

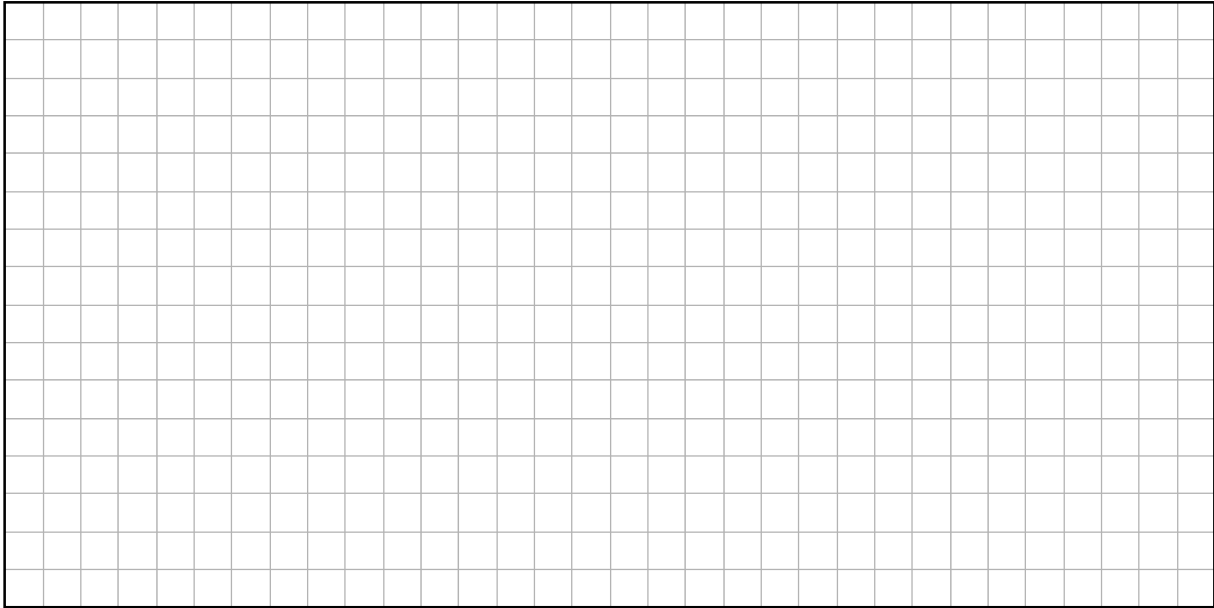
Question 8**(50 marks)**

The weekly revenue produced by a company manufacturing air conditioning units is seasonal. The revenue (in euro) can be approximated by the function:

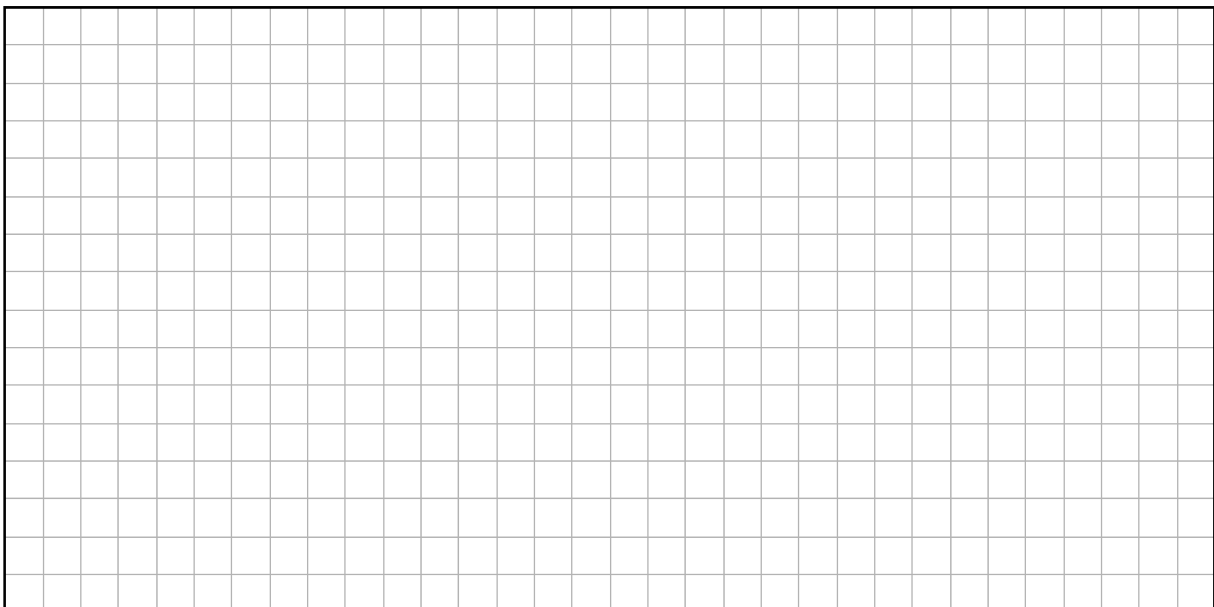
$$r(t) = 22\,500 \cos\left(\frac{\pi}{26}t\right) + 37\,500, \quad t \geq 0$$

