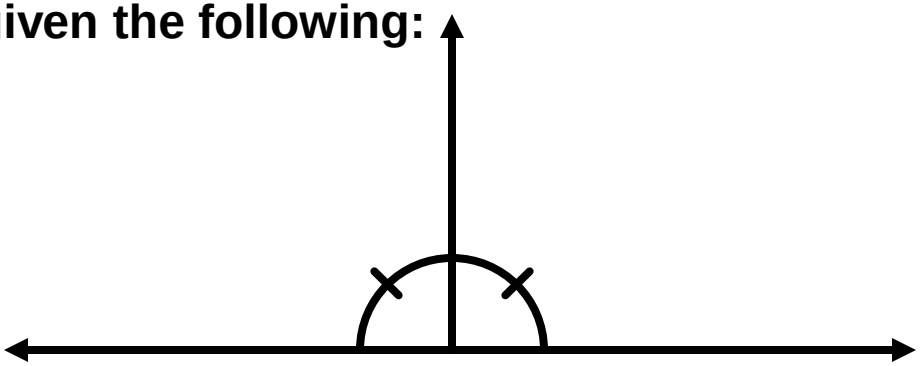
# 3.4

# PROPERTIES OF PERPENDICULAR LINES

- **Understand the properties of perpendicular lines.**
- **Explore problems with parallel lines and a perpendicular transversal.**
- **Solve problems involving complementary adjacent angles.**

**Let's say you were given the following:**



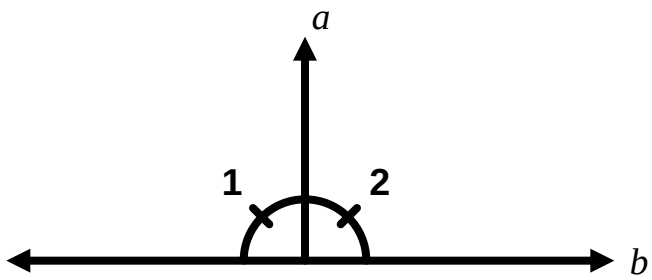
**What can you say about the two angles? How do you know?**

**In your own words, try to explain why this is so.**

# Two Column Proof

Given: $\angle 1 \cong \angle 2$

Prove: $a \perp b$




| Statements | Reasons |
| --- | --- |
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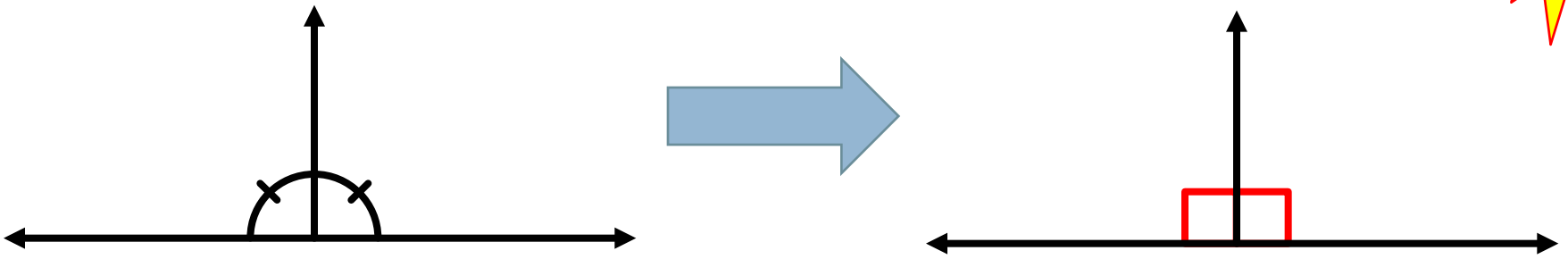
# Linear Pair Perpendicular Theorem

