# MATHS

## BOOKS - RD SHARMA MATHS (HINGLISH)

## SURFACE AREAS AND VOLUMES

**Others**

**1.** Find the value of $k$ , if the point P (2,4) is equidistant from the points $A(5, k)$ and $B(k, 7)$.

▶ **Watch Video Solution**

**2.** A solid sphere of radius 10.5 cm is melted and recast into smaller solid cones, each of radius 3.5cm and height 3cm. Find the number of cones so formed. $\left(Use\pi = \dfrac{22}{7}\right)$

▶ Watch Video Solution

**3.** From a rectangular sheet of paper ABCD with AB=40CM and AD=28cm, a semi circular portion with BC as diameter is cut off. Find the area of the remaining paper. $\left(Use\pi = \dfrac{22}{7}\right)$

▶ Watch Video Solution

**4.** A card is drawn at random from a well shuffled pack of 52 playing cards. Find the probability of getting neither a red card nor a queen and (2) a face card

**5.** A solid right circular cone is cut into two parts at the middle of its height by a plane parallel to its base. The ratio of the volume of the smaller cone to the whole cone is: 1:2 (b) 1:4 (c) 1:6 (d) 1:8

**6.** The radius of the base of a right circular cone of semi-vertical angle $\alpha$ is $r$ . Show that its volume is $\frac{1}{3}\pi r^3 \cot\alpha$ and curved surface area is $\pi r^2 \cos es\, \alpha.$

**7.** The angles of the depression of the top and bottom of the tower is seen from the top of a $60\sqrt{3}$ cliff are $45^\alpha$ and $60^\alpha$ respectively. Find the height of the tower.

**8.** Find the coordinates of a point P, which lies on the line segment joining the points A(-2,-3) and B(2. -4) such that AP=$\dfrac{3}{7}$ AB.

**9.** . If the radii of the circular ends of a conical bucket, which is 16 cm high, are 20 cm and 8 cm, find the capacity and total surface area of the bucket. [Use pi= 22/7]

**10.** A cylindrical hole of diameter $30cm$ is bored through a cuboidal wooden block with side $1meter$ Find the volume of the object so formed $(\pi = 3.14)$

▶ **Watch Video Solution**

**11.** The perimeters of the ends of a frustum of a right circular cone are 44 cm and 33 cm. If the height of the frustum be 16 cm, find its volume, the slant surface and the total surface.

▶ **Watch Video Solution**

**12.** The radii of the circular ends of a frustum of height 6cm are 14cm and 6cm respectively. Find the lateral surface area and

total surface are of the frustum.

**13.** A toy is in the form of a hemisphere surmounted by a right circular cone of the same base radius as that of the hemisphere. If the radius of the base of the cone is 21cm and its volume is 2/3 of the volume of the hemisphere, calculate the height of the cone and the surface area of the toy. $\left(Use\pi = \dfrac{22}{7}\right)$.

**14.** An iron pole consisting of a cylindrical portion 110 cm high and of base diameter 12 cm is surmounted by a cone 9 cm high. Find the mass of the pole, given that $1\ cm^3$ of iron has 8 gram mass approximately. (Use $\pi = 355/115$ )

**15.** The largest cone is curved out from one face of solid cube of side 21 cm find the volume of the remaining solid.

**16.** The largest possible sphere is carved out of a wooden solid cube of side 7cm. Find the volume of the wood left. $\left( Use \pi = \dfrac{22}{7} \right).$

**17.** The height of a right circular cone is trisected by two planes drawn parallel to the base. Show that the volumes of the three portions starting from the top are in the ratio 1:7:19.

**18.** A Hollow cone is cut by a plane parallel to the base and upper portion is removed. If the curved surface of the remainder is 8/9 of the curved surface of the whole cone; find the ration of the line-segment into which the cone's altitude is divided by the plane.

**19.** If the numbers $x - 2, 4x - 1 and 5x + 2$ are in AP., find the value of $x$.

**20.** Two tangents $PA$ and $PB$ are drawn from an external point $P$ to a circle with centre $O$. Prove that $AOBP$ is a cyclic quadrilateral.

