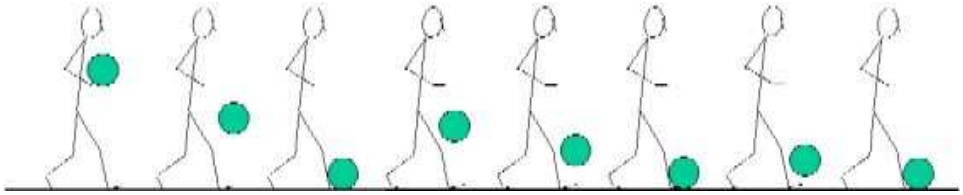
Walk and ball

Aim: To show that vertical and horizontal movement is independent.

Subjects: 1F30 (Inertia of Motion)

Diagram:



Equipment:
- Basketball.
- Walking instructor.

Presentation: The instructor holds the basketball on his hand and walks at constant speed in front of the lecture-hall. While walking, the basketball rolls from his hand. The basketball bounces up and down, looses height more and more and finally only rolls over the floor. But during this quite complicated vertical movement, the ball keeps pace with the instructor who continued his walk. So, the horizontal velocity of the ball remains constant.

Explanation: In this situation there are only forces acting in the vertical direction. In the horizontal direction the ball is free of forces: In the horizontal direction there is no force to change the horizontal movement and so, the horizontal velocity the ball has in the beginning remains the same.

Remarks:
- The basketball will get also an amount of rotation when hitting the ground, but when you let the ball go in the right way (let it roll from your hand in stead of just dropping it) this rotation will not destroy your demonstration.
  So, also for this simple demonstration it is needed to take a couple of minutes to practice!
- When you just drop the ball without rotation it will start rotating when hitting the ground and it will not keep up with you. Of course you can use this phenomenon to discuss with your students about energy.
- Also see the demonstration "Throwing a basketball" in this database.