

## Measurements/Geometry: Carpenter (1)

Pacific Star Cabinetry

Job Description: Carpenter

---

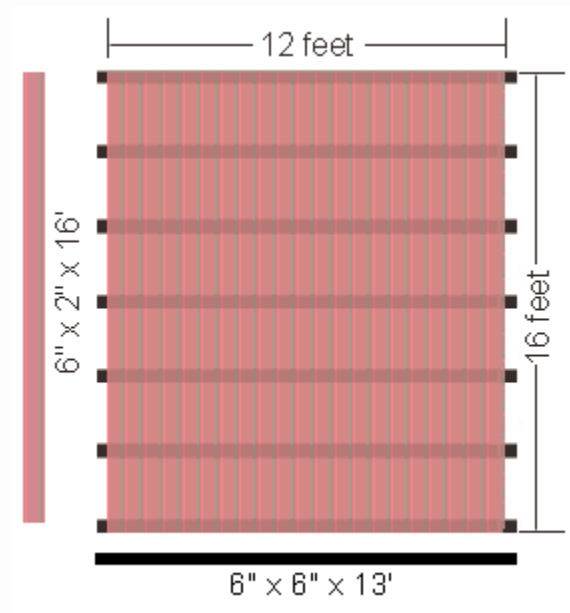
### Problem:

Determine the lumber cost of a 12' x 16' redwood deck for a hot tub.

Solid lumber is sold by the board footage. A board foot is defined as a piece of lumber 1 inch thick by 12 inches wide by 12 inches long, or 144 cubic inches.

The 2" x 6" premium-grade redwood used for decking is \$1.35 per board foot and is cut 16' long to lay across treated framing.

The seven 6" x 6" treated framing are \$1.25 per board foot and are cut 13 feet long. How far apart should the framing be?



## Measurements/Geometry: Carpenter (1)

### Pacific Star Cabinetry

Job Description: Carpenter

*See problem for details.*

### Solution:

Use the following formula to determine the amount of board feet in the deck:

- $T \times W \times L \div 144" = \text{board feet}$
- T = thickness in inches
- W = width in inches
- L = length in inches

Decking redwood = 2" thick x 6" wide

(12' x 12") width of deck  $\div$  6" width of board = 24 boards

(2" x 6" x (16' x 12")) length of deck  $\div$  144" = 2,304"  $\div$  144" = 16 board feet each

16 x 24 boards = 384 board feet x \$1.35 = **\$518.40 for decking**

Framing = 6" x 6" thick x 13'

6" x 6" x (13' x 12")  $\div$  144" = 5,616 in  $\div$  144" = 39 board feet each

39 x 7 boards = 273 board feet x \$1.25 = **\$341.25 for treated posts**

518.40 + 341.25 = **\$859.65 total cost of lumber**

### Calculate length of space between posts:

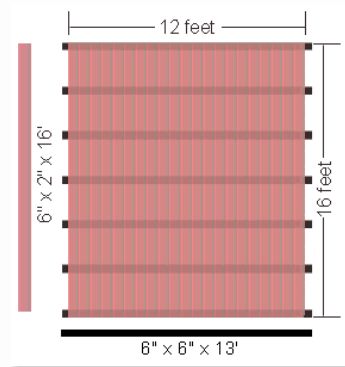
Number of spaces x (width of board + width of space) + extra width of board

