F-LE Newton's Law of Cooling

Task

A cup of hot coffee will, over time, cool down to room temperature. The principle of physics governing the process is Newton's Law of Cooling. Experiments with a covered cup of coffee show that the temperature (in degrees Fahrenheit) of the coffee can be modelled by the following equation

$$f(t) = 110e^{-0.08t} + 75.$$

Here the time t is measured in minutes after the coffee was poured into the cup.

a. Explain, using the structure of the expression $110e^{-0.08t} + 75$, why the coffee temperature decreases as time elapses.

b. What is the temperature of the coffee at the beginning of the experiment?

c. After how many minutes is the coffee 140 degrees? After how many minutes is the coffee 100 degrees?

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