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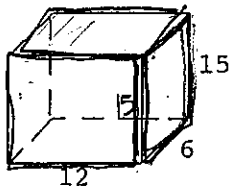
Unit 8 Review: Volume & SA

1. A right rectangular prism has dimensions 6, 12, and 15. Find
   a. its volume. $l \cdot w \cdot h$ ↳ $12 \cdot 6 \cdot 15 = 1{,}080$
   b. its surface area.



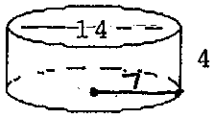
F: $12 \cdot 15 = 180$ L: 90
B: 180 T: $12 \cdot 6 = 72$
R: $6 \cdot 15 = 90$ B: 72

$180+180+90+90+72+72$

1) a) 1080 units^3
b) 684 units^2

2. Find the exact volume of a right cylinder with diameter of 14 and height of 4.

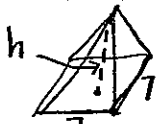
$r = 7$



○ Base: $\pi \cdot r^2$
$\pi \cdot 7^2 = 153.9$
↳ $\times 4 =$

2) 615.6 units^3

3. A pyramid has a square base. Its volume is 196 cubic inches. If the length of a base edge is 7 inches, what is its height?



$\div 3$

□ Base: $7 \cdot 7 = 49$

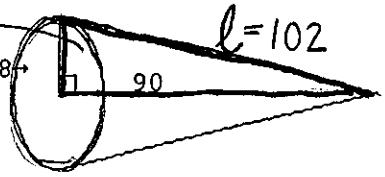
$\frac{49 \cdot h}{3} = 196 \cdot 3$

$49 \cdot h = 588$

$h = 12$

3) 12 in.

4. Find the lateral area of the cone below.



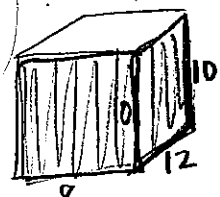
$l^2 + b^2 = c^2$
$48^2 + 90^2 = c^2$
$\sqrt{10{,}404} = \sqrt{c^2}$
$102 = c$

$LA = \frac{1}{2} \cdot l \cdot P$ → $C = 2 \cdot \pi \cdot r$
$2 \cdot \pi \cdot 48$
301.6

$= \frac{1}{2} \cdot 102 \cdot 301.6$
$= 15{,}381.6$

4) $15{,}381.6 \text{ units}^2$

5. An open rectangular box has a base 8 in. by 12 in. and a height of 10 in. How much paper is needed to cover the outer surface of all five sides?

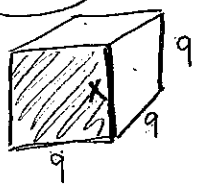


Front: $8 \cdot 10 = 80$
Back: 80
Left: $12 \cdot 10 = 120$
Right: 120
Bottom: $8 \cdot 12 = 96$

$80+80+120+120+96$

5) 496 in^2

6. A cube has surface area 486 cm^2. Find its volume.



F: $x \cdot x = x^2$

$\frac{6 \cdot x^2}{6} = \frac{486}{6}$

$\sqrt{x^2} = \sqrt{81}$

$x = 9$

$V = l \cdot w \cdot h$
$= 9 \cdot 9 \cdot 9$
$= 729$

6) 729 cm^3

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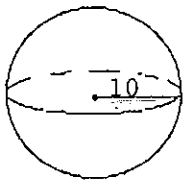
7. Consider the sphere at the right.
   a. Find its surface area.
   b. Find its volume.

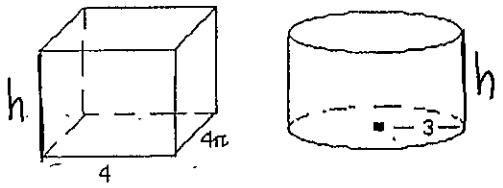


a) $SA = 4 \cdot \pi \cdot r^2$ $= 4 \cdot \pi \cdot 10^2$

b) $V = \frac{4}{3} \cdot \pi \cdot r^3$ $= \frac{4}{3} \cdot \pi \cdot 10^3$

7) a) 1256.6 units^2
b) 4188.8 units^3

8. Refer to the drawing of the right prism and the right cylinder shown below. If the two figures have the same height, will they have the same volume? Why or why not?

