

1. Page 35 #21. If $\frac{1}{4}$ inch represents 1 foot on a drawing, how many feet are represented by 10 $\frac{1}{8}$ inches?

$$10 \frac{1}{8}'' \div \frac{1}{4}'' = 40.5 \text{ feet}$$

OR \rightarrow if $\frac{1}{4}'' = 1 \text{ foot}$, then $1'' = 4 \text{ feet}$ so $10'' = 40 \text{ feet}$ and $\frac{1}{8}'' = \frac{1}{2} \text{ foot}$ } $40' - 6''$

2. Page 37 #9. If $\frac{1}{4}$ inch on a drawing represents 1 foot, how many inches on the drawing represent 18 feet?

$$\frac{\frac{1}{4}'' \times 18}{1' \times 18} = \frac{?''}{18'}$$

$$\frac{1}{4}'' \times 18 = \boxed{4 \frac{1}{2}''}$$

OR if $\frac{1}{4}'' = 1 \text{ ft}$
 $1'' = 4 \text{ ft}$
 $18 \text{ ft} \div 4 \text{ ft} = 4.5$ } So $1'' \times 4.5 = 4 \frac{1}{2}''$

3. Page 43 #12. A carpenter accepts a job for \$575.00. Bills for materials and labor are \$113.52, \$287.61, and \$78.92. What is the profit?

$$113.52 + 287.61 + 78.92 = 480.05$$

$$575 - 480.05 = \boxed{\$94.95 \text{ profit}}$$

4. Page 47 #7. If one square foot of wall requires 6.25 firebricks, find the approximate number needed for 33 square feet. Round your answer to the nearest whole firebrick.

$$6.25 \times 33 = 206.25$$

about 206 firebricks

5. Page 47 #9. Installing roofing on an irregular roof is estimated to take 2.6 hours per square. How long will it take to lay 14.4 squares?

$$14.4 \frac{\text{squares}}{\text{square}} \times 2.6 \frac{\text{hrs}}{\text{square}} = \boxed{37.44 \text{ hours}}$$

6. Page 47 #10. The material needed for a counter is estimated to be 81.9 board feet, at a cost of \$3.15 per board foot. What is the total cost of the material?

$$81.9 \text{ board ft} \times \$3.15 / \text{board feet} = \boxed{\$257.99}$$

rounded to nearest penny

7. For a flight of stairs with a total rise of 109":

- a. Estimate how many risers you will need for this flight of stairs (recall that Wisconsin code requires risers to be no greater than 8 inches). Write down your estimate and show or explain your strategy.

Round 109 to 110 and 8" to 10"

$110 \div 10 = 11$ but 10" is a little high so add 1

I + will take about 12 risers

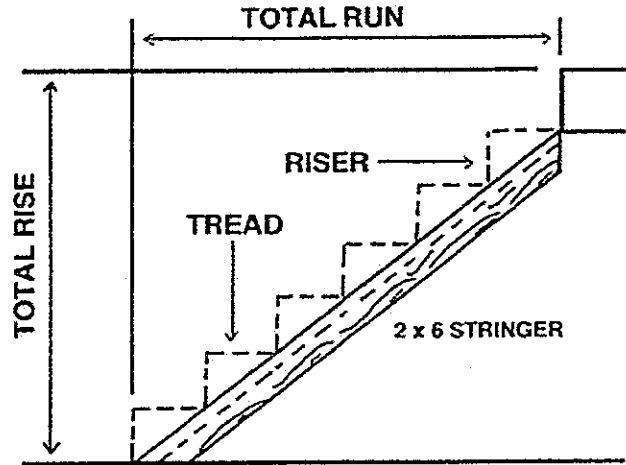
- b. What is the height of each riser?

$109" \div 8" = 13.625$ round to 14

$109" \div 14 = 7 \frac{13}{16}"$ rise

- c. How many risers will the flight of stairs have?

14 risers



WRONG

NOTE... if I had used my estimate... $109" \div 12 = 9 \frac{1}{16}"$ I would have exceeded code.

