Example problems – free-fall & projectiles

1. I throw a ball straight upward. The ball leaves my hand with a speed of 25 m/s.

(a) For how much time will the ball move upward?

(b) What maximum height above its release point will the ball reach?

(c) How much time after I release the ball will it return to my hand?

(d) What is the velocity of the ball when it is 16 meters above my hand?

2. A hailstone forms essentially motionless in a cloud 10,000 meters above the ground.

The stone falls freely to the ground. ***Use g = 10 m/s2.***

(a) How much time is required for the stone to fall to the ground?

(b) What is the speed of the hailstone when it hits the ground?

3. A lemming runs off a 78-m vertical cliff in Norway. For how long is the lemming in the air before it hits the water and how far from the base of the cliff does the lemming hit the water if the speed of the lemming when the lemming leaves the cliff is:

(a) 4 m/s?

(b) 40 m/s?

4. A player kicks a soccer ball at an upward angle of 37o with the ground. The ball leaves the player’s foot with a speed of 25 m/s.

(a) For how much time will the ball stay in the air before returning to the ground?

(b) How far will the ball travel in the air?

(c) What is the maximum height the ball reaches?

(d) How far is the ball horizontally from the player when the ball is at its maximum height?

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