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|  | **Roof Framing Calculations** |  |
|  |  |  |

**• Span**. In roof framing, span is the horizontal distance from the outside of one exterior wall to the outside of the other (opposing) exterior wall.

**• Slope**. Slope is the inclination of the roof surface expressed as the relationship of rise to run. It is expressed in a ratio as the unit of rise in inches, to run in inches, which is always 12 (*y*/*x* or *y*/12).

**• [Total]** **Run**. Run is the horizontal distance from the outside of the top plate of an exterior wall to the center line of the ridge-board. This is normally ½ the span.

**TOTAL RUN = SPAN ÷ 2**

**• Odd Unit**. In roof framing, an odd unit is any amount of the run that is less than a foot.

**ODD UNIT = TOTAL RUN (in inches) – 12x**, where x = total number of feet

**• Projection.** The *horizontal measurement* of the how far a rafter extends beyond the building is its projection.

**• [Total]** **Rise**. Rise is the total height of the roof from the top plate to the top of the ridge.

**• Line Length.** Line length is the actual length of the rafter, measured as the hypotenuse of a triangle. It is found by using the Pythagorean Theorem with the run (in inches) plus projection as the base, and the total rise (in inches) as the leg of a right triangle. This length may be simplified to Feet + Inches.

**LINE LENGTH2 = (Total Run + PROJECTION)2 + TOTAL RISE2**

**• Pitch.** Pitch is the relationship between the total rise (in inches) to the span (in inches), expressed as a ratio.

**PITCH = TOTAL RISE / SPAN**

**Exercise (25 pts.)**

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  | **a.** | **b.** |  | **c.** | **d.** | **e.** |
|  | **Span** | **Slope** | **[Total] Run** | **Odd Unit** | **Projection** | **[Total] Rise** | **Line Length** | **Pitch** |
| **EX.** | 6’ – 0” | 3/12 | 3’ – 0” | 0” | 6” | 9” | 42 15/16” | 9”/72” = 1/8 |
| **1.** | 10’ – 0” | 4/12 |  |  | 0” |  |  |  |
| **2.** | 15’ – 0” | 5/12 |  |  | 6” |  |  |  |
| **3.** | 21’ – 10” | 6/12 |  |  | 12” |  |  |  |
| **4.** | 20’ – 7 ½” | 4/12 |  |  | 6” |  |  |  |
| **5.** | 22’ - 9 ½” | 5/12 |  |  | 18” |  |  |  |