8. You're putting up a fence along one side of your back yard, and you want the slats in the fence to be no more than 2 inches apart. You also want to spend the least amount of money possible on materials. Use the information in the fence pickets image to answer the following:

- a. If you need a total of 12 feet of fencing, determine the number of the fence pickets (hint: treat this as a baluster problem) needed.

$12' + 3 \frac{1}{2}" = A$ so $A = 12' - 3 \frac{1}{2}" \rightarrow 27$ spaces
 $B = 2" + 3 \frac{1}{2}"$ so $B = 5 \frac{1}{2}"$
 $A \div B = 12' - 3 \frac{1}{2}" \div 5 \frac{1}{2}" \rightarrow 26.8$
 So 26 pickets

- b. How much will it cost if you get an 8% contractor discount (before tax), and pay 5.5% in tax?

$26 \text{ pickets} \times \$1.75/\text{picket} = \$45.50$

8% discount \rightarrow pay 92% (100% - 8%)

so $92\% \times \$45.50 = \41.86

add tax of 5.5% \rightarrow pay 105.5% (100% + 5.5%)

so $105.5\% \times \$41.86 = \44.16

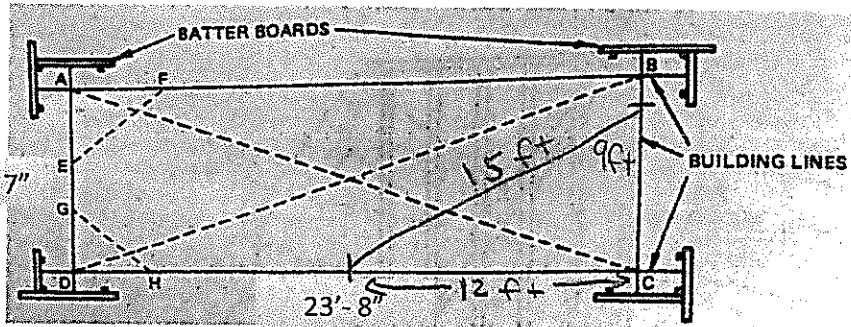


Hampton Lumber 5/8 in. x 6-1/2 in. x 6 ft. Kiln Dried Cedar Wood Dog-Ear Fence Picket
 Model# 772-733
 ★★★★★ CM
 PULLY \$1.75 /piece
 Buy 360 or more \$1.66

9. You need to confirm that the wall layout is square for the building below. How do you do that and what is the measurement you need to find?

a. Explain

since the measurements imply opposite walls are the same length, just need to calculate the rise-run-



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

diag on a triangle using 2 walls and measure to make sure it matches

b. Do the Calculation

1st option: 9'7" Rise, 23'8" Run so Diag = 25'6³/₈"

2nd option: make a 3-4-5 triangle... 3x3=9, 3x4=12 so measure off 9' on short wall and 12 ft on long wall. Diagonal should = 3x5

3rd option: Use $a^2 + b^2 = c^2$ where 9'7" = a and 23'8" = b so $c^2 = 651.95$ an c = 25'6³/₈"

10. Page 53 #10. The actual width of a pine board is 7 1/4 inches. Write the width in decimal form.

7.25 inches

do $1 \div 4$ to get 0.25

11. Page 53 #13. Find the approximate thickness in common fraction form of a piece of siding 0.4375 inch thick.

0.4375 inch \rightarrow press inch, then $\frac{1}{10}$, then inch to convert on calculator. = $\frac{7}{16}$ "

OR 0.4375 is 43.75% of 1"

