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16/ENG08/010

MATHEMATICS.

Answer

a)  $\frac{dy}{dt} = ky$

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

$$\ln y = kt + C$$

$$y = e^{kt+C}$$

$$y = e^{kt} \cdot e^C$$

Let  $e^C = y_0$

$$y = y_0 \cdot e^{kt}$$

But  $y = d_{50}$  and  $t = 5 \text{ hrs}$

$$d_{50} = y_0 \cdot e^{5k}$$

$$\ln d = 5k$$

$$k = \frac{\ln d}{5} = \frac{\ln 2}{5}$$

$$= 0.139$$

$$y = y_0 e^{0.139t}$$

b) 24 hours = 1 day

20 = 1 1/2 day

$$y = e^{kt} \cdot e^c$$

$$\text{let } e^c = y_0$$

$$y = y_0 \cdot e^{kt}$$

$$\text{But } y = dy_0 \text{ and } t = 5 \text{ hrs}$$

$$dy_0 = y_0 \cdot e^{5k}$$

$$\ln d = 5k$$

$$k = \frac{\ln d}{5} = \frac{\ln 2}{5}$$

$$= 0.139$$

$$y = y_0 e^{0.139t}$$

$$b) \quad 24 \text{ hours} = 1 \text{ day}$$

$$2C = 1 \frac{1}{2} \text{ day}$$

$$2C = 24 \times 1.5 = 36 \text{ hrs}$$

$$\text{Where } y_0 = 20 \text{ and } t = 36$$

$$y = 20 e^{0.139 \times 36}$$

$$y = 2980.2$$