

(12.5)

① $\frac{6}{9} = \frac{10}{15}$

② $\frac{18}{30} \neq \frac{8}{15}$

yes

NO

③ SC. fact = 3:4

④ SC. fact = 12:18 = 2:3

heights = 3:4

base areas = 4:9

base Circ = 3:4

LA = 4:9

LA = 9:16

TA = 4:9

V = 27:64

V = 8:27

⑤ SC. fact $\frac{\text{Earth}}{\text{Moon}} = \frac{12800}{3200} = \frac{4}{1}$

⑥ LA: $\frac{8/\pi}{144/\pi} = \frac{9}{16} \rightarrow \text{SC. fact: } \frac{3}{4}$

equators = $\frac{H}{1}$

heights = $\frac{3}{4}$

areas = $\frac{16}{1}$

TA = $\frac{9}{16}$

V = $\frac{64}{1}$

V = $27/64$

⑦ Vol: $\frac{8/\pi}{27/\pi} \rightarrow \text{SC. fact: } \frac{2}{3}$

⑧ Vol: $\frac{375}{3} = \frac{125}{1} \rightarrow \text{SC. fact} = \frac{5}{1}$

radii = $\frac{2}{3}$

heights = $\frac{1}{5}$

L = $\frac{2}{3}$

R = $\frac{1}{25}$

LA = $\frac{4}{9}$

TA = $\frac{1}{25}$

⑨ SC. fact = $\frac{1}{1000}$ * Actual plane requires 40000 x amt. for model
TA = $\frac{1}{40000}$

⑩ SC. fact = $\frac{1}{48}$ 1 ft³ = 1728 in³
Vol = $\frac{1}{110592}$

$$\frac{1}{110592} = \frac{90 \text{ in}^3}{x} \quad \frac{9953280}{1728} = \boxed{5760 \text{ ft}^3}$$
$$9953280 \text{ in}^3 = x$$

$$\textcircled{11} \text{ Sc. fact: } \frac{4}{9} = \frac{2}{3}$$

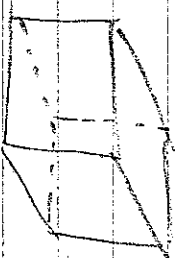
$$\frac{36\pi}{x} = \frac{4}{9}$$

$$\text{Areas} = \frac{4}{9}$$

$$4x = 36\pi$$

$$x = 81\pi \text{ cm}^3$$

$\textcircled{12}$



$$\text{Sc. fact.} = \frac{2}{4\sqrt{3}} = \frac{1}{2\sqrt{3}} \rightarrow \text{Vol} = \frac{1}{24\sqrt{3}}$$

$$\frac{x}{4x} = \frac{1}{24\sqrt{3}}$$

$$4x = 24\sqrt{3}x$$

$$\frac{4x}{24\sqrt{3}} = x = \frac{8}{3\sqrt{3}} = \frac{8\sqrt{3}}{9} \text{ cm}^3$$

$$\textcircled{13} \text{ Sc. fact} = \frac{6}{10} = \frac{3}{5}$$

$$\frac{4}{87} = \frac{x}{125}$$

$$\text{Vol} = \frac{27}{125}$$

$$27x = 500$$

$$x = 18.5 \text{ kg}$$

$\textcircled{14}$



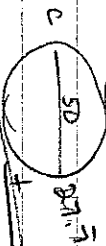
$$\text{Sc. fact. A:B} = 3:4 \rightarrow \text{Vol} = \frac{27}{64}$$