**21.** In Figure, there are shown sectors of two concentric circles of radii 7cm and 3.5cm. Find the area of the shaded region. $\left( Use \pi \frac{22}{7} \right)$

**22.** How many sphereical lead shots each 4.2cm in diameter can be obtained from a rectangular solid of lead with dimensions 66cm, 42cm, 21cm. $\left( Use \pi = \frac{22}{7} \right)$

**23.** Point $P(5, \, -3)$ is one of the two points of trisection of the line segment joining the points $A(7, \, -2) \, and \, B(1, \, -5)$ near to $A$ . Find the coordinates of the other point of trisection.

**24.** Show that the point $P(-4, 2)$ lies on the line segment joining the points $A(-4, 6)$ and $B(-4, \, -6).$

**25.** Two dice are thrown at the same time. Find the probability of getting different numbers on both dice.

**26.** A natural number, when increased by 12, becomes equal to 160 times its reciprocal. Find the number.

**27.** Find the sum of the integers between 100 and 200 that are divisible by 9.

**28.** Find the roots of the following quadratic equation:

$$\frac{2}{5}x^2 - x - \frac{3}{5} = 0$$

**29.** If the circumference of a circle is equal to the perimeter of a square then the ratio of their areas is: (a)22:7     (b) 14:11     (c) 7:22     (d) 7:11

**30.** Two tangents making an angle of $120^0$ with each other are drawn to a circle of radius 6cm, then the length of each tangent is equal to $\sqrt{3}$ cm (b) 6 $\sqrt{3}$ cm (c) $\sqrt{2}$ cm (d) 2 $\sqrt{3}$ cm

**31.** If radii of the two concentric circles are 15cm and 17cm, then the length of each chord of one circle which is tangent to other is:  8cm     (b)  16cm  (c) 30cm   (d) 17cm

**32.** A metallic hemisphere is melted and recast in the shape of a cone with the same base radius R as that of the hemisphere. If $H$ is the height of the cone, then write the value of $H/R$.

▶ **Watch Video Solution**

**33.** All kings, queens are aces are removed from a pack of 52 cards. The remaining cards are well shuffled and then a card is drawn from it. Find the probability that the drawn card is : a black face card      (b) a red card.

▶ **Watch Video Solution**

**34.** If the points $A(x, y)$, $B(3, 6)$ and $C(-3, 4)$ are collinear, show that $x - 3y + 15 = 0$

**35.** Find the common difference of an A.P. whose first term is 5 and the sum of its first four terms is half the sum of the next four terms.

**36.** In a flight of 2800km, an aircraft was slowed down due to bad weather. Its average speed is reduced by 100km/h and time increased by 30 minutes. Find the original duration of the flight.

**37.** A conical vessel of radius 6cm and height 8cm is completely filled with water. A sphere is lowered into the water and its size is such that when it touches the sides, it is just immersed . What fraction of water over flows?

> ▶ **Watch Video Solution**

**38.** An agriculture field is in the form of a rectangle of length 20m width 14m. A 10m deep well of diameter 7m is dug in a corner of the field and the earth taken out of the well is spread evenly over the remaining part of the field. Find the rise in its level.

> ▶ **Watch Video Solution**

**39.** Solid cylinder of brass 8m high and 4m diameter is melted and recast into a cone of diameter 3m. Find the height of the cone.

▶ **Watch Video Solution**

**40.** A solid iron rectangular block of dimensions 4.4m, 2.6m and 1m is cast into a hollow cylindrical pipe of internal radius 30cm and thickness 5cm. Find the length of the pipe.

