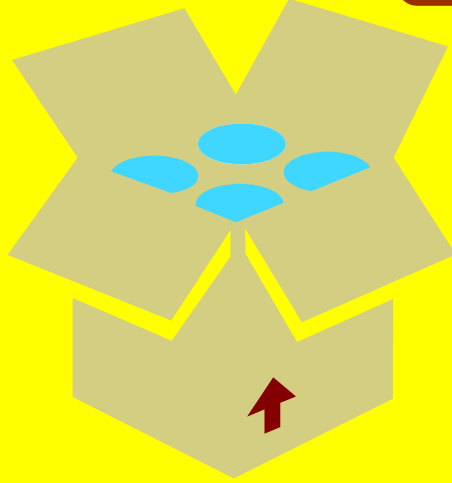
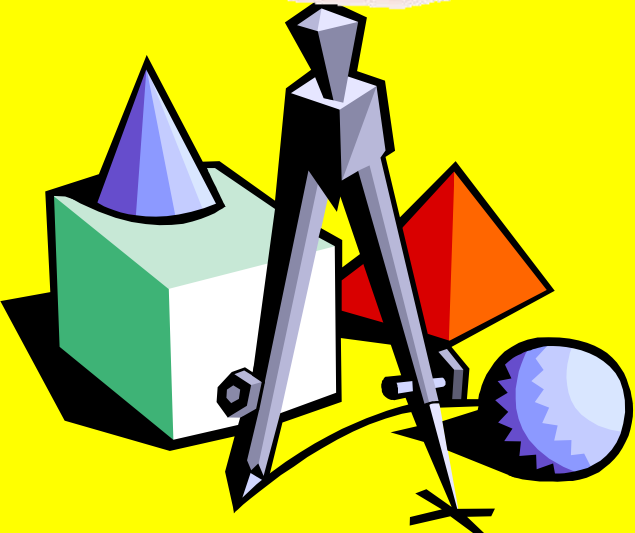
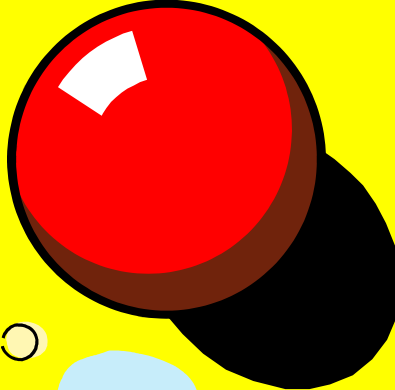
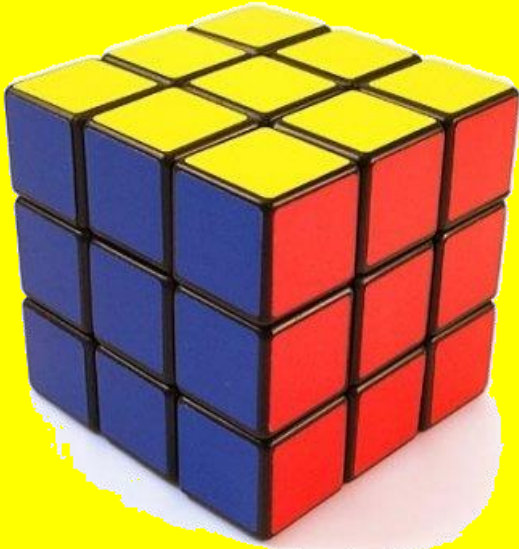
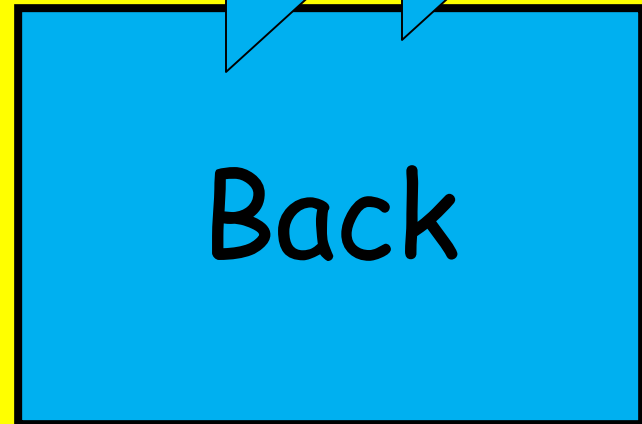