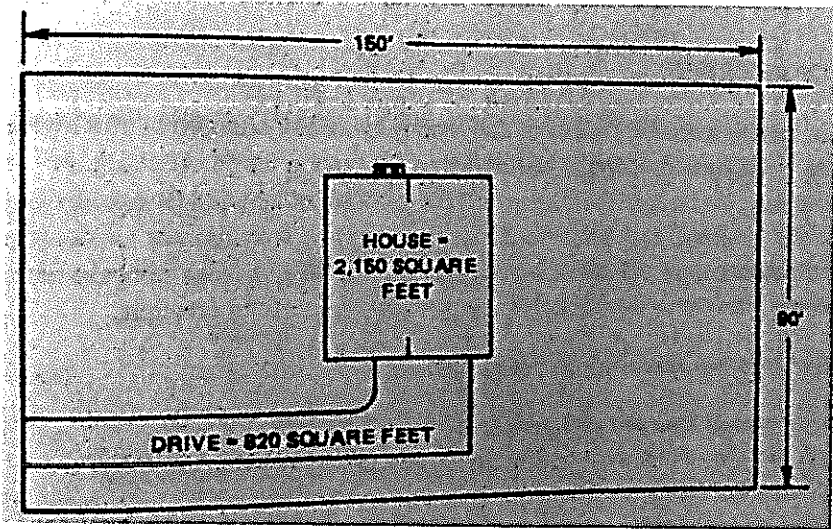
if I do 43.75% of 16, I find how many parts out of 16...

12. Page 63 #32. What percent of the lot illustrated is taken up by the house and driveway? Note: 43.75% * 16 = 7

Area of a rectangle = length x width

Area of lot :
150' x 90' =
13,500 ft²

House + driveway
2,150 ft² + 820 ft²
2,970 ft²



So $\frac{7}{16}$

So $\frac{2970}{13,500} = 0.22$
x100

22% of the lot is house + drive

13. The pitch per foot of a driveway is $\frac{1}{2}$ ".

a. What is the fall for 25' of driveway?

$$25 \times \frac{1}{2}'' = \boxed{12\frac{1}{2} \text{ inches}}$$

b. What is the % slope of this driveway?

$$\frac{\frac{1}{2}''}{12''} \times 100$$

OR $\frac{\frac{1}{2}''}{1'} \times 100$

OR $\frac{12\frac{1}{2}''}{25'} \times 100$

All = 0.04167

$\boxed{4.2\%}$

14. Page 65 #8. A bank loans \$44,250 to a contractor at a rate of 9% per year. What is the interest payment for the first year?

↳ Just the 9% so $\$44,250 \times 9\% = \boxed{\$3,982.50}$

15. Page 69 #1. List price is \$5,670, and discount is 12% of this price. Find the cost.

$$5,670 \times 12\% = 680.40$$

$$5670 - 680.40 = \$4989.60$$

OR

Discount of 12% means pay 100% - 12% = 88%

$$5,670 \times 88\% = \boxed{\$4,989.60}$$

16. Page 69 #8. Cost is \$15.86 after taking 35% off of the catalog price. Find the catalog price.

Cost = 35% OF catalog price

$$15.86 = 0.35 * ?$$

$$\text{so } ? = 15.86 \div 0.35 = \boxed{\$45.31}$$

OR Part = cost
whole = catalog price

$$\text{whole} = \frac{\text{part}}{\%}$$

$$\text{catalog price} = \frac{15.86}{35\%} = \boxed{\$45.31}$$

17. Page 69 #14. When the amount paid is \$154 after a 15% discount is allowed, determine the original amount of the bill.

amount paid = part
original amount = whole
whole = $\frac{\text{part}}{\% \text{ paid}}$

