

Areas & Volumes
Multiple Choice Questions

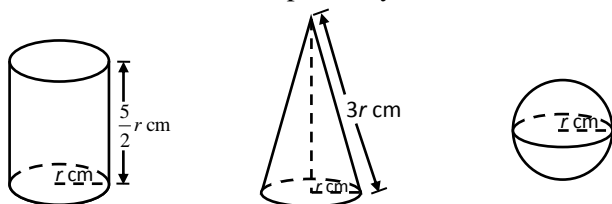
1. [14-15 Standardized Test, 2]

A hollow cylindrical metal pipe, 1 m long, has an external radius and an internal radius of 5 cm and 4 cm respectively. The volume of metal is

- A. $10\pi \text{ cm}^3$ B. $90\pi \text{ cm}^3$
C. $100\pi \text{ cm}^3$ D. $900\pi \text{ cm}^3$

2. [14-15 Standardized Test, 3]

The figure shows a right circular cylinder, a right circular cone and a sphere. Their curved surface areas are $X \text{ cm}^2$, $Y \text{ cm}^2$ and $Z \text{ cm}^2$ respectively. Which of the following is true?



- A. $Y < Z < X$
B. $Z < Y < X$
C. $Z < X < Y$
D. $X < Y < Z$

3. [14-15 Standardized Test, 10]

A solid metal sphere of volume 504 cm^3 is melted and recast into 3 smaller solid spheres whose curved surfaces are in the ratio $1 : 4 : 9$. The volume of the medium sphere is

- A. 14 cm^3
B. 36 cm^3
C. 112 cm^3
D. 144 cm^3

4. [14-15 Final Exam, 9]

The formula $b^m \sqrt{a^2 + c^n}$ represents the total surface area of a solid where a , b and c are linear measurements of the object, m and n are constants. Which of the following are the possible values of m and n ?

- A. $m = 1, n = 1$
B. $m = 1, n = 2$
C. $m = 2, n = 1$
D. $m = 2, n = 2$

5. [14-15 Final Exam, 21]

If the base radius of a right circular cone is increased by 30% and slant height is decreased by 40%, then the percentage increase in its curved surface area is

- A. -78%.
- B. -22%.
- C. -10%.
- D. 78%.

6. [15-16 Mid-year Exam, 7]

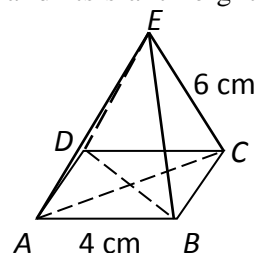
The base area of a pyramid is 120 cm^2 and the height is 10 cm. If the pyramid is melted and recast into a triangular prism with base area 80 cm^2 . Find the percentage change in height from pyramid to prism.

- A. 100%
- B. 50%
- C. -50%
- D. -100%

7. [15-16 Mid-year Exam, 8]

The figure shows a right pyramid with a square base of side 4 cm and its slant height is 6 cm. Find the total area of all lateral faces.

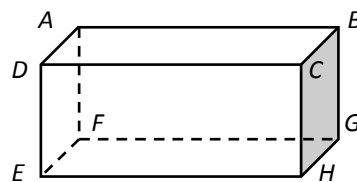
- A. 22.6 cm^2
- B. 45.3 cm^2
- C. 61.3 cm^2
- D. 90.5 cm^2



8. [15-16 Standardized Test, 3]

If the volume of cuboid $ABCDEFGH$ is $a^3 \text{ cm}^3$, find the volume of pyramid $ADEFH$.

- A. $\frac{a}{3} \text{ cm}^3$
- B. $\frac{a}{2} \text{ cm}^3$
- C. $\frac{a^3}{3} \text{ cm}^3$
- D. $\frac{a^3}{8} \text{ cm}^3$

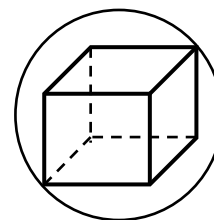


9. [15-16 Standardized Test, 10]

A cube can just be fitted into a sphere of radius $\frac{r}{2}$ so that all the vertices of the cube touch the sphere.

