Let us work out 12.

1. The length of radius of sphere = $r = 10.5$ cm

so the whole surface area = $4\pi r^2$

$= \left(4 \times \frac{22}{7} \times 10.5 \times 10.5\right)$ sqcm

$= 1386.00$ sqcm

$= 1386$ sqcm

2. The total cost of making the leather ball = ₹431.20

cost of making per sq cm of the leather ball = ₹17.50

So total surface area of the leather ball is = $\frac{431.20}{17.50}$ sqcm.

$= \frac{616}{25}$ sqcm.

Let the radius of the ball be = $r$ cm

So total surface area = $4\pi r^2$ sqcm

So, $4\pi r^2 = \frac{616}{25}$

$\Rightarrow 4 \times \frac{22}{7} \times r^2 = \frac{616}{25}$

$\Rightarrow r^2 = \frac{7 \times 7}{25}$

$\Rightarrow r = \frac{7}{5}$ $(\because r > 0)$

The diameter of the ball is = $2r = \frac{2 \times 7}{5} = \frac{14}{5} = 2.8$ cm

3. diameter of the ball = 7 cm

radius of the ball = $r = \frac{7}{2}$ cm.

The amount of iron in the ball = volume of the ball = $\frac{4}{3}\pi r^3 = \left(\frac{4}{3} \times \frac{22}{7} \times \frac{7}{2} \times \frac{7}{2} \times \frac{7}{2}\right)$ cm$^3$

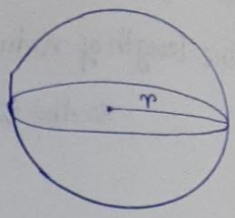
$= \frac{11 \times 7 \times 7}{3}$ cm$^3$

$= \frac{539}{3}$ cm$^3$

$= 179\frac{2}{3}$ cm$^3$

4. Diameter of the solid sphere = 28 cm

so, its radius = $r = \frac{28}{2} = 14$ cm




If the solid sphere is completely immersed into water,

the volume of water displaced by the sphere = volume of the sphere

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

$= \left(\frac{4}{3} \times \frac{22}{7} \times \cancel{14}^{2} \times 14 \times 14\right) cm^3$

$= 11498\frac{2}{3}$ cubic cm.

5. Previously,

The radius of the balloon was = 7 cm = $r_1$

so its surface area was = $4\pi r_1^2 = (4 \times \pi \times 7 \times 7)$ sqcm

then the new radius was = $r_2 = 21$ cm

new surface area = $4\pi r_2^2 = (4 \times \pi \times 21 \times 21)$ sqcm.

Ratio of the surface areas in two cases

$= 4\pi r_1^2 : 4\pi r_2^2$

$= (4 \cdot \pi \times 7 \times 7) : (4 \times \pi \times 21 \times 21)$

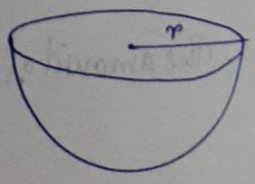
$= (7 \times 7) : (21 \times 21)$

$= 1 : (3 \times 3)$

$= 1 : 9$

6. $127\frac{2}{7}$ sqcm of sheet is required to make a hemispherical bowl.

so, surface area of hemispherical bowl is $127\frac{2}{7}$ sqcm.




Let its radius = ~~127~~ r cm

so its surface area = $2\pi r^2$.

according to the problem,

$$2\pi r^2 = 127\frac{2}{7}$$

$$\Rightarrow 2 \times \frac{22}{7} \times r^2 = \frac{891}{7}$$

$$\Rightarrow r^2 = \frac{81}{4}$$

$$\Rightarrow r = \frac{9}{2} \quad (r > 0)$$

so diameter of the bowl is $= 2r = \left(\frac{9}{2} \times 2\right) = 9$ cm.

