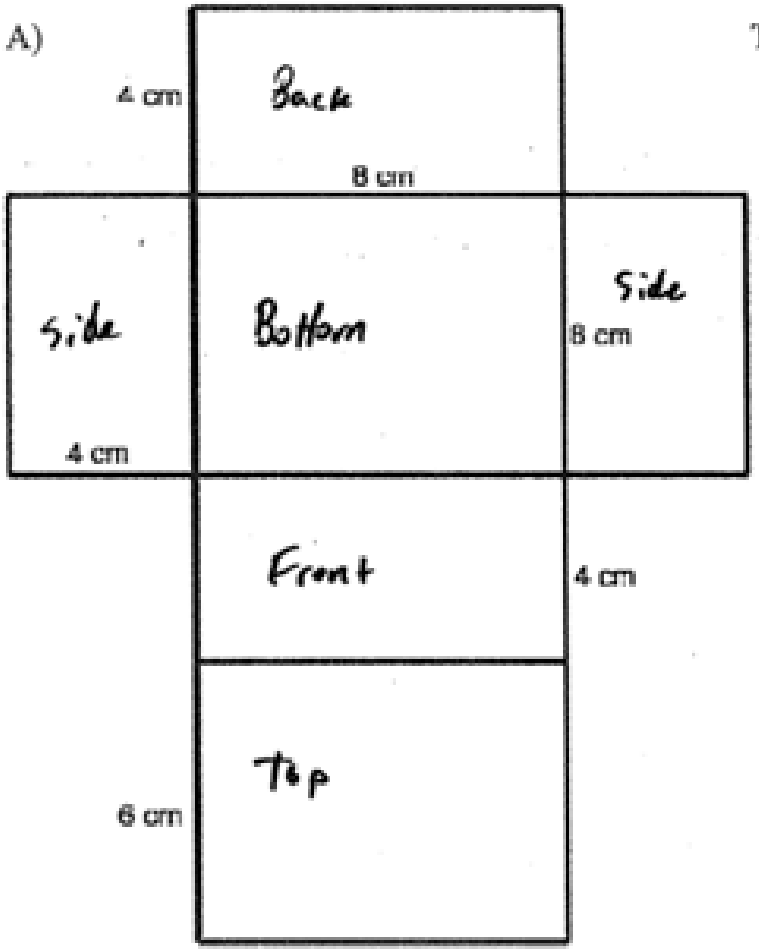
Get out your homework and have it ready to check.

Classwork - Surface Area of Prisms

Name and find the area of the following nets. SHOW WORK AND LABEL

A)



