Solutions:

1]

In given figure, AB||CO

$\angle ABD + \angle DBO = 90^\circ$

$\angle ABD + 30^\circ = 90^\circ$

$\angle ABD = 60^\circ$

$\angle ABD = \angle BDO = y = 60^\circ$ (alternate interior angles)

Also, $\angle ABC = \angle BCO = x = 30^\circ$ (alternate interior angles)

Thus, the value of y and x are 60° and 30° respectively.

2]

The given series can be written as $\sqrt{2} + 2\sqrt{2} + 3\sqrt{2} + 4\sqrt{2} + \ldots\ldots\ldots\ldots$

So, the next term would be $5\sqrt{2}$, i.e., $\sqrt{50}$

3]

The angle between a pair of tangents to a circle which are inclined to each other at an angle is supplementary to the angle between the two radii of the circle.

Thus, the angle between the radii of the circle

$= 180^\circ - 35^\circ = 145^\circ$

4]

When a die is thrown once the outcomes are 1,2,3,4,5,6 out which 2,3 and 5 are prime numbers.

Therefore, P(prime number) = $\frac{3}{6} = \frac{1}{2}$

5]

Let the coordinates of the point be P(x,2x). Let Q be the point (4,3).

$PQ^2 = (4-x)^2 + (3-2x)^2 = 10$

$16 + x^2 - 8x + 9 + 4x^2 - 12x = 10$

$\Rightarrow 5x^2 - 20x + 15 = 0$

□℘ $x^2-4x+3=0$

□℘ $(x-3)(x-1)=0$

□℘ $x=1$ or $x=3$

So, $2x = 2$ or 6

Hence, the coordinates of the required point are (1,2) or (3,6).

6]

Let the line segment AB cut the y-axis at the point P(0,y).

Let the ratio in which AB is divided by the point P be k:1.

$$\therefore \therefore 0 = \frac{-2k+3}{k+1} \Rightarrow k = \frac{3}{2}$$

Hence the required ratio is $\frac{3}{2}$: 1, i.e., 3:2.

7]

Let d be the depth of the cylindrical tank.

According to the given information,

$\pi(28)^2 x d = 28x16x11$

□℘ $d=2$

Thus, the depth of the cylindrical tank is 2 m.

8]

Area of the circle = $\pi r^2 = 3.14 \times (7.5)^2 = 176.625$ cm^2

Side of square = diameter of circle = 15cm

Area of square = side^2 = 15^2=225 cm^2

Remaining area = area of square â€“ area of circle

= 225 - 176.625=48.375cm^2

9]

Here, $t_3=a + 2d = 7$ and $t_6 = a + 5d = 13$

Solving the two equations, we get,

a = 3; d = 2

Therefore, 10^{th} term = a + 9d = 3 + 9 x 2 = 21

10] Since the lengths of tangents from an exterior point to a circle are equal.

Therefore, XP=XQ (from X) ……(i)

AP=AR (from A) ………..(ii)

BQ=BR (from B) ………..(iii)

Now, XP=XQ

$\Rightarrow$XA+AP=XB+BQ

$\Rightarrow$XA+AR=XB+BR (Using (ii) and (iii))

11] There are 13 letters in the word 'ASSASSINATION'.

Total number of outcomes = 13

(i) There are 6 vowels in the word. (A,A,A,I,I,O)

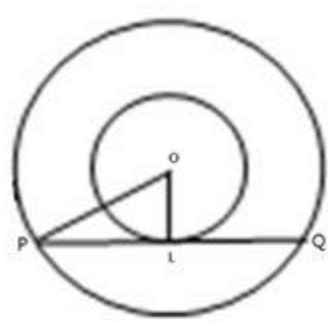
Number of favourable outcomes = 6

P(vowel) = $\frac{6}{13}$

(ii) Number of consonants in the word = 13-6 =7

P(consonant) = $\frac{7}{13}$

OR



Let PQ be the chord of the larger circle which touches the smaller circle at the point L.

Since PQ is tangent at the point L to the smaller circle with centre O.

Therefore, OL is perpendicular to PQ.

Since PQ is a chord of the bigger circle and OL is perpendicular to PQ, OL bisects PQ.

So, PQ=2PL

In right âˆ†OPL,

$PL^2=OP^2-OL^2$

$PL^2= 25-9=16$

PL=4cm

$\therefore\therefore$PQ=2PL= 2(4cm) =8cm

Hence, the length of the chord PQ is 8cm.

