Q A. A train car moves along a long straight track. The graph shows the position as a function of time for this train. The graph shows that the train:

![Position vs. Time Graph]

1. speeds up all the time.
2. slows down all the time.
3. speeds up part of the time and slows down part of the time.
4. moves at a constant velocity.

Q 1. A cart on a roller-coaster rolls down the track shown below. As the cart rolls beyond the point shown, what happens to its speed and acceleration in the direction of motion?

![Roller-coaster Track]

1. Both decrease.
2. The speed decreases, but the acceleration increases.
3. Both remain constant.
4. The speed increases, but acceleration decreases.
5. Both increase.
6. Other

Q B. The graph shows position as a function of time for two trains running on parallel tracks. Which is true:

![Position vs. Time Graph for Two Trains]

1. At time $t_B$, both trains have the same velocity.
2. Both trains speed up all the time.
3. Both trains have the same velocity at some time before $t_B$.
4. Somewhere on the graph, both trains have the same acceleration.

Q 2. A marathon runner runs at a steady 15 km/hr. When the runner is 7.5 km from the finish, a bird begins flying from the runner to the finish at 30 km/hr. When the bird reaches the finish line, it turns around and flies back to the runner, and then turns around again, repeating the back-and-forth trips until the runner reaches the finish line. How many kilometers does the bird travel?

![Runner and Bird Diagram]

1. 10 km
2. 15 km
3. 20 km
4. 30 km
Answers

QA. 2
QB. 3
Q1. 4
Q2. 2

Note: these are mostly from Eric Mazur, Peer Instruction (Prentice Hall, 1996).