PARALLELOGRAM, MA'AM

Oh, Yeah? Well Prove It!

A Knock at the Door

It's 12:27 and you're just finishing watching "The Rocky Horry Picture Show" for the third time this week when you hear a peculiar knock at the door. You go to the living room understandably apprehensive about who might be visiting at that time of night. Unfortunately, the porch light is out so you can't see anything through the peephole. "Hello?" you offer. "Who is it?

"Parallelogram, ma'am."

Ma'am? you think to yourself. Really? I'm sixteen! Now you REALLY don't want to open the door. If it <u>were</u> a parallelogram, that would be one thing. Parallelograms are fun. They can disguise themselves as other shapes and flatten themselves so thin that they almost become one dimensional. You should always invite a few parallelograms to your parties.

But how do you <u>know</u> it's a parallelogram? It could be some other polygon who was passing by and smelled the popcorn through the open window and wanted to come in and eat more than its fair share. Or worse, it could be a perpendicular bisector. After that episode with the recliner (for which you got blamed), you'd prefer that there be no more bisecting of any kind in your home.

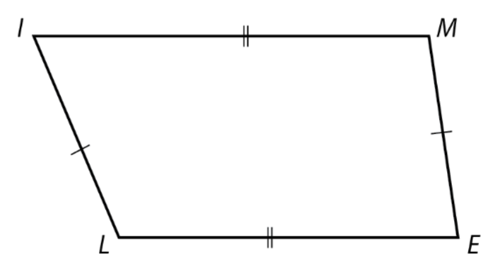
"Parallelogram who? you ask but then realize that you probably sound like a knock-knock joke. "How can you prove that you're a parallelogram?"

Some Useful Converses

Every time you prove something, you should be wondering to yourself, "Hmmm…I wonder if the converse is true." (If you can wonder it in French or Italian, that's even better.) Earlier in this unit you proved three different properties of parallelograms. If you can prove their converses to be true, then you'll have three ways to determine whether a quadrilateral is a parallelogram or not.

<u>CONVERSE OF THE NON-ADJACENT-SIDES-OF-A-PARALLELOGRAM (NASP) THEOREM</u>

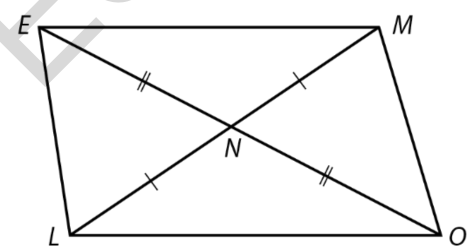
Given: $\overline{IL} \cong \overline{ME}$ and $\overline{IM} \cong \overline{LE}$
Prove: *LIME* is a parallelogram.
Comments: You're going to need to construct something. You can use the chart below for a two-column proof, or you can use a paragraph proof or a flow proof as directed by your teacher.



Statement	**Reason**
$\overline{IL} \cong \overline{ME}$ and $\overline{IM} \cong \overline{LE}$	given
∴ *LIME* is a parallelogram.	definition of parallelogram

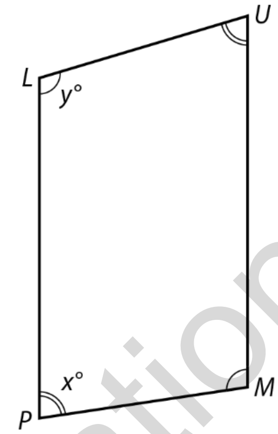
<u>Converse of the Parallelogram Diagonals Theorem</u>

Given: $\overline{EN} \cong \overline{ON}$ and $\overline{LN} \cong \overline{MN}$
Prove: *LEMO* is a parallelogram.
Comments: You can use the chart below for a two-column proof, or you can use a paragraph proof or a flow proof as directed by your teacher.



Statement	**Reason**
$\overline{EN} \cong \overline{ON}$ and $\overline{LN} \cong \overline{MN}$	given
∴ *LEMO* is a parallelogram.	definition of parallelogram

<u>CONVERSE OF THE NON-ADJACENT-ANGLES-OF-A-PARALLELOGRAM THEOREM</u>



Given: $m\angle P = m\angle U = x°$ and $m\angle M = m\angle L = y°$
Prove: *PLUM* is a parallelogram.
Comments: You can use the chart below for a two-column proof, or you can use a paragraph proof or a flow proof as directed by your teacher.

STATEMENT	REASON
$\overline{EN} \cong \overline{ON}$ and $\overline{LN} \cong \overline{ON}$	given
$\therefore$	