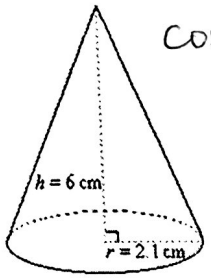
SOLUTIONS

# 3D Measurement PT Prep | MEL4E

1. Find the **volume** of the following solids.

a) CONE

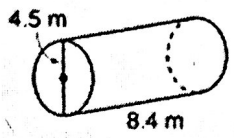



$V = \pi \times r^2 \times h \div 3$

$= 3.14 \times 2.1 \times 2.1 \times 6 \div 3$

$= 27.7\ cm^3$

b) CYLINDER

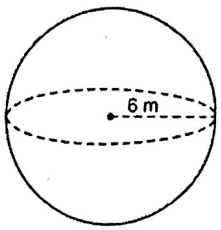



$V = \pi \times r^2 \times h$

$= 3.14 \times 4.5 \times 4.5 \times 8.4$

$= 534.1\ m^3$

c) SPHERE

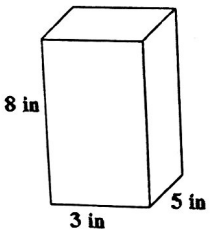



$V = 4 \times \pi \times r \times r \times r \div 3$

$= 4 \times 3.14 \times 6 \times 6 \times 6 \div 3$

$= 904.32\ m^3$

d) RECT. PRISM

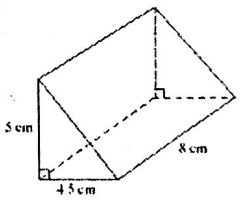



$V = l \times w \times h$

$= 3 \times 5 \times 8$

$= 120\ in^3$

e) TRI. PRISM

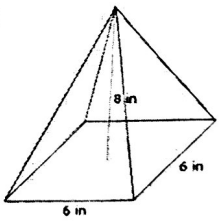



$V = b \times h \times l \div 2$

$= 4.5 \times 5 \times 8 \div 2$

$= 90\ cm^3$

f) PYRAMID



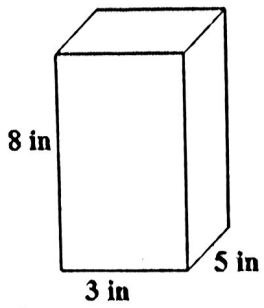

$V = b^2 \times h \div 3$

$= 6 \times 6 \times 8 \div 3$

$= 96\ in^3$

2. Find the **surface area** of the following solids.

a)




$SA = 2(l \times w + l \times h + w \times h)$

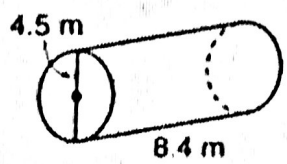
$= 2(3 \times 5 + 3 \times 8 + 5 \times 8)$

$= 2(15 + 24 + 40)$

$= 2(79)$

$= 158 \text{ in}^2$

b) Note: 4.5m is the radius here



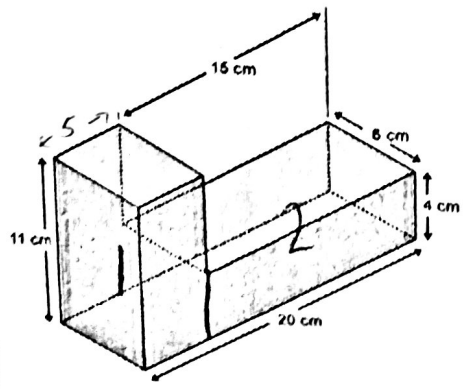
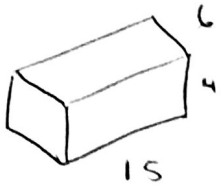

