- Enough steps shown to clearly demonstrate thinking
- Solutions that are neat and easy to follow
- Proper use of mathematical symbols
- Equal signs aligned
- Units used as required
- Concluding statements for all word problems
- Fractions reduced to lowest terms
- Correct rounding.

1. The volume of a cone is 900 in^3. The height is four times the radius of the cone. What is the radius of the cone?

$V_{cone} = \frac{\pi r^2 h}{3}$

$3 \times 900 = \frac{\pi r^2 \cdot r}{3} \cdot 3$ multiply BS by 3 to cancel out ÷ on RS

$\frac{2700}{\pi} = \frac{\pi r^3}{\pi}$ divide BS by π to cancel out $\times$ on RS

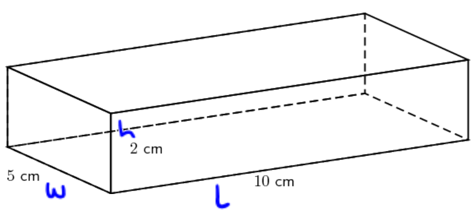
$\sqrt[3]{859.4367} = \sqrt[3]{r^3}$ $\sqrt[3]{\ }$ BS

$\boxed{r \cong 9.5}$

height is $4 \times r$

$\therefore$ Radius is approx 9.5 in.

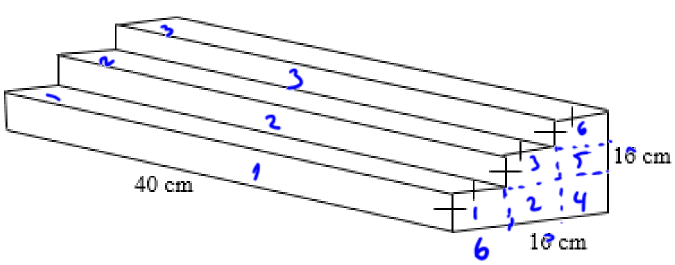
2. Calculate the volume and surface area of the shape below.



$V = l \cdot w \cdot h$
$= 10 \cdot 5 \cdot 2$
$= 100 \text{ cm}^3$

$SA = 2(wh + wl + lh)$
$= 2(5 \cdot 2 + 5 \cdot 10 + 2 \cdot 10)$
$= 160 \text{ cm}^2$

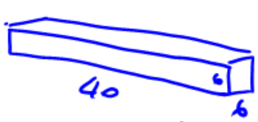
3. Determine the volume and surface area of the shape below, rounded to one decimal place.



Volume

There're 6 rectangular prism that make up of these stairs.

$V = 6 \times$



$= 6 \times (40 \times 6 \times 6)$

$= \underline{8640 \text{ cm}^3}$

There

Surface Area

Front : 3 rectangles 40 by 6
Back : 3 rectangles 40 by 6
Top : 3 rectangles 40 by 6
Bottom : 3 rectangles 40 by 6

$12 \times (40 \times 6)$

Sides : 6 on each side,
Total 12 rectangles 6 by 6

$SA = 12 \times (40 \times 6) + 12(6 \times 6)$
$= 2880 + 432$
$= 3312 \text{ cm}^2$

4. A cylindrical can of tomato paste has been designed to have a minimum surface area. It has a volume of 600 in.^{3}

a) Calculate the optimal dimension: radius and height

$V = 600\text{ in}^3$

$r = \left(\frac{V}{2\pi}\right)^{1/3}$

OR

$r = \left(\frac{600}{2\cdot\pi}\right)^{1/3}$

$r = (95.49)^{1/3}$

$r = (\text{ANS})\boxed{\wedge}(1 \div 3)$ or $\boxed{y^x}$ or $\boxed{a^b}$

$\boxed{r \cong 4.6\text{ in}}$

$h = 2r$
$= 2 \cdot 4.6$
$\cong 9.2$

$\therefore h = 9.2\text{ in}$
$r = 4.6\text{ in.}$

b) Calculate the minimum surface area. Round all measurements to 1 decimal place.

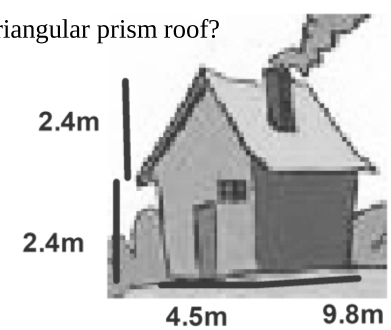
$SA = 2\pi r^2 + 2\pi r h$
$= 2\pi(4.6)^2 + 2\pi(4.6)(9.2)$
$\cong 398.9$

$\therefore$ Min surface area is 398.9 in^2.

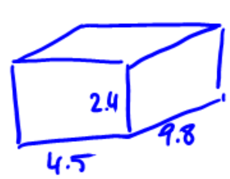
5. Convert the following measurements, rounded to 2 decimal places:

27 in. = <u>2.25</u> ft. $\times 12$: ft → in; $\div 12$: in → ft $27 \div 12 =$	320 m = <u>0.32</u> km $320 \div 10 \div 10 \div 10$ km hm dam m	2.2 lb = <u>998.8</u> g 1 lb ≅ 454 g 2.2 × 454

