Math 63 Chapter 4 Review

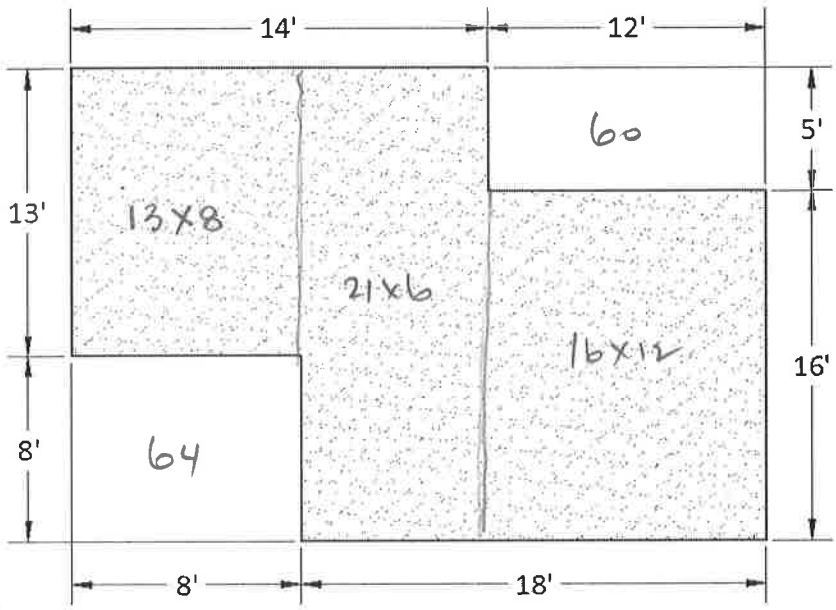
- Calculators are allowed but show your steps and box your final answer.
- Include the correct unit with your answer.

1. Calculate the shaded area of the floor.

OUTER RECT. $21 \times 26 = 546$

546
-60
-64

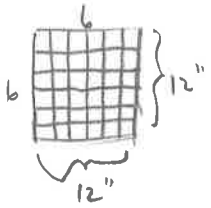
$\boxed{422\ FT^2}$



or

$13 \times 8 + 21 \times 6 + 16 \times 12 = \boxed{422\ FT^2}$

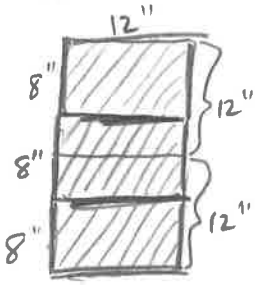
2. Calculate the number of 2" x 2" tiles that it will take to cover the floor.



$\frac{422\ FT^2}{1} \cdot \frac{36\ TILES}{1\ FT^2} = \boxed{15,192\ TILES}$

↳ $36\ TILES/FT^2$

3. Calculate the number of lineal feet of 8" wide hardwood that it will take to cover the floor.



$3\ LF = 2\ FT^2$

$\frac{422\ FT^2}{1} \cdot \frac{3\ LF}{2\ FT^2} = \boxed{633\ LF}$

4. Calculate the perimeter of the floor.

$14+5+12+16+18+8+8+13 = \boxed{94\ FT}$

or $2(26)+2(21) = \boxed{94\ FT}$

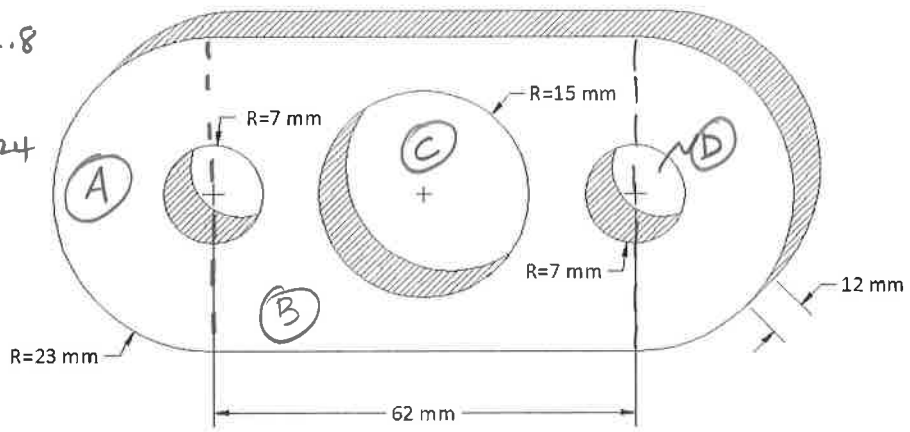
5. Calculate the volume of the steel plate.

