**Quiz**   **Name**

Galileo begins an experiment by dropping his metal ball from the edge of a table straight down to the floor. With the ball starting from rest in repeated trials, Galileo concludes that it takes the ball $\frac{3}{7}$ of a second to fall to the floor. Continuing his experiment, Galileo rolls the ball on the table. He measures its speed to be a constant 4 meters per second. (We are assuming incorrectly that Galileo's units are the meter and the second.) The ball soon reaches the edge of the table and falls to the falls in a parabolic arc as shown in the figure.
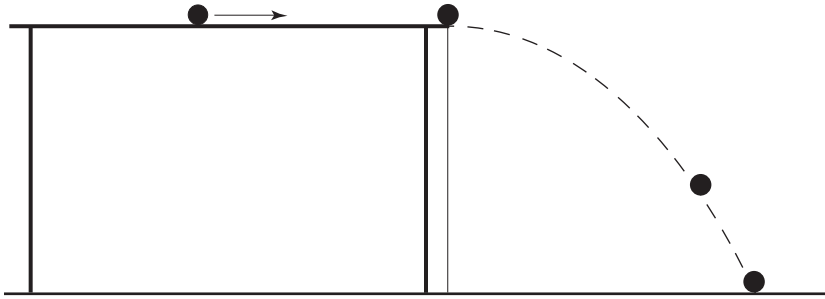
1. Before measuring anything, Galileo knows that the ball will hit the floor $\frac{12}{7}$ meters from the base of the table. Explain how Galileo reaches this conclusion. Identify the laws and principles of projectile motion that Galileo relies on and specify how he applies them to reach his conclusion.

2. Verify the following formula by using mathematical induction:
   For any $n \geq 1$, $1 + 2 + 2^2 + \cdots + 2^n = 2^{n+1} - 1$.