Useful Calculations
Chapter 1

**Total Rise**

\[
\text{Total distance from rough floor to rough floor} + \text{Thickness of upper finished floor} - \text{Thickness of lower finished floor} = \text{Thickness rise (Finished floor to floor)}
\]

**Number of Risers**

\[
\frac{\text{Total rise (Finished floor to floor)} + \text{Maximum unit rise}}{\text{Number of risers}} = \text{Number of risers}
\]

(Rounded to the next highest whole number)

**Unit Rise**

\[
\frac{\text{Total rise (Finished floor to floor)}}{\text{Number of risers}} = \text{Unit rise}
\]
**Number of Treads**

\[
\text{Number of risers} \quad \text{Number of treads} = \text{One} \quad \text{Number of treads}
\]

\[
\quad = \text{Number of treads}
\]

**Minimum Total Run**

\[
\text{Number of treads} \quad (x) \quad \text{Maximum unit run} = \text{Maximum total run}
\]

\[
\quad = \text{Maximum total run}
\]

**Unit Run**

\[
\text{Desired total run} \quad \text{Number of treads} = \text{Unit Run}
\]

\[
\quad \div \text{Number of treads} = \text{Unit Run}
\]
Stringer Lengths - Pythagorean theorem

\[(\text{Run})^2 + (\text{Rise})^2 = (\text{Rake})^2\]

\[(____)^2 + (____)^2 = (____)^2\]

\[(\text{Rake})^2 = _____\]

\[(____)^2 = _____\]

\[_____ ÷ 12" = _____\]

- or the length of the stringer. Round this to the next highest “even” number. The rounded number will give you the necessary 2 x 12" length you will need.

Calculating First Riser Heights

\[_______ \quad \text{First unit rise}\]

\[_______ \quad - \text{Tread thickness}\]

\[_______ \quad + \text{Finished floor thickness}\]

\[\text{________________________}\]

\[_______ = \text{First Riser height}\]
Checking the Fit of the Stringer

<table>
<thead>
<tr>
<th>Equation</th>
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<tbody>
<tr>
<td>________</td>
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<td>________</td>
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</table>

________ = Distance of the stringer below rough cut
Calculations
Chapter 3

### Starting Newel Height

\[
\text{Starting newel height} = \text{Distance from the bottom of the fitting to the tread} + \text{Desired rail height} - \text{Depth of the handrail}
\]

### Newel Height

\[
\text{Newel height} = \text{Desired rail height} - \text{Rail thickness}
\]
Calculations
Chapter 4

Starting Newel Height

\[
\begin{align*}
&= \text{Distance from the bottom of the fitting to the tread} \\
&+ \text{Desired rail height} \\
&- \text{Depth of the handrail} \\
&= \text{Starting newel height}
\end{align*}
\]

Rake-to-Rake Newel Length

\[
\begin{align*}
&= \text{Reveal} \\
&+ \text{Rail Height} \\
&+ \text{Slope difference} \\
&+ \text{Tread height} \\
&= \text{Rake-to-rake newel length (TOP MOUNT SYSTEM)} \\
&+ \text{Tale or drop down length} \\
&= \text{Rake-to-rake newel length (HALF LAP SYSTEM)}
\end{align*}
\]
Rake-to-Balcony Newel Length

_______  Reveal
_______  + Rail Height
_______  + Tread height

______________

_______  = Newel Length (TOP MOUNT SYSTEM)
_______  + Tale or drop down length

_______  Newel length (HALF LAP SYSTEM)

Balcony Newel Length

_______  Reveal
_______  + Rail Height
_______  + Thickness of the finished floor

______________

_______  = Newel Length (TOP MOUNT SYSTEM)
_______  + Tale or drop down length

_______  Newel length (HALF LAP SYSTEM)
Baluster Spacing (Balcony or Landing)

<table>
<thead>
<tr>
<th>Distance</th>
<th>Maximum baluster spacing + Thickness of narrowest part of baluster</th>
</tr>
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<tbody>
<tr>
<td></td>
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<tr>
<td></td>
<td>Round to the nearest whole number</td>
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<td></td>
<td>Minimum number of baluster spacing</td>
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</tbody>
</table>

Calculations
Chapter 5