A (CYLINDER) = $\pi \cdot 23^2 \cdot 12 \approx 19{,}942.8$

B (RECT PRISM) = $62 \cdot 46 \cdot 12 = 34{,}224$

C (CYLINDER) = $\pi \cdot 15^2 \cdot 12 \approx 8{,}482.3$

D (CYLINDER) = $\pi \cdot 7^2 \cdot 12 \approx 1847.3$



VOLUME = A + B − C − 2D = 19,942.8 + 34,224 − 8,482.3 − 3,694.6

41,989.9 mm^3 = 42 cm^3

6. Calculate the surface area of the steel plate.

FRONT = A + B − C − 2D = $\pi \cdot 23^2 + 62 \cdot 46 - \pi \cdot 15^2 - 2 \cdot \pi \cdot 7^2 \approx 3499.2\ mm^2$

INSIDE D = $2\pi \cdot 7 \cdot 12 \approx 527.8$

INSIDE C = $2\pi \cdot 15 \cdot 12 \approx 1131$

TOP B = $62 \cdot 12 = 744$

OUTSIDE A = $2\pi \cdot 23 \cdot 12 \approx 1734.2$

SURFACE AREA = FRONT + BACK + 2(INSIDE D) + INSIDE C + 2(TOP B) + OUTSIDE A

= 2(3499.2) + 2(527.8) + 1131 + 2(744) + 1734.2 ≈ 12,407.2 mm^2

124.1 cm^2

7. Use the steel design table to calculate the weight of the steel plate in grams.

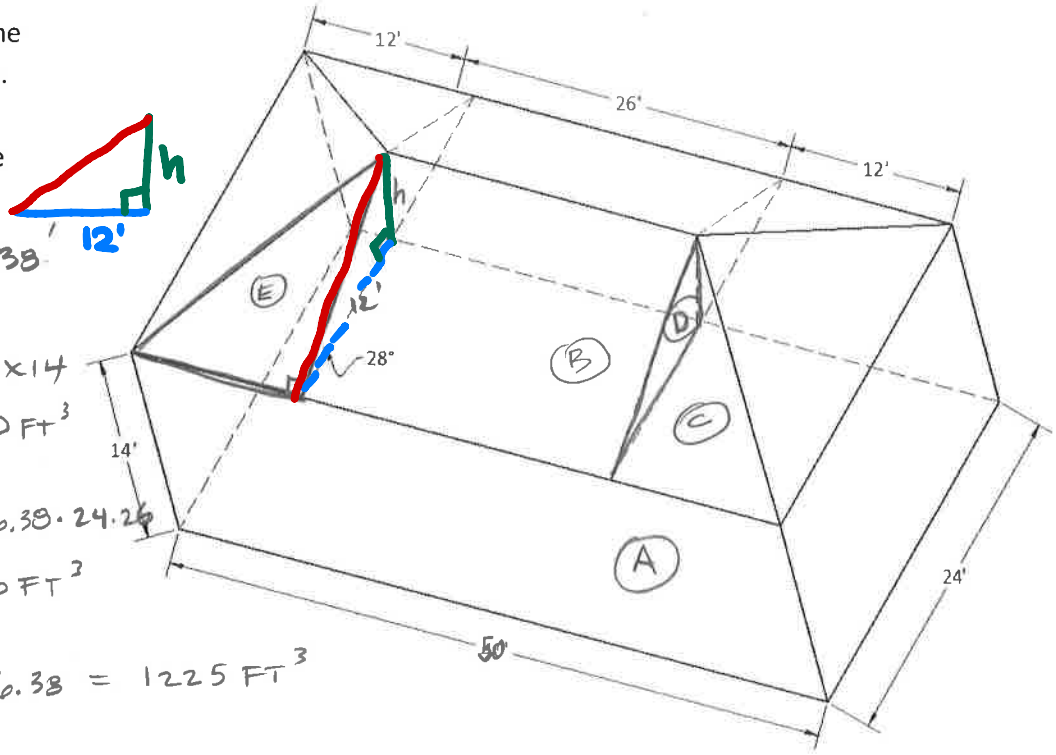
12mm = $\frac{94.2\ kg}{m^2} \cdot \frac{3499.2\ mm^2}{1} \cdot \frac{1000\ g}{1\ kg} \cdot \frac{1\ cm^2}{100\ mm^2} \cdot \frac{1\ m^2}{10{,}000\ cm^2}$ = 329.6 grams

8. Calculate the weight of the part if it is made of wood weighing 13 ounces per cubic inch.

$\frac{13\ oz}{1\ in^3} \cdot \frac{41{,}989.9\ mm^3}{1} \cdot \frac{1\ cm^3}{1000\ mm^3} \cdot \frac{1\ in^3}{16.387\ cm^3}$ = 33.3 OUNCES

or 2.1 POUNDS

9. Calculate the volume of the house (including the roof). Hint: You will need to calculate the height of the roof using trigonometry.



