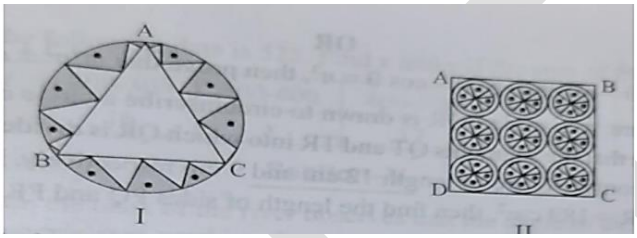
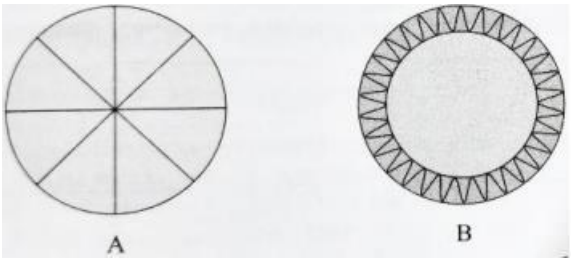
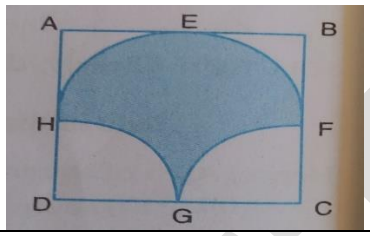
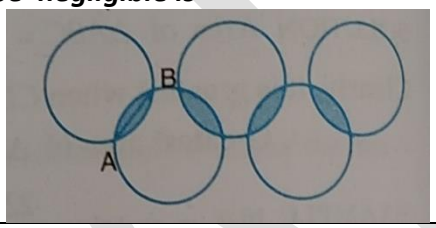
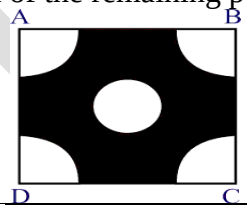
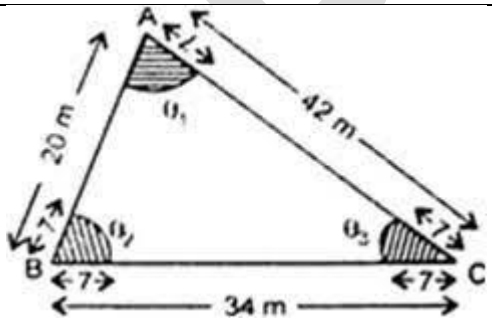
CHAPTER-12

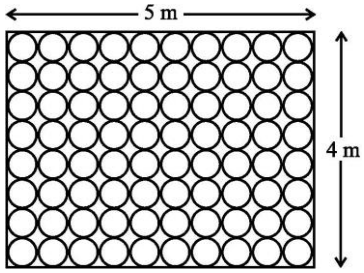
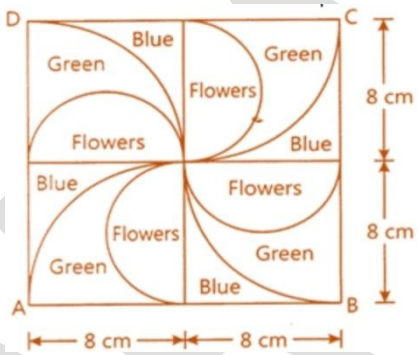
AREA RELATED TO CIRCLES

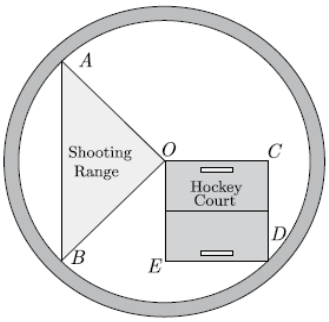
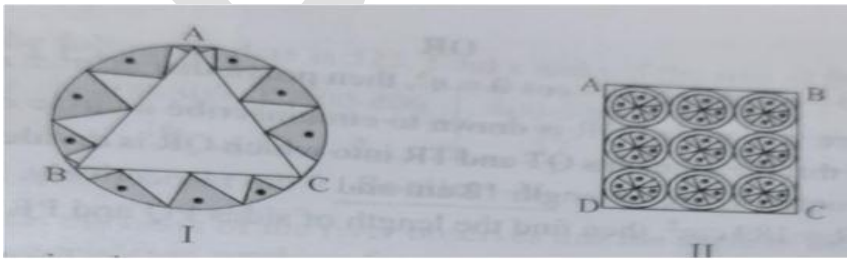
04 MARK TYPE QUESTIONS

