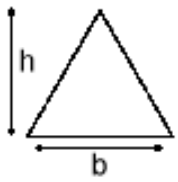
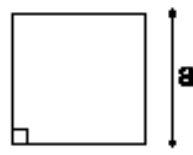


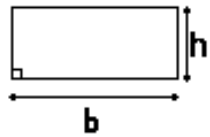
## Chapter 7: Area and Volume.



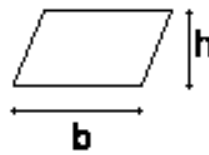
Triangle  
Area =  $\frac{1}{2}b \times h$   
b = base  
h = vertical height



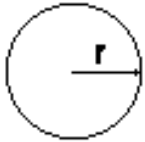
Square  
Area =  $a^2$   
Perimeter =  $4a$   
a = length of side



Rectangle  
Area =  $l \times b$   
Perimeter =  $2l + 2b$   
l = length  
b = breadth



Parallelogram  
Area =  $b \times h$   
b = breadth  
h = height



Circle  
Area =  $\pi r^2$   
Circumference =  $2\pi r$   
r = radius



Sector  
Area =  $\frac{\theta}{360} \times \pi r^2$   
r = radius

Example 1:

What is the area and perimeter of a rectangle with length 7cm and breadth 4cm.

Example 2:

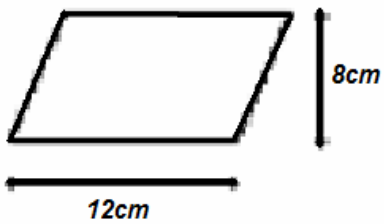
What is the area and perimeter of a square with sides of length 5cm.

Example 3:

Find the area and circumference of a circle with a diameter of 12cm

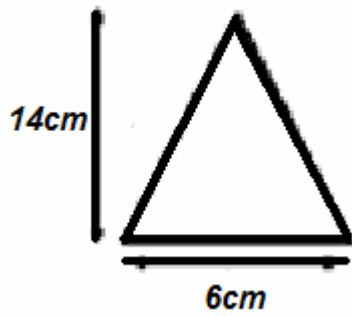
Example 4:

Find the area of the parallelogram.



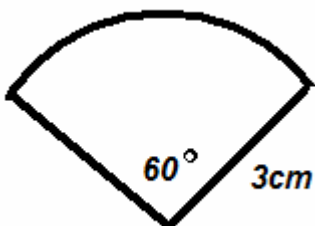
Example 5:

Find the area of the triangle.



Example 6:

Find the area and length of arc in the shape.



## Given the Perimeter or Area.

When you are given the perimeter or area of a shape, follow the steps.

1. Write the equation, e.g. area = ? or perimeter = ?
2. Use the correct formula for area or perimeter.
3. Fill in the given values.
4. Solve.

### **Example 1.**

The area of a rectangle is  $40\text{cm}^2$ . If the length is 8cm, find its width.

**Answer:**

### **Example 2.**

The circumference of a circle is 56.52cm. Find its radius. (take  $\pi$  to be 3.14)

**Answer:**

### **Example 3.**

The area of a circle is  $36\pi\text{cm}^2$ . Find its radius.

**Answer:**

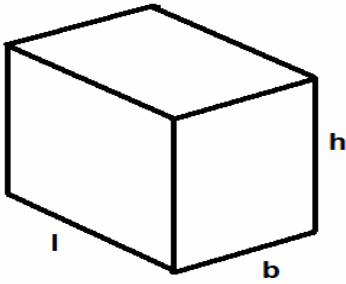
### **Example 4.**

The length and breadth of a rectangle are in the ratio 5:2 respectively. The length of the rectangle is 30cm. Find its breadth and hence find its area.

**Answer:**

## Volume and Surface Area.

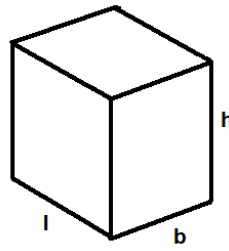
Rectangular Solid



$$\text{Volume} = l \times b \times h$$

$$\text{Surface Area} = 2lb + 2lh + 2bh$$

Cube (all sides equal)



$$\text{Volume} = l \times b \times h \quad \text{or} \quad l^3$$

$$\text{Surface Area} = 2lb + 2lh + 2bh \quad \text{or} \quad 6l^2$$

### **Example 1:**

Find the volume and surface area of a rectangular solid with sides 3cm, 5cm, 4cm.

