Friday 19th June 2020

Cone and Frustrum Grade 7-9

Volume of square based pyramid = $\frac{1}{3} \times w \times h$

Volume of Cone = $\frac{1}{3} \times \pi \times r^2 \times h$

Volume of sphere = $\frac{4}{3} \times \pi \times r^3$

Starter:

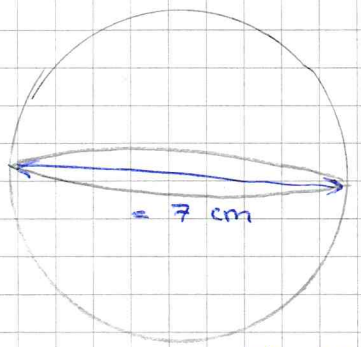
1) $\frac{1}{3} \times 7 \times 4 \times 7 = 65.3\ cm$ ✓

2) $\frac{1}{3} \times \pi \times 8^2 \times 16 = 40.2\ cm^3$ ✓

3) $\frac{4}{3} \times \pi \times 4^3 = 268.08\ cm$ ✓

Volume = 179.59

find x:



diameter = x cm

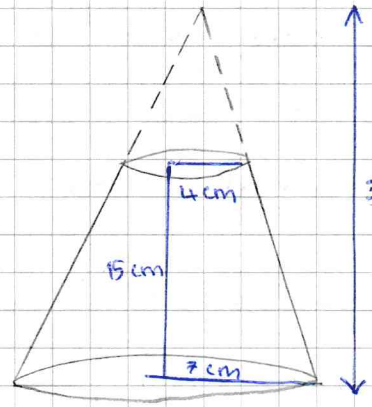
$179.59 = \frac{4}{3} \times \pi \times \square^3$

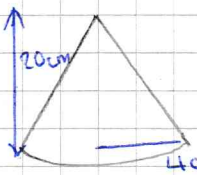
$\div \frac{4}{3}$

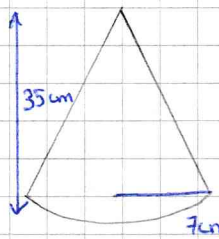
$\sqrt[3]{\square} = 3.3$

$\div \pi$

$\square = 3.4999$ x2 to get diameter ✓

① 





Scale factor

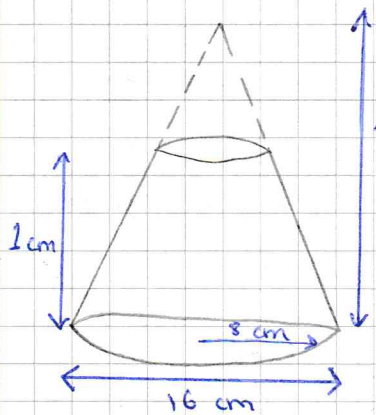
$= \frac{7}{4} = 1.75$

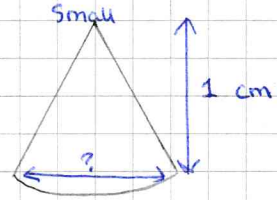
Height = $35 \div 1.75 = 20\ cm$

Big - Small

$\left(\frac{1}{3} \pi \times 7^2 \times 35\right) - \left(\frac{1}{3} \times \pi \times 4^2 \times 20\right)$

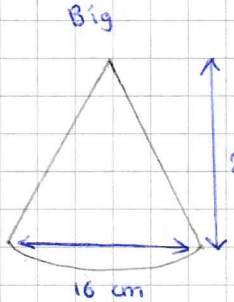
$= 1460.8\ cm^3$ ✓

② 



$16 \div 2 = 8$

$8 \div 2 = 4$



Scale factor

$= 2 \div 1 = 2$

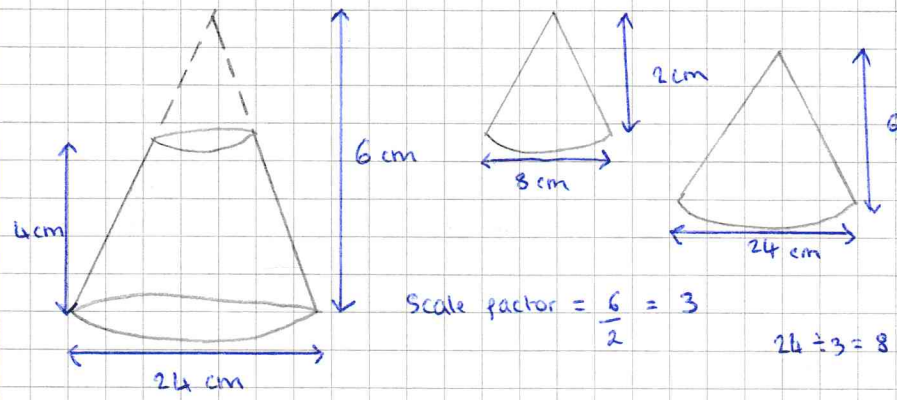
$= 2$ SF

Big - Small

$\left(\frac{1}{3} \pi 8^2 \times 2\right) - \left(\frac{1}{3} \times \pi \times 4^2 \times 1\right)$ $= 117.2861227$