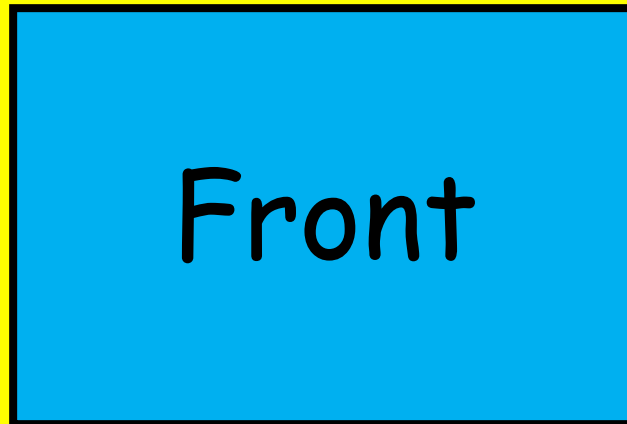
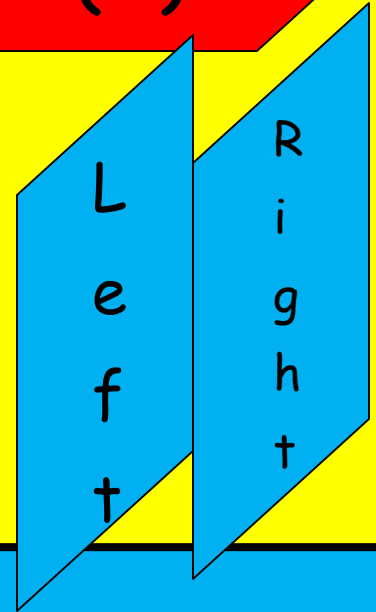
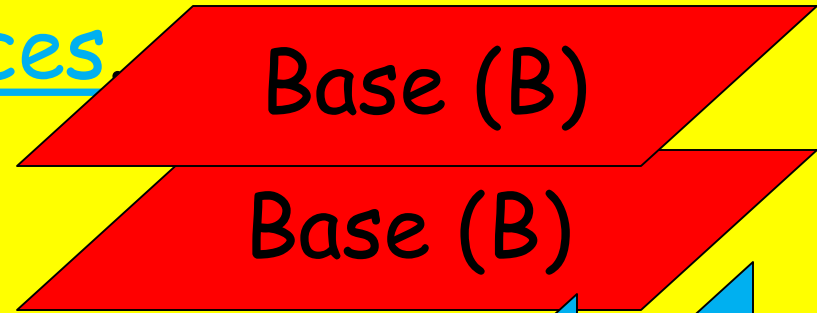
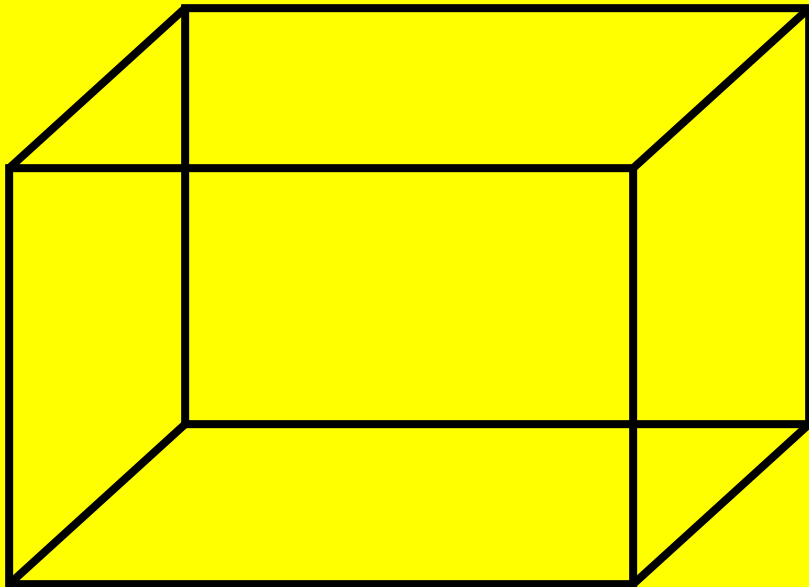


