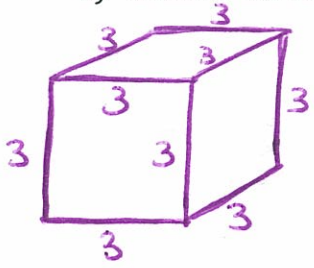
Ch. 3.1 Surface Area of Prisms (Part II)

Example 1: Mignmei builds a shipping crate out of $\frac{1}{4}$" plywood. The crate is a cube with a side dimension of 3 feet.

a) What is the surface area of the crate?



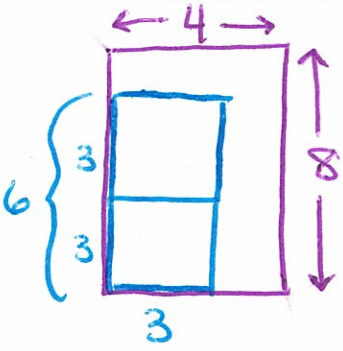
A cube has 6 sides. Each side is a square

Each Square:  Area = length x width

$A = 3 \times 3 = 9$

but 6 squares so $6 \times 9 =$ **54 ft²**

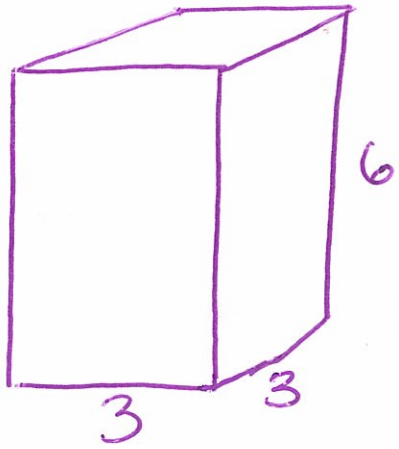
b) She buys plywood in standard sheet sizes of 4 ft x 8 ft. How many sheets of plywood does she need to build one shipping crate?

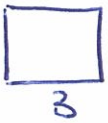


she can fit 2 squares onto each piece of plywood. she needs 6 squares, so

she will need 3 sheets of plywood

c) She builds a second crate that is twice the height, but has the same length and width. What is the surface area of the second crate? How many sheets of plywood will she need to build the larger shipping crate? Explain.



Top & Bottom: 

$A = 3 \times 3 = 9$

but 2 squares so $2 \times 9 = 18$ ft²

Sides:  $A = 3 \times 6 = 18$

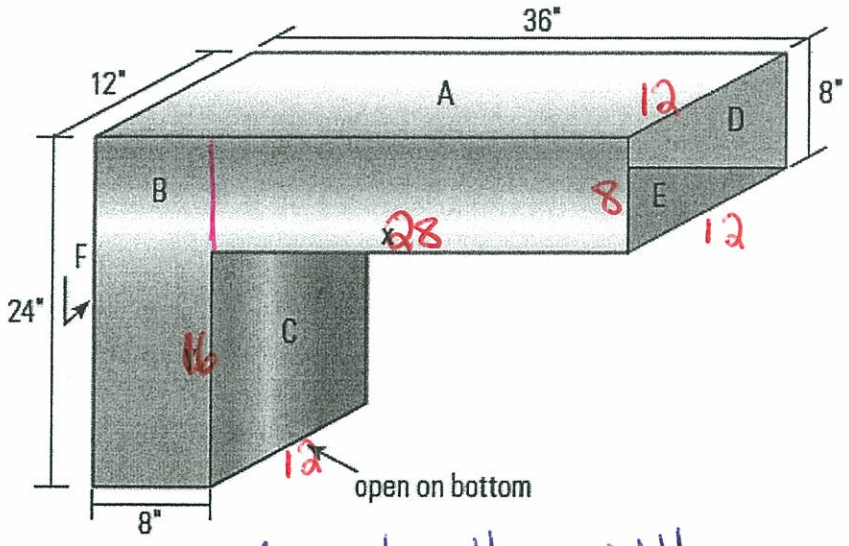
but 4 rectangles: $4 \times 18 =$ 72 ft²

Total SA $= 18 + 72 =$ **90 ft²**

Now she can only get one of the sides on a piece of plywood so 4 for the sides & 1 for top/bottom →

She will need 5 sheets of plywood

Example 2: Dirk fabricates a section of furnace duct out of sheet metal. What is the total area of sheet metal that he needs? The duct is open at the upper right face and the left bottom face.