$= 117.286...$ ✓

②



Scale factor $= \frac{6}{2} = 3$

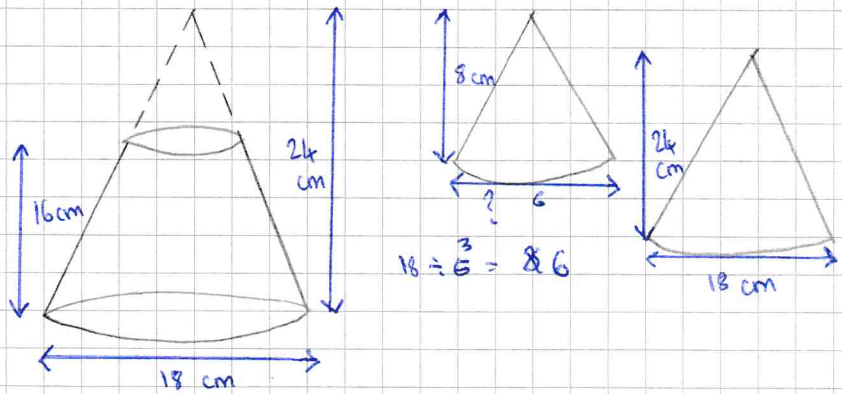
$24 \div 3 = 8$

Big − Small

$\left(\frac{1}{3} \times \pi \times 12^2 \times 6\right) - \left(\frac{1}{3} \times \pi \times 4^2 \times 2\right)$

$= 871.27 \text{ cm}$

③



$18 \div 6 = 3$

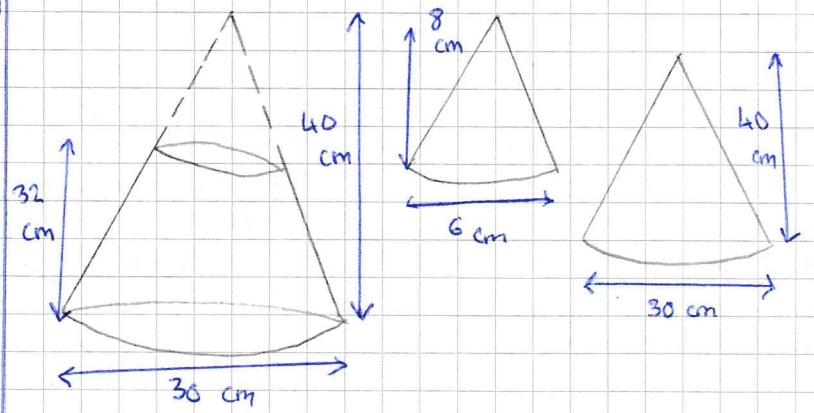
Scale factor $= \frac{24}{8} = 3$

Big − Small

$\left(\frac{1}{3}\pi \times 9^2 \times 24\right) - \left(\frac{1}{3}\pi \times 3^2 \times 8\right)$

$= 1960.35 \text{ cm}^3$

④



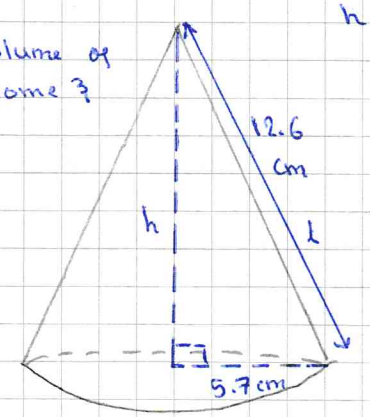
Scale factor $= 40 \div 8 = 5$

Big − Small

$\left(\frac{1}{3}\pi \times 15^2 \times 40\right) - \left(\frac{1}{3} \times \pi \times 3^2 \times 8\right)$

$= 9349.38 \text{ cm}^3$

1) Volume of cone?