Total Area & Volume



Rectangular Prism - A three dimensional object
with two rectangular bases and
four rectangular lateral faces



Total Area - the sum of the areas of all of the faces (bases and lateral faces) of a solid.

Lateral Area - the sum of the areas of the lateral faces of a prism

How do we find Total Area?

Example 1

Find the area of each face:

Front: 80cm²

Back: 80cm²

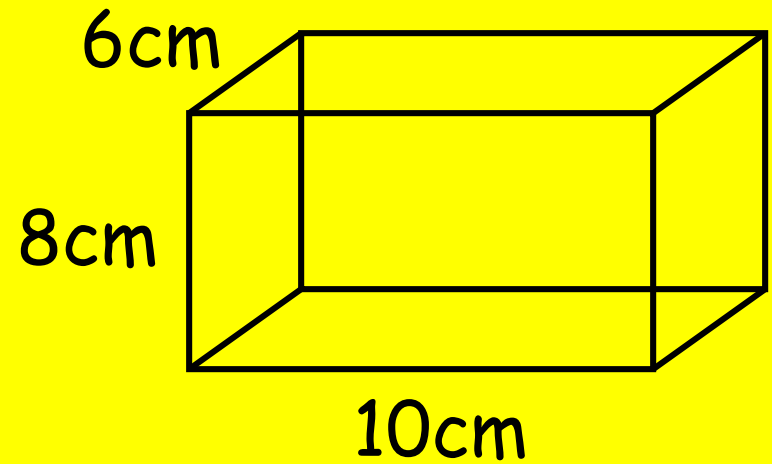
Top: 60cm²

Bottom: 60cm²

Left Side: 48cm²

Right Side: 48cm²

Total: 376cm²



How do we find Lateral Area?

Example 1

Find the area of each face:

Front: 80cm²

Back: 80cm²

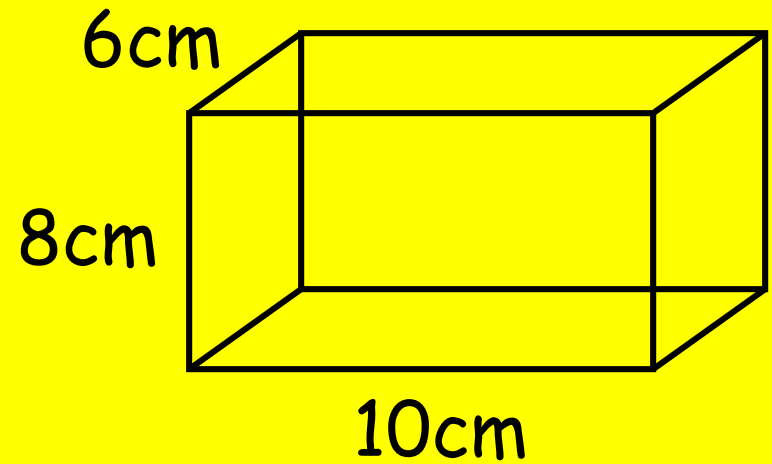
Top: 60cm²

Bottom: 60cm²

Left Side: 48cm²

Right Side: 48cm²

Lateral Area: 256cm²



Formula for Lateral Area:

Lateral Area = Perimeter of Base x Height

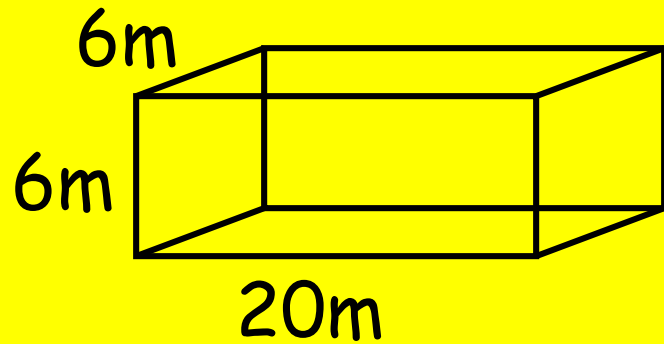
$$LA = Ph$$

Formula for Total Area:

