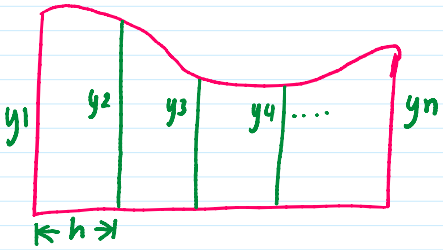
Trapezoidal Rule

10 October 2019 16:21

Used to find the approximate area of an irregular shape

Pg 12
Log tables

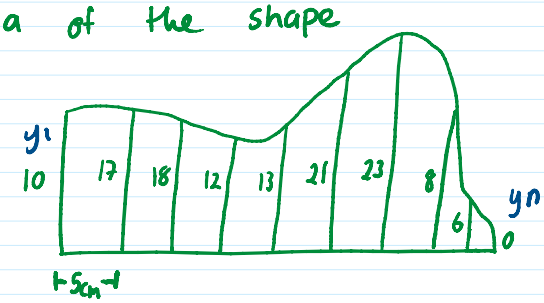


Note y = height
h = width

$$\text{Area} = \frac{h}{2}\left[y_1 + y_n + 2(y_2 + y_3 + y_4 + y_{n-1})\right]$$

Formula in words = $\frac{\text{width}}{2}\left[\text{Frist height} + \text{last height} + 2(\text{sum of all other heights})\right]$

Eg1) Use the trapezoidal rule to find the area of the shape



$$\text{Area} = \frac{5}{2}\left[10 + 0 + 2(17+18+12+13+21+23+8+6)\right]$$

Calculator

Area = 615 cm²

H/W Pg 268 Q1

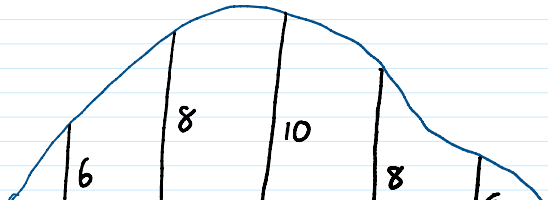
Trap Rule

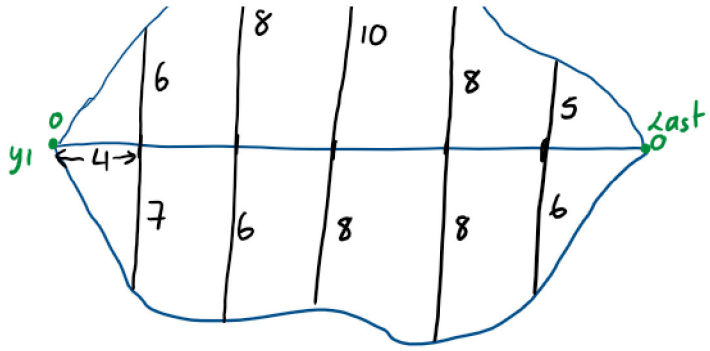
When the horizontal axis is passing through the shape.

① Work out the area of the top shape and bottom shape seperately then add the answers together

② Add the vertical heights to get the total heights then sub in to trap rule.

h = width
y = height



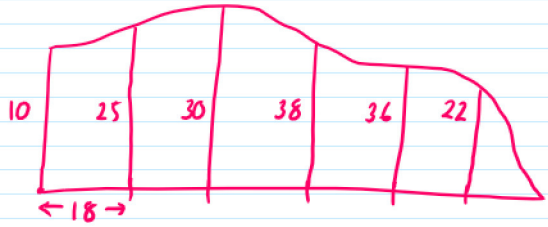


$$\text{Area} = \frac{4}{2}\left(0 + 0 + 2\left(13 + 14 + 18 + 16 + 11\right)\right)$$

calculator

$$\text{Area} = 288\text{m}^2$$

Q1) The sketch shows a lake bounded on one side by a straight dam



1) Use the trap rule to estimate the area of the lake

$$A = 18/2\left[10 + 0 + 2(25 + 30 + 38 + 36 + 22)\right] = 2808\text{ m}^2$$

2) If the lake contains 15,000m³ of water calculate the average dept of the water in the lake to the nearest m.

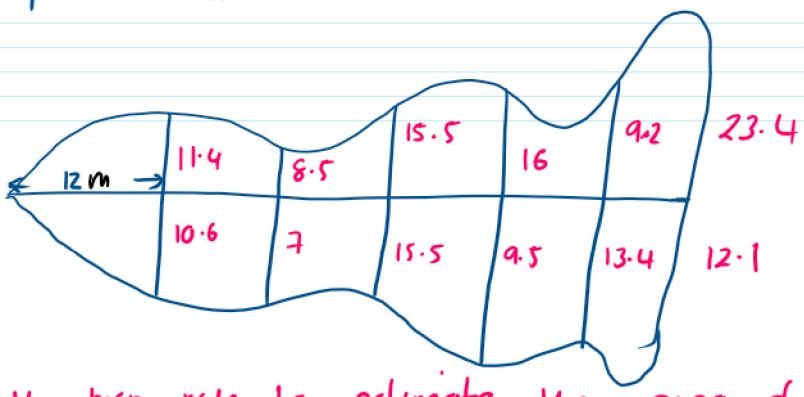
Volume = Area x Dept

$$15{,}000\text{m}^3 = (2808)D$$

$$D = \frac{15{,}000}{2808} = 5.34$$

= 5m Dept.

Q2) A piece of land



1) Use the trap rule to estimate the area of the piece of land

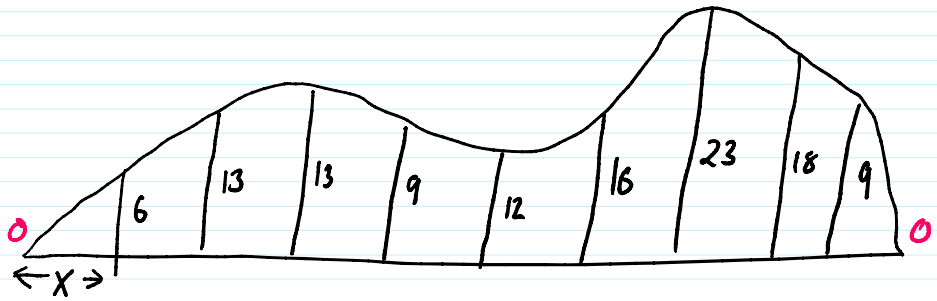
$$\text{Area} = \frac{12}{2}\left[0 + 35.5 + 2\left(22 + 15.5 + 31 + 25.5 + 22.6\right)\right] = 1612.2 \text{ m}^2$$

2) The land is valued at €280,000 per hectare. Find the value of the piece of land

Note: 1 hectare = 10,000 m^2

$$\frac{1612.2}{10000} \times 280{,}000 = €45141.6$$

Using the trap rule when missing a width (h) or a height (y)



The area of the given shape is estimated to be 732 cm^2
Find x. in cm.

$$732 = \frac{x}{2}\underbrace{\left(0 + 0 + 2(6 + 13 + 13 + 9 + 12 + 16 + 23 + 18 + 9\right)}_{\text{Calc.}}$$

$$732 = \frac{x}{2}(238)$$

Multiply

$$1464 = x(238)$$

$$\frac{1464}{238} = x$$

$$6.15_{cm} = x$$