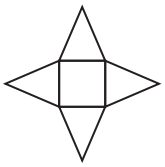
LESSON 169

Note that all areas are in square units and all volumes are in cubic units.

1.



2. Use the Euler's formula.

$F + V = E + 2$

$20 + V = 30 + 2$

$V = 12$

It has 12 vertices.

3. $LA = Ph = (18 + 6 + 18 + 6)(7) = 336$

$SA = 2B + LA = 2(18)(6) + 336 = 552$

$V = Bh = 18(6)(7) = 756$

4. $SA = 2\pi r^2 + 2\pi rh = 2\pi(3)^2 + 2\pi(3)(7) = 60\pi$

$V = \pi r^2 h = \pi(3)^2(7) = 63\pi$

5. The dashed triangle has hypotenuse 10 and base 6. Use the 6-8-10 Pythagorean triple to find $h = 8$.

$LA = \frac{1}{2}Pl = \frac{1}{2}4(12)(10) = 240$

$SA = B + LA = 12(12) + 240 = 384$

$V = \frac{1}{3}Bh = \frac{1}{3}(12)(12)(8) = 384$

6. Use the 3-4-5 Pythagorean triple to find $l = 5$.

$SA = \pi r^2 + \pi rl = \pi(3)^2 + \pi(3)(5) = 24\pi$

$V = \frac{1}{3}\pi r^2 h = \frac{1}{3}\pi(3)^2(4) = 12\pi$

7. $SA = 4\pi r^2 = 4\pi(2)^2 = 16\pi$

$V = \frac{4}{3}\pi r^3 = \frac{4}{3}\pi(2)^3 = (32/3)\pi$

8. SA = cone LA + cylinder LA + cylinder B

$= \pi rl + 2\pi rh + \pi r^2$

$= \pi(12)(15) + 2\pi(12)(7) + \pi(12)^2 = 492\pi$

V = cone V + cylinder V

$= \frac{1}{3}\pi r^2 h + \pi r^2 h = \frac{1}{3}\pi(12)^2(9) + \pi(12)^2(7) = 1440\pi$

9. $V = \pi r^2 h = \pi(7)^2(12) = 588\pi$

10. The cons are not similar because corresponding linear dimensions are not proportional (25/15 ≠ 9/6).

11. volume ratio = 40/135 = 8/27

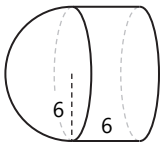
side ratio = 2/3, area ratio = 4/9

$\frac{4}{9} = \frac{12}{x}$ → $4x = 9(12)$ → $x = 27$ ft^2

12. rectangle

13. C

14.



The solid is a cylinder with a hemisphere on top. The hemisphere has radius 6. The cylinder has radius 6 and height 6.

15. SA = hemisphere LA + cylinder LA + cylinder B

$= \frac{1}{2} \cdot 4\pi r^2 + 2\pi rh + \pi r^2$

$= \frac{1}{2} \cdot 4\pi(6)^2 + 2\pi(6)(6) + \pi(6)^2 = 180\pi$

V = hemisphere V + cylinder V

$= \frac{1}{2} \cdot \frac{4}{3}\pi r^3 + \pi r^2 h$

$= \frac{1}{2} \cdot \frac{4}{3}\pi(6)^3 + \pi(6)^2(6) = 360\pi$

16. The amount of air in the balloon is the volume of a sphere with radius 15 inches.

balloon $V = \frac{4}{3}\pi r^3 = \frac{4}{3}\pi(15)^3 = 4500\pi$

$\approx 4500(22/7) \approx 14143$ in^3

time = volume / rate ≈ 14143/30 ≈ 471

So, it will take about 471 minutes.

17. aquarium $V = Bh = 12(6)(6) = 432$ ft^3

density = mass/volume

$62 = x/432$; $x = 26784$

So, the aquarium can hold 26,784 pounds of water.

18. cube $V = Bh = 2(2)(2) = 8$ cm^3

cube density = mass/volume = 6/8 = 0.75 g/cm^3

The cube is less dense than water, so it will float.

19. population density = people/land area

$320 = x/92$; $x = 29440$

So, there are 29,440 people in the town.

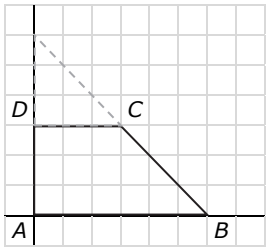
20. sphere SA = sphere V

$4\pi r^2 = \frac{4}{3}\pi r^3$

$3(4)\pi r^2 = 4\pi r^3$

$r = 3$

21. All cross sections are rectangles. The largest possible cross section is a rectangle with width = diameter = 10 and height = 6. So, its area is 10(6) = 60 cm^2.

22. 

The solid is a truncated cone, a cone whose top is cut off. The entire cone has radius 6 and height 6. The cut-off cone has radius 3 and height 3.

V = entire cone V – cut-off cone V

$= \frac{1}{3}\pi(6)^2(6) - \frac{1}{3}\pi(3)^2(3) = 63\pi$

23. rate = 12 – 3 = 9 ft^2/min
volume = 10(10)(10) = 1000 ft^2
time = volume / rate = 1000/9 ≈ 111
So, it will take about 111 minutes.