

14 A cube contains a solid metal sphere.
The sphere touches all the faces of the cube.
The side length of the cube is 8 cm.

(a) Show that the volume of the sphere is $\frac{256}{3}\pi\text{ cm}^3$.

[1]

(b) Calculate the percentage of the cube that is **not** occupied by the sphere.

.....% [3]

(c) The density of the metal of the sphere is 7.86 g/cm^3 .

Calculate the mass of the sphere.
Give your answer in kilograms.
[Density = mass $\div$ volume]

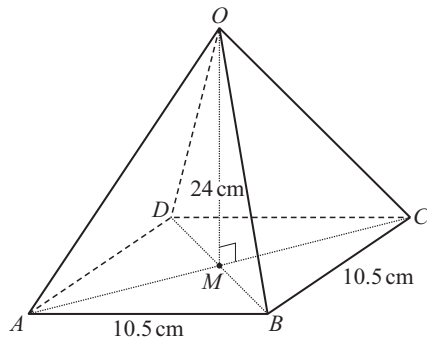
..... kg [2]

(d) The sphere is melted down and made into a solid cylinder with radius 3.1 cm.

Calculate the **total** surface area of the cylinder.

..... cm^2 [4]

20



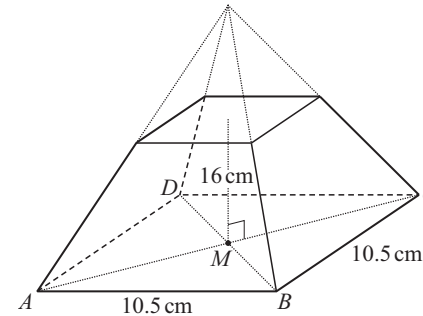
NOT TO
SCALE

The diagram shows a pyramid $OABCD$.
The pyramid has a square base, $ABCD$, with sides 10.5 cm.
The vertex O is vertically above the centre of the base, M .
The height of the pyramid is 24 cm.

- (a) Calculate the angle that OA makes with the base.

..... [4]

(b)



NOT TO
SCALE

The diagram shows a frustum of the pyramid $OABCD$.
The height of the frustum is 16 cm.

Calculate the volume of the frustum.

..... cm^3 [5]

Question 21 is on page 16.