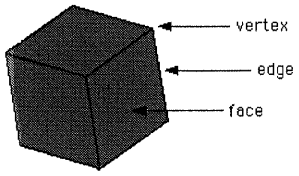
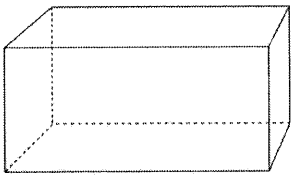
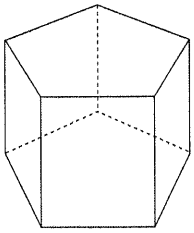
Topic 13.1: Solid Figures and Nets

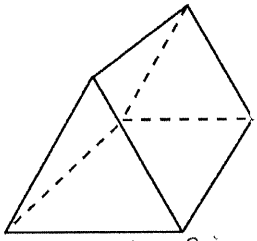
1. **Polyhedron** – 3-dimensional figure made of flat polygon-shaped surfaces called faces.
2. **Faces** – flat polygon-shaped surfaces.
3. **Edge** – line segment where two faces intersect.
4. **Vertex** – point where several edges meet.



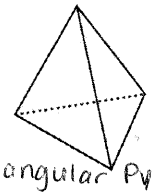
5. **Prisms** – a polyhedron with 2 identical, parallel, polygon-shaped bases. A prism is named by the shape of its base

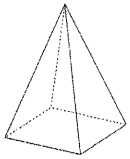

Rectangular Prism

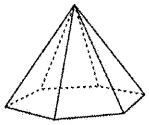

Pentagonal Prism


Triangular Prism

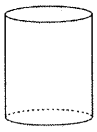
6. **Pyramids** – a polyhedron that has one base. A pyramid is named by the shape of this base.


Triangular Pyramid

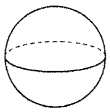

Rectangular Pyramid


Hexagonal Pyramid

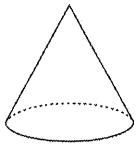
7. **Cylinder** – two circular bases that are parallel and identical.



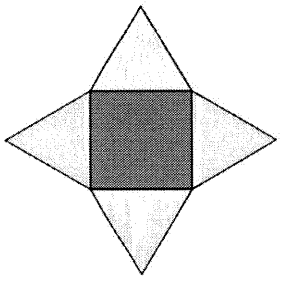
8. **Sphere** – no base. Every point on a sphere is the same distance from the center.



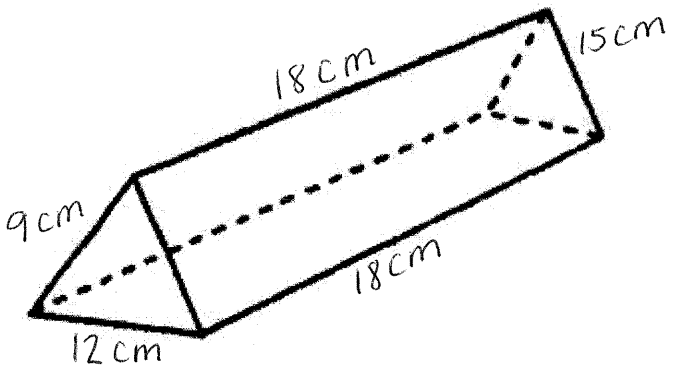
9. **Cone** – one circular base. The points on this circle are joined to one point outside the base.



10. **Net** – a plane figure pattern which, when folded, makes a solid shape.



