

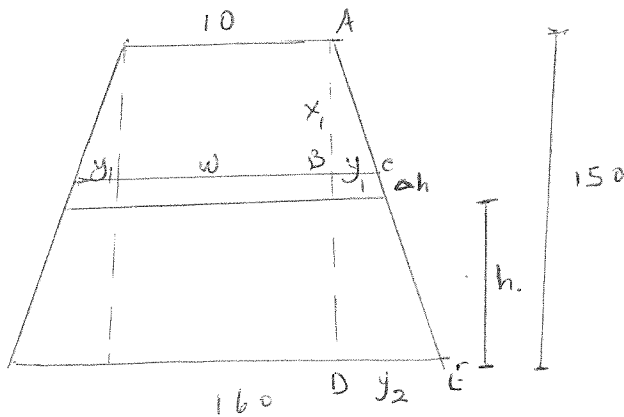
8.1 Q 28.

Solution

The volume of the material of the dam

$$V = 1400 w \Delta h.$$

Using the cross-section of the dam and slicing horizontally:



we can find w in terms of h from the similar triangles ABC and ADE .

$$\frac{x_1}{150} = \frac{y_1}{y_2} ; \quad x_1 = 150 - h, \quad y_1 = \frac{w - 10}{2}, \quad y_2 = \frac{160 - 10}{2} = 75$$

$$\Rightarrow \frac{150 - h}{150} = \frac{\frac{w - 10}{2}}{75}$$

$$\frac{150 - h}{150} = \frac{w - 10}{150}$$

$$150 - h = w - 10$$

$$\text{and } w = 160 - h.$$

Hence the sum over the interval $[0, 150]$ is

$$\sum 1400 (160 - h) \Delta h.$$

and

$$1400 \int_0^{150} (160 - h) dh.$$

$$= 1400 \left[160h - \frac{h^2}{2} \right]_0^{150}$$

$$= 1.785 \times 10^7 \text{ m}^2$$

Comments

* Most of you could not set up the equation to find w in terms of h .

* Also, some did not follow the instructions given in the question.

1, You were asked to take horizontal slices, which meant you were to sum over the interval $[0, 150]$

2, You were to find the volume of the material for the dam using definite integration and not directly calculating the volume by formula.

* A few of you forgot to multiply 1400 m, which is a constant in calculating the volume of every slice, by the sum of the areas.