

2.3 Pitch Notes

The slope of a roof is often referred to as its pitch. The slope or pitch of a roof is determined by the vertical rise in inches for every 12 inches of length or run.

Flat roof: less than 2:12

Low slope 2:12 - 4:12

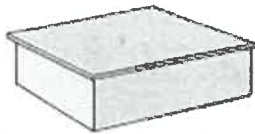
Conventional slope roof: 4:12 – 9:12

Higher slope roofs 9:12 - 20:12

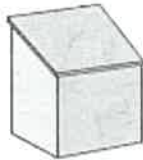
Steep slope 21:12 or higher

Roof slope is important in roof design as it affects many components such as: the interior volume of the building, the drainage, the style and the material used for covering. For example, if you notice water collecting on the roof the problem is probably related to the pitch. The style is affected too because the framing of the roof changes the pitch.

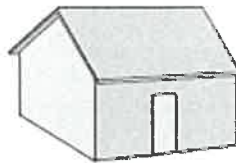
Types of Roof Designs



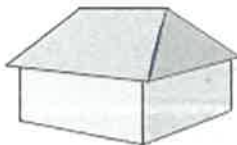
flat



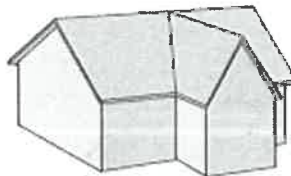
lean-to



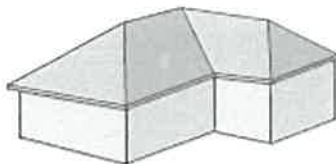
gable



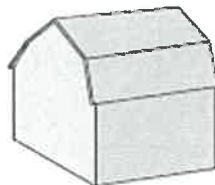
hip



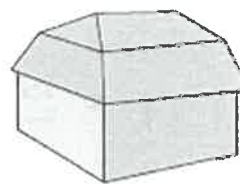
cross-gabled



cross-hipped



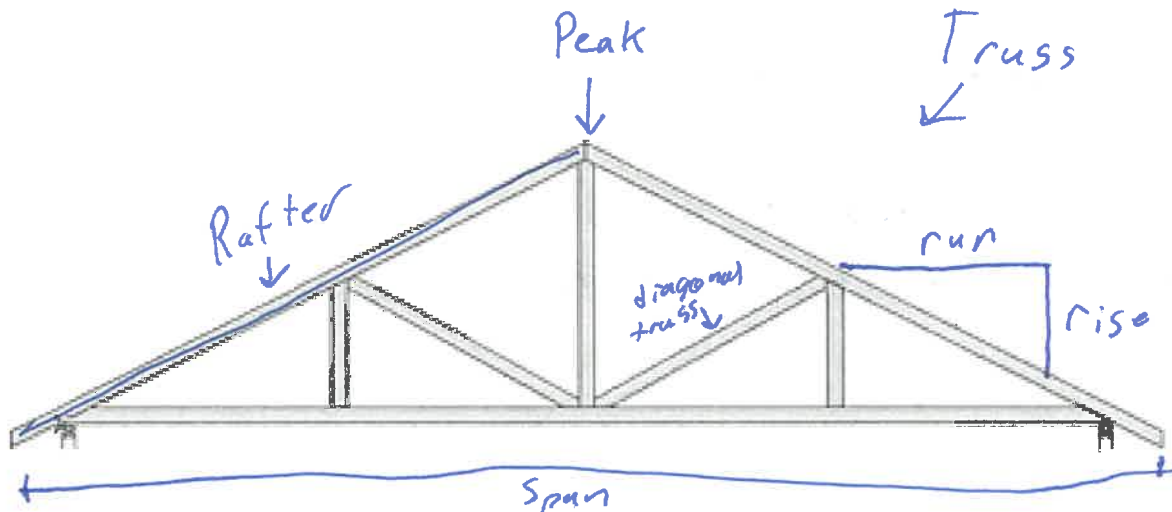
gambrel



mansard

Roofing terminology

Truss rafter peak span pitch



Always round pitch to nearest whole numbers!

Examples

1. If a roof has a rise of 4 and a run of 12, calculate the pitch and express it as a ratio.

$$\text{pitch} = \frac{\text{rise}}{\text{run}}$$

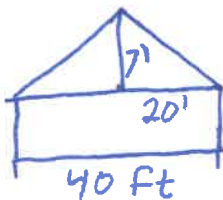
$$= \frac{4}{12}$$

4:12 pitch

$$\frac{4 \div 4}{12 \div 4} = \frac{1}{3} \quad \text{or} \quad \underline{1:3}$$

