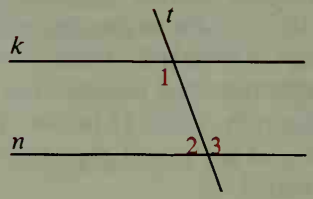
## Theorem 3-6

**If two lines are cut by a transversal and same-side interior angles are supplementary, then the lines are parallel.**

Given: Transversal $t$ cuts lines $k$ and $n$;
$\angle 1$ is supplementary to $\angle 2$.

Prove: $k \parallel n$



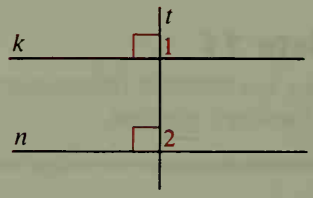

The proof is left as Exercise 22.

## Theorem 3-7

**In a plane two lines perpendicular to the same line are parallel.**

Given: $k \perp t$; $n \perp t$

Prove: $k \parallel n$




The proof is left as Exercise 23.

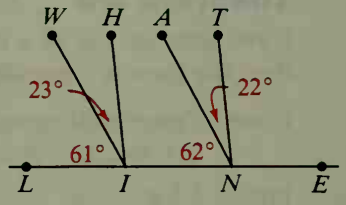
**Example 1** Which segments are parallel?

**Solution** (1) $\overline{HI}$ and $\overline{TN}$ are parallel since corresponding angles have the same measure:

$m\angle HIL = 23 + 61 = 84$

$m\angle TNI = 22 + 62 = 84$

(2) $\overline{WI}$ and $\overline{AN}$ are *not* parallel since $61 \neq 62$.




**Example 2** Find the values of $x$ and $y$ that make $\overline{AC} \parallel \overline{DF}$ and $\overline{AE} \parallel \overline{BF}$.

**Solution** If $m\angle CBF = m\angle BFE$, then $\overline{AC} \parallel \overline{DF}$. (Why?)

$$3x + 20 = x + 50$$
$$2x = 30$$
$$x = 15$$

If $\angle AEF$ and $\angle F$ are supplementary, then $\overline{AE} \parallel \overline{BF}$. (Why?)

$$(2y - 5) + (x + 50) = 180$$
$$(2y - 5) + (15 + 50) = 180$$
$$2y = 120$$
$$y = 60$$