**Answer:**

### **Example 2**

Find the volume and surface area of a cube with sides of length 5cm.

**Answer:**

### **Example 3.**

The volume of a rectangular box is  $270\text{cm}^3$ . If its length is 9cm and its breadth is 5cm, calculate its height.

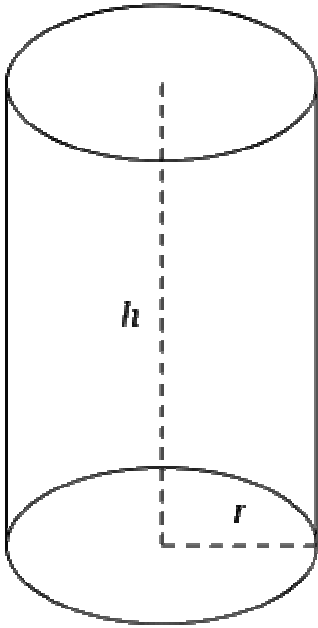
**Answer.**

### **Example 4.**

The volume of a cube is  $343\text{cm}^3$ . Find its surface area.

**Answer:**

## Cylinder.



$$\text{Volume} = \pi r^2 h$$

$$\text{CSA} = 2\pi r h$$

$$\text{TSA} = 2\pi r h + 2\pi r^2$$

### **Example.**

Find the volume, CSA and TSA of a cylinder with a radius of 4cm and a height of 10cm. (take  $\pi=3.14$ )

$$\text{Volume} = \pi r^2 h$$

(i)  $\text{Volume} = (3.14)(4)^2(10)$

$$\text{Volume} = 502.4\text{cm}^3$$

$$\text{CSA} = 2\pi r h$$

(ii)  $\text{CSA} = 2(3.14)(4)(10)$

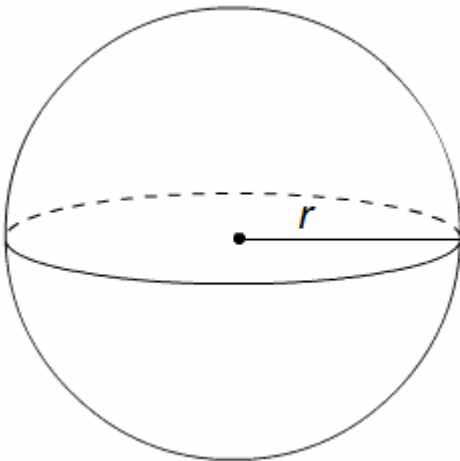
$$\text{CSA} = 251.2\text{cm}^2$$

$$\text{TSA} = 2\pi r h + 2\pi r^2$$

(iii)  $\text{TSA} = 251.2 + 2(3.14)(4)^2$

$$\text{TSA} = 351.68\text{cm}^2$$

## Sphere.



$$\text{Volume} = \frac{4}{3}\pi r^3$$

$$\text{CSA} = 4\pi r^2$$

### **Example.**

Find the volume and CSA of a sphere with a radius of 7cm.

(take  $\pi = \frac{22}{7}$ )

$$\text{Volume} = \frac{4}{3}\pi r^3$$

(i)  $\text{Volume} = \frac{4}{3}\left(\frac{22}{7}\right)(7)^3$

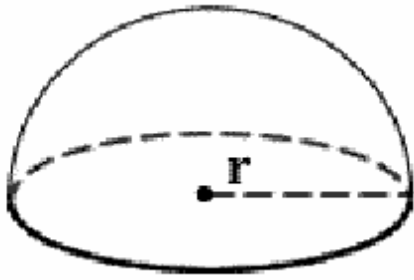
$$\text{Volume} = 1437.33\text{cm}^3$$

$$\text{CSA} = 4\pi r^2$$

(ii)  $\text{CSA} = 4\left(\frac{22}{7}\right)(7)^2$

$$\text{CSA} = 616\text{cm}^2$$

## Hemisphere



$$\text{Volume} = \frac{2}{3}\pi r^3$$

$$\text{CSA} = 2\pi r^2$$

$$\text{TSA} = 3\pi r^2$$

### **Example.**

Find the volume, CSA and TSA of a hemisphere with a radius of 6cm. (take  $\pi = \pi$ )