Type of 3D Figure → Rectangular Prism

Top & Bottom $A = 8(6) = 48(2) = 96\ cm^2$

F + B $A = 4(8) = 32(2) = 64\ cm^2$

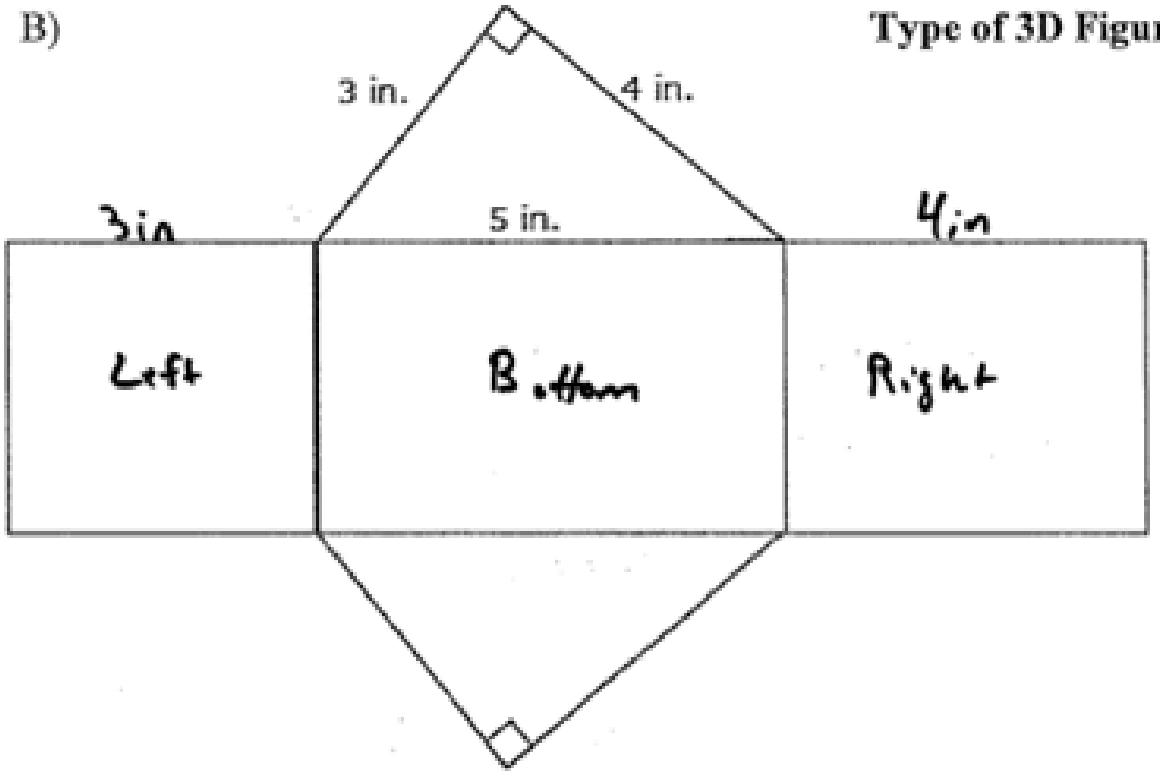
Sides $A = 6(4) = 24(2) = 48\ cm^2$

$96 + 64 + 48 = 208\ cm^2$

Area = $208\ cm^2$

B)

