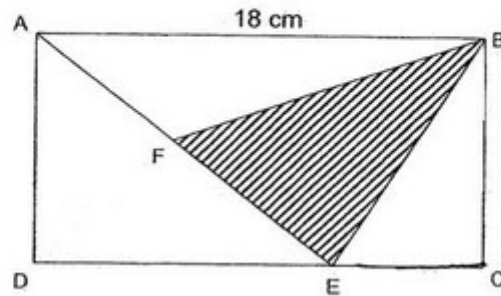
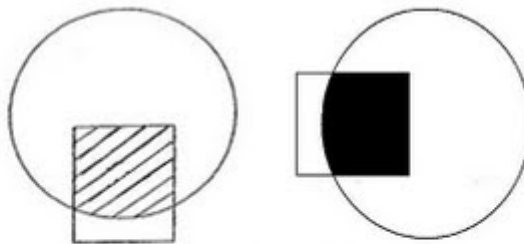
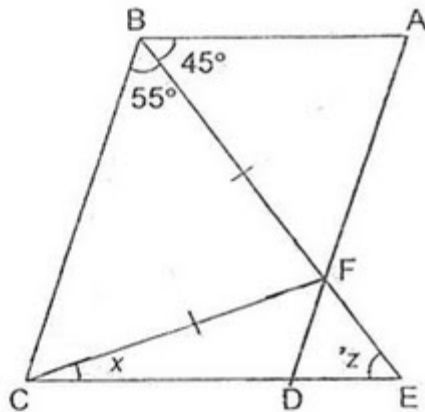


Rectangle ABCD has a perimeter of 56 cm. Given that the area of triangle ABF is  $42 \text{ cm}^2$  and  $AB = 18 \text{ cm}$ , find the area of triangle BEF.

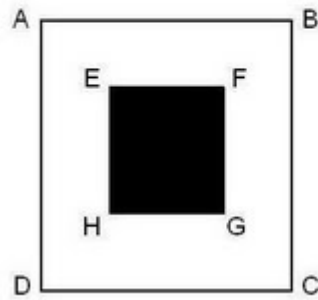


The figure below is not drawn to scale. ABCD is a parallelogram. CDE and BFE are straight lines.  $CF = BF$ ,  $\angle CBF = 55^\circ$  and  $\angle ABF = 45^\circ$ . Find the difference between  $\angle z$  and  $\angle x$ .

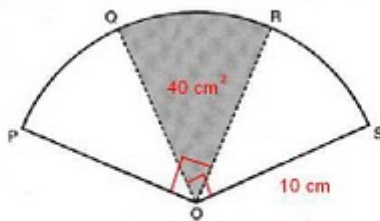


The figure is made up of a circle and a rectangle. The area of the rectangle is  $\frac{3}{8}$  of the area of the circle. The shaded area is  $88 \text{ cm}^2$ . The area of the unshaded part of the rectangle is 10% that of the unshaded part of the circle. What is the difference between the unshaded areas?

The figure below shows 2 squares, ABCD and EFGH. The length of each square is a whole number. The area of the unshaded part is  $28 \text{ cm}^2$ . What is the perimeter of the Square ABCD?



OPQRS is part of a circle of radius 10 cm. OPR and OQS are quarter circles. The area of the shaded part OQR is  $40 \text{ cm}^2$  and the perimeter of the shaded part OQR is 28 cm.



For each of the following, use the calculator value of  $\pi$  to find

- (a) the area of the figure OPQRS, correct to 2 decimal places,  
 (b) the perimeter of the figure OPQRS, correct to 2 decimal places.

$$\frac{1}{4} \times \pi \times 10 \times 10 = 78.55$$

$$78.55 - 40 = 38.55$$

$$38.55 + 78.55 = 117.10 \text{ cm}^2$$

a) The area of the figure OPQRS is  $117.10 \text{ cm}^2$

$$\frac{1}{4} \times 2 \times \pi \times 10 = 15.71$$

$$28 - 10 - 10 = 8$$

$$15.71 - 8 = 7.71$$

$$10 + 10 + 15.71 + 7.71 = 43.42 \text{ cm}$$

b) The perimeter of the figure OPQRS is 43.42 cm.