lowest terms
ratio

2. If the total span of a house is 40 feet and the roof rises 7 feet at its peak, what is the pitch?



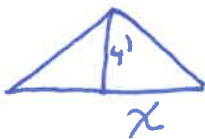
$$p = \frac{\text{rise}}{\text{run}}$$

$$= \frac{7'}{20'} = \frac{x}{12'}$$

$$x = 4.2$$

$$\frac{4:12}{\text{pitch}}$$

3. If a roof has a pitch of 3:12 and the roof has a rise of 4 feet, what is its run?

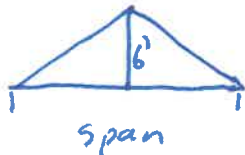


$$p = \frac{\text{rise}}{\text{run}}$$

$$= \frac{3}{12} = \frac{4}{x}$$

$$\underline{\underline{x = 16'}}$$

4. What is the total span of a roof that has a pitch of 3:12 and a total rise of 6 feet?

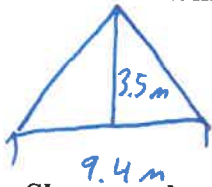


$$p = \frac{\text{rise}}{\text{run}}$$

$$\text{span} = 24 \times 2 = 48'$$

$$\frac{3}{12} = \frac{6'}{x} \quad x = 24'$$

5. What is the pitch of the roof of an A-frame building if the height from rafter to the peak is 3.5m and the house is 9.4m wide?



$$9.4 \div 2 = 4.7m$$

$$\text{pitch} = \frac{\text{rise}}{\text{run}}$$

pitch

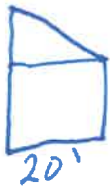
9:12

$$= \frac{3.5}{4.7} = \frac{x}{12} \quad x = 8.94$$

Show you know:

1. The sloped roof of a tool shed has a pitch of 2:12. If the shed is 20 feet deep, what is the rise of the roof?

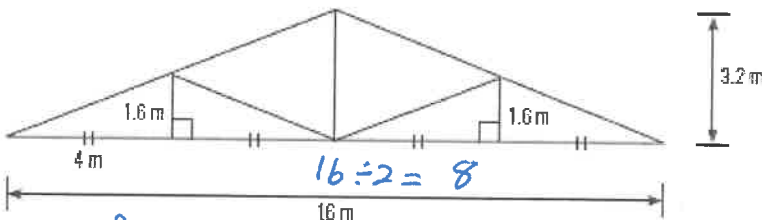
$$p = \frac{\text{rise}}{\text{run}}$$



$$\frac{2}{12} = \frac{x}{20}$$

$$x = 3.33'$$

Example Calculate the pitch of the roof and of the diagonal trusses.



$$\text{roof}$$

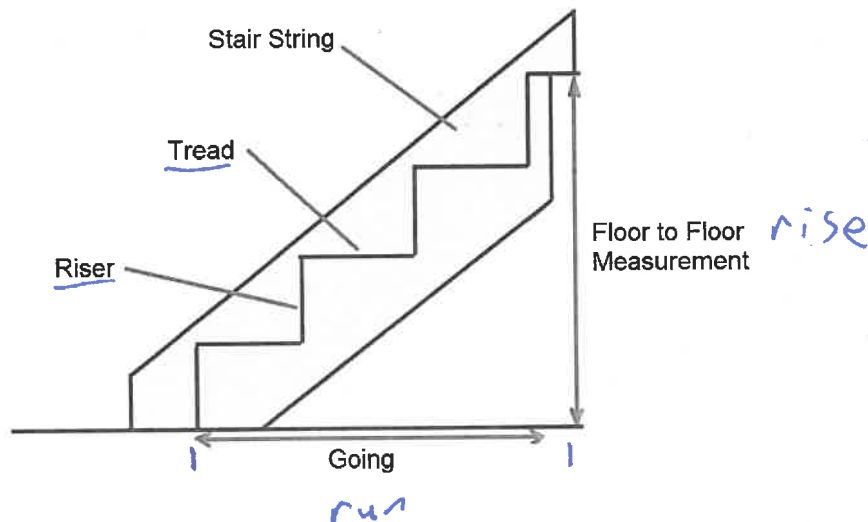
$$p = \frac{\text{rise}}{\text{run}}$$

$$= \frac{3.2}{8} = \frac{x}{12}$$

$$x = 4.8$$

$$\text{pitch} = 5:12$$

Pitch is also used to describe the slope of stairs and gravity drained sewer pipes such as found in your house or septic field. Let's look at the components of a staircase:



Example

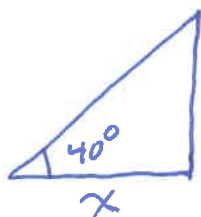
A staircase with a rise of 45" has 5 steps.

- a) Find the height of each step.

$$\frac{45''}{5 \text{ steps}} = \frac{x}{1 \text{ step}}$$

$$x = 9'' \text{ per step}$$

- b) If the angle of incline of the staircase is 40°, find the length of the staircase (the 'going') and the depth of each tread.



$$\tan = \frac{o}{A}$$

$$\frac{\tan 40^\circ}{1} = \frac{45''}{x}$$

$$x = 53.63''$$

$$53.63 \div 5 = 10.73''$$