Geometry   Practice 11.6 Spheres   Name __ANSWERS__ ____date____

Find the surface area and volume of each sphere. Leave your answers in terms of pi;

1. $d = 8$ ft $r = 4$

$SA = 4\pi(16) = \boxed{64\pi \text{ ft}^2}$

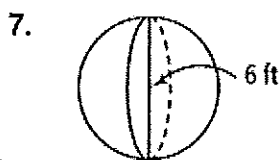$V = \dfrac{4\pi(4^3)}{3} = \boxed{\dfrac{256\pi}{3} \text{ ft}^3}$

2. $r = 10$ cm $SA = 4\pi(10^2)$

$\boxed{400\pi \text{ cm}^2}$

$V = \dfrac{4\pi(1000)}{3} = \boxed{\dfrac{4000\pi}{3} \text{ cm}^3}$

6. $r = 4$ 4 yd

$SA = 4\pi(4^2) = \boxed{64\pi \text{ yd}^2}$

$V = \dfrac{4\pi(4^3)}{3} = \dfrac{4\pi(64)}{3} = \boxed{\dfrac{256\pi}{3} \text{ yd}^3}$

7.   6 ft

$r = 3$

$SA = 4\pi(9) = \boxed{36\pi \text{ ft}^2}$

$V = \dfrac{4\pi(3^3)}{3} = \dfrac{4\pi(27)}{3} = \boxed{36\pi \text{ ft}^3}$

Use the given circumference to find the surface area of each spherical object. Round your answer to the nearest whole number.

11. an asteroid with $C = 83.92$ m

$C = 2\pi r$ $\dfrac{83.92}{2} = \dfrac{2\pi r}{2}$

$\dfrac{41.96}{\pi} = \dfrac{\pi r}{\pi}$

$r = 13.36$

$SA = 4\pi(13.36^2) = 713.56\pi$

$\approx 2241.7 \approx \boxed{2242 \text{ m}^2}$

12. a meteorite with $C = 26.062$ yd

$C = 2\pi r = \dfrac{26.062}{2}$

$\dfrac{\pi r}{\pi} = \dfrac{13.031}{\pi}$

$r = 4.15$

$SA = 4\pi(4.15)^2$

$\boxed{216 \text{ yd}^2}$

A sphere has the volume given. Find its surface area to the nearest whole number.

21. $V = 1200$ ft³

$\dfrac{4\pi r^3}{3} = 1200$

$4\pi r^3 = 3600$

$\dfrac{4\pi r^3}{\pi} = \dfrac{900}{\pi}$

$r^3 = 286.5$

$r = 6.6$

$SA = 4\pi(6.6)^2 = 174.24\pi$

$\boxed{547 \text{ ft}^2}$

22. $V = 750$ m³

$\dfrac{4\pi r^3}{3} = 750$

$3\left(\dfrac{4\pi r^3}{3}\right) = (750)3$

$\dfrac{4\pi r^3}{4} = \dfrac{2250}{4}$

$\dfrac{4\pi r^3}{\pi} = \dfrac{562.5}{\pi}$

$r^3 = 179.05$

$r = 5.64$

$SA = 4\pi(5.64^2) = $

$\approx \boxed{399 \text{ ft}^2}$

23. $V = 4500$ cm³ $= \dfrac{4\pi r^3}{3}$

$3(4500) = \left(\dfrac{4\pi r^3}{3}\right)3$

$\dfrac{13500}{4} = \dfrac{4\pi r^3}{4}$

$\dfrac{33.75}{\pi} = \dfrac{\pi r^3}{\pi}$

$10.74 = r^3$

$r = 10.24$

$SA = 4\pi(10.24^2)$

$\boxed{1318 \text{ cm}^2}$

Find the volume in terms of π of each sphere with the given surface area.

24. 900π in.²

$4\pi r^2 = 900\pi$

$\dfrac{4\pi r^2}{\pi} = \dfrac{900\pi}{\pi}$

$\dfrac{4r^2}{4} = \dfrac{900}{4}$

$r^2 = 225$

$r = 15$

$V = \dfrac{4\pi(15^3)}{3}$

$\boxed{4500\pi \text{ in}^3}$

25. 81π in.² $= 4\pi r^2$

$\dfrac{81\pi}{\pi} = \dfrac{4\pi r^2}{\pi}$

$\dfrac{81}{4} = \dfrac{4r^2}{4}$

$r^2 = 20.25$

$r = 4.5$

$V = \dfrac{4\pi(4.5)^3}{3}$

$\boxed{121.5\pi \text{ in}^3}$ or $\dfrac{243\pi}{2}$

26. 6084π m² $= 4\pi r^2$

$\dfrac{6084}{4} = \dfrac{4r^2}{4}$

$1521 = r^2$

$r = 39$

$V = \dfrac{4\pi(39^3)}{3}$

$\boxed{79092\pi \text{ m}^3}$

28. A spherical scoop of ice cream with a diameter of 4 cm rests on top of a sugar cone that is 10 cm deep and has a diameter of 4 cm. If all of the ice cream melts into the cone, what percent of the cone will be filled?

