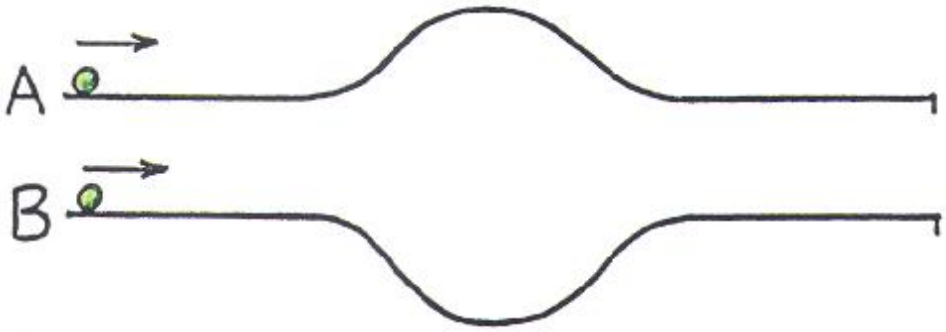
NEXT-TIME QUESTION



Two smooth tracks of equal length have "bumps"—A up and B down, both of the same curvature. If two balls start simultaneously with the same initial speed, the ball to complete the journey first is along
a) Track A. b) Track B. c) ... both take the same time.

If the initial speed = 2 m/s, and the speed of the ball at the bottom of the curve on Track B is 3 m/s, then the speed of the ball at the top of the curve on Track A is
d) 1 m/s. e) > 1 m/s. f) < 1 m/s.

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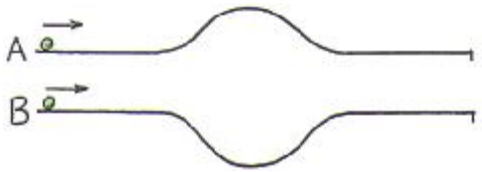

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Answers: b and f

Although both balls have the same speed on the level parts of the tracks, the speeds along the curved parts differ. The speed of the ball everywhere along curve B is greater than the initial speed, whereas everywhere along curve A it is less. So the ball on Track B finishes first.

Does the gain in speed at B's bottom equal the loss at A's top? No! Speed isn't conserved: *energy* is. The loss in *kinetic energy* at the top of A will be equal to the gain in *kinetic energy* at the bottom of B—if there is enough energy to begin with.

There isn't because the initial KE [$^1/_2$ m2^2] is less than the *gain* in KE at the bottom of B [$^1/_2$ m(3^2 - 2^2)]. At 2 m/s, the ball will not even make it to the top of A's curve.

CONCEPTUAL Physics