

**Simpson's Rule** is used to calculate the area of an irregular surface.

The surface is measured using Ordinates (or Lengths).

The Ordinates are measured at regular intervals along the baseline and at right angles to it.

There should always be an uneven number of ordinates.

$$\text{Area} = W/3 \{ (\text{first} + \text{last}) + 4 (\text{evens}) + 2 (\text{odds}) \}$$

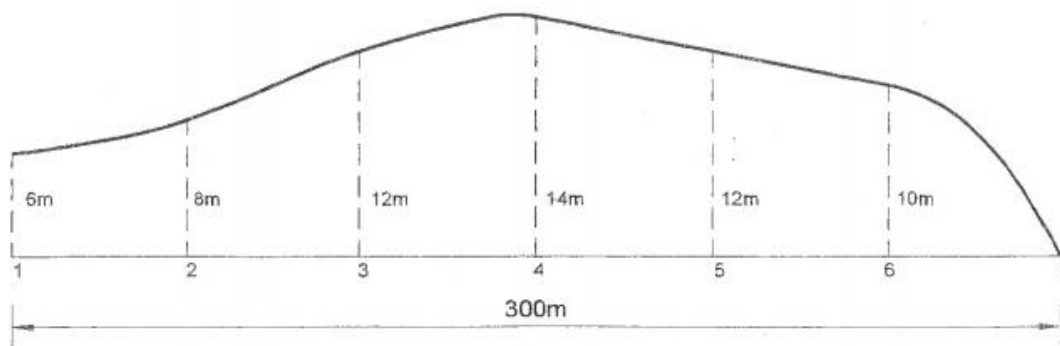
W = width of each section (should be equal widths)

(first + last) = the first ordinate + last ordinate

4 (evens) = 4 x (the sum of all of the even ordinates)

2 (odds) = 2 x (the sum of all of the odd ordinates)

**(Except the first and the last)**



$$\begin{aligned} \text{Area} &= \frac{W}{3} \{ (\text{first} + \text{last}) + 4 (\text{evens}) + 2 (\text{odds}) \} \\ &= \frac{50}{3} \{ (6 + 0) + 4 (8 + 14 + 10) + 2 (12 + 12) \} \\ &= \frac{50}{3} \{ (6) + 4 (32) + 2 (24) \} \\ &= \frac{50}{3} \{ 6 + 128 + 48 \} \\ &= \frac{50 \times 182}{3} \\ &= 3033.33\text{m}^2 \end{aligned}$$

$W = \frac{300}{6} = 50$
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Question 1. Find the area of the piece of land shown below in Fig. 1.

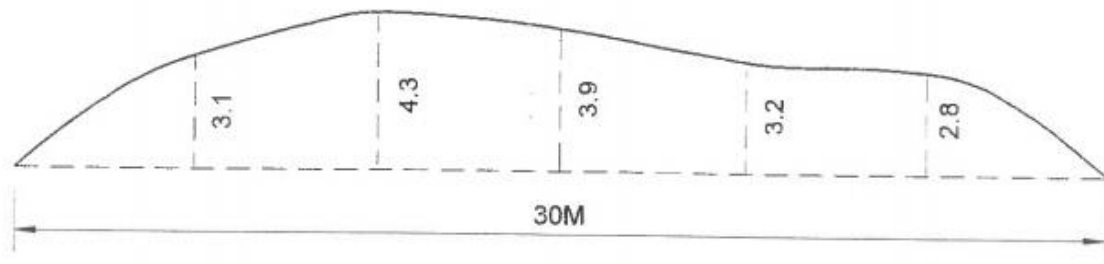
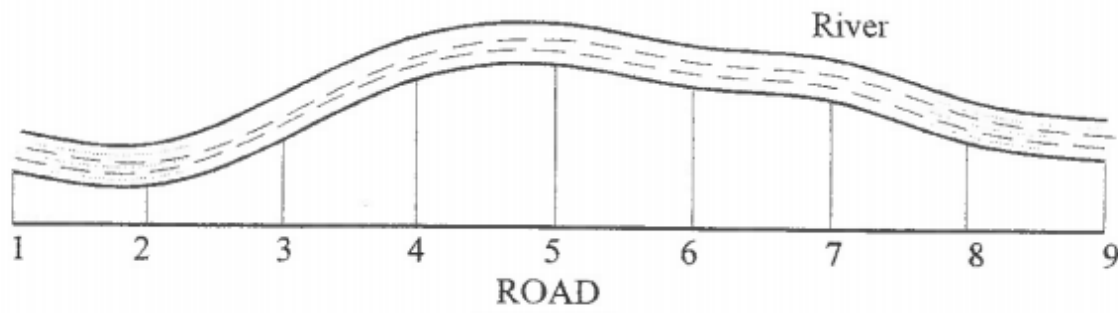


Fig. 1.

Question 2.

A local authority wants to buy the piece of land between a road and the river. The frontage to the road is 96m long. Using the ordinate lengths given in the table below, calculate the cost of the land @ €150,000 per hectare. 1 Hectare = 10,000m<sup>2</sup>



Ordinate Number	1	2	3	4	5	6	7	8	9
Ordinate Length	4.2	3.1	7.0	12.1	13.4	11.6	10.6	7.2	5.8

## Simpson's Rule (Answers)

**Q. 1**     Area =  $\frac{W}{3} \{ (\text{first} + \text{last}) + 4 (\text{evens}) + 2 (\text{odds}) \}$   
                  =  $\frac{5}{3} \{ (0 + 0) + 4 (3.1+3.9+2.8) + 2 (4.3+3.2) \}$   
                  =  $\frac{5}{3} \{ (0) + 4 (9.8) + 2 (7.5) \}$   
                  =  $\frac{5}{3} \{ 0 + 39.2 + 15 \}$   
                  =  $\frac{5 \times 54.2}{3}$   
                  = **90.333m<sup>2</sup>**

$W = \frac{30}{6} = 5$
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**Q. 2**     Area =  $\frac{W}{3} \{ (\text{first} + \text{last}) + 4 (\text{evens}) + 2 (\text{odds}) \}$   
                  =  $\frac{12}{3} \{ (4.2 + 5.8) + 4(3.1+12.1+11.6+7.2) + 2(7+13.4+10.6) \}$   
                  =  $\frac{12}{3} \{ (10) + 4 (34) + 2 (31) \}$   
                  =  $\frac{12}{3} \{ 10 + 136 + 62 \}$   
                  =  $\frac{12 \times 208}{3}$   
                  = **832m<sup>2</sup>**

$W = \frac{96}{8} = 12$
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$$\frac{832}{10,000} = 0.0832 \text{ Hectares}$$

$$€ 150,000 \times 0.0832 = \text{€ } 12,480$$