The two-column proofs you have seen in this section and the previous one are examples of **deductive reasoning.** We have proved statements by reasoning from postulates, definitions, theorems, and given information. The kinds of reasons you can use to justify statements in a proof are listed below.

Reasons Used in Proofs

Given information

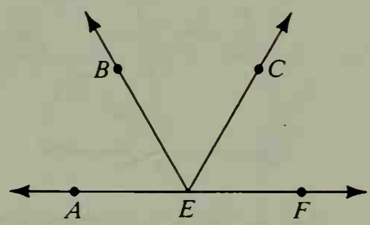
Definitions

Postulates (These include properties from algebra.)

Theorems that have already been proved

Classroom Exercises

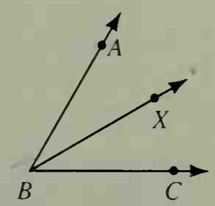
What postulate, definition, or theorem justifies the statement about the diagram?



Exs. 1–9

1. $m\angle AEB + m\angle BEC = m\angle AEC$
2. $AE + EF = AF$
3. $m\angle AEB + m\angle BEF = 180$
4. If E is the midpoint of $\overline{AF}$, then $\overline{AE} \cong \overline{EF}$.
5. If E is the midpoint of $\overline{AF}$, then $AE = \frac{1}{2}AF$.
6. If E is the midpoint of $\overline{AF}$, then $\overrightarrow{EC}$ bisects $\overline{AF}$.
7. If $\overrightarrow{EB}$ bisects $\overline{AF}$, then E is the midpoint of $\overline{AF}$.
8. If $\overrightarrow{EB}$ is the bisector of $\angle AEC$, then $m\angle AEB = \frac{1}{2}m\angle AEC$.
9. If $\angle BEC \cong \angle CEF$, then $\overrightarrow{EC}$ is the bisector of $\angle BEF$.

10. Complete the proof of Theorem 2-2.
    Given: $\overrightarrow{BX}$ is the bisector of $\angle ABC$.
    Prove: $m\angle ABX = \frac{1}{2}m\angle ABC$; $m\angle XBC = \frac{1}{2}m\angle ABC$



Proof:

Statements	Reasons
1. $\overrightarrow{BX}$ is the bisector of $\angle ABC$.	1. _?_ given
2. $\angle ABX \cong$ _?_, or $m\angle ABX =$ _?_	2. _?_ definition
3. $m\angle ABX + m\angle XBC = m\angle ABC$	3. _?_ angle add. of postulate
4. $m\angle ABX + m\angle ABX = m\angle ABC$, or $2m\angle ABX = m\angle ABC$	4. _?_ substitution
5. $m\angle ABX = \frac{1}{2}m\angle ABC$	5. _?_ multiplication
6. $m\angle XBC = \frac{1}{2}m\angle ABC$	6. Substitution Prop. (Steps _?_ and _?_)