▶ **Watch Video Solution**

**41.** A led pencil consists of a cylindner of wood with a solid cylinder of graphite filled into it. the diameter of pencil is 7mm, the diameter of graphite is 1 mm and the length of the pencil is 10cm. Calculate the weight of the whole pencil, if the specific

gravity of the wood is $0.7\dfrac{gm}{(cm)^3}$ and that of graphite is $2.1\dfrac{gm}{(cm)^3}$

**42.** Find the maximum volume of a cone that can be carved out of a solid hemisphere of radius r.

**43.** Water is flowing at the rate of 3km/hr through a circular pipe of 20cm internal diameter into a circular cistern of diameter 10m and depth 2m. In how much time will the cistern be filled?

**44.** Water flows at the rate of 10 meter per minute through a cylindrical pipe having its diameter as 5mm. How much time will it take to fill a conical vessel whose diameter of base is 40cm and depth 24cm?

**45.** 21 glass spheres, each of radius 2cm are packed in a cuboidal box of internal dimensions $16cm x 8cm x 8cm$ and, then the box is filled with water. Find the volume of water filled in the box.

**46.** The slant height of a frustum of a cone is 4 cm and the perimeters (circumference) of its circular ends are 18 cm and 6 cm. Find the curved surface area of the frustum.

**47.** Prove that the length of the tangents drawn from an external point to a circle are equal.

**48.** A well of inner diameter 14 m is dug 12 m deep. The earth taken out of it has been spread evenly all around it in the shape of a circular ring of width 7 m to form an embankment. Find the height of the embankment.

**49.** If the $n^{th}$ term of an A.P., is $(2n + 1)$, then the sum of its first three terms is (a) 6n+3 (b) 15 (c) 12 (d) 21

**50.** Tangent PQ at a point P of a circle of radius 5 cm meets a line through the centre O at a point Q so that OQ = 12 cm. Find length of PQ

**51.** From a point on the ground, the angles of elevation of the bottom and the top of a transmission tower fixed at the top of a 20 m high building are $45o$ and $60o$ respectively. Find the height of the tower.

**52.** The roots of the quadratic equation $2x^2 - x - 6 = 0$ (a) $-2, \dfrac{3}{2}$ (b) $2, -\dfrac{3}{2}$ (c) $-2, -\dfrac{3}{2}$ (d) $2, \dfrac{3}{2}$

**53.** Find the area of the quadrilateral $ABCD$ , in which

$AB = 7cm, BC = 6cm, CD = 12cm, DA = 15cm$ and $AC = 9cm$

**54.** The circumference of a circle is 22cm. The area of its quadrant $\left( \in cm^2 \right)$ is: $\dfrac{77}{2}$ (b) $\dfrac{77}{4}$ (c) $\dfrac{77}{8}$ (d) $\dfrac{77}{16}$

**55.** A hemisphereical bowl of internal diameter 36cm contains a liquid. This liquid is to be filled in cylindrical bottles of radius 3cm and height 6cm. How many bottles are required to empty.

▶ Watch Video Solution

**56.** How many sphereical lead shots each 4.2cm in diameter can be obtained from a rectangular solid of lead with dimensions 66cm, 42cm, 21cm. $\left( Use \pi = \dfrac{22}{7} \right)$

▶ Watch Video Solution

**57.** 2 cubes each of volume $64 \quad cm^3$ are joined end to end. Find the surface area of the resulting cuboid.

▶ Watch Video Solution

**58.** The diameter of a metallic sphere is 6cm. The sphere is melted and drawn into a wire of uniform cross-section. If the length of the wire is 36m, find its radius.

▶ **Watch Video Solution**

**59.** Three cubes whose edges measure 3cm, 4cm and 5cm respectively to form a single cube. Find its edge. Also, find the surface area of the new cube.

▶ **Watch Video Solution**

**60.** A cone of height 24 cm and radius of base 6 cm is made up of modelling clay. A child reshapes it in the form of a sphere. Find the radius of the sphere.

**61.** The diameter of a metallic sphere is 6cm. The sphere is melted and drawn into a wire of uniform cross-section. If the length of the wire is 36m, find its radius.

**62.** A solid sphere of radius 3cm is melted and then cast into small spherical balls each of diameter 0.6cm. Find the number of balls thus obtained.

