Next-Time Question

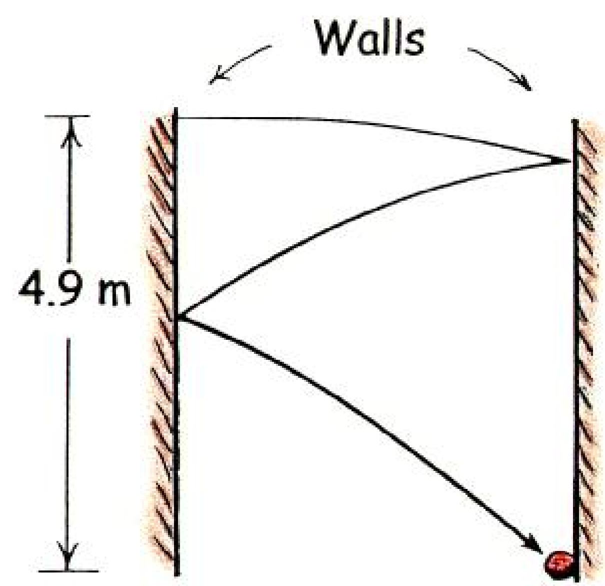
If a ball is horizontally projected between a vertical pair of parallel walls, it will bounce back and forth and fall a vertical distance of 4.9 m in 1 s in a uniform gravitational field. If the walls were ideal mirrors and a horizontal beam of light were directed between them, light would reflect back and forth and in one second fall a vertical distance of

a) zero m.

b) between zero and 4.9 m.

c) 4.9 m.

d) more than 4.9 m.



NEXT-TIME QUESTION

CONCEPTUAL Physics

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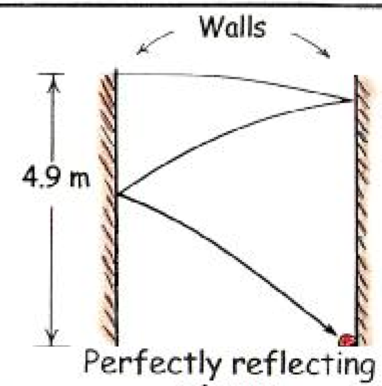
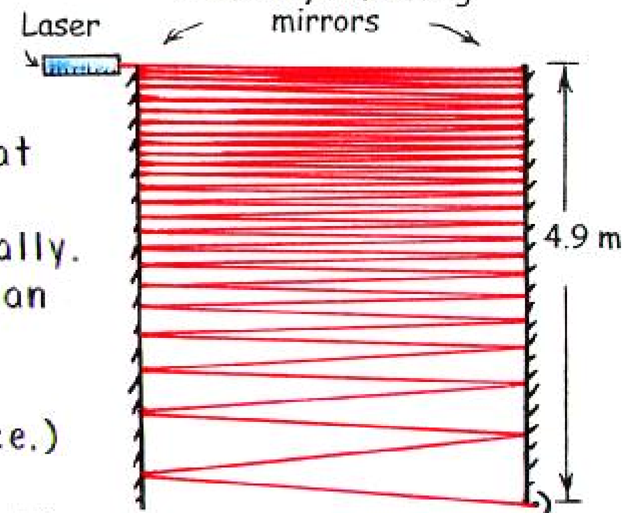
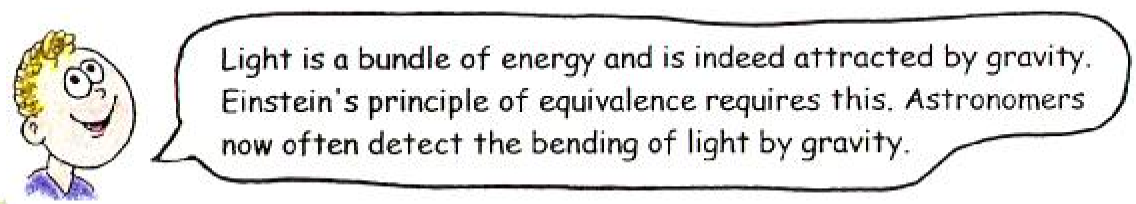
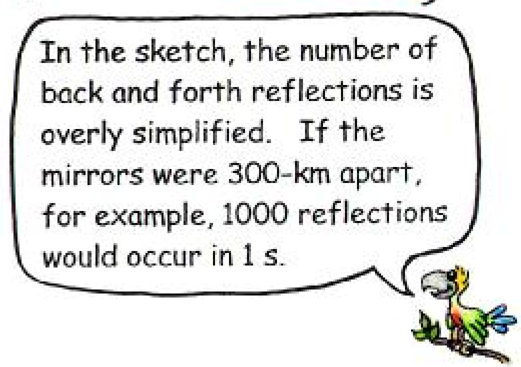




Answer: c, 4.9 m

Imagine the parallel walls are inside an elevator that starts to fall freely from rest at the moment that both a ball and a light beam are launched horizontally. To an observer within the elevator, the elevator is an inertial frame, one in which Newton's first law is valid. (It's like a spacecraft in orbit, in which astronauts float and drift as if in gravity-free space.) To this observer, both the ball and the light beam keep bouncing back and forth in a horizontal straight line. But to an observer attached to the Earth, the elevator, the ball, and the light beam all fall the same distance in the first second—4.9 m.





Hewitt Drew it!

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