sphere $r = 2$

$Vol = \dfrac{4\pi(2^3)}{3} = \dfrac{32\pi}{3}$

cone

$Vol = \dfrac{BH}{3} = \dfrac{4\pi(10)}{3} = \dfrac{40\pi}{3}$

$\dfrac{32}{40} = \dfrac{x}{100}$

$\boxed{80\%}$

Find the surface area and volume of the following composite figures;

A. cylinder
C = 10π
B = 25π
H = 2
= 50π
$t = (10\pi)(2) + (25\pi)$
$20 + 25\pi$
45π

cone
C = 10π
B = 25π
ℓ = 13
H = 12
$V = \dfrac{(25\pi)(12)}{3}$
100π
$SA = \dfrac{1}{2}(10\pi)(13)$
65π

13 cm

5 cm

2 cm

$\boxed{V = 150\pi \text{ cm}^3}$ $\boxed{SA = 110\pi \text{ cm}^2}$

B. Prism
B = 16
H = 5
P = 16
$V = 16 \cdot 5$
$\boxed{80}$

6 in.

5 in.

4 in.

$SA = PH + B$
$16 \cdot 5 + 16$
$\boxed{96}$

$\boxed{V = 112 \text{ in}^3}$

C. Pyramid
B = 16
H = 6
P = 16
ℓ = 6.32
$(2\sqrt{10})$
$V = \dfrac{16 \cdot 6}{3} = 32$

4 in.

$SA = \dfrac{1}{2} P\ell$
$\dfrac{1}{2}(16)(6.32)$
$16\sqrt{10}$ or 50.56
$SA = 96 + 16\sqrt{10}$ or $\boxed{146.6 \text{ in}^2}$

cylinder
C = 20π
B = 100π
H = 16

10

16

$V = 1600\pi + \dfrac{2000\pi}{3}$

$SA = CH + B$
$20\pi(16) + 100\pi$
$320\pi + 100\pi$
$\boxed{420\pi}$

$\boxed{V = \dfrac{6800\pi}{3}} \; \boxed{7120.9}$

sphere
r = 10

$V = \dfrac{4\pi(100)}{3} \div 2$ half sphere

$SA = 4\pi r^2 \div 2$ (half)
$\dfrac{2\pi(100)}{\boxed{200\pi}}$

$\boxed{SA = 620\pi}$

D.

8.9 mm

15.2 mm

E.

4 ft

8 ft

12 ft

8 ft

14 ft

rect. prism   cylinder

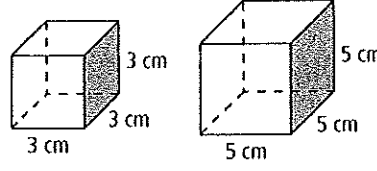**F. challenge!!**

3 in.

10.5 ft

Name **ANSWERS** Period___ Date___

Geometry: 11.7 Practice
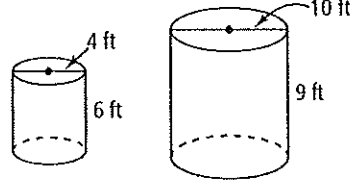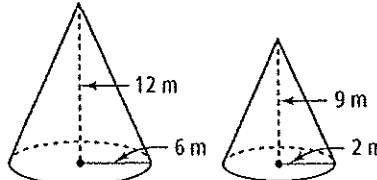
Are the two figures similar? If so, give the scale factor of the first figure to the second figure.

1.

$\frac{10}{4} = \frac{5}{2}$ yes

15 in. 10 in. 6 in. 4 in.
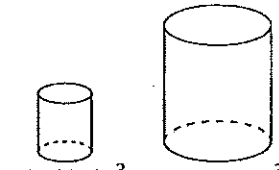
$\frac{15}{6} = \left(\frac{5}{2}\right)$

2.

3 cm 3 cm 3 cm 5 cm 5 cm 5 cm

yes $\left(\frac{3}{5}\right)$

3.

