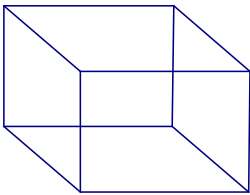


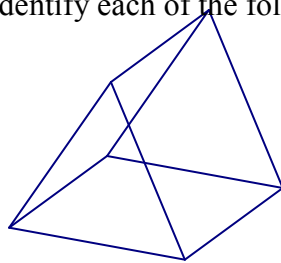
✚ homework check: FM10 p. 362 # 1 – 4

✚ note: Volume of Prisms and Pyramids

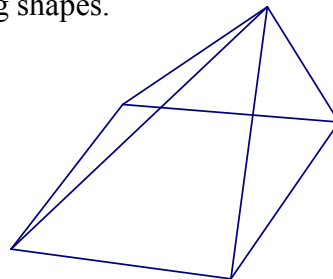
To find the volume of any three dimensional *prism*, we can multiply the *area of the base by the height*. To find the volume of any three dimensional *pyramid*, we can multiply the *area of the base by the height and divide the product by 3*. The important idea is the identification of the base. Since the walls of all prisms are rectangular, the base shape is usually the shape that is not rectangular (unless the three dimensional shape is a rectangular prism). For instance identify each of the following shapes.



rectangular prism

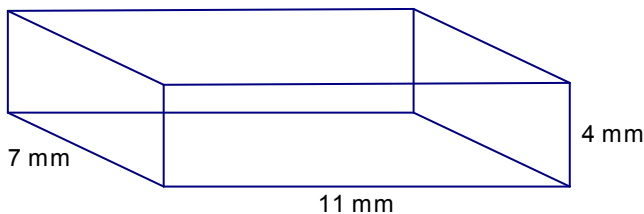


triangular prism



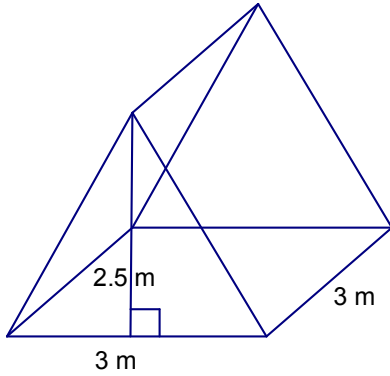
rectangular based pyramid

Find the volume of each of the given shapes. Remember it is important to identify the uncommon face as the base of the shape.



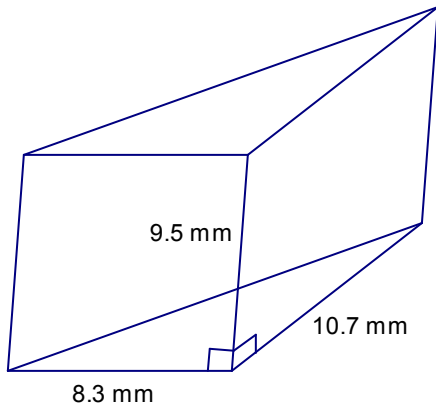
$$\begin{aligned}Area_{base} &= lw \\ &= 11(7) \\ &= 77mm^2\end{aligned}$$

$$\begin{aligned}Volume_{prism} &= A_b h \\ &= 77(4) \\ &= 308mm^3\end{aligned}$$



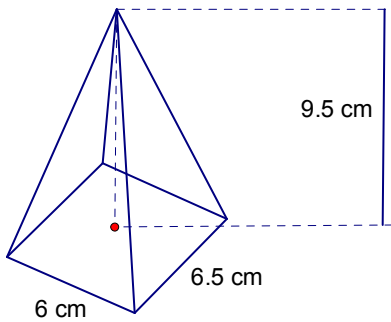
$$\begin{aligned} Area_{base} &= \frac{bh}{2} \\ &= \frac{3(2.5)}{2} \\ &= 3.75m^2 \end{aligned}$$

$$\begin{aligned} Volume_{prism} &= A_{base}h \\ &= 3.75(3) \\ &= 11.25m^3 \end{aligned}$$



$$\begin{aligned} Area_{base} &= \frac{bh}{2} \\ &= \frac{8.3(9.5)}{2} \\ &= 44.405mm^2 \end{aligned}$$

$$\begin{aligned} Volume_{prism} &= A_{base}h \\ &= 44.405(10.7) \\ &= 475.1335mm^3 \end{aligned}$$



$$\begin{aligned} Area_{base} &= lw \\ &= 6(6.5) \\ &= 39cm^2 \end{aligned}$$

$$\begin{aligned} Volume_{pyramid} &= \frac{A_{base}h}{3} \\ &= \frac{39(9.5)}{3} \\ &= 123.5cm^3 \end{aligned}$$

