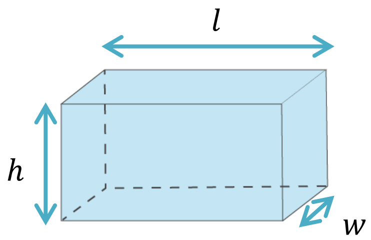
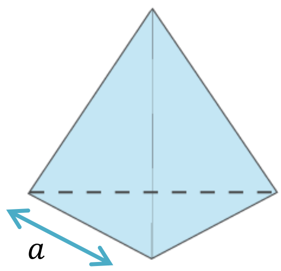
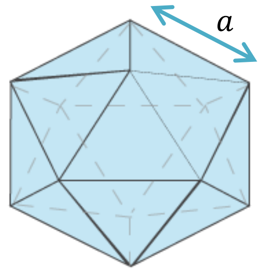
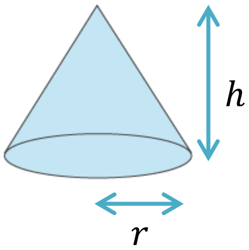
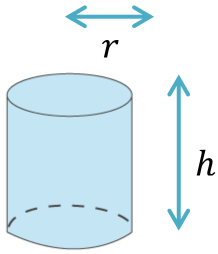


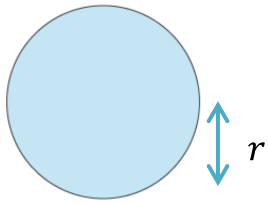




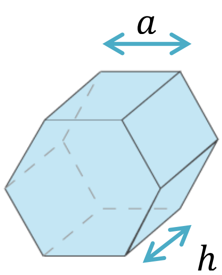
Cuboid	Tetrahedron	Icosahedron
$A = 2(lw + wh + hl)$ $V = wlh$	$A = \sqrt{3}a^2$ $V = \frac{a^3}{6\sqrt{2}}$	$A = 5\sqrt{3}a^2$ $V = \frac{5(3+\sqrt{5})}{12}a^3$

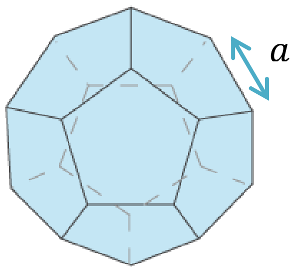


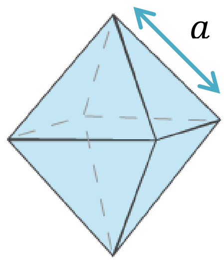




Cone	Cylinder	Sphere
$A = \pi r(r + \sqrt{h^2 + r^2})$ $V = \frac{\pi r^2 h}{3}$	$A = 2\pi rh + 2\pi r^2$ $V = \pi r^2 h$	$A = 4\pi r^2$ $V = \frac{4}{3}\pi r^3$







Hexagonal prism	Dodecahedron	Octahedron
$A = 6ah + 3\sqrt{3}a^2$ $V = \frac{3\sqrt{3}}{2}a^2 h$	$A = 3\sqrt{25 + 10\sqrt{5}}a^2$ $V = \frac{15 + 7\sqrt{5}}{4}a^3$	$A = 2\sqrt{3}a^2$ $V = \frac{\sqrt{2}a^3}{3}$

1. A cylinder with radius 5 cm and height 8 cm is melted down and used to make a cuboid with width 5 cm and length 5 cm. What is the height of the cuboid?

2. A cylinder with radius r cm and height h cm is melted down and used to make a cuboid with width r cm and length r cm. Write an expression for the height of the cuboid?

3. A sphere and a cube have the same surface area. What is the ratio of the volume of the sphere to the volume of the cube in the form $1{:}n$?

4. A dodecahedron with edge length a is melted down and used to make 5 identical tetrahedra. What is the length of the sides of these tetrahedra? Give your answer in the form $b = pa$ where p is a constant given in exact form and then as a decimal rounded to 3 significant figures.

5. A cylinder is to be made with a radius of r and a height of $h = 10 - 3r$. The Surface area must be 24π. Find the two possible sets of values for r and h.

6. Allen and Breana each have an identical tin of paint. Allen uses his to paint all the faces of a hexagonal prism with side length a and height h. He has exactly enough paint to paint all the faces with no paint left over. Write an equation which could be used to calculate how many cones with radius $\frac{a}{4}$ and height $\frac{h}{2}$ Breana could paint with her paint.

7. A tetrahedron and an icosahedron are created with side lengths in the ratio 2:3. What is the ratio of their surface areas? What is the ratio of their volumes?

Now write a similar question of your own and solve it. How can you make it more difficult? How could you include other areas of maths?

Answers

1. 8π
2. πh
3. $\sqrt{\frac{2\pi}{3}}$
4. $p = \sqrt[3]{\frac{3\sqrt{2}(15+7\sqrt{5})}{10}} \approx 2.35$
5. r=2.h=4 or r=3,h=1
6. $6ah + 3\sqrt{3}a = x\left(\frac{\pi a^2}{16} + \frac{\pi a}{4}\right)\sqrt{(\frac{a^2}{16} + \frac{h^2}{4})}$
7. Areas: $1{:}\frac{45}{4}$

   Volumes: $1{:}\frac{135\sqrt{2}(3+\sqrt{5})}{16}$