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Assignment: Practice Questions for
Sections 6.3 & 7.2 [Not for

For a particular chemical reaction the rate (g/hr) at which one of the reactants changes is proportional to the amount of that reactant present. If y represents the amount of that reactant at time t , $\frac{dy}{dt} = -0.1y$. If there were 50 grams of the reactant when the process started ($t = 0$), how many grams will remain after 2 hours.

Solve for y by integrating both sides of $\frac{dy}{y} = -0.1dt$.

$$\int \frac{dy}{y} = -0.1 \int dt$$

$$\ln y = -0.1t + C$$

Rewrite by using each side of the equation as the exponent of the base e .

$$e^{\ln y} = e^{-0.1t + C}$$

$$\text{Simplifying both sides, } y = C_1 e^{-0.1t}.$$

Evaluate the arbitrary constant with the given initial conditions: $y = 50$ grams at $t = 0$ hours.

$$C_1 = 50$$

Thus, $y = 50 e^{-0.1t}$. The amount remaining at $t = 2$ hours is 40.9 grams.