



A ball of mass $9m$ is dropped from rest from a height $H = 5.0$ meters above the ground, as shown above on the left. It undergoes a perfectly elastic collision with the ground and rebounds. At the instant that the ball rebounds, a small blob of clay of mass m is released from rest from the original height H , directly above the ball, as shown above on the right. The clay blob, which is descending, eventually collides with the ball, which is ascending. Assume that $g = 10 \text{ m/s}^2$, that air resistance is negligible, and that the collision process takes negligible time.

- Determine the speed of the ball immediately before it hits the ground.
- Determine the time after the release of the clay blob at which the collision takes place.
- Determine the height above the ground at which the collision takes place.
- Determine the speeds of the ball and the clay blob immediately before the collision.
- If the ball and the clay blob stick together on impact, what is the magnitude and direction of their velocity immediately after the collision?

Answers

- 10 m/s
- 0.5 s
- 3.75 m
- both 5 m/s
- 4 m/s , upward

* optional - requires more than just kinematics