4 ft 6 ft 10 ft 9 ft

$\frac{6}{9} = \frac{2}{3}$ (NO)

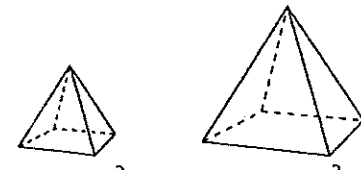$\frac{4}{10} = \frac{2}{5}$

4.

12 m 6 m 9 m 2 m

$\frac{12}{9} = \frac{4}{3}$ (NO)

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

5. two cubes, one with 5-in. edges, the other with 6-in. edges
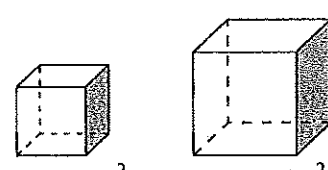
yes $\left(5:6\right)$

Each pair of figures is similar. Use the given information to find the scale factor of the smaller figure to the larger figure as well as the other missing ratio. (make L-A-V chart)

6.

$V = 64\pi$ in.³ $V = 125\pi$ in.³

L	A	V
$\frac{4}{5}$	$\frac{16}{25}$	$\frac{64}{125}$

7.

$V = 125$ cm³ $V = 216$ cm³
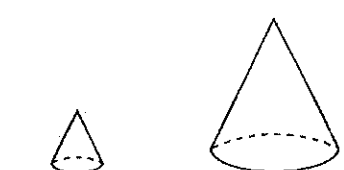
L	A	V
$\frac{5}{6}$	$\frac{25}{36}$	$\frac{125}{216}$

8.

S.A. = 150 m²   S.A. = 294 m²

L	A	V
$\frac{5}{7}$	$\frac{150}{294}$	$\frac{125}{343}$

$= \frac{25}{49}$ Simplified

9.

S.A. = 36π ft²   S.A. = 121π ft²

L	A	V
$\frac{6}{11}$	$\frac{36\pi}{121\pi}$	$\frac{216}{1331}$

The surface areas of two similar figures are given. The volume of the larger figure is given. Find the volume of the smaller figure.

10. S.A. = 36 m²
S.A. = 225 m²
$V = 750$ m³

L	A	V
$\frac{6}{15}$	$\frac{36}{225}$	$\frac{216}{3375}$
$= \frac{2}{5}$		$\frac{8}{125}$

$\frac{8}{125} = \frac{x}{750}$ $X = 48$ m³

11. S.A. = 108 in.²
S.A. = 192 in.²
$V = 1408$ in.³

L	A	V
	$\frac{108}{192}$	$\frac{27}{64}$
$\frac{3}{4}$	$\frac{9}{16}$	

$\frac{27}{64} = \frac{x}{1408}$ $x = 594$ in³

12. S.A. = 49 m²
S.A. = 441 m²
$V = 432$ m³

L	A	V
$\frac{7}{21}$	$\frac{49}{441}$	$\frac{343}{9261}$
$= \frac{1}{3}$		$\frac{1}{27}$

$\frac{1}{27} = \frac{x}{432}$ $X = 16$ m³

13. A shipping box holds 350 golf balls. A larger shipping box has dimensions triple the size of the other box. How many golf balls does the larger box hold?

L	A	V
$\frac{1}{3}$	$\frac{1}{9}$	$\frac{1}{27}$

$\frac{1}{27} = \frac{350}{x}$ X $\left(9450 \text{ golf balls}\right)$

The volumes of two similar figures are given. The surface area of the smaller figure is given. Find the surface area of the larger figure.

14. $V = 8 \text{ m}^3$

$V = 27 \text{ m}^3$

S.A. $36 = \text{m}^2$

L	A	V
$\frac{2}{3}$	$\frac{4}{9}$	$\frac{8}{27}$

$\frac{4}{9} = \frac{36}{x}$ $\boxed{x = 81 \text{ m}^2}$

15. $V = 125 \text{ in.}^3$

$V = 216 \text{ in.}^3$

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

L	A	V
5	25	125
6	36	216

$\frac{25}{36} = \frac{200}{x}$ $\boxed{x = 288 \text{ in}^2}$

16. $V = 3 \text{ ft}^3$

$V = 375 \text{ ft}^3$

S.A. $= 4 \text{ ft}^2$

L	A	V
$\frac{1}{5}$	$\frac{1}{25}$	$\frac{3}{375} = \frac{1}{125}$

$\frac{1}{25} = \frac{4}{x}$ $\boxed{x = 100 \text{ ft}^2}$

17. A cylindrical thermos has a radius of 2 in. and is 5 in. high. It holds 10 f oz. To the nearest ounce, how many ounces will a similar thermos with a radius of 3 in. hold?
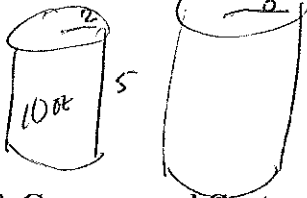
L	A	V
$\frac{2}{3}$	$\frac{4}{9}$	$\frac{8}{27}$

