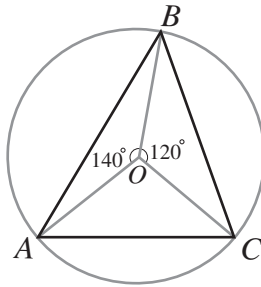


The point  $O$  is the center of the circle circumscribed about  $\triangle ABC$ , with  $\angle BOC = 120^\circ$  and  $\angle AOB = 140^\circ$ , as shown. What is the degree measure of  $\angle ABC$ ?



- (A) 35    (B) 40    (C) 45    (D) 50    (E) 60

**2007 AMC 10 B, Problem #4—**

**2007 AMC 12 B, Problem #3—**

“ $OA = OB = OC$ .”

**Solution**

**Answer (D):** Since  $OA = OB = OC$ , triangles  $AOB$ ,  $BOC$ , and  $COA$  are all isosceles. Hence

$$\angle ABC = \angle ABO + \angle OBC = \frac{180^\circ - 140^\circ}{2} + \frac{180^\circ - 120^\circ}{2} = 50^\circ.$$

OR

Since

$$\angle AOC = 360^\circ - 140^\circ - 120^\circ = 100^\circ,$$

the Central Angle Theorem implies that

$$\angle ABC = \frac{1}{2}\angle AOC = 50^\circ.$$

**Difficulty:** Medium

**NCTM Standard:** Geometry Standard: Analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships.

**Mathworld.com Classification:** Geometry > Plane Geometry > Circles

Geometry > Plane Geometry > Triangles > Special Triangles > Other Triangles > Triangle