12]

Area of square = 14cmx14cm=196 cm^2

Diameter of each circle = $\frac{14}{2}$ =7

Radius of each circle = $\frac{7}{2}$

Area of four circles = 4x πr^2

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

= 154 cm^2

Remaining area = 196-154 = 42 cm^2

13]

Let r be the radius of the wheel.

Distance covered in 1 revolution = $2\pi r$

Distance covered in 5000 revolution = 5000 $\times 2\pi r$ = 11km

$\frac{5000\times22}{7}$ (2r) =11 $\times$1000 metres

2r = $\frac{7}{10}$ metres

Hence diameter of the wheel = $\frac{7}{10}$ m or 70 cm.

14]

The given equation will have real roots, if b^2-4acâ‰¥0.

□℘ $(6)^2$-4(p)(1)â‰¥0

□℘ 36-4pâ‰¥0

□℘ 36â‰¥4p

□℘ pâ‰¤9

15]

$$\frac{1}{a}+\frac{1}{b}+\frac{1}{x}=\frac{1}{a+b+x}$$
$$\frac{1}{a}+\frac{1}{b}=\frac{1}{a+b+x}-\frac{1}{x}$$
$$\Rightarrow \frac{a+b}{ab}=\frac{x-a-b-x}{(a+b+x)x}$$

$$\Rightarrow \frac{a+b}{ab}=\frac{-(a+b)}{(a+b+x)x}$$

$\Rightarrow$ax+bx+x^2=-ab

$\Rightarrow$$x^2$+ax+bx+ab=0

$\Rightarrow$x(x+a)+b(x+a)=0

$\Rightarrow$(x+a)(x+b)=0

$\Rightarrow$x+a=0 or x+b=0

$\Rightarrow$x=-a,-b

16]

Area of quadrilateral ABCD = Area of âˆ†ABC + Area of âˆ†ACD

Area of triangle = $\frac{1}{2}\left[x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2)\right]$

Area of âˆ†ABC = $\frac{1}{2}$[1(-3-2) + 7(2-1) +12(1+3)]

= $\frac{1}{2}$[-5+7+48] = 25 sq. units

Area of âˆ†ACD = $\frac{1}{2}$[1(2-21) + 12(21-1) +7(1-2)]

= $\frac{1}{2}$[-19+240-7] = 107 sq. units

Therefore, area of quadrilateral ABCD = 25 +107 = 132 sq. units.

OR

Let the abscissa of other end be x.

Given, distance of A(-3,2) from B(x,10) is 10 units, i.e., AB =10

AB = $\sqrt{(-3 - x)^2 + (2 - 10)^2}$

10 = $\sqrt{9 + x^2 + 6x + 64}$

Squaring both the sides, we get,

100 = x^2 + 6x + 73

x^2 + 6x -27 = 0

x^2 + 9x â€“ 3x -27 = 0

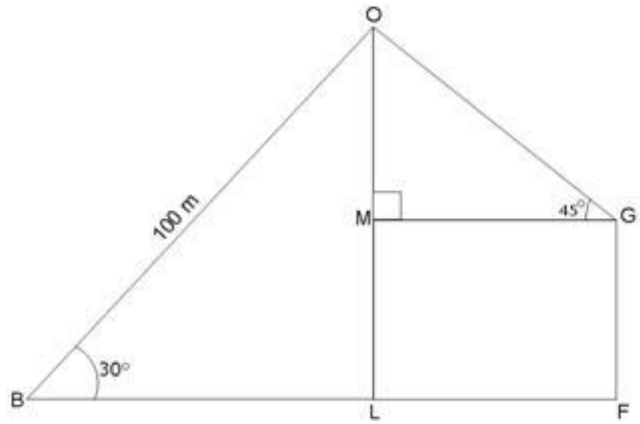
x(x+9)-3(x+9) =0

(x+9)(x-3) =0

x = -9 or 3

Thus, the abscissa of other end is â€“9 or 3.

17]



Let O be the position of the bird, B be the position of the boy, G be the position of the girl and FG be the building at which the girl is standing.