$\tan 28 = \frac{h}{12}$ $h \approx 6.38$

$A(\text{RECT PRISM}) = 50 \times 24 \times 14 = 16{,}800\ FT^3$

$V = l \cdot w \cdot h$ p.151

$B(\text{TRIANGULAR PRISM}) = \frac{1}{2} \cdot 6.38 \cdot 24 \cdot 26 = 1990.6\ FT^3$

$V = \frac{l \cdot w \cdot h}{2}$ $h = 6.38$, $w = 24$, $l = 26$

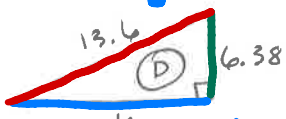
$C(\text{PYRAMID}) = \frac{1}{3} \cdot 24^2 \cdot 6.38 = 1225\ FT^3$

$V = \frac{b^2 \cdot h}{3}$ $b = 24$, $h = 6.38$

VOLUME = A + B + C = $\boxed{20{,}015.6\ FT^3}$

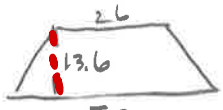
10. Calculate the surface area of the house (all outside surfaces including the bottom).

The hypotenuse of this triangle (red) is the height of the red Δ + trapezoid



BOTTOM = $50 \times 24 = 1200$, SIDES = $2(14 \times 24) + 2(14 \times 50) = 2072$

ROOF TRAPEZOID = $\frac{1}{2} \cdot 13.6(50 + 26) = 516.8$



$A = \frac{1}{2} h(a + b)$

You could break this into Δ + rect + Δ

ROOF TRIANGLES = $\frac{1}{2} \cdot 24 \cdot 13.6 = 163.2$

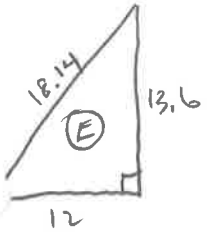
these are at the ends of the house

SURFACE AREA:

$1200 + 2072 + 2(516.8) + 2(163.2) =$

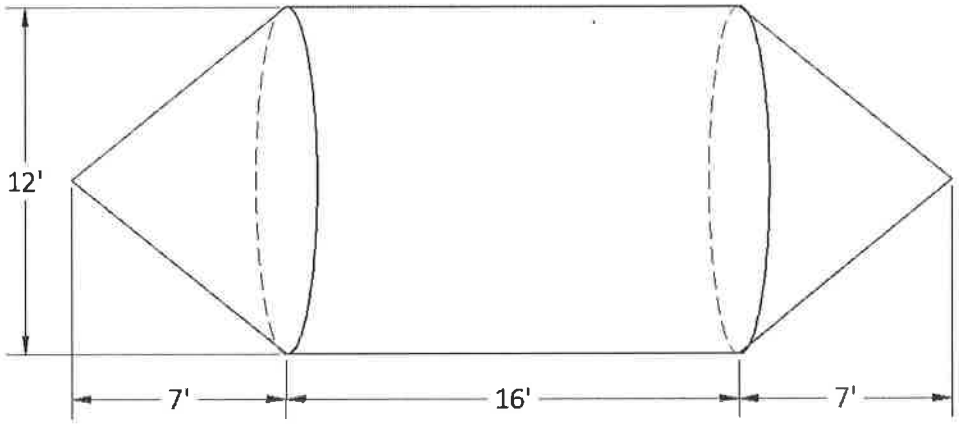
$\boxed{4632\ FT^2}$

11. Calculate the total length of the 9 lines that define the roof.



$2(50) + 2(24) + 4(18.14) + 26 \approx$ $\boxed{246.6\ FT}$

12. Calculate the volume of tank in cubic yards.



$YL = \pi \cdot 6^2 \cdot 16 \approx 1809.6$

$CONE = \frac{1}{3} \cdot \pi \cdot 6^2 \cdot 7 \approx 263.9$

VOLUME = CYLINDER + 2 CONES = 1809.6 + 527.8 = **2337.4 FT³**

$\frac{2337.4\ FT^3}{1} \cdot \frac{1\ YD^3}{27\ FT^3} =$ **86.6 YD³**

13. Calculate the surface area of the tank.

CYL = $2\pi rh$ (ENDS AREN'T EXPOSED) = $2 \cdot \pi \cdot 6 \cdot 16 \approx 603.2$

CONE = $\pi r \sqrt{r^2+h^2}$ (BOTTOM ISN'T EXPOSED) = $\pi \cdot 6 \cdot \sqrt{6^2+7^2} \approx 173.8$

