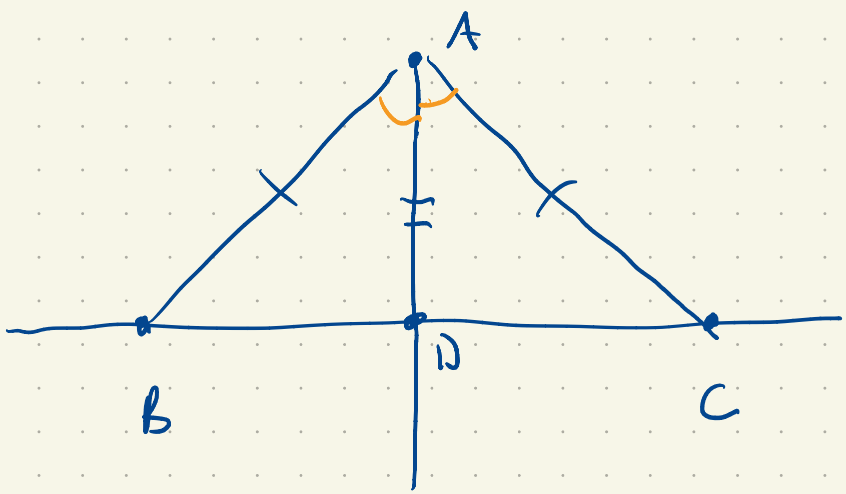
and hence both are right.

I-12 "Dropping a perpendicular"

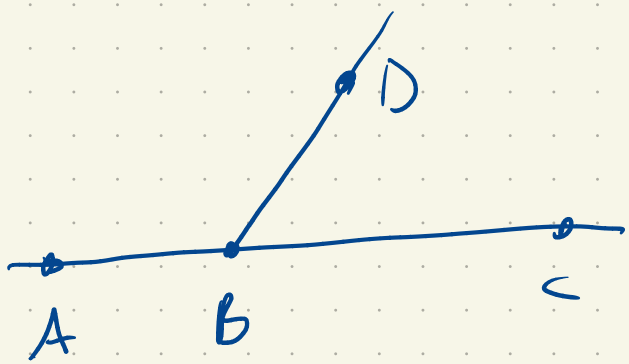


1) Build B, C with $AB = AC$
2) Bisect $\measuredangle BAC$
3) By SAS $\triangle BAD = \triangle CAD$

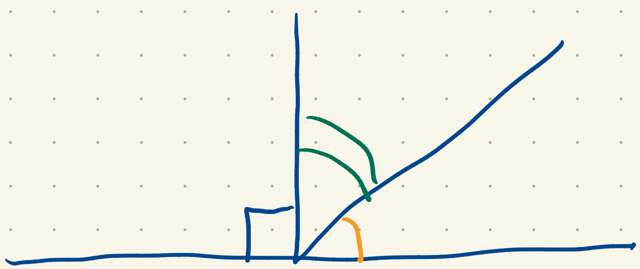
   and $\measuredangle ADB = \measuredangle ADC$

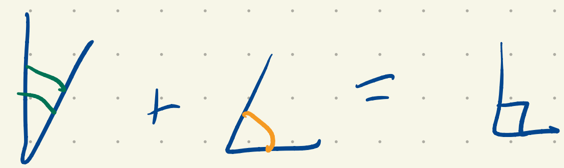
   and these are right.

