1.19

$$a = \frac{dv}{dt} = g - \beta v^2$$

$$\frac{dv}{ds}\frac{ds}{dt} = \frac{dv}{ds} v = g - \beta v^2$$

$$\int \frac{vdv}{g - \beta v^2} = \int ds$$

$$\int \frac{1}{2} \frac{dv^2}{g - \beta v^2} = \int \frac{-1}{2\beta} \frac{d(g - \beta v^2)}{g - \beta v^2} = h$$

$$\frac{-1}{2\beta} \ln(g - \beta v^2)\Big|_0^v = \frac{-1}{2\beta} \ln \frac{g - \beta v^2}{g} = h$$

$$\frac{g - \beta v^2}{g} = e^{-2\beta h}$$

$$v = \sqrt{\frac{g}{\beta}(1 - e^{-2\beta h})}$$