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?**

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 $\angle BEF$.

Exs. 1–9

10. Complete the proof of Theorem 2-2.

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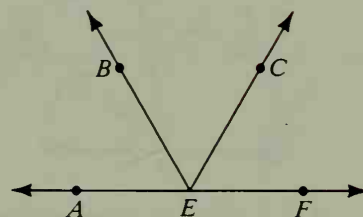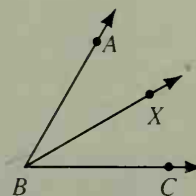
Proof:

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 addition 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 __?__)