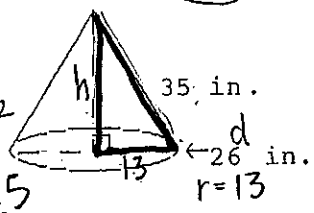


8) No

Box: $l \cdot w \cdot h$
$4 \cdot 4\pi \cdot h$
$50.3h$

Cyl: Base: $\pi \cdot r^2$
$\pi \cdot 3^2 = 28.3$
$28.3 \cdot h$

9. Find the volume of the cone below. ← ÷ 3 @ end



$a^2 + b^2 = c^2$
$13^2 + h^2 = 35^2$
$169 + h^2 = 1225$
$-169 \quad -169$
$\sqrt{h^2} = \sqrt{1056}$ ∫ $h = 32.5$

Base: $\pi \cdot r^2$
$\pi \cdot 13^2$
530.9
× 32.5
17,254.25 → ÷ 3

9) 5,751.4 in^3

10. State a formula for determining the lateral area of a right cone if its radius is r and its slant height is 2r.

$C = 2 \cdot \pi \cdot r$

$LA = \frac{1}{2} \cdot l \cdot P$
$= \frac{1}{2} \cdot 2r \cdot 2\pi r$
$= 6.28r^2$

10) $6.28r^2$

11. Give the cube root of 120 to the nearest hundredth.
2 decimals

11) 4.93

12. The surface area of a sphere is 200 cm^2. Give the radius of the sphere to the nearest tenth.

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

$\frac{200}{4} = \frac{4 \cdot \pi \cdot r^2}{4}$

$\frac{50}{\pi} = \frac{\pi \cdot r^2}{\pi}$

$\sqrt{15.9} = \sqrt{r^2}$

$3.99 = r$

12) 4.0 cm

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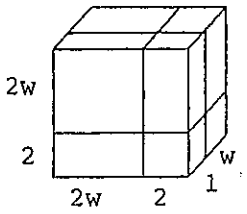
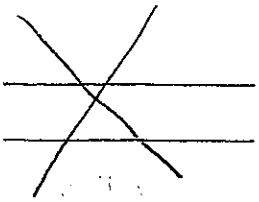
13. a. Express the volume of the box pictured at the right as a product of expressions.

b. Expand the expression.



13)
a) _____
b) _____



14. How much heat-resistant material is needed to cover the nose of a rocket that is a right cone (except for the base) with a radius of 6 feet and a slant height of 8 feet?

$LA = \frac{1}{2} \cdot l \cdot P$ → $C = 2 \cdot \pi \cdot r$, $2 \cdot \pi \cdot 6$, 37.7

$= \frac{1}{2} \cdot 8 \cdot 37.7$

14) 150.8 ft^2

15. How much water, to the nearest cubic centimeter, can a cone-shaped cup with a diameter of 6 cm and a height of 12 cm hold?

Volume

Base: πr^2

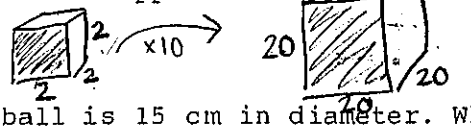
$\pi \cdot 3^2 = 28.27$ → $\cdot 12 = \frac{339.24}{3} = 113.08$

15) 113.08 cm^3

16. Suppose all the dimensions of a cube are multiplied by 10.

a. What happens to its surface area? $20 \cdot 20 = 400$

b. What happens to its volume?



$SA =$ → ×6 → 2400

$V = 20 \cdot 20 \cdot 20 = 8000$

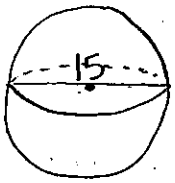
16) a) 100 times larger

b) 1000 times larger

$2 \cdot 2 = 4$ ×6 → $SA =$ → 24

$V = 2 \cdot 2 \cdot 2 = 8$

17. A ball is 15 cm in diameter. What is the surface area of the ball?



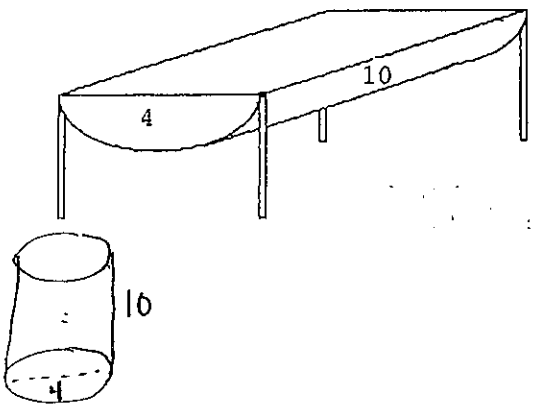
$SA = 4 \cdot \pi \cdot r^2$

$4 \cdot \pi \cdot 7.5^2$

706.9

17) 706.9 cm^2

18. A feeding trough for cattle is shown below. About how much feed will it hold? (volume) Round to the nearest whole number.