BO= 100m , FG= 20m

In ΔOLB,

$\frac{OL}{BO} = \sin 30^\circ \Rightarrow \frac{OL}{100} = \frac{1}{2} \Rightarrow OL = 50m$

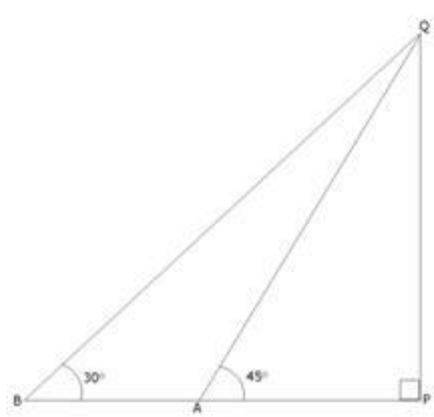
OM = OL-ML = OL-FG = 50-20 = 30m

In ΔOMG,

$\frac{OM}{OG} = \sin 45^\circ = \frac{1}{\sqrt{2}} \Rightarrow OG = 30\sqrt{2}\ m = 42.3m$

Thus, the distance of the bird from the girl is 42.3 m.

OR



Let PQ be the tower and let PA and PB be its shadows when the altitudes of the sun are 45^o and 30^o respectively. Then, $\angle$PAQ = 45^o, $\angle$PBQ = 30^o, PQ = 50m, AB =x m.

In ΔAPQ,

cot 45° = $\frac{AP}{PQ}$

1 = $\frac{AP}{50}$ $\Rightarrow AP = 50\,m$

In ΔBPQ,

cot 30° = $\frac{BP}{PQ}$

$\sqrt{3}$ = $\frac{x + 50}{50}$

∴∴x= 50($\sqrt{3} - 1$)

18]
Let P(x,y), Q(a + b, b â€œ a) and R(a â€œ b, a + b) be the given points.

It is given that PQ = PR

PQ^2 = PR^2

{x â€œ (a + b)}^{2} +{y â€œ (b â€œ a)}^{2} = {x â€œ (a - b)}^{2} +{y â€œ (a + b)}^{2}

□℘ x^2 â€œ 2 x (a + b) + (a + b)^2 + y^2 â€œ 2y (b â€œ a) + (b-a)^2

= x^2 + (a â€œ b)^2 â€œ 2x (a - b) + y^2 â€œ 2y (a + b) + (a + b)^2

□℘ -2 x (a + b) â€œ 2 y (b â€œ a) = -2x (a â€œ b) â€œ 2 y (a + b)

□℘ -ax - bx - by + ay = -ax + bx - ay - by

□℘ 2 bx = 2 ay

□℘ bx = ay

19]

$a_1=3(1)+2=5$

$a_2=3(2)+2=8$

$a_3=3(3)+2=11$

The AP with nth term as 3n+2 is 5,8,11,14,â€¦â€¦â€¦

Here, a=5 and d=3

$S_{25}= \frac{25}{2}[2x5+(25-1)3] = \frac{25}{2}[10+72] =1025$

20]

The steps of construction are as follows:

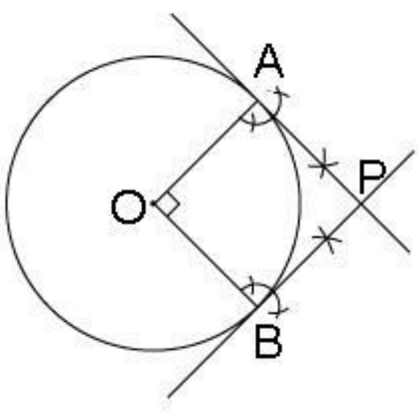
1. Draw a circle of any convenient radius and mark its centre as O.

2. Draw one of its radius OA and draw a line perpendicular to OA at A.

3. Draw an angle of 90º at O such that it intersects the circle at B.

4. Draw a line perpendicular to OB at B and let both perpendiculars intersect at point P.

Thus, PA and PB are the required tangents.



21]

Total number of outcomes =52

(i) Number of kings=4

Number of queens = 4

P(king or queen) = $\frac{(4+4)}{52} = \frac{8}{52} = \frac{2}{13}$

(ii) Number of hearts =13

Number of red kings =2 (out of these 1 ia a heart)

P(neither a heart nor a red king) = 1â€“ $\frac{13+2-1}{52} = \frac{38}{52} = \frac{19}{26}$

22]

For Rs. 24 , the length of fencing =1m

For Rs. 5280, the length of fencing = $\frac{1}{24} \times 5280$ = 220 metres.

