1. Two gliders of unequal mass \((m_A < m_B)\) are placed on a frictionless air track.  
Glider A is pushed horizontally as shown so that the gliders move faster and faster.

a. In the space provided below, draw a separate free-body diagram for each glider while it is speeding up. Recall that your diagram should include:

- a description of each force,
- the name of the object on which each force is exerted, and
- the name of the object exerting each force.

Free-body diagram for glider A

Free-body diagram for glider B

b. Rank the magnitudes of all the horizontal forces (if any) in order from largest to smallest. If two forces are equal in magnitude, indicate that explicitly. Explain.

c. At right, draw arrows to indicate the directions of the net forces on gliders A and B. If the net force on either glider is zero, indicate that explicitly. Explain.

| Direction of net force on glider A | Direction of net force on glider B |

Is the magnitude of the net force on glider A greater than, less than, or equal to the magnitude of the net force on glider B? Explain.
2. When the gliders are halfway along the air track, the hand stops pushing.

   a. Describe the subsequent motion of the gliders just before they reach the end of the frictionless air track.

   b. In the spaces below, sketch free-body diagrams for the gliders just before they reach the end of the frictionless air track. Label each of the forces as instructed on the first page.

   Free-body diagram for glider A

   Free-body diagram for glider B

   c. At right, draw arrows to indicate the directions of the net forces on gliders A and B. If the net force on either glider is zero, indicate that explicitly. Explain.

   Direction of net force on glider A

   Direction of net force on glider B

   Is the magnitude of the net force on glider A greater than, less than, or equal to the magnitude of the net force on glider B? Explain.