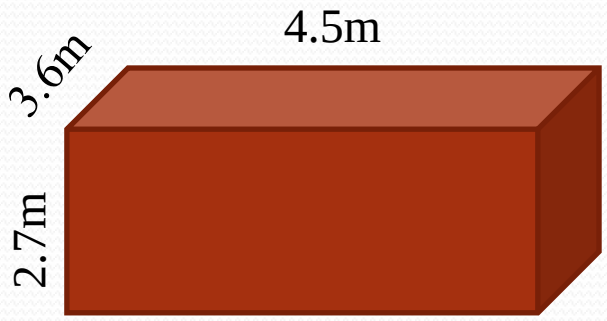
Quantitative Methods Surface Area

Module No. Cons 1012

Lecturer Jennifer Byrne

Surface Area



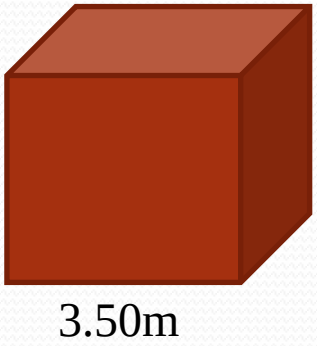
- Last week we got a question to calculate the cost of painting the surface area of room.
- Walls (4) 2 x 4.5 x 2.7 = 24.3
- 2 x 3.6 x 2.7 = 19.44
- 43.74m²
- Instead we can add the length and breath together and then x 2 x H.
- 2(L + B) x H = Surface Area
- 2(4.5+3.6) x 2.7 = 43.74m²

- When calculating surface area you can assume the top and bottom of the shapes are left open unless the question states to include them.

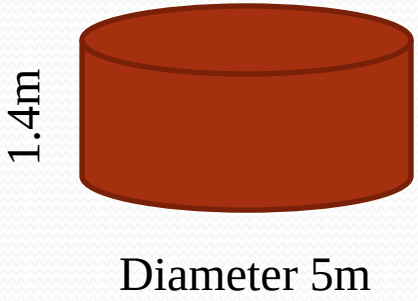
Surface Area

- Q 1. Calculate the surface area of the cuboid.

- Q 2. Calculate the surface area of the cube.



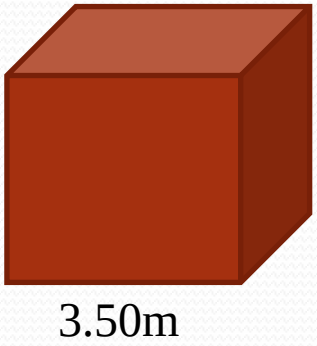
- Q 3. Calculate the surface area of the cylinder.



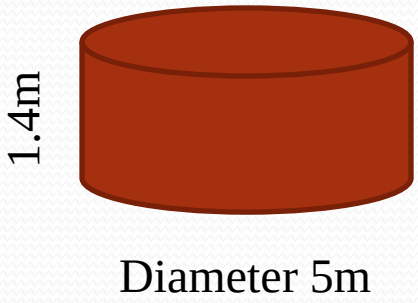
Surface Area

- Q 1. Calculate the surface area of the cuboid.
- 2(L + B) x H = Surface Area
- 2 (3.75 + 2.6) x 2.4 = 30.48m²

- Q 2. Calculate the surface area of the cube
- 2(L + B) x H = Surface Area
- 2(3.5 + 3.5) x 3.5 = 49m²

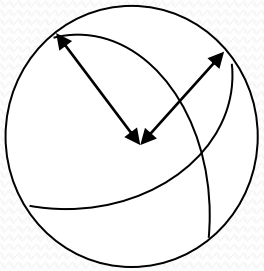


- Q 3. Calculate the surface area of the cylinder.
- 2πrH = Surface Area
- 2 x π x 2.5 X 1.4 = 21.991m²



Surface Area of Sphere

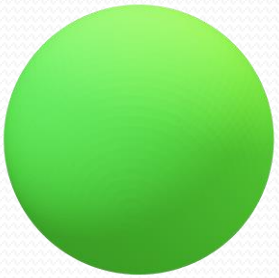
- Calculate the surface area of the Sphere.
- Formula: Surface Area = $4 \pi r^2$
- $4 \times \pi \times 2^2 = 4 \times \pi \times 2^2 = 50.26m^2$



Radius = 2m

- Q 1. Calculate the surface area of the Sphere A.

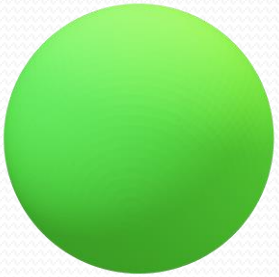
A



Radius = 3.75m

- Q 2. Calculate the surface area of the Sphere B.

