Proposition XIII. Theorem.

The angles which one straight line makes with another upon one side of it are either two right angles, or together equal to two right angles.

Fig. 1.

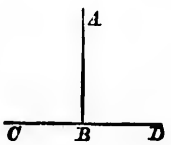
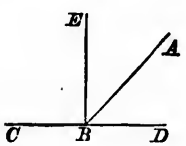


Fig. 2.



Let AB make with CD upon one side of it the $\angle$s ABC, ABD.

Then must these be either two rt. $\angle$s, or together equal to two rt. $\angle$s

First, if $\angle ABC = \angle ABD$ as in Fig. 1,

each of them is a rt. $\angle$. Def. 9.

Secondly, if $\angle ABC$ be not $= \angle ABD$, as in Fig. 2,

from B draw $BE \perp$ to CD. I. 11.

Then sum of $\angle$s ABC, ABD = sum of $\angle$s EBC, EBA, ABD,

and sum of $\angle$s EBC, EBD = sum of $\angle$s EBC, EBA, ABD;

$\therefore$ sum of $\angle$s ABC, ABD = sum of $\angle$s EBC, EBD;

Ax. 1.

$\therefore$ sum of $\angle$s ABC, ABD = sum of a rt. $\angle$ and a rt. $\angle$;

$\therefore$ $\angle$s ABC, ABD are together = two rt. $\angle$s.

Q. E. D.

Ex. Straight lines drawn connecting the opposite angular points of a quadrilateral figure intersect each other in O. Shew that the angles at O are together equal to four right angles.

Note (1.) If two angles together make up a right angle, each is called the **Complement** of the other. Thus, in fig. 2, $\angle ABD$ is the complement of $\angle ABE$.

(2.) If two angles together make up two right angles, each is called the **Supplement** of the other. Thus, in both figures, $\angle ABD$ is the supplement of $\angle ABC$.