



18/2/2017

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1.  $T = 20^\circ\text{C}$  @ 5min.

$$T_{\text{actual}} = 25^\circ\text{C} \quad \frac{dT}{dt} \propto (T - T_a)$$
$$\frac{dT}{dt} = k(T - T_a) \quad T_a = \text{Actual temp}$$

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

collecting terms.

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

Integrating both side.

$$\ln(T - 25) = t k + C$$

$$T - 25 = e^{tk + C} \quad \text{where } e^C = A$$

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

$$T - 25 = A e^{tk}$$

$$T = A e^{tk} - 25$$

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

$$10 = A e^0 - 25$$

$$A = 35$$

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

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

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



11/01/2019

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

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

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

$$k = \frac{0.281}{5}$$

$$k = 0.056$$

$$T = 35e^{0.056t} - 25$$

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

$$24.9 = 35e^{0.056t} - 25$$

$$49.9 = 35e^{0.056t}$$

$$e^{0.056t} = 49.9/35$$

$$e^{0.056t} = \ln(1.426)$$

$$0.056t = 0.355$$

$$t = 7.1 \text{ minutes}$$



```
yimaquiz2.m x +  
- commandwindow  
- clear  
- clc  
- close all  
- format short g  
- mdata=xlsread('onlinequizdata','fluiddata')  
- x=mdata(1:2:250,1)  
- y=mdata(1:2:250,2)  
- plot(x,y)  
- grid on  
- grid minor|
```

I

Command Window  
86  
88  
90  
92  
94  
96  
98  
100  
fx 102