$$\text{Volume} = \frac{2}{3}\pi r^3$$

$$(i) \text{ Volume} = \frac{2}{3}\pi(6)^3$$

$$\text{Volume} = 144\pi \text{cm}^3$$

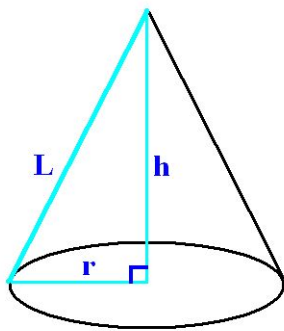
$$\text{CSA} = 2\pi r^2$$

$$(ii) \text{ CSA} = 2\pi(6)^2$$

$$\text{CSA} = 72\pi \text{cm}^2$$

$$\text{TSA} = 3\pi r^2$$

## Cone



$$L^2 = h^2 + r^2$$

$$\text{Volume} = \frac{1}{3}\pi r^2 h$$

$$\text{CSA} = \pi r l$$

$$\text{TSA} = \pi r l + \pi r^2$$

$$\text{Pythagoras's Theorem : } l^2 = r^2 + h^2$$

### **Example.**

Find the (i) slant height, (ii) volume, (iii) CSA (iv) TSA of a cone with radius 5cm and height 12cm. (take  $\pi = 3.14$ )

$$l^2 = r^2 + h^2$$

$$(i) \quad l^2 = 5^2 + 12^2$$

$$l^2 = 169$$

$$l = \sqrt{169} = 13$$

$$\text{Volume} = \frac{1}{3}\pi r^2 h$$

$$(ii) \text{ Volume} = \frac{1}{3}(3.14)(5)^2(12)$$

$$\text{Volume} = 314\text{cm}^3$$

$$\text{CSA} = \pi r l$$

$$(iii) \text{ CSA} = (3.14)(5)(13)$$

$$\text{CSA} = 204.1\text{cm}^2$$

$$\text{TSA} = \pi r l + \pi r^2$$

$$(iv) \text{ TSA} = 204.1 + (3.14)(5)^2$$

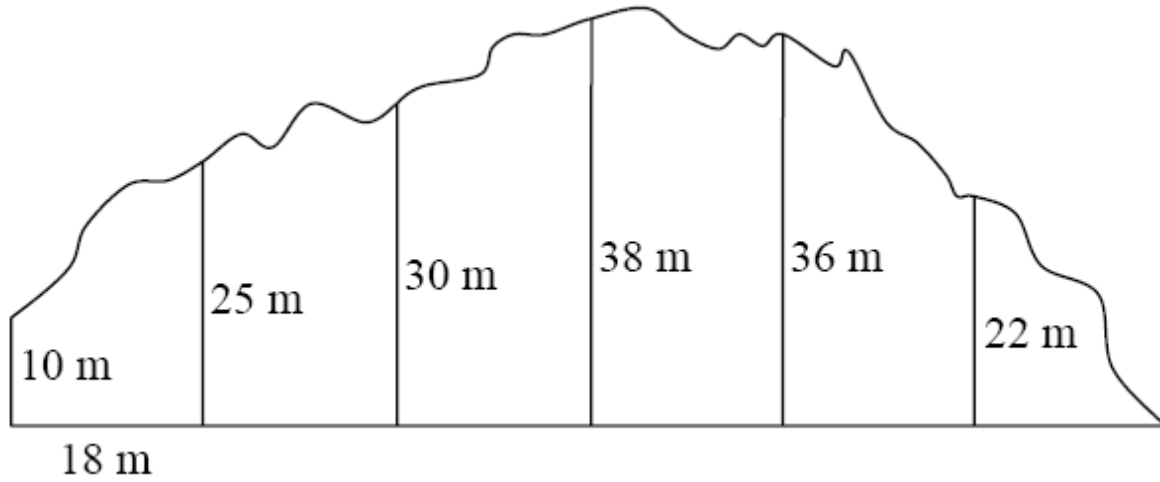
$$\text{TSA} = 282.6\text{cm}^2$$

**Simpsons Rule.**

$$area = \frac{w}{3} \{(first + last) + 4(evens) + 2(odds)\}$$

**Example:**

Find the area of the diagram using Simpsons rule.