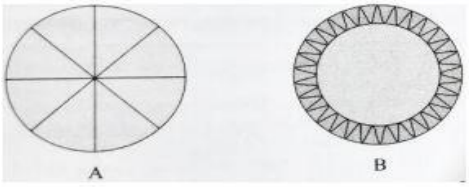
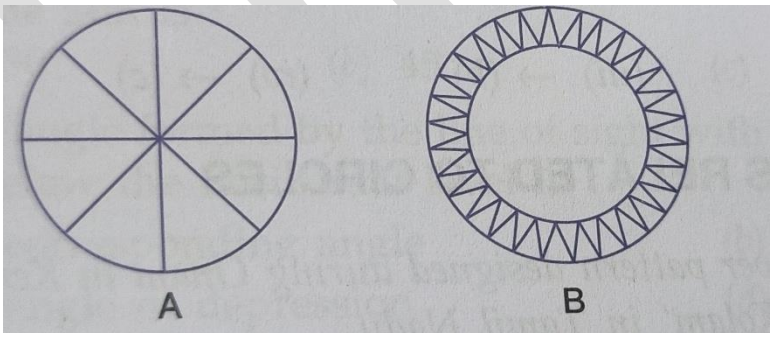
Q. NO	QUESTION	MARK
1.	Pookalam is the flower bed or flower pattern designed during Onam in Kerala. It is similar as Rangoli in North India and Kolam in Tamil Nadu. During the festival of Onam, your school is planning to conduct a Pookalam competition. Your friend who is a partner in competition , suggests two designs given below. Observe these carefully.  Design I: This design is made with a circle of radius 32cm leaving equilateral triangle ABC in the middle as shown in the given figure. Design II: This Pookalam is made with 9 circular design each of radius 7cm. Refer Design I: i. The side of equilateral triangle is a) $12\sqrt{3}$ cm b) $32\sqrt{3}$ cm c) 48cm d) 64cm ii. The altitude of the equilateral triangle is a) 8 cm b) 12 cm c) 48cm d) 52cm Refer Design II: iii. The area of square is a) 1264 cm^2 b) 1764 cm^2 c) 1830 cm^2 d) 1944 cm^2 iv. Area of each circular design is a) 124 cm^2 b) 132 cm^2 c) 144 cm^2	

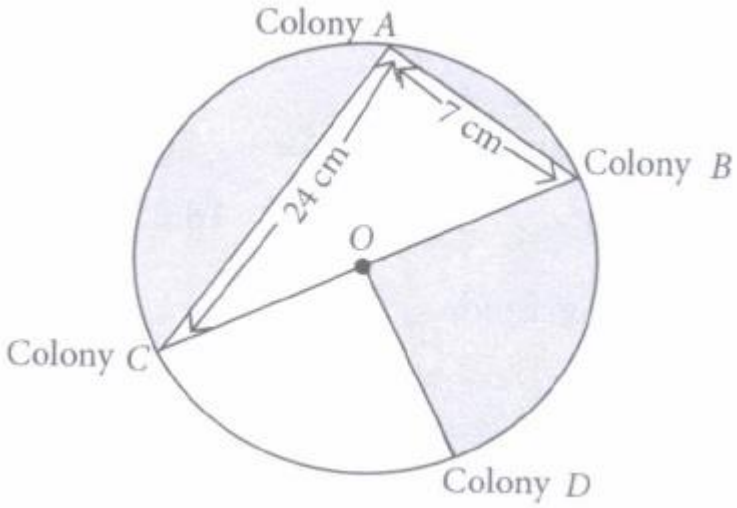
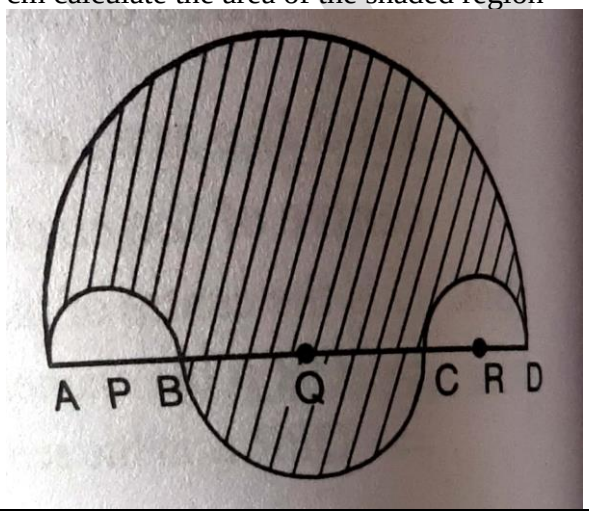
	d) 154 cm^2	
2.	A brooch is a small piece of jewellery which has a pin at the back so it can be fastened on a dress, blouse or coat. Designs of some brooch are shown below. Observe them carefully.  Design A: Brooch A is made with silver wire in the form of a circle with diameter 28mm. The wire used for making 4 diameters which divide the circle into 8 equal parts. Design B: Brooch b is made two colours: Gold and silver. Outer part is made with Gold. The circumference of silver part is 44mm and the gold part is 3mm wide everywhere. Refer to Design A 1. The total length of silver wire required is a) 180 mm b) 200 mm c) 250 mm d) 280 mm 2. The area of each sector of the brooch is a) 44 mm^2 b) 52 mm^2 c) 77 mm^2 d) 68 mm^2 Refer to Design B 3. The circumference of outer part (golden) is a) 48.49 mm b) 82.2 mm c) 72.50 mm d) 62.86 mm 4. The difference of areas of golden and silver parts is a) 18π b) 44 π	