7. Radius of the solid spherical ball $= r = 2.1$ cm

so, amount of iron in the ball = volume of the sphere $= \frac{4}{3}\pi r^3$

$$= \left(\frac{4}{3} \times \frac{22}{7} \times 2.1 \times 2.1 \times 2.1\right) \text{ cm}^3.$$

$$= 38.808 \text{ cm}^3$$

$$= 38.808 \text{ cubic cm.}$$

The curved surface area

$$= 4\pi r^2$$

$$= \left(4 \times \frac{22}{7} \times 2.1 \times 2.1\right) \text{ cm}^2$$

$$= 55.44 \text{ cm}^2 = 55.44 \text{ sqcm}$$

8. The diameter of solid sphere of lead is $= 14$ cm so its radius $= R = \frac{14}{2} = 7$ cm

This sphere's volume $= \frac{4}{3}\pi R^3 = \left(\frac{4}{3} \times \pi \times 7 \times 7 \times 7\right)$ cubic cm.

now radius of each of small eq spheres $= r = 3.5\text{cm} = \frac{35}{10}$ cm

volume of each of small spheres $= \frac{4}{3}\pi r^3 = \left(\frac{4}{3} \times \frac{22}{7} \times \frac{35}{10} \times \frac{35}{10} \times \frac{35}{10}\right)$ cubic cm.

$\therefore$ number of small spheres that can be made after melting the big sphere

$$= \frac{4\pi R^3}{4\pi r^3} = \frac{4 \times \frac{22}{7} \times 7 \times 7 \times 7}{4 \times \frac{22}{7} \times \frac{35}{10} \times \frac{35}{10} \times \frac{35}{10}} = 7 \times 7 \times 7 \times \frac{10^2}{35} \times \frac{10^2}{35} \times \frac{10^2}{35} = 8$$

9. Radius, of first small cylinder $= r_1 = 3\text{cm}$

second small cylinder $= r_2 = 4\text{cm}$

third small cylinder $= r_3 = 5\text{cm}$

Total volume of these three small cylinders

$$= \frac{4}{3}\pi r_1^3 + \frac{4}{3}\pi r_2^3 + \frac{4}{3}\pi r_3^3$$

$$= \frac{4}{3}\pi\left(r_1^3 + r_2^3 + r_3^3\right)$$

$$= \frac{4}{3}\pi\left(3^3 + 4^3 + 5^3\right) \text{ cubic cm.}$$

$$= \frac{4}{3} \times \pi \times \left(27 + 64 + 125\right) \text{ cubic cm}$$

$$= \left(\frac{4}{3} \times \pi \times 216\right) \text{ cubic cm}$$

Melting these three small cylinders a large cylinder is made.

$\therefore$ large cylinder's volume $= \left(\frac{4}{3} \times \pi \times 216\right) \text{ cm}^3$.

Let the large cylinder radius $= R\text{ cm}$ so its volume $= \frac{4}{3}\pi R^3 \text{ cm}^3$

according to the problem,

$$\frac{4}{3}\pi R^3 = \frac{4}{3}\pi 216$$

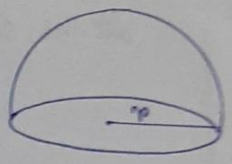
$$\Rightarrow R^3 = 216$$

$$\Rightarrow R = 6$$

So, radius of the large sphere is $= 6\text{ cm}$.

10. The hemispherical domb's,

diameter = 42 dm (decimeter)



So radius = $r = \frac{42}{2}$ dm = 21 dm = $\frac{21}{10}$ m.

So, the upper surface (curved surface) area of the domb = $2\pi r^2$

$= \left(2 \times \frac{22}{7} \times \frac{21}{10} \times \frac{21}{10}\right) m^2$.

Total cost of colouring the upper surface

$= ₹\left(2 \times \frac{22}{7} \times \frac{21}{10} \times \frac{21}{10} \times 35\right)$

$= ₹\ 97\frac{02}{10}$

$= ₹970.20$

11. First hollow sphere's,

radius = $r_1 = 21$ cm

So, surface area = $4\pi r_1^2$ sqcm

Second hollow sphere's,

radius = $r_2 = 17.5$ cm = $\frac{175}{10}$ cm

So, surface area = $4\pi r_2^2$ sq cm.