Circumference of the field = 220 m

$2\pi r = 220$

$2 \times \frac{22}{7} \times r = 220 \Rightarrow r = \frac{220 \times 7}{44} = 35\text{m}$

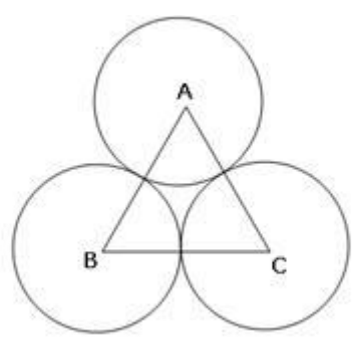
Area of the field = $\pi r^2 = \pi (35)^2 = 1225\pi$ m^2

Cost of ploughing = Rs. 0.50 per m^2

Total cost of ploughing the field = Rs. 1225 π x 0.50

= Rs. $\frac{1225 \times 22 \times 1}{7 \times 2} = 175 \times 11 = \text{Rs.}1925$

OR



Let ABC be the equilateral triangle whose each side is of length 'a'.

$\frac{\sqrt{3}}{4} \times a^2 = 17320.5 \Rightarrow \frac{1.73205}{4} \times a^2 = 17320.5 \Rightarrow a^2 = 4 \times 10000$ or $a=200$

Radius of each circle = 100cm

Area of the required region = area of equilateral â€“ area of 3 sectors

$= 17320.5$ â€“ $3 \times \frac{60}{360} \times \pi (100)^2 = 17320.5$ â€“ $\frac{1}{2} \times 3.14 \times 10000$

$= 17320.5$ â€“ $1.57 \times 10000 = 17320.5 - 15700 = 1620.5\ cm^2$

23] Let the radius of the smaller sphere be r , so the radius of the larger sphere is 2r.

Let the base radius of the cylinder be R

So, height of the cylinder=12R...given

ATQ,

$\frac{4}{3}\pi r^3 + \frac{4}{3}\pi (2r)^3 = \pi R^2 (12R)$

$\Rightarrow 12r^3 = 12R^3$

$\Rightarrow r=R$

$\Rightarrow$The ratio of the radii is 1:1

24] Curved surface area of a cone , $c= \pi rl$

Volume of a cone , $V = \frac{1}{3}\pi r^2 h$

L.H.S.= $3\pi Vh^3 - c^2h^2 + 9V^2$

$= 3\pi h^3 \left(\frac{1}{3}\pi r^2 h\right) - (\pi rl)^2 h^2 + 9\left(\frac{1}{3}\pi r^2 h\right)^2$

$= \pi^2 r^2 h^4 - \pi^2 r^2 h^2 l^2 + 9\left(\frac{1}{9}\pi^2 r^4 h^2\right)$

$= \pi^2 r^2 h^4 - \pi^2 r^2 h^2 (r^2+h^2) + \pi^2 r^4 h^2$ (Since, $l^2=r^2+h^2$)

$= \pi^2 r^2 h^4 - \pi^2 r^4 h^2 - \pi^2 r^2 h^4 + \pi^2 r^4 h^2 = 0 =$ R.H.S.

25] Let the numbers be x and x-5.

Given, $\frac{1}{x-5} - \frac{1}{x} = \frac{1}{10} \left(\frac{1}{x-5} > \frac{1}{x} \right)$

$\frac{x-x+5}{(x-5)x} = \frac{1}{10}$

$\Rightarrow (x-5)x=50$

$\Rightarrow x^2-5x-50=0$

$\Rightarrow (x-10)(x+5)=0$

$\Rightarrow x=10$ or $x=-5$

When $x=10$, $x-5=5$

When $x=-5$, $x-5=-5-5 = -10$

Thus the required numbers are 10 and 5 or -5 and -10.

OR

Let x and y be the two natural numbers and $x>y$.

Given, $x^2-y^2=45$ ....(i)

$y^2=4x$ ....(ii)

Using (ii) in (i), we get,

$x^2-4x-45=0$

$\Rightarrow (x-9)(x+5)=0$

$\Rightarrow x=9$ or $x=-5$

Rejecting $x=-5$ because x is a natural number.

Therefore, $x=9$

From (ii),

$y^2=4x = 4 \times 9=36$

$y = \pm 6$

But y is a natural number. Therefore, y=-6 is rejected.

Thus, y=6.

Hence the required natural numbers are 9 and 6.

26]

Let the four consecutive numbers in AP be a-3d,a-d,a+d,a+3d.

So, a-3d+a-d+a+d+a+3d=32

□℘ 4a=32

□℘ a=8

Also, $\frac{(a-3d)(a+3d)}{(a-d)(a+d)} = \frac{7}{15}$

or, $15(a^2-9d^2)=7(a^2-d^2)$

or, $15a^2-135d^2=7a^2-7d^2$

or, $8a^2-128d^2=0$

or, $d^2=4$ or d=Â±2

So, when a=8 and d=2, the numbers are 2,6,10,14.