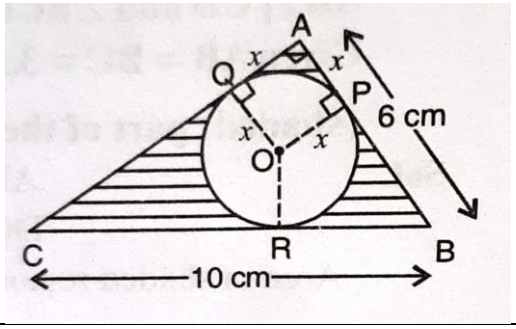
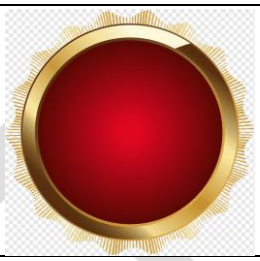
	c) 51 π d) 64 π	
3.	***ABCD is a square field of side 14 m with E, F,G AND H as the mid points of sides AB,BC, CD and DA respectively. A farmer wants to farm in the area EFGH as shown in the figure .*** ***i)Find the area of the shaded portion where he wants to farm.*** **ii) Find the area which is not farmed**. 	***4***
4.	***Given below is the picture of Olympic rings made by taking five congruent circles of radius 1cm each, intersecting in such a way that the chord formed by joining the point of intersection of 2 circles each of length 1cm . total area of all the dotted region assuming the thickness of the rings to be negligible is*** 	***4***
5.	The above right sided figure depicts a racing track whose left and right ends are semi-circular. The distance between the two inner parallel line segments is 60 m and they are each 106 m long. If the track is 10 m wide, find: a) the distance around the track along its inner edge b) the area of the track.	4
6.	From each corner of a square of side 4cm a quadrant of a radius 1 cm is cut and also a circle of diameter 2 cm is cut. Find the area of the remaining portion of the square . 	4
7.	 Three horses are tethered with 7 m long ropes at the three corners of a triangular field having sides 20m, 34 m and 42 m. Find the area of the plot, which can be grazed by the horses. Also, find the area of the plot, which remains ungrazed.	4

8.	 Floor of a room is of dimensions 5 m × 4 m and it is covered with circular tiles of diameters 50 cm each as shown in the below figure. Find the area of floor, which is not covered by tiles.	4
9.	**Find the area of the sector of a circle with a radius of 4cm and of angle 30°. Also, find the area of the corresponding major sector.**	4
10.	**A square is inscribed in a circle. Calculate the ratio of the area of the circle and the square.**	4
11.	Shiva made a painting on a square chart paper ABCD . The painting is made up of squares ,semi-circular arcs(painted with flowers) and arcs of quadrants of circles as shown below.He painted the same type of region with same colours.Based on the above information,answer the following questions:  (i) What is the total are apainted with flower ? a) 90.8 cm^2 b)100. 57 cm^2 c) 105. 6 cm^2 d) 111. 20 cm^2 (ii) What is the area of all quadrant given in the figure? a) 190 cm^2 b)198.14 cm^2 c) 201.14 cm^2 d) 222.14 cm^2 (iii) What is the total length of the boundary of the region which is painted green ? a) 128.57 cm b) 132.56 cm c) 145.57 cm d) 150 cm	
12.	Jawaharlal Nehru Stadium is a multi-purpose sports stadium and a very popular sports stadium of Delhi. The stadium is a part of the Jawaharlal Nehru sports complex in central Delhi,which also houses the headquarters of the Sports Authority of India, the field arm of the Ministry of Youth Affairs and Sports, and the Indian Olympic Association . It has a capacity to seat 60,000 people. It is the third largest multi-purpose stadium in India. In	

