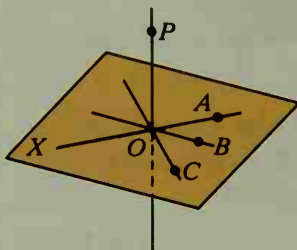


Some proofs require the idea of a line perpendicular to a plane. A line and a plane are **perpendicular** if and only if they intersect and the line is perpendicular to all lines in the plane that pass through the point of intersection. Suppose you are given  $\overrightarrow{PO} \perp \text{plane } X$ . Then you know that  $\overrightarrow{PO} \perp \overrightarrow{OA}$ ,  $\overrightarrow{PO} \perp \overrightarrow{OB}$ ,  $\overrightarrow{PO} \perp \overrightarrow{OC}$ ,  $\overrightarrow{PO} \perp \overrightarrow{OC}$ , and so on. The ice-fishing equipment shown below suggests a line perpendicular to a plane.

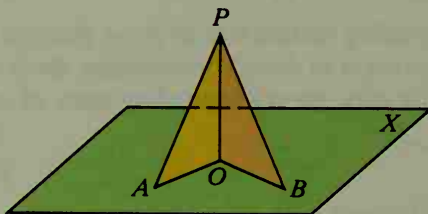


### Example 2

Given:  $\overrightarrow{PO} \perp \text{plane } X$ ;

$$\overline{AO} \cong \overline{BO}$$

Prove:  $\overline{PA} \cong \overline{PB}$



**Plan for Proof:** You can prove  $\overline{PA} \cong \overline{PB}$  if you can show that these segments are corresponding parts of congruent triangles. The diagram suggests that you try to prove  $\triangle POA \cong \triangle POB$ .

### Proof:

Statements	Reasons
1. $\overrightarrow{PO} \perp \text{plane } X$	1. Given
2. $\overrightarrow{PO} \perp \overrightarrow{OA}$ ; $\overrightarrow{PO} \perp \overrightarrow{OB}$	2. Def. of a line perpendicular to a plane
3. $m\angle POA = 90$ ; $m\angle POB = 90$	3. Def. of $\perp$ lines
4. $\angle POA \cong \angle POB$	4. Def. of $\cong \angle$
5. $\overline{AO} \cong \overline{BO}$	5. Given
6. $\overline{PO} \cong \overline{PO}$	6. Reflexive Prop.
7. $\triangle POA \cong \triangle POB$	7. SAS Postulate
8. $\overline{PA} \cong \overline{PB}$	8. Corr. parts of $\cong \triangle$ are $\cong$ .