$$6(6" + s) + 6" = 36" + 6s + 6" = 192"$$

$$6s + 42" = 192"$$

$$6s = 192" - 42" = 150"$$

Length of space =  $150" \div 6 = 25"$  **between boards**



## Measurements/Geometry: Carpenter (2)

**Dan Roman Construction**

**Job Description:** Builds residential homes.

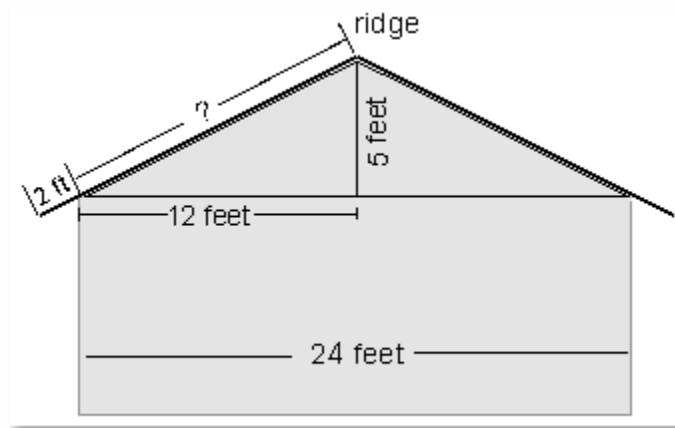
---

### Problem:

A customer would like a bonus room to be added to an existing home. The new room is to be 26' x 24' with an 8' ceiling and a 2' roof overhang. The ridge of the roof is to be centered over the 24 foot wall and 5 feet above the top of the wall of the bonus room.

Assuming the builder uses standard 4' x 8' plywood sheets, determine the following:

1. How many plywood sheets will be needed to cover the walls of the bonus room (not accounting for doors or windows).
2. How many plywood sheets will be necessary to cover the roof over the bonus room.



## Measurements/Geometry: Carpenter (2)

**Dan Roman Construction**

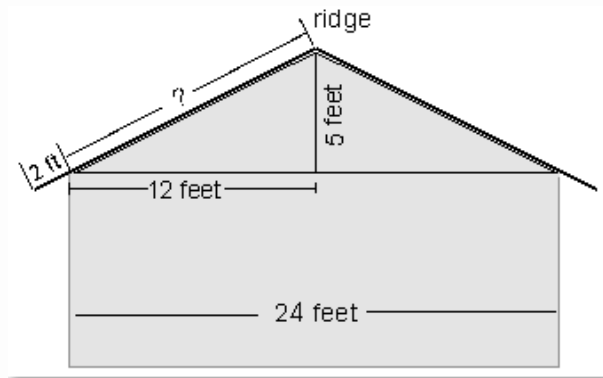
**Job Description:** Builds residential homes.

### Problem:

A customer would like a bonus room to be added to an existing home. The new room is to be 26' x 24' with an 8' ceiling and a 2' roof overhang. The ridge of the roof is to be centered over the 24 foot wall and 5 feet above the top of the wall of the bonus room.

Assuming the builder uses standard 4' x 8' plywood sheets, determine the following:

1. How many plywood sheets will be needed to cover the walls of the bonus room (not accounting for doors or windows)?
2. How many plywood sheets will be necessary to cover the roof over the bonus room?



### Solution:

1. To find how many sheets will be necessary for the 4 walls, divide the area of the walls by the area of a plywood sheet (not allowing for doors or windows).

$$[(2 \text{ walls}) (26' \times 8') + (2 \text{ walls}) (24' \times 8')] \div 4' \times 8' \text{ plywood sheet}$$

$$[(2 \times 208 \text{ sq ft}) + (2 \times 192 \text{ sq ft})] \div 32 \text{ sq ft} = 25 \text{ sheets of plywood for the walls.}$$

2. To find how many sheets will be necessary for the roof, divide the total area of the roof (2 equal sides) by the area of a plywood sheet.

The ridge of the roof is 26 feet and the overhang is 2 feet. The height of the roof is 5 feet. Find the area of each side of the roof by calculating the length from the ridge to the edge ( $a^2 + b^2 = c^2$ ), adding the overhang, and multiplying the total length by the width (ridge).

$$5^2 + 12^2 = c^2 \quad 25 + 144 = c^2 = 169 \quad c = 13 \text{ ft} = \text{length ridge to edge}$$

$$\text{Roof area: } (2' + 13') \times 26' = 390 \text{ sq ft} \times 2 \text{ (both sides)} = 780 \text{ sq ft}$$

Now divide by the plywood sheet dimension:

$$780 \text{ sq ft} \div 4' \times 8' \text{ sheets} = 24.375 \text{ or } \mathbf{25 \text{ sheets of plywood for the roof}}$$