E Michaelmas 3D Shapes

Patrons are reminded that V denotes Volume and S denotes Surface Area. Always write down the relevant formula, fill in what you know and then solve the resulting equation.

Prism	$V = Al$	Where A is the area of the *extended* face and l is the length.
Pyramid	$V = \frac{1}{3}Ah$	Where A is the area of the base and h is the *perpendicular* height.
Sphere	$V = \frac{4}{3}\pi r^3$ and $S = 4\pi r^2$	Where r is the radius of the sphere.
Cone	$V = \frac{1}{3}\pi r^2 h$ and $S = \pi r^2 + \pi rl$	Where r is the radius of the base and h is the *perpendicular* height of the cone and l is the *slant height*.
Cylinder	$V = \pi r^2 h$ and $S = 2\pi r^2 + 2\pi rh$	Where r is the radius of the circular face and h is the height.

1. Work out the volume of a cone with $r = 3$ and $h = 6$. $V = 18\pi$
2. Work out the height of a cone with $r = 4$ and $V = 30$. $h = \frac{45}{8\pi}$
3. Work out the surface area of a sphere with $r = 11$. $S = 484\pi$
4. Work out the radius of a sphere of with $V = 60$. $r = \sqrt[3]{\frac{45}{\pi}} \approx 2.43$
5. Work out the volume of a sphere with $S = 1600\pi$. [You'll need to do two steps here.] $V = \frac{32000\pi}{3} \approx 33510$
6. A solid metal cone is melted down into three identical spheres. If the base of the cone has radius 5 and its perpendicular height is 7, find the radius of each new sphere. $r = \sqrt[3]{\frac{175}{12}} \approx 2.44$
7. A solid cylinder has total surface area 96π. Its height is 2. Find the radius of its face. $r = 6$ (only)
8. A solid cylinder has total surface area 24π. Its height is 1. Find the radius of its face. $r = 3$ (only)
9. A solid cylinder has total surface area 70π. Its height is 2. Find the radius of its face. $r = 5$ (only)
10. A solid cylinder has total surface area 8π. Its height is 3. Find the radius of its face. $r = 1$ (only)
11. A solid cylinder has total surface area 28π. Its height is 5. Find the radius of its face. $r = 2$ (only)
12. A solid cylinder has total surface area 154π. Its height is 4. Find the radius of its face. $r = 7$ (only)

13. A solid cone has total surface area 10π. Its slant height is 3. Find the radius of the circular base.

$r = 2$ (only)

14. A solid cone has total surface area 6π. Its slant height is 1. Find the radius of the circular base.

$r = 2$ (only)

15. A solid cone has total surface area 24π. Its slant height is 2. Find the radius of the circular base.

$r = 4$ (only)

16. A solid cone has total surface area 24π. Its slant height is 5. Find the radius of the circular base.

$r = 3$ (only)

17. A solid cone has total surface area 10π. Its slant height is 9. Find the radius of the circular base.

$r = 1$ (only)

18. A solid cone has total surface area 60π. Its slant height is 7. Find the radius of the circular base.

$r = 5$ (only)