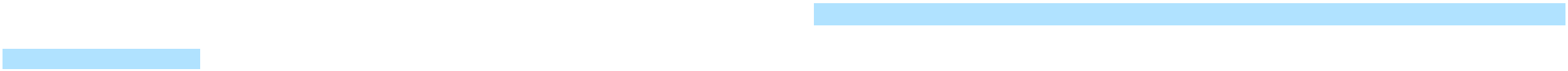


Proof. Let A , B , and C be three non-collinear points. Let ℓ and m be the two perpendicular bisectors of \overline{AB} and \overline{BC} . We claim that ℓ and m intersect each other. If not, that is, if $\ell \parallel m$, then m intersects \overleftrightarrow{AB} by Proclus' lemma. By the converse of the Alternate Interior Angle theorem, $m \perp \overleftrightarrow{AB}$ since $\ell \perp \overleftrightarrow{AB}$. But then either $\overleftrightarrow{AB} \parallel \overleftrightarrow{BC}$ since $\overleftrightarrow{AB} \neq \overleftrightarrow{BC}$ and by the Alternate Interior Angle theorem with m as a common perpendicular. This contradicts $B \in \overleftrightarrow{AB} \cap \overleftrightarrow{BC}$. Thus, ℓ and m intersect at some point O .

By a basic SAS argument, we see that $\overline{OA} \cong \overline{OB} \cong \overline{OC}$. Thus, A , B , C are all incidence to the circle centered at O and with radius \overline{OA} . This circle is unique, since by a basic SSS argument shows that $\overline{PA} \cong \overline{PB} \cong \overline{PC}$ implies that $P \in \ell \cap m = \{O\}$. \square