When a=8,d=-2 the numbers are 14,10,6,2.

OR

Here, $S_1 = \frac{n}{2}[2a+(n-1)d]$

$S_2 = \frac{2n}{2}[2a+(2n-1)d]$

$S_3 = \frac{3n}{2}[2a+(3n-1)d]$

S_2-S_1= 2an+n(2n-1)d â€“an â€“ $\frac{n(n-1)d}{2}$

=an +[(2n-1) â€“ $\frac{n-1}{2}$]nd

$= an + \frac{n(3n-1)d}{2}$

$3(S_2 - S_1) = 3an + \frac{3n(3n-1)d}{2} = S_3$

27] Total number of outcomes = 52

(i) Favourable outcomes = 4 + 4 = 8

\\ Required probability = $\frac{\text{Favourable outcomes}}{\text{Total outcomes}} = \frac{8}{52} = \frac{2}{13}$

(ii) Ace cards are 4 in number.

\\ Non–ace cards = 52 – 4 = 48

\\ Required probability = $\frac{48}{52} = \frac{12}{13}$

(iii) Number of red cards = 26

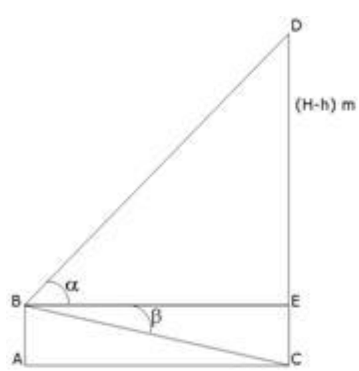
\\ Required probability = $\frac{26}{52} = \frac{1}{2}$

(iv) Number of kings and queens = 4 + 4 = 8

\\ Number of cards which are neither king nor queen = 52 – 8 = 44

\\ Required probability = $\frac{44}{52} = \frac{11}{13}$

28]



Let B be the window of a house AB and let CD be the other house. Then, AB= = EC =h metres.

Let CD = H metres. Then, ED= (H-h) m

In ΔBED,

$\cot\alpha = \frac{BE}{ED}$

BE = (H-h) cotα ... (a)

In ΔACB,

$\frac{AC}{AB} = \cot\beta$

AC=h.cotβ …. (b)

But BE=AC

∴∴(H-h) cotα = hcotβ

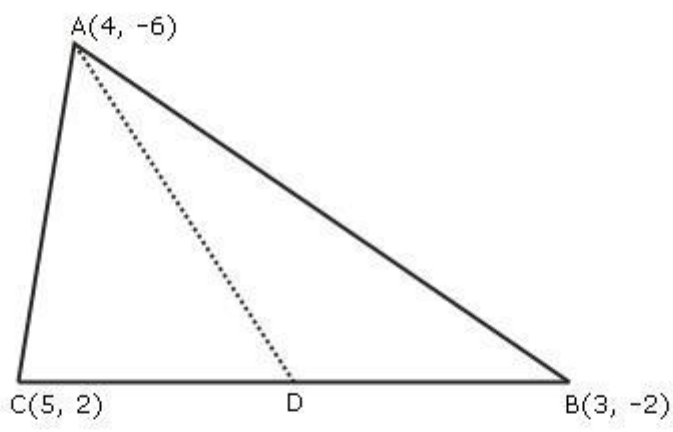
$H = h\frac{(\cot\alpha + \cot\beta)}{\cot\alpha}$

H = h(1+tanα cotβ) m

Hence proved.

29]

30]



Let D is the mid-point of BC

Therefore, co-ordinates of D = $\left[\frac{5+3}{2}, \frac{2-2}{2}\right]$ = (4, 0) Area of ?ADC =

$\frac{1}{2}\left[4(0-2)+4(2+6)+5(-6-0)\right]$ $= \frac{1}{2}(-8+32-30)$ = 3 sq. units

(Area cannot be in the negative units) Area of ?ABD =

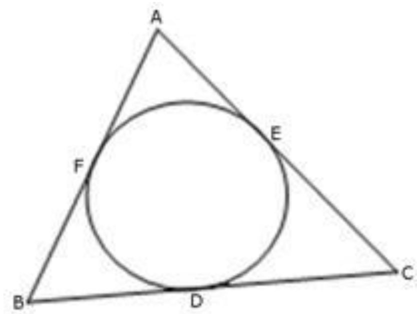
$\frac{1}{2}[4(-2-0)+3(0+6)+4(-6+2)] \quad = \frac{1}{2}[-8+18-16]$ = 3 sq. units

(area cannot be in the negative units)

area of ?ADC =area of ?ABD

Median AD of triangle divides it into two triangles of equal areas.