Type of 3D Figure → Triangular Prism



2 Bases $A = \frac{1}{2}(3)(4) = 6in^2$

$6(2) = 12in^2$

A of L□ $= 3(2.5) = 7.5in^2$

A of B□ $= 5(2.5) = 12.5in^2$

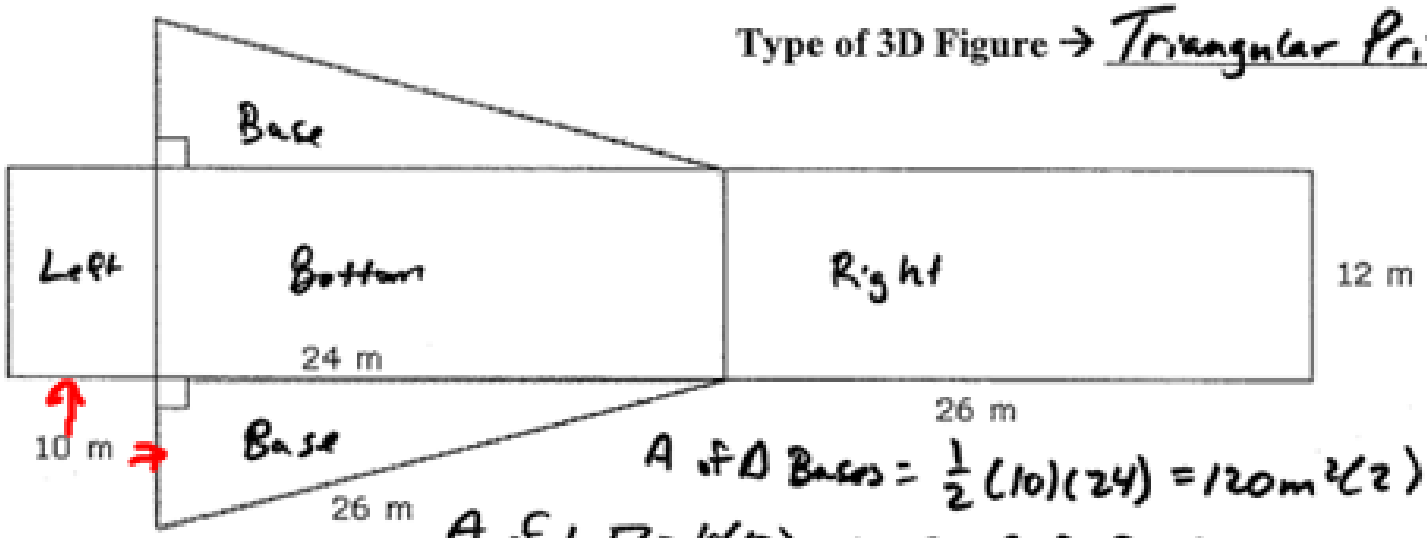
A of R□ $= 4(2.5) = 10in^2$

$12 + 7.5 + 12.5 + 10 = 42in^2$

Area = $42in^2$

C)

Type of 3D Figure → Triangular Prism



A of Δ Bases = $\frac{1}{2}(10)(24) = 120\,m^2(2) = 240\,m^2$

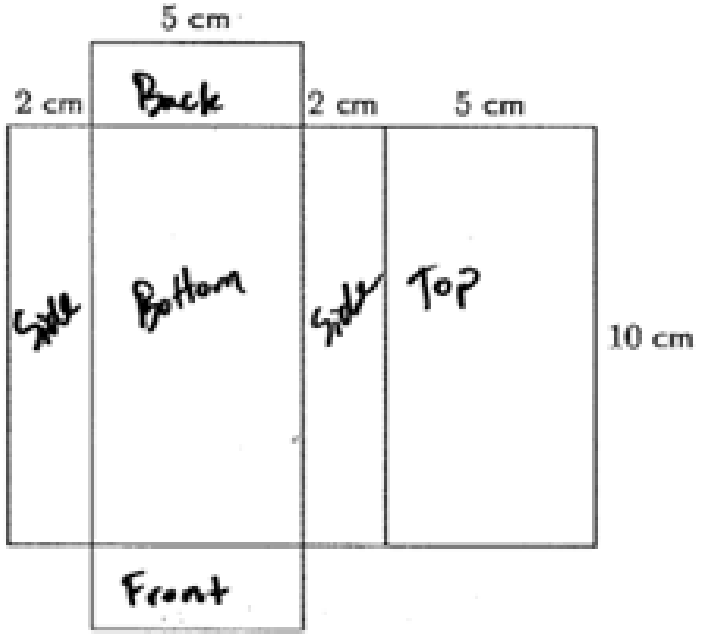
A of L□ = 10(12) = 120 m² A of B□ = 24(12) = 288 m²

A of R□ = 26(12) = 312 m²

240 + 120 + 288 + 312 = 960

Area = 960 m²

D)