Area = length x width

A: 12 × 36

A = 36 × 12 = 432

B: 28 × 8, 21 × 8

A = 8 × 28 = 224

A = 8 × 24 = 192 → Add = 416

D: (same as B) 416

C: 16 × 12 A = 12 × 16 = 192

E: 28 × 12 A = 12 × 28 = 336

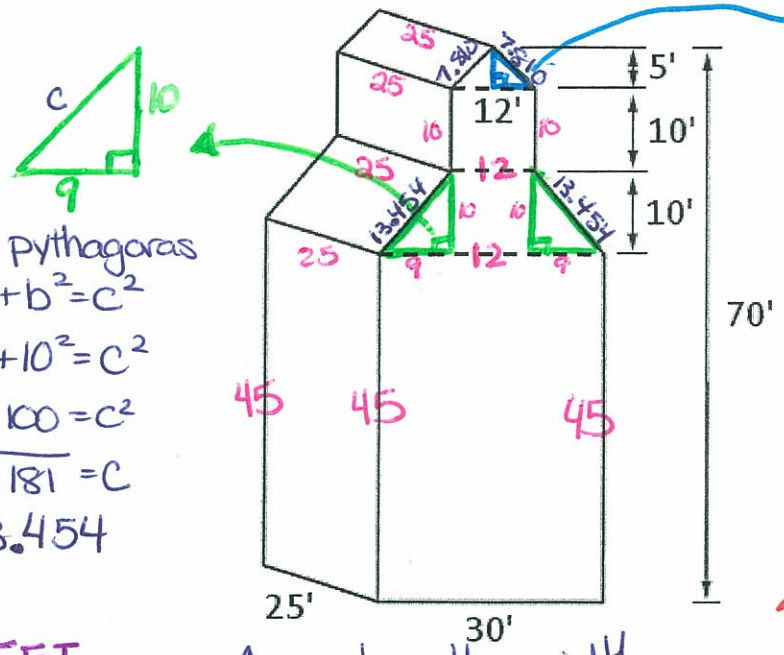
F: 24 × 12 A = 12 × 24 = 288

Total Surface Area (Add them all up)

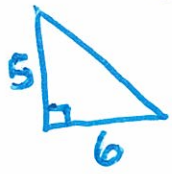
SA = 432 + 416 + 416 + 192 + 336 + 288

= 2080 in²

Example 3: Calculate the surface area of the shape below.



use pythagoras
$a^2+b^2=c^2$
$9^2+10^2=c^2$
$81+100=c^2$
$\sqrt{181}=c$
13.454



use pythagoras
$a^2+b^2=c^2$
$5^2+6^2=c^2$
$25+36=c^2$
$\sqrt{61}=c$
$7.810=c$

LEFT

Area = length x width

25 × 7.810: $A = 25 \times 7.810 = 195.25$ *

25 × 10: $A = 25 \times 10 = 250$ *

25 × 13.454: $A = 25 \times 13.454 = 336.35$ *

25 × 45: $A = 25 \times 45 = 1125$ *

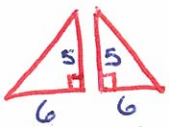
Total Left side
$= 195.25 + 250 + 336.35 + 1125$
$= 1906.6\ ft^2$

Right Side = Left Side
↳ $= 1906.6\ ft^2$

Bottom

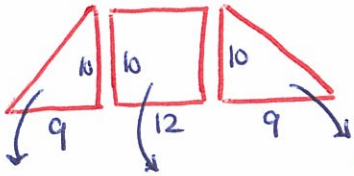
25 × 30: $A = 25 \times 30$
$= 750\ ft^2$

FRONT (& Back is the same)



Each triangle = $\frac{b \times h}{2}$
$A = \frac{5 \times 6}{2} = \frac{30}{2} = 15$ *
2nd △ $A = 15$ *

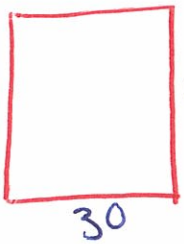
$A = 12 \times 10 = 120$ *



$A = \frac{9 \times 10}{2} = 45$ *

$A = \frac{9 \times 10}{2} = 45$ *

$A = 10 \times 12 = 120$ *



$A = 30 \times 45 = 1350$ *

Total Front:
$15+15+120+45+120+45+1350$
$= 1710\ ft^2$

Back = $1710\ ft^2$

Total SA $= 1906.6 + 1906.6 + 750 + 1710 + 1710$
$= 7983.2\ ft^2$

Homework: Pg. 145 #11-12 Pg. 146 #1-4