Formulas

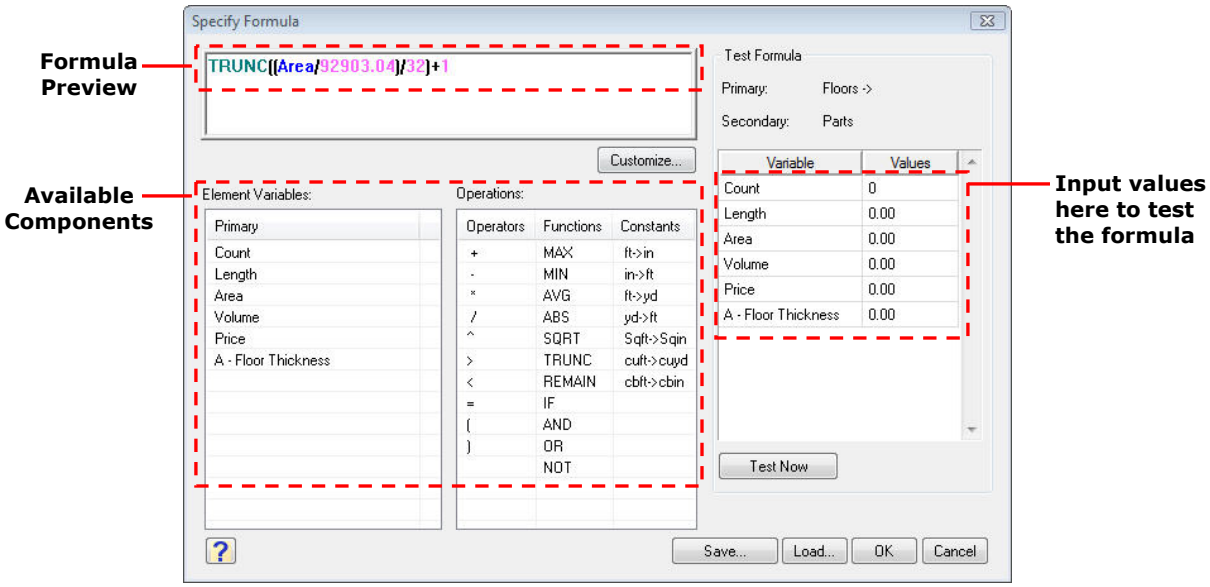
Formulas are mathematical equations (e.g. Count x Price) that are used to calculate a value (e.g. Cost). They can be used when defining assemblies in an element's properties, or records in a report template. There are a number of different variables, constants, operators and mathematical functions available for building a formula.

In this document:

- Overview of Formula Building
- Element Variables
- Operators
- Functions
- Constants
- Getting Results in Feet and Inches
- Sample Formula Breakdown

Overview of Formula Building

Formulas are defined in the Specify Formula dialog. To add a component to the equation, such a **variable**, **operator**, **function** or **constant**, simply double-click it in the list. The item you choose is added to the formula in the preview window. You can also type directly in the preview window.



Element Variables

The items shown in the Element Variables list will vary depending on the element you are specifying a formula for. For example, if you are specifying a formula for a floor, as shown in the image above, you will see a 'Floor Thickness' variable listed. If you are specifying a formula for a door, you will see variables such as 'Height' and 'Width' in the list. Element variables are the main building blocks of a formula.

Operators

An operator performs an operation on something, such as addition, multiplication or division. Below is a description of the available operators, which are typical ones you would find an algebraic equation.

+	Add
-	Subtract
*	Multiply
/	Divide
^	Exponent (e.g. ^2 means "squared", or "to the power of 2")
>	Greater than
<	Less than
=	Sum (equals)
(	Start bracket
)	End bracket

Tip: Use brackets when you want a particular calculation within the formula to be done first.

Functions

A function performs an operation on an input value, a set of values, or a sequence of values. Below is a description of available functions.

MAX	The largest value in a set of values.
MIN	The smallest value in a set of values.
AVG	The average value when comparing values.
ABS	Makes all values a positive value.
SQRT	The square root value.
TRUNC	Truncate the value to remove decimals.
REMAIN	The remaining value after an equation has been performed.
IF	Tests whether a certain condition is true or false. If the condition is true, the function will do one thing, if the condition is false, the function will do something else.
AND	Often combined with the IF function, this evaluates all criteria for a true or false result. All criteria must be met for a true result.
OR	Often combined with the IF function, this allows you to specify multiple criteria for evaluation. Only one of the criteria needs to be met for a true result.
NOT	Reverses the result from true to false, or vice versa.

Constants

Constants are fixed values that do not change. Examples are length, volume and mass. Below is a description of each available constant.

ft>in	Converts feet to inches
in>ft	Converts inches to feet
ft>yd	Converts feet to yards
yd>ft	Converts yards to feet
Sqft>Sqin	Converts square feet to square inches
cuft>cuyd	Converts cubic feet to cubic yards
cbft>cbin	Converts cubic feet to cubic inches

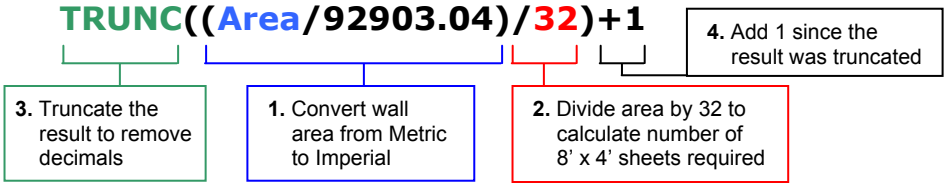
Getting Results in Feet and Inches

By default, all quantities (length, area and volume) in Envisioneer are measured in Metric units. If you want to measure quantities in Imperial units (e.g. linear, square or cubic feet), you must include a conversion calculation in your formula. The magic number to remember is **304.8**.

Type of Measurement	Operation Required	Result
Length	Divide by 304.8	Linear Feet
Area	Divide by 304.8^2 (or 92903.04)	Square Feet
Volume	Divide by 304.8^3 (or 28316846.592)	Cubic Feet

Sample Formula Breakdown

Here is a breakdown of the formula for calculating the number of 8’ x 4’ sheets of drywall required to finish interior walls. The formula uses an element variable, function and operators, and includes a calculation that converts Metric units to Imperial units.



How this formula works:

1. The inner brackets are processed first. The Area is divided by 92903.04 to convert the area of the walls from square meters to square feet.
2. The outer brackets are processed next. The square footage (calculated in step 1) is divided by 32 because an 8’ x 4’ sheet of drywall covers 32 square feet. The result from this calculation gives you the number of sheets of drywall required.
3. Since you can only buy whole sheets of drywall, the result of the bracket operations is truncated to remove any decimals. For example, 10.5 would become 10.
4. One sheet is added to account for the portion that was truncated.