



initial values  $t=0$   $T=10^\circ\text{C}$

$$10 = Ae^{-25t}$$

$$A = 35$$

$$T = 35e^{-25t} - 25$$

$$T = 20^\circ\text{C} \quad t = 5 \text{ min}$$

$$20 = 35e^{-5k} - 25$$

$$45 = 35e^{-5k}$$

$$e^{-5k} = 45/35$$

$$5k = \ln(45/35)$$

$$k = \frac{0.25}{5} \quad k = 0.05$$

$$T = 35e^{-0.05t} - 25$$

$$T = 24.9 \text{ at } t = ?$$

$$24.9 = 35e^{-0.05t} - 25$$

$$49.9 = 35e^{-0.05t}$$

$$e^{-0.05t} = 49.9/35$$

$$e^{-0.05t} = \ln(1.426)$$

$$0.05t = 0.055$$

$$t = \frac{0.055}{0.05}$$

$t = 7.1 \text{ minutes}$  or  $7 \text{ minutes } 6 \text{ seconds}$

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$$\frac{dT}{dt} \propto (T - T_a)$$

$$\frac{dT}{dt} = k(T - T_a)$$

$$\frac{dT}{dt} = k(T - 25)$$

Collecting like terms from  $\frac{dT}{dt} = k(T - 25)$

$$\frac{dT}{(T - 25)} = k dt$$

$$\ln(T - 25) = e^{+kt + C}$$

$$T - 25 = e^{+kt} \cdot e^C$$

$$T - 25 = e^{+kt} \cdot e^C$$

$$T - 25 = Ae^{+kt}$$

$T_1$  of a thermometer = 100