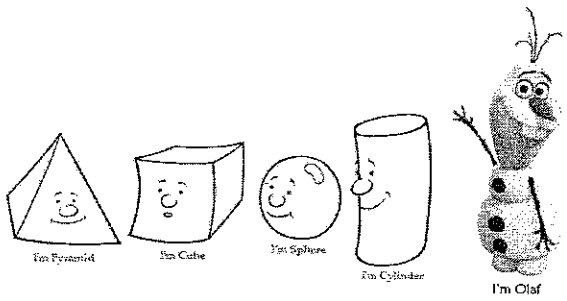
Name: key Per: _____ Date: _____

Serafino • Geometry

12.1 Surface Area & Volume

Classwork / Homework

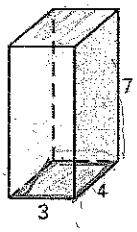


Surface Area = the sum of the area of all the sides (faces)

Volume = how much space (inside) the shape takes up.

1. Name Rectangular Prism

V: 84 u^3 SA: 122 u^2



V: $A_{Base} \cdot Hght$

$(3 \cdot 4) \cdot 7 = 84$

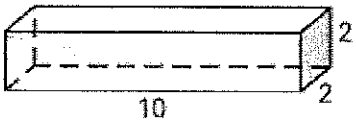
SA: top/bot back/front sides

$2(3 \cdot 4) + 2(7 \cdot 3) + 2(7 \cdot 4)$

$2(12) + 2(21) + 2(28)$

2. Name rectangular prism

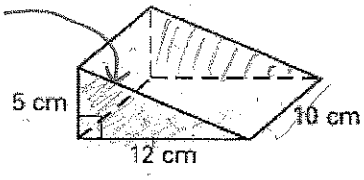
V: 40 u^3 SA: 88 u^2



3. Name right triangular prism

V: 300 cm^3 SA: 360 cm^2

pythag 13



$A_B \cdot depth$

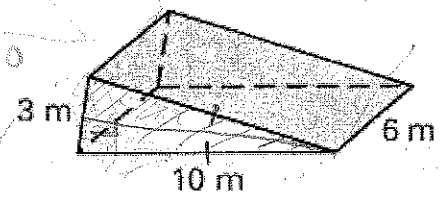
$30 \cdot 10$

SA: bases + side + bottom + back

$2(30) + (10 \cdot 13) + (10 \cdot 12) + (5 \cdot 10)$

4. Name Isosceles triangular prism

V: 88.974 m³ SA: 167.659 m²



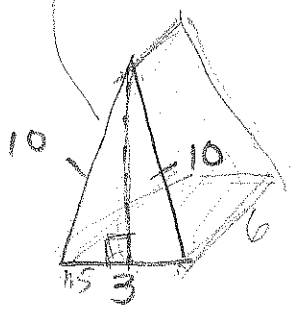
3 | 10

$V = A_b \cdot dept$

$14.829 \cdot 6$

SA: 2 Δs + bot + side + top

$2(14.8296) + 2(10.6) + (3.6)$



$A_\Delta = \frac{1}{2}bh$

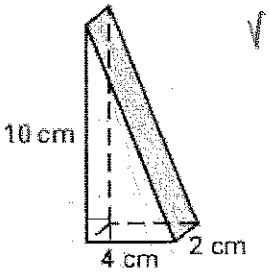
$\frac{1}{2}3(9.886) = 14.829$

$(1.5)^2 + x^2 = 10^2$

$h = 9.886$

5. Name right triangular prism

V: 40 cm³ SA: $68 + 4\sqrt{29}$ 89.54 cm²



V: $A_b \cdot d$

$20 \cdot 2$

SA: 2Δ + bot + back + slant

$2(20) + (2.4) + (10.2) + (2 \cdot 2\sqrt{29})$

$40 + 8 + 20 + 4\sqrt{29}$

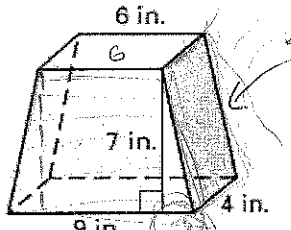
$\sqrt{116}$

$2\sqrt{29}$

$2\sqrt{29}$

6. Name trapezoidal prism

V: 210 in³ SA: 222.2 in²

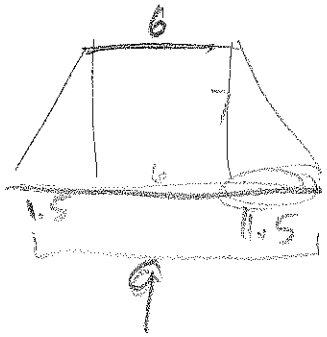


7.159

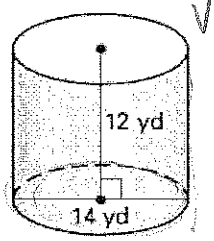