Total Area = Lateral Area + 2(Area of the Base)

$$TA = LA + 2B$$

Example 2 - Find the Lateral Area and the Total Area



L.A. = Perimeter of Base \times Height

$$L.A. = ph$$

$$p = 20 + 20 + 6 + 6 = 52m \quad h = 6m$$

$$L.A. = 52 \times 6 = 312m^2$$

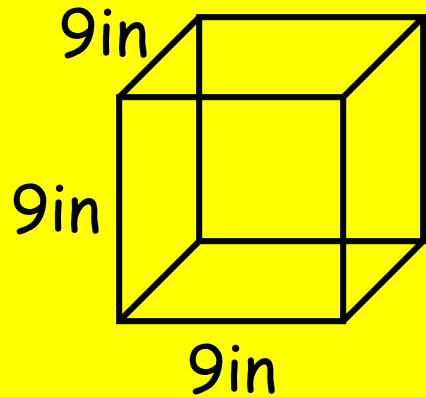
T.A. = L.A. + 2(Area of the Base)

$$T.A. = L.A. + 2B$$

$$L.A. = 312m^2 \quad B = 20 \times 6 = 120m^2$$

$$T.A. = 312 + 2(120) = 552m^2$$

Example 3 - Find the Lateral Area and the Total Area



$$L.A. = \text{Perimeter of Base} \times \text{Height}$$

$$L.A. = ph$$

$$p = 9 + 9 + 9 + 9 = 36\text{in} \quad h = 9\text{in}$$

$$L.A. = 36 \times 9 = 324\text{in}^2$$

$$T.A. = L.A. + 2(\text{Area of the Base})$$

$$T.A. = L.A. + 2B$$

$$L.A. = 324\text{in}^2$$

$$B = 9 \times 9 = 81\text{in}^2$$

$$T.A. = 324 + 2(81) = 486\text{in}^2$$

Volume - the amount of space that an object occupies

The units for Volume are always cubed.
Examples: in^3 , m^3 , cm^3 .

Formula for Volume of a Right Prism:

