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# JC MATHEMATICS (H2) STUDY TIPS

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**A KEY REMINDER IN  
DIFFERENTIAL EQUATIONS:  
RESTRICTING THE CURVE  
SKETCHING UNDER REAL-  
WORLD CONTEXTS**

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JC\_H2Maths\_044



$$(ii) \quad n = 250,000 \Rightarrow 100(3 - e^{1-0.04t}) > 250$$

$$3 - e^{1-0.04t} > 2.5$$

$$e^{1-0.04t} < 0.5$$

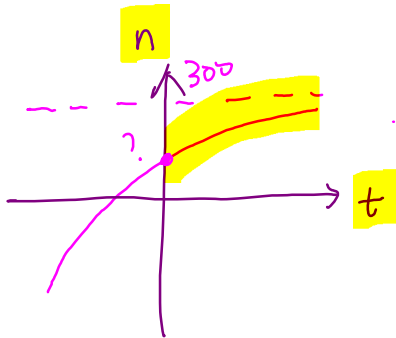
$$1 - 0.04t < \ln 0.5$$

$$t > \frac{1 - \ln 0.5}{0.04}$$

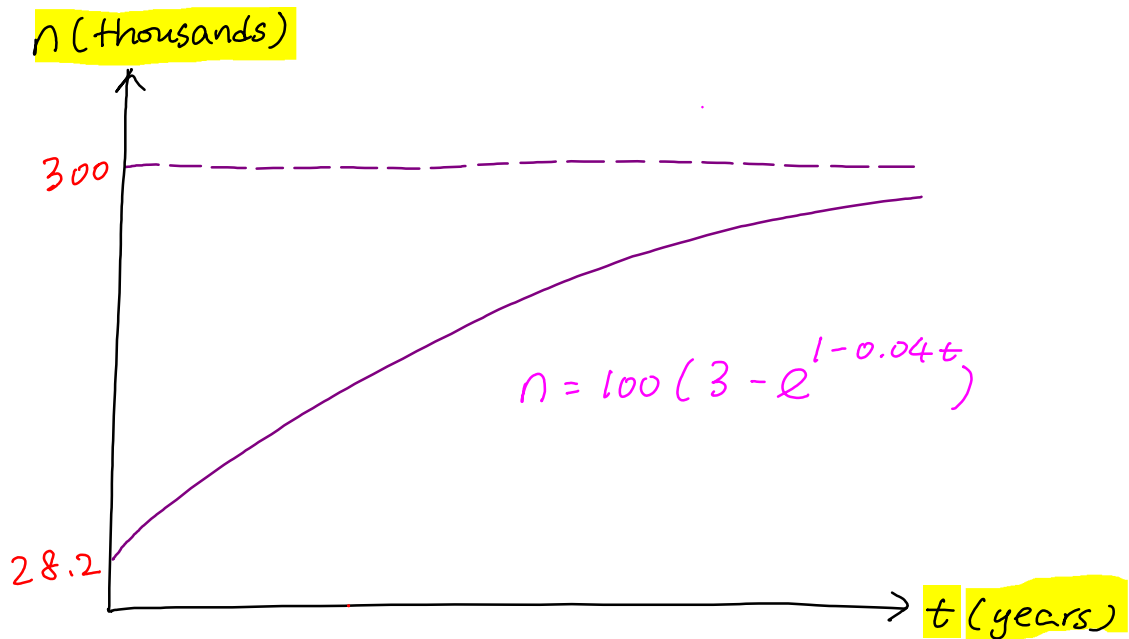
$$t > 42.328..$$

$$= 43 \text{ years}$$

(Corr. to the nearest integer)



(iii)





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## Explanation

When graphing the solution of a differential equation, it is crucial to carefully analyze what each variable represents in its real-world context to identify any necessary domain or range restrictions.

For instance, as demonstrated in this scenario where the variables represent population size and time, both are inherently non-negative quantities.

Consequently, the graphical representation must be strictly confined to the first quadrant. Sketching any portion of the curve in negative regions would mathematically imply negative time or a negative population, both of which are physically impossible.

Therefore, a vital tip when sketching these functions is to always evaluate the practical boundaries of your variables beforehand to ensure the final graph remains contextually valid and accurate.