	2010, the Jawaharlal Nehru Stadium was the main stadium for XIX Commonwealth Games; a major sporting event. Jawaharlal Nehru stadium is conducting the annual sports competition soon. The curator of the stadium is tasked to figuring out the dimensions for carving out some areas allotted for a hockey court and a shooting range, as shown in the figure below. The shapes of the hockey court and the shooting range are square and triangle respectively. Both of the courts have a common edge that touches the centre of stadium. The construction of the shooting range is such that the angle to centre is 90^0. The radius of the stadium is 200 metres.  Based on the above information,answer the following questions: (i) What is the area allotted to shooting range ? (a) 80000 m^2 (b) 40000 m^2 (c) 20000 m^2 (d) 25600 m^2 (ii) What is the area allotted to hockey court ? (a) 80000 m^2 (b) 40000 m^2 (c) 20000 m^2 (d) 25600 m^2 (iii) If the team of the curators managing the stadium, likes to allot space for some more sports, how much area is available to them? (Use π = 3.14) (a) 85600 m^2 (b) 40000 m^2 (c) 120000 m^2 (d) 125600 m^2	
13.	Pookalam is the flower bed or flower pattern designed during Onam in Kerala. It is similar as Rangoli in North India and Kolam in Tamil Nadu. During the festival of Onam, your school is planning to conduct a Pookalam competition. Your friend who is a partner in competition, suggests two designs given below. Observe these carefully.  **1. The side of equilateral triangle is** a) $12\sqrt{3}$ cm b) $32\sqrt{3}$ cm c) 48cm d) 64cm **2. The altitude of the equilateral triangle is** a) 8 cm b) 12 cm c) 48cm d) 52cm **Refer Design II:** **3. The area of square is** a) 1264 cm^2 b) 1764 cm^2 c) 1830 cm^2 d) 1944 cm^2 **4. Area of each circular design is**	4

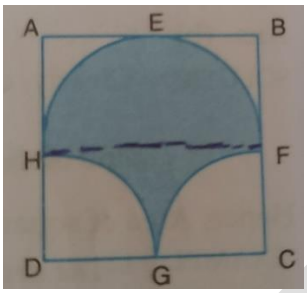
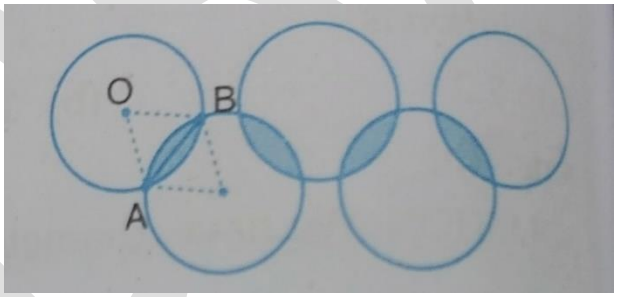
	a) 124 cm^2 b) 132 cm^2 c) 144 cm^2 d) 154 cm^2	
14.	A brooch is a small piece of jewellery which has a pin at the back so it can be fastened on a dress, blouse or coat. Designs of some brooch are shown below. Observe them carefully. **Design A:** Brooch A is made with silver wire in the form of a circle with diameter 28mm. The wire used for making 4 diameters which divide the circle into 8 equal parts.   **Design B:** Brooch b is made two colours - Gold and silver. Outer part is made with Gold. The circumference of silver part is 44mm and the gold part is 3mm wide everywhere. **Refer to Design A** **1. The total length of silver wire required is** a) 180 mm b) 200 mm c) 250 mm d) 280 mm **2. The area of each sector of the brooch is** a) 44 mm^2 b) 52 mm^2 c) 77 mm^2 d) 68 mm^2 **Refer to Design B** **3. The circumference of outer part (golden) is** a) 48.49 mm b) 82.2 mm c) 72.50 mm d) 62.86 mm **4. The difference of areas of golden and silver parts is** a) 18 π b) 44 π c) 51 π d) 64 π	4
15.	A Brooch A brooch is a small piece of jewellery which has a pin at the back so it can be fastened on a dress, blouse or coat. Designs of some brooch are shown below. Observe them carefully. Design A: Brooch A is made with silver wire in the form of a circle with diameter 28 The wire used for making 4 diameters which divide the circle into 8 equal parts. Design B: Brooch B is made two colours-Gold and silver. Outer part is made with The circumference of silver part is 44 mm and the gold part is 3 mm wide everywhere. Refer to Design A  (1) The total length of silver wire required is : (a) 180 mm (b) 200 mm (c) 250 mm (d) 280 mm (ii) The area of each sector of the brooch is: (a) 44 mm^2 (b) 52 mm^2 (c) 77 mm^2(d) 68 mm Refer to Design B	4