$V = \text{Area of the base} \times \text{height}$

$V = Bh$

$V = \text{Area of the base} \times \text{height}$

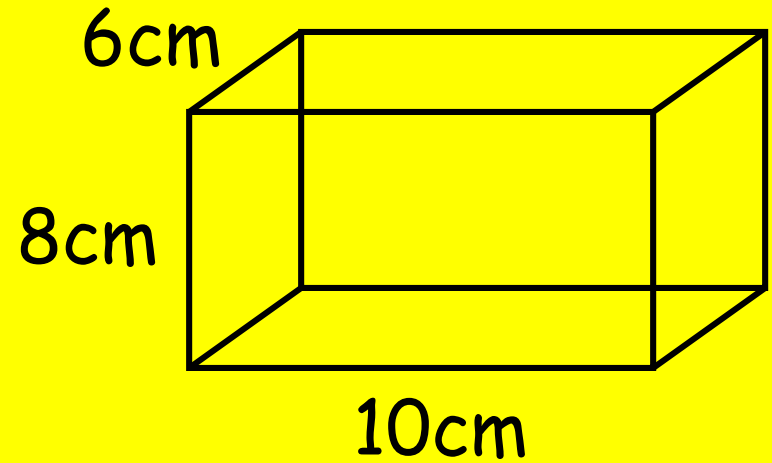
Example 1

$$V = Bh$$

$$B = 6 \times 10 = 60\text{cm}^2$$

$$h = 8\text{cm}$$

$$V = 60 \times 8 = 480\text{cm}^3$$



$V = \text{Area of the base} \times \text{height}$

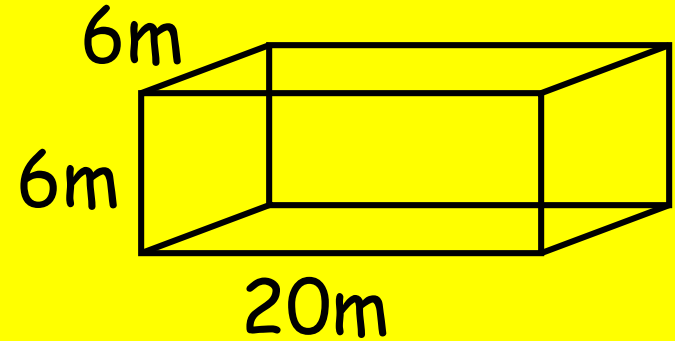
Example 2

$$V = Bh$$

$$B = 6 \times 20 = 120\text{m}^2$$

$$h = 6\text{m}$$

$$V = 120 \times 6 = 720\text{m}^3$$



$V = \text{Area of the base} \times \text{height}$

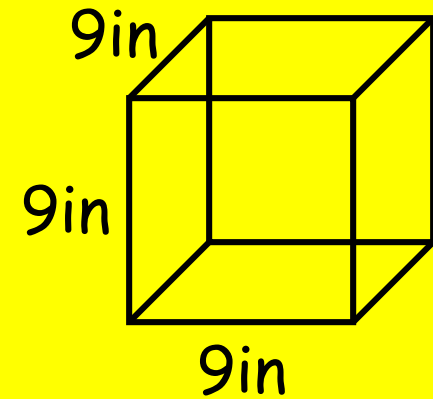
Example 3

$$V = Bh$$

$$B = 9 \times 9 = 81\text{in}^2$$

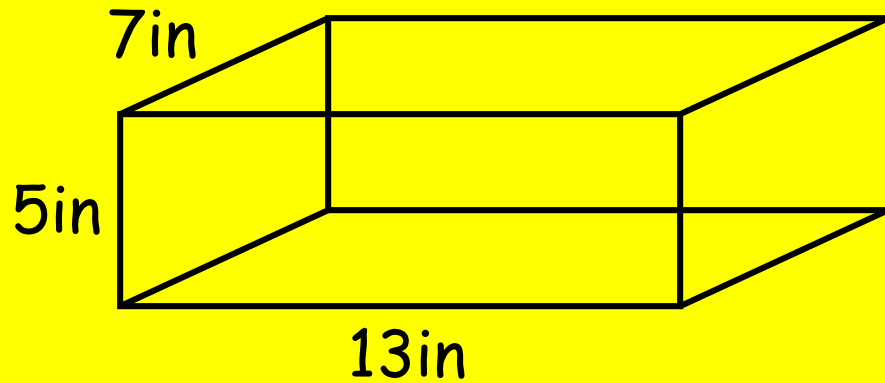
$$h = 9\text{in}$$

$$V = 81 \times 9 = 729\text{in}^3$$



Example 4

Find the Lateral Area, Total Area, and Volume of the rectangular prism.



