$\frac{dy}{dt} = ky$ Soln

$\int \frac{1}{y}\, dy = \int k\,dt$

$\ln y = \int k\,dt$

$\ln y = kt + c$

$\ln y = kt \ln e + c \ln e$

$\ln y = \ln e^{kt} + \ln e^{c}$

$\ln y = \ln (e^{kt} \cdot e^{c})$

$y = e^{kt} . C$

$y = Ce^{kt}$

At the beginning of the experience

$t = 0$ and $y = 20$

$20 = Ce^{k(0)}$

$20 = C \ldots\ldots (1)$

At $t = 5hrs$

$y = 2y_0$

$y = 2 \times 20 = 40 \ldots\ldots (2)$

Inputing the value of C into y in eqn *

$40 = 20e^{kt}$

$\frac{40}{20} = e^{5k}$

$2 = e^{5k}$

$\ln 2 = 5k$

$0.6931 = 5k$

$k = \frac{0.6931}{5} = 0.13863$

model $= y = 20e^{0.13863t}$

2) $1\frac{1}{2}$ day $= 24hrs + 12hrs$

$t = 36hrs$

$y = 20e^{0.13863(36)}$

$= 147.036 \times 20 = 2940$ bacteria

d if $C = 10$

$y = 10e^{kt}$

$y = 10e^{0.13863t}$

when $C = 30$

$y = 30e^{kt}$

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$= 30e^{0.13863t}$

when $c = 50$

$y = 50e^{xt}$

$= 50e^{0.13863t}$

time $t = 0$ to $t = 30$hrs

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