

HS.P.D.21 Assessment

1. Kyle stands on top of a building and throws a ball horizontally from a height of 30 meters. He hopes the ball will reach a swimming pool that is at the bottom of the building, 12 meters horizontally from the edge of the building.

- a. How long does it take the ball to hit the ground below?

$$y_1 = 0 \text{ m}$$

$$y_2 = -30 \text{ m}$$

$$v_{y1} = 0 \text{ m/s}$$

$$v_{y2} = ?$$

$$a_y = -9.8 \text{ m/s}^2$$

$$t = ?$$

$$y_2 = y_1 + v_{y1}t + \frac{1}{2}a_y t^2$$

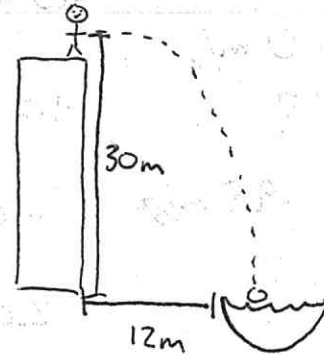
$$-30 = 0 + (0)t + \frac{1}{2}(-9.8)t^2$$

$$-30 = 0 + 0 + (-4.9)t^2$$

$$-30 = -4.9t^2$$

$$6.122 = t^2$$

$$2.47 \text{ sec} = t$$



- b. How fast must he throw the ball for it to reach the pool?

$$x_1 = 0 \text{ m}$$

$$x_2 = 12 \text{ m}$$

$$v_{ix} = ?$$

$$v_{fx} = ?$$

$$a_x = 0 \text{ m/s}^2$$

$$t = 2.47 \text{ sec}$$

↑
answer from
part a.

$$x_2 = x_1 + v_{ix}t + \frac{1}{2}a_x t^2$$

$$12 = 0 + v_{ix}(2.47) + \frac{1}{2}(0)(2.47)^2$$

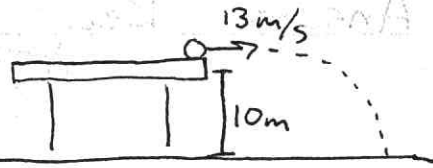
$$12 = 0 + 2.47 v_{ix} + 0$$

$$12 = 2.47 v_{ix}$$

$$4.86 \text{ m/s} = v_{ix}$$

2. A marble with speed 13 m/s rolls off the edge of a table 10 meters high.

a. How long does it take the marble to hit the floor?



$$y_1 = 0$$

$$y_2 = -10 \text{ m}$$

$$v_{y1} = 0 \text{ m/s}$$

$$v_{y2} = ?$$

$$a_y = -9.8 \text{ m/s}^2$$

$$t = ?$$

$$y_2 = y_1 + v_{y1}t + \frac{1}{2}at^2$$

$$-10 = 0 + (0)t + \frac{1}{2}(-9.8)t^2$$

$$-10 = 0 + 0 + (-4.9)t^2$$

$$-10 = -4.9t^2$$

$$2.04 = t^2$$

$$1.43 \text{ sec} = t$$

b. How far from the edge of the table does the marble hit the floor?

$$x_1 = 0 \text{ m}$$

$$x_2 = ?$$

$$v_{ix} = 13 \text{ m/s}$$

$$v_{2x} = 13 \text{ m/s}$$

$$a_x = 0 \text{ m/s}^2$$

$$t = 1.43 \text{ sec}$$

↑

answer from
part a

$$x_2 = x_1 + v_{ix}t + \frac{1}{2}a_x t^2$$

$$x_2 = 0 + 13(1.43) + \frac{1}{2}(0)(1.43)^2$$

$$x_2 = 0 + 18.59 + 0$$

$$x_2 = 18.59 \text{ m}$$