where t is the number of weeks measured from the beginning of July and $\left(\frac{\pi}{26}t\right)$ is in radians.

- (a) Find the approximate revenue produced 20 weeks after the beginning of July. Give your answer correct to the nearest euro.

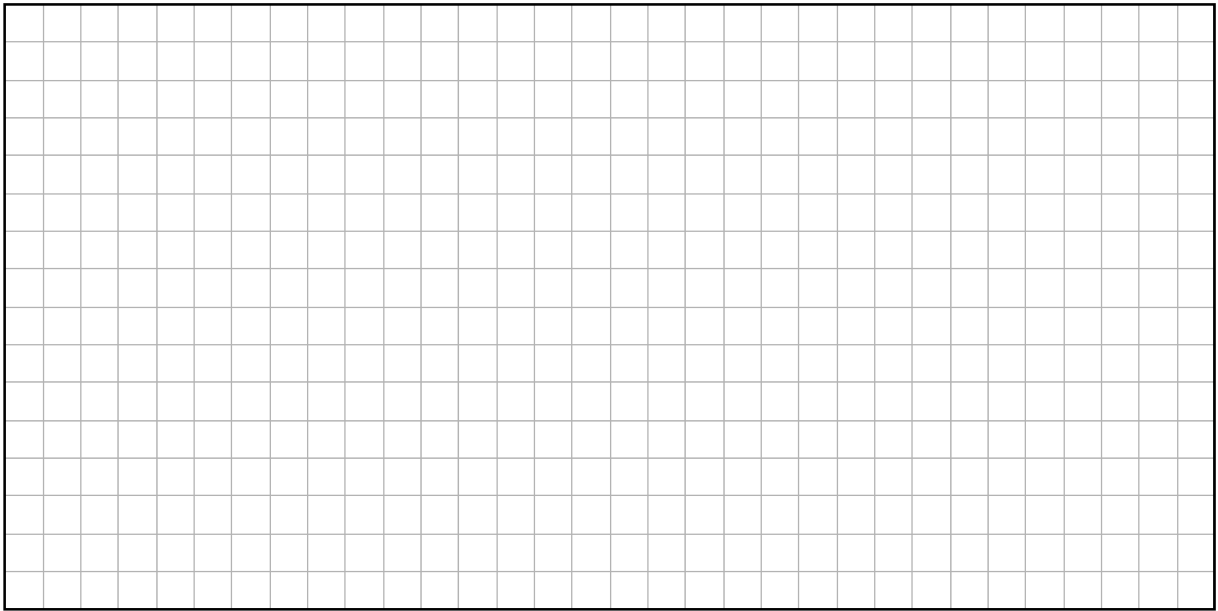


- (b) Find the two values of the time t , within the first 52 weeks, when the revenue is approximately €26 250.