**63.** If the diameter of cross-section of a wire is decreased by 5% how much percent will the length be increased so that the volume remains the same?

▶ Watch Video Solution

**64.** In Figure, OABC is a squaer inscribed in a quadrant OPBQ. If OA=20cm, find the are of shaded region. $[Use \pi = 3.14.]$

▶ Watch Video Solution

**65.** Draw a triangle ABC with side BC=6CM, AB=5CM and $\angle ABC = 60^0$ . Then construct a triangle whose sides are $\frac{3}{4}$ time the corresponding sides of $ABC$ .

▶ View Text Solution

**66.** A tower stands near an airport. The angle of elevation $\theta$ of the tower from a point on the ground such that its tangent is $\dfrac{5}{12}$. Find the height of the tower, if the distance of the observer from the tower is 120m.

**67.** A hemispherical depression is cut out from one face of a cubical wooden block such that the diameter 'l' of the hemisphere is equal to the edge of the cube. Determine the surface area of the remaining solid.

**68.** A train travels at a certain average speed for a distance of 63km and then travels a distance of 72km at an average speed of 6 km/hr more than its original speed. If it takes 3 hours to complete the total journey, what is its original average speed?

▶ **Watch Video Solution**

**69.** Cards with numbers 2 to 101 are placed in a box. A card is selected at random from the box. Find the probability that the card which is selected has a number which is a perfect square.

▶ **Watch Video Solution**

**70.** A sum of Rs. 1400 is to be used to give seven cash prizes to students of a school for their overall academic performance. If

each prize is Rs.40 less than the preceding price, find the value of each of the prizes.

**71.** Find two consecutive odd positive integers, sum of whose squares is 290.

**72.** A golf ball has diameter equal to 4.1 cm. Its surface has 150 dimples each of radius 2 mm. Calculate totals area which is exposed to the surrounding assuming that the dimples are hemispherical.

**73.** A tent of height 77dm is in the form of a right circular cylinder of diameter 36m and height 44dm surmounted by a right circular cone. Find the cost of the canvas at Rs. 3.50 per $m^2 \left( Use \pi = \frac{22}{7} \right)$

▶ **Watch Video Solution**

---

**74.** A tent is in the shape of a cylinder surmounted by a conical top. If the height and diameter of the cylindrical part are 2.1 m and 4 m respectively, and the slant height of the top is 2.8 m, find the area of the canvas used for making the tent. Also find the rate of the canvas with 500 per $m^2$

▶ **Watch Video Solution**

**75.** A toy is in the shape of a right circular cylinder with a hemisphere on one end and a cone on the other. The height and radius of the cylindrical par are 13cm and 5cm respectively. The radii of the hemispherical and conical parts re the same as that of the cylindrical part. Calculate the surface area of the toy if height of the conical part is 12 cm.

▶ **Watch Video Solution**

**76.** A right triangle, whose sides are 3 cm and 4 cm (other than hypotenuse) is made to revolve about its hypotenuse. Find the volume and surface area of the double cone so formed.

▶ **Watch Video Solution**

**77.** A cone made of paper has height 3h and vertical angle $2\alpha$. It contains two other cones of height 2h and h and vertical angle $4\alpha$ and $6\alpha$. Find the ratio of the two volume in the cones.

**78.** A cylinder vessel of diameter 14cm and height 42cm is fixed symmetrically inside a similar vessel of diameter 16cm and height 42cm. The total space between the two vessels is filled with cork dust for heat insulation purposes. How many cubic centimetres of cork dust will be required?

**79.** The difference between outside and inside surface areas of cylindrical metallic pipe 14cm long is $44cm^2$. If the pipe is made

of $99 cm^2$ of metal, find the outer and inner radii of the pipe

▶ **Watch Video Solution**

---

**80.** A solid iron rectangular block of dimensions 4.4 m , 2.6 m and 1 m is cast into a hollow cylindrical pipe of internal radius 30 cm and thickness 5 cm.Find the length of the pipe.

