreation.
4. I could demonstrate Newton's third law by floating, facing another person who is also floating, and pushing off of the person. We should feel equal forces and should both move backward.