Soln

$T(0) = 10°c$

$T(0) = 10°c$

Actual temp $= 25°c = T_A$

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

$dT = k(T_0 - T_A)dt$

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

Integrating both Sides

$\ln(T_0 T_A) = Kt + c$

$T - T_A = e^{kt} + e$

Let e^c be A

$T - T_A = e^{kt} \cdot A$

$T - T_A = Ae^{kt}$

$T = Ae^{kt} + T_A$

When $T = 10$

$10 = Ae^{k(0)} + 25$

$10 = A + 25$

$A = 10 - 25$

$A = -15$

$T_{(5)} = 15e^{kt}$

$t = e(5) = 20$

$20 = 25 - 15e^{k(5)}$

$20 = 25 - 15e^{5k}$

$15e^{5k} = 25 - 20$

$15e^{5k} = 5$

$e^{5k} = 0.333$

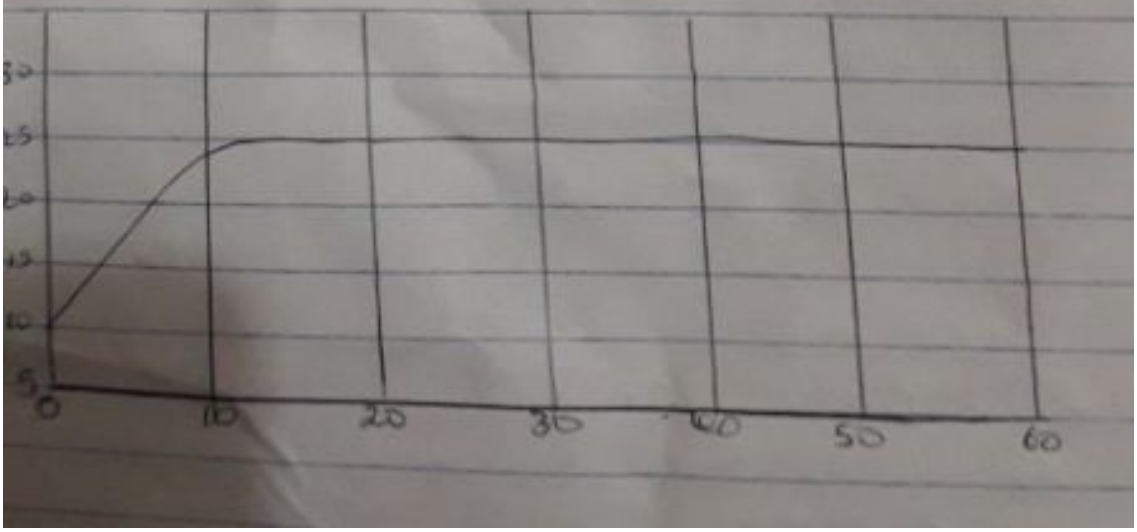
$5k = 100.333$

$5k = -1.0986$

$k = 0.22$

$T(t) = 25 - 15e^{-0.22t}$

Using Microsoft Excel
Pick a box insert 't'
Pick another box insert 'T'
Under the already labelled box 't'
Insert a value of 0 in an empty box
Go to fill
Click on Series
Insert a Step Value of 1
Change the Series into Columns
Insert a Step Value of 1
Change the Series into Columns
Insert a Step Value of 60
Under the already labelled box 'T'
Pick a box
Insert "$=25(15"exp(-0.22t)$
Autofill.
Go to next
Pick a graph of choice
Label the graph
Output



Using Matlab

Command windows

Clear

cls

Close all

t=0.1:50

T=25.5*4*exp(-0.2t*t)

Plot (x,T)

grid on

grid minor

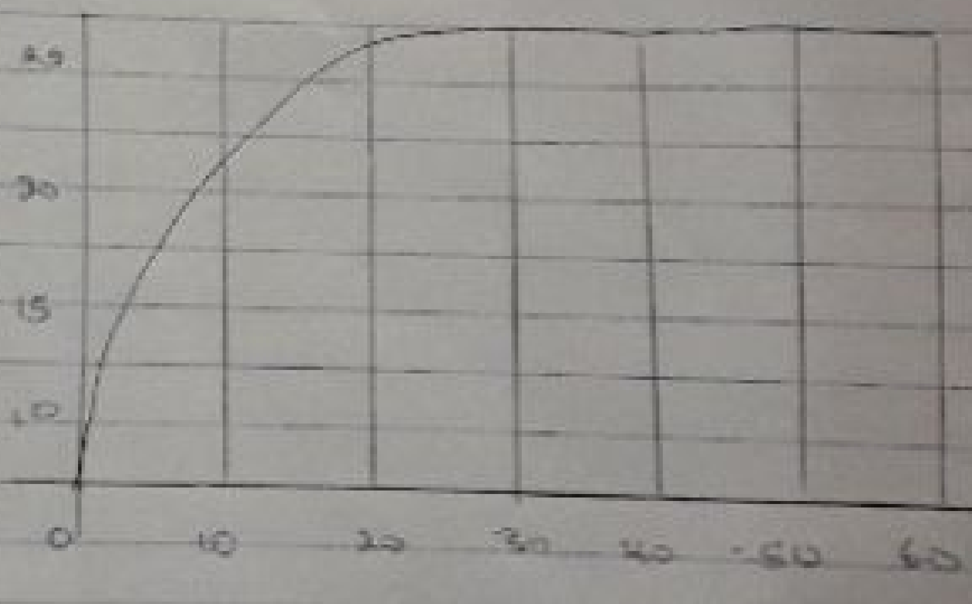
x label ('Time(sec)')

Y label ('Temperature')

grid on

grid minor

Output



Using Excel's dynamic response, the [illegible] of the system would be 25C at 20 mins.

Using the [illegible] model equation, the temperature of the thermometer at (∞) will be 25°c.