

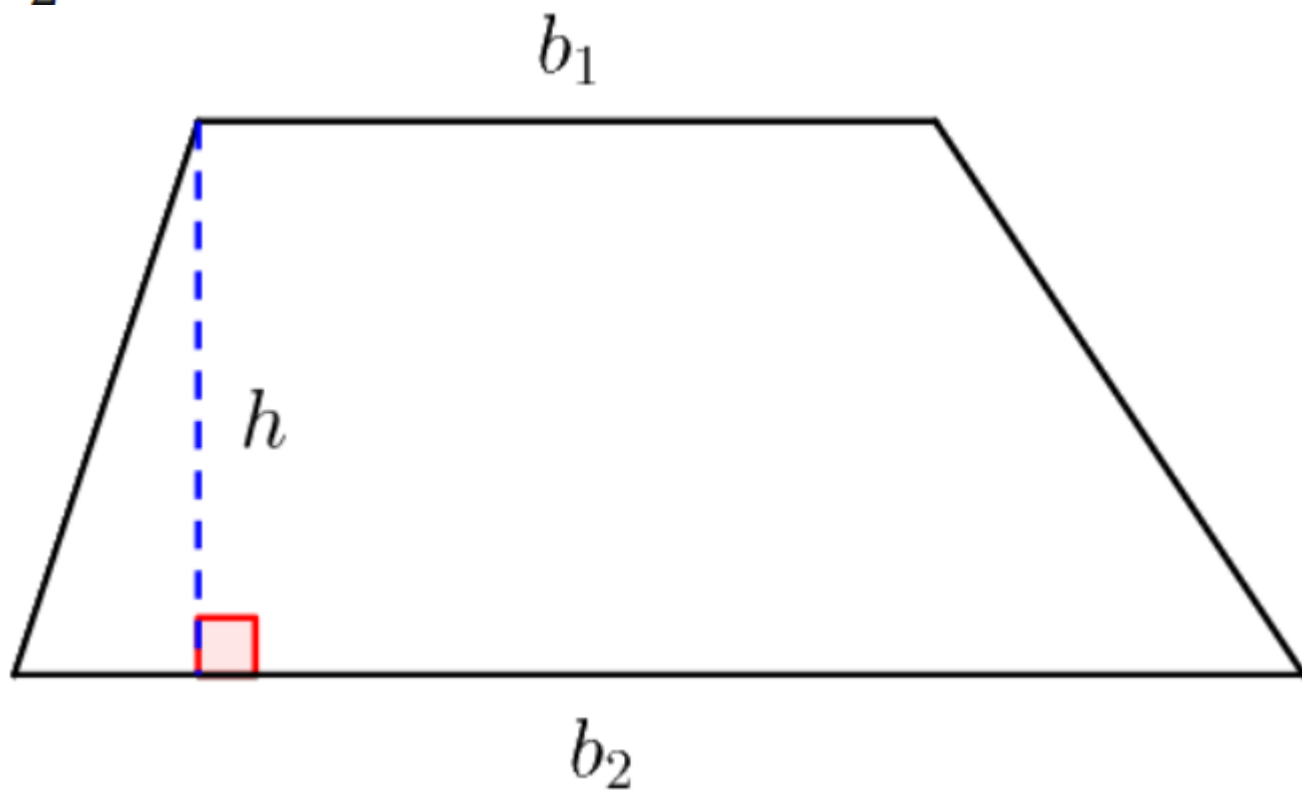
# Area and volume calculation

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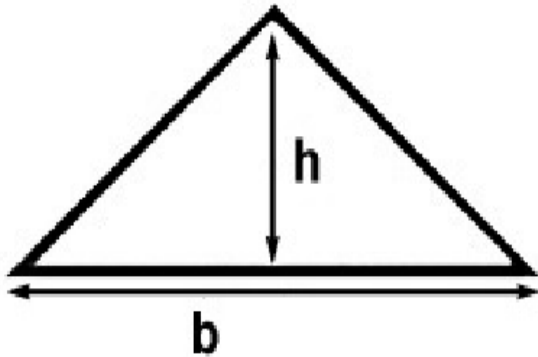
# Calculation of area of regular plane surfaces

- *The area of the trapezium*
- A **trapezium**, also known as a **trapezoid**, is a quadrilateral in which a pair of sides are parallel, but the other pair of opposite sides are non-parallel. The area of a trapezium is computed with the following formula:
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Area =  $\frac{1}{2} \times$  Sum of parallel sides  $\times$  Distance between them.



$$\text{Area} = \frac{1}{2} (b_1 + b_2) h$$

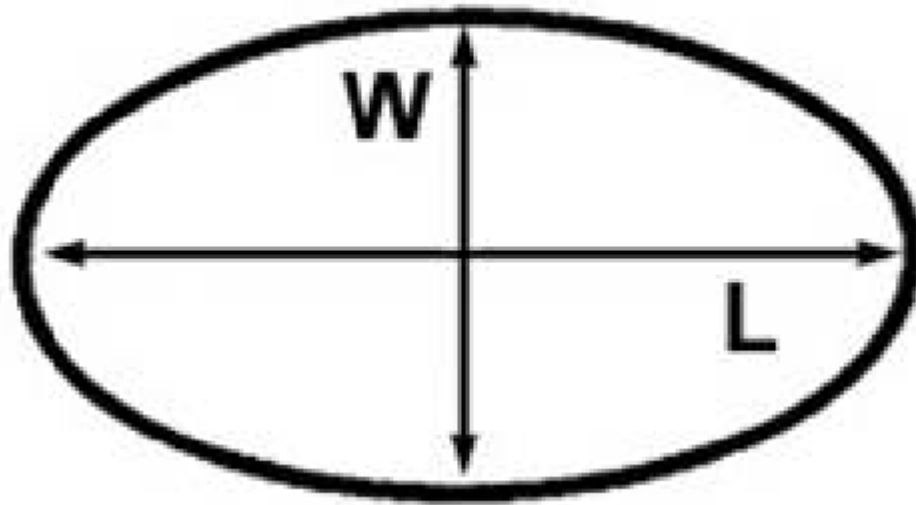


## Triangle

The area of a triangle is found by multiplying the length of the base times the length of the height, then dividing this result by 2.