SA: 2 trap + 2 sides + bot + top

$2(7.5 \cdot 7) + 2(4 \cdot 7.15) + (6.4) + (9.4)$

525



7. Name Cylinder V: 1,847.26 yd^3 SA: $260\pi \approx 835.664$

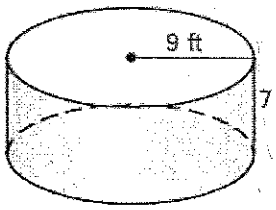


V: $A_{base} \cdot h$
$\pi r^2 \cdot h$
$49\pi \cdot 12$
588π

SA: $2(49\pi) + 12 \cdot (14\pi)$
$98\pi + 168\pi$
$= 266\pi$ or ≈ 835.664

8. Name _____ V: $567\pi\ ft^3$ SA: 288π

$\approx 1781.28 f^3$ $904.778\ ft^2$

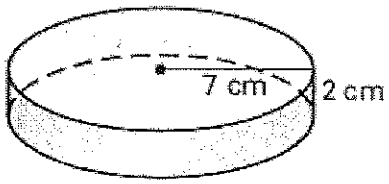


V: $81\pi \cdot 7$

2 0's + □
$2(81\pi) + 18\pi(7) = 162\pi + 126\pi$

9. Name _____ V: 98π SA: 126π

307.88 395.84

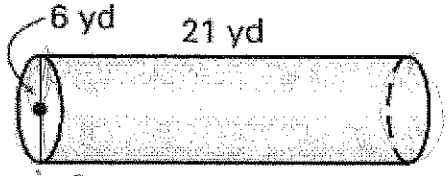


V: $49\pi \cdot 2$

SA: 2 0's + □
$2(49\pi) + 14\pi \cdot 2 = 98\pi + 28\pi$

10. Name _____ V: 189π SA: 144π

593.76 432.389

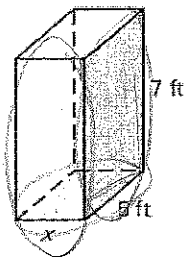


radius 6

V: $A_b \cdot h$
$3^2 \cdot \pi \cdot 21$
$9\pi \cdot 21$

SA: 2 0's + □
$2(9\pi) + 6\pi \cdot 21$
$18\pi + 126\pi$

Find the missing variable in the figure:

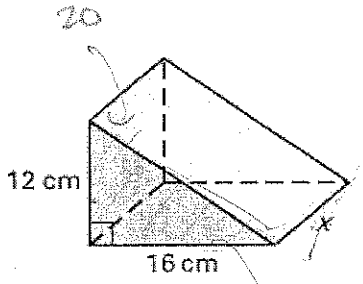
11. 

$V = Ab \cdot h$
$105 = 5x \cdot 7$
$\frac{105}{35} = \frac{35x}{35}$
$3 = x$

If Volume = 105, x = 3

If Surface Area = 118, x = 2

SA = 2 bases + 2 sides + 2 front/back
$118 = 2(5x) + 2(35) + 2(7x)$
$118 = 10x + 70 + 14x$
$48 = 24x$
$2 = x$

12. 

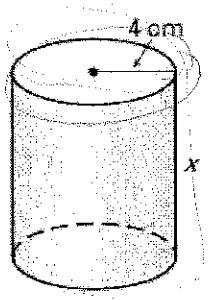
$V = (B) \cdot d$
$960 = 96x$
$\frac{1}{2}bh$

If Volume = 960, x = 10 cm

SA: 2 Δs + top + bot + side
$344 = 192 + 20x + 16x + 12x$
$152 = 48x$
$x \approx 3.166$ or $19/6$

If Surface Area = 344, x = _____

SA: 2 Δs + ▭
$80\pi = 2(16\pi) + 8\pi \cdot x$
$\frac{48\pi}{8\pi} = \frac{8\pi \cdot x}{8\pi}$
$80\pi = 32\pi + 8\pi \cdot x$

13. 

