1.

$v_x = 5.0\,m/s$ $v_{iy} = 0\,m/s$

$\Delta d_x = ?$ $g = -9.80\,m/s^2$

Δt $\Delta d_y = -5.4\,m$

Δt

$$\Delta d_y = v_{iy}\Delta t + \frac{1}{2} g \Delta t^2$$

$$\Delta t = \sqrt{\frac{2\Delta d_y}{g}} = \sqrt{\frac{2(-5.4)}{-9.80}} = 1.0\,s$$

$$\Delta d_x = v_x \Delta t = (5.0)(1.0) = \boxed{5.0\,m}$$

2.

$v_x = 5.0\,m/s$ $v_{iy} = 0\,m/s$

$\Delta d_x = ?$ $g = -9.80\,m/s^2$

$\Delta t =$ $\Delta d_y = -1.0\,m$

$$\Delta t = \sqrt{\frac{2\Delta d_y}{g}} = \sqrt{\frac{2(-1.0)}{-9.80}} = .45\,s$$

$$\Delta d_x = v_x \Delta t = (5.0)(.45) = \boxed{2.3\,m}$$

3.

$\Delta d_x = 5.0\,m$ $v_{iy} = 0\,m/s$

v_x $g = -9.80\,m/s^2$

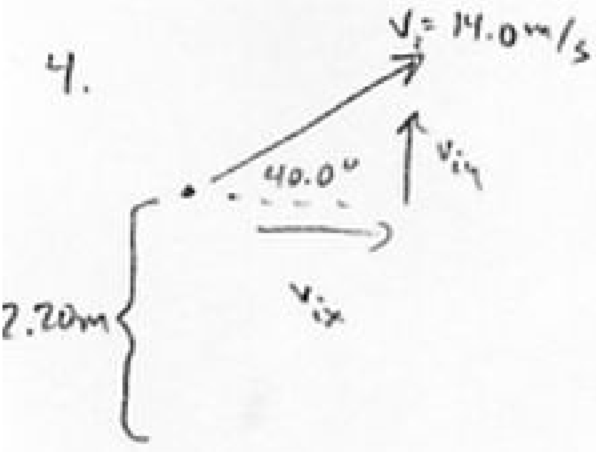
Δt $\Delta d_y = -35\,m$

Δt

$$\Delta t = \sqrt{\frac{2\Delta d_y}{g}} = \boxed{2.7\,s}$$

$$v_x = \frac{\Delta d_x}{\Delta t} = \frac{5.0}{2.7} = \boxed{1.9\,m/s}$$

4.