$\frac{8}{27} = \frac{10}{x}$ $\boxed{x = 33.75 \text{ oz}}$

$8x = 270$

18. **Compare and Contrast** You have a set of three similar nesting gift boxes. Each box is a regular hexagonal prism. The large box has 10-cm base edges. The medium box has 6-cm base edges. The small box has 3-cm base edges. How does the volume of each box compare to every other box?

Lg → Md

L	A	V
$\frac{10}{6} = \frac{5}{3}$		$\frac{125}{27}$

4.6 times med vol.

Md → Sm

L	A	V
$\frac{6}{3}$		
$\frac{2}{1}$		8

8 times sm vol.

Lg → Sm

L	A	V
$\frac{10}{3}$		$\frac{1000}{27}$

37 times sm. vol.

19. Two similar pyramids have heights 6 m and 9 m.

a. What is their scale factor? $\frac{6}{9} = \boxed{\frac{2}{3}}$

b. What is the ratio of their surface areas? $\boxed{\frac{4}{9}}$

c. What is the ratio of their volumes? $\boxed{\frac{8}{27}}$

20. The volumes of two similar prisms are 135 ft³ and 5000 ft³.

L	A	V
$\frac{3}{10}$	$\frac{9}{100}$	$\frac{135}{5000} = \frac{27}{1000}$

a. Find the ratio of their heights. $\boxed{\frac{3}{10}}$

b. Find the ratio of the area of their bases. $\boxed{\frac{9}{100}}$

21. A small, spherical hamster ball has a diameter of 8 in. and a volume of about 268 in.³. A larger ball has a diameter of 14 in. Estimate the volume of the larger hamster ball.

L	A	V
$\frac{8}{14} = \frac{4}{7}$		$\frac{64}{343}$

$\frac{64}{343} = \frac{268}{x}$ $\boxed{\approx 1436 \text{ in}^3}$

22. The lateral area of two similar cylinders is 64 m² and 144 m². The volume of the larger cylinder is 216 m³. What is the volume of the smaller cylinder?

L	A	V
$\frac{8}{12}$	$\frac{64}{144}$	$\frac{8}{27}$
$\frac{2}{3}$		

$\frac{8}{27} = \frac{x}{216}$ $\boxed{x = 64 \text{ m}^3}$

23. How many square inches are there in 3 square yards?

L	A	V
$\frac{1}{36}$	$\frac{1}{1296}$	$\frac{1}{46656}$

$\frac{1}{1296} = \frac{3}{x}$ $\boxed{3888 \text{ sq. in}}$

Lesson 11-6

Find the volume and surface area of a sphere with the given radius or diameter. Give each answer in terms of π and rounded to the nearest whole number.

30. $r = 5$ cm

$SA = 4\pi(5^2) = \boxed{100\pi} \approx 314$

$V = \dfrac{4(5^3)}{3}\pi = \boxed{\dfrac{500}{3}\pi} \approx 524$ (166.6π)

31. $r = 3$ ft   ≈ 113

$SA = 4\pi(3^2) = \boxed{36\pi}$

$V = \dfrac{4\pi(3)^3}{3} = \boxed{36\pi}$

32. $d = 8$ in. $r = 4$

$SA = 4\pi(4^2) = \boxed{64\pi} \approx 201$

$V = \dfrac{4\pi(4^3)}{3} = \boxed{256\pi} \approx 268$ $\left(85.3\dfrac{1}{3}\right)$

The surface area of each sphere is given. Find the volume of each sphere in terms of π.