$SA = 2 \times \pi \times r^2 + 2 \times \pi \times r \times h$

$= 2 \times 3.14 \times 4.5 \times 4.5 + 2 \times 3.14$

$= 127.17 + 237.38$

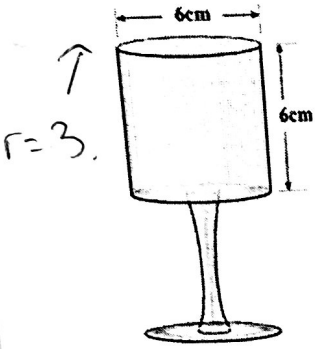
$= 364.55 \text{ m}^2$

3) Find the volume of the following 3D shapes.

| Solid #1 | Basic Shape 1 | Basic Shape 2 |
|---|---|---|
| Sketch:   |   $V = l \times w \times h$ $= 5 \times 6 \times 11$ $= 330$ |   $V = l \times w \times h$ $= 15 \times 4 \times 6$ $= 360$ |
| | Volume = $330 \text{ cm}^3$ | Volume = $360 \text{ cm}^3$ |
| Total Volume = $330 + 360 = 690 \text{ cm}^3$ | | |

4) Bort is taking a glass blowing course, and is designing two glasses. Find the volume of each glass.

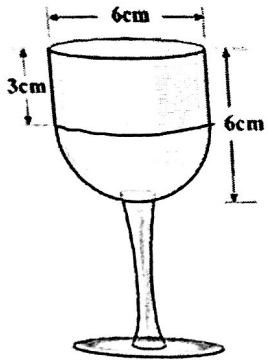
Glass 1: Cylinder




$V = \pi \times r^2 \times h$

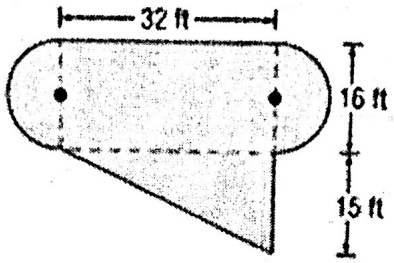
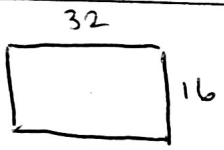
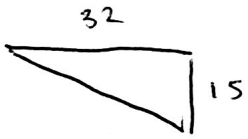
$= 3.14 \times 3 \times 3 \times 6$

$= 169.56\ cm^3$

| Glass 2: Cylinder and Half a Sphere | Basic Shape 1 | Basic Shape 2 |
|---|---|---|
| Sketch:   |   $V = \pi \times r^2 \times h$ $= 3.14 \times 3 \times 3 \times 3$ $= 84.78\ cm^3$ |  half sphere. $V = 4 \times \pi \times r \times r \times r \div 3 \div 2$ $= 4 \times 3.14 \times 3 \times 3 \times 3 \div 3 \div 2$ $= 56.52\ cm^3$ |
| | Volume = $84.78\ cm^3$ | Volume = $56.52\ cm^3$ |
| Total Volume = $84.78 + 56.52 = 141.3\ cm^3$ | | |

5) The dimensions of an irregularly shaped pool are shown in the diagram below.

a) Find the area of the pool surface:

| Diagram of Pool Surface | | |
|---|---|---|
|  | | |
| **Basic Shape #1** | **Basic Shape #2** | **Basic Shape #3** |
|  <br>$A = l \times w$<br>$= 32 \times 16$ |  <br>$A = b \times h \div 2$<br>$= 32 \times 15 \div 2$ |  <br>$A = \pi \times r^2$<br>$= 3.14 \times 8 \times 8$ |
| Area = $512\ ft^2$ | Area = $240\ ft^2$ | Area = $200.96\ ft^2$ |
| Total Area = $512 + 240 + 200.96 = 952.96\ ft^2$ | | |

b) The pool is 6 feet deep. Use the formula: $V_{prism} = Area\ of\ Base \times Height\ of\ Prism$ to find the volume of the entire pool.

$= 952.96 \times 6$

$= 5,717.76\ ft^3$ ← water needed to fill pool!

c) Your backyard hose can pump out 1.2 feet$^3$ of water every minute. How many minutes will it take to fill your pool?

$\frac{5717.76}{1.2} = 4,764.8$ minutes $(\div 60)$

$= 79.4$ hours!

(you need a bigger hose)