✚ homework assignment: **FM10** p. 367 # 1 – 6 a, c, of each

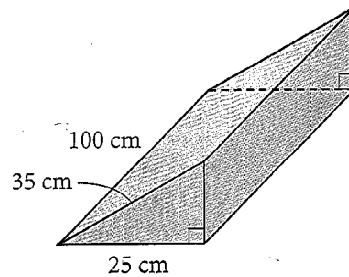
## Key Concepts

- The volume of an object is the amount of space occupied by the object.
- Volume is measured in cubic units.
- To find the volume of a prism, multiply the area of the base by the height of the prism.
- The volume of a pyramid is one third the volume of a prism with the same base and height.

### Discuss the Concepts

**D1.** Gundeep calculates the volume of a rectangular prism with width 5 cm, height 4 cm, and length 8 cm to be  $160 \text{ cm}^2$ . What is his mistake?

**D2.** Isaac says that to find the volume of this triangular prism, he needs to use the Pythagorean theorem to find the height of the triangular face. Is Isaac correct? Explain why or why not.



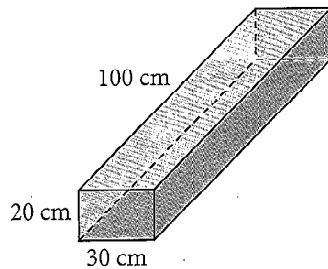
## Practise the Concepts

**A**

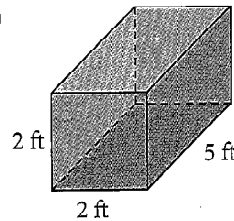
For help with question 1, refer to Example 1.

1. Find the volume of each prism.

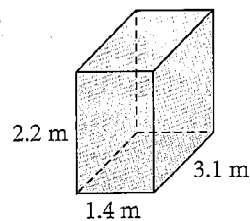
a)



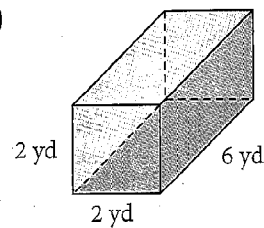
b)



c)

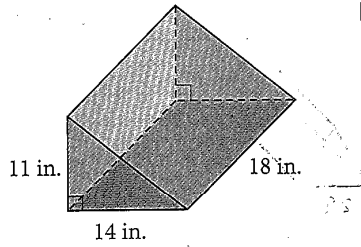


d)

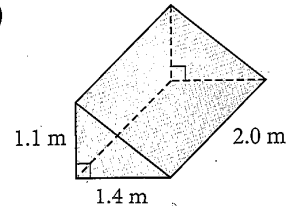


2. Find the volume of each prism.

a)



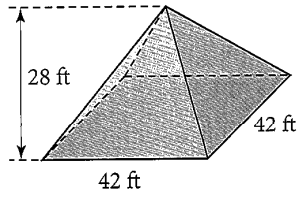
b)



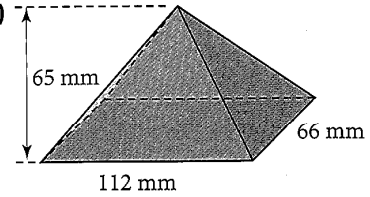
For help with question 3, refer to Example 2.

3. Find the volume of each pyramid.

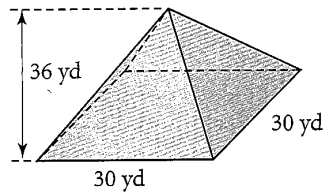
a)



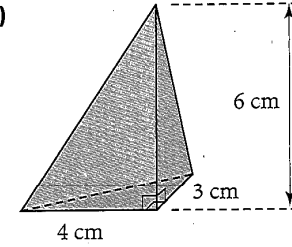
b)



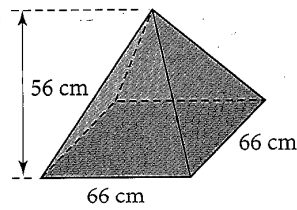
c)