36. 64π m² $= \dfrac{4\pi r^2}{4\pi}$

$16 = r^2$

$r = 4$

$\boxed{V = \dfrac{256\pi}{3}}$ m³

37. 16π in.² $= \dfrac{4\pi r^2}{4\pi}$

$4 = r^2$

$r = 2$ $\boxed{V = \dfrac{32\pi}{3}}$ in³

38. 49π ft² $= \dfrac{4\pi r^2}{4\pi}$

$r = \dfrac{7}{2}$

$V = \dfrac{4\left(\dfrac{7}{2}\right)^3\pi}{3} = \dfrac{4\left(\dfrac{343}{8}\right)\pi}{2}$

$\boxed{\dfrac{343\pi}{6}}$ ft³

A sphere has the volume given. Find its surface area to the nearest whole number.

21. $V = 1200$ ft³ $= \dfrac{4\pi r^3}{3}$

$\dfrac{3600}{4\pi} = \dfrac{4\pi r^3}{4\pi}$ $SA = 4\pi$

$r = 6.6$ $\boxed{546 X}$

22. $V = 750$ m³ $= \dfrac{4\pi r^3}{3}$

$r = 5.64$ $\boxed{SA = 399 \text{ m}^2}$

23. $V = 4500$ cm³ $= \dfrac{4\pi r^3}{3}$

$r = 10.24$ $SA = \boxed{1318 \text{ cm}^2}$

39. A spherical beach ball has a diameter of 1.75 ft when it is full of air. What is the surface area of the beach ball, and how many cubic feet of air does it contain? Round to the nearest hundredth.
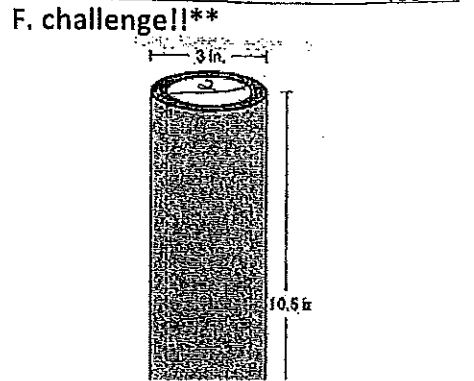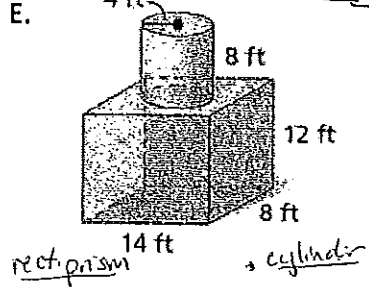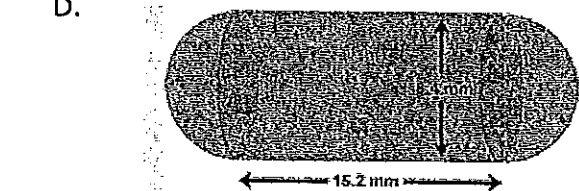
$r = .875$

$SA = 4\pi(.875)^2$ $\boxed{9.62 \text{ ft}^2}$

$V = \dfrac{4\pi(.875^3)}{3}$ $\boxed{2.81 \text{ ft}^3}$

Find the surface area and volume of the following composite figures;

A. cylinder $\approx 10\pi$ $B = 25\pi$ $A = 2$ $\approx 50\pi$ $(10\pi)(2) + \frac{1}{2}(25\pi)$ $20 + 12.5\pi$ $\boxed{45\pi}$

cone $C = 10\pi$ $B = 25\pi$ $\ell = 13$ $H = 12$ 13 cm   5 cm   2 cm

$V = \dfrac{(25\pi)(12)}{3} = \boxed{100\pi}$ $SA = \frac{1}{2}(10\pi)(13)$ $\boxed{65\pi}$

$\boxed{V = 150\pi \text{ cm}^3}$ $\boxed{SA = 110\pi \text{ cm}^2}$

B. Prism $B = 16$ $H = 5$ $P = 16$

$V = 16.5$ $\boxed{80}$

$SA = PH + B$ $16·5 + 16$ $\boxed{96}$

6 in.   5 in.   4 in.   4 in.

$\boxed{V = 112 \text{ in}^3}$

Pyramid $B = 16$ $H = 6$ $P = 16$ $\ell = 6.32$ $(2\sqrt{10})$

$V = \dfrac{16·6}{3} = \boxed{32}$

$SA = \frac{1}{2}P\ell$ $\frac{1}{2}(16)(6.32)$ $16\sqrt{10} \text{ or } 50.56$ $SA = 96 + 16\sqrt{10}$ or $\boxed{146.6 \text{ in}^2}$