**Answer:**

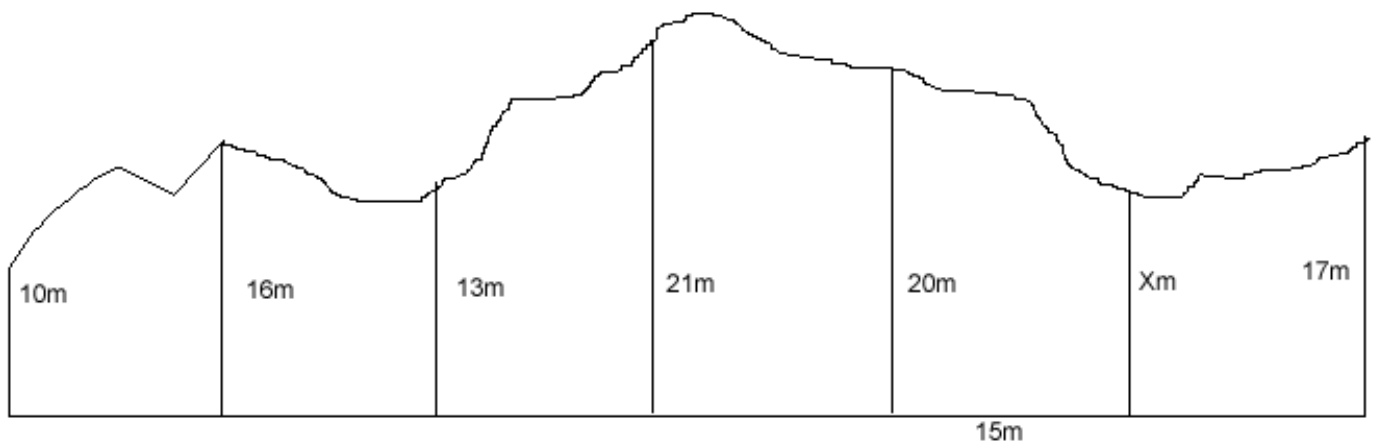
First thing we do is label all the heights in the diagram with h1, h2, h3....., and label w.

- w =
- first =
- last =
- evens =
- odds =

**Example 2:**

The area of the shape below is  $1485\text{m}^2$ . Use Simpsons rule to find X.

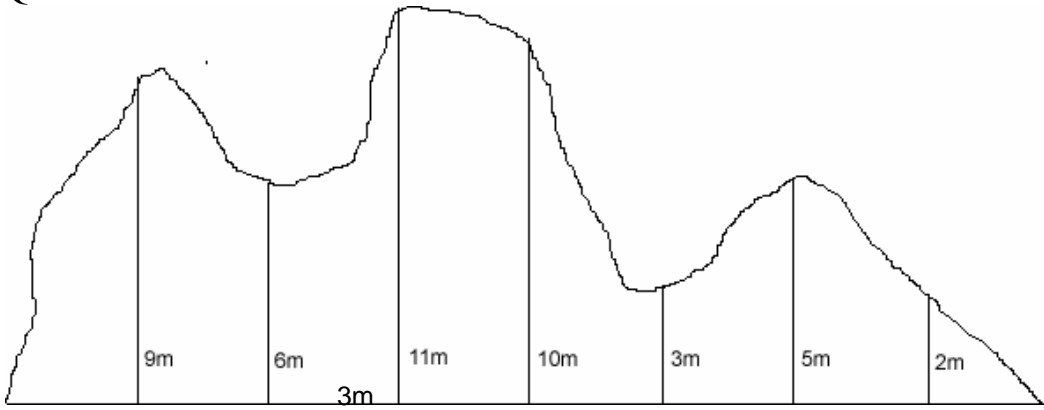
**Answer:**



w =  
first =  
last =  
evens =  
odds =

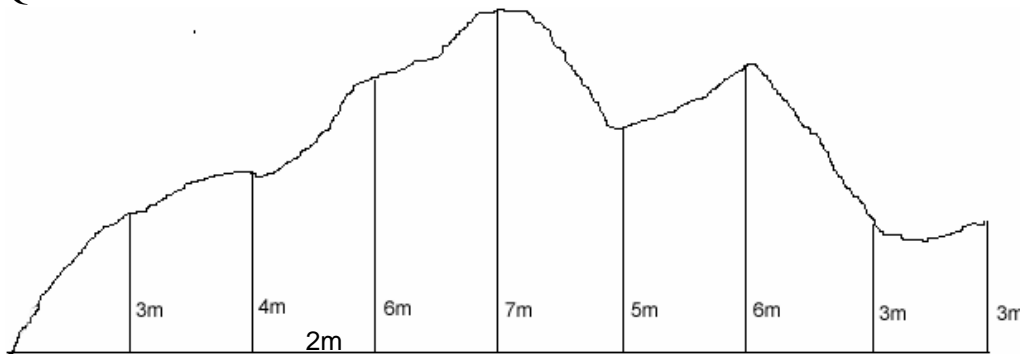
Extra Simpson Rule questions.