$h = \sqrt{12.6^2 - 5.7^2}$

$= 11.236...$

$V = \frac{1}{3} \times \pi \times r^2 \times h$

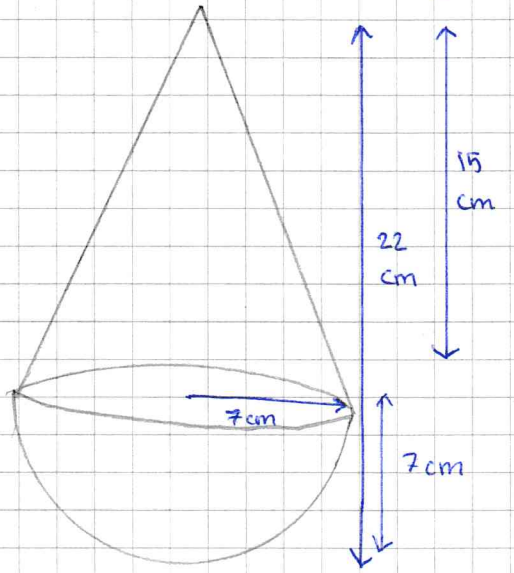
$V = \frac{1}{3} \times \pi \times 5.7^2 \times \square$

$V = \frac{1}{3} \times \pi \times 5.7^2 \times 11.230$

$= 382.32 \text{ cm}^2$

$= 382 \text{ cm}^3$

① A childs toy is made from a cone and a hemisphere. They each have a radius of 7cm. The Total height is 22 cm. Work out the volume of the toy.



$\text{Cone} = \frac{1}{3}\pi r^2 h$

$= \frac{1}{3} \times \pi \times 7^2 \times 15$

$= 769.690... \text{ cm}^3$

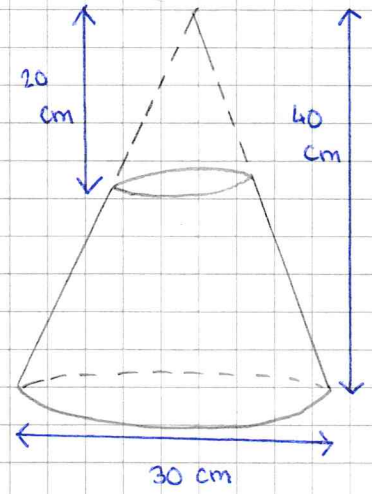
$\text{Hemisphere} = \frac{4}{3}\pi \times r^3$ ÷2

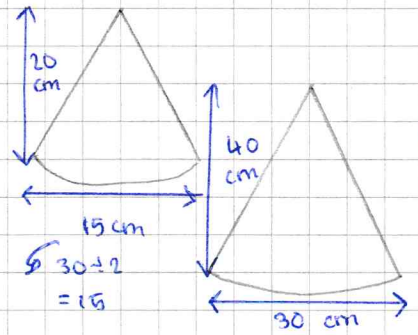
$= \frac{4}{3} \times \pi \times 7^3$ ÷2

$= 718.378 \text{ cm}^3$

$= 718 \text{ cm}^3$

②





$30 \div 2 = 15$

scale factor = 2

Big - Small

$\left(\frac{1}{3}\pi r^2 h\right) - \left(\frac{1}{3}\pi r^2 h\right)$

$\left(\frac{1}{3}\pi \times 15^2 \times 40\right) - \left(\frac{1}{3} \times \pi \times 7.5^2 \times 20\right)$

$= 8246.68...$

$= 8250 \text{ cm}^3$

Thursday 18th June 2020

Cone and Frustrum Grade 7-9

Starter:

Volume of Cone = $\frac{1}{3}\pi r^2 h$

Volume of Sphere = $\frac{4}{3}\pi r^3$

Volume of pyramid = $\frac{1}{3} \times b \times w \times h$

1) $\sqrt{24^2 + 7^2} = 25$ ✓

2) $\sqrt{6^2 + 2^2} = 6.32$ ✓

3) $\sqrt{10^2 - 5^2} = 8.66$ ✓

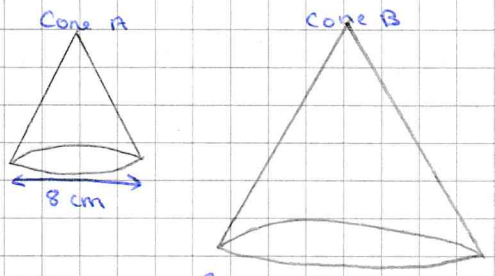
4) $\sqrt{21^2 - 6^2} = 20.12$ ✓

5) $\frac{1}{3}\pi r^2 h = \frac{1}{3} \times \pi \times 2.5^2 \times 6 = 39.26\text{cm}$ ✓

