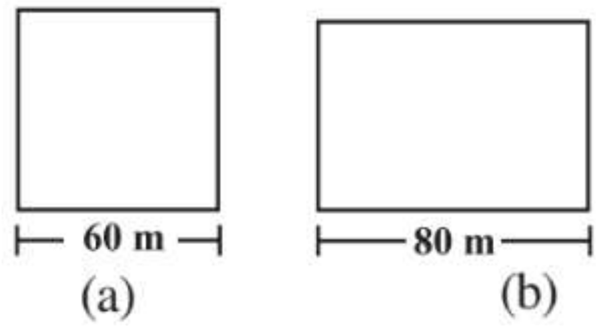
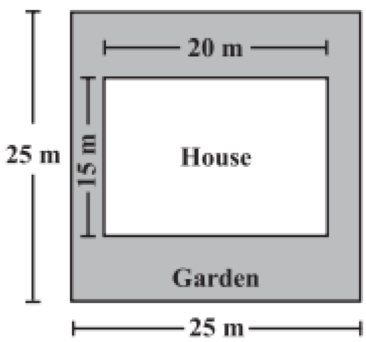
Mensuration: Exercise 11.1

Q.1 A square and a rectangular field with measurements as given in the figure have the same perimeter. Which field has a larger area?



Sol. Given: rectangle and square have same perimeter.
Since, Perimeter of a square = 4 x Side of the square
= 4 x 60 m
= 240 m.
And Perimeter of a rectangle = 2 x (length + breadth)
= 2 x (80 m + breadth)
= 160 m + 2 x breadth
Since, perimeter of rectangle is equal to perimeter of square.
So, 160 m + 2 x breadth = 240 m
2 x breadth = 80 m
Thus, breadth = 40 m
Now, area (square) = $(\text{side})^2$
= $(60\text{ m})^2$
= 3600 m^2.
And area (rectangle) = length x breadth
= (80 x 40)
= 3200 m^2.
Therefore, the area of the square field is larger than area of rectangle.

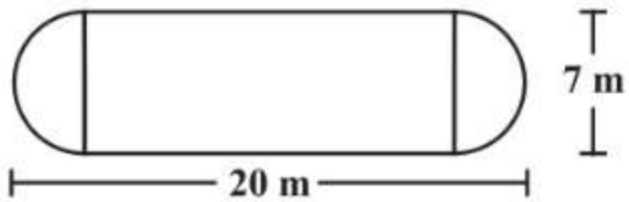
Q.2 Mrs. Kaushik has a square plot with the measurement as shown in the figure. She wants to construct a house in the middle of the plot. A garden is developed around the house. Find the total cost of developing a garden around the house at the rate of Rs 55 per m^2.



Sol. Side of square plot = 25 cm
So, area of the square plot = $(\text{side})^2$
= $(25\text{ m})^2$
= 625 m^2.
Now, from figure length of house l = 20 m and breadth b = 15 m
So, area of the house = length x breadth
= (15 m x 20 m)
= 300 m^2.
Thus, area (remaining portion) = Area (square plot) – Area (house)
= 625 m^2 - 300 m^2
= 325 m^2

Since, cost of developing the garden around the house = Rs 55 per m^2.
So, cost of developing the garden of area 325 m^2 = 55 x 325
= Rs. 17,875

Q.3 The shape of a garden is rectangular in the middle and semi circular at the ends as shown in the diagram. Find the area and the perimeter of this garden [Length of rectangle is 20 – (3.5 + 3.5) metres].



Sol. From the figure, diameter of semi - circle = 7 m.
So, radius of semi - circle = 7/2 = 3.5 m

Area of two semi – circles = 2 x $\frac{1}{2}\pi r^2$

$= 2\times\frac{1}{2}\times\frac{22}{7}\times 3.5\times 3.5$

= 38.5 m^2

Now, length of the rectangular field = 20 – (3.5 + 3.5) (Given)
= 20 – 7
= 13 m
Breadth of the rectangular field = 7 m
So, area of the rectangular field = length x breadth
= 13 m x 7 m
= 91 m^2
Thus, area of garden = 91 + 38.5 = 129.5 m^2
Here, perimeter of two semi – circles = $2\times\pi\times r$

$= 2\times\frac{22}{7}\times 3.5$

= 22 m
Now, perimeter of the garden will be = 22 m + 13 m + 13 m
= 48 m
Therefore, the area = 129.5 m^2 and perimeter = 48m of garden.

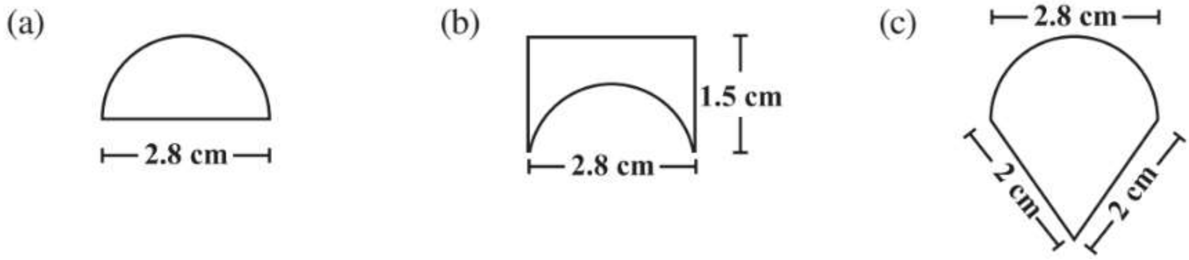
Q.4 A flooring tile has the shape of a parallelogram whose base is 24 cm and the corresponding height is 10 cm. How many such tiles are required to cover a floor of area 1080 m^2? (If required you can split the tiles in whatever way you want to fill up the corners).
Sol. Since, base of the tile = 24 cm = 0.24 m
And height of the tile = 10 cm = 0.10 m
So, area of tile = base x height
= 0.24 x 0.10
= 0.024 m^2

Now, number of tile required to cover the floor = $\frac{\text{Area of floor}}{\text{Area of one tile}}$

$= \frac{1080}{0.024}$

= 45000 tiles
Therefore, number of tiles required for area 1080 m^2 = 45000.

Q.5 An ant is moving around a few food pieces of different shapes scattered on the floor. For which food-piece would the ant have to take a longer round? Remember, circumference of a circle can be obtained by using the expression $c = 2\pi r$, where r is the radius of the circle.



Sol. In given figures which has maximum perimeter, ant will take longer round of that figure. So, firstly find the perimeter for each figure.

(a) From the first figure, diameter = 2.8 cm.

So, radius = $\frac{2.8}{2}$ = 1.4 cm.

Now, perimeter of semi-circle = π r
= π x 1.4 cm
= 4.4 cm.

So, total perimeter = (perimeter of diameter) + (perimeter of semi-circle)
= 2.8 cm + 4.4 cm
= 7.2 cm

(b) From second figure, perimeter of semi-circle = π r
= π x 1.4 cm
= 4.4 cm

So, Total perimeter = (perimeter of three sides) + (perimeter of semi-circle)
= (1.5 + 2.8 + 1.5) + 4.4
= 10.2 cm

c) From third figure, perimeter of semi-circle = π r
= π x 1.4 cm
= 4.4 cm

So, Total perimeter = (perimeter of two sides) + (perimeter of semi-circle)
= (2 + 2) + (4.4)
= 8.4 cm

So from the calculation, figure (b) has maximum perimeter, for this figure ant will have to take a longer round.