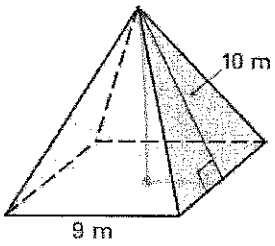
$V = Ab \cdot h$
$\frac{144\pi}{16\pi} = \frac{16\pi \cdot x}{16\pi}$
$x = 9$

If volume = 144 π, x = 9

Surface Area: 80 π, x = 6

SA: 2 Δs + ▭
$80\pi = 2(16\pi) + 8\pi \cdot x$
$80\pi = 32\pi + 8\pi \cdot x$
$-32\pi \quad -32\pi$
$48\pi = 8\pi \cdot x$

14. Name square pyramid V: 241.11 m^3 SA: 261 m^2



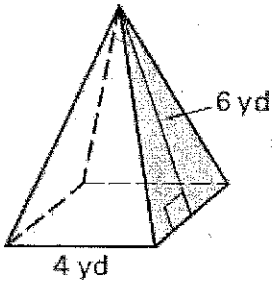
$V: \frac{1}{3} 81(8.93)$

$SA: B + 4\Delta's$

$81 + 4(\frac{1}{2} 9 \cdot 10)$

h, 8.93, 10, 4.5

15. Name square pyramid V: $\frac{64\sqrt{2}}{3}$ yd^3 ≈ 30.17 SA: 64 yd^2



$V: \frac{1}{3} B h$

$\frac{1}{3} 16 \cdot 4\sqrt{2}$

$SA: B + 4\Delta's$

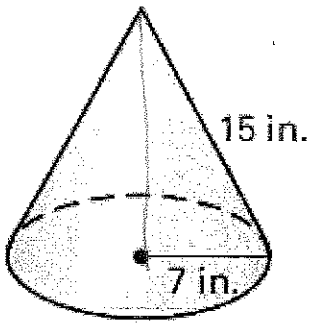
$16 + 4(\frac{1}{2} 4 \cdot 6)$

$4\sqrt{2}$, 6, 2

$36 - 4 = \sqrt{32}$

$\sqrt{16 \cdot 2}$

16. Name cone V: $\frac{196\pi\sqrt{11}}{3}$ in^3 ≈ 686.74 SA: 154π ≈ 483.805



$V: \frac{1}{3} B h$

$V: \frac{1}{3} 49\pi \cdot 4\sqrt{11}$

$\bigcirc + \triangle$

$49\pi + \frac{1}{2} 14\pi \cdot 15$

$49 + 105\pi$

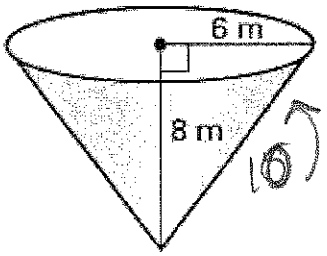
$225 - 49 = 176$

$\sqrt{176}$

$4 \cdot 16 \cdot 11$

$4\sqrt{11}$, 15, 7

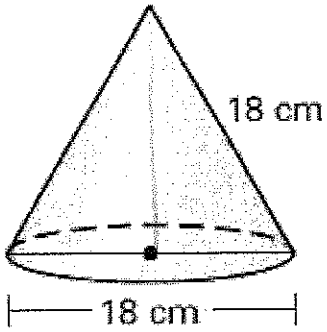
17. Name cone V: 96π SA: 96π

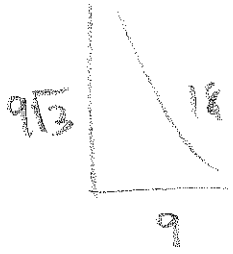


$V: \frac{1}{3} 36\pi \cdot 8$

$SA: 36\pi + \frac{1}{2} 12\pi \cdot 10$

18. Name cone V: $243\pi\sqrt{3}$ SA: 243π



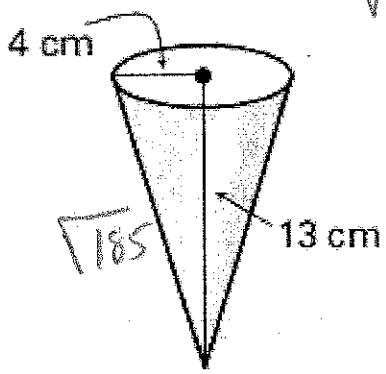


$V: \frac{1}{3} 81\pi\, 9\sqrt{3}$

$81\pi + \frac{1}{2} 18\pi\, 18$

$81\pi + 162\pi$

19. Name cone V: $\frac{208\pi}{3}$ SA: $16\pi + 4\pi\sqrt{185}$

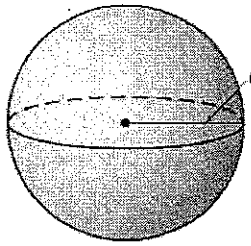


$V: \frac{1}{3} 16\pi \cdot 13$

$SA: 0 + \frac{1}{2} 8\pi\sqrt{185}$

16π

20. Name Sphere V: 288π cm³ SA: 144π cm²

