1. A car covers a certain distance in 25 hr. If it reduces the speed by 1/5, the car covers 200 km less in that time. The speed of car is

1. 60km/hr 2. 30km/hr 3. 40km/hr 4. 50 km/hr

Ans. 3

**Explanation**

Let the distance be D km, speed be V kmph and t (25 hr) is the time to cover he distance;

From the given condition, time t is given by

$\frac{D}{V} = 25$ ……..(1)

When speed is reduced by 1/5, the distance travelled is 200km less in the same time. Therefore:

$\frac{D-200}{\frac{4}{5}V} = 25$ ……..(2)

i.e., D-200 = $\frac{4}{5}V$ x25 = 20V …….(3)

From Eqn.(1), D = 25V, ∴ Eqn. (3) → 25V-200 =20V → V →40

2. If $x^2+y^2+z^2 = 14$ and xy + yz + zx = 11, then the value of $(x+y+z)^2$ is

1. 16 2. 25 3. 36 4. 49

Ans. 3

**Explanation**

$(x+y+z)^2 = x^2+y^2+z^2 + 2(xy + yz + zx)$

$= 14 + 2 \times 11$

$= 36$

3. If $\sqrt{2}\tan2\theta = \sqrt{6}$ and $0° < \theta < 45°$, then the value of $\sin\theta + \sqrt{3}\cos\theta - 2\tan^2\theta$ is,

1. 2/3 2. 4/3 3. 2 4. 8/3

Ans. 2

**Explanation**

Given: $\tan2\theta = \frac{\sqrt{6}}{\sqrt{2}} \rightarrow \sqrt{3}$; $\tan2\theta = \tan60$;

$2\theta = 60 \rightarrow \theta = 30$;

$\sin\theta + \sqrt{3}\cos\theta - 2\tan^2\theta = \sin30 + \sqrt{3}\cos30 - 2\tan^230$;

$= \frac{1}{2} + \sqrt{3} \times \frac{\sqrt{3}}{2} - 2 \times \frac{1}{3} = \frac{1}{2} + \frac{3}{2} - \frac{2}{3} = 2 - \frac{2}{3} = \frac{4}{3}$;

4. A positive number when decreased by 4 is equal to 21 times the reciprocal of this number. The number is:

1. 3 2. 7 3. 5 4. 9

Ans. 2

**Explanation**

Let the number be =x;

Given: $x - 4 = 21 \times \frac{1}{x} \rightarrow x^2-4x-21=0 \rightarrow (x - 7)(x +3) = 0$

X=7, -3;

5. If each side of a rectangle is increased by 50%, its area will increase by

1. 50 % 2. 125% 3. 100% 4. None

Ans: 2

**Explanation**

(Rectangle area, A = ℓb ; ℓ → 1.5ℓ , b → 1.5b

∴ A → 1.5 ℓ × 1.5 b = 2.25 ℓb; ∴ Increase in area = 1.25 A.

6. Which one of the following is true?

1. AM=GM=HM
2. AM<GM<HM
3. GM>AM>HM
4. AM>GM>HM

Ans: 4.

6.1 Which one of the following is true?

1. $(AM)(GM) = (HM)^2$
2. $(AM)(HM) = (GM)^2$
3. $(HM)(GM) = (AM)^2$
4. $(AM)(HM) = (GM)^2$

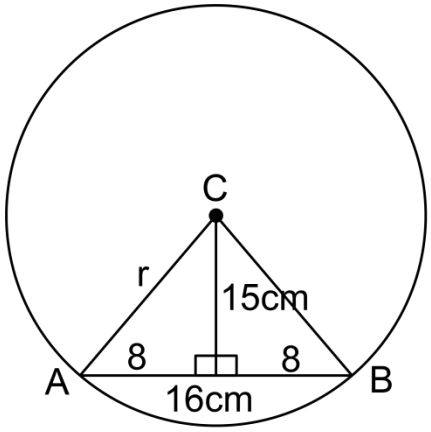
Ans: 4.

7. If the length of a chord of a circle is 16 cm. and is at a distance of 15 cm from the centre of the circle, then the radius of the circle (in cm) is

1.15 2. 16 3. 17 4. 34

Ans. 3

**Explanation**




$r^2 = 15^2 + 8^2$;

$r^2 = 225 + 64 = 289 \rightarrow r = 17$ cm; (Pythagorean triples. So sum be be done mentally in less than 10 seconds)

8. On 24th May 2008 the maximum temperature of Delhi, Kolkata and Mumbai were recorded as 35°C, 33°C and 34°C respectively. What was the maximum temperature of Chennai so that the average maximum temperature of those cities would be 35°?

