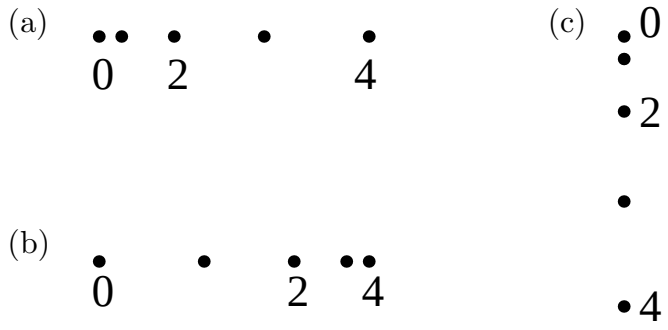
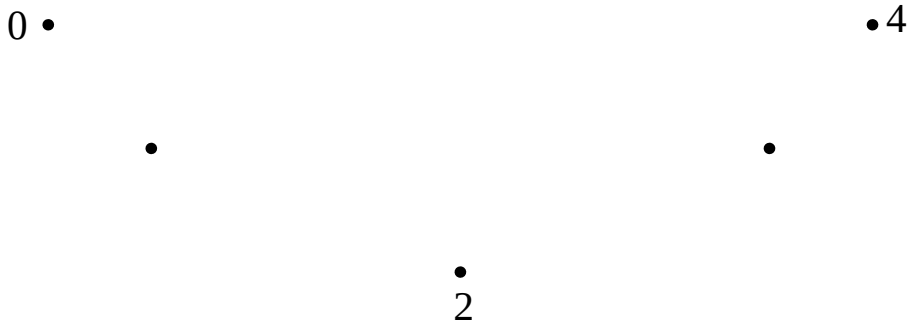
1. Below are three possible motion diagrams for a particle. For each case, draw and label an arrow to represent the net force at time 2. Are the time labels important for the directions of your arrows?

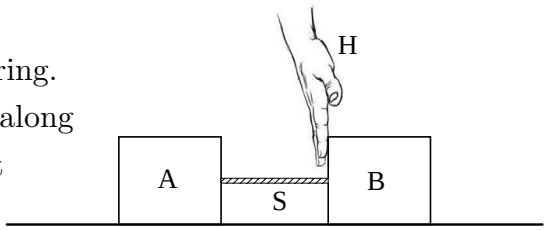


2. Consider the motion diagram below; it could be the motion diagram for one swing of a ball on a string (a pendulum). At times 0 and 4 the particle is momentarily at rest. Draw and label the net force arrow at each of the five points. Explain how you decided on the direction of the net force arrow for each time. HINT: you must write about how the velocity (both speed and direction) is changing at each dot.



3. For the motion diagram in 1(a) you are now given that the mass of the particle is 1.5 kg and that the acceleration is 3.0 m/s^2 rightwards. You are also given that there are only two forces acting on the particle, and that one of those two forces has a magnitude of 15 N and points towards the bottom of the page. Find the second force acting on the particle, magnitude and direction (relative to rightwards on the page).

4. Blocks A and B, with $m_A > m_B$, are connected by a string. A hand (H) pushing on the back of B accelerates them along a frictionless surface. The string (S) is massless, so that m_S may be entirely ignored.



a. Draw separate extended FBD's for A, S, and B (an extended FBD shows the forces at their points of application, not at a dot at the center of the object). Draw the force arrows to scale. Connect any Third-Law pairs with dotted lines.

b. Rank in order, from largest to smallest, all of the horizontal forces. Although not appearing in your FBD's, include $F_{\mathrm{B\,on\,H}}$, the strength of the force on the hand by m_B, in your rankings. Explain the reasons for your ranking choices using either Newton's 2nd or 3rd Law.