POK

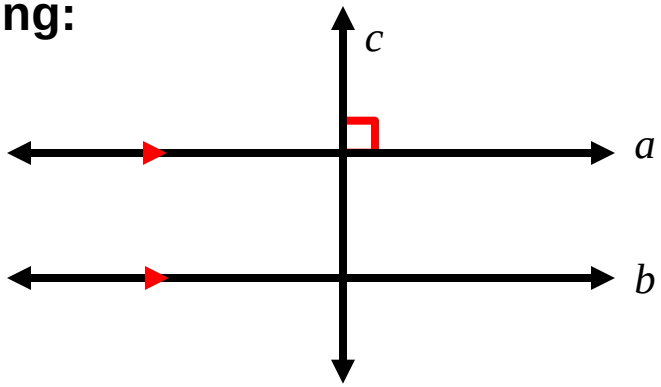


**If two lines _____ to form a linear pair of _____ angles, then the lines are _____ .**

**Let's say you were given the following:**

$a \parallel b$

$a \perp c$



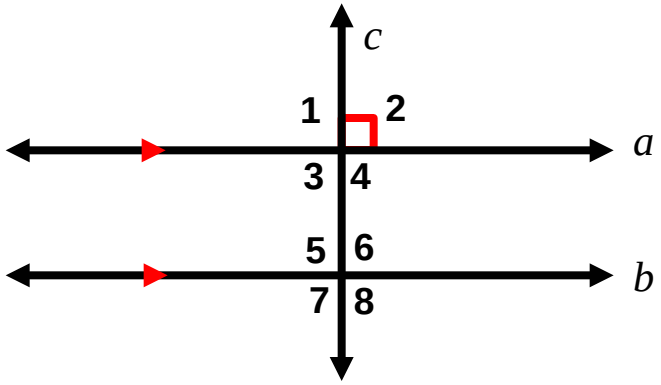

**What can you say about lines b and c? How do you know?**

**In your own words, try to explain why this is so.**

# Two Column Proof

Given: $a \parallel b,\ a \perp c$

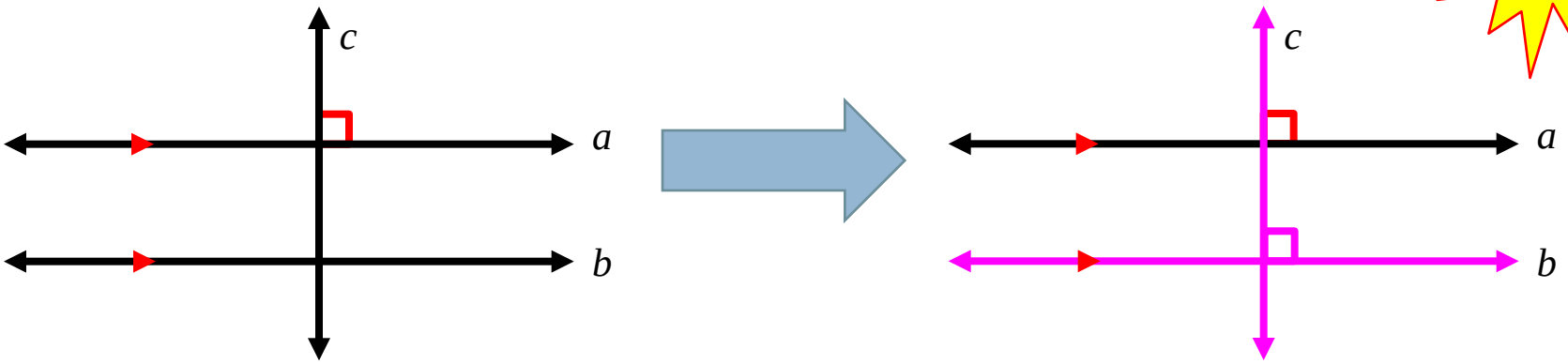
Prove: $b \perp c$




| Statements | Reasons |
|---|---|
| 1. | |
| 2. $m\angle 2 = 90°$ | |
| 3. $\angle 6 \cong \angle 2$ | |
| 4. | |
| 5. | |
| 6. | |

