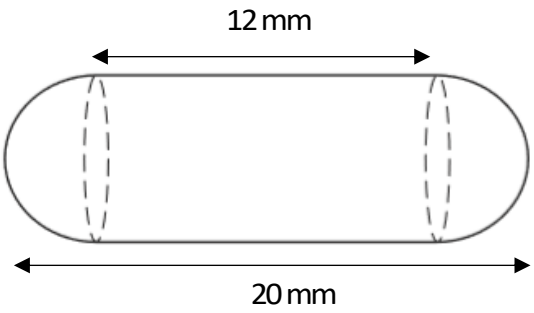
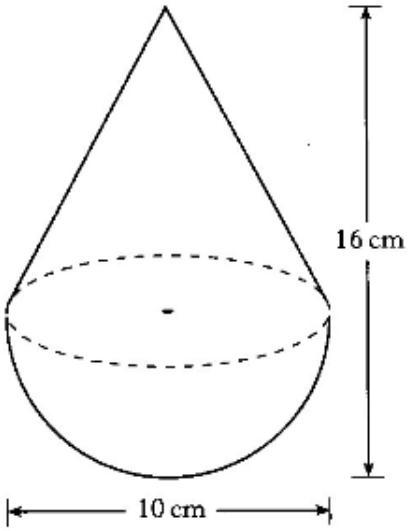
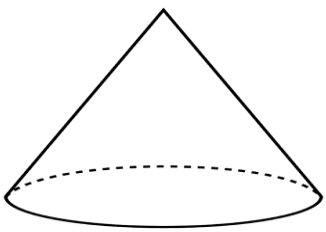
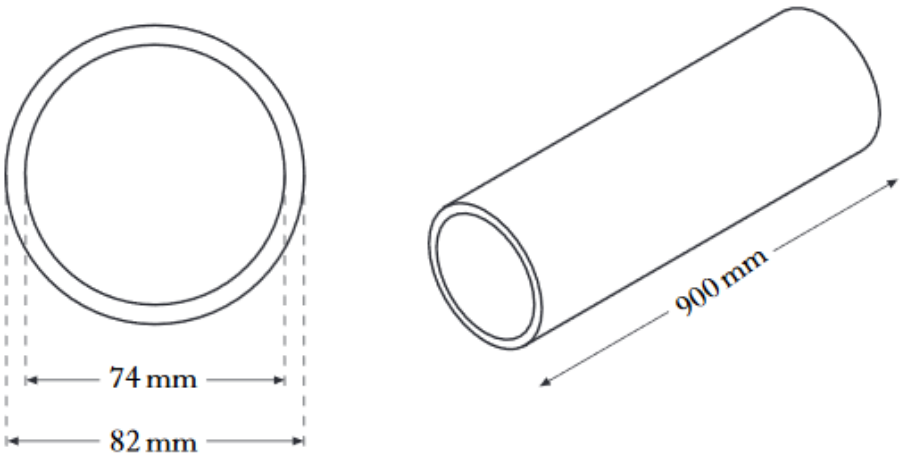
	Volume	
1	A health food shop produces probiotic capsules for its customers. Each capsule is in the shape of a cylinder with hemispherical eds as show below  The total length of the capsule is 20 millimetres and the length of the cylinder is 15 millimetres. Calculate the volume of one capsule. Give your answer correct to **2 significant figures.**	5
2	Calculate the volume of a sphere with a diameter of 9 centimetres. Give your answer correct to **2 significant figures.**	3
3	 The solid shown here has dimensions: • height is 16 centimetres. • Diameter of the hemisphere is 10 centimetres. Calculate the volume of this solid. Give your answer rounded to **2 significant figures.**	5
7	 Find the volume of a cone with a radius of $370\ m$ and a height of $410\ m$. Give your answer rounded to **2 significant figures in scientific notation.**	4

5	The cross-section of am aluminium pipe is shown below.  The inner diameter is 74 millimetres. The outer diameter is 82 millimetres. The length of the tube is 900 millimetres. Calculate the volume of aluminium needed to make this tube. Give your answer correct to **three significant figures.**	5
	22 marks	

