



SURFACE AREA, PERIMETERS & CUBIC VOLUME

6

TIME FOR MATH

Unit Summary...

This “Time for Math!” unit will give you an opportunity to practice all of your math skills (addition, subtraction, multiplication and division) in some fun examples of math problems you can expect to encounter as a Building Performance professional.



Math skills help you make the best decisions for your customer

LEARNING OBJECTIVES

- *Be able to calculate linear feet, square footage and cubic volume with both pencil & paper and a calculator*



INSTRUCTOR NOTES & SUGGESTIONS

Here are the answers for the examples in this unit:

TEST YOUR KNOWLEDGE: ANSWERS

Exercise 1:

Example Provided

$$22' \times 64' = 1,408 \text{ sq ft}$$

$$30' \times 9' = 270 \text{ sq ft}$$

Exercise 2:

Example Provided

$$21' + 12' + 10' + 18'6'' + 11 + 18' 6'' + 12' = 103 \text{ linear feet}$$

$$32' + 90' + 32' + 32' + 14' + 30' + 14' + 28' = 272 \text{ linear feet}$$

Exercise 3:

Example Provided

$$14' \times 8' \times 42' = 4,704 \text{ cu ft}$$

$$14' \times 18' \times 8' = 2,016 \text{ cu ft}$$

$$2016' + 4704' = 6720 \text{ cu ft}$$

EXTRA CREDIT ANSWERS

$$8' \times 8' \times 10' = 640 \text{ cu ft}$$

$$6' \times 7' \times 8' = 336 \text{ cu ft}$$

$$36' \times 10' \times 8' = 2880 \text{ cu ft}$$

$$2880' + 336' + 640' = 3,856 \text{ cu ft}$$

$$7' \times 5' \times 8' = 280 \text{ cu ft of utility closet}$$

$$3856' - 280' = 3,576 \text{ cu ft of living space}$$



ACTIVITY...

Enhance your knowledge by completing this activity.

APPLY IT

The following examples are what you can expect to see when you are hired as a Building Performance professional.

NOTE: These diagrams are NOT drawn to scale and some numbers have been left out. This is not an accident and all of the information you need to find the answers is there.

We have done this on purpose to prepare you for how it is on the job. It may be common for your boss to hand you a piece of paper with a diagram that's not drawn to scale and is missing numbers. Your boss will expect you to be able to figure it out. Don't get frustrated and try to work through the problems. If you need help, ask. Work with a partner to complete the following exercise.

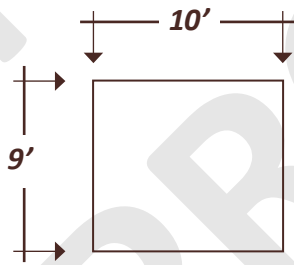
Remember: Employers look for employees who are able to work with a partner or on a team. This is a great chance to improve your teamwork skills.

TEST YOUR KNOWLEDGE

EXERCISE 1

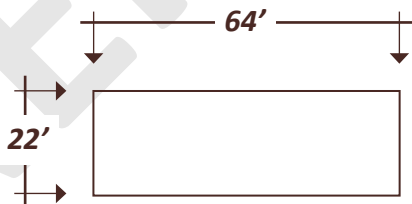
Your supervisor asks you to determine the square footage of the crawlspace so she knows how much vapor barrier it will take to cover the floor of the crawlspace. Using these diagrams of the crawlspace, determine the area. Remember to give your answers in square footage.

1. Example:



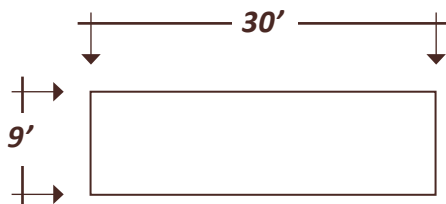
$$10' \times 9' = 90'$$

2. Calculate the following:



$$\underline{\hspace{1cm}} \times \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$$

3. Calculate the following:



$$\underline{\hspace{1cm}} \times \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$$