Topic 13.2: Surface Area of Prisms and Pyramids

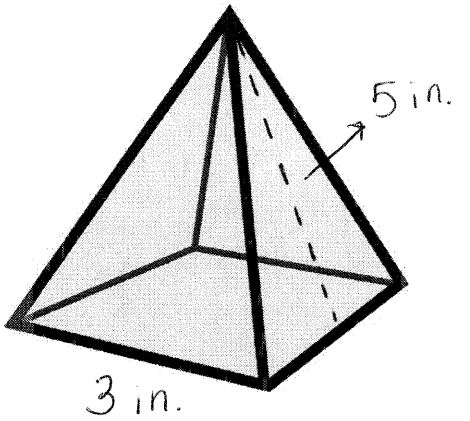


$SA = \overbrace{\frac{1}{2}bh \times 2}^{\text{2 triangles}} + \overbrace{\text{area of rectangular faces}}^{l \times w}$

$SA = \left(\frac{1}{2} \times 12 \times 9\right)2 + (12 \times 18) + (9 \times 18) + (15 \times 18)$

$SA = 108 + 216 + 162 + 270$

$\boxed{SA = 756\ cm^2}$

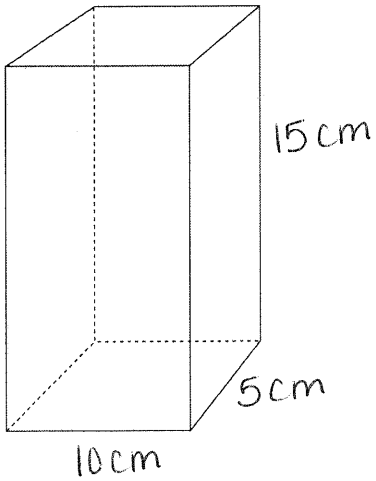


$SA = (\text{area of base}) + (\text{number of triangular faces}) \times (\text{area of triangular face})$

$SA = (3 \times 3) + 4\left(\frac{1}{2} \times 3 \times 5\right)$

$SA = (9) + 4(7.5)$

$\boxed{SA = 39\ in^2}$



$SA = 2lw + 2wh + 2lh$

$SA = 2 \times 10 \times 5 + 2 \times 5 \times 15 + 2 \times 10 \times 15$

$SA = 100 + 150 + 300$

$\boxed{SA = 550\ cm^2}$

Topic 13.3: Surface Area and Volume

Volume – the number of cubic units needed to fill a solid figure.

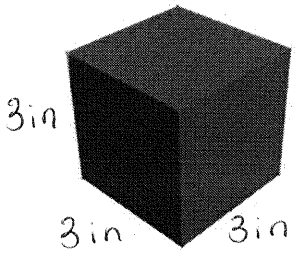
***To find the volume (V) of a rectangular prism, multiply the area of the base (B) by the height (h) of the figure.**

Formula:
V = B x h

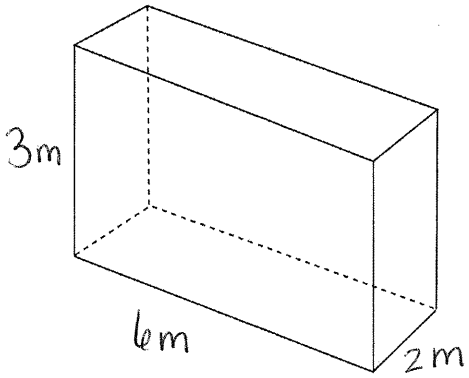
Step 1: Find the area of the base.
B = l x w

Step 2: Find the height of the prism.
The height will be listed on the shape.

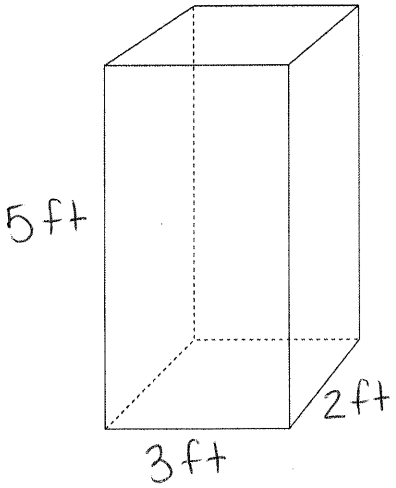
Step 3: Find the volume.
V = B x h



$V = B \times h$
$V = l \times w \times h$
$V = 3 \times 3 \times 3$
$V = 27\ in^3$