$$p = 7 + 7 + 13 + 13 = 40\text{in}$$

$$h = 5\text{in}$$

$$B = 7 \times 13 = 91\text{in}^2$$

$$L.A. = ph$$

$$L.A. = 40 \times 5$$

$$L.A. = 200\text{in}^2$$

$$T.A. = L.A. + 2B$$

$$T.A. = 200 + 2(91)$$

$$T.A. = 382\text{in}^2$$

$$V = Bh$$

$$V = 91 \times 5$$

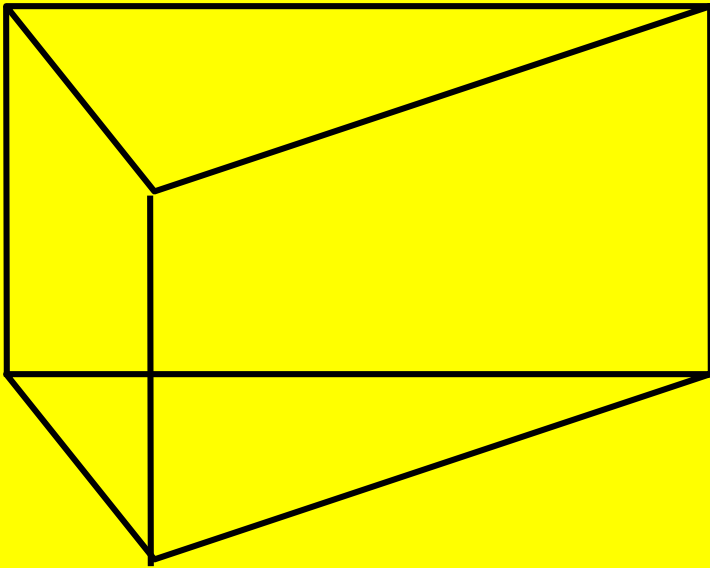
$$V = 455\text{in}^3$$

We use the same formulas for lateral area, surface area and volume when dealing with other right prisms.

