(1) The acceleration of a particle is $-21\ ft/sec^2$

initial velocity $4\ ft/sec$

initial distance $14\ ft$

velocity →	$-21t + 4$
distance →	$-\frac{21}{2}t^2 + 4t + 14$

$$\int -21\,dt$$

$$\frac{dv}{dt} = -t$$

$$-21t + c$$

$$-21t + 4 \rightarrow v(t)$$

$$\int -21t\,dt + \int 4\,dt$$

$$-\frac{21}{2}t^2 + 4t + c = s(t)$$

$$-\frac{21}{2}t^2 + 4t + 14 = s(t)$$

(2) initial 100 230 after 3 days

$\frac{dA}{dt} = Ar$

$\frac{1}{A}dA = r\,dt \qquad \int \frac{1}{A}dA = \int r\,dt$

$\ln|A| + C_1 = rt + C_2$

(a)

$\ln|A| = rt + C$

$A = e^{rt+C}$

$A = e^{rt}e^{C}$

$A = Ce^{rt}$

(b)

$230 = 100e^{r3}$

$\frac{\ln(2.3)}{3} = r \Rightarrow r \approx .2776$

$A = 100e^{\frac{\ln(2.3)}{3}t}$

(c)

$A = 100e^{\frac{\ln(2.3)}{3}14}$

$A \approx 100 \cdot 48.759948107$

$A \approx 4875.9948107$

After 14 days, the population is around 4.876 ants

(3)

(a) $\frac{dH}{dt} = -k(H-8)$

(b) $\frac{1}{H-8}\,dH = -k\,dt$

$\int \frac{1}{H-8}\,dH = \int -k\,dt$

$\ln(H-8) + C_1 = -kt + C_2$

$\ln(H-8) = -kt + C$

$H-8 = e^{-kt+C}$

$H = e^{-kt}C + 8$ $\rightarrow$ $H = (H_0 - 8)e^{-kt} + 8$

$21 = 8 + (27-8)e^{-k}$

$\frac{13}{19} = e^{-k}$

$-\ln\left(\frac{13}{19}\right) = k \approx 0.379$

$\Downarrow$

$H(t) = 19e^{-kt} + 8$ //

(c) $37 = 19e^{+0.379t} + 8$

$\frac{\ln\left(\frac{29}{19}\right)}{\ln\left(\frac{13}{19}\right)} \approx -1.114278$

It was discovered approximately 1.114278 hours after