Geometry Honors

Name: KEY
Period:

1. Find the measure of an angle and its supplement if the angle is 15° less than twice its supplement.

Let x = meas. of ∡
$180 - x$ = supp

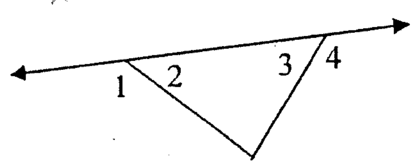
$x = 2(180 - x) - 15$
$x = 360 - 2x - 15$
$3x = 345$
$x = 115$

$\{115°, 65°\}$

ck $65 \times 2 = 130$
-15
$115°$

2. Given: ∠1 supp ∠2
∠2 ≅ ∠3
∠4 supp ∠3

Prove: ∠1 ≅ ∠4



① ∡1 supp ∡2 → ② m∡1 + m∡2 = 180
∡4 supp ∡3 → m∡4 + m∡3 = 180 → ③ m∡1 + m∡2 = m∡4 + m∡3

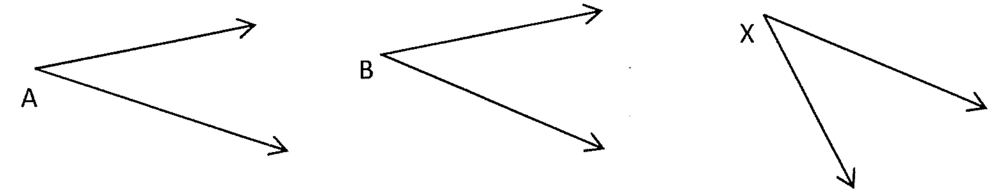
④ ∡2 ≅ ∡3 → ⑤ m∡2 = m∡3

⑥ m∡1 + m∡2 = m∡4 + m∡2 → ⑦ m∡1 = m∡4 → ⑧ ∡1 ≅ ∡4
(optional)

Reasons

① Given
② Suppl. ∡s are 2 ∡s that totals 180.
③ Substitution Prop.
④ Given
⑤ ≅ ∡s have = measures.
⑥ Substitution Prop.
⑦ Subtraction Prop.
⑧ ≅ ∡s have = measures.

Congruent complements theorem: If two angles complement the same angle or are complementary to congruent angles, then the two angles are congruent. ⟶ ∠s that complement the same ∠s are congruent.



Given: ∠A complement ∠x
∠B complement ∠x.

Prove: ∠A ≅ ∠B

1. ∠A compl. ∠X → 2. $m\angle A + m\angle X = 90$
∠B compl. ∠X → $m\angle B + m\angle X = 90$ → 3. $m\angle A + m\angle X = m\angle B + m\angle X$

4. $m\angle A = m\angle B$ → 5. $\angle A \cong \angle B$

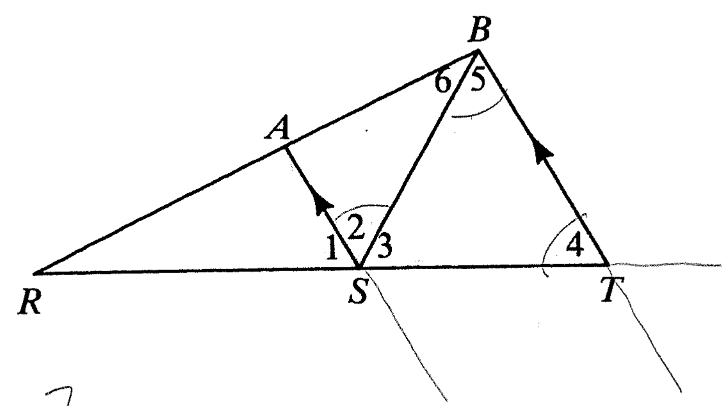
1. Given
2. Compl. ∠s are 2 ∠s whose sum is 90°.
3. Substitution Prop.
4. Subtraction Prop.
5. ≅ ∠s have = measures.

5. Given: $\overline{AS} \parallel \overline{BT}$;

$m\angle 4 = m\angle 5$

Prove: $\overrightarrow{SA}$ bisects $\angle BSR$.

Plan: Show $\angle 1 \cong \angle 2$



$$\left.\begin{array}{l} \left.\begin{array}{l} (1)\ \overline{AS} \parallel \overline{BT} \longrightarrow (2)\ \angle 5 \cong \angle 2 \\ (3)\ m\angle 4 = m\angle 5 \longrightarrow (4)\ \angle 4 \cong \angle 5 \end{array}\right\} \rightarrow (5)\ \angle 2 \cong \angle 4 \\ (1) \longrightarrow (6)\ \angle 1 \cong \angle 4 \end{array}\right\} \rightarrow (7)\ \angle 1 \cong \angle 2 \rightarrow (8)\ \overrightarrow{SA} \text{ bisects } \angle BSR.$$

(1) Given

(2) 2 ∥ lines → alternate interior ∠s ≅

(3) Given

(4) If ∠s are =, they are ≅.

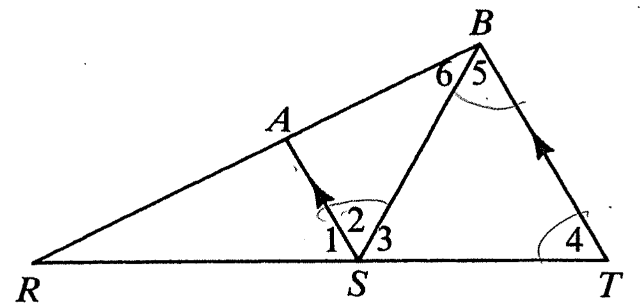
(5) Transitive Property

(6) 2 ∥ lines → corresp. ∠s ≅.

(7) Transitive Prop.

(8) Def. of ∠ bisector: If a ray creates 2 ≅ ∠s, then it is an ∠ bisector.

6. Given: $\overline{AS} \parallel \overline{BT}$;
$m\angle 4 = m\angle 5$;
$\overrightarrow{SB}$ bisects $\angle AST$.
Find the measure of $\angle 1$.



Because $\overline{AS} \parallel \overline{BT}$, $\angle 2 \cong \angle 5$
Given $m\angle 4 = m\angle 5 \rightarrow \angle 4 \cong \angle 5$
So, $\angle 2 \cong \angle 4$

Since $\overline{SB}$ bisects $\angle AST$, $\angle 2 \cong \angle 3$
So, $\angle 3 \cong \angle 4$

Now, $\angle 3 \cong \angle 4 \cong \angle 5$. $\triangle BST$ is equiangular; $m\angle 4 = 60°$.

Since $\angle 1$ & $\angle 4$ are corresponding $\angle$s formed by $\parallel$ lines, $\angle 1 \cong \angle 4$. Therefore $\underline{m\angle 1 = 60°}$.