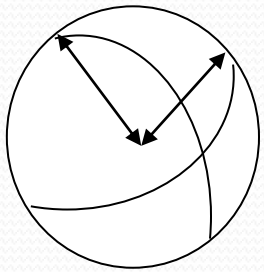
B



Diameter = 7.5m

Surface Area of Sphere

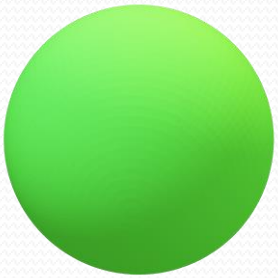
- Calculate the surface area of the Sphere.
- Formula: Surface Area = $4 \pi r^2$
- $4 \times \pi \times 2^2 = 4 \times \pi \times 2^2 = 50.26 m^2$



Radius = 2m

- Q 1. Calculate the surface area of the Sphere A.
- $4 \times \pi \times 3.75^2 = 4 \times \pi \times 3.75^2 = 176.714 m^2$

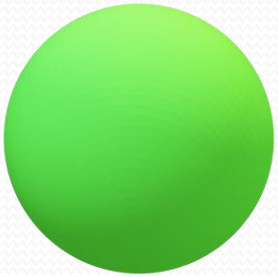
A



Radius = 3.75m

- Q 2. Calculate the surface area of the Sphere B.
- $4 \times \pi \times 3.75^2 = 4 \times \pi \times 3.75^2 = 176.714 m^2$

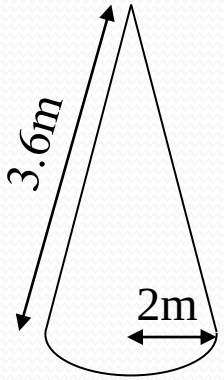
B



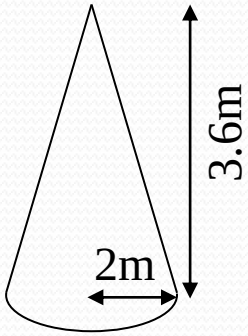
Diameter = 7.5m

Surface Area of Cones

- ***NOTE:*** When working with cones you need vertical height to calculate **volume** and sloping side length to calculate surface area. If you only have one of these you may need to work out the other.
- E.g. 1. Calculate the surface area of the Cone.
- Formula: Surface Area = π r l (l = sloping length)
- π x 2 x 3.6 = 22.619m²

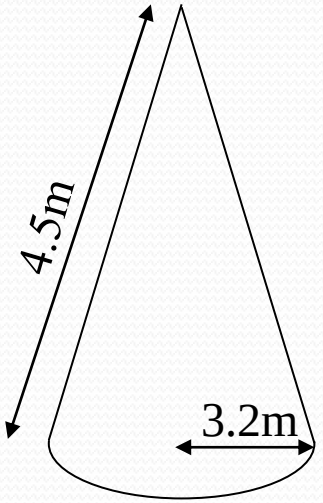


- E.g.2. Calculate the surface area of the Cone.
- First, we need sloping height Pythagoras Theorem $a^2 + b^2 = c^2$
- $2^2 + 3.6^2 = 16.96^2$
- √16.96 = **l = 4.118m**
- π x 2 x 4.118 = 25.874m²

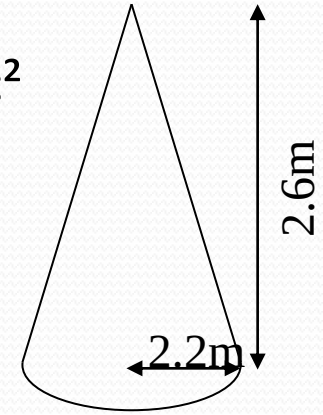


Surface Area of Cones

- Q 1. Calculate the surface area of the Cone.
- Formula: Surface Area = π r l (l = sloping length)

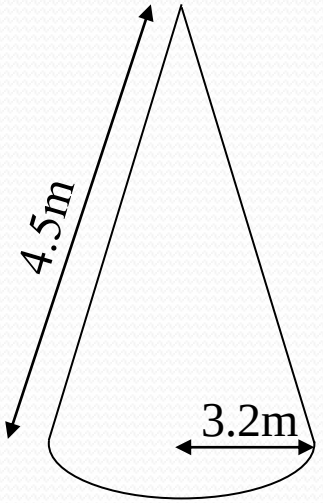


- Q 2. Calculate the surface area of the Cone.
- First, we need sloping height Pythagoras Theorem $a^2 + b^2 = c^2$

