

$$T_{\text{initial}} = 10^{\circ}\text{C}$$

$$T = 20^{\circ}\text{C}$$

at 5mins

$$T_{\text{actual}} = 25^{\circ}\text{C}$$

$$dT/dt \propto (T - T_A)$$

$\therefore T_A = \text{Actual temperature}$

$$dT/dt = k(T - T_A)$$

$$dT/dt = k(T - 25)$$

collecting like terms

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

By integrating both sides

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

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

$$T - 25 = e^{t/k} \times e^C$$

$$T - 25 = A e^{t/k}$$

$$T = A e^{t/k} + 25$$

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

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

$$A = 35$$

$$\therefore T = 35 e^{t/k} + 25$$

$t = 5 \text{ minutes}$

$$T = 20^{\circ}\text{C}$$

$$20^{\circ}\text{C} = 35 e^{5/k} + 25$$

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

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

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

$$k = \frac{0,251}{5}$$

$$k = 0,05$$

$$T = 35 e^{0,05t} + 25$$

$$T = 24.9$$

$$t = ?$$

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

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

$$e^{0.05t}$$

$$= 49.9 / 35$$

$$e^{0.05t}$$

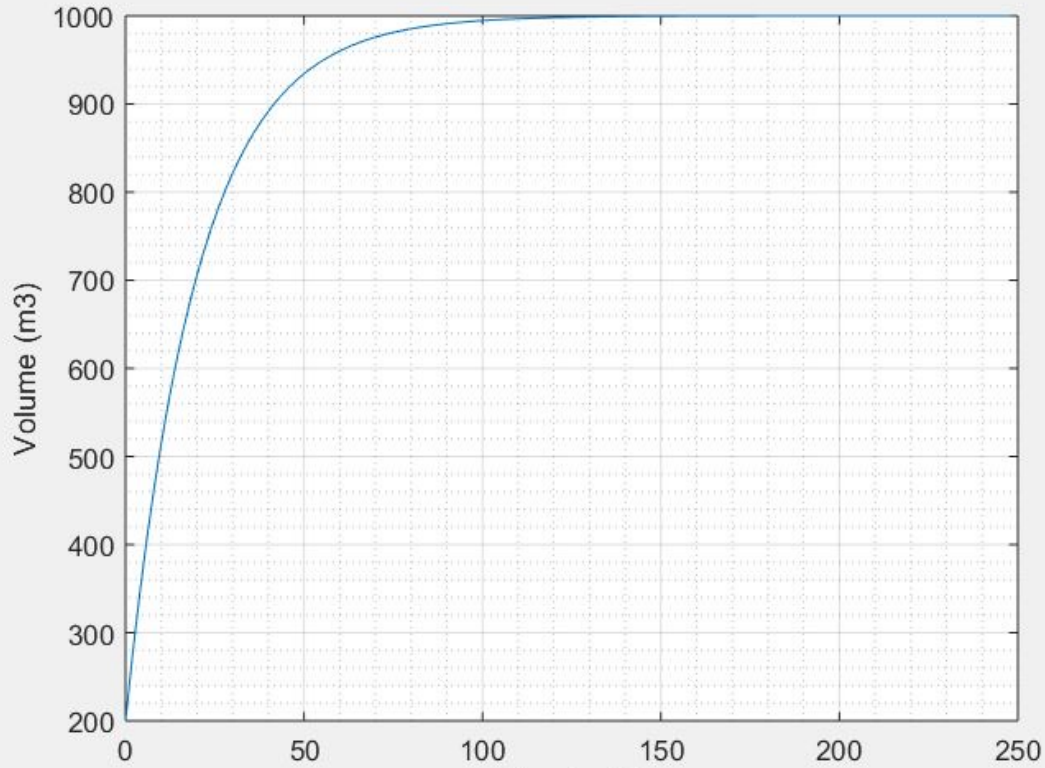
$$= \ln(1.43)$$

$$0.05t = 0.36$$

$$t = 7.2 \text{ minutes}$$

7 minutes 12 seconds

$$\underline{\underline{= 432 \text{ seconds}}}$$



MathQuiz.m

Mathquiz2.m

graph2.m

+

```
1 -   commandwindow
2 -   clearvars
3 -   clc
4
5 -   format shortg
6 -   numbers = xlsread('onlinequizdata.xlsx', 'fluiddata')
7 -   x = numbers(1:2:250,1)
8 -   y = numbers(1:2:250,2)
9 -   plot(x,y)
10 -  xlabel('Time (min)')
11 -  ylabel('Volume (m3)')
12 -  grid on
13 -  grid minor
14
```