

MATHEMATICS ANSWERS

Level Three

Trapezium Rule and Simpson Rule

1. Trapezium:

$$\begin{aligned} \text{Area} &= x \left(\frac{h_1 + h_n}{2} + h_2 + h_3 + \dots + h_{n-1} \right) \\ &= 30 \left(\left(\frac{32 + 38}{2} \right) + 23 + 27 + 30 + 29 + 27 + 35 + 33 \right) \\ &= 7170\text{m}^2 \end{aligned}$$

Simpsons:

$$\begin{aligned} \text{Area} &= \frac{x}{3} \left(h_1 + h_n + \sum 2(h_{\text{odds}}) + \sum 4(h_{\text{evens}}) \right) \\ &= \frac{30}{3} \left(32 + 38 + \sum 2(27 + 29 + 35) + \sum 4(23 + 30 + 27 + 33) \right) \\ &= 7040\text{m}^2 \end{aligned}$$

2. Trapezium:

$$\begin{aligned} \text{Area} &= x \left(\frac{h_1 + h_n}{2} + h_2 + h_3 + \dots + h_{n-1} \right) \\ &= 25 \left(\left(\frac{30 + 38}{2} \right) + 35 + 32 + 34 + 35 + 38 \right) \\ &= 5200\text{m}^2 \end{aligned}$$

Simpsons:

$$\begin{aligned} \text{Area} &= \frac{x}{3} \left(h_1 + h_n + \sum 2(h_{\text{odds}}) + \sum 4(h_{\text{evens}}) \right) \\ &= \frac{25}{3} \left(30 + 38 + \sum 2(32 + 35) + \sum 4(35 + 34 + 38) \right) \\ &= 5250\text{m}^2 \end{aligned}$$

3. Trapezium:

$$Area = x \left(\frac{h_1 + h_n}{2} + h_2 + h_3 + \dots + h_{n-1} \right)$$

$$= 50 \left(\left(\frac{45 + 80}{2} \right) + 57 + 75 + 70 + 65 + 68 \right)$$
$$= 19875 \text{m}^2$$

Simpsons:

$$Area = \frac{x}{3} \left(h_1 + h_n + \sum 2(h_{\text{odds}}) + \sum 4(h_{\text{evens}}) \right)$$

$$= \frac{50}{3} \left(45 + 80 + \sum 2(75 + 65) + \sum 4(57 + 70 + 68) \right)$$

$$= 19750 \text{m}^2$$