6) $\frac{4}{3}\pi r^3 = \frac{4}{3}\pi \times 4^3 = 268\text{ cm}$ ✓

7) $\frac{1}{3} \times b \times w \times h = \frac{1}{3} \times 5 \times 6 \times 7 = 70$ ✓

1)



S.A 120 $\times \square^2$ 1080

S.F = 3 ÷120 $= \sqrt{9}$ $= 3$

length = 3
Area = $3^2 = 9$
Volume = $3^3 = 27$

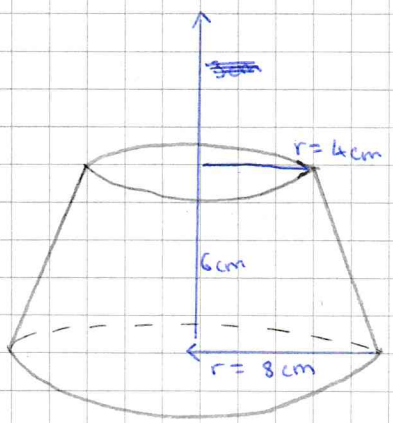
Frustrum Equation

Big - Smaller

$\left(\frac{1}{3}\pi r^3 \times h\right) - \left(\frac{1}{3}\pi r^3 \times h\right)$

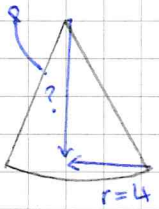
Frustrum

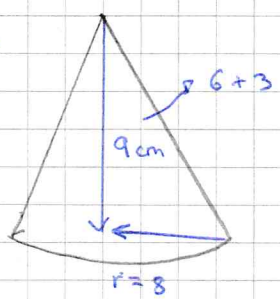
1)



4.5cm (9÷2)

Scale factor = 2

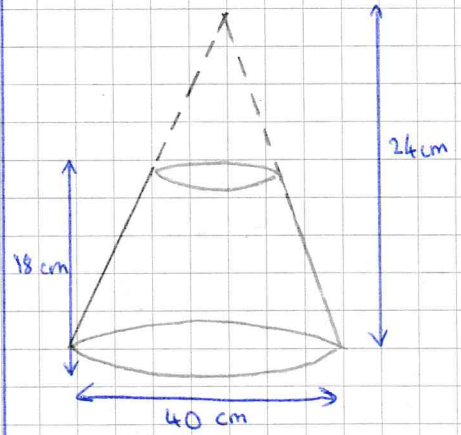


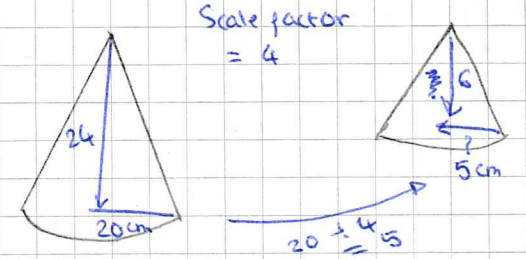


= Big - Small

$= \left(\frac{1}{3} \times \pi \times 9^2 \times 9\right) - \left(\frac{1}{3} \times \pi \times 4^2 \times 4.5\right)$

2)





Scale factor = 4

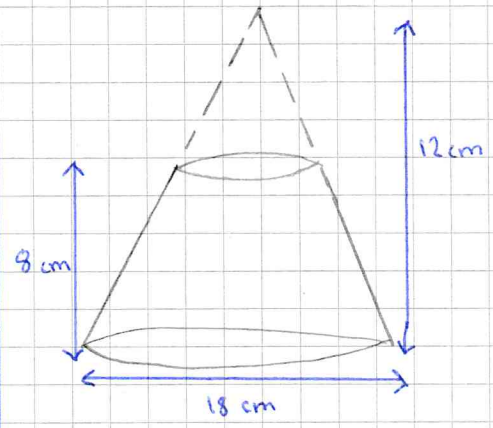
$20 \div 4 = 5$

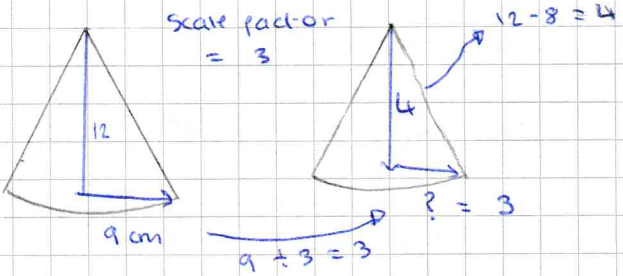
= Big − Small

$= \left(\frac{1}{3} \times \pi \times 20^2 \times 24\right) - \left(\frac{1}{3} \times \pi \times 5^2 \times 6\right)$