6. How much air is inside this empty house, which is made up of a rectangular prism base and a triangular prism roof?



$V_{Total} = V_{Base} + V_{Roof}$



$= 4.5 \times 9.8 \times 2.4$
$= 105.84\text{ m}^3$

$= \frac{4.5 \times 2.4 \times 9.8}{2}$
$= 52.92$

$V_{Total} = 105.84 + 52.92$
$= 158.76\text{ m}^3$

Complete: p. 120 #1c, 7, 9d, 10d, 11, 12, 15, 16, 18, 19

Metric and Imperial Conversions

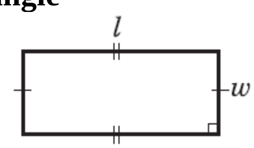
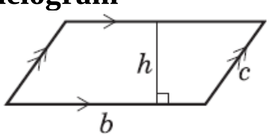
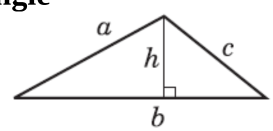
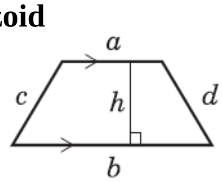
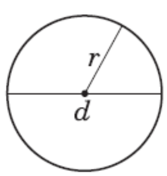
Length

Imperial to Metric	Metric to Imperial
1 inch = 2.54 cm	1 cm ≐ 0.3937 inch
1 foot = 30.48 cm	1 m ≐ 39.37 inches
1 foot = 0.3048 m	1 m ≐ 3.2808 feet
1 mile ≐ 1.609 km	1 km ≐ 0.6214 mile

Volume

Imperial to Metric	Metric to Imperial
1 fl. ounce ≐ 28.413 mL	1 mL ≐ 0.0352 fl. ounce
1 pint ≐ 0.568 L	1 L ≐ 1.7598 pints
1 quart ≐ 1.1365 L	1 L ≐ 0.8799 quart
1 gallon ≐ 4.546 L	1 L ≐ 0.22 gallon

Formula Sheet 2-Dimensional Shapes

Geometric Figure	Perimeter	Area
Rectangle 	$P = l + l + w + w$ *or* $P = 2(l + w)$	$A = lw$
Parallelogram 	$P = b + b + c + c$ *or* $P = 2(b + c)$	$A = bh$
Triangle 	$P = a + b + c$	$A = \frac{bh}{2}$ *or* $A = \frac{1}{2}bh$
Trapezoid 	$P = a + b + c + d$	$A = \frac{(a+b)h}{2}$ *or* $A = \frac{1}{2}(a+b)h$
Circle 	$C = \pi d$ *or* $C = 2\pi r$	$A = \pi r^2$

OPTMIZATION FORMULAS

For a 2-D triangle:

$\boxed{c = 1.414a}$

$\boxed{a = \frac{P}{3.414}}$

$\boxed{a = \sqrt{2A}}$

For a cylinder:

$\boxed{h = 2r}$

$\boxed{r = \sqrt{\frac{SA}{6\pi}}}$

$\boxed{r = \left(\frac{V}{2\pi}\right)^{\frac{1}{3}}}$

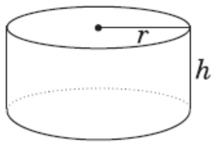
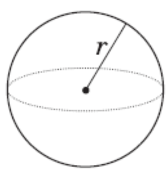
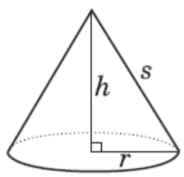
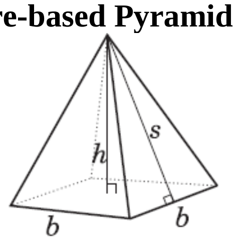
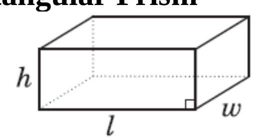
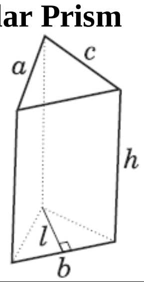
For a triangular prism:

$\boxed{c = 1.414s}$

$\boxed{l = \frac{SA - s^2}{3.414s}}$

$\boxed{l = \frac{2V}{s^2}}$ or $\boxed{s = \sqrt{\frac{2V}{l}}}$

Formula Sheet
3-Dimesional Shapes

Geometric Figure	Surface Area	Volume
Cylinder 	$A_{base} = \pi r^2$ $A_{lateral\ area} = 2\pi rh$ $A_{total} = 2A_{base} + A_{lateral\ area}$ $= 2\pi r^2 + 2\pi rh$	$V = \pi r^2 h$
Sphere 	$A = 4\pi r^2$	$V = \frac{4\pi r^3}{3}$ *or* $V = \frac{4}{3}\pi r^3$
Cone 	$A_{base} = \pi r^2$ $A_{lateral\ area} = \pi rs$ $A_{total} = A_{base} + A_{lateral\ area}$ $= \pi r^2 + \pi rs$	$V = \frac{\pi r^2 h}{3}$ *or* $V = \frac{1}{3}\pi r^2 h$
Square-based Pyramid 	$A_{base} = b^2$ $A_{triangle} = \frac{bs}{2}$ $A_{total} = A_{base} + 4A_{triangle}$ $= b^2 + 2bs$	$V = \frac{b^2 h}{3}$ *or* $V = \frac{1}{3}b^2 h$
Rectangular Prism 	$A = wh + wh + lw + lw + lh + lh$ *or* $A = 2(wh + lw + lh)$	$V = lwh$
Triangular Prism 	$A_{base} = \frac{bl}{2}$ $A_{rectangles} = ah + bh + ch$ $A_{total} = 2A_{base} + A_{rectangles}$ $= bl + ah + bh + ch$	$V = \frac{blh}{2}$ *or* $V = \frac{1}{2}blh$