1. 34°C 2. 35°C 3. 36°C 4.38° C

Ans. 4

**Explanation**

Average temperature of all cities including Chennai = (35 + 33 + 34 + x)/4 = 35

x = 140 -102 = 38;

9. The diameter of a sphere is twice the diameter of another sphere. The curved surface area of the first and the volume of the second are numerically equal. The numerical value of the radius of the first sphere is

1. 3/8 2.24 3. 8 4. 16

Ans. 1

**Explanation**

Let the diameter of one sphere be $d_1$ (radius $r_1$) and diameter of second sphere be $d_2$ ( radius $r_2$)

Let the sphere with diameter d be smaller hence $r_2=2r_1$;

Curved surface area of a sphere = $4\pi r^2$ and volume is $\frac{4}{3}\pi r^3$

Given:Curved surface of smaller sphere, $4\pi {r_1}^2$ =Volume of the second sphere,$\frac{4}{3}\pi {r_2}^3$

${r_1}^2 = \frac{1}{3}{r_2}^3$

${r_1}^2 = \frac{1}{3}(2r_1)^3 = \frac{1}{3}x8x{r_1}^3$ → $r_1 = 3/8$

10. The thread of a kite makes 60° angle with the horizontal plane. If the length of the thread be 80 m, then the vertical height of the kite will be

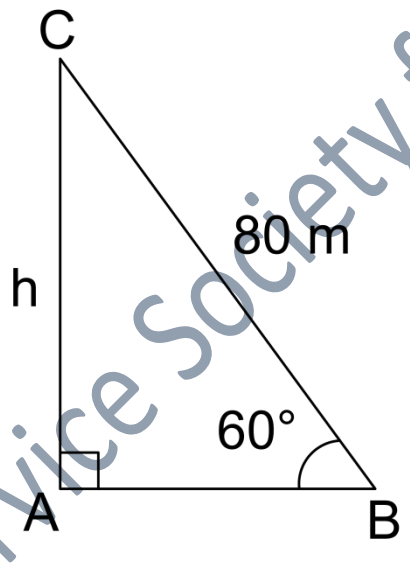
1. 40/√3 m 2. 80√3 m 3. 80 m 4. 40√3m

Ans. 1

**Explanation**

It is given: BC =80 m

h= BC sin60 = 80 sin60 =40√3 m;

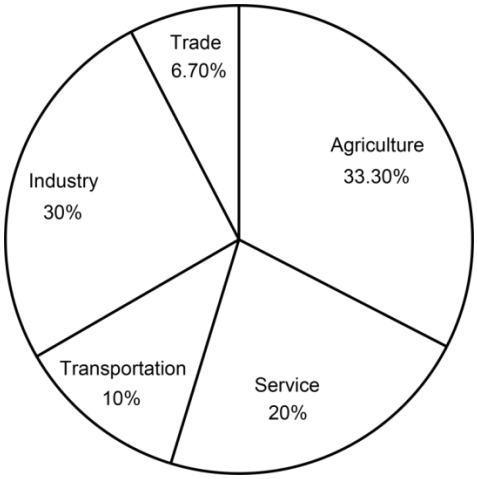



11. Study the pie chart carefully and answer the questions. The pie chart represents the percentage of people involved in various occupations. Total number of people = 20000. How many more people are involved in service than in trade?

1. 3660 2. 2660 3. 1660 4. 660

Ans. 2

**Explanation**




% Difference in service and trade = 20-6.7 = 13.3%;

Hence, no. of people involved in service than in trade = 13.3×20000/100 = 2660.