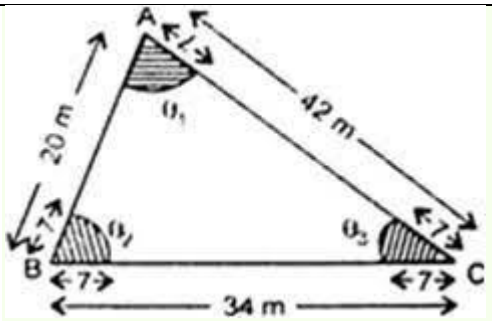
	(i) The circumference of outer part (golden) is : (a) 48.49 mm (b) 82.2 mm (c) 72.50 mm (d) 62.86 mm (ii)The difference of areas of golden and silver parts is: (a) 18π (b) 44π (c) 51π(d) 64π	
16.	To find the polluted region in different areas of dumdum (a place of west bengal represented by the circle given below) a survey was conducted by the students of class X. It was found that the shaded region is the polluted region, where O is the centre of the circle.  Based on the above information, answer the following questions. (i) Find the radius of the circle **(a) 12.5 cm (b) 13.5 cm (c) 15 cm (d) 16.5 cm** (ii) Find the area of the circle. **(a) 481.7 cm² (b) 490 cm² (c) 491.07 cm² (d) 495.6 cm²** (iii) If D lies at the middle of arc BC, then area of region COD is **(a) 121 cm² (b) 122.76 cm² (c) 126 cm² (d) 129.8 cm²** (iv) Area of the ∆ΔBAC is **(a) 77 cm² (b) 79 cm² (c) 81 cm² (d) 84 cm²**	4
17.	In the figure given below the boundary of a shaded region consist of four semi circular arcs, two smallest being equal. If the diameter of the largest is 14cm and that of the smallest is 3.5 cm calculate the area of the shaded region  	4
18.	ABC is a right triangle,right angled at A. Find the area of the shaded region if AB=6cm BC=10cm,and O is the centre of the in	4

	circle of ΔABC.Take π= 3.14 	
19.	Principal of a school decided to give badges to students who are chosen for the post of head boy and head girl. Badges are circular in shape with two color area, red and silver, as shown in the figure. The diameter of the region representing red color is 22 cm and silver color is filled in 10.5 cm wide ring. Find the area of the silver region. 	4
20.	while doing dusting a maid found a button whose upper face is of blue color, as shown in the figure. The diameter of each of the smaller identical circles is ¼ of the diameter of the larger circle whose radius is 16 cm. find the area of the blue region? 	4

ANSWERS:

Q. NO	ANSWER	MARKS
1.	i. b) $32\sqrt{3}$ cm ii. c) 48cm iii. b) 1764 cm^2 iv. d) 154 cm^2	4
2.	i. b) 200mm ii. c) 77mm iii. d) 62.86 mm iv. c) 51 π	4
3.	***Ans = (c)*** ***Area of shaded region = Area of semi-circle FEHF***	***4***