$v_{ix} = 14.0 \cos 40.0° = 10.7\,m/s$

$v_{iy} = 14.0 \sin 40.0° = 9.00\,m/s$

$g = -9.80\,m/s^2$

$\Delta d_y = -2.20\,m$

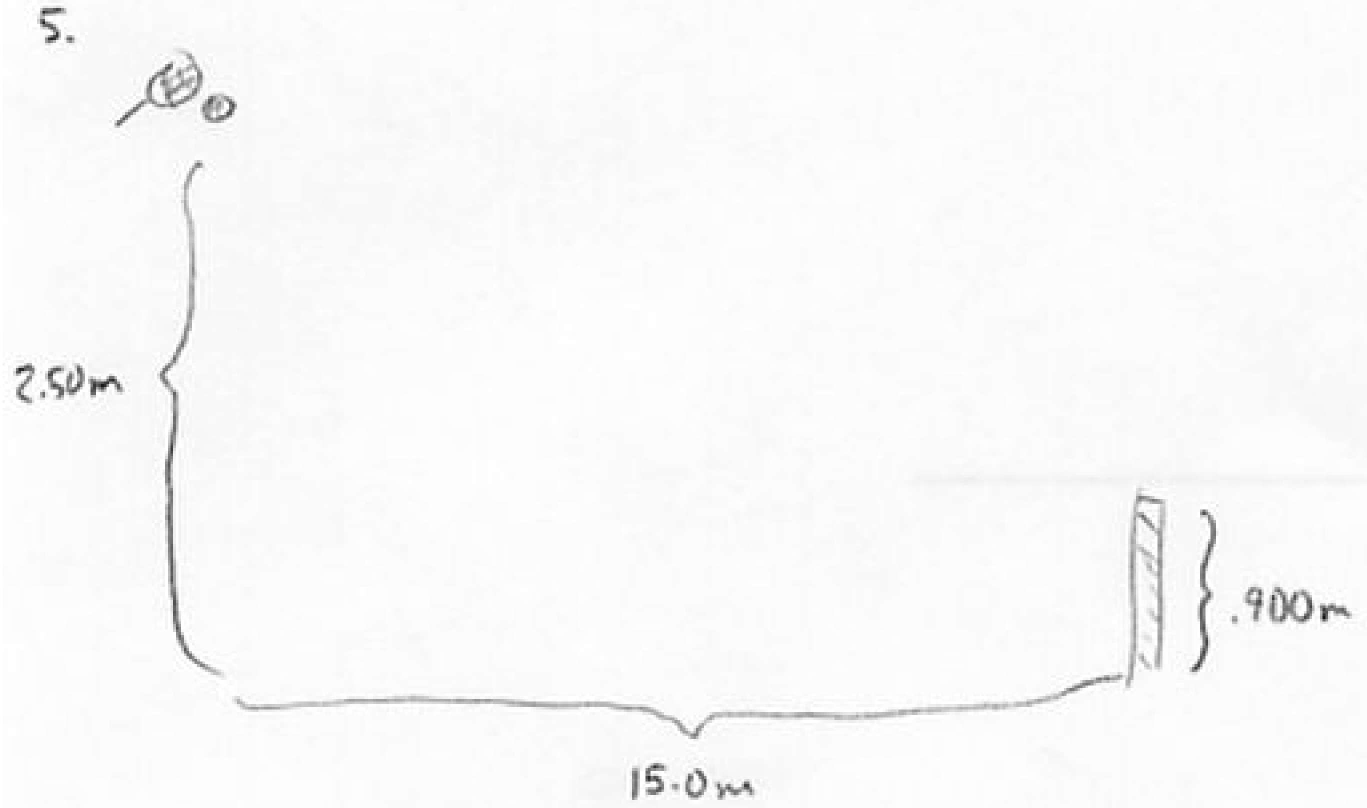
$$v_{fy}^2 = v_{iy}^2 + 2g\Delta d$$

$$v_{fy} = \sqrt{9.00^2 + 2(-9.80)(-2.20)} = -11.1\,m/s$$

$$\Delta t = \frac{v_{fy} - v_{iy}}{g} = \frac{-11.1 - 9.00}{-9.80} = 2.05\,s$$

$$\Delta d_x = v_x \Delta t = (10.7)(2.05) = \boxed{21.9\,m}$$

5.



How long does it take to fall to net height? $2.50 - .900 = 1.60\,m$

$$\Delta t = \sqrt{\frac{2\Delta d_y}{g}} = \sqrt{\frac{2(-1.60)}{-9.80}} = .571\,s$$

Ball has to go 15.0m horizontally in .571s

$$v_x = \frac{\Delta d_x}{\Delta t} = \frac{15.0}{.571} = \boxed{26.3\,m/s}$$

Where will it land if it just clears the net?

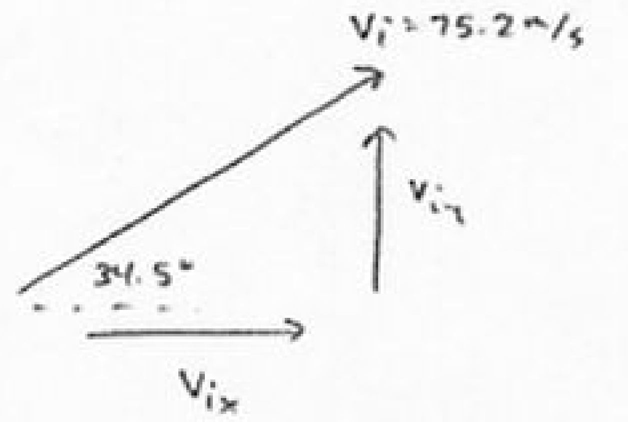
How long to reach the ground?

$$\Delta t = \sqrt{\frac{2\Delta d}{g}} = \sqrt{\frac{2(-2.50)}{-9.80}} = \boxed{.714\,s}$$

Where will it land?

$$\Delta d_x = v_x \Delta t = (26.3)(.714) = 18.8\,m - 15.0\,m = \boxed{3.8\,m \text{ past net (good)}}$$

6.



$v_{ix} = 75.2 \cos 34.5°$
$= 62.0\ m/s$

$v_{iy} = 75.2 \sin 34.5°$
$= 42.6\ m/s$

a) max height? $v_{fy} = 0\ m/s$

$$\Delta d_y = \frac{v_{fy}^2 - v_{iy}^2}{2g}$$
$$= \frac{-(42.6)^2}{2(-9.80)}$$
$$\boxed{= 92.5\ m}$$