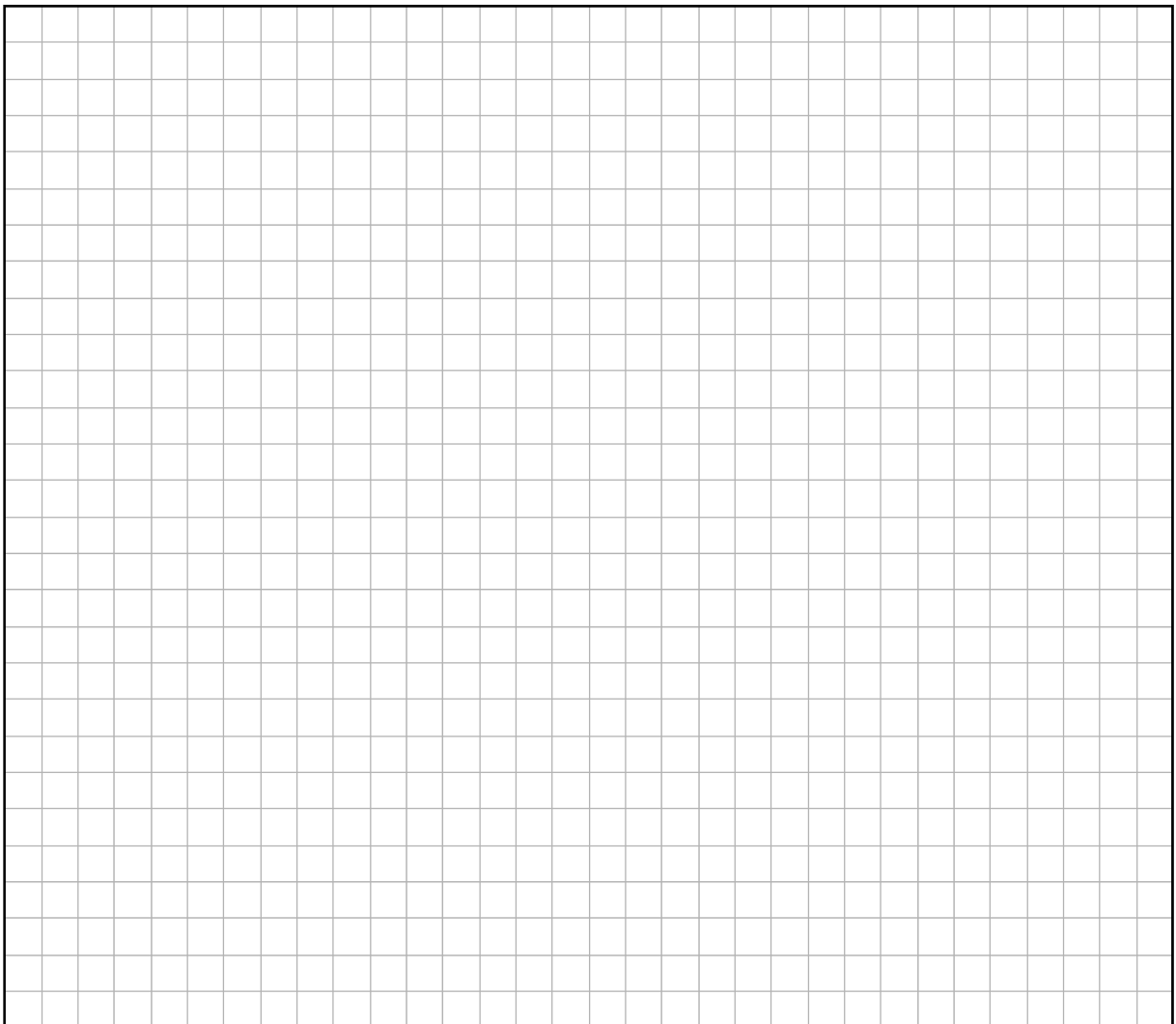


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- (c) Find $r'(t)$, the derivative of $r(t) = 22500 \cos\left(\frac{\pi}{26}t\right) + 37500$.



- (d) Use calculus to show that the revenue is increasing 30 weeks after the beginning of July.



- (e) Find a value for the time t , within the first 52 weeks, when the revenue is at a minimum. Use $r''(t)$, to verify your answer.