$$\text{original} = \frac{154}{85\%}$$

$\boxed{\text{original} = \$181.18}$

paid 100% - 15%
so % paid = 85%

OR

$$154 = 85\% * ?$$

$$\text{so } ? = 154 \div 85\%$$

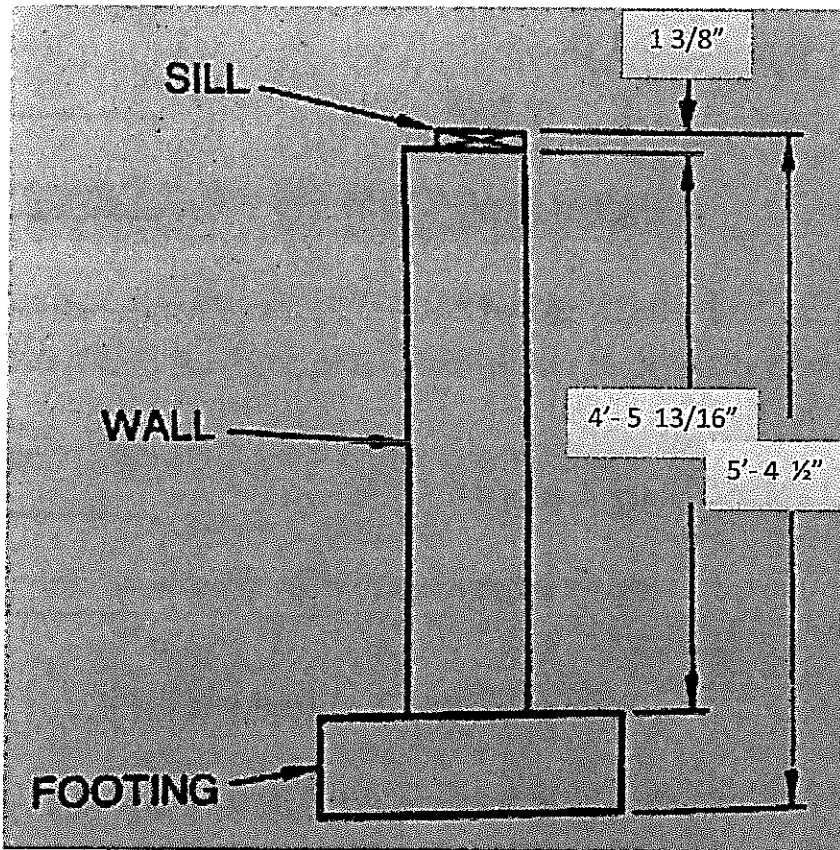
$$? = \boxed{\$181.18}$$

18. Page 71 #25. A contractor purchases oak lumber for \$1,400, less 2% discount ^{pay 98%}, yellow pine for \$596, less 2% discount ^{pay 98%} and white pine for \$896.50, less 1% discount ^{pay 99%}. What is the total amount of the bill?

$$1,400 * 98\% + 596 * 98\% + 896.50 * 99\% = \boxed{\$2843.62}$$

$$1372 + 584.08 + 887.54 = \boxed{\$2843.62}$$

NO CALCULATOR for 19 and 20 and 21 below



OR

$$2\% \text{ of } 1400 = 28$$

$$2\% \text{ of } 596 = 11.92$$

$$1\% \text{ of } 896.50 = 8.97$$

total discount $\rightarrow 48.89$

Total before discount

$$1400 + 596 + 896.50 = 2892.50$$

Price after discount

$$2892.50 - 48.89 = \boxed{\$2843.61}$$

*penny difference due to rounding

19. Page 82 #17. What is the combined height of the wall and the sill?

$$\frac{3 \times 2}{8 \times 2} = \frac{6}{16}$$

$$4' 5 \frac{13}{16}'' + 1 \frac{3}{8}''$$

$$5 \frac{13}{16}'' + 1 \frac{6}{16}'' = 6 \frac{19}{16}''$$

$$\frac{16}{16}'' = 1''$$

So $19 - 16 = 3$

$$7 \frac{3}{16}''$$

20. Page 82 #18. What is the height of the footing?

$$\frac{1 \times 8}{2 \times 8} = \frac{8}{16}$$

$$5' 4 \frac{1}{2}'' - 4' 7 \frac{3}{16}'' = 4' 16 \frac{8}{16}'' - 4' 7 \frac{3}{16}'' = 9 \frac{5}{16}''$$

$$\boxed{4' 7 \frac{3}{16}''}$$

21. Page 82 #19. How much would have to be cut from the end of a 12 foot piece of lumber to leave a piece 8 feet 5 inches long