12. The value of $\sec^2 17° - \frac{1}{\tan^2 73^o} - \sin 17° \sec 73°$ is

1. 1 2.0 3)-1 4)2

Ans: 2

**Explanation**

The given sum: $\sec^2 17^o - \frac{1}{\tan^2 73^o} - \sin 17^o \sec 73^o$

$= 1 + \tan^2 17^o - \cot^2 73^o - \sin(90^o - 73^o) \sec 73^o$

$= 1 + \tan^2 17^o - \cot^2 (90^o - 17^o) - \cos 73^o \quad \sec 73^o$

$= 1 + \tan^2 17^o - \tan^2 17^o - 1 = 0$

13. The value of $\frac{\sin\theta}{1+\cos\theta} + \frac{\sin\theta}{1-\cos\theta}$ is

1. $2\sin\theta$ 2. $2\cos\theta$ 3.$2\sec\theta$ 4.$2\operatorname{cosec}\theta$

**Explanation**

$= \frac{\sin\theta}{1+\cos\theta} + \frac{\sin\theta}{1-\cos\theta} = \frac{\sin\theta(1-\cos\theta)+\sin\theta(1+\cos\theta)}{1-\cos^2\theta} = \frac{2\sin\theta}{\sin^2\theta} = 2\operatorname{cosec}\theta.$

14.. The sides of three faces of a cuboid are in the ratio 1:2:3. If its volume is 6000 $cm^3$, the length of the shortest side is

1. 7.5 cm 2. 10cm 3. 15 cm 4. 17.5 cm

Ans: 2

**Explantion**

Let the sides be l, b and h. ∴Volume of cuboid, V =lbh

For the given sides, V =a x 2a x 3a = $6a^3$= 6000

$6a^3$ = 6000 → $a^3$= 1000 ∴ a = 10

15. The area of the base of a right circular cone is 51 $m^2$. Find its vertical height if its volume is 68 $m^3$.

1. 5 m 2. 4.5 m 3. 4m 4. 3.5 m

Ans: 3

**Explantion**

Volume of cone, V = $\frac{1}{3}\pi r^2 h = \frac{1}{3}$ A . h = $\frac{1}{3} \times 51 \times h$∴ h =4

16. The surface area of a cube is 150 $cm^2$. Its volume is

1. 100 $cm^3$ 2. 125 $cm^3$ 3. 150 $cm^3$ 4. 200 $cm^3$

Ans: 2

**Explantion**

S = $6a^2$ and V = $a^3$

Given: $6a^2$ = 150

∴ a = 5 cm

∴V = 125 $cm^3$

17. The slant height of a right circular cone is 10 m and its height 8 m. Find the area of its curved surface?

1. 60 π $m^2$ 2. 50π $m^2$ 3, 40π $m^2$ 4. 30π $m^2$

Ans: 1

**Explanation**

For a right circular cone, $\ell = \sqrt{r^2 + h^2}$ and CSA = $\pi r\ell$

Given: $\ell$ = 10m, h = 8m ∴ r = 6m (Pythagorean triples)

CSA = $\pi r\ell$ = π x 6 x 10 = 60π

18. A right circular cylinder and a right circular cone have the same radius and height. The ratio of their volume is

1. 2:1 2. 3:1 3. 3:2 4. 4:3

Ans:2

**Explanation**

Volume of cylinder = $\pi r^2 h$

Volume of cone = 1/3 $\pi r^2 h$

Volume of cylinder : Volume of cone =3:1

(Note: Remember that for the same radius and height for a cylinder and cone, cylinder volume is 3 times that of cone volume)

19.. The height and radius of a cone are doubled. The volume of the cone becomes

1. 2 times 2, 4 times 3. 8 times 4. None

Ans: 3

**Explantion**

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

Given r → 2r, h → 2h

∴Volume → $\frac{1}{3}\pi(2r)^2 . (2h) = 8 . \frac{1}{3}\pi r^2 h = 8V$

20. A hallow cone of height 24 cm and radius 7 cm is to be made. The total area of the sheet required is

1. 607 $cm^2$ 2. 704 $cm^2$ 3. 804 $cm^2$ 4. None

Ans:1

**Explanation**

Given r = 7; h= 24; ∴ Slant side = $\ell = \sqrt{r^2 + h^2} \rightarrow \ell = 25$;

Total surface area, TSA = $\pi rl + \pi r^2$

=22/7 x 7 x 25 + 22/7 x 7 x 7

= 550 +154 = 704$cm^2$

21. The surface are of a sphere is 324 π $cm^2$. Find its volume

1.450 π $cm^3$ 2. 167 π $cm^3$ 3. 972 π $cm^3$ 4. None

Ans:3

**Explanation**

**To find volume Method 1.**

Spherical surface area, S =$4\pi r^2$ = 324 π

∴ r = 9.

