1　$h = v_0 t + \frac{1}{2} a t^2 = 0 + \frac{1}{2} g t^2$

$= \frac{1}{2} \cdot 9.8 \cdot 3.0^2 = 44.1 \doteqdot \boxed{44}$ m

$v = v_0 + at = 0 + gt$

$= 9.8 \cdot 30 = 30 - 0.6 = 29.4 \doteqdot \boxed{29}$ m/s

2　$\begin{cases} h = v_0 t + \frac{1}{2} a t^2 \\ v = v_0 + at \end{cases}$

$\begin{cases} 19.6 = 0 + \frac{1}{2} \cdot 9.8 \cdot t^2 \\ v = 0 + 9.8 t \end{cases}$

$t = \sqrt{19.6 \cdot \frac{2}{9.8}} = \sqrt{4} = 2$

$\Rightarrow v = 9.8 \cdot 2 = 19.6$ m/s $\doteqdot \boxed{20}$ m/s

3　$v = v_0 + at = 20 + 9.8 \cdot 2.0 = 39.6 \doteqdot \boxed{40}$ m/s

$h = 100 - \left(v_0 t + \frac{1}{2} a t^2 \right)$

$= 100 - \left(20 \cdot 2.0 + \frac{1}{2} \cdot 9.8 \cdot 2.0^2 \right)$

$= 40.4 \doteqdot \boxed{40}$ m

4　最高点　0 m/s

鉛直下向　9.8 m/s

5　鉛直上向：＋

$v = v_0 + at = 20 - 9.8 \cdot 1.5$

$= 5.3$ m/s　$(\doteqdot 5$ m/s $)$

$h = v_0 t + \frac{1}{2} a t^2$

$= 20 \cdot 1.5 + \frac{1}{2} (-9.8) \cdot 1.5^2$

$= 18.9 \cdots \doteqdot \boxed{19}$ m

6　鉛直上向：＋

$40 = v_0 t + \frac{1}{2} a t^2$

$= v_0 t + \frac{1}{2} (-9.8) t^2$

$0 = v_0 + at$

$= v_0 - 9.8 t \quad (\Leftrightarrow) \quad t = \frac{v_0}{9.8}$

$\Rightarrow 40 = v_0 \cdot \frac{v_0}{9.8} - \frac{1}{2} \cdot 9.8 \cdot \frac{v_0}{9.8} \cdot \frac{v_0}{9.8}$

$40 \cdot 9.8 = v_0^2 - \frac{1}{2} v_0^2 = \frac{1}{2} v_0^2$

$v_0^2 = 40 \cdot 9.8 \cdot 2$

$v_0 = \sqrt{40 \cdot 9.8 \cdot 2} = \boxed{28}$ m/s

7　$a_x = 0$ m/s^2

$v_{0x} = 10$ m/s

$\Delta x = v_0 t + \frac{1}{2} a t^2 = 10 \cdot 4.0 + 0 = \boxed{40}$ m //

$a_y = g = 9.8$　(鉛直下向：＋)

$v_{0y} = 0$ m/s

$\Delta y = v_0 t + \frac{1}{2} a t^2 = 0 + \frac{1}{2} \cdot 9.8 \cdot 4.0^2$

$= 78.4 \doteqdot \boxed{78}$ m //

8　$v_{0x} = 10 \cos 30° = 10 \cdot \frac{\sqrt{3}}{2} = 8.66 \cdots \doteqdot \boxed{8.7}$ m/s

$v_{0y} = 10 \sin 30° = \boxed{5.0}$ m/s

9　$\Delta x = v_{0x} t + \frac{1}{2} a_x t^2$

$= 39.2 \cos 30° \cdot 2.0 + 0$

$= 67.8 \cdots \doteqdot \boxed{68}$ m

$\Delta y = v_{0y} t + \frac{1}{2} a_y t^2$　(鉛直上向：＋)

$= 39.2 \sin 30° \cdot 2.0 + \frac{1}{2} (-9.8) 2.0^2$

$= 19.6 \doteqdot \boxed{20}$ m