1.

$$v_x = v\cos\theta \quad = 15.0\,\frac{m}{s}\cos 12.0^\circ \quad = \boxed{14.7\,\frac{m}{s}}$$

$$v_y = v\sin\theta \quad = 15.0\,\frac{m}{s}\sin 12.0^\circ \quad = \boxed{3.12\,\frac{m}{s}}$$

$$x = \frac{1}{2}at^2 \quad t = \sqrt{\frac{2x}{a}} \quad = \sqrt{\frac{2(12\ \cancel{m})}{9.8\,\frac{\cancel{m}}{s^2}}} \quad = \boxed{1.56\ s}$$

2.

$$v = at \quad = 9.8\,\frac{m}{\cancel{s^2}}(1.56\ \cancel{s}) \quad = \boxed{14.7\,\frac{m}{s}}$$

3.

$$v_y = v\sin\theta \quad = 125\,\frac{m}{s}\sin 32.0^\circ \quad = \quad 66.24\,\frac{m}{s} \qquad v_x = v\cos\theta \quad = 125\,\frac{m}{s}\cos 32.0^\circ \quad = \quad 106.0\,\frac{m}{s}$$

$$v = v_o + at \quad t = \frac{v_y - v_{y0}}{a} \quad = \quad \frac{-66.24\,\frac{\cancel{m}}{\cancel{s}} - 66.24\,\frac{\cancel{m}}{\cancel{s}}}{-9.8\,\frac{\cancel{m}}{\cancel{s^2}}} \quad = \quad 13.52\ s$$

$$v_x = \frac{x}{t} \qquad x = v_x t \quad = 106\,\frac{m}{\cancel{s}}(13.52\ \cancel{s}) \quad = \quad \boxed{1430\ m}$$

4.

$$v_x = \frac{x}{t} \quad = \frac{45\ m}{4.50\ s} \quad = \quad 10\,\frac{m}{s}$$

$$v = v_o + at \quad v - v_o = at \quad 2v = at \quad v = \frac{at}{2} \quad \frac{9.8\,\frac{m}{\cancel{s^2}}(4.5\ \cancel{s})}{2} \quad = \quad 22.05\,\frac{m}{s}$$

$$v = \sqrt{{v_y}^2 + {v_x}^2} \quad = \sqrt{\left(22.05\,\frac{m}{s}\right)^2 + \left(10\,\frac{m}{s}\right)^2} \quad = \quad 24.21\,\frac{m}{s}$$

$$\tan\theta = \frac{v_y}{v_x} \quad = \frac{22.05\ \cancel{m}/\cancel{s}}{10\ \cancel{m}/\cancel{s}} \qquad \theta \quad = \quad \boxed{65.6^\circ}$$

5.

$$x = \frac{1}{2}at^2 \quad t = \sqrt{\frac{2x}{a}} = \sqrt{2(65.0\ \cancel{m})\left(\frac{1}{9.8\frac{\cancel{m}}{s^2}}\right)} = \boxed{3.64\ s}$$

$$34.5\frac{\cancel{km}}{\cancel{h}}\left(\frac{1\ \cancel{h}}{3600\ s}\right)\left(\frac{1000\ m}{1\ \cancel{km}}\right) = 9.58\frac{m}{s} \qquad x = v_x t = \left(9.58\frac{m}{\cancel{s}}\right)(3.64\ \cancel{s}) = \boxed{34.9\ m}$$

$$v_y = at = 9.8\frac{m}{\cancel{s^2}}(3.64\ \cancel{s}) = 35.7\frac{m}{s} \qquad v = \sqrt{{v_y}^2 + {v_x}^2} = \sqrt{\left(9.58\frac{m}{s}\right)^2 + \left(35.7\frac{m}{s}\right)^2} = \boxed{37.0\frac{m}{s}}$$

6.

$$y = \frac{1}{2}at^2 \quad t = \sqrt{\frac{2y}{a}} = \sqrt{\frac{2h}{g}}$$

$$x = vt = \boxed{v\sqrt{\frac{2h}{g}}}$$