▶ **Watch Video Solution**

---

**81.** Sushant has a vessel of the form of an inverted cone, open at the top, of height 11 cm and radius of the top as 2.5 cm and is full of water. Metallic spherical balls each of diameter 0.5 cm are put in the vessel due to which two - fifths of the water in the vessel flows out Find how many balls were put in teh vessel. Sushant made the arrangement so that the water that flows out

irrigates the flower beds. What value has been shown by Sushant ?

**82.** A vessel in the shape of a cuboid contains some water. If three indentical spheres are immersed in the water, the level of water is increased by 2cm. If the area of the base of the cuboid is $160 \ cm^2$ and its height 12cm, determine the radius of any of the spheres.

**83.** Prove that the surface area of a sphere is equal to the curved surface area of the circumscribed cylinder.

**84.** Find the volume of the largest right circular cone that can be cut out of a cube whose edge is 9cm.

> ▶ **Watch Video Solution**

**85.** A right circular cylinder having diameter 12cm and height 15cm is full of ice-cream. The ice-cream is to be filled in cones of height 12cm and diameter 6cm having a hemispherical shape on the top. Find the number of such cones which can be filled with ice-cream.

> ▶ **Watch Video Solution**

**86.** A circus tent is cylindrical upto a height of 3m and conical above it. If the diameter of the base is 105m and the slant height

of the conical part is 53m, find the total canvas used in making the tent.

> ▶ **Watch Video Solution**

87. Water is flowing at the rate of 2.52 km/h through a cylindrical pipe into a cylindrical tank, the radius of the base is 40cm. If the increase in the level of water in the tank, in half an hour is 3.15m, find the internal diameter of the pipe.

> ▶ **Watch Video Solution**

88. The solid is composed of a cylinder with hemispherical ends. If the whole length of the solid is 108cm and the diameter of the hemispherical ends is 36cm, find the cost of polishing the

surface of the solid at the rate of 7 paise per sq. cm $\left( Use \pi = \dfrac{22}{7} \right)$

**89.** A solid is in the form of a right circular cone mounted on a hemisphere. The radius of the hemisphere is 3.5cm and the height of the cone is 4cm. The solid is placed in a cylindrical tub, full of water, in such a way that the whole solid is submerged in water. If the radius of the cylinder is 5cm and its height is 10.5cm, find the volume of water left in the cylindrical tub. $\left( Use \pi = \dfrac{22}{7} \right)$

**90.** Three cubes each of side 5 cm are joined end to end. Find the surface area of the resulting cuboid.

▶ **Watch Video Solution**

**91.** A metallic sphere of radius 4.2 cm is melted and recast into the shape of a cylinder of radius 6 cm. Find the height of the cylinder.

▶ **Watch Video Solution**

**92.** A tent is in the form of a right circular cylinder surmounted by a cone. The diameter of cylinder is 24 m. The height of the cylindrical portion is 11 m while the vertex of the cone is 16 m above the ground. Find the area of canvas required for the tent.

**93.** A solid consisting of a right circular cone of height 120 cm and radius 60 cm standing on a hemisphere of radius 60 cm is placed upright in a right circular cylinder full of water such that it touches the bottoms. Find the volume of water left in the cylinder, if the radius of the cylinder is 60 cm and its height is 180 cm.

▶ **Watch Video Solution**

**94.** A hemisphere and a cone have equal bases. If their heights are also equal, then the ratio of their curved surfaces will be (a) 1 : 2 (b) 2 : 1 (c) $1 : \sqrt{2}$ (d) $\sqrt{2} : 1$

▶ **Watch Video Solution**

**95.** A solid metallic spherical ball of diameter 6 cm is melted and recast into a cone with diameter of the base as 12 cm. The height of the cone is (a) 2 cm      (b) 3 cm      (c) 4 cm      (d) 6 cm

**96.** A hollow sphere of internal and external diameters 4 cm and 8 cm respectively is melted into a cone of base diameter 8 cm. The height of the cone is (a) 12 cm      (b) 14 cm      (c) 15 cm      (d) 18 cm

