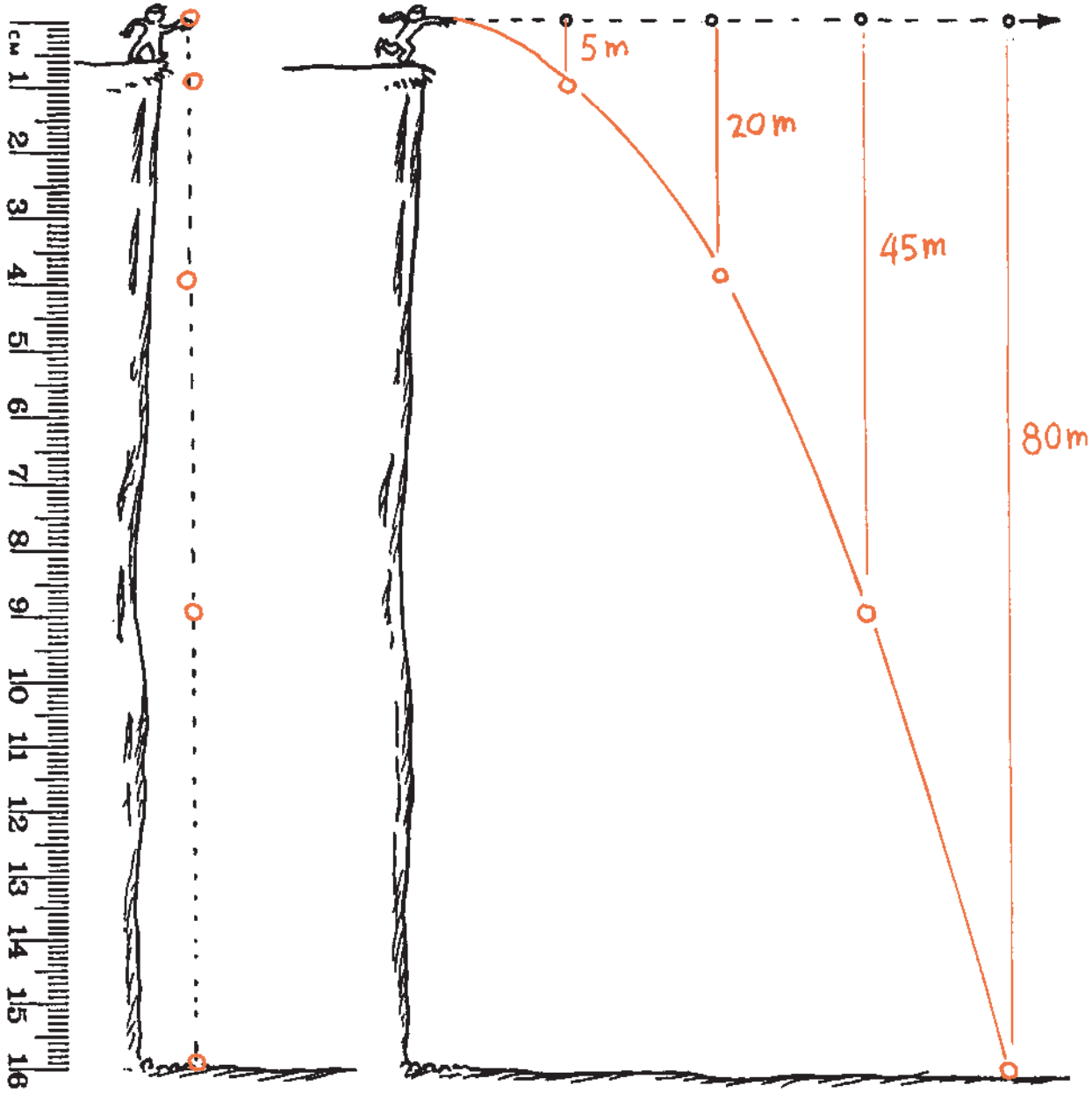
Name _____ Class _____ Date _____

Concept-Development Practice Page **5-1**

Projectile Motion



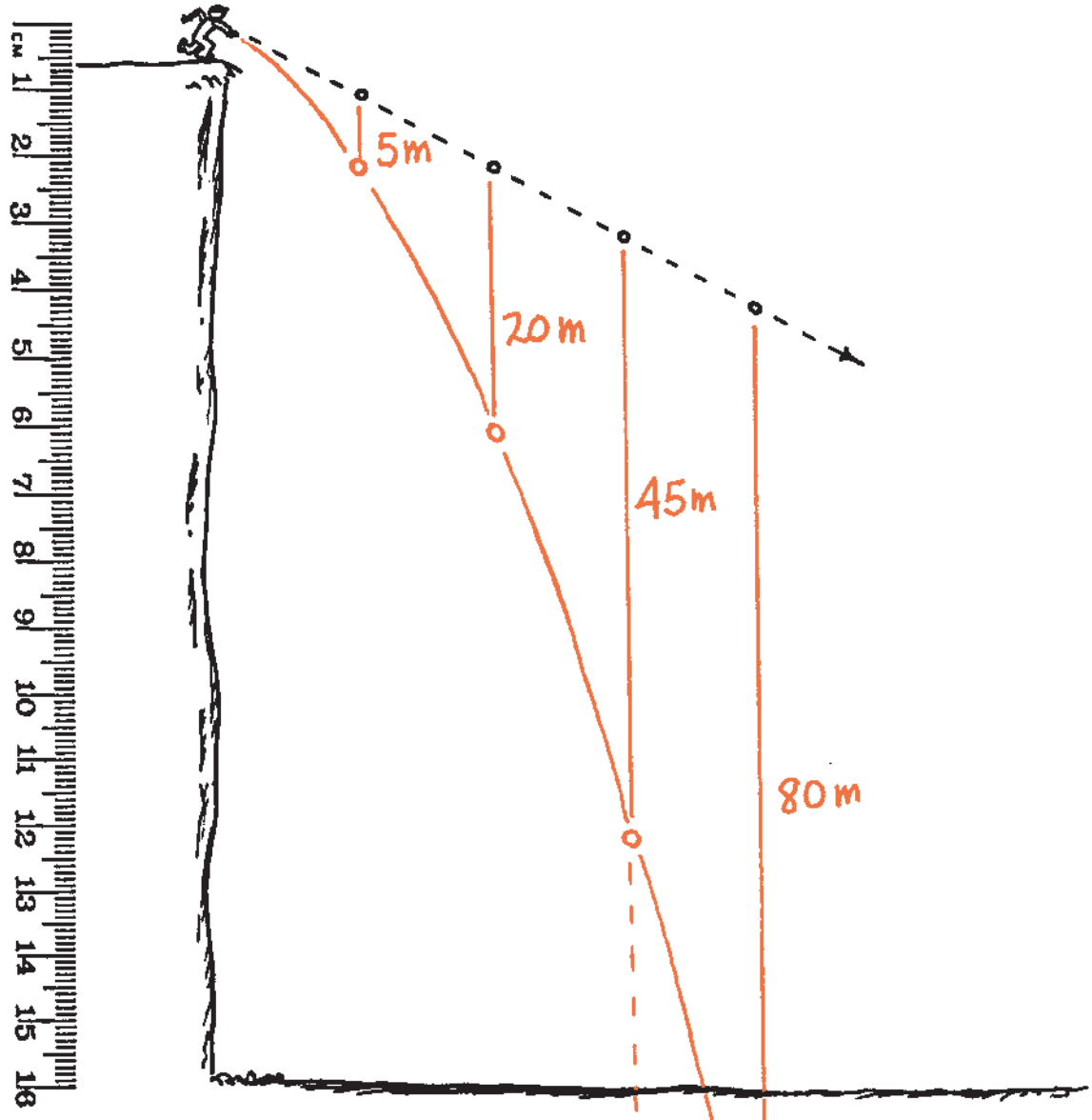
1. Above left: Use the scale 1 cm:5 m and draw the positions of the dropped ball at 1-second intervals. Neglect air drag and assume $g = 10\ m/s^2$. Estimate the number of seconds the ball is in the air.

   4 seconds

2. Above right: The four positions of the thrown ball with *no gravity* are at 1-second intervals. At 1 cm:5 m, carefully draw the positions of the ball *with* gravity. Neglect air drag and assume $g = 10\ m/s^2$. Connect your positions with a smooth curve to show the path of the ball. How is the motion in the vertical direction affected by motion in the horizontal direction?

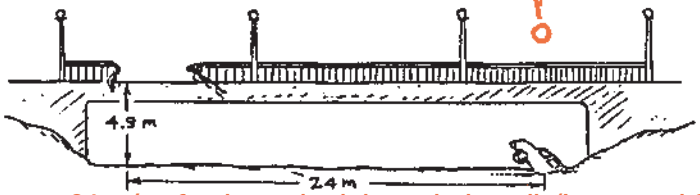
   Vertical motion is affected only by gravity; horizontal motion does not affect vertical motion.

CONCEPTUAL PHYSICS



3. This time the ball is thrown below the horizontal. Use the same scale 1 cm:5 m and carefully draw the positions of the ball as it falls beneath the dashed line. Connect your positions with a smooth curve. Estimate the number of seconds the ball remains in the air. 3.5 s

4. Suppose that you are an accident investigator and you are asked to figure whether or not the car was speeding before it crashed through the rail of the bridge and into the mudbank as shown. The speed limit on the bridge is 55 mph = 24 m/s. What is your conclusion?



The car was traveling at 24 m/s *after* it crashed through the rail. (It covered 24 m in a time of 1 s, the time to fall vertically 4.9 m.) Therefore it must have been traveling faster than 24 m/s *before* hitting the rail, for some speed is lost in crashing through the rail. Therefore, the driver was speeding.

CONCEPTUAL PHYSICS