# Perpendicular Transversal Theorem

POK



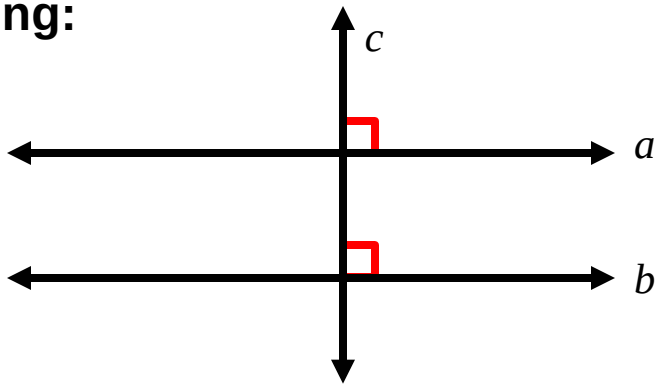

If $a \parallel b$ and $a \perp c$, *then* $b \perp c$ .

**In a plane, if a _____ is perpendicular to one of two parallel lines, then it is _____ to the other line.**

**Let's say you were given the following:**

$a \perp c$

$b \perp c$



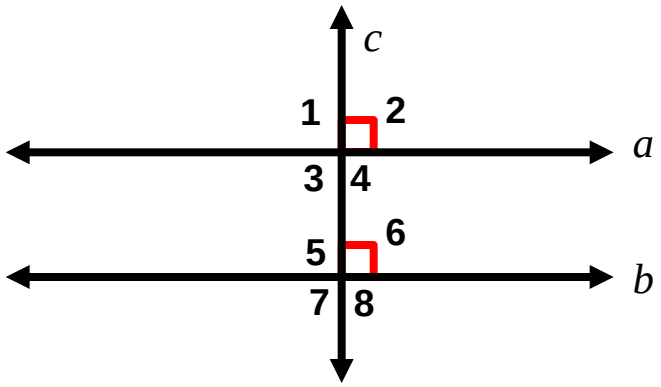

**What can you say about lines a and b? How do you know?**

**In your own words, try to explain why this is so.**

# Two Column Proof

Given: $a \perp c$, $b \perp c$

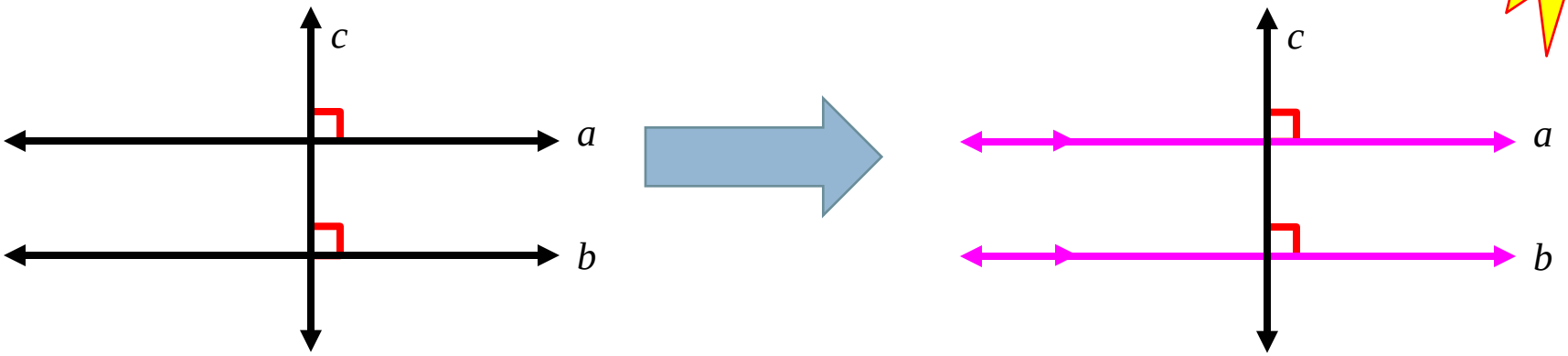
Prove: $a \parallel b$




| Statements | Reasons |
|---|---|
| 1. | |
| 2. $m\angle 2 = 90°$<br>$m\angle 6 = 90°$ | |
| 3. | |
| 4. | |
| 5. | |

# Perpendicular to the Same Line Theorem

POK




If $a \perp c$ and $b \perp c$, then $a \parallel b$

**In a plane, if lines are _____ to the _____ line, then they are _____ to each other.**