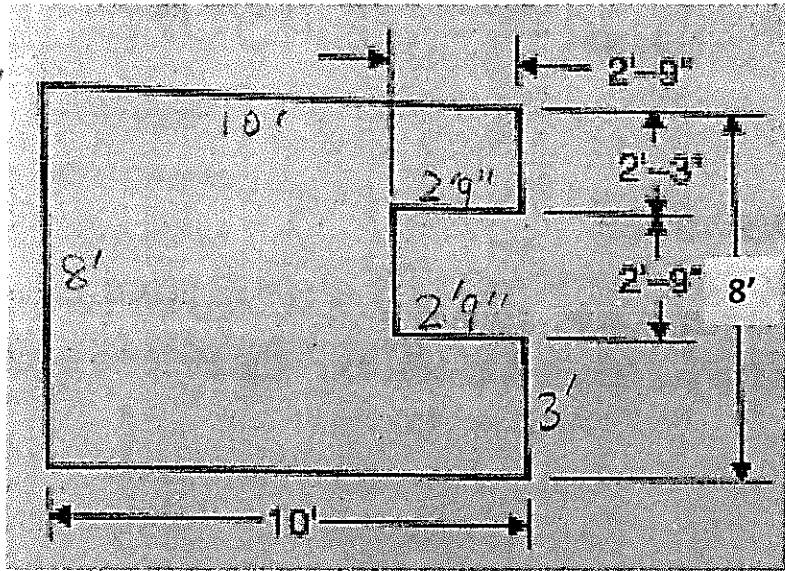
$$12 - ? = 8' 5''$$

$$+ 7'' = 1 \text{ ft}$$

$$+ 3' = 12$$

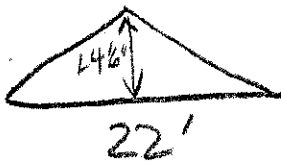
22. Page 83 #22. Find the perimeter of the house footprint below

$$\begin{aligned}
 & \boxed{10' + 3' + 2'9'' + 2'9'' + 2'9''} \\
 & + 2'3'' + 10' + 8' \\
 & 2 * 10' + 3 * 2'9'' + 3' \\
 & + 2'3'' + 8' \\
 & \underline{20'} + \underline{8'3''} + \underline{3'} + \underline{2'3''} + \underline{8'} \\
 & \boxed{41'6''}
 \end{aligned}$$



23. Page 89 #5. What is the area of the hip roof shown (all 4 sides) if the length of one side is 22 feet and the common rafter length is 14 feet 6 inches as shown in the image below.

Area of a triangle
is $\frac{1}{2}$ base x height



base = 22'

height = 14'6"

$$\text{so } \frac{1}{2} * 22' * 14'6'' =$$

$$11' * 14'6'' = 159.5 \text{ ft}^2 \leftarrow \text{one side}$$

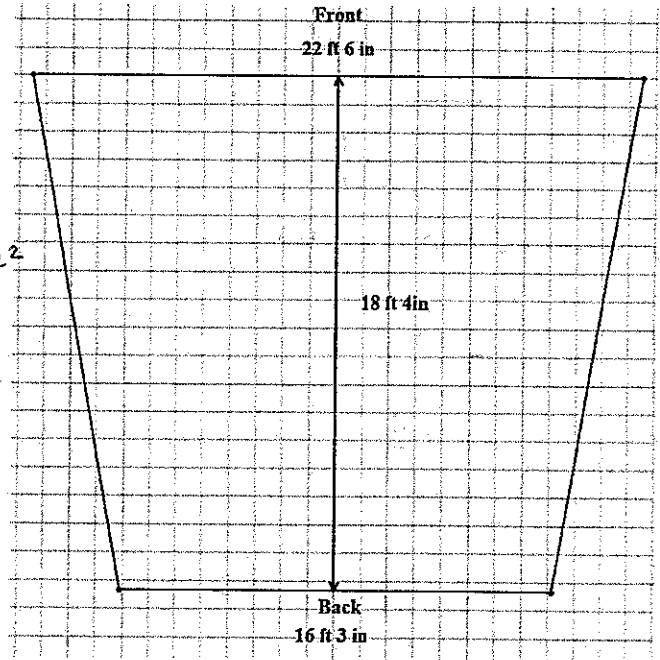
x 4

Bethany Sansing-Helton

$$\boxed{638 \text{ ft}^2}$$

24. You are helping a friend re-tile their bathroom. You measure the bathroom and draw out the size below.

a. What is the area of the bathroom?
 Trapezoid: $\frac{1}{2}(b_1 + b_2) * h$
 $\frac{1}{2}(22'6'' + 16'3'') * 18'4''$
 $19'4\frac{1}{2}'' * 18'4'' = 355.2 \text{ ft}^2$



b. If you measure the diagonals, will they be equal? Explain your answer
 As long as the two sides without measurements are the same length, the two diagonals will be equal. That is a property of trapezoids like this. A trapezoid that doesn't have equal sides won't