	Volume – Answers	22
1	Mark 1 Find the volume of sphere $V_{sphere} = \frac{4}{3} \times \pi \times 4^3$ Mark 2 Find the volume of the cylinder $V_{cylinder} = \pi \times 4^2 \times 12$ Mark 3 Know that the volume of the capsule is found by addition $V_{sphere} + V_{cylinder}$ Mark 4 Carry out all calculations correctly, give all your answers in unrounded form where possible $V_{sphere} = 268.0825731, \quad V_{cylinder} = 603.1875895,$ $V_{capsule} = V_{sphere} + V_{cylinder} = 871.2683626$ Mark 5 Correctly rounded answer with units $\boldsymbol{V = 870\ mm^3}$ You can lose one mark for: • Using the diameter of 8 cm rather than the radius of 4cm $(4557.4 \ldots mm^3)$ • Using the height of the solid (20 cm) for the height of the cylinder $(1273.3922 \ldots cm^3)$ • Rounding too early in your calculations	5
2	Mark 1 Substitute into the formula $V_{sphere} = \frac{4}{3} \times \pi \times 4.5^3$ Mark 2 Calculate the answer $V_{sphere} = 381.7035 \ldots$ Mark 3 Correctly rounded answer with units $\boldsymbol{V_{sphere} = 380\ cm^3}$ Lose one mark for using the diameter (9 cm) instead of the radius of 4.5cm $(3053.6 = 3050\ cm^3)$	3
	Mark 1 Find the volume of hemisphere $V_{hemi-sphere} = \frac{4}{3} \times \pi \times 5^3 \times \frac{1}{2}$ Mark 2 Find the volume of the cone $V_{cone} = \frac{1}{3} \times \pi \times 5^2 \times 11$ Mark 3 Know that the volume of the shape is found by addition $V_{hemi-sphere} + V_{cone}$ Mark 4 Carry out all calculations correctly, give all your answers in unrounded form where possible $V_{hemi-sphere} = 261.799387, \quad V_{cone} = 287.9793266,$ $V_{shape} = V_{hemi-sphere} + V_{cone} = 549.7787136$ Mark 5 Correctly rounded answer with units $\boldsymbol{V = 550\ cm^3}$ You can lose one mark for: • Using the diameter of 10 cm rather than the radius of 5cm $(2722.8 \ldots cm^3)$ • Find the volume of a sphere instead of a hemisphere $(811.578 \ldots cm^3)$ • Using the height of the solid (16 cm) for the height of the cone $(680.678 \ldots cm^3)$ • Rounding too early in your calculations	5
4	Mark 1 Substitute into the formula $V_{cone} = \frac{1}{3} \times \pi \times (370)^2 \times 410$ Mark 3 Calculate the answer $V_{cone} = 58778151.35$ Mark 4 Change the answer into scientific notation $V_{cone} = 5.877815 \ldots \times 10^7$ Mark 5 Correctly rounded answer with units $\boldsymbol{V_{cone} = 5.9 \times 10^7 m^3}$	4

5	Mark 1 Find the volume of the outer pipe $V_{outer} = \pi \times 41^2 \times 900$ Mark 2 Find the volume of the inner pipe $V_{outer} = \pi \times 37^2 \times 900$ Mark 3 Know that the volume of the tube is found by subtracting $V_{outer} - V_{inner}$ Mark 4 Carry out all calculations correctly, give all your answers in unrounded form where possible $V_{outer} = 4752915.526,$ $V_{inner} = 3870756.308,$ $V_{tube} = V_{outer} - V_{inner} = 882159.2171$ Mark 5 Correctly rounded answer with units $\boldsymbol{V = 882\,000\ mm^3}$ If you use the diameters instead of the radii you only lose one mark. $V = \pi \times 82^2 \times 900 - \pi \times 74^2 \times 900 = 3528636.8 = 3\,530\,000\ mm^3$	5