∴ V = $\frac{4}{3}\pi r^3 = \frac{4}{3}\pi . 9^3$ = 972 π= 3055

**Method 2**

Surface area $S = 4\pi r^2$
or $V = \frac{S\,r}{3}$ or $S = \frac{3V}{r}$
$\therefore V = 4\pi r^2 \times \frac{r}{3}$

22. How many balls of radius 1 cm can be made by casting a sphere of radius 10 cm?

1. 100 2. 1000 3. 1111 4. None

Ans:3

**Explanation**

Sphere volume, $V = \frac{4}{3}\pi r^3$

$\frac{v_1}{v_1} = \frac{10^3}{1^3} = 1000$

23. How many pieces of cube of side 2 cm can be made out of a cube of side 22 cm?

1.444 2. 631 3. 1331 4. None

Ans:3

**Explanation**

Volume of cube, $V = a^3$

$\therefore n = \frac{V_1}{v_1} = \frac{22 \times 22 \times 22}{2 \times 2 \times 2} = 11 \times 11 \times 11 = 121 \times 11 = 1331$

24. The volume of a sphere is 4851 $cm^3$. Its surface area is

1. 1386 $cm^2$ 3. 1481 $cm^2$ 3. 1555.56 $cm^2$ 4.none of these

Ans:1

Explanation

Volume of sphere, $V = \frac{4}{3}\pi r^3 = \frac{4x22xr^3}{3x7} = 4851$

$\therefore r^3 = \frac{21x21x21}{2x2x2}$

$S = 4\pi r^2 = 1386.$

25. The sum of the angles around a point is

1. 90° 2. 180° 3.270 4. 360°

Ans:4

26. Three spheres of radii 6 cm, 8 cm 10 cm, are melted to form a solid sphere. Find its approximate radius.

1. 12 cm 2. 13 cm 3. 15 cm 4. none of these

Ans:4

**Explanation**

Sphere volume, $V = \frac{4}{3}\pi r^3$

$V_1 + V_2 + V_3 = \frac{4}{3}\pi.6^3 + \frac{4}{3}\pi.8^3 + \frac{4}{3}\pi.10^3$

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

$R^3 = 6^3 + 8^3 + 10^3 = 1528 \; ;\therefore R \approx 11.51$

**27.** A sphere, cylinder and cone of dimensions are as follows: radius=r, height 2r. Which one has the greatest volume?

1.sphere 2. cylinder 3. cone 4. no definite relation can be deduced

Ans:2

**Explanation**

Radius r is same for sphere, cylinder and cone

Height h = 2r for cone and cylinder

Volume of sphere = $\frac{4}{3}\pi r^3$

Volume of cylinder = $\pi r^2 h \rightarrow \pi r^2(2r) = 2\pi r^3$

Volume of cone = $\frac{1}{3}\pi r^2 h \rightarrow \frac{\pi}{3}r^2.(2r) = \frac{2}{3}\pi r^3$

Volume ratio: Volume of Sphere : Volume of cylinder : volume of cone = $\frac{4}{3}\pi r^3 : 2\pi r^3 : \frac{2}{3}\pi r^3$

$= 1.33\pi r^3 : 2\pi r^3 : 0.666\pi r^3 \rightarrow \frac{4}{3} : 2 : \frac{2}{3}$

28. The sum of all the interior angles of a pentagon is

1. $360^o$ 2. $450^o$ 3. $540^o$ 4. None

Ans:2

**Explanation**

5 x 108° =540°.