$$\frac{4 \text{ kg}}{87} = \frac{x}{64} \rightarrow 114.7 \text{ kg}$$



$$\text{Sc. fact A:C} = 3:5 \rightarrow \text{Vol} = \frac{27}{125}$$

$$\frac{6}{87} = \frac{x}{125} \rightarrow 107.5 \text{ kg}$$



$$\approx 47.8 \text{ kg}$$

$\textcircled{15}$

$$\text{Vol}_{\text{alum}} = \frac{4}{3}\pi \cdot 3^3 = 36\pi$$

$$\frac{36\pi \text{ cm}^3}{8.1}$$

$$\frac{288\pi \text{ cm}^3}{4.5}$$

$$= \frac{44.3\pi \text{ cm}^3}{8.1}$$

$$\text{Vol}_{\text{iron}} = \frac{4}{3}\pi \cdot 6^3 = 288\pi$$

Better Deal

$$(16) \frac{\text{large}}{\text{small}} = \frac{3}{1} \text{ (weight + sc. fact.)}$$

a) Ratio of areas of cross-section = $\frac{9}{1} \rightarrow$ larger is 9 x as strong

b) ratio of volumes = $\frac{27}{1} \rightarrow$ larger is 27 x as heavy

$$c) \frac{\text{strength}}{lb} \rightarrow \frac{\overset{\text{large}}{9}}{27} = \frac{1 \text{ strength}}{3 lb} \quad \text{vs.} \quad \frac{\overset{\text{small}}{1}}{1 lb}$$

↑
smaller supports
more per lb.

(17) Areas: $\frac{8}{18} = \frac{4}{9} \rightarrow$ sc. fact: $\frac{2}{3} \rightarrow$ volume: $\frac{8}{27}$

$$\frac{32}{x} = \frac{8}{27}$$

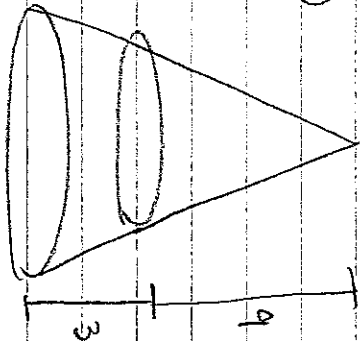
$$x = 108 \quad \text{ft}^3$$

(18) Volumes: $\frac{12\pi}{96\pi} = \frac{1}{8} \rightarrow$ sc. fact: $\frac{1}{2} \rightarrow$ LA: $\frac{1}{4}$

$$\frac{15\pi}{x} = \frac{1}{4}$$

$$x = 60\pi$$

(19)



Sc. fact: $\frac{9}{18} = \frac{3}{6}$

a) Areas: $9/16$

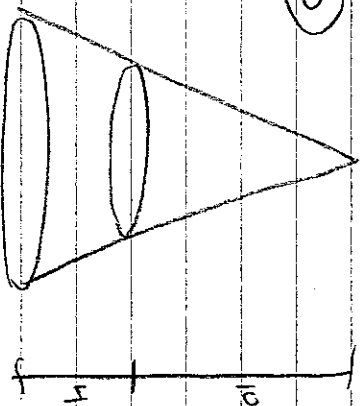
b) LA: $9/16$

c) $\frac{LA_{top}}{LA_{bottom}} = \frac{9}{16}$ (16-9)

d) Vol: $27/64$

e) $\frac{V_{top}}{V_{bottom}} = \frac{27}{37}$ (64-27)

(20)



Sc. fact: $10/4 = 5/2$

a) Areas: $25/16$

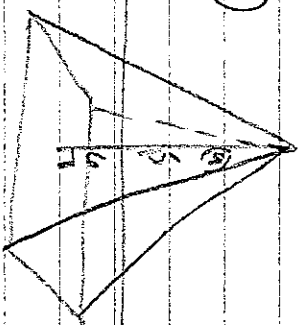
b) LA = $25/16$

c) $\frac{LA_{top}}{LA_{bottom}} = \frac{25}{16}$

d) Vol = $125/64$

e) $\frac{Vol_{top}}{Vol_{bottom}} = \frac{125}{216}$

(21)



Sc. fact = $9/5 = 3/5 \rightarrow$ Volume: $27/125$

$\frac{x}{27} = \frac{27}{125}$

$x = 54$ (Vol. of top)
 $270 - 54 = 216$ (Vol. of bottom)