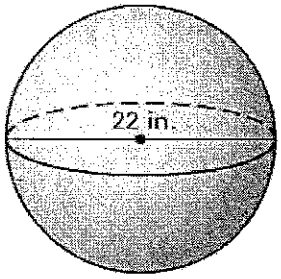


$V = \frac{4}{3}\pi r^3$

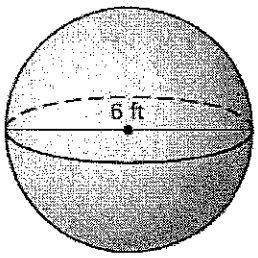
$= \frac{4}{3}\pi 216$

$S = 4\pi r^2$

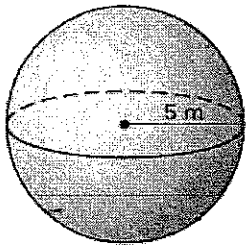
21. Name Sphere V: 5324π in³ SA: 484π in²



22. Name Sphere V: 36π ft³ SA: 36π ft²



23. Name Sphere V: $\frac{500\pi}{3}$ m³ SA: 100π m²



24. Find the radius of a sphere with the given surface area, S:

a. $S = 324\pi$ cm²

$\frac{4\pi r^2}{4} = \frac{324\pi}{4}$

$r^2 = 81$

$r = 9$

b. $S = 4\pi$ ft²

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

$1 = r^2$

$r = 1$

c. $S = 163$ m²

$\frac{163}{4} = \frac{4\pi r^2}{4}$

$\frac{40.75}{\pi} = \frac{\pi r^2}{\pi}$

$12.97 = r^2$

≈ 3.60

25. Find the radius of a sphere with the given volume, V

b. $V = 2304\pi$ cm²

$\frac{3}{4} \cdot \frac{4}{3}\pi r^3 = 2304\pi \cdot \frac{3}{4}$

$r^3 = 1728$

$r = 12$

b. $V = 36\pi$ ft²

$36\pi = \frac{4}{3}\pi r^3$

$27 = r^3$

$r = 3$

c. $V = 33.51$ m²

$\frac{3}{4} \cdot 33.51 = \frac{4}{3}\pi r^3 \cdot \frac{3}{4}$

$\frac{25.1325}{\pi} = \frac{\pi r^3}{\pi}$

$7.999 = r^3$

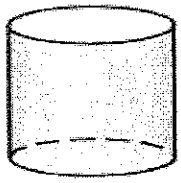
$r = 1.99$

Solids Reference Sheet – Volume and Surface Area

Prisms:

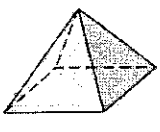
Volume: Area of front face • depth
Surface Area: Area of each face added up

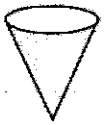
Cylinders:



Volume: Area of Circle • height
Surface Area: 2 (Area Circle) + Rectangle
(Circumference • height)

Pyramids & Cones:



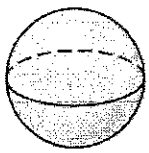


$SA = A_{Base} + \frac{1}{2}Cl$

Volume: $\frac{1}{3}$ • (Area of Base) • height

SA: B + Δ's

Spheres:



Volume: $\frac{4}{3}\pi r^3$

Surface Area: $4\pi r^2$