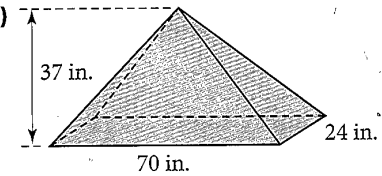
d)



e)



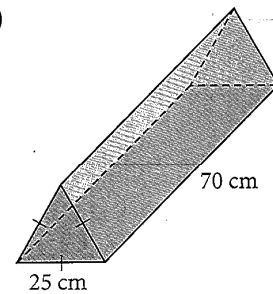
f)



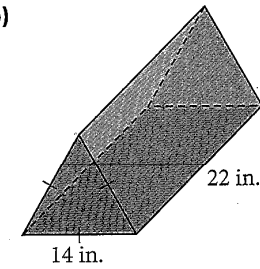
For help with question 4, refer to Example 3.

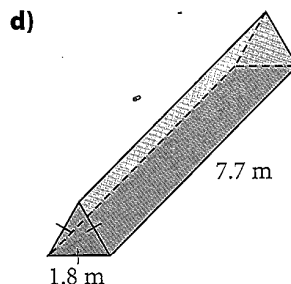
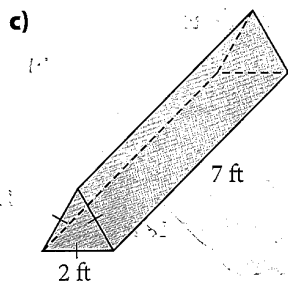
4. Find the volume of each triangular prism.

a)

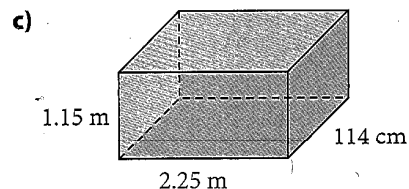
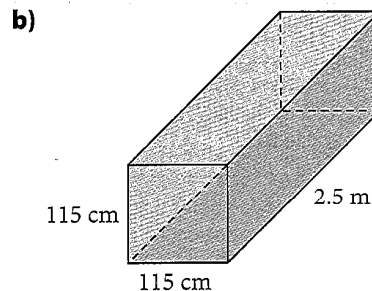
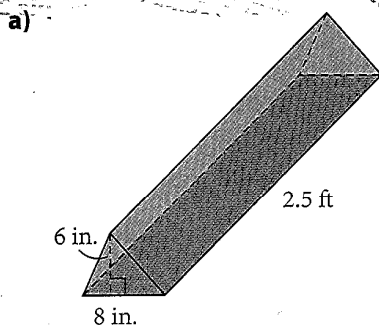


b)

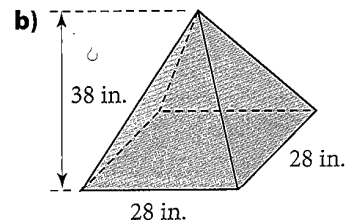
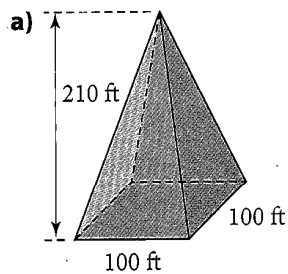




5. Find the volume of each prism.



6. Find the volume of each square-based pyramid.



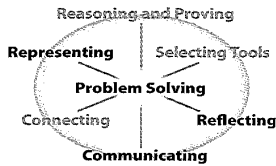
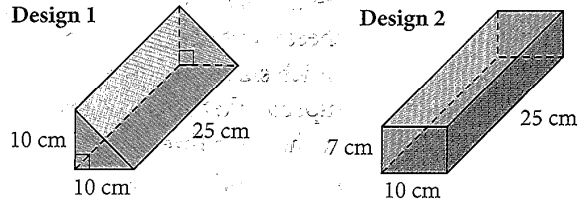
**Apply the Concepts** **B**

**Literacy Connect**

6. Which has the greater volume, a rectangular prism with length 3", width 4" and height 5", or a cube with edges 4" long?
7. The most efficient way to package something is to leave very little space between the item and the package, so you can load the maximum number of items on a truck without a lot of wasted space. Think about buying a computer, television, or other piece of electronic equipment. Work with a partner to suggest some reasons for the way in which these items are packaged. Record your work.

