Extra for Experts
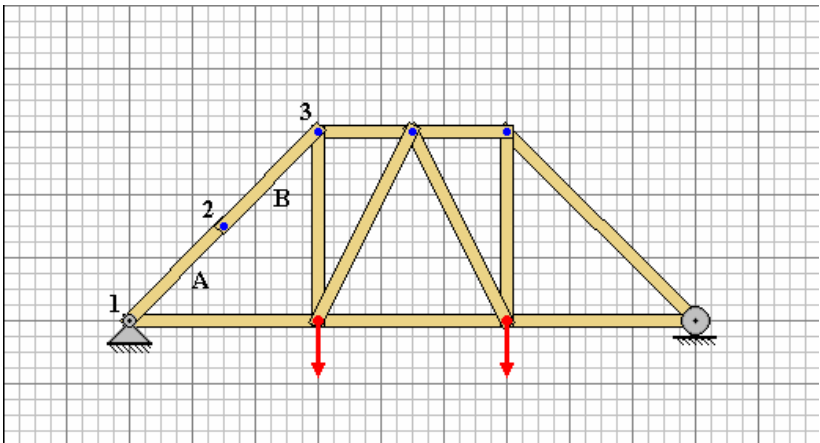
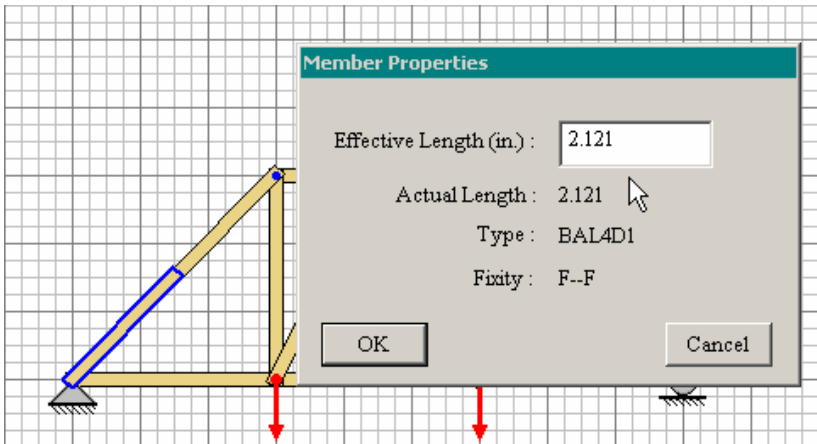## Editing the Effective Length of a Member

ModelSmart assumes that you will provide lateral support, both in plane and perpendicular to the plane of the screen (monitor), for all joints in the model.

ModelSmart also assumes that the effective length (column mode buckling length) of a member is the distance between joints.

Unless you use the special feature in ModelSmart for editing the effective length, do not place unbraced joints in the model.

For example, joint "2" in the model below, incorrectly causes ModelSmart to assume that the effective length of member "A" is the distance from joint "1" to joint "2" and the effective length of member "B" is the distance from joint "2" to joint "3". This is modeling error!

To correct this, place the mouse cursor over member "A" and right click (Open Apple-Click for Mac). This will display a special dialog that will enable you to correctly change the effective length (2.121") of member "A" to the correct distance (4.242") - the distance from joint "1 to joint "3". You must also right click over member "B" and change it's length to the distance from joint 1 to joint "3" (also 4.242").

Now ModelSmart knows that the segment AB can buckle as a unit and you will get a much better prediction of the actual failure load for the model.

Remember, unless you will provide bracing for the joint both in plane of the screen (no bracing member is shown here in the figure above) and perpendicular to the plane of the screen (behind the joint shown above – where we can't see.), you will need to manually set the correct effective length to be used for analysis.

You must also set the correct effective lengths for compression members in a tower if the sides are not all fully braced.
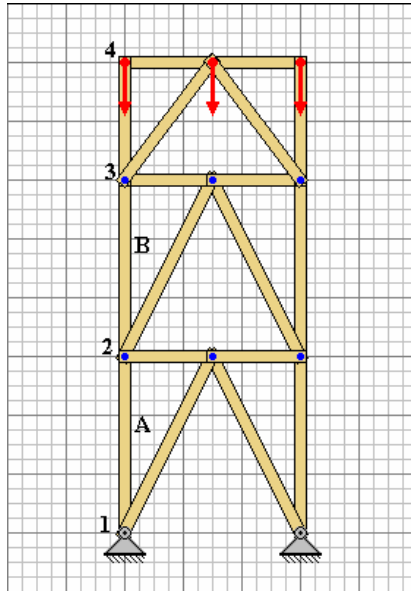
Consider joint "2" in the figure above. This joint does have support in the plane of the screen. But, if you do not plan to provide a brace that supports this joint into the plane of the screen, then you must manually change the effect length of both members "A" and "B" to at least the distance from joint "1" to joint "3".
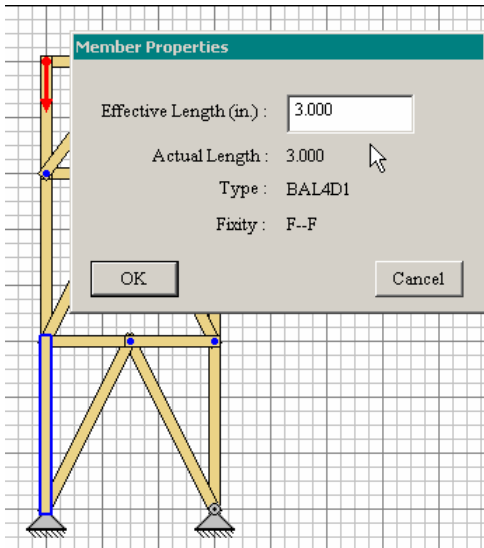
The distance shown above show be changed to 6" (or greater).

Sometimes, depending on the relative stiffness of a member segment's joints, in a tower that is not fully braced, the actual effective length can be greater than the sum of the two adjacent segments. This occurs in tower frames where "sidesway" (unbraced lateral drift) is not prevented. Unless you fully research this phenomena, it's probably safer to fully brace all sides of your tower.

If you incorrectly put unused joints in a compression member you will trick the program into incorrectly predicting a higher failure load – but this is not your goal.

Your goal is to create a mathematical model in ModelSmart that accurately predicts the performance of the physical model that you plan to build.