31]



Since lengths of the tangents drawn from an external point to a circle are equal.

Therefore, AF=AE (From A)…………(i)

BD=BF (From B) …………(ii)

CE=CD (From C) ……..(iii)

Adding equations (i), (ii) and (iii), we get

AF+BD+CE = AE+BF+CD

Now, Perimeter of ΔABC = AB+BC+CA

Perimeter of ΔABC = (AF+FB)+(BD+CD)+(EC+AE)

= (AF+AE)+(BD+BF)+(EC+CD)

= 2(AF+BD+CE)

AF+BD+CE = $\frac{1}{2}$(Perimeter of ΔABC)

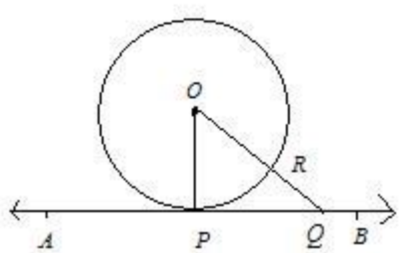
Hence, AF+BD+CE = AE+BF+CD = $\frac{1}{2}$(Perimeter of ΔABC)

32]

Given: A circle C (O, r) and a tangent AB at a point P.

To Prove: OP is perpendicular to AB.

Construction: Take any point Q, other than P, on the tangent AB. Join OQ.



Since, Q is a point on the tangent AB, other than the point of contact P, so Q will be outside the circle.

Let OQ intersect the circle at R.

Then, OQ=OR+RQ

⇒OQ>OR

⇒OQ>OP (OR=OP=radius)

Thus, OP<OQ, i.e., OP is shorter than any other segment joining O to any point of AB.

But, among all the line segments, joining the point O to a point on AB, the shortest one is the perpendicular from O on AB.

Hence, OP is perpendicular to AB.

33]

Let the radius of the hemispherical dome be r metres and the total height of the building be h metres.

Since the base diameter of the dome is equal to $\frac{2}{3}$ of the total height, 2r = $\frac{2h}{3}$.

This implies r = $\frac{h}{3}$. Let H metres be the height of the cylindrical portion.

Therefore, H= h â€“ $\frac{h}{3}$ = $\frac{2h}{3}$ metres.

Volume of the air inside the building

= volume of air inside the dome+ volume of the air inside the cylinder

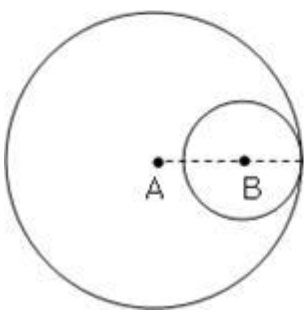
= $\frac{2}{3}\pi\left(\frac{h}{3}\right)^{3} + \pi\left(\frac{h}{3}\right)^{2}\left(\frac{2h}{3}\right) = \frac{8}{81}\pi h^{3}$ cu.meters

Volume of the air inside the building is 67 $\frac{1}{21}$ m^3.

Therefore, $\frac{8}{81}\pi h^3 = \frac{1408}{21}$

This gives h=6m

34]



Let r_1, r_2 be the radii of the given circles respectively. Since the circles touch internally,

\\ distance between their centres = r_1 â€“ r_2

\\r_1 â€“ r_2 = 6 â€¦(1)

Sum of their areas = $\pi r_1^2 + \pi r_2^2 = \pi(r_1^2 + r_2^2)$

\\$\pi(r_1^2 + r_2^2) = 116\pi$ (Given)

℘□$r_1^2 + r_2^2 = 116$ â€¦(2)

Since $(r_1 + r_2)^2$ + (r_1 â€“ $r_2)^2$ = $2(r_1^2 + r_2^2)$

\\ $(r_1 + r_2)^2 + 36 = 2(116) = 232$

\\($r_1 + r_2$) = 232 â€“ 36 = 196

℘□ $r_1 + r_2 = 14$ â€¦(3)

(1) + (3) gives, $2r_1 = 20$ □℘ $r_1 = 10$

(3) - (1) gives, $2r_2 = 8$ □℘ $r_2 = 4$

Thus, radii of the circles are 10 cm and 4 cm respectively