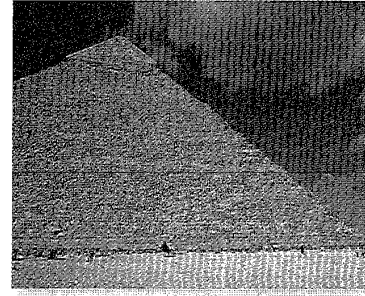
**Chapter Problem**

8. Vanessa is deciding on packaging for her ski and snowboard goggles. She has narrowed the design of the box down to these possibilities:

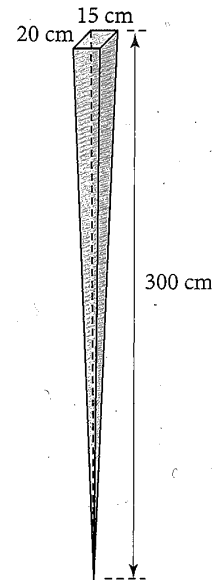
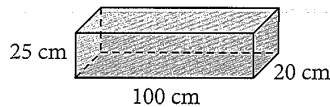


- Which package would be more efficient to ship and to store? Explain.
- Which package would be more appealing to consumers? Why?
- Which package should Vanessa use? Why?

9. Pharaoh Khufu's pyramid is one of the Pyramids of Giza in Egypt. It was built of limestone and granite in about 2566 B.C.E. Over time, some of the stone has worn away. The length of the square base was originally 754 ft, but is now 745 ft. The height of the pyramid was originally 481 ft, but is now 449 ft.



- Find the volume of stone in the pyramid originally.
  - Find the volume of stone in the pyramid now.
  - What volume of stone has worn away?
10. A polymer resin is to be mixed in a rectangular container with length 100 cm, width 25 cm, and depth 20 cm. The resin will be poured into a rectangle-based pyramid mould with dimensions 15 cm by 20 cm at the base and height 300 cm.

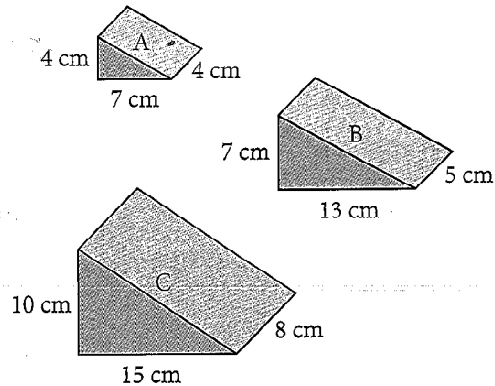


- Find the volume of the rectangular container.
- Find the volume of the mould.
- Is the rectangular container large enough to mix the resin for the mould? Explain.

**Achievement Check**

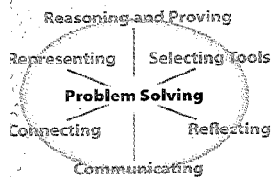
**11.** Drew is buying groceries. He wants to buy some cheese, but he is not sure which size to get. The supermarket sells wedges of cheese in three sizes.

- Find the volume of cheese in each wedge.
- Suppose cheese wedge A costs \$3.50, B costs \$4.75, and C costs \$6.50. Which is the best buy? Explain and justify your answer.

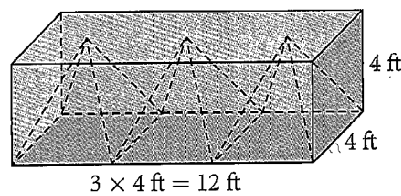


**Extend the Concepts**

**C**



**12.** Three identical square-based pyramids are to be created by cutting a rectangular piece of foam that is 4 ft by 4 ft by 12 ft as shown. The base of each pyramid has side length 4 ft and height 4 ft.



What volume of material is used in creating the three pyramids?

**13.** Discuss the effects that making the following changes would have on the volume of a rectangular prism with length  $l$ , width  $w$ , and height  $h$ .

- The length and width are both doubled.
- The height increases by a factor of three and the width decreases to one third of its original value.
- All three measurements are doubled.
- The length triples and the height and width decrease to half of their original values.
- What would be the effect on the volume of a rectangular prism if its length were to triple in value? Explain your answer.

