**Activity 2: Worksheet answers**

# Practice question 1

**Step 1: Plot the curve under the arch on graph paper.**

A graph plotting the curve of the opening area underneath an arch.
The x-axis goes from 0 to 10, split into 2 metre intervals. It is labelled: horizontal position (m).
The y-axis goes from 0 to 7. It is labelled: height (m).
The graph consists of a line graph in purple representing the arch, starting at point 0, 2. It follows an inverted u-shape across points 1.5, 4.78, then 3, 6.44 then 4.5, 7 then 6, 6.44 then 7.5, 4.78 and finally 9, 2.
The area underneath the curved is shaded in light purple to represent the opening area. 

**Step 2: Divide the base width of the cross-section into equal intervals.**

The base width is 9 m.

6 intervals will give 7 ordinates.

interval width = 9 ÷ 6 = 1.5 m

**Step 3: Label the points where you will measure the ordinates.**

A graph plotting the opening area underneath an arch.
The x-axis goes from 0 to 10, split into 2 metre intervals. It is labelled: horizontal position (m).
The y-axis goes from 0 to 7. It is labelled: height (m).
The graph consists of a line graph in purple representing the arch, starting at point 0, 2. It follows an inverted u-shape across points 1.5, 4.78, then 3, 6.44 then 4.5, 7 then 6, 6.44 then 7.5, 4.78 and finally 9, 2.
The area underneath the curved is shaded in light purple to represent the opening area. Lines have been added joining the points to the x axis.

**Step 4: Find the height of each ordinate.**

The height of each ordinate is:

**Step 5: Use Simpson’s rule to calculate the area under the curve**.

interval width = 1.5

first ordinate = 2

sum of middle even ordinates = 4.78 + 7 + 4.78 = 16.56

sum of middle odd ordinates = 6.44 + 6.44 = 12.88

last ordinate = 2

m2

# Practice question 2

**Step 1: Plot the curve under the arch on graph paper.**

A graph plotting the curve of the cladding area of a Hangar roof.
The x-axis goes from 0 to 35, split into 5 metre intervals. It is labelled: horizontal position (m).
The y-axis goes from 0 to 10. It is labelled: height (m).
The graph consists of a line graph in purple representing the arch, starting at point 0, 3. It follows a wide inverted u-shape with the highest point at 18, 9, returning to 36, 3.
The area underneath the curved is shaded in light purple to represent the cladding area. 

**Step 2: Divide the base width of the cross-section into equal intervals.**

The base width is 36 m.

12 intervals gives 13 ordinates.

interval width = 36 ÷ 12 = 3 m

**Step 3: Label the points where you will measure the ordinates.**

**A graph plotting the curve of the cladding area of a Hangar roof.
The x-axis goes from 0 to 35, split into 5 metre intervals. It is labelled: horizontal position (m).
The y-axis goes from 0 to 10. It is labelled: height (m).
The graph consists of a line graph in purple representing the arch, starting at point 0, 3. It follows a wide inverted u-shape with the highest point at 18, 9, returning to 36, 3.
The area underneath the curved is shaded in light purple to represent the cladding area. Lines have been added joining the points to the x axis.**

**Step 4: Find the height of each ordinate.**

The height of each ordinate is:

**Step 5: Use Simpson’s rule to calculate the area under the curve.**

interval width = 3

first ordinate = 3

sum of middle even ordinates = 4.83 + 7.5 + 8.83 + 8.83 + 7.5 + 4.83 = 42.32

sum of middle odd ordinates = 6.33 + 8.33 + 9 + 8.33 + 6.33 = 38.32

last ordinate = 3

= 251.92