Q1



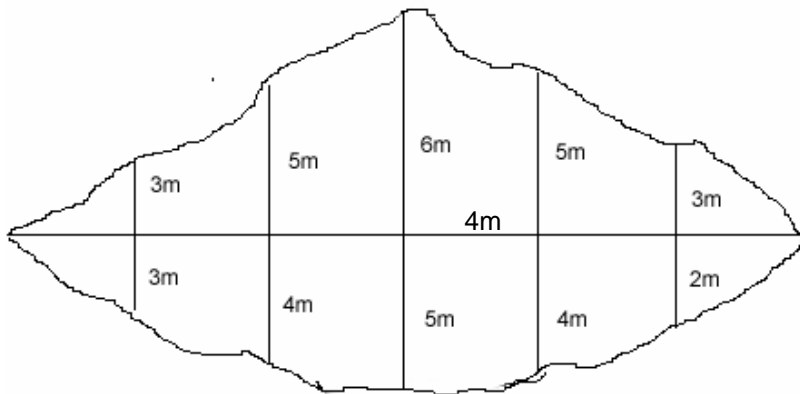
w =  
 first =  
 last =  
 evens =  
 odds =

Q2.



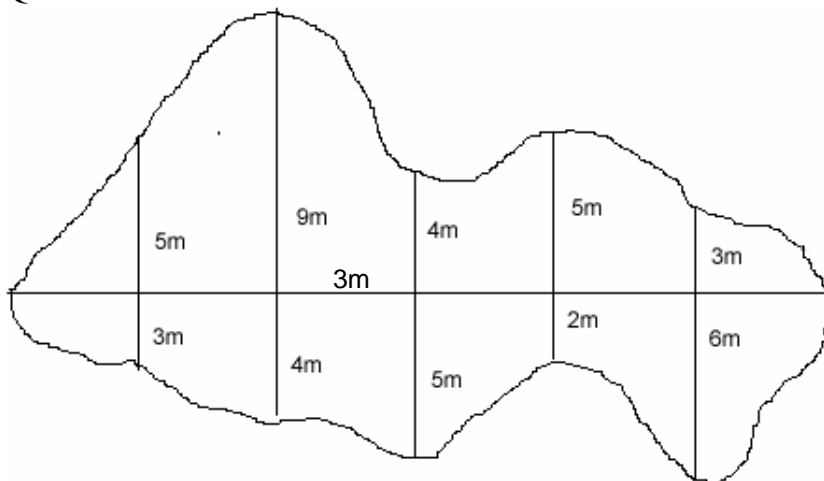
w =  
 first =  
 last =  
 evens =  
 odds =

Q3.



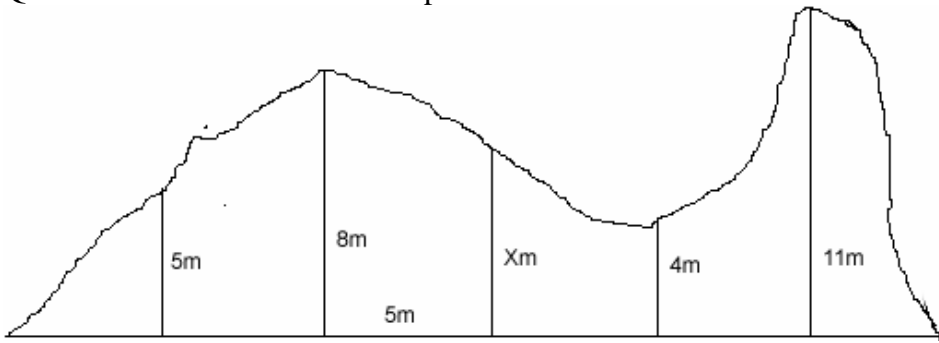
w =  
 first =  
 last =  
 evens =  
 odds =

Q4.