Type of 3D Figure → Rectangular Prism

T + B $A = 5(10) = 50(2) = 100\ cm^2$

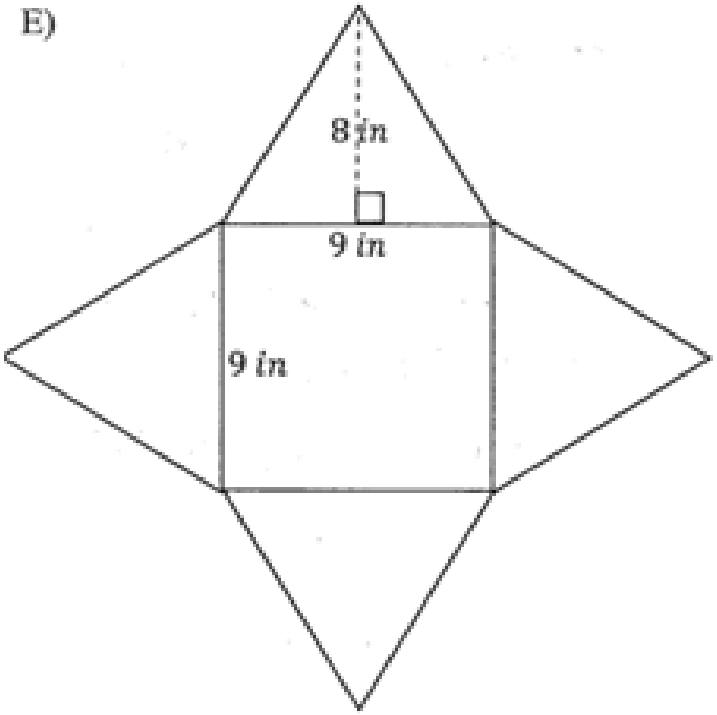
Sides $A = 2(10) = 20(2) = 40\ cm^2$

F + B $A = 2(5) = 10(2) = 20\ cm^2$

$100 + 40 + 20 = 160\ cm^2$

Area = $160\ cm^2$

E)



Type of 3D Figure → Square Pyramid

A of □ $= 9(9) = 81\ in^2$

A of Δ $= \frac{1}{2}(8)(9) = 36\ in^2$

$36(4) = 144\ in^2$

$81 + 144 = 225\ in^2$

Area = $225\ in^2$

Real-World Link

Message Board Members of a local recreation center are permitted to post messages on 8.5-inch by 11-inch paper on the board. Assume the signs are posted vertically and do not overlap, as shown below.

1. Suppose 6 messages fit across the board widthwise.

   What is the width of the board in inches? ☐ inches

2. Suppose 3 messages fit down the board lengthwise.

   What is the length of the board in inches? ☐ inches

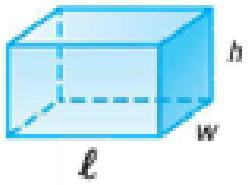
3. What is the area in square inches of the message board?

4. Messages can also be posted on the other side of the board. What is the total area of the front and back of the board in square inches?

Surface Area of a Rectangular Prism

Words The surface area $S.A.$ of a rectangular prism with base ℓ, width w, and height h is the sum of the areas of its faces.

Model



Symbols $S.A. = 2\ell h + 2\ell w + 2hw$

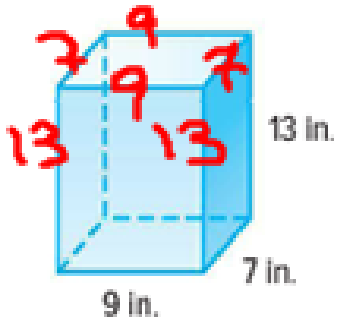
ONLY works with Rectangular Prism

The sum of the areas of all the surfaces, or faces, of a three-dimensional figure is the **surface area**. In the previous Inquiry Lab, you used a net to find the surface area of a rectangular prism. You can also use a formula to find surface area.

When you find the surface area of a three-dimensional figure, the units are square units, not cubic units.

Example

1. **Find the surface area of the rectangular prism shown at the right.**



Replace ℓ with 9, w with 7, and h with 13.

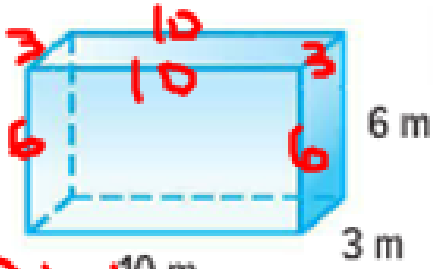
$$\begin{aligned}\text{surface area} &= 2\ell h + 2\ell w + 2hw \\ &= 2 \cdot 9 \cdot 13 + 2 \cdot 9 \cdot 7 + 2 \cdot 13 \cdot 7 \\ &= 234 + 126 + 182 \qquad \text{Multiply first. Then add.} \\ &= 542\end{aligned}$$

The surface area of the prism is 542 square inches.

Got it? Do these problems to find out.

Find the surface area of each rectangular prism.

a.