C. cylinder $C = 20\pi$ $B = 100\pi$ $H = 16$ 16

$V = \boxed{1600\pi}$

$SA = CH + B$ $20\pi(16) + 100\pi$ $320\pi + 100\pi$ $\boxed{420\pi}$

sphere $r = 10$

$V = \dfrac{4\pi(10^3)}{3} \div 2$ half sph $+ \boxed{\dfrac{2000\pi}{3}}$

$SA = 4\pi r^2 \div 2$ (half) $\dfrac{2\pi(100)}{2}$ $\boxed{200\pi}$

$\boxed{V = \dfrac{6800\pi}{3} \approx 7120.9}$ $\boxed{SA = 620\pi}$

D.   15.2 mm

E.   8 ft   12 ft   8 ft   14 ft   4 ft   rect. prism   + cylinder

F. challenge!!   3 in.   10.5 ft

11. The circumference of a standard baseball is about 9 in. About how many square in. of horsehide are required to cover 100 baseballs, to the nearest whole number?

$C = 2\pi r$　　　　$SA = 4\pi(1.43)^2$

$9 = 2\pi r$　　　　$SA = 25.78$　　　$\boxed{2578 \text{ in}^2}$

$r = \dfrac{9}{2\pi}$

$r = 1.43$

12. The radius of Earth is approximately 4000 mi, and the radius of its core, which is a sphere of molten metals, is about 800 mi. What is the volume of Earth that lies outside the core to the nearest billion mi^3?

$V = \dfrac{4\pi(4000)^3}{3}$　　　$\dfrac{4\pi(800)^3}{3} =$　　$\dfrac{4\pi(4000^3 - 800^3)}{3} = 2.66 \times 10^{11}$

$\boxed{2\,660\,000\,000\,000 \text{ mi}}$

13. Concrete can be purchased by the cubic yard. How much will it cost to pour a rectangular slab 18 feet by 18 feet by 4 inches for a patio if the concrete costs $41.00 per cubic yard?

6yds 6yds ⅑ yd
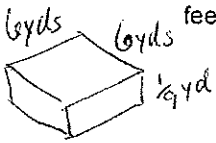
$V = 6 \cdot 6 \cdot \dfrac{1}{9}$

$\boxed{V = 4 \text{ yd}^3}$

$\boxed{\$164.00}$
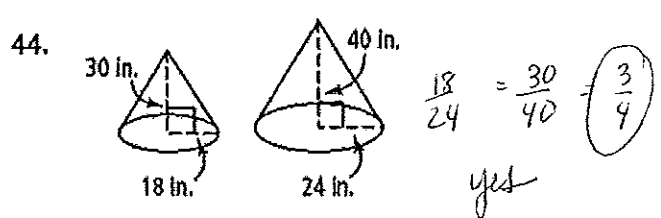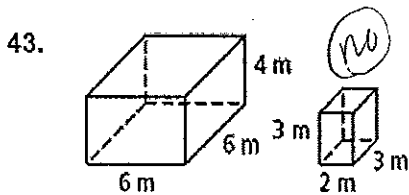
$\dfrac{1}{36}$　$\dfrac{1}{1296}$　$\dfrac{1}{46656}$

$V = (216)(216)(4) = 186624$ cubic in

Lesson 11-7

Copy and complete the table for three similar solids.

	Similarity Ratio	Ratio of Surface Areas	Ratio of Volumes
40.	2 : 3	4 : 9	8 : 27
41.	5 : 8	25 : 64	125 : 512
42.	3 : 4	9 : 16	27 : 64

Are the two figures similar? If so, give the scale factor.

43. 4 m 6 m 3 m 6 m 2 m 3 m (NO)

44. 30 in. 40 in. 18 in. 24 in.　$\dfrac{18}{24} = \dfrac{30}{40}$　$\left(\dfrac{3}{4}\right)$　yes

The surface areas of two similar figures are given. The volume of the larger figure is given. Find the volume of the smaller figure.

45. S.A. = 160 ft²
    S.A. = 250 ft²
    V = 600 ft³　$V = 384 \text{ ft}^3$

L	A	V
4/5	160/250	16/25

$\dfrac{16}{25} = \dfrac{x}{600}$

46. S.A. = 121 cm²
    S.A. = 196 cm²
    V = 343 cm³　$V = 166.375 \text{ cm}^3$

L	A	V
11/14	121/196	1331/2744

$\dfrac{1331}{2744} = \dfrac{x}{343}$

47. S.A. = 4 yd²
    S.A. = 4.5 yd²
    V = 8 yd³　6.7 yd^3

L	A	V
2/2.12	4/4.5	8/9.55

$\dfrac{8}{9.55} = \dfrac{x}{8}$