SURFACE AREA = CYLINDER + 2 CONES = 603.2 + 347.6 = **950.8 FT²**

14. Calculate the weight of the empty tank if it is made of ½" thick steel.

$\frac{950.8\ FT^2}{1} \cdot \frac{20.4\ LBS}{FT^2} =$ **19,396.3 POUNDS = 9.7 TONS**

15. Calculate the weight of the tank full of water. Q17 4.3 HW

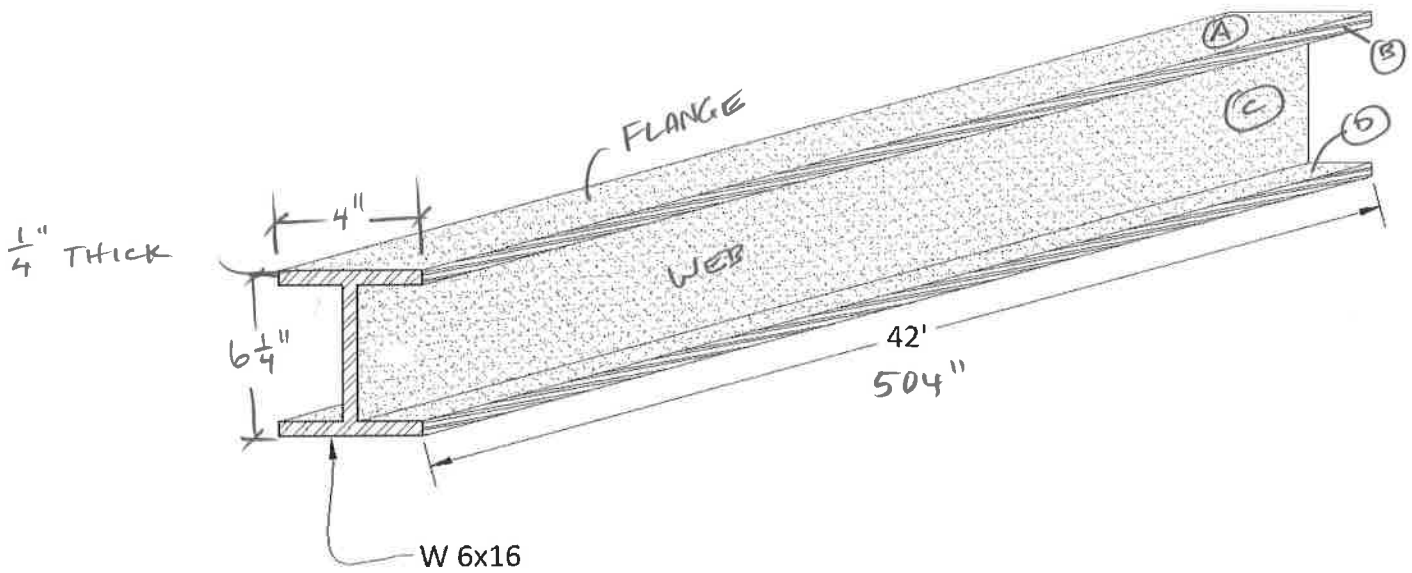
$\frac{2337.4\ FT^3}{1} \cdot \frac{7.48\ GAL}{FT^3} \cdot \frac{8.345\ LBS}{GAL} =$ 145,901.9 LBS WATER

+ 19,396.3 LB TANK

165,298 LBS

82.6 TONS

16. Use the steel design table to find the volume of the I-beam.



TOP FLANGE = $\frac{1}{4} \times 4 \times 504 = 504$

WEB = $\frac{1}{4} \times 5\frac{3}{4} \times 504 = 724.5$

VOLUME = WEB + 2(FLANGES)

$= 724.5 + 1008 =$ **1732.5 IN³**

17. Find the surface area of the I-beam.

END = $\frac{1}{4} \cdot 4 \cdot 2 + \frac{1}{4} \cdot 5\frac{3}{4} = 3.4$

(A) = $4 \times 504 = 2016$

(B) = $\frac{1}{4} \times 504 = 126$

(C) = $5\frac{3}{4} \times 504 = 2898$

(D) = $1\frac{7}{8} \times 504 = 945$

SURFACE AREA = 2(ENDS) + 2(A) + 4(B) + 2(C) + 4(D)

$14,119\ IN^2$

$\frac{14119\ IN^2}{1} \cdot \frac{1\ FT^2}{144\ IN^2} =$ **98 FT²**

18. Find the weight of the I-beam in pounds.

$\frac{16\ LBS}{FT} \cdot \frac{42\ FT}{1} =$ **672 LBS**