	+ Area of rectangle HDCF ***- Area of two quadrants*** ***=>area of shaded region = area of semicircle of radius 7cm*** ***+ ½ (area of square ABCD)*** ***- Area of semi-circle of radius 7cm.*** ***= ½ (Area of square ABCD) = ½ x 14 x 14 cm² = 98 cm²*** 	
4.	***Ans = (d)*** ***Sol.-*** ***Let O be the centre of the left-most ring which intersects the adjacent ring at two points A and B.*** ***Then, OA = OB = AB = 1cm.*** ***Therefore, triangle OAB is an equilateral and hence <AOB = 60°. We observe that there are 8 segments of a circle of radius 1 cm and sector angle (θ) = 60°. Therefore,*** ***Required area = 8 x Area of one segment of a circle of radius 1cm and sector angle (θ) = 60°.*** $= 8\left(\frac{60}{360}\right) \times \pi \times 1^2 - \frac{\sqrt{3}}{4} \times 1^2\right) cm^2$ $= 8\left(\frac{\pi}{6} - \frac{\sqrt{3}}{4}\right) cm^2$ 	***4***
5.	Semi circle of diameter =60m, r=30m circumference= 2*22/7*30m =60πm Distance around the track along its inner edge=60π+106+106=2804/7m Area of track =106*10+106*10+π/2(1600-900)=2120+2200=4320m^2	4
6.	Area of shaded region =Area of sector- Area of 4 quadrant - Area of circle with diameter 2cm =16-3.14-3.14 =16-6.28=9.72cm^2	4

7.	 Given, Sides of triangular field is 20m,34m and 42m Semi-perimeter = (20 m+34 m+42 m)/2 =96 m/2= 48 m Area of field= √[48(48−20)(48−34)(48−42)] =√(48×28×14×6)) =√112896 =336 m^2 We know that sum of angles of triangles =180 Thus, Area gazed =Area of sector APQ + Area of sector BRS + Area of sector CTU =Area of semicircle with radius 7m =1/2 x π×$(7m)^2$ =1/2 x 22/7 × 49 m^2 =77 m^2 Area of field-Area of gazed =(336−77) m^2 =259 m^2 Area of ungazed is 259m^2	4
8.	As the diameter of circular tile is 50 cm each, then radius=50 cm/2= 0.25 m Number of tiles lengthwise =5m/ 0.5 m = 10 tiles Number of tiles width wise =4 m/ 0.5m = 8 tiles So, 10 tiles are length wise and 8 tiles are width wise. So, total number of tiles =10×8=80 ∴ Area of floor not covered by tiles =Area of rectangular floor - Area of 80 tiles =5×4 – 80x πr^2 =20 −80×3.14×0.25×0.25 =20−15.7= 4.3 m^2 Hence, the area of floor not covered by tiles =4.3 m^2	4
9.	Radius = r = 4 cm, θ=30° Area of sector = [θ/360]×πr^2	4

	= 30/360×3.14×$(4)^2$ = 1/12×3.14×4×4 = 1/3×3.14×4 = 12.56/3 cm^2 = 4.19 cm^2 Area of major sector = ((360 − θ)/360)×πr^2 = ((360 − 30))/360×3.14×$(4)^2$ = 330/360×3.14×4×4 = 11/12×3.14×4×4 = 46.05 cm^2	
10.	As the square is inscribed in a circle, a diagonal of the square will be = the diameter of the circle. Let "r" be the radius of the circle and "d" be the length of each diagonal of the square. We know, Length of the diagonal of a square = side (s) × √2 So, d = 2r And, s × √2 = 2r Or, s = √2r We know, the area of the square = s^2 Thus, the area of the square = $(\sqrt{2}r)^2 = 2r^2$ Now, the area of the circle = π × r^2 ∴ Area of the circle : area of the square = π × r^2 : $2r^2$ = π : 2 So, the ratio of the area of the circle and the square is π : 2.	4
11.	i) Region which is painted with flowers are 4 semi-circles of diameter 8cm i.e., 2 circles of radius 4cm each. So total Region which is painted with flowers = $\mathbf{2\pi r^2}$ $=2x\frac{22}{7}$ x4 x4 =100. 57 cm^2	