$$\text{Area} = (b \times h) \times 2$$

- b = length of base
- h = length of height

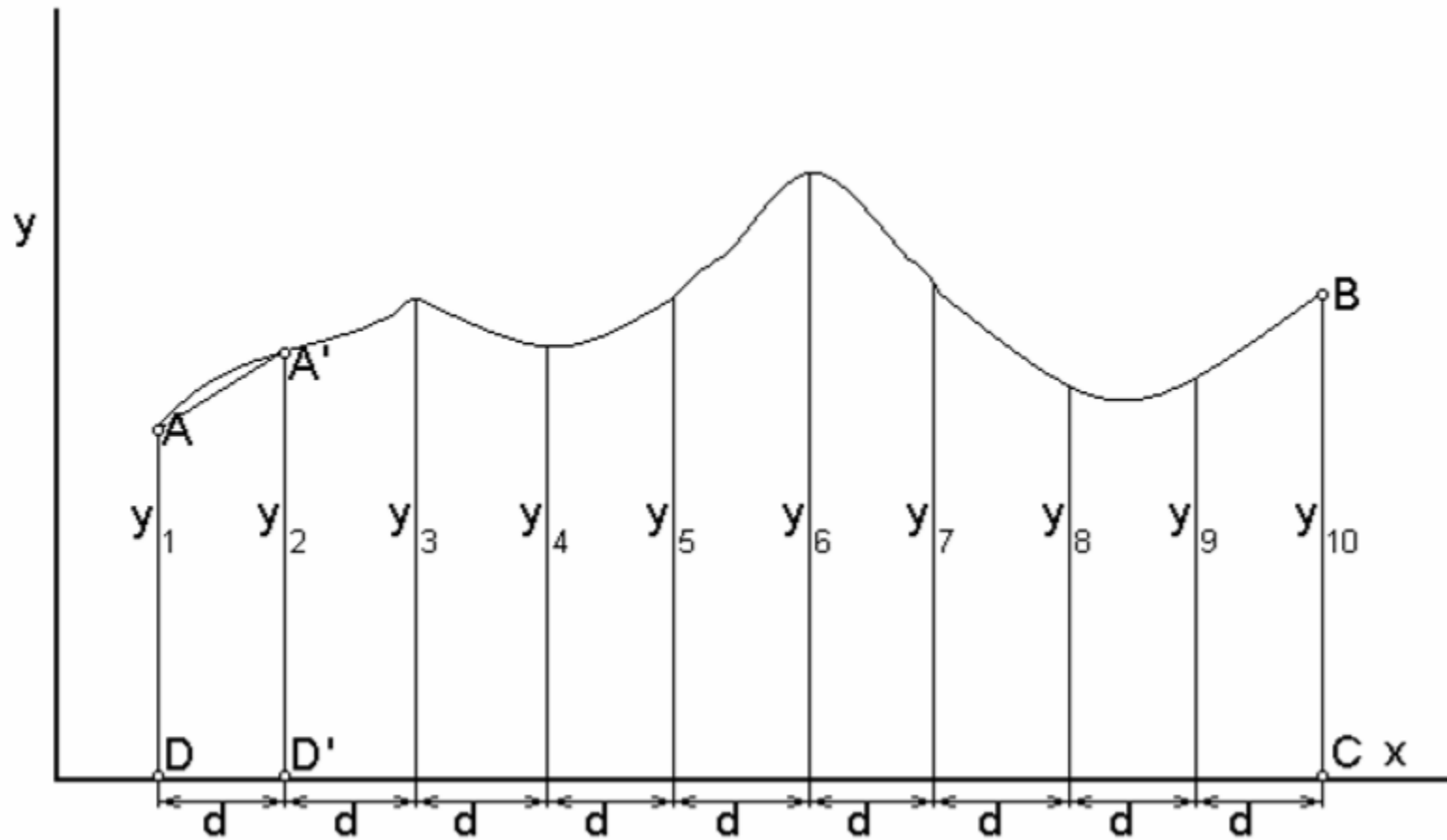


**Area = (W x L) x 0.8 where W = width, L = length**

# Area of irregular surfaces

- Trapezoidal rule
- Simpson's rule

# Trapezoidal rule



**Area = (width of interval)\*[1/2((first + last ordinate) + sum of remaining ordinates)]**

$$\text{Area} = d * \left[ \frac{y_1 + y_n}{2} (y_2 + y_3 + y_4 + \dots + y_{n-1}) \right] \quad (10.1.)$$

**Correction in formula**



$$\text{Area} = \frac{1}{3}d[(y_1 + y_n) + 4(y_2 + y_4 + \dots + y_{n-1}) + 2(y_3 + y_5 + \dots + y_{n-2})]$$

(10.3)

If the number of ordinates are even, the area of last division maybe calculated separated and added to the result obtained by applying Simpson's rule to two remaining ordinates.

$$\text{i.e. volume} = \frac{\text{common distance}}{2} \{ \text{area of first section} + \text{area of last section} + 2(\text{sum of area of other sections}) \}$$