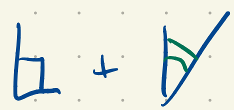
I-13



$$\measuredangle ABD + \measuredangle DBC = 2 \llcorner$$

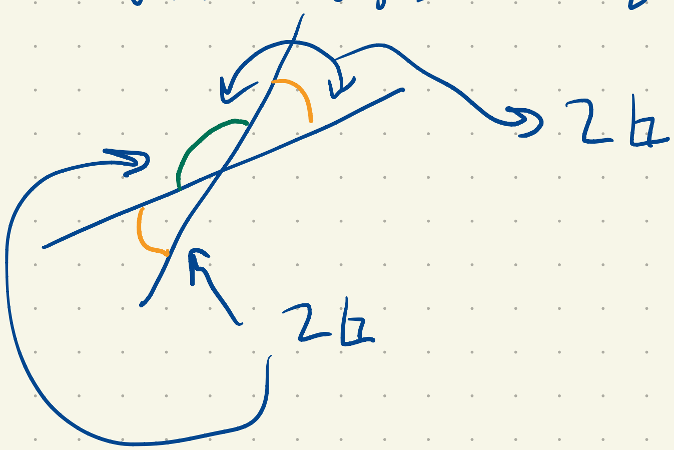




 $= \measuredangle ABD$

$$\Rightarrow \measuredangle ABD + \measuredangle BDC = 2 \llcorner$$

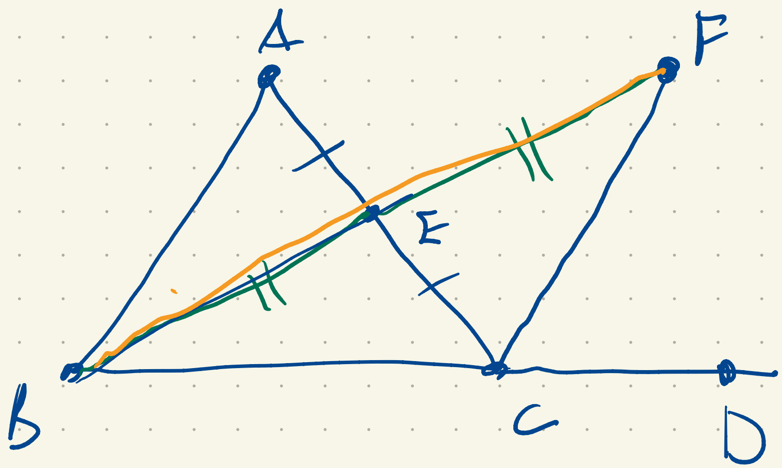
I-15 Vertical angles are equal



green in both.

So two yellows are same.

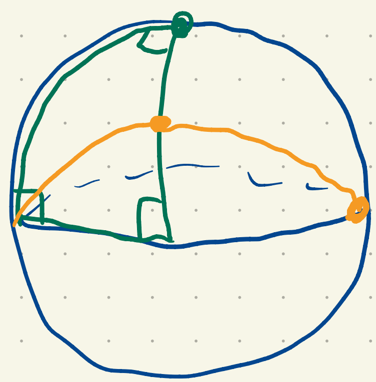
I-16: The exterior angle of a triangle is greater than either of the two opposite angles.

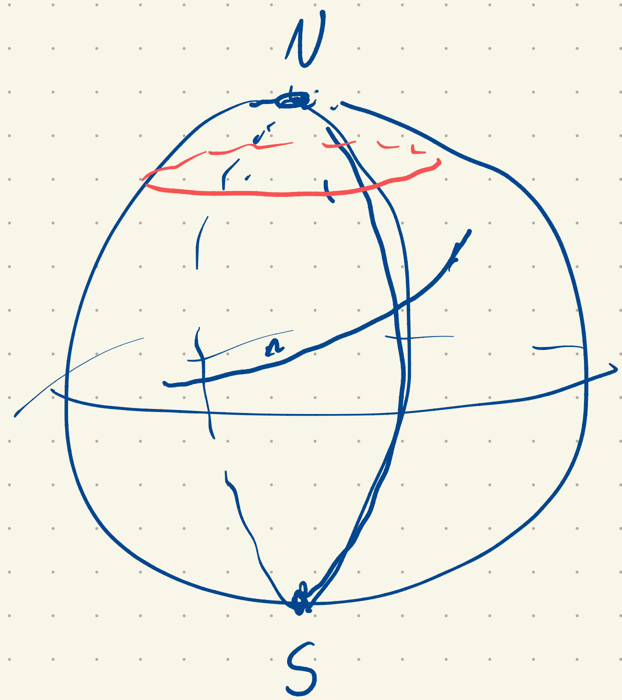


1) Bisect AC at E.
2) Extend BE to F so
   $BE = EF$
3) Join FC
4) By SAS (I-15)
   $\Delta BEA \cong \Delta FEC$
5) Want to conclude that

$\measuredangle ECF < \measuredangle ECD$

$\Rightarrow \measuredangle EAB < \measuredangle ECD$

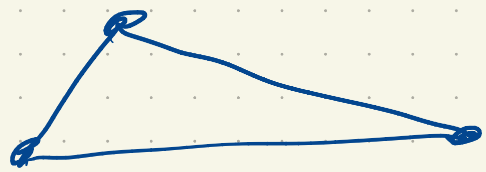




Extra: two distinct lines intersect at most once.

