

## Measurements/Geometry: Architect

James Gipson Associates

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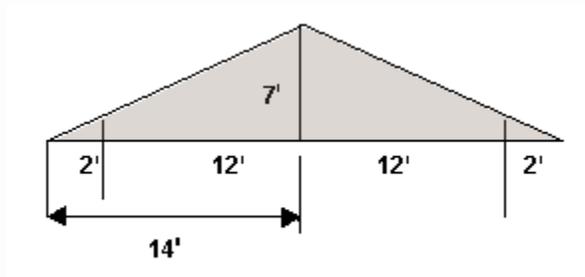
### Problem:

#1 John and Joan are planning a new home. They want as much window area as possible. The local energy code permits a maximum window area of 17% of the house floor area.

The windows John and Joan will use are each 3 ft. x 5 ft. and the floor area of the house is 1,720 square feet. How many windows can they put into their new house?

#2 Karen is figuring how many bundles of shingles to order for the roof on a garage. The garage is 24 ft. x 24 ft., with a single roof ridge down the middle, plus a 2 ft. overhang all around.

Three bundles of shingles are required for each 100 sq. ft. of roof. How many bundles of shingles should Karen order?



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Three bundles of shingles are required for each 100 sq. ft. of roof. How many bundles of shingles should Karen order?

### Solution:

#1 17% of 1,720 sq. ft. = 292.4 sq. ft.

Each window is 3' x 5' or 15 sq. ft.

$$292.4 \div 15 = 19.49$$

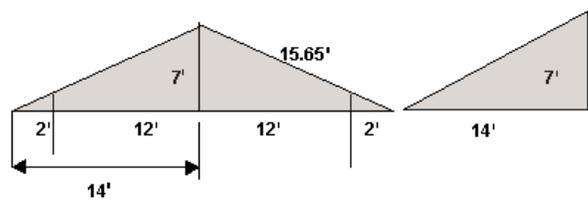
Therefore, John and Joan can have at most 19 windows.

#2 Consider the end view of the roof as two right triangles, each with a base of 12' + 2' = 14' and a height of 7'.

$$a^2 + b^2 = c^2$$

$$7^2 + 14^2 = c^2 = 245 \text{ sq. ft.}$$

$$c = 15.65 \text{ ft.}$$



Area of half the roof = 15.65' x (24' + 4') = 438.2 sq. ft.

Area of the roof = 438.2 x 2 = 876.4 sq. ft.

The number of shingle bundles required = area of roof  $\div$  33  $\frac{1}{3}$

$$876.4 \div 33 \frac{1}{3} = 26.29$$

Therefore, Karen should order 27 bundles.