So, ratio of the area of sheets of metal required to make two spheres

= ratio of area of surfaces of spheres

$= 4\pi r_1^2 : 4\pi r_2^2$

$= r_1^2 : r_2^2$

$= (21)^2 : \left(\frac{175}{10}\right)^2$

$= 21 \times 21 : 35\frac{175}{10_2} \times \frac{175}{10_2}35$

$= \left(3\cancel{21} \times \cancel{21}\right) : \left(\frac{535}{2} \times \frac{355}{2}\right)$

$= 9 : \frac{25}{4}$

$= 36 : 25.$

12.

Let the, solid spheres radius = R unit.

so its curved surface area = $4\pi R^2$ sq unit. and volume = $\frac{4}{3}\pi R^3$ cubic unit

now some portion of this sphere is cut out, and by that a new smaller sphere is made.

let newly made sphere's radius = r unit

so curved surface area = $4\pi r^2$ sq unit.

according to the prob,

$$4\pi r^2 = \frac{1}{2}(4\pi R^2)$$

$$\Rightarrow 2r^2 = R^2$$

$$\Rightarrow R = \sqrt{2}\, r \quad \text{——— (i)}$$

So, volume of the portion cut off = volume of new circle = $\frac{4}{3}\pi r^3$ cubic unit.

volume of remaining portion of the sphere

$$= \left(\frac{4}{3}\pi R^3 - \frac{4}{3}\pi r^3\right) \text{ cubic unit.}$$

required ratio = volume of portion cut off : volume of remaining portion

$$= \frac{4}{3}\pi r^3 : \left(\frac{4}{3}\pi R^3 - \frac{4}{3}\pi r^3\right)$$

$$= \frac{4}{3}\pi r^3 : \frac{4}{3}\pi\left(R^3 - r^3\right)$$

$$= r^3 : \left(R^3 - r^3\right)$$

$$= r^3 : (\sqrt{2}r)^3 - r^3 \quad \text{[applying (i)]}$$

$$= r^3 : \left(2\sqrt{2}r^3 - r^3\right)$$

$$= r^3 : (2\sqrt{2} - 1)\, r^3$$

$$= 1 : 2\sqrt{2} - 1 \quad \text{(Ans).}$$

13. The globe's radius = R = 14cm

so its curved surface area = $4\pi R^2 = (4\pi \times 14 \times 14)$ sqcm.

each circle's, radius = $r = 0.7\text{cm} = \frac{7}{10}$ cm

each circles ~~ew~~ area = $\pi r^2 = \left(\pi \times \frac{7}{10} \times \frac{7}{10}\right)$ sqcm

two circles area = $\left(2 \times \pi \times \frac{7}{10} \times \frac{7}{10}\right)$ sqcm

∴ Area of metal sheet surrounding curved surface of globe

= area of globe except holes

= globe's surface area − two holes' area

$= \left(4 \times \pi \times 14 \times 14 - 2 \times \pi \times \frac{7}{10} \times \frac{7}{10}\right)$ sq cm

$= 2 \times \pi \times 7 \times 7 \times \left(2 \times 2 \times 2 - \frac{1}{100}\right)$ sqcm

$= 2 \times \frac{22}{7} \times 7 \times 7 \times \left(8 - \frac{1}{100}\right)$ sqcm

$= 44 \times 7 \times \frac{799}{100}$ sqcm

$= \frac{246092}{100}$ sqcm

$= 2460.92$ sqcm.

14. Radius of sphere do be melted = R = 8 cm, so its volume = $\frac{4}{3}\pi R^3 = \left(\frac{4}{3}\pi \times 8 \times 8 \times 8\right)$ cm

radius of each of spheres do be made = r = 1cm, so its volume = $\frac{4}{3}\pi r^3$

$= \left(\frac{4}{3}\pi \times 1 \times 1 \times 1\right) \text{cm}^3$

$= \frac{4}{3}\pi \text{ cm}^3$.

So, required number of spheres do be made by melting the large sphere

$= \left(\frac{\frac{4}{3}\pi \times 8 \times 8 \times 8}{\frac{4}{3}\pi}\right) = 8 \times 8 \times 8 = 512$