Example:

c. The tiles come in boxes of twenty-four 10" by 10" tiles. The wholesale price is \$15.60 per box. How much will you spend on the tiles? Assume 10% for waste and 5.5% for tax

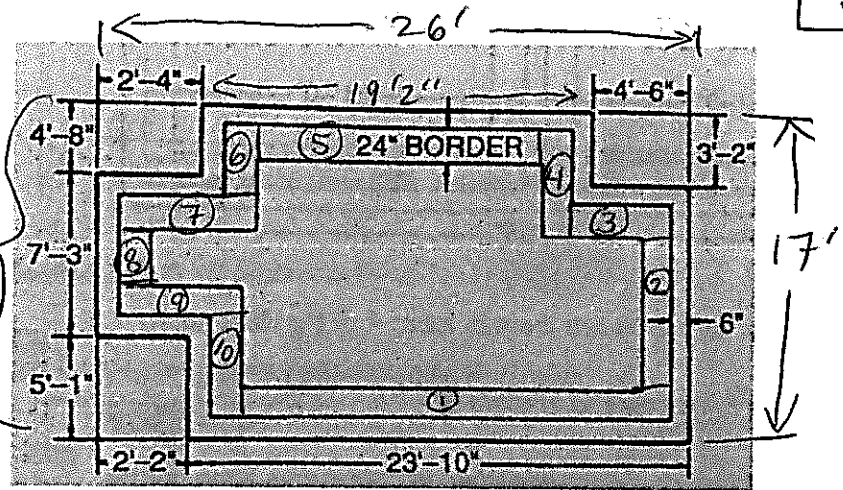
$10" \times 10" = 100 \text{ m}^2 \text{ or } 0.6944 \text{ ft}^2$
 So each box covers $0.6944 \times 24 = 16.67 \text{ ft}^2$
 So $355.2 \text{ ft}^2 \div 16.67 \text{ ft}^2 = 21.3 \text{ boxes}$
 10% waste: $21.3 \times 10\% = 2.13 \leftarrow \text{ADD} = 23.4 \text{ boxes}$
 Round UP 24 boxes
 $24 * \$15.60 = \374.40 ADD tax
 $\$374.40 * 105.5\% = \394.91

25. Page 97 #3. The plan shown has walls 6 inches thick. A 24-inch border of light-colored carpet is installed around the entire floor as shown in the image below.

a. Determine the area included within the walls

SKIP

JUST TOP Wall Border
 $\rightarrow 19'2'' - 6'' - 6'' = 18'2''$
 $18'2'' \times 24'' = 36.33 \text{ ft}^2$

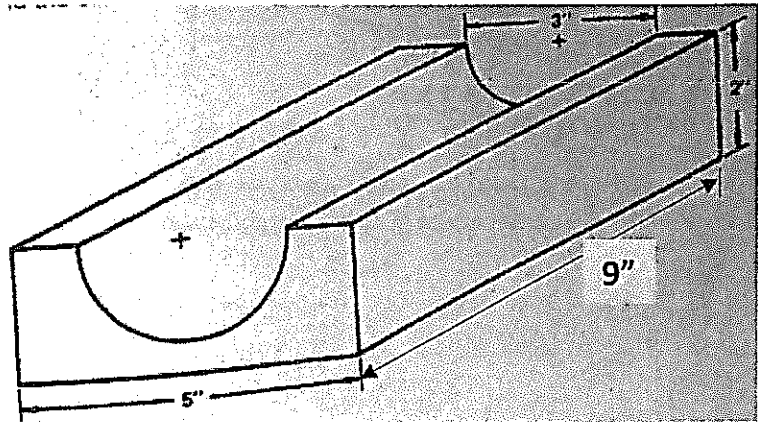
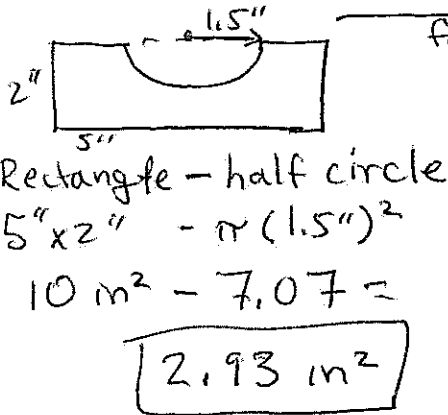