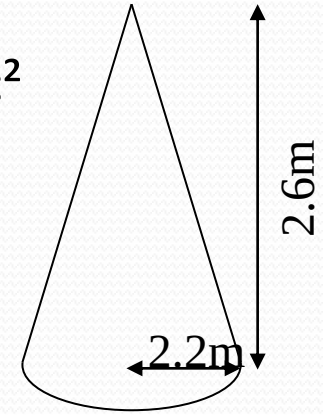


Surface Area of Cones

- Q 1. Calculate the surface area of the Cone.
- Formula: Surface Area = π r l (l = sloping length)
- π x 3.2 x 4.5 = 245.238m²

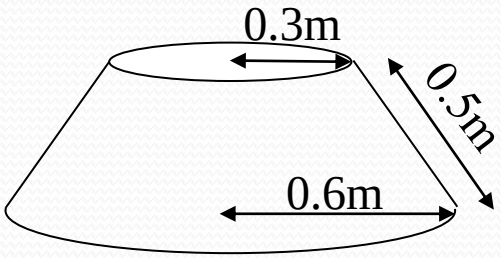


- Q 2. Calculate the surface area of the Cone.
- First, we need sloping height Pythagoras Theorem $a^2 + b^2 = c^2$
- $2.2^2 + 2.6^2 = x^2$
- 4.84 +6.76 = 11.6
- √11.6 = **l = 3.405m**
- π x 2.2 x 3.405= 23.533m²

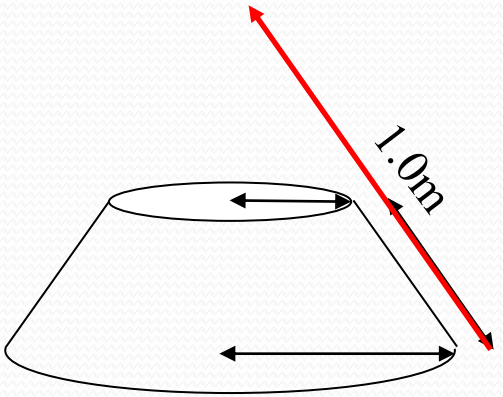


Surface Area of Truncated Cones

- ***NOTE:*** (for frustum we need to get full cone and take off the piece we don't have)
- Truncated cones are half full height.
- Formula: Surface Area = π R L- π r l

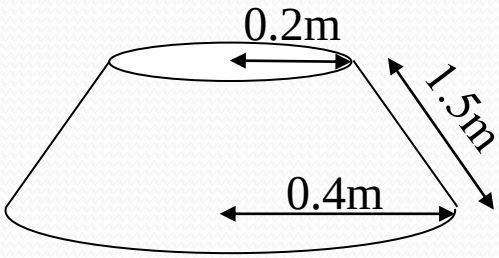


- Q6. Calculate the surface area of the truncated cone.
- (π R L)- (π r l) =
- (π x 0.6 x 1.0) – (π x 0.3 x 0.5) =
- 1.885 – 0.471 = 1.414m²
- Or
- Frustum of truncated cone
- Formula π(r + R)l
- π (0.3 + 0.6) x 0.5 = 1.414m²



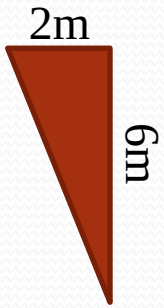
Surface Area of Truncated Cones

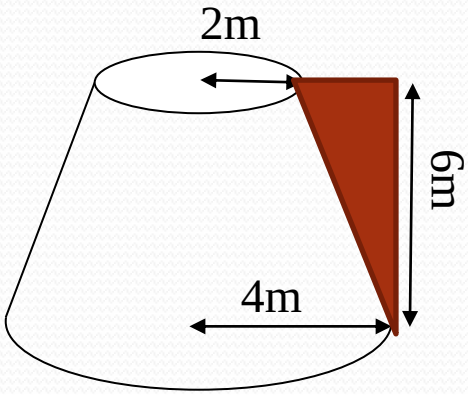
- Q6. Calculate the surface area of the Truncated Cone.
- Formula: Surface Area = π R L- π r l
- (π x 0.4 x 3.0) – (π x 0.2 x 1.5) =
- 3.769 – 0.942 = 2.827m²
- Or
- Frustum of truncated cone
- Formula $\pi(r + R)l$
- π (0.2 + 0.4) x 1.5 = 2.827m²
-



Surface Area of Truncated Cones

- ***NOTE:*** if we are not given the Slope length then we must find it using Pythagoras Theorem $a^2 + b^2 = c^2$
- $2^2 + 6^2 = 40$
- $\sqrt{40}$= **l = 6.325m**
- Formula $\pi(r + R)l$
- π (2 + 4) x 6.325 = 119.223m²





- Q1. Calculate the surface area of the truncated Cone
- $3^2 + 4^2 = 25$
- $\sqrt{25}$= **l = 5m**
- Formula $\pi(r + R)l$
- π (2 + 5) x 5= 109.95m²