	ii) In the figure ,we have 4 quadrants of radius 8cm So total areaof 4 quadrants $=4x\frac{1}{4}\pi r^2 = \pi r^2=\frac{22}{7}$ x8 x8 = 201.14 cm^2 iii)Total length of the boundary of the region which is painted green = 4 [circumference of semi-circles of radius 4cm each + length of the arcs of quadrants of radius 8cm + radius of quadrant] $= 4[\frac{1}{2}$ x 2π **(4)** $+\frac{1}{4}$ x $2x\pi$ **x8 + 8]** = 4[**4π + 4π + 8]** = 4[**8π + 8]** = 4[**8x22/7 + 8]** = 4[33.14**]** = 132.56 cm	
12.	i) Shooting range is a right angled triangle area of the right triangle = 1/2 x r x r = 1/2 x 200 x 200 =20000 m^2 (ii) The area of hockey court is a square. we know that the radius of the stadium forms the diagonal of the hockey court. Therefore the sides of the hockey court will be $\frac{r}{\sqrt{2}}$. (applying Pythagoras Theorem in a square) So the area of the square = $a^2 = (\frac{r}{\sqrt{2}})^2$ = $r^2 / 2 = 200^2 / 2$ =20000 m^2 (iii) The unallocated area = The total circular area of the stadium - Area of the hockey court - Area of the shooting range . = л r^2 -20000-20000 = 3.14 x 200x200 - 40000 = 3.14 x 40000- 40000 =125600-20000-20000 = 85600 m^2	
13.	**Answer:** 1) d) 154 cm^2 **Answer:** 2) b) 32√3 cm **Answer: 3)** c) 48cm **Answer: 4)** b) 1764 cm^2	4
14.	**Answer: 1)** b) 200 mm **Answer:** 2) c) 77 mm^2 **Answer:** 3) d) 62.86 mm **Answer:** 4) c) 51 **π**	4
15.	A (i)Total wire is used = Length of wire in Circle + Wire used in 4 diameters Now, Diameter of the brooch = 28 mm Radius of brooch = 28/2 = 14 mm Length of wire in circle = Circumference of Circle = 2πr = 2x 22 x 14 = 2 × 22 × 2 = 88 mm Silver wire used in 4 diameters = 4 x Diameter of circle	4

	= 4 × 28 = 112 mm Now, Total wire is used = Length of wire in circle + Wire used in 4 diameters = 88 + 112 = 200 mm (ii)Since the wire divides the circle into 8 equal sectors Area of each sector of the brooch =1/8x Area of all sectors of brooch =1/8x Area of circle = 1/8 x πr^2 = 1/8 x 22/7 x 14x14 =11x1x7 =77 mm^2 B (i)Given that Circumference of silver part is 44 mm $2\pi r = 44$ 2x22/7 x r = 44 r = 7mm Thus, Radius of golden + silver part = 7 + 3 = 10 mm Circumference of Golden part = 2π x Radius of (golden + silver) part =2x22/7x10 = 62.86 mm (ii) Difference b/w areas of golden and silver part = Area of silver – Area of golden = Area of circle of radius 10mm – Area of circle of radius 7mm $= \pi(10)^2 - \pi(7)^2 = 100\pi - 49\pi = 51\pi$	
16.	**(i) (a):** Since BOC is the diameter and ∠BAC = 90° ∴∴ $BC^2 = AB^2 + AC^2$ $= 7^2 + 24^2 = 625$ ⇒⇒ BC = 25 cm ∴ Radius of circle =25/2 cm=12.5cm **(ii) (c)**: Area of circle $=\pi(12.5)^2=227\times12.5\times12.5$ = 491.07 cm^2 **(iii) (b):** Clearly, ∠COD = 90° [∴∠COB = 180° and equal arcs subtends equal angles at the centre] Area of region COD $=(90/360)\times\pi r^2=(90/360)x(22/7)\times(12.5)^2$ $=1/4(491.07)=122.76\ cm^2$ **(iv) (d)**: Area of $\Delta BAC=(1/2)\times AB\times AC =(1/2)\times7\times24=84\ cm^2$	4
17.	AD=14cm AB=CD=3.5cm now AB+CD+BC=14 or 7+BC=14 or BC=7cm BQ=QC=7/2 cm area of the shaded region ½ πx 7x7 + ½x π x7/2x7/2 - 2x1/2 xπx 7/4x7/4 86.63cm^2	4
18.	OPAQ is a square	4

	Now in right triangle BAC BC=10cm AB=6cm Using Pythagoras Theorem AC=8cm BR=BP=6-x CQ=CR=8-x CR+RB=10 8-x+ 6-x=10 x=2 Area of the shaded region = Area of the triangle- area of the circle =24-12.56 =11.44cm²	
19.	$1072.50cm^2$	4
20.	$603.45cm^2$	4