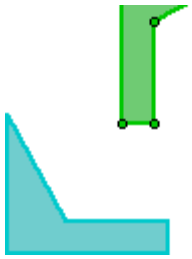

Answer Key - Finding What Doesn't Change

7. After being rotated counterclockwise through an angle of 90°, the flag will appear on its side as shown in the figure at right.

8. You can click on the Show Rotated Figure button to check your answer. Different angles will result in different rotated images, as will different centers of rotation.
9. If the rotocenter is inside the original green flag, that point will be left fixed by the rotation.
10. The center of rotation is the only point that will never be moved by every rotation.

11. The net effect is a single rotation about the given rotocenter through twice the original angle.

12. A rotation of 180°.

13. A rotation of 100°.

14. A rotation of 120°.

15. To convert an angle with measure greater than 360° to an angle with measure less than 360°, subtract 360° or multiples of 360° until you get a positive angle less than 360°.

16. Every figure will be left unchanged by a rotation of 0°.

17. The red square will land exactly on the green square after rotations of 0°, 90°, 180°, and 270°. The red pentagon will land exactly on the green pentagon after rotations of 0°, 72°, 144°, 216°, and 288°.

18. There are several patterns that can be observed in these angles. The square, which has four edges and four vertices, is left unchanged by four different rotations and the pentagon, which has five edges and five vertices, is left unchanged by five different rotations. For the square, all angles of rotation are multiples of 90°, which is one-fourth of 360°; for the pentagon, all angles of rotation are multiples of 72°, which is one-fifth of 360°.

19. If a different center of rotation were used, the red figure would not land exactly on the green figure (except for a rotation of 0°).

20. The center of rotation is the center of the hexagon, which is the point of intersection of any two diagonals, and the angles of rotation that leave the hexagon apparently unchanged are 0°, 60°, 120°, 180°, 240°, and 300°. In general, the center of rotation of a regular *n*-sided figure (called an *n*-gon) is the center of the *n*-gon, which is the point of intersection of any two diagonals. The angles of rotation that leave the *n*-gon apparently unchanged are 0°, 360/*n* °, 2 times 360/*n* °, 3 times 360/*n* °, 4 times 360/*n* °, . . . , and *n*-1 times 360/*n* °.