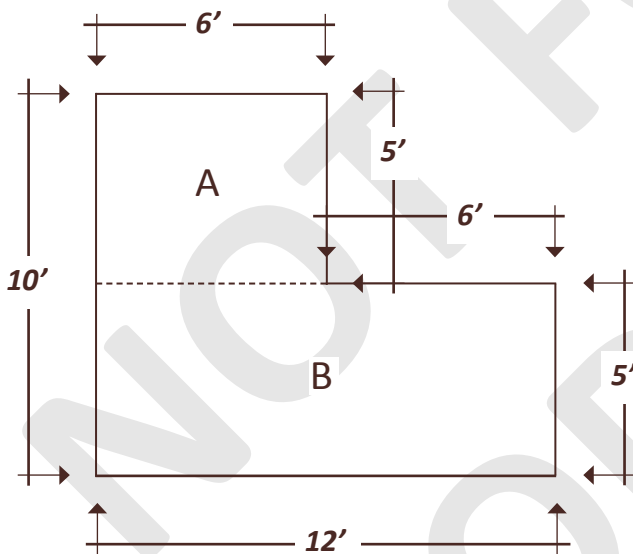
The first two examples were houses that were a square and rectangle which made them easy. But in the real world, sometimes floor plans aren't so easy or simple and we still have to work with them. For instance, look at the next two examples. How are you going to work through the problems?

Look at the shapes and figure out a way to cut them up into familiar pieces like squares and rectangles.

EXERCISE 2

Your supervisor needs to know the volume of a home for a Blower Door calculation. An old trick is to measure the perimeter of the home (in linear feet) to find the square footage. Then, to find the volume of the home, you multiply the square footage by the ceiling height. This means you need to find the perimeter of the home first. Give BOTH the linear footage and the square footage for these examples.

1. Example:



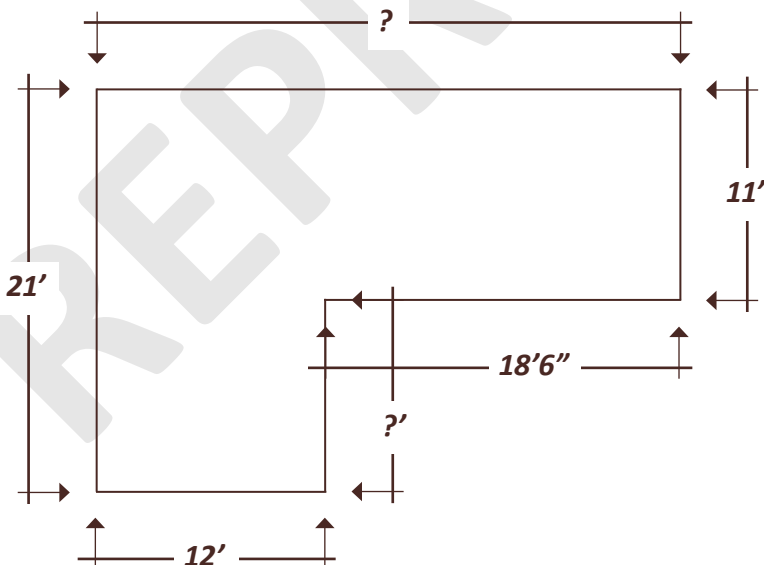
To calculate the perimeter, add up all of the sides of the building.

- Perimeter: $6' + 5' + 6' + 5' + 12' + 10' = 44'$
- Area of A: $6' \times 5' = 30 \text{ sq. ft.}$
- Area of B: $12' \times 5' = 60 \text{ sq. ft.}$
- $A + B = \text{Total square footage}$
 $30' + 60' = 90 \text{ sq. ft.}$



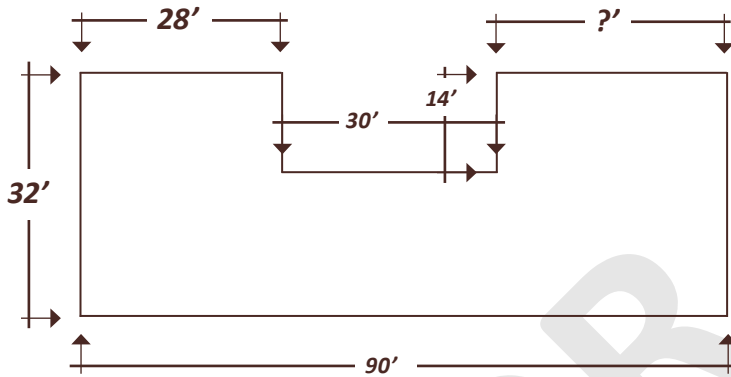
You may see square footage represented with this symbol:

