Proposition 4.2 (Hypotenuse-Leg Criterion). Two right triangles are congruent if the hypotenuse and a leg of one are congruent, respectively, to the hypotenuse and a leg of the other.

Proof. Let ΔABC be a right triangle such that $\sphericalangle$BAC is a right angle. Let D be a point on the ray opposite to $\overrightarrow{AC}$ such that BD $\cong$ BC. (We know that such a D exists because the hypotenuse of any right triangle must be longer than either of its legs, ensuring that a segment congruent to BC would actually meet the ray.) ΔBDC is then an isosceles triangle, so we may apply the Base Angles Theorem to obtain that $\sphericalangle$BDA $\cong$ $\sphericalangle$BCA. Since any right angle is congruent to its supplement, $\sphericalangle$BAC $\cong$ $\sphericalangle$BAD, so ΔABC $\cong$ ΔABD by the SAA criterion. This proves the Hypotenuse-Leg Criterion, since the only assumptions we made about $\sphericalangle$ABD were that its hypotenuse and shared leg were congruent to that of $\sphericalangle$ABC, and that $\sphericalangle$BAD is right (since it is supplementary to a right angle). $\square$