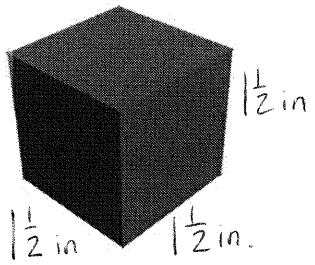
$V = B \times h$
$V = l \times w \times h$
$V = 6 \times 2 \times 3$
$V = 36\ m^3$



$V = B \times h$
$V = l \times w \times h$
$V = 3 \times 2 \times 5$
$V = 30\ ft^3$

Topic 13.4: Volume with Fractional Edge Lengths

*Use the formula for finding the volume of a rectangular prism:
V = l x w x h



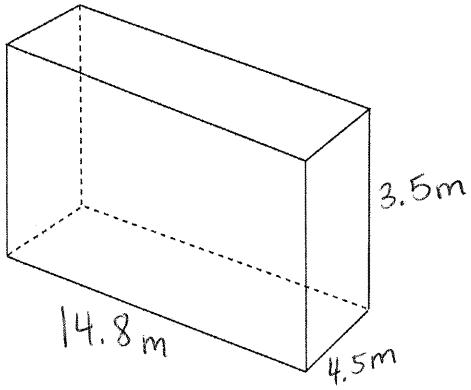
$V = l \times w \times h$

$V = 1\frac{1}{2} \times 1\frac{1}{2} \times 1\frac{1}{2}$

$V = 3\frac{3}{8}\ in^3$

$\frac{3}{2} \times \frac{3}{2} \times \frac{3}{2} = \frac{27}{8}$

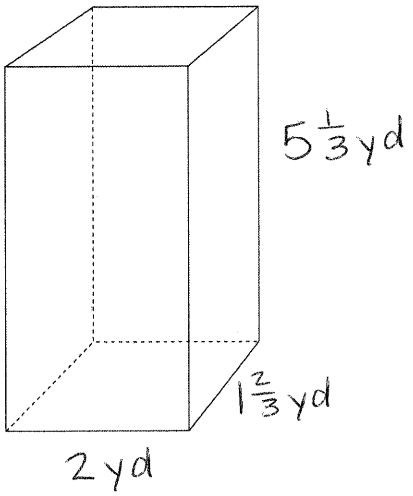
$8\overline{)27}$ $\quad -24$ $\quad 3$ $\quad \times 3$



$V = l \times w \times h$

$V = 14.8 \times 4.5 \times 3.5$

$V = 233.1\ m^3$



$V = l \times w \times h$

$V = 2 \times 1\frac{2}{3} \times 5\frac{1}{3}$

$V = 17\frac{7}{9}\ yd^3$

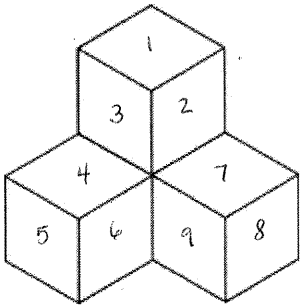
$\frac{2}{1} \times \frac{5}{3} \times \frac{16}{3} = \frac{160}{9}$

$9\overline{)160}$ $\quad -9$ $\quad 70$ $\quad -63$ $\quad 7$ $\quad \times 17$

Topic 13.5: Use Objects and Reasoning

Plan and Solve:

1. Count the cubes to find the volume.
2. Count all the outside faces of the cubes in the figure to find the surface area. Keep in mind faces that might be "hidden."

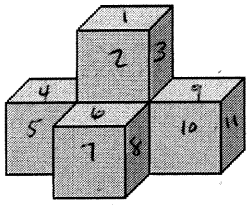


V = 3 cubes (assume no cubes are hidden)

$V = 3\ cm^3$

SA = 9 faces
+ 7 faces hidden

$SA = 16\ cm^2$



V = 4 cubes (assume no cubes are hidden)

$V = 4\ cm^3$

SA = 11 faces
+ 10 faces hidden

$SA = 21\ cm^2$