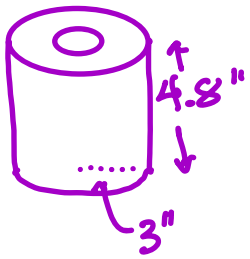
Area and Volume Problems

1. Area of Full circle:

$A = \pi r^2$

$= 3.14(3)^2$

$= 28.3$



Area of top of core:

$A = \pi r^2$

$= 3.14(0.8)^2$

$= 2.0$

Area of Top of Roll w/out the core:

$\text{Area}_{\text{full circle}} - \text{Area}_{\text{core}} = 28.3 - 2.0$

$= 26.3 \text{ in}^2$

Volume of T.P. on Roll

$V = Bh$

$= 26.3 \cdot 4.8$

$= 126.2 \text{ in}^3$

Volume of 1 sheet of T.P.

$126.2 / 1000 = 0.1262 \text{ in}^3$

$V = L \cdot w \cdot h$

$\frac{0.1262}{10.56} = \frac{4.8 \cdot 2.2 \cdot h}{10.56}$

$0.012 = h$

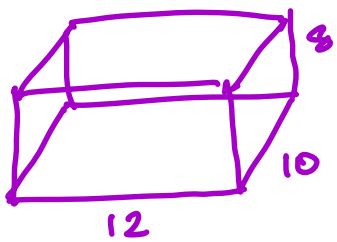
One sheet is 0.012 in. thick

2. $V = Bh$

$= 3^2 \cdot 12$

$= 108\ ft^3$

3. a. CARPET



$A = 12 \cdot 10$

$= 120\ ft^2$ of carpet

b. PAINT

$SA_{walls} = 2(12 \cdot 8) + 2(10 \cdot 8)$

$= 192 + 160$

$= 352\ ft^2$

$$\#\text{ of buckets needed} = \frac{\text{Total area}}{8\ ft^2/\text{bucket}}$$

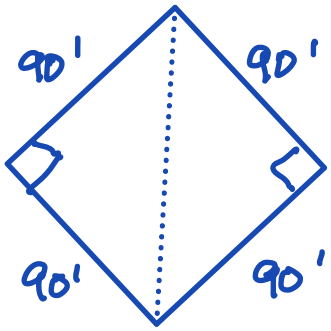
$$= \frac{352\ ft^2}{8\ ft^2/\text{bucket}}$$

$= 44$ buckets of paint

4. a. $P = 90 + 90 + 90 + 90$

$= 360$ feet

Perimeter of base paths is 360 feet



b. $A = L \cdot w$

$= 90 \cdot 90$

$= 8100 \text{ ft}^2$

Area of the infield is 8100 ft^2

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

$90^2 + 90^2 = c^2$

$16{,}200 = c^2$

$127.3 = c$

Distance between 2nd base and homeplate is 127.3 feet

d. $A = \frac{1}{2}bh$

$= \frac{1}{2}(90)(90)$

$= 4050 \text{ ft}^2$

Area of one triangle $= 4050 \text{ ft}^2$

5. $V = Bh$

$= \pi r^2 \cdot h$

$= 3.14(9)^2 \cdot 3$

$= 763.02 \text{ ft}^3$

$\#\text{ of gallons} = \frac{V}{0.134 \text{ ft}^3/\text{gal}}$

$= \frac{763.02 \text{ ft}^3}{0.134 \text{ ft}^3/\text{gal}}$

$= 5{,}694.2 \text{ gal.}$

Mark will need 5,694.2 gallons of water.

6. Rectangular Yard

$A = L \cdot W$
$= 18 \cdot 8$
$= 144\ ft^2$

Square Yard

$A = s^2$
$\sqrt{144} = \sqrt{s^2}$
$12 = s$

Each side of the square yard is 12 feet.

7. $P = 2L + 2W$
$340 = 2(50) + 2W$
$340 = 100 + 2W$
$-100 \quad -100$
$\frac{240}{2} = \frac{2W}{2}$
$120 = W$

$A = L \cdot W$
$= (50)(120)$
$= 6000$

Area of the field is $6000\ yds^2$

8. a. Total Area to be floored = Area of Room − Area for Stairwell
$= 20 \cdot 24 - 4 \cdot 12$
$= 480 - 48$
$= 432\ ft^2$

$432\ ft^2$ needs to be floored

b. # of boxes needed = $\frac{\text{Area to be floored}}{22.5\ ft^2/box}$
$= \frac{432}{22.5}$
$= 19.2$

19.2 boxes will be needed
20 boxes if you have to buy full boxes

c. Cost = # of boxes · $70.95/box
$= 19.2 \cdot 70.95$
$= \$1,362.24$

Total cost is $1,362.24

If you can only buy full boxes it would cost $1419

9. Area of Patio

$A = L \cdot w$

$= (12)(18)$

$= 216\ ft^2$

Area of Fountain

$A = \pi r^2$

$= 3.14(4)^2$

$= 50.24\ ft^2$

Area to be paved:

$216 - 50.24 = 165.76\ ft^2$

Area of each brick:

$A = L \cdot w$

$= \left(\frac{1}{3}\right)\left(\frac{2}{3}\right)$

$= \frac{2}{9} = 0.22\ ft^2$

It's easier to convert to feet

$4" = \frac{1}{3}'$

$8" = \frac{2}{3}'$

# of bricks needed:

$$\frac{\text{Area to be paved}}{0.22\ ft^2/\text{brick}} = \frac{165.76}{0.22} = 753.5$$

He will need 754 bricks

10. a. $V = L \cdot w \cdot h$

$= (37.75)(11.5)(17.125)$

$= 7434.4\ in^3$

Volume of the tank = $7434.4\ in^3$

b. $\#\text{ of total gallons} = \frac{\text{Volume}}{231\ in^3/\text{gallon}}$

$= \frac{7434.4}{231}$

$= 32.2$ gallons

The tank can hold 32.2 gallons of water

c. $10\ \text{gallons} \cdot 231\ in^3/\text{gallon} = 2310\ in^3$ ← Volume of 10 gallons

$V = L \cdot w \cdot h$

$2310 = (37.75)(11.5)h$

$\frac{2310}{434.125} = \frac{434.125h}{434.125}$

$5.32 = h$

For 10 gallons, the depth will be 5.32"

11. **Large Box**

$SA = 2(8 \cdot 11) + 2(3 \cdot 11) + 2(3 \cdot 8)$
$= 2(88) + 2(33) + 2(24)$
$= 290 \text{ in}^2$

$V = L \cdot w \cdot h$
$= (8)(11)(3)$
$= 264 \text{ in}^3$

Small Box

$SA = 2(6 \cdot 10) + 2(2.5 \cdot 10) + 2(2.5 \cdot 6)$
$= 2(60) + 2(25) + 2(15)$
$= 200 \text{ in}^2$

$V = L \cdot w \cdot h$
$= (6)(10)(2.5)$
$= 150 \text{ in}^3$

SA Large Box - SA Small Box
$= 290 - 200$
$= 90 \text{ in}^2$

You need 90 in^2 more cardboard to make the large box.

Volume Difference $= V_{\text{large box}} - V_{\text{small box}}$
$= 264 - 150$
$= 114 \text{ in}^3$

The large box holds 114 in^3 more cereal than the small box.