2. Calculate the following:



- Perimeter: _____
- Square Footage: _____

3. Calculate the following:

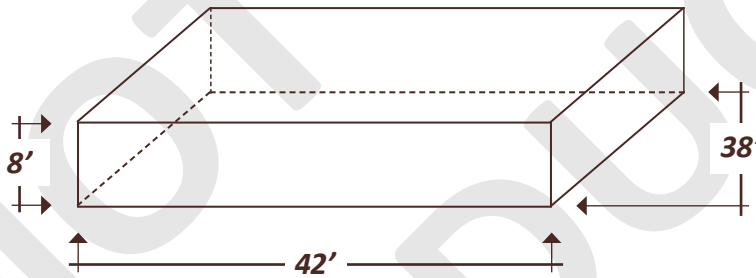


- Perimeter: _____
- Square Footage: _____

EXERCISE 3

You are the crew leader on a new job site. You have to determine how many cubic feet are in the living space of a home as part of your Combustion Ventilation Air (C.V.A.) assessment. Determine the volume (in cubic feet), area (in square footage) and the perimeter (in linear footage) in the following two homes:

1. Example:



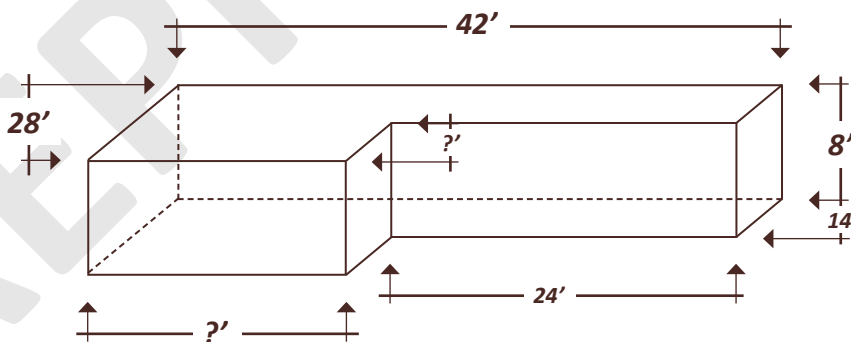
To calculate the cubic volume, multiply the length, width, and height of the building.

$$8' \times 42' \times 38' = 12,768'$$

Tricks of the Trade:

You can save a little time when calculating cubic volume if you have already calculated the square footage. Just multiply the square footage (length x width) by height.

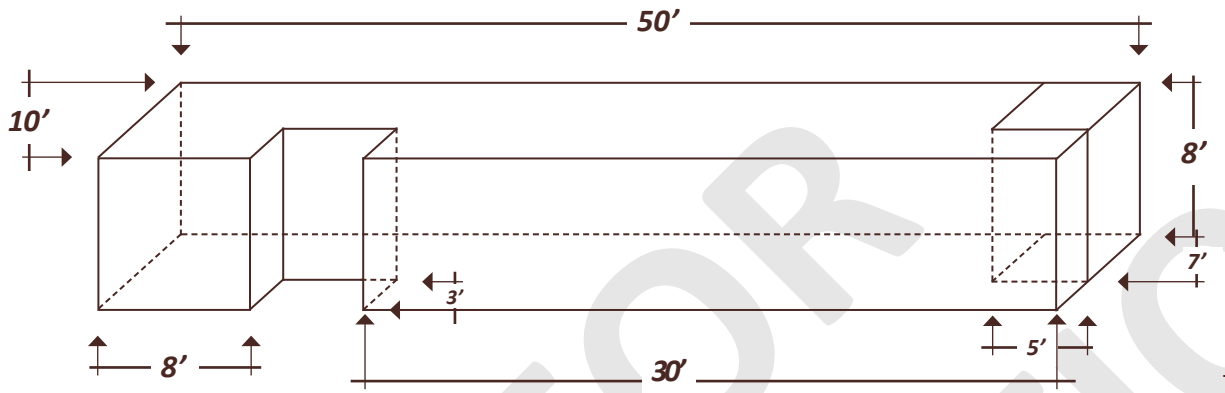
2. Calculate the following:



- Perimeter: _____
- Square Footage: _____
- Volume: _____

EXTRA CREDIT

Your supervisor wants you to determine how many cubic feet are in just the living space of the following home. The area in $7' \times 5' \times 8'$ area in the back right corner is an unconditioned furnace room.



- Perimeter: _____
- Square Footage: _____
- Volume: _____



SHOW YOUR WORK

This area is reserved for problem solving...

A large, light gray rectangular area with rounded corners, intended for students to show their work on a problem-solving task.

