LERP(s)

This is slang for "linear interpolation", a process whereby an unknown value is calculated between two known values in a table. This occurs not infrequently in our industry and it's a handy skill, yet it is still confusing to me, and I suspect mysterious to some. Let's take a practical example. I have an allowable span table reading:

Spacing	6' 0"	6' 6"
Allowable Spans	20' 11"	18' 7"

Let's hypothesize we want to know the allowable span associated with a spacing of 6' 2". We can, by inspection, interpolate the value because we know that 2" is exactly one-third the distance from 0" to 6" (spacing). So, we would, again, without the benefit of a fancy mathematical formula, take one-third of the linear difference between the tabular values of 20' 11" and 18' 7" [28" or 2' 4" / 3 = 9.33"] and subtract from the higher value of 20' 11", so the answer is approximately 20' 1¾".

Now, let's do the real math. I'm assuming you can convert feet and inches into either decimal feet or into inches. It seems simpler to me to convert into just inches, so, our table then becomes:

Key to known & unknown values		a	b
X	Spacing	72"	78"
Y	Allowable Spans	251"	223"

The general formula for the "LERP" is: $y = y_a + (x - x_a) \cdot \dfrac{(y_b - y_a)}{(x_b - x_a)}$ and in our example, Y

is the derived allowable span associated with the X spacing value of 6' 2" (72+2), or 74". Substitute the numerics for the equation symbols and grab the pocket calculator, if you've done the substitution and button pushing correctly, the result is 241.667", or about 20' 1¾".

Let's try a second example by borrowing some values from the Component and Cladding wind pressure table in the residential Florida Building Code. For a 130 mph Exposure B region, the end zone component and cladding wall pressures are shown as:

Wall Pressures (psf)			130 mph	
Zone		Effective Area (X)	(Y)	
			Positive	Negative
5	a	20 sqft	29.0	-38.0
	b	50 sqft	27.3	-34.3

Our hypothetical window is 5' 4" wide by 6' 0" high, 5.33' X 6' = 32 sqft, which will become our target X value, and the associated pressure the Y value (we'll use the negative number because it is numerically greater and will govern the design). And so, substituting the numerics again for the general LERP equation's unknowns:

$y = -38.0 + (32 - 20) \cdot \dfrac{[-34.3 - (-38.0)]}{[50 - 20]}$ = -36.5 psf, so, using the linear interpolation

permitted by the code, the negative component and cladding pressure associated with a window size of 5' 4" wide by 6' 0" high is -36.4 psf.