Find the length of a side of the cube.

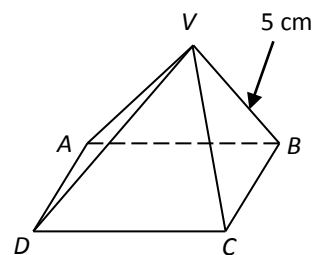
- A. $\frac{\sqrt{3}}{6} r$
- B. $\frac{\sqrt{2}}{4} r$
- C. $\frac{\sqrt{3}}{3} r$
- D. $\frac{2\sqrt{3}}{3} r$



10. [15-16 Final Exam, 6]

In the figure, $VABCD$ is a right pyramid with a square base $ABCD$ of area 36 cm^2 and the slant height is 5 cm . The total surface area of the pyramid is

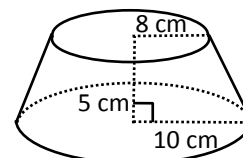
- A. 48 cm^2 .
- B. 60 cm^2 .
- C. 72 cm^2 .
- D. 84 cm^2 .



11. [15-16 Final Exam, 26]

In the figure, the radii of the upper and lower bases of a frustum are 8 cm and 10 cm respectively. Find the total surface area of the frustum, correct to 3 significant figures.

- A. 261 cm^2
- B. 515 cm^2
- C. 820 cm^2
- D. 1280 cm^2



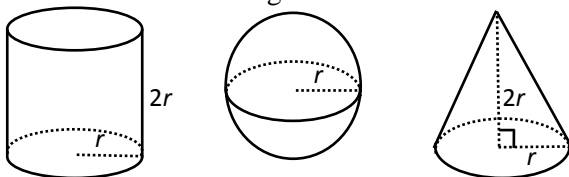
12. [15-16 Final Exam, 19]

What is the dimension of the measurement $\pi x^2 + \pi x\sqrt{4x^2 + y^2}$ if x and y are linear measurements?

- A. 1
- B. 2
- C. 3
- D. 4

13. [16-17 Standardized Test, 8]

In the figure, a cylinder, a sphere and a right circular cone, each of which has radius r and height $2r$, are given. Let A_1 , A_2 and A_3 be the total surface areas of the cylinder, the sphere and the cone respectively. Which of the following is/are correct?

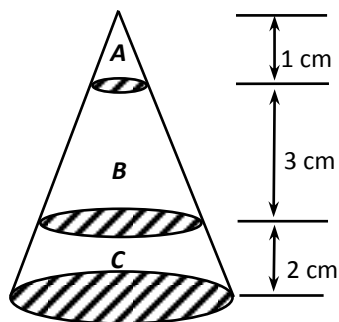


- I. $A_1 = A_2$
- II. $A_2 > A_3$
- III. $A_1 : A_2 : A_3 = 2 : 4 : 3$

- A. II only
- B. I and II only
- C. II and III only
- D. I, II and III

14. [16-17 Standardized Test, 9]

In the figure, a right circular cone is cut horizontally into 3 parts. Part A is a cone, part B and part C are circular frustums. Find the ratio of the curved surface areas of parts A : B : C.

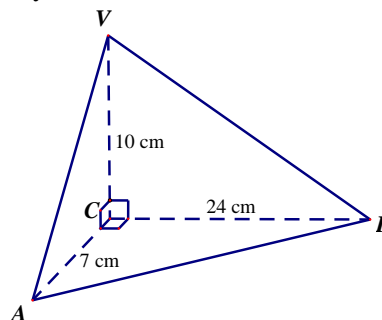


- A. 1 : 3 : 2
- B. 1 : 9 : 4
- C. 1 : 15 : 20
- D. 1 : 16 : 36

15. [16-17 Mid-year Exam, 10]

In the figure, $VABC$ is a right-angled triangular pyramid where V is vertically above C . $AC = 7$ cm, $BC = 24$ cm and $VC = 10$ cm. Find the volume of $VABC$.