$= 9896.02$

3)





Scale factor = 3

$9 \div 3 = 3$

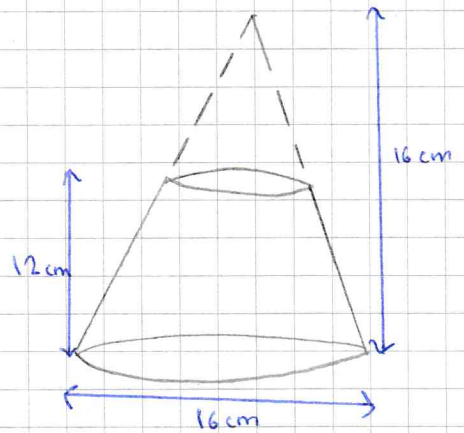
= Big − Small

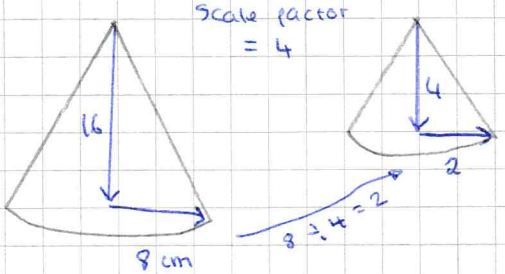
$= \left(\frac{1}{3} \times \pi \times 9^2 \times 12\right) - \left(\frac{1}{3} \times \pi \times 3^2 \times 4\right)$

$= 980.176...$

$= 980.18$ ✓

4)





Scale factor = 4

$8 \div 4 = 2$

Big − Small

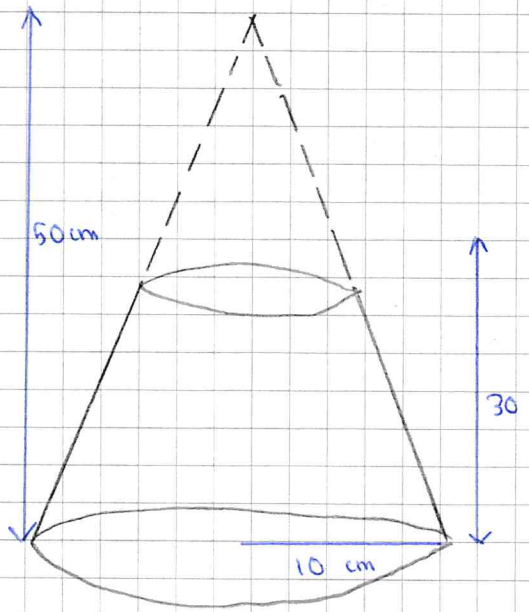
$\left(\frac{1}{3} \times \pi \times 8^2 \times 16\right) - \left(\frac{1}{3} \times \pi \times 2^2 \times 4\right)$

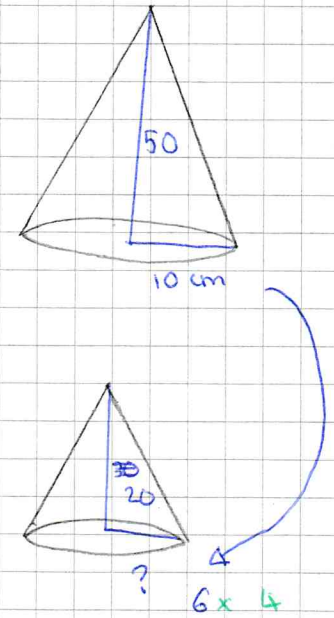
$= 1059.5751...$

$= 1055.58$ ✓

Exam Q

1)





Scale factor

$= 50 \div 30$ (×20)

$= 1.6$ or $\frac{5}{3}$

$= 2.5$

$10 \div \frac{5}{3} \times 2.5$

Big − Small

$\left(\frac{1}{3} \times \pi \times r^2 \times h\right) - \left(\frac{1}{3} \times \pi \times r^2 \times h\right)$

$\left(\frac{1}{3} \times \pi \times 10^2 \times 50\right) - \left(\frac{1}{3} \times \pi \times 8^2 \times 20\right)$

$= 4900.82494$

$= 4900.33$