SA = 120 + 60 + 36 = 216 m²

A of F + B □ = 10(6) = 60 m²

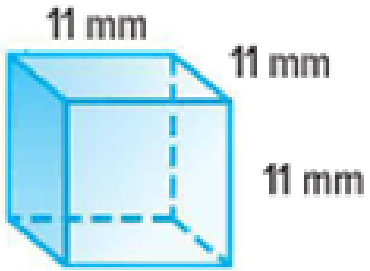
60(2) = 120 m²

A of T + B □ = 10(3) = 30 m²

30(2) = 60 m²

A of L + R □ = 6(3) = 18 m² → 18(2) = 36 m²

b.

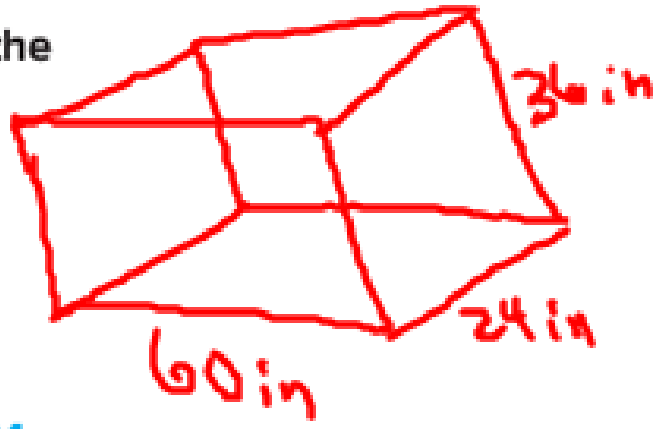


11(11) = 121 mm²

121(6) = 726 mm²

Example

2. **Domingo built a toy box 60 inches long, 24 inches wide, and 36 inches high. He has 1 quart of paint that covers about 87 square feet of surface. Does he have enough to paint the outside of the toy box? Justify your answer.**



Step 1 Find the surface area of the toy box.

Replace ℓ with 60, w with 24, and h with 36.

$$\text{surface area} = 2\ell h + 2\ell w + 2hw$$
$$= 2 \cdot 60 \cdot 36 + 2 \cdot 60 \cdot 24 + 2 \cdot 36 \cdot 24$$
$$= 8{,}928 \text{ in}^2$$

Step 2 Find the number of square inches the paint will cover.

$1 \text{ ft}^2 = 1 \text{ ft} \times 1 \text{ ft}$ Replace 1 ft with 12 in.

$= 12 \text{ in.} \times 12 \text{ in.}$ Multiply.

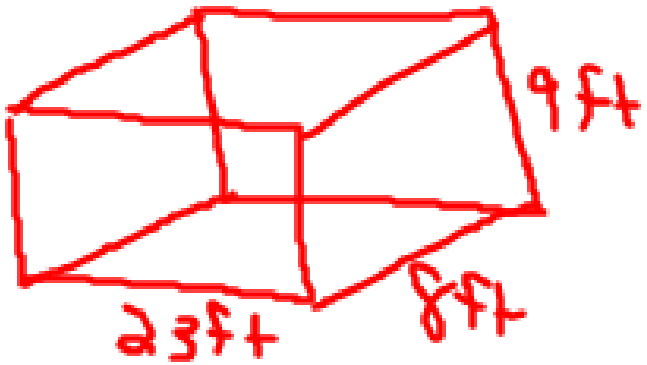
$= 144 \text{ in}^2$

So, 87 square feet is equal to 87×144 or 12,528 square inches.

Since $12{,}528 > 8{,}928$, Domingo has enough paint.

Got it? **Do this problem to find out.**

c. The largest corrugated cardboard box ever constructed measured about 23 feet long, 9 feet high, and 8 feet wide. Would 950 square feet of paper be enough to cover the box? Justify your answer.