- A. 280 cm^3
- B. 420 cm^3
- C. 560 cm^3
- D. 840 cm^3



16. [16-17 Mid-year Exam, 16]

If the total surface area of a right circular cone with a base radius of 3 cm is $24\pi \text{ cm}^2$, the volume of the cone is

- A. $12\pi \text{ cm}^3$.
- B. $15\pi \text{ cm}^3$.
- C. $24\pi \text{ cm}^3$.
- D. $36\pi \text{ cm}^3$.

17. [16-17 Mid-year Exam, 17]

The height of a circular cone is the same as its base radius. If the volume of the circular cone increases by 20%, the percentage change of its total surface area is

- A. -36% .
- B. $+6.27\%$.
- C. $+12.9\%$.
- D. $+44\%$.

18. [16-17 Final Exam, 14]

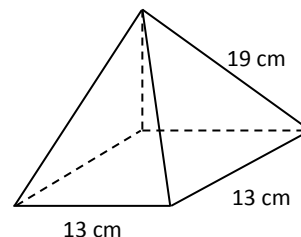
If the radius of a larger sphere is 20% longer than that of a smaller sphere, then by what percent is the surface area of the larger sphere greater than that of the smaller sphere?

- A. 20%
- B. 40%
- C. 44%
- D. 72.8%

19. [16-17 Final Exam, 15]

In the figure, find the total surface area of the right pyramid with square base correct to 3 significant figures.

- A. 529 cm²
- B. 633 cm²
- C. 663 cm²
- D. 1100 cm²



20. [17-18 Mid-year Exam, 11]

The base of a pyramid is a right-angled isosceles $\triangle ABC$ with $\angle ABC = 90^\circ$ and the height of the pyramid is 8 cm. If the volume of the pyramid is 48 cm³, find the length of AB .

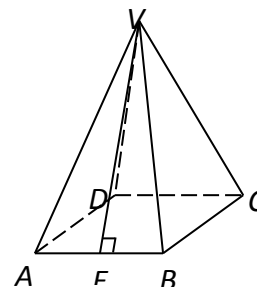
- A. 3 cm
- B. $3\sqrt{2}$ cm
- C. 6 cm
- D. $6\sqrt{2}$ cm

21. [17-18 Mid-year Exam, 20]

In the figure, $VABCD$ is a solid right pyramid. $ABCD$ is a rectangle with $AB = \frac{20}{3}$ cm and $BC = 12$ cm.

The height VE of $\triangle VAB$ is 10 cm. Find the total surface area of the pyramid.

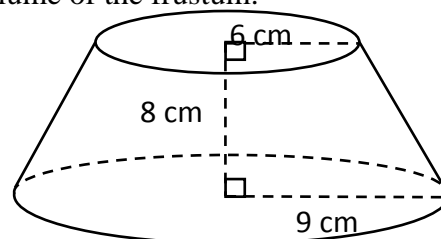
- A. $\frac{512}{3}$ cm²
- B. $\frac{560}{3}$ cm²
- C. $\frac{752}{3}$ cm²
- D. $\frac{800}{3}$ cm²



22. [17-18 Standardized Test 2, 9]

The base radii of the upper and lower bases of a right circular frustum are 6 cm and 9 cm respectively. The height of the frustum is 8 cm. Find the volume of the frustum.

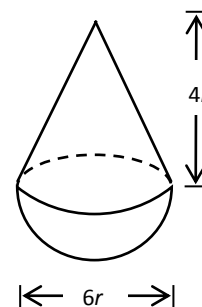
- A. 296π cm³
- B. 456π cm³
- C. 888π cm³
- D. 1368π cm³



23. [17-18 Standardized Test 2, 10]

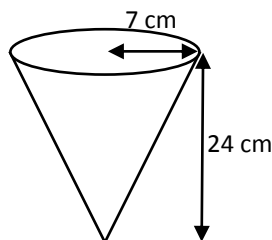
The solid in the figure consists of a right circular cone and a hemisphere. Find the total surface area of the solid in terms of π and r .