The figure below shows a right-angled isosceles triangle ABC and part of a circle of diameter 20 cm. Given that BD is equal to DC, find the difference in the areas of the shaded parts.

Area of part circle,  $x = C + D$  (Take  $\pi = 3.14$ ) A

Area of triangle ACD,  $y = B + D$

$$x - y = C + D - B - D = C - B$$

Right-angled isosceles triangle  $\rightarrow \angle ABC = 45^\circ$

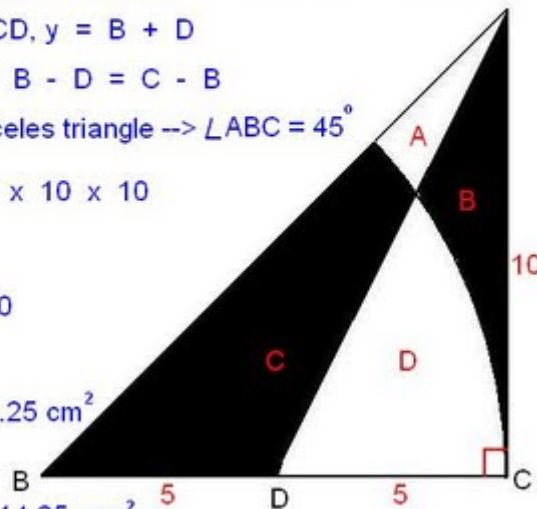
$$x = \frac{45}{360} \times 3.14 \times 10 \times 10$$

$$= 39.25$$

$$y = \frac{1}{2} \times 5 \times 10$$

$$= 25$$

$$39.25 - 25 = 14.25 \text{ cm}^2$$



The difference is  $14.25 \text{ cm}^2$ .

The diagram is made up of a circle with diameter 20 cm, 2 semicircles and a rectangle.

Find the difference between the sum of areas A and B and the sum of areas X and Y. [5]

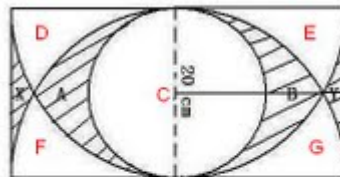
(Take  $\pi = 3.14$ ) Ans:  $142 \text{ cm}^2$

$$A + B = \text{Semicircle} - \text{Circle} - D - E$$

$$X + Y = \text{Rectangle} - \text{Semicircle} - F - G$$

$$(A + B) - (X + Y) = 2 \text{ Semicircle} - \text{Circle} - \text{Rectangle}$$

(since  $D = E = F = G$ )



$$3.14 \times 20 \times 20 = 1256$$

$$3.14 \times 10 \times 10 = 314$$

$$40 \times 20 = 800$$

$$1256 - 314 - 800 = 142 \text{ cm}^2$$

The difference between the sum of areas A and B and the sum of areas X and Y is  $142 \text{ cm}^2$ .

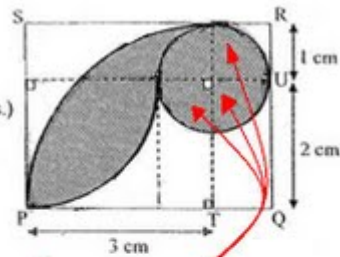
The shaded figure below is formed by a semicircle and quarter circles. It lies within the rectangle PQRS in which RU = 1 cm, UQ = 2 cm and PT = 3 cm.

- (a) Find the perimeter of the shaded region.

(Give your answer in terms of  $\pi$ .)

- (b) Find the area of the shaded region.

(Give your answer correct to 2 decimal places.)