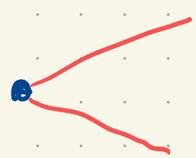
I-20 The sum of two sides of a triangle exceeds the third

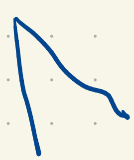
"triangle inequality"



I-22 You can construct a triangle with given sides so long as the sides obey I-20.

I-24 You can move angles

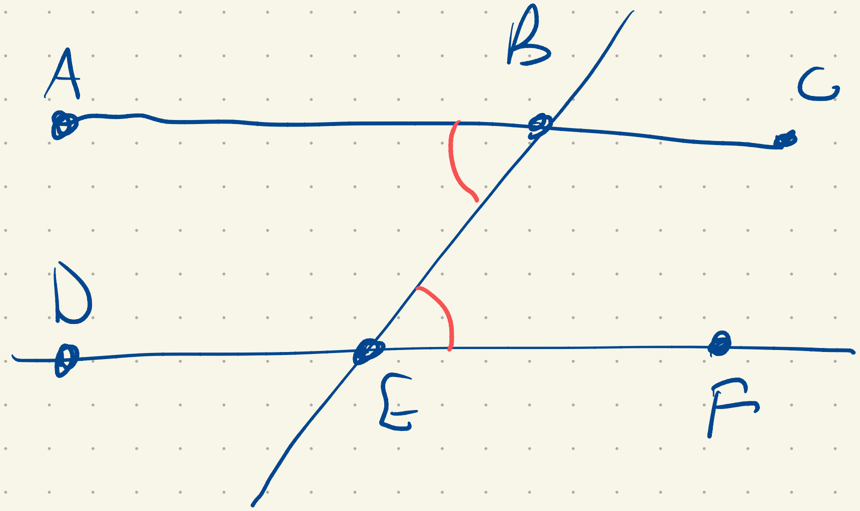




I-27
I-28

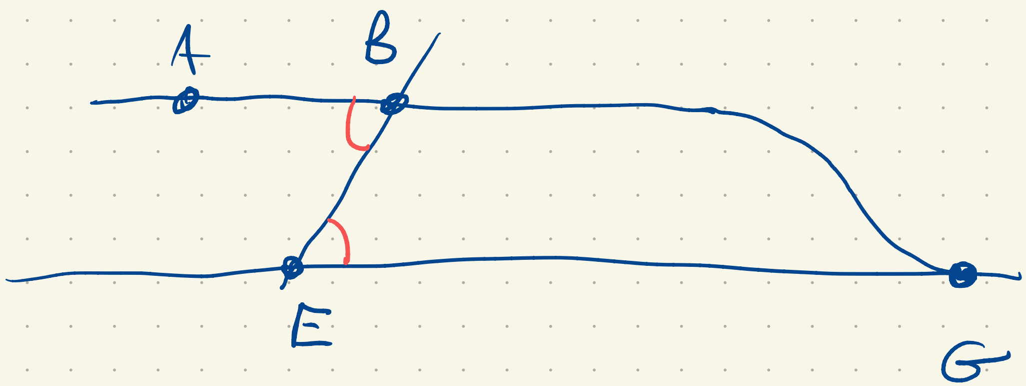
How to recognize parallel lines.