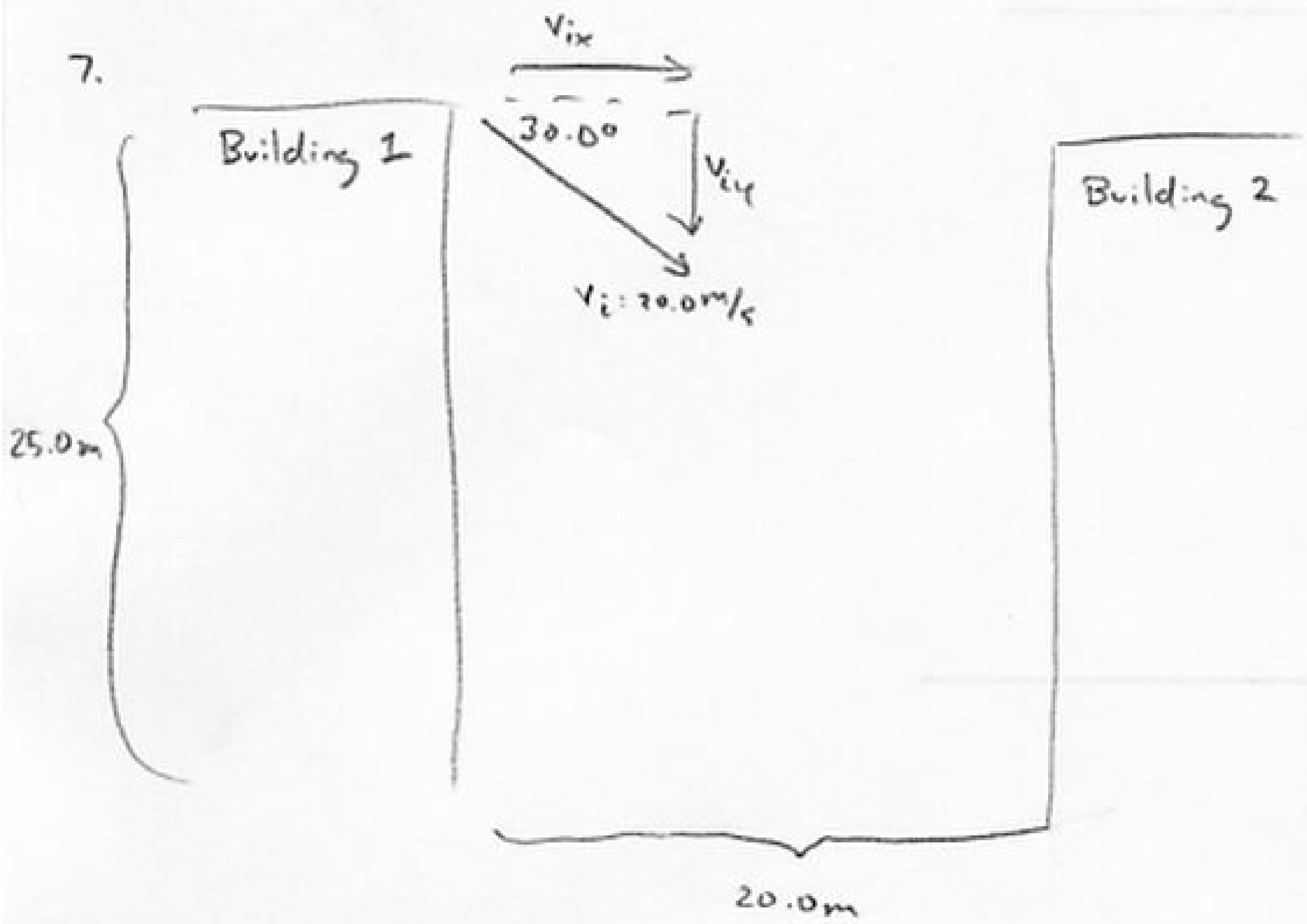
b) total time in air? $\Delta d_y = 0\ m$

$$\Delta d_y = v_{iy}\Delta t + \frac{1}{2} g \Delta t^2$$
$$-v_{iy}\cancel{\Delta t} = \frac{1}{2} g \Delta t^{\cancel{2}}$$
$$\Delta t = \frac{-2v_{iy}}{g}$$
$$\boxed{= 8.69\ s}$$

c) range?

$$\Delta d_x = v_x \Delta t$$
$$= (62.0)(8.69)$$
$$\boxed{= 539\ m}$$

7.



$v_{ix} = 20.0 \cos 30.0°$
$= 17.3\ m/s$

$v_{iy} = 20 \sin 30.0°$
$= -10.0\ m/s$

How long to go $\Delta d_x = 20.0\ m$

$$\Delta d_x = v_x \Delta t$$
$$\Delta t = \frac{\Delta d_x}{v_x} = \frac{20.0}{17.3} = 1.16\ s$$

Ball falls for 1.16 s

$v_{iy} = -10.0\ m/s$
$g = -9.80\ m/s^2$
$\Delta t = 1.16\ s$

$$\Delta d_y = v_{iy}\Delta t + \frac{1}{2} g \Delta t^2$$
$$= (-10.0)(1.16) + \frac{1}{2}(-9.80)(1.16)^2$$
$$= -11.6 + (-6.59)$$
$$= -18.2\ m$$

$25.0 - 18.2 =$ $\boxed{6.8\ m \text{ above the ground}}$