**13.** The growth of pond weed on the surface of a pond is being investigated.

The surface area of the pond covered by the weed, $A$ m$^2$, can be modelled by the equation

$$A = 0.2e^{0.3t},$$

where $t$ is the number of days after the start of the investigation.

(*a*) State the surface area of the pond covered by the weed at the start of the investigation.

**(1)**

(*b*) Find the rate of increase of the surface area of the pond covered by the weed, in m$^2$/day, exactly 5 days after the start of the investigation.

**(2)**

Given that the pond has a surface area of 100 m$^2$,

(*c*) find, to the nearest hour, the time taken, according to the model, for the surface of the pond to be fully covered by the weed.

**(4)**

The pond was observed for one month. By the end of the month 90% of the surface area of the pond was covered by the weed.

(*d*) Evaluate the model in light of this information, giving a reason for your answer.

**(1)**

**(Total for Question 13 is 8 marks)**