- A. $21\pi r^2$
- B. $30\pi r^2$
- C. $33\pi r^2$
- D. $51\pi r^2$



24. [17-18 Final Exam, 5]

If a paper cone of base radius 7 cm and height 24 cm is cut along a slant edge and unfolded into a sector, find the angle of the sector.



- A. 28.224°
- B. 100.8°
- C. 105°
- D. 109.375°

25. [17-18 Final Exam, 6]

It is given that the volume of a sphere is $288\pi \text{ cm}^3$, find the surface area of the sphere.

- A. $144\pi \text{ cm}^2$
- B. $288\pi \text{ cm}^2$
- C. $576\sqrt{2}\pi \text{ cm}^2$
- D. $864\pi \text{ cm}^2$

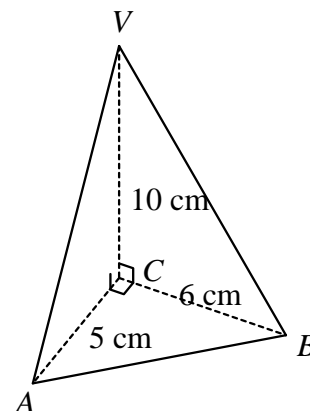
26. [17-18 Final Exam, 16]

Find the volume of a triangular prism with all lengths of edges $\sqrt{3}$.

- A. $\frac{3\sqrt{3}}{4}$
- B. $\frac{9}{4}$
- C. $\frac{3\sqrt{15}}{4}$
- D. $3\sqrt{3}$

27. [18-19 Mid-year Exam, 7]

In the figure, $VABC$ is a triangular pyramid with $AC = 5$ cm, $BC = 6$ cm and $VC = 10$ cm. Find its volume.



- A. 50 cm^3
- B. 100 cm^3
- C. 150 cm^3
- D. 300 cm^3

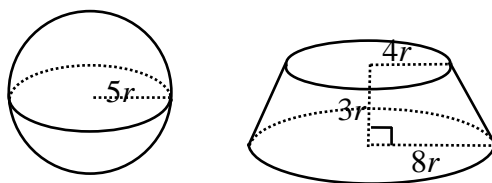
28. [18-19 Standardized Test 2, 4]

a , b and c are linear measurements of a solid. Which of the following is a possible formula for the volume of the solid?

- A. $a^2\sqrt{b^2 + c^2}$
- B. $4\pi a^2$
- C. $\sqrt{(a-b)^2 + c^2}$
- D. $ab + c^2$

29. [18-19 Standardized Test 2, 10]

The figure show a sphere with radius $5r$ and a frustum of right circular cone with lower base radius $8r$, upper base radius $4r$ and height $3r$. Let A_1 , A_2 be the total surface areas of the sphere and the frustum respectively, and V_1 , V_2 be the volumes of the sphere and the frustum respectively. Which of the following are correct?



- I. $A_1 : A_2 = 5 : 7$
 - II. $V_1 > V_2$
 - III. If the sphere is cut into two identical hemispheres, the new total surface area is larger than A_2 .
- A. I and II only
 - B. I and III only
 - C. II and III only
 - D. I, II and III

30. [18-19 Final Exam, 8]

When a solid sphere with radius 6 cm is split into two hemispheres, find the total surface area.

- A. $108\pi \text{ cm}^2$
- B. $144\pi \text{ cm}^2$
- C. $180\pi \text{ cm}^2$
- D. $216\pi \text{ cm}^2$

31. [18-19 Final Exam, 17]

If $AM : MN = 3 : 2$, find the ratio of the volume of the cone ABC to the volume of the frustum $BCED$.

- A. 3 : 1
- B. 9 : 5
- C. 27 : 19
- D. 27 : 98