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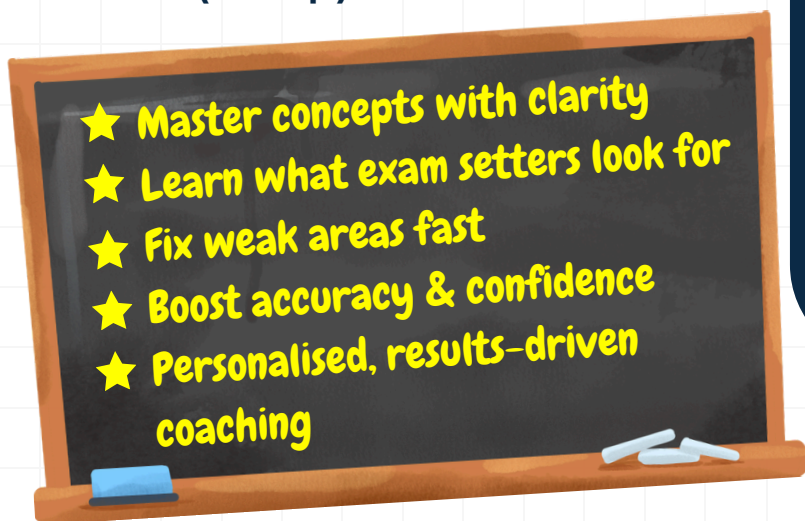
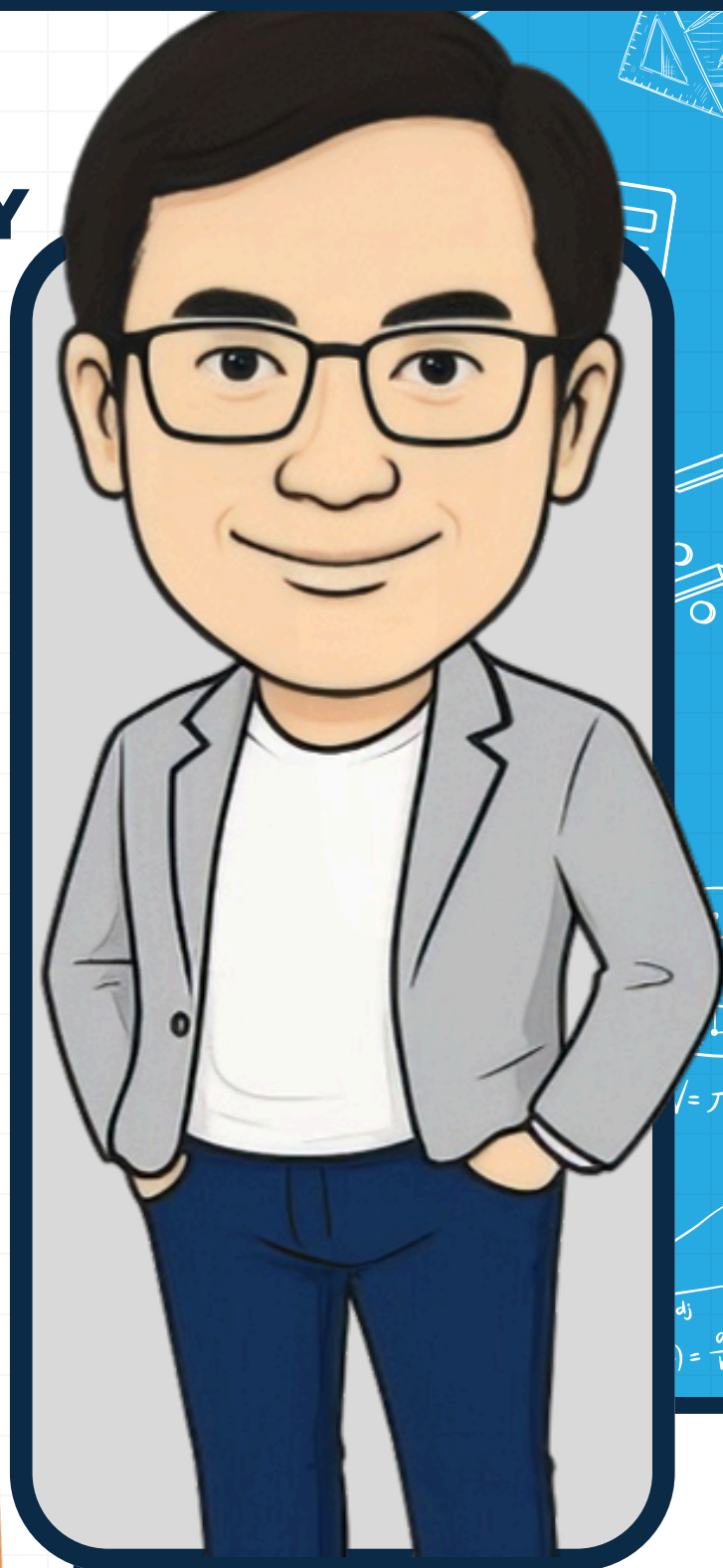
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