**97.** A solid piece of iron of dimensions $49 \times 33 \times 24$ cm is moulded into a sphere. The radius of the sphere is (a) 21 cm (b) 28 cm (c) 35 cm (d) None of these

**98.** The ratio of lateral surface area to the total surface area of a cylinder with base diameter 1.6 m and height 20 cm is $1 : 7$ (b) $1 : 5$ (c) $7 : 1$ (d) $5 : 1$

**99.** A solid consists of a circular cylinder with an exact fitting right circular cone placed at the top. The height of the cone is $h$ . If the total volume of the solid is 3 times the volume of the cone, then the height of the circular cylinder is $2h$ (b) $\dfrac{2h}{3}$ (c) $\dfrac{3h}{2}$ (d) $4h$

**100.** Find the maximum volume of a cone that can be carved out of a solid hemisphere of radius r.

▶ Watch Video Solution

**101.** The radii of the bases of two cylinders are in the ratio 3 : 5 and their heights are in the ratio 2 : 3. Find the ratio of their curved surface areas.

▶ Watch Video Solution

**102.** A right circular cylinder of radius $r$ and height $h$ $(h > 2r)$ just encloses a sphere of diameter (a) $h$ (b) $r$ (c) $2r$ (d) $2h$

▶ Watch Video Solution

**103.** The radii of the circular ends of a frustum are 6 cm and 14 cm. If its slant height is 10 cm, then its vertical height is (a) 6 cm    (b) 8 cm    (c) 4 cm    (d) 7 cm

**104.** The height and radius of the cone of which the frustum is a part are $h_1$ and $r_1$ respectively. If $h_2$ and $r_2$ are the heights and radius of the smaller base of the frustum respectively and $h_2 : h_1 = 1 : 2$, then $r_2 : r_1$ is equal to (a) $1 : 3$ (b) $1 : 2$ (c) $2 : 1$ (d) $3 : 1$

**105.** The diameters of the ends of a frustum of a cone are 32 cm and 20 cm. If its slant height is 10 cm, then its lateral surface

area is $321\pi cm^2$ (b) $300\pi cm^2$ (c) $260\pi cm^2$ (d) $250\pi cm^2$

▶ **Watch Video Solution**

106. A solid frustum is of height 8 cm. If the radii of its lower and upper ends are 3 cm and 9 cm respectively, then its slant height is (a) 15 cm (b) 12 cm (c) 10 cm (d) 17 cm

▶ **Watch Video Solution**

107. The radii of the ends of a bucket 16 cm high are 20 cm and 8 cm. The curved surface area of the bucket is $1760\ cm^2$ (b) $2240\ cm^2$ (c) $880\ cm^2$ (d) $3120\ cm^2$

▶ **Watch Video Solution**

**108.** The diameters of the top and the bottom portions of a bucket are $42cm$ and $28cm$. If the height of the bucket is $24cm$, then find the cost of painting its outer surface at the rate of $5\dfrac{paise}{cm^2}$.

**109.** If four times the sum of the areas of two circular faces of a cylinder of height 8 cm is equal to twice the curve surface area, then diameter of the cylinder is (a) 4 cm    (b) 8 cm    (c) 2 cm    (d) 6 cm

**110.** If the radius of the base of a right circular cylinder is halved, keeping the height same, what is the ratio of the volume of the reduce cylinder to that of the original.

**111.** A metallic solid cone is melted to form a solid cylinder of equal radius. If the height of the cylinder is 6 cm, then the height of the cone was (a) 10 cm      (b) 12 cm      (c) 18 cm      (d) 24 cm

**112.** A rectangular sheet of paper $40cm \times 22cm$ , is rolled to form a hollow cylinder of height 40 cm. The radius of the cylinder (in cm) is (a) 3.5 (b) 7 (c) $80/7$ (d) 5

**113.** The number of solid spheres, each of diameter 6 cm that can be made by melting a solid metal cylinder of height 45 cm and diameter 4 cm is (a) 3     (b) 5     (c) 4     (d) 6