b. Find the area of the 24-inch wide light-colored border carpet

- ① $23'-10'' - 6'' - 6'' - 24'' = 20'10'' \times 24'' = 41.67 \text{ ft}^2$
- ② $17' - 3'2'' - 6'' - 6'' - 24'' - 24'' = 8'10'' \times 24'' \rightarrow 17.67 \text{ ft}^2$
- ③ $4'6'' - 6'' + 6'' = 4'6'' \times 24'' \rightarrow 9 \text{ ft}^2$
- ④ $3'2'' - 6'' + 6'' + 24'' = 5'2'' \times 24'' \rightarrow 10.33 \text{ ft}^2$
- ⑤ $19'2'' - 6'' - 6'' - 24'' - 24'' = 14'2'' \times 24'' \rightarrow 28.3 \text{ ft}^2$

26. Page 103 #13. Use the illustration of the wooden block below to answer the following questions.

a. Find the cross-sectional area of the block



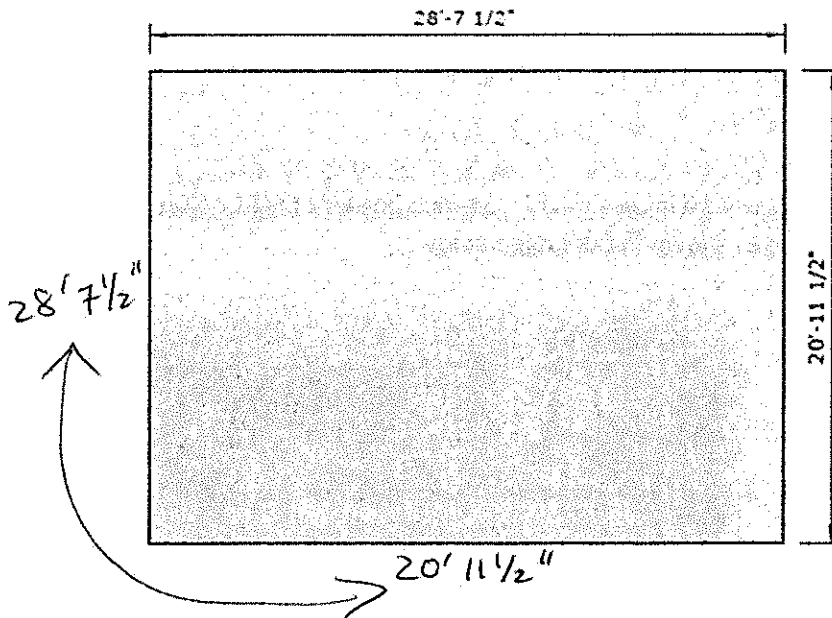
Rectangle - half circle
 $5'' \times 2'' - \pi(1.5'')^2$
 $10 \text{ m}^2 - 7.07 =$

2.93 m^2

b. Find the volume of the block

Volume is Area x depth so $2.93 \text{ m}^2 \times 9'' = 26.4 \text{ m}^3$

27. Answer the following questions for the concrete slab shown below.



a. What is the area of the concrete slab?

$L \times W \rightarrow 28'-7\frac{1}{2}'' \times 20'-11\frac{1}{2}'' = 599.93 \text{ ft}^2 \approx 600 \text{ ft}^2$

b. What is the perimeter of the slab?

Add all sides together
 $28'-7\frac{1}{2}'' + 20'-11\frac{1}{2}'' + 28'-7\frac{1}{2}'' + 20'-11\frac{1}{2}'' = 99'2''$

c. If you are need to pour the slab to a depth of 3 1/2", how many cubic yards of concrete will you need to order? Include 10% waste factor in your calculation.