29. The angle which is twice it supplementary is

1. $120^o$ 2. $60^o$ 3. $150^o$ 4. None

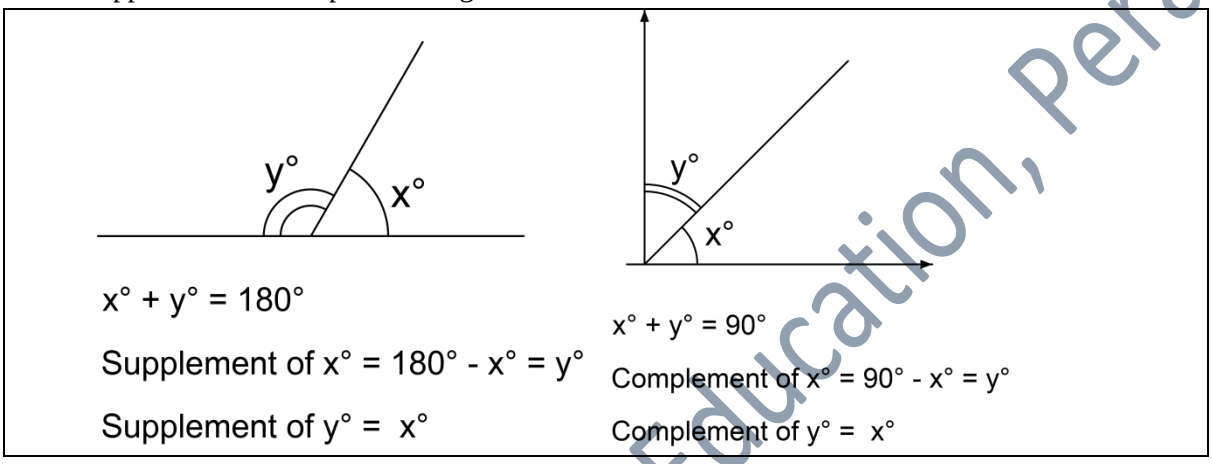
Ans: 1

**Explanation**

$Let\ the\ angle\ be\ x\ and\ \therefore\ its\ supplement = 180 - x$

$It\ is\ given\ that: x = 2(180 - x) \rightarrow 3x = 360 \rightarrow x = 120.$

Box; Supplement and complement angles




30. The angle which exceeds its complement by $20^o$ is

1. $30^o$ 2. $55^o$ 3. $60^o$ 4. $45^o$

Ans: 2

**Explantion**

Let the angle be x.

Its complement = 90 - x

Given x-(90-x) = 20

$\therefore$ 2x = 110 $\rightarrow$ x = 55°

32. The sum of the exterior angles of a hexagon is

1. $360^o$ 2. $540^o$ 3. $180^o$ 4. none of these

Ans: 1.

**Explanation:** Sum of exterior angles of all polygons is always 360°

33. In any triangle, the centroid divides the medians in the ratio (from the vertex)

1. 2:1 2. 3:1 3. 3:2 4. No definite relation exists

Ans: 1

34.Opposite angles of cyclic quadrilaterals are

1. supplementary
2. complementary
3. equal
4.. No definite relation exists

Ans: 1

**Explanation:** (∵ their sum is 180°); it is one of the features of a cyclic quadrilateral.

35. Simplify: $\frac{(2^2)^3+(2^3)^2}{4}$

Explanation

$\frac{(2^2)^3+(2^3)^2}{4}=\frac{2\times 2^6}{2^2} = 2^5 = 32$ or $\frac{4^3+8^2}{4} = \frac{128}{4} = 32$

35.1. Calculate $\sqrt{2^{-1}+3^{-1}+4^{-1}}$

$Ans: [1/2 + 1/3 + 1/4]^{1/2}$

$=\sqrt{\frac{6+4+3}{12}}=\sqrt{\frac{13}{12}}$

36. If the diagonals of a rhombus are equal, it is a

1. rectangle
2. square
3. Kite or deltoid
4. none of these

Ans: 2

37. The figure formed by joining the mid-points of the sides of a quadrilateral is a

1. trapezium
2. rectangle
3. parallelogram
4. rhombus

Ans: 3

38. If the sum of a pair of opposite angles of a quadrilateral are supplementary ($180^o$), the quadrilateral is

1. cycle quadrilateral
2. parallelogram
3. a rhombus
4. a rectangle or square

Ans: 1 and 4.

39. Any cyclic parallelogram is a

1. rhombus 2. trapezium 3, rectangle 4. Deltoid

Ans: 3

**Explanation:** No rhombus or parallelogram can be drawn inside a circle

40. If two medians of a triangle are equal, the triangle is

1. right angled
2. isosceles
3. equilateral
4. None

Ans: 2

41. The ratio of areas of two similar triangles is equal to

1. the ratio of corresponding altitudes
2. the ratio of corresponding sides
3. the ratio of the squares of corresponding sides
4. none of these

Ans: 3

**Explanation:** Options 1 and 2 are principally wrong because area is not linear number but it is quadratic number, i.e., area $\propto$ (linear)$^2$

42.The perimeters of similar triangles are in the ratios of

1.altitudes 2.medians 3. the ratio of their corresponding sides 4.none of these

Ans: 3

43. Find the number of sides of a regular polygon if each of its interior angles is $135^o$

1. 6 2. 7 3.8 4. None

Ans: 2

44. Two cubes of side 1 cm each, four cubes of side 2 cm each, and two cubes of side 3 cm and 4 cm are melted to form one cube of side

