

Pearson Edexcel AS Further Mathematics 8FM0

Core Pure – 5 Further Calculus

Time allowed: 45 minutes

School: www.CasperYC.club

Name:

Teacher:

Question	Points	Score
1	5	
2	8	
3	11	
4	11	
Total:	35	

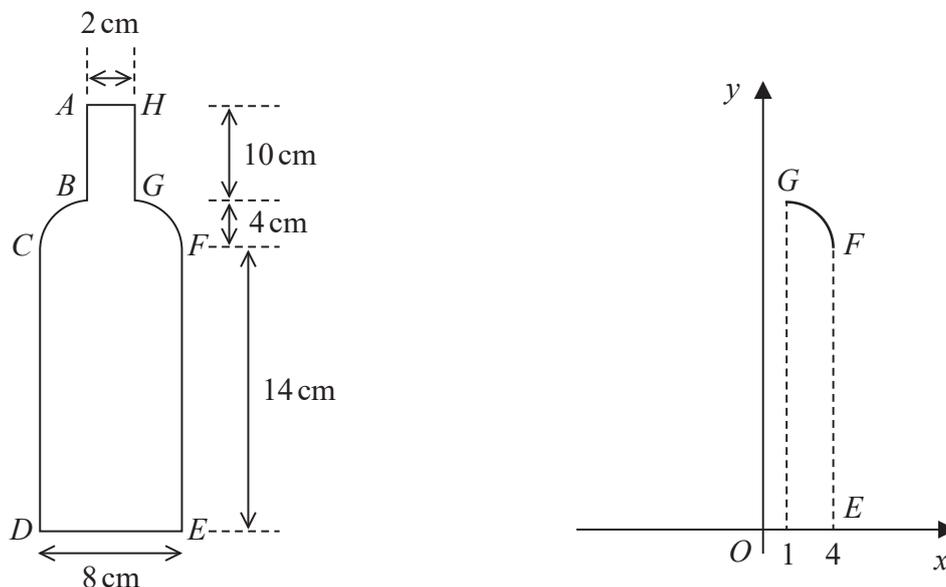
How I can achieve better:

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Last updated: February 3, 2026



3. A mathematics student is modelling the profile of a glass bottle of water. Figure below shows a sketch of a central vertical cross-section $ABCDEFGHA$ of the bottle with the measurements taken by the student.



The horizontal cross-section between CF and DE is a circle of diameter 8 cm and the horizontal cross-section between BG and AH is a circle of diameter 2 cm .

The student thinks that the curve GF could be modelled as a curve with equation

$$y = ax^2 + b, \quad 1 \leq x \leq 4$$

where a and b are constants and O is the fixed origin, as shown.

- (a) Find the value of a and the value of b according to the model. [2]
- (b) Use the model to find the volume of water that the bottle can contain. [7]
- (c) State a limitation of the model. [1]

The label on the bottle states that the bottle holds approximately 750 cm^3 of water.

- (d) Use this information and your answer to part (b) to evaluate the model, explaining your reasoning. [1]

Total: 11