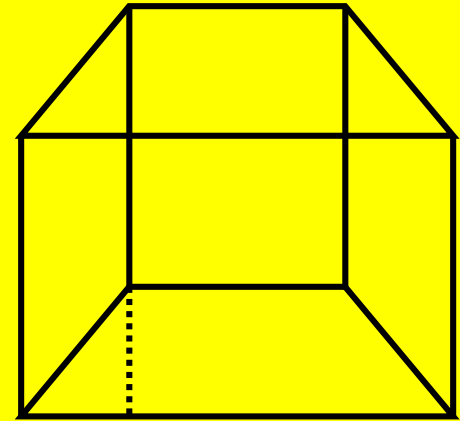
$$L.A. = ph$$

$$T.A. = L.A. + 2B$$

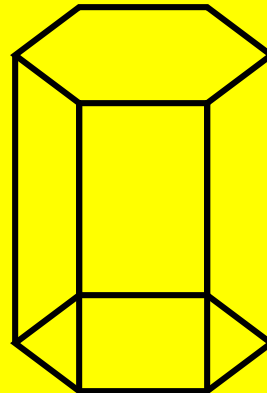
$$V = Bh$$



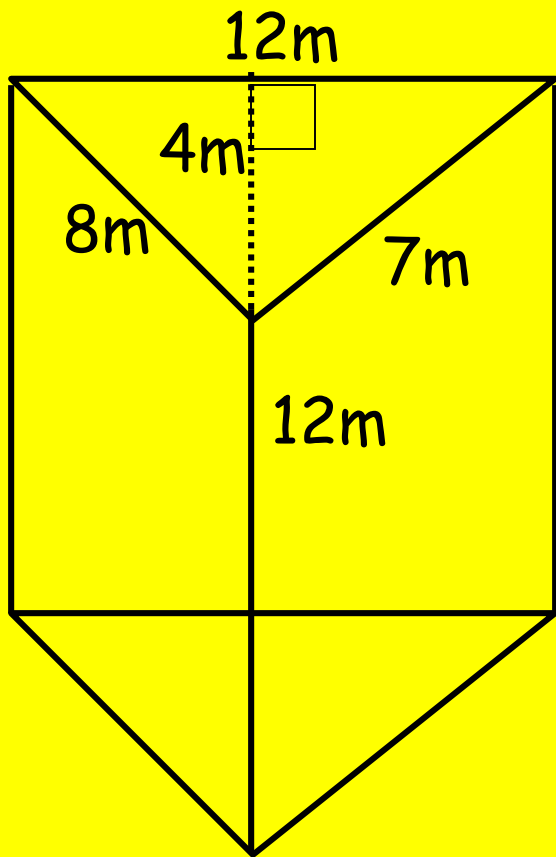
Triangular Prism



Trapezoidal Prism



Hexagonal Prism



Example 1

$$L.A. = ph = (27)(12)$$

$$L.A. = ph = 324m^2$$

$$T.A. = L.A. + 2B = 324m^2 + 2(24)$$

$$T.A. = 372m^2$$

$$V = Bh = (24)(12)$$

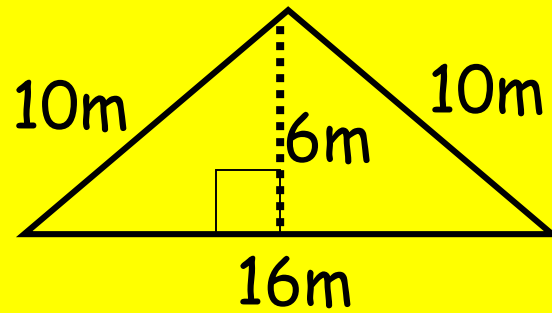
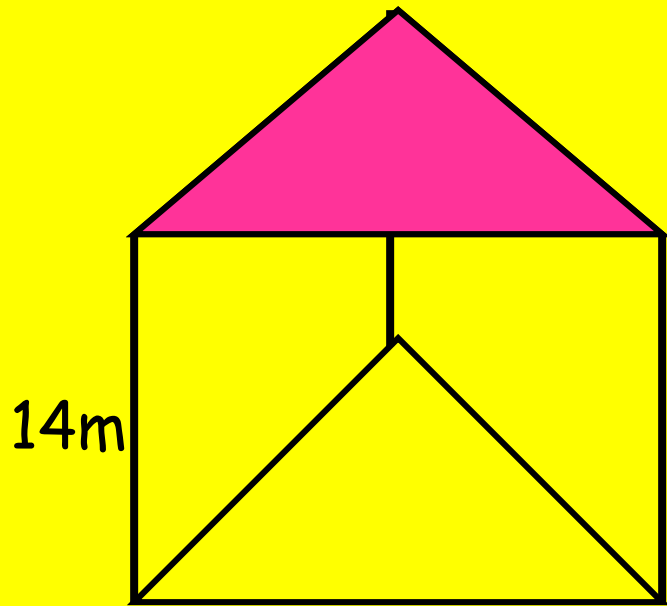
$$V = 288m^3$$