1. 5 cm 2. 6 cm 3. 7cm 4. None

Ans:1

**Explanation**

Let V = volume of a single cube after melting all cubes together; Let a be the side of new cube

$\therefore V = 2 \times 1^3 + 4 \times 2^3 + 3^3 + 4^3 = 2 + 32 + 27 + 64 = 125 = a^3 ; \therefore a = 5$

45. The perimeters of similar triangles are in the ratio of their corresponding

1. altitudes 2. medians 3. sides 4. None

Ans: 3.

46. How many pieces of cube of side 2 cm can be made out of a cube of side 22 cm?

1. 444 2. 631 3. 1331 4. None

Ans:3

**Explanation**

Volume of cube, $V = a^3$

$\therefore n = \frac{V_1}{v_1} = \frac{22 \times 22 \times 22}{2 \times 2 \times 2} = 11 \times 11 \times 11 = 121 \times 11 = 1331$

47. The surface are of a sphere is 324 π $cm^2$. Find its volume

1.450 π $cm^3$ 2. 167 π $cm^3$ 3. 972 π $cm^3$ 4. None

Ans:3

**Explanation**

To find volume

**Method 1.**

Spherical surface area, $S = 4\pi r^2 = 324\ \pi$; $\therefore r = 9$.

$\therefore V = \frac{4}{3}\pi r^3 = \frac{4}{3}\pi.9^3 = 972\ \pi = 3055$

**Method 2**

Surface area $S = 4\pi r^2$

or $V = \frac{S\,r}{3}$ or $S = \frac{3V}{r}$

$\therefore V = 4\pi r^2 \times \frac{r}{3}$

$= 324\pi \times \frac{9}{3} = 972\ \pi = 3055$

47. Which of the following is true?

1. Mean = 3 Median – 2 Mode
2. Median = 3 Mode – 2 Mean
3. Mode = 3 Median – 2 Mean
4. Mode = Mean - Median

Ans: 3.

48. The volume of a sphere is 4851 $cm^3$. Its surface area is

1. 1386 $cm^2$ 3. 1481 $cm^2$ 3. 1555 $cm^2$ 4.none of these

Ans:1

Explanation

Volume of sphere, $V = \frac{4}{3}\pi r^3 = \frac{4x22xr^3}{3x7} = 4851$

$\therefore r^3 = \frac{3x4581x7}{4x22} = \frac{3x11x441x7}{4x22} = \frac{3x11x21x21x7}{4x2x11}$ $\frac{21x21x21}{8} \rightarrow r = \frac{21}{2}$

Surface area S = $4\pi r^2 = 1386$.

49. Three spheres of radii 6 cm, 8 cm 10 cm, are melted to form a solid sphere. Find its approximate radius.

1. 11 cm 2. 13 cm 3. 12 cm 4. none of these

Ans:3

**Explanation**

Sphere volume, $V = \frac{4}{3}\pi r^3$

$V_1 + V_2 + V_3 = \frac{4}{3}\pi.6^3 + \frac{4}{3}\pi.8^3 + \frac{4}{3}\pi.10^3 = \frac{4}{3}\pi R^3$

$R^3 = 6^3 + 8^3 + 10^3 = 1728 ; \therefore R = 12$

**50**. A sphere, cylinder and cone of dimensions are as follows: radius = r, height 2r. Which one has the greatest volume?

1.sphere 2. cylinder 3. cone 4. no definite relation can be deduced

Ans:2

**Explanation**

Radius r is same for sphere, cylinder and cone

Height h = 2r for cone and cylinder

Volume of sphere = $\frac{4}{3}\pi r^3$

Volume of cylinder = $\pi r^2 h \rightarrow \pi r^2(2r) = 2\pi r^3$

Volume of cone = $\frac{1}{3}\pi r^2 h \rightarrow \frac{\pi}{3} r^2.(2r) = \frac{2}{3}\pi r^3$

Volume ratio: volume of sphere : volume of cylinder : volume of cone = $\frac{4}{3}\pi r^3 : 2\pi r^3 : \frac{2}{3}\pi r^3$

$= \frac{4}{3} : 2 : \frac{2}{3} \rightarrow 1.33 : 2 : 0.666$