Volume = Area x Depth
 $600 \text{ ft}^2 \times 3\frac{1}{2}'' = 6.48 \text{ yd}^3$

$6.48 \times 10\% = 0.648$

$6.48 + 0.648 = 7.1 \text{ cubic yards}$

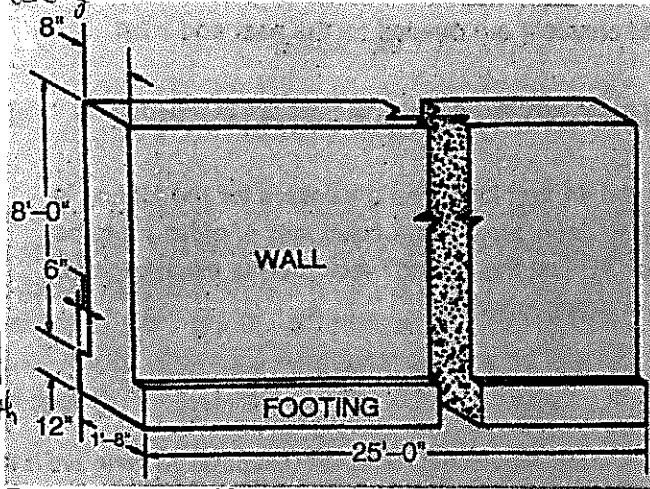
28. Page 107 #17. The illustration shows a section of a concrete foundation wall and footing. How many cubic yards of concrete does it contain? Round answer to the nearest tenth of a yard.

Method 1: Do wall & footing separately

Volume = $L \times W \times H$
 Wall = $8' \times 8'' \times 25'$
 $= 4.938 \text{ yd}^3$

Footing = $12'' \times 1'8'' \times 25'$
 $= 1.543 \text{ yd}^3$

Total $\rightarrow 4.938 + 1.543 = 6.5 \text{ yd}^3$



Method 2: cross-sectional area \times length

Wall area $\rightarrow 8' \times 8'' = 5.33 \text{ ft}^2 \rightarrow 7 \text{ ft}^2 \times 25'$
 Footing area $\rightarrow 12'' \times 1'8'' = 16.6 \text{ ft}^2 \rightarrow 17.5 \text{ ft}^2 \times 25' \rightarrow 6.5 \text{ yd}^3$

29. Page 152 #1. How many square feet of sheathing are required to cover a wall 8 feet by 26 feet? Make no allowances for openings, but do allow 10% for waste.

$8' \times 26' = 208 \text{ ft}^2$

10% of 208 = 20.8

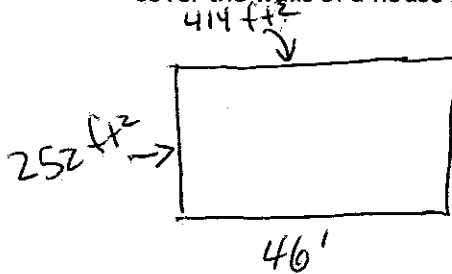
$20.8 + 208 = 228.8 \text{ ft}^2$

30. Page 159 #7. A roll of roofing paper covers an area of 100 square feet. How many rolls are needed for a shed roof measuring 12 feet by 16 feet? Do not allow for waste.

$12' \times 16' = 192 \text{ ft}^2 \div 100 \text{ ft}^2$

1.92 rolls ... **2 rolls are needed**

31. Page 165 #8. Determine the number of rolls (400 square feet per roll) of builder's felt needed to cover the walls of a house measuring 28 feet by 46 feet by 9 feet



9' tall
 28' \leftarrow this wall is
 $28' \times 9' = 252 \text{ ft}^2$
 this wall is
 $46' \times 9' = 414 \text{ ft}^2$

Total wall area is
 $414 \times 2 + 252 \times 2 = 1332 \text{ ft}^2$
 $828 + 504$
 $1332 \text{ ft}^2 \div 400 \text{ ft}^2 = 3.33 \text{ rolls}$

Purchase 4 rolls of builder's felt

