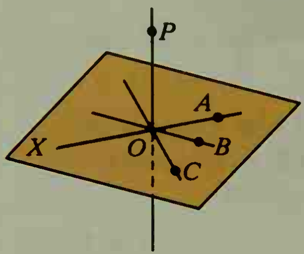
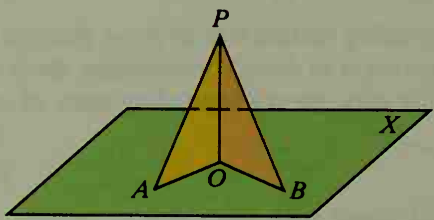
Some proofs require the idea of a line perpendicular to a plane. **A line and a plane are perpendicular** if and only if they intersect and the line is perpendicular to all lines in the plane that pass through the point of intersection. Suppose you are given $\overleftrightarrow{PO} \perp$ plane X. Then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



Example 2

Given: $\overline{PO} \perp$ 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. $\overline{PO} \perp$ plane X	1. Given
2. $\overline{PO} \perp \overline{OA}$; $\overline{PO} \perp \overline{OB}$	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 $\cong$ $\measuredangle$s
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 $\cong$ $\triangle$s are $\cong$.