
MPM 1DI Unit 9 lesson 5 Name:_____

**Warm Up:** A **frustum** may be formed from a right circular **cone** by cutting off the tip of the **cone** with a cut perpendicular to the height, forming a lower base and an upper base that are circular and parallel.

A 0.41 caliber bullet has a diameter of 9.8 mm and a case length of 28.9 mm. The cylindrical portion of the bullet has a case length of 15 mm. The top of the bullet is a frustum. The "missing cone tip" has a ~~radius~~ diameter of 5.5mm and a height of 20 mm. Calculate the volume of the bullet.

$V = V_B + V_\Delta - V_\Delta$ $V = \pi(4.9)^2(15) + \frac{\pi(4.9)^2(33.9)}{3} - \frac{\pi(2.75)^2(20)}{3}$ $V \doteq 1825.4\text{mm}^3$

∴ the volume of the bullet is about $1825.4\text{ mm}^3$

## Surface Area of Spheres

A *sphere* is a round ball-shaped three dimensional solid. Every point on the surface of the sphere is the same distance from the centre of the sphere.

Orange Demonstration:
https://www.youtube.com/watch?v=FB-acn7d0zU

Another Video of interest:
https://www.youtube.com/watch?v=T_DBkFnr4NM

Demonstration using Surface Area of Cylinder:
https://www.youtube.com/watch?v=Fyvq-jIQKr8

**Surface Area of a Sphere:** $A_{total} = 4\pi r^2$

**Example 1:** An adult human eyeball has a diameter of 2.5 cm. Calculate the surface area of the eyeball, to the nearest tenth of a square centimeter. $r = 1.25\text{cm}$

$A_{total} = 4\pi(1.25)^2$
$= 19.63...$
$\doteq 19.6\text{ cm}^2$
∴ the surface area of the eyeball is $19.6\text{cm}^2$.

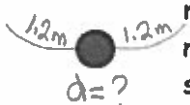
**Example 2:** The radius of a sphere is tripled. Does this triple the surface area of the sphere? Explain.

$A = 4\pi r^2$ ($r \times 3$) When r is tripled, A is $3^2 = 9$ times larger.

**Example 3:** The surface area of an orange is 147 $\text{cm}^2$. What is the diameter of the orange? Round your answer to two decimal places.

$4\pi r^2 = A_{total}$
$4\pi r^2 = 147$
$r^2 = \frac{147}{4\pi}$
$r = \sqrt{\frac{147}{4\pi}}$, $r > 0$
$r \doteq 3.4202...$
$2r \doteq 6.84$
$d \doteq 6.84$
∴ the diameter of the orange is about 6.84 cm.

**Example 4:** A spherical balloon is blown up, covered in paper maché and painted. The surface area of the masterpiece is $400\pi\text{ cm}^2$. A hole is drilled through the sphere in order to hang the sphere like a necklace from the ceiling. The chain used to hang the sphere must be 1.2 m on either side of the sphere. The chain costs \$48/m, what is the total cost of the chain including 13% taxes?




$4\pi r^2 = 400\pi$
$r^2 = \frac{400\pi}{4\pi}$
$r^2 = 100$
$r = 10$, $r > 0$
diameter is 20cm = 0.2m

Chain length $= 1.2 + 0.2 + 1.2$
$= 2.6\text{m}$

Cost $= 2.6 \times 48 \times 1.13$
$= 141.024$
$\doteq \$141.02$
∴ the total cost is \$141.02

Pgs. 459-460 # 1b,2-6,8,11,12