$\frac{3}{4}$  Area of circle  
 + Big Quadrant  
 - Rectangle 2 by 1  
 - (Square 2 by 2 - Small Quadrant)

$$\frac{1}{4} \times 2 \times \pi \times 3 = 1.5\pi$$

$$3 - 1 = 2$$

$$\frac{1}{4} \times 2 \times \pi \times 2 = \pi$$

$$\frac{3}{4} \times 2 \times \pi \times 1 = 1.5\pi$$

$$1.5\pi + \pi + 1.5\pi = 4\pi \text{ cm}$$

- a) The perimeter of the shaded region is  $4\pi$  cm.

$$\frac{3}{4} \times \frac{22}{7} \times 1 \times 1 = 2.36$$

$$\frac{1}{4} \times \frac{22}{7} \times 3 \times 3 = 7.07$$

$$2 \times 1 = 2$$

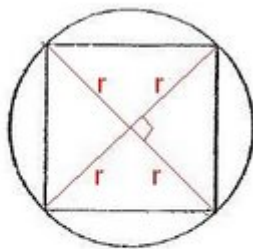
$$2 \times 2 = 4$$

$$\frac{1}{4} \times \frac{22}{7} \times 2 \times 2 = 3.14$$

$$2.36 + 7.07 - 2 - 4 + 3.14 = 6.57 \text{ cm}^2$$

The area of the shaded region is  $6.57 \text{ cm}^2$ .

- 30 A square is inscribed in a circle as shown below. If the area of the square is  $70 \text{ cm}^2$ , what is the area of the circle? (Take  $\pi = \frac{22}{7}$ )



$$\text{Area of 1 small triangle} = \frac{1}{2} r \times r = \frac{70}{4}$$

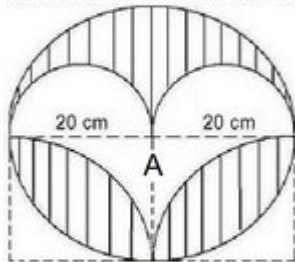
$$r \times r = 35$$

$$\text{Area of circle} = \frac{22}{7} \times 35 = 110 \text{ cm}^2$$

The figure is made up of 6 identical quarter circles and 2 identical semicircles. The radius of each quarter circle is 20 cm.

- (a) The unshaded part, marked A, is enclosed by 2 quarter circles and 2 semicircles. What is the perimeter of A?  
 (b) What is the total area of the shaded parts ?

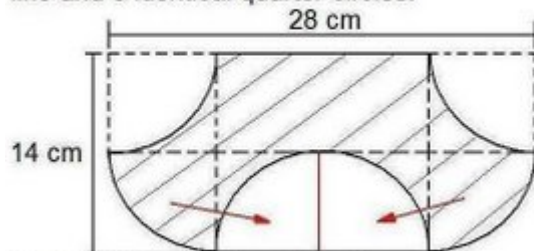
(Take  $\pi = 3.14$ )



Perimeter  $\rightarrow 0.5 \text{ Big Circle} + 1 \text{ Small Circle}$   
 $= 0.5 \times 2 \times 3.14 \times 20 + 2 \times 3.14 \times 10$   
 $= 125.6 \text{ cm}$

Shaded area  $\rightarrow 1.5 \text{ Big Circle} - 1 \text{ Small Circle} - 2 \text{ Squares}$   
 $= 1.5 \times 3.14 \times 20 \times 20 - 3.14 \times 10 \times 10 - 2 \times 20 \times 20$   
 $= 770 \text{ cm}^2$

The shaded figure shows a flowerbed which is formed by 1 straight line and 6 identical quarter circles.



- (a) Find the perimeter of the flowerbed.  
 (b) Find the area of the flowerbed. (Take  $\pi = \frac{22}{7}$ )

$$2 \times \frac{22}{7} \times 7 = 44$$

$$\frac{6}{4} \times 44 = 66$$

$$66 + 14 = 80 \text{ cm}$$

a) It is 80 cm.

$$14 \times 14 = 196$$

$$7 \times 7 = 49$$

$$\frac{1}{4} \times \frac{22}{7} \times 7 \times 7 = 38.5$$

$$49 - 38.5 = 10.5$$

$$2 \times 10.5 = 21$$

$$21 + 196 = 217 \text{ cm}^2$$

b) It is 217 cm<sup>2</sup>.