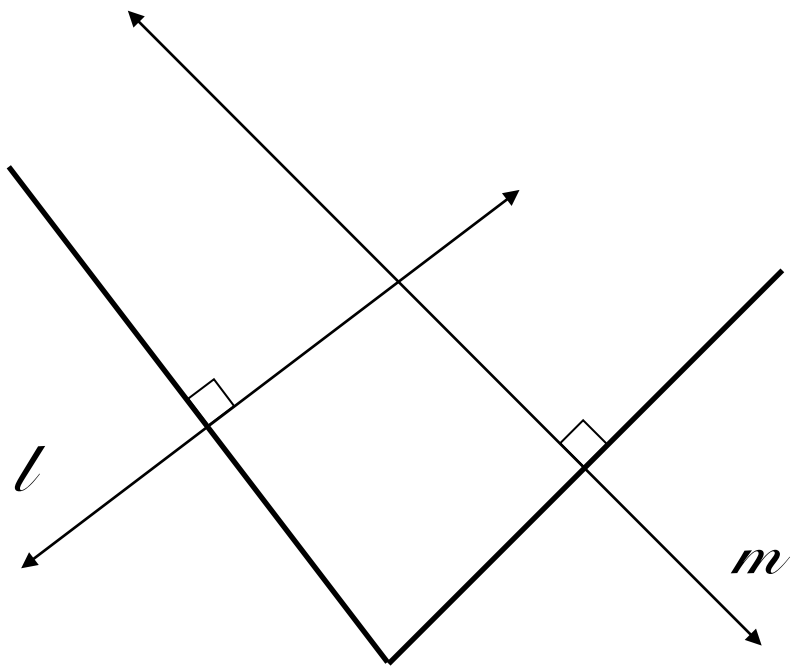
A



C

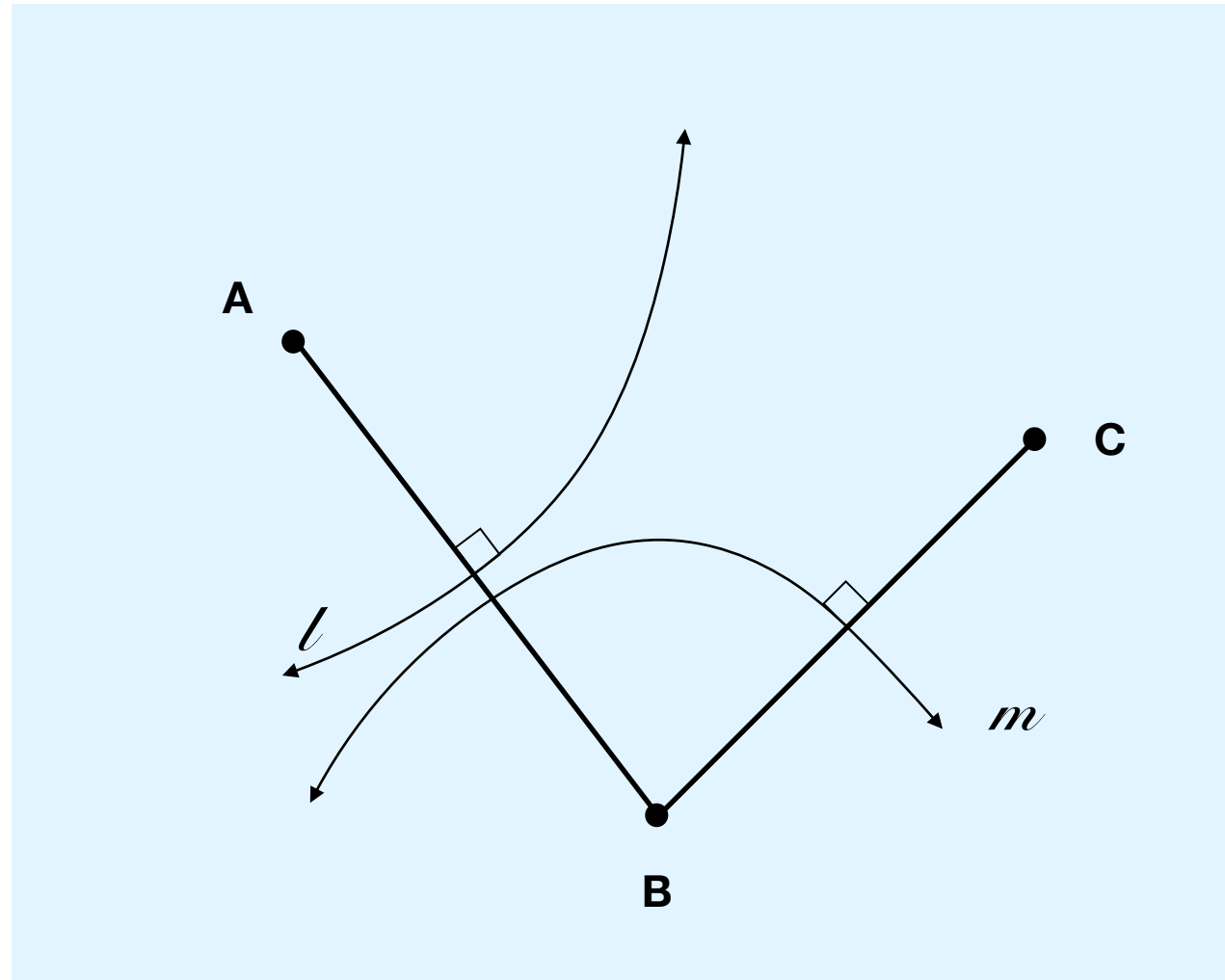


B



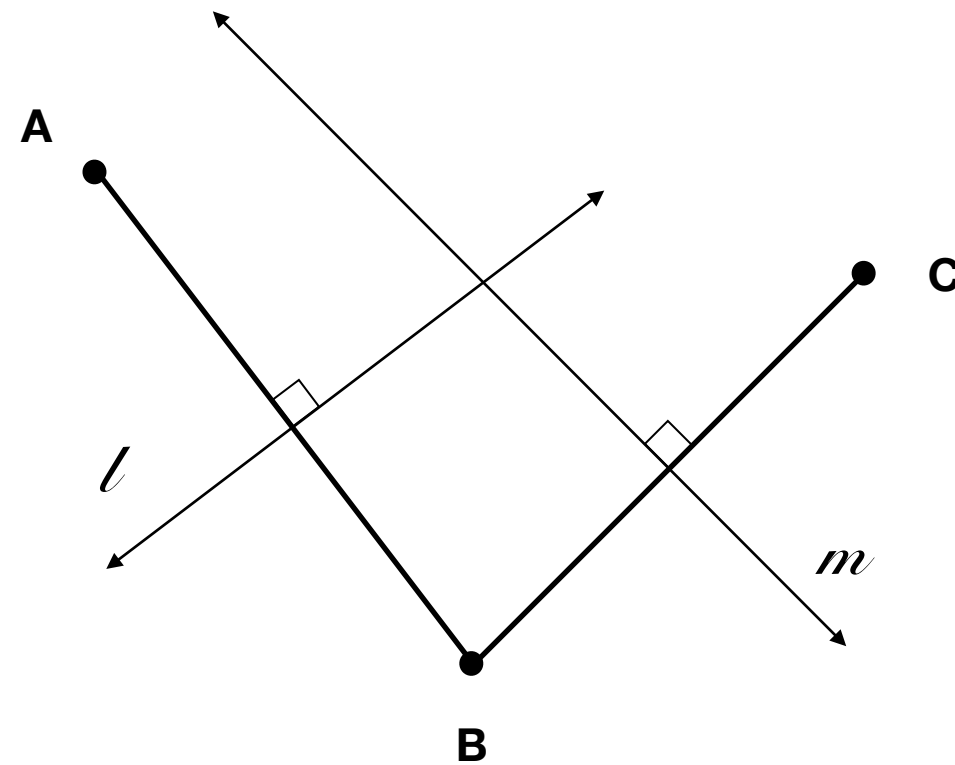


then



Proof. Let A , B , and C be three non-collinear points. Let ℓ and m be the two perpendicular bisectors of \overline{AB} and \overline{BC} . We claim that ℓ and m intersect each other. If not, that is, if $\ell \parallel m$, then m intersects \overleftrightarrow{AB} by Proclus' lemma. By the converse of the Alternate Interior Angle theorem, $m \perp \overleftrightarrow{AB}$ since $\ell \perp \overleftrightarrow{AB}$. But then $\overleftrightarrow{AB} \parallel \overleftrightarrow{BC}$ since $\overleftrightarrow{AB} \neq \overleftrightarrow{BC}$ and by the Alternate Interior Angle theorem with m as a common perpendicular. This contradicts $B \in \overleftrightarrow{AB} \cap \overleftrightarrow{BC}$. Thus, ℓ and m intersect at some point O .

By a basic SAS argument, we see that $\overline{OA} \cong \overline{OB} \cong \overline{OC}$. Thus, A , B , C are all incidence to the circle centered at O and with radius \overline{OA} . This circle is unique, since a basic SSS argument shows that $\overline{PA} \cong \overline{PB} \cong \overline{PC}$ implies that $P \in \ell \cap m = \{O\}$. \square



Proof. Let A , B , and C be three non-collinear points. Let ℓ and m be the two perpendicular bisectors of \overline{AB} and \overline{BC} . We claim that ℓ and m intersect each other. If not, that is, if $\ell \parallel m$, then m intersects \overleftrightarrow{AB} by Proclus' lemma. By the converse of the Alternate Interior Angle theorem, $m \perp \overleftrightarrow{AB}$ since $\ell \perp \overleftrightarrow{AB}$. But then $\overleftrightarrow{AB} \parallel \overleftrightarrow{BC}$ since $\overleftrightarrow{AB} \neq \overleftrightarrow{BC}$ and by the Alternate Interior Angle theorem with m as a common perpendicular. This contradicts $B \in \overleftrightarrow{AB} \cap \overleftrightarrow{BC}$. Thus, ℓ and m intersect at some point O .

By a basic SAS argument, we see that $\overline{OA} \cong \overline{OB} \cong \overline{OC}$. Thus, A , B , C are all incidence to the circle centered at O and with radius \overline{OA} . This circle is unique, since a basic SSS argument shows that $\overline{PA} \cong \overline{PB} \cong \overline{PC}$ implies that $P \in \ell \cap m = \{O\}$. \square