Constructing a Congruent Angle

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Challenge 11.5. Given an angle at a point B and given a ray emanating from a point D, construct an angle at D congruent to the angle at B having the given ray as a side.
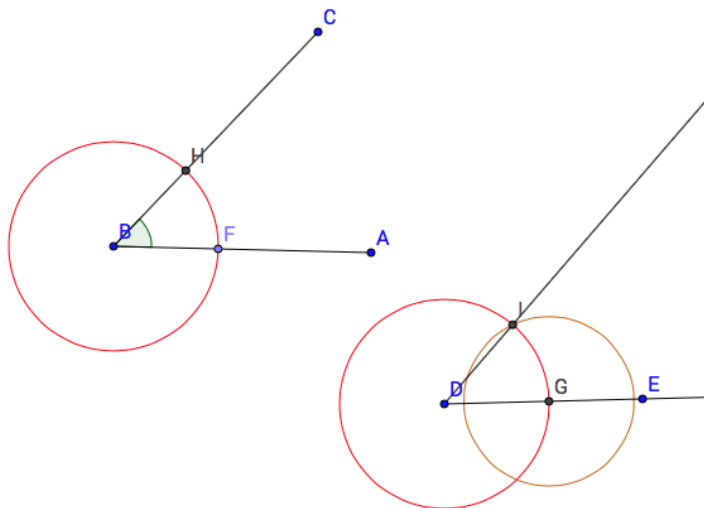

Figure 1: A pair of congruent angles on the beach

1. Pick point F on one of the rays of the angle at point B. Draw circle B through F. Label the intersection of the circle with angle B as point H.

2. Draw a circle with radius BF at point D. Label the intersection of the circle with ray D as point G.

3. Draw a circle with radius FH at point G. Label the intersection of circle D and circle G as point I.
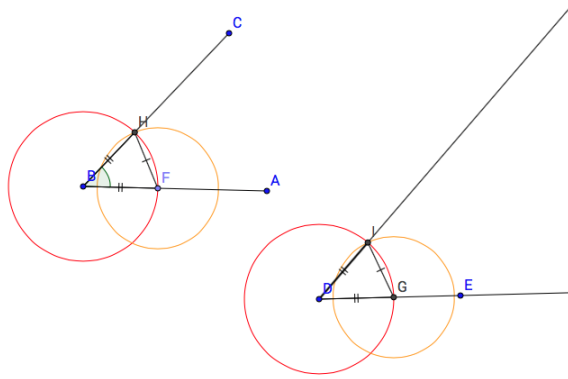
4. Draw ray DI.

Figure 2:

Proof. Consider the triangles HBF and IDG. segments HB, FB, ID, and GD are all congruent since they are radii of congruent circles. Segment IG is congruent to HF by construction. Then by Side-Side-Side, triangles HBF and IDG are congruent. Thus, angle IBG is congruent to angle HBF. □

Refereed by Harmony Van Nevele.

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