I-27

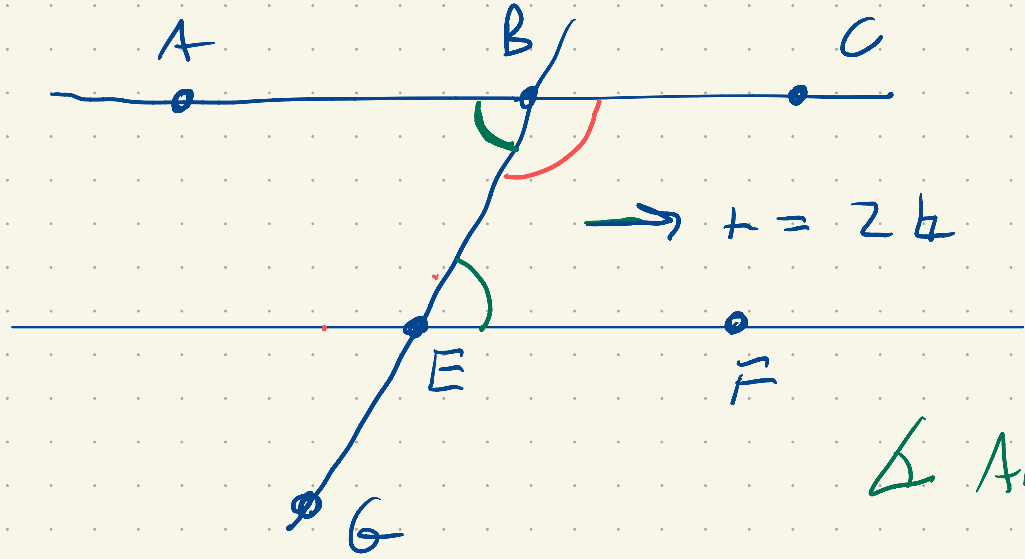


If $\angle ABE = \angle FEB$ then lines AC and DF are parallel.

If they are not parallel then AC can be extended to a point G on an extension of DF. This violates I-16.



I-28



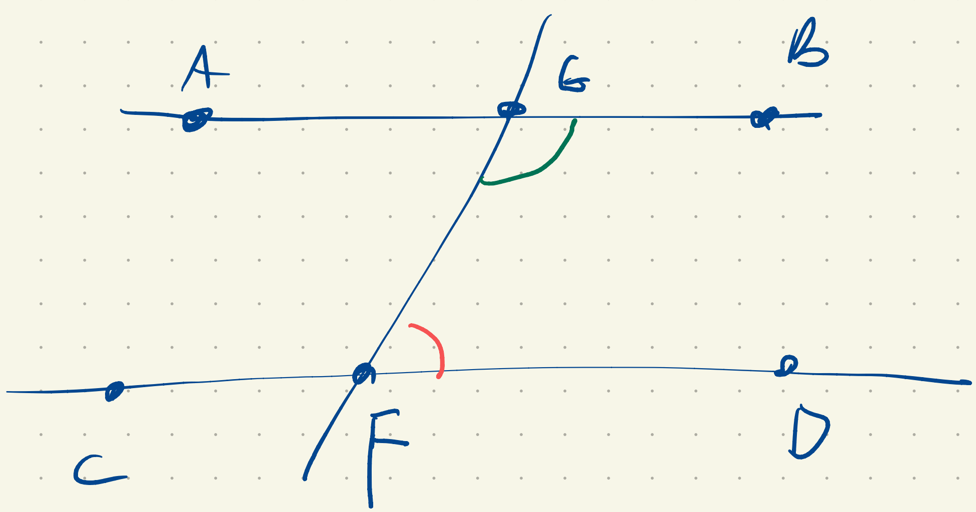
→ + = 2∟ ⇒ parallel

∡ ABE = ∡ BEF

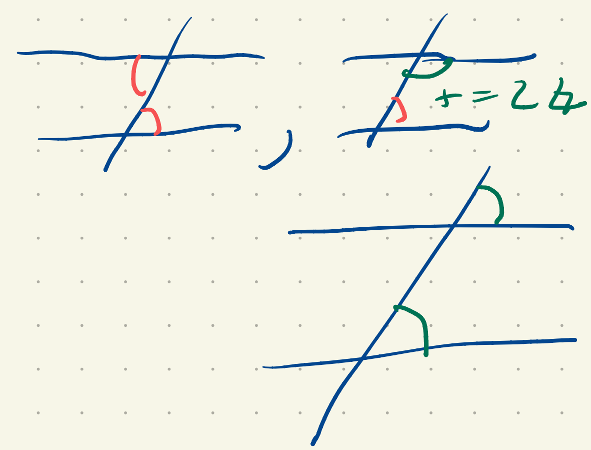
via I-13.

Now apply I-27.

I-29



If AB and CD are parallel then



1) If $\angle AEF \neq \angle EFD$ we can assume $\angle EFD$ is smaller

2) But $\angle AEF + \angle FEB = 2\angle$

3) So $\angle EFD + \angle FEB$ is less than two right angles.

4) By postulate 5, AB and CD intersect, a contradiction.