$$\text{Area of the Base (B)} = \frac{1}{2}(12)(4) = 24m^2$$

$$\text{Perimeter of Base (p)} = 12 + 8 + 7 = 27m$$

$$\text{Height (h)} = 12m$$

Example 2



$$V = Bh = (48)(14)$$

$$V = 672\text{m}^3$$

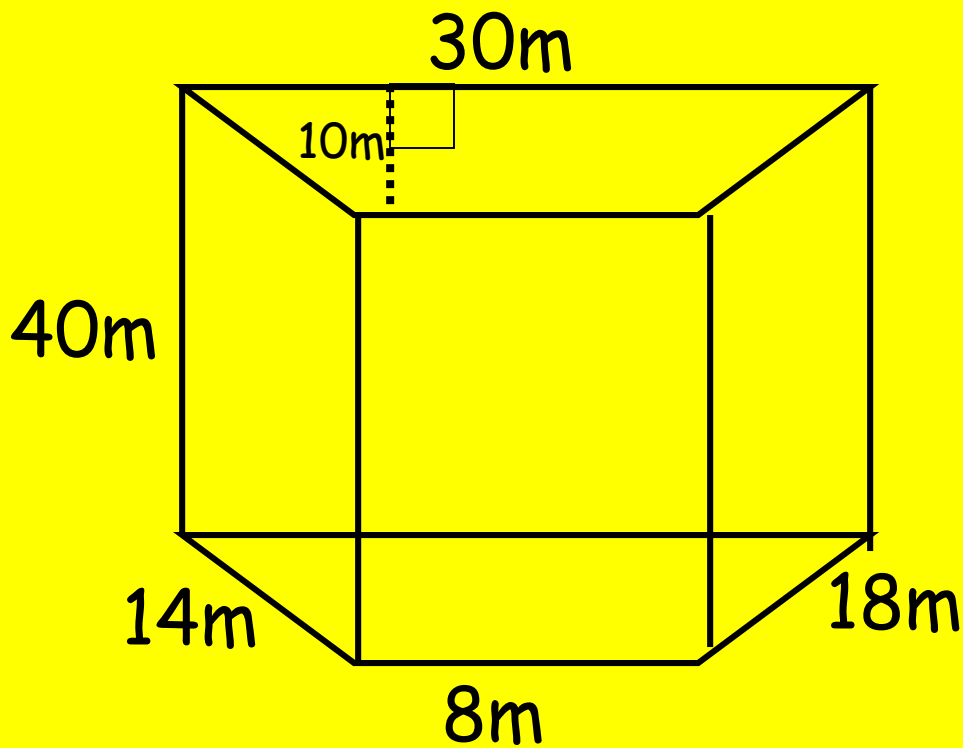
$$\text{L.A.} = ph = (36)(14)$$

$$\text{L.A.} = 504\text{m}^2$$

$$\text{T.A.} = \text{L.A.} + 2B = 504 + 2(48)$$

$$\text{T.A.} = 600\text{m}^2$$

Example 3



$$B = \frac{1}{2}(b_1 + b_2)(h)$$

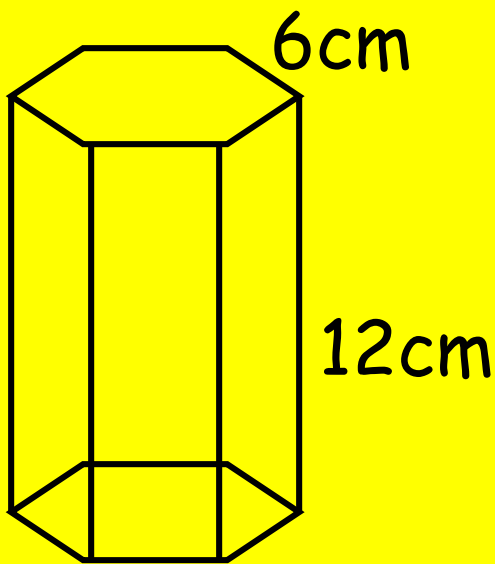
$$B = \frac{1}{2}(8 + 30)(10)$$

$$B = 190\text{m}^2$$

$$V = Bh = (190)(40) \quad V = 7600\text{m}^3$$

$$\text{L.A.} = ph = (70)(40) \quad \text{L.A.} = 2800\text{m}^2$$

$$\text{T.A.} = \text{L.A.} + 2B = 2800 + 2(190) \quad \text{T.A.} = 3180\text{m}^2$$



$$V = Bh = (54\sqrt{3})(12)$$

$$V = 648\sqrt{3}\text{cm}^3$$

Example 4

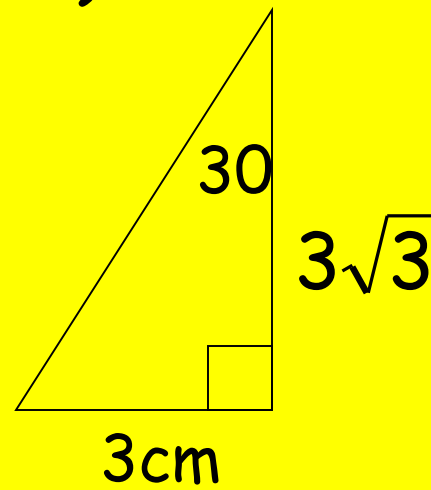
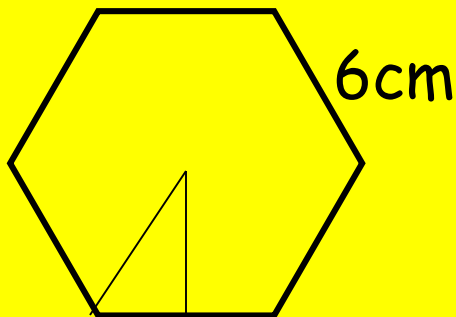
$$\text{L.A.} = ph = (36)(12)$$

$$\text{L.A.} = 432\text{cm}^2$$

$$\text{T.A.} = \text{L.A.} + 2B = 432 + 2(54\sqrt{3})$$

$$\text{T.A.} = 432 + 108\sqrt{3}\text{ cm}^2$$

$$\text{Area of Base (B)} = \frac{1}{2} 3\sqrt{3} (36) = 54\sqrt{3}$$



$$\text{Area of Base (B)} = \frac{1}{2}ap$$