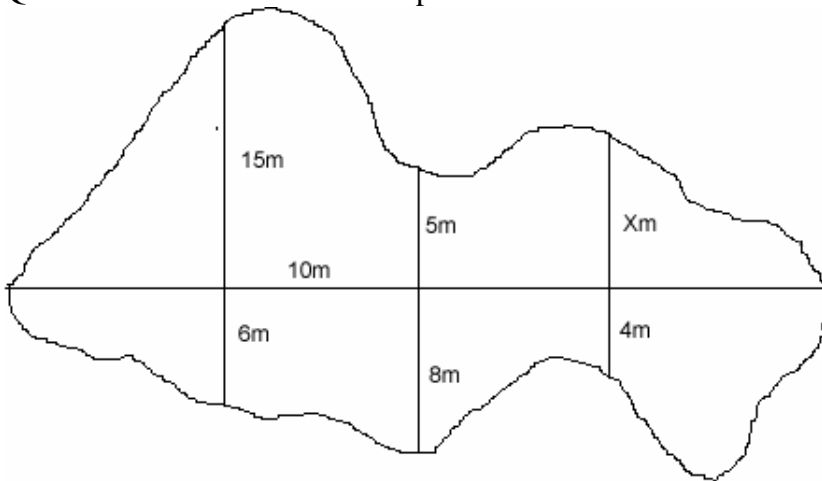
w =  
 first =  
 last =  
 evens =  
 odds =

Q5. Find X if the area of the shape is



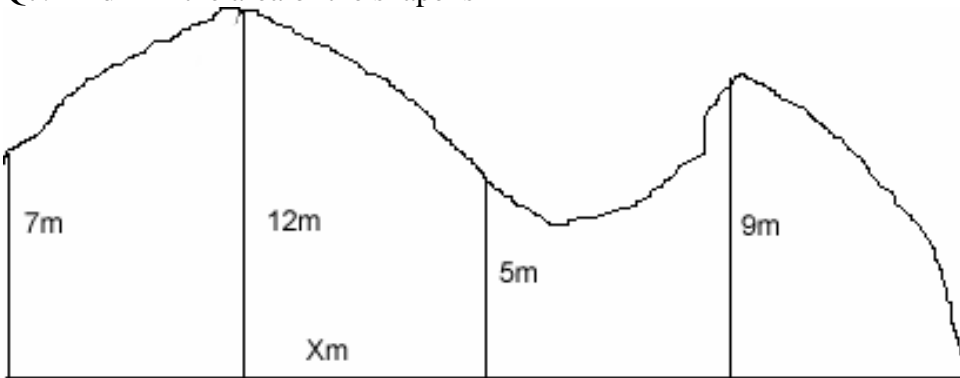
w =  
 first =  
 last =  
 evens =  
 odds =

Q6. Find X if the area of the shape is



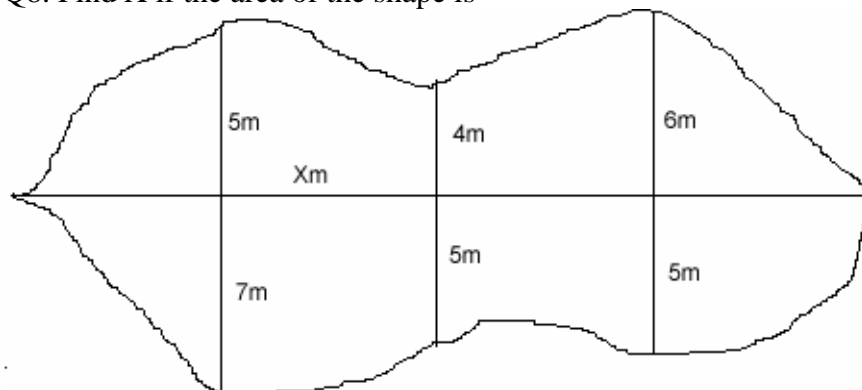
w =  
 first =  
 last =  
 evens =  
 odds =

Q7. Find X if the area of the shape is



w =  
 first =  
 last =  
 evens =  
 odds =

Q8. Find X if the area of the shape is



w =  
 first =  
 last =  
 evens =  
 odds =