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Elect/Elect
Maths Assignment

600 t³ / min
fresh air →

20000
lit³ of
air

→ 600 t³ / min

$$\frac{dy}{dt} = y_{in} - y_{out}$$

$$y_{in} = 600$$

$$y_{out} = \frac{600}{20000} = 0.03y$$

$$\frac{dy}{dt} = 600 - 0.03y$$

$$\frac{dy}{dt} = -0.03(y - 20000)$$

$$\int \frac{dy}{y - 20000} = \int -0.03 dt$$

$$\ln(y - 20000) = -0.03t + C$$

$$y - 20000 = e^{-0.03t + C}$$

$$y - 20000 = e^{-0.03t} \cdot e^C$$

$$y = e^C$$

$$e^C = y_0$$

$$y - 20000 = y_0 \cdot e^{-0.03t}$$

$$y = y_0 \cdot e^{-0.03t} + 20000$$

$$y = y_0 \cdot e^{-0.03t} + 20000$$

$$\text{At } t = 0, y = 0$$

$$0 = y_0 \cdot e^{0.03 \cdot 0} + 20000$$

$$0 = y_0 \cdot e^{-0.03(0)} + 20000$$

$$y_0 = -20000$$