Académie de Toulouse – sections européennes – session 2015

Sujet n°29

Please, do not write on this exam paper and don't forget to give it back at the end of the test.

FUNCTIONS

Investigation :

On the scene of a crime, the officer in charge of the investigation asks the legist what the victim's temperature is. The victim's temperature is 32°C, and the temperature of the room is 20°C.
The drop in temperature of an object in an environment is given by Newton's law .

Hence, the victim's temperature can be modelised by the function : $T(t)=A\,e^{kt}+20$, where $t\in[0;24]$ represents the time, in hours, since the officer's arrival and $T(t)$ is the victim's temperature at time t in °C. A and k are real constants.

Given that 30 minutes later, the victim's temperature dropped to 31°C, at what time did the crime happen ?