A of F+B □ = 23(9) = 207(2) = 414 ft²

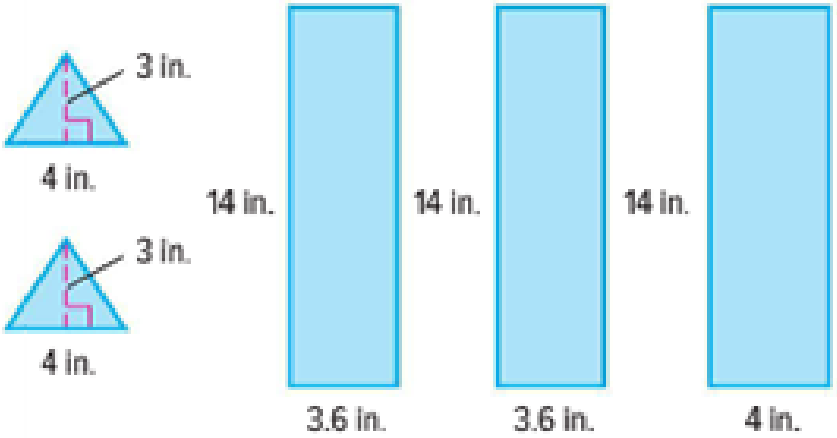
A of T+B □ = 23(8) = 184(2) = 368 ft²

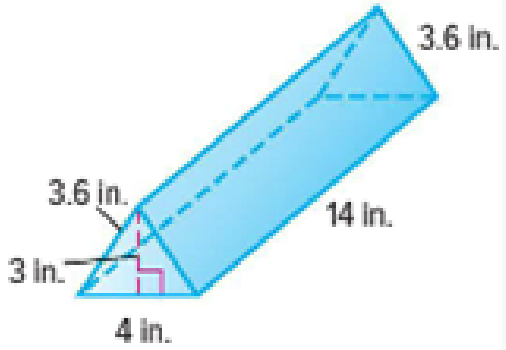
A of R+L □ = 8(9) = 72(2) = 144 ft²

SA = 414 + 368 + 144 = 926 ft²

Surface Area of Triangular Prisms

To find the surface area of a triangular prism, it is more efficient to find the area of each face and calculate the sum of all of the faces rather than using a formula.



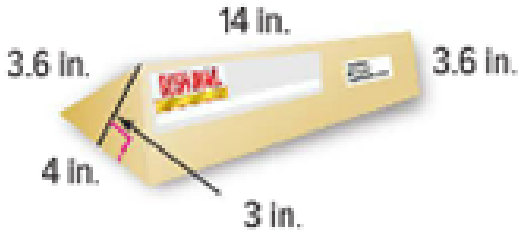


A of $\triangle = \frac{1}{2}bh$

Example

Tutor

3. **Marty is mailing his aunt the package shown. How much cardboard is used to create the shipping container?**



Find the area of each face and add.

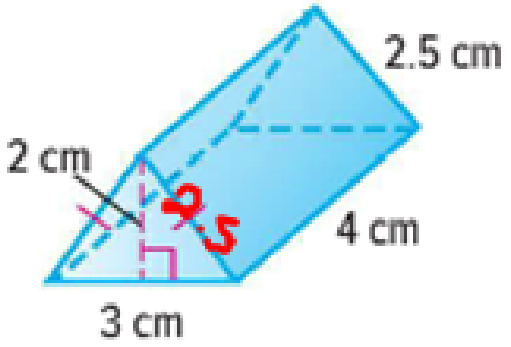
The area of each triangle is $\frac{1}{2} \cdot 4 \cdot 3$ or 6.

The area of two of the rectangles is $14 \cdot 3.6$ or 50.4. The area of the third rectangle is $14 \cdot 4$ or 56.

The sum of the areas of the faces is $6 + 6 + 50.4 + 50.4 + 56$ or 168.8 square inches.

Got it? **Do this problem to find out.**

d. Find the surface area of the triangular prism.



A of $\triangle s = \frac{1}{2}(2)(3) = 3\,cm^2$

$3(2) = 6\,cm^2$

A of Bottom $\square = 3(4) = 12\,cm^2$

A of R L $\square = 2.5(4) = 10\,cm^2$

$10(2) = 20\,cm^2$

$SA = 6 + 12 + 20$

$SA = 38\,cm^2$