Half cylinder

Base: $\pi \cdot r^2$

$\pi \cdot 2^2$

12.57

×10

125.7 ÷ 2

18) 62.85 units^3

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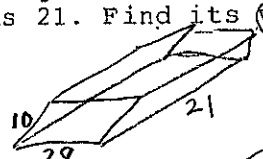
÷3 at end

19. State a formula for determining the volume of a regular square pyramid if the sides of the base have length n and its height is 3n.

□ Base: $n \cdot n = n^2$ → $n^2 \cdot 3n$ → $n^3 \cdot 3$ → $\frac{n^3 \cdot 3}{3}$

19) n^3 units^3

20. An oblique rectangular prism has a base with length 28 and width 10. The height of the prism is 21. Find its volume.



$l \cdot w \cdot h$

$28 \cdot 10 \cdot 21 =$

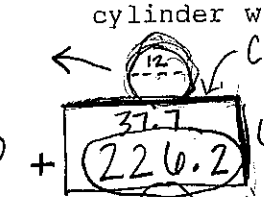
20) 5,880 units^3

21. Find the ~~exact~~ surface area of an oblique cylinder with diameter 12 and height 6.

$A = \pi r^2$

$\pi \cdot 6^2$

113.1

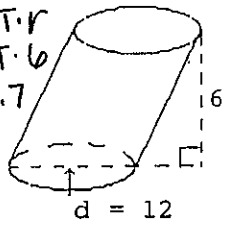


+ 113.1

$C = 2 \cdot \pi \cdot r$

$2 \cdot \pi \cdot 6$

37.7



113.1 + 226.2 + 113.1

21) 452.4 units^2

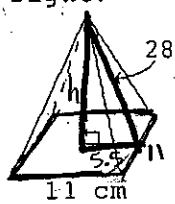
22. Consider the square pyramid at the right.

a. Find the area of its base. 11 · 11

b. Find the total surface area.

c. Find its volume.

Round to the nearest tenth.



22) a) 121 units^2

b) 737 units^2

c) 1109.2 units^3

b) LA = $\frac{1}{2} \cdot l \cdot P$ → $11 \cdot 4 = 44$

$\frac{1}{2} \cdot 28 \cdot 44$

616 + 121 = 737

c) □ Base: 121

$a^2 + b^2 = c^2$

$5.5^2 + b^2 = 28^2$

$30.25 + b^2 = 784$

$-30.25 \quad -30.25$

$\sqrt{b^2} = \sqrt{753.75}$

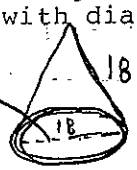
$b = 27.5$

$\times 27.5$

3327.5

$\div 3$

23. A right cone has slant height of 18 and a base with diameter 18. Find its surface area.



$\pi \cdot r^2$

$\pi \cdot 9^2$

254.5

LA = $\frac{1}{2} \cdot l \cdot P$ → $C = 2 \cdot \pi \cdot r$

$= \frac{1}{2} \cdot 18 \cdot 56.5$

$2 \cdot \pi \cdot 9$

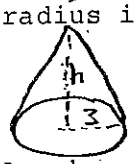
56.5

508.5

+ 254.5

23) 763 units^2

24. The volume of a cone is 63π cm^3. If its radius is 3 cm, what is its height?



○ Base: $\pi \cdot r^2$

$\pi \cdot 3^2$

28.3

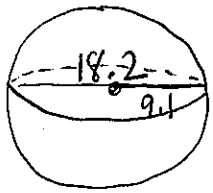
$\frac{28.3 \cdot h}{3} = 63\pi \cdot 3$ → $h = 20.98$

$28.3 \cdot h = 593.8$

$\frac{28.3}{28.3}$

24) h = 20.98 cm

25. A sphere has a diameter of 18.2 yd. What is its volume to the nearest tenth of a square yard?



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

$\frac{4}{3} \cdot \pi \cdot 9.1^3$

25) 3156.6 yd^3