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Date _____
Geometry

$\frac{360}{n}$ is the minimum rotation
- any multiple of that will also map it onto itself

Rotational Symmetry with Regular Polygons

1. What is the minimum number of degrees an equilateral triangle must be rotated to be carried onto itself?

$$\frac{360}{3} = 120^\circ$$

2. What is the minimum number of degrees a square must be rotated to be mapped onto itself?

$$\frac{360}{4} = 90^\circ$$

3. What is the minimum number of degrees a regular octagon must be rotated to be carried onto itself?

$$\frac{360}{8} = 45^\circ$$

4. What is the minimum number of degrees a regular hexagon must be rotated to be mapped onto itself?

$$\frac{360}{6} = 60^\circ$$

5. What is the minimum number of degrees a regular decagon must be rotated to be carried onto itself?

$$\frac{360}{10} = 36^\circ$$

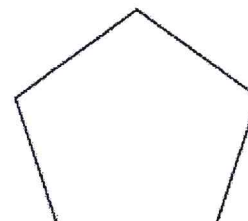
6. If a regular polygon has rotational symmetry of 30° , how many angles does it have?

$$\frac{360}{n} = 30 \quad \frac{360}{30} = 30n$$
$$n = 12 \quad 12 = n$$

7. If a regular polygon has rotational symmetry of 20° , how many sides does it have?

$$\frac{360}{n} = 20 \quad 20n = 360$$
$$n = 18 \quad n = 18$$

8. The regular polygon below is rotated about its center.



$$\frac{360}{5} = 72$$

Which angle of rotation will carry the figure onto itself?

- 1) 60°
- 2) 108°
- 3) 216° $72(3)$
- 4) 540°

9. Which of the following rotations would not map an equilateral triangle onto itself?

- (1) 120° ✓
 - (2) 240° $120(2)$ ✓
 - (3) 180° ✗
 - (4) 480° $120(4)$ ✓
- $$\frac{360}{3} = 120$$

10. Which rotation about its center will carry a regular decagon onto itself?

- 1) 54°
 - 2) 162°
 - 3) 198°
 - 4) 252° $36(7)$
- $$\frac{360}{10} = 36$$

11. A regular octagon is rotated n degrees about its center, carrying the octagon onto itself. The value of n could be

- 1) 10°
 - 2) 150°
 - 3) 225° $45(5)$
 - 4) 252°
- $$\frac{360}{8} = 45$$

12. Which of the following rotations would not map a regular pentagon onto itself?

- (1) 144° $72(2)$ ✓
 - (2) 120° ✗
 - (3) 216° $72(3)$ ✓
 - (4) 720° $72(6)$ ✓
- $$\frac{360}{5} = 72$$

13. Which of the following regular polygons has rotational symmetry of 480° ?

- (1) pentagon $\frac{360}{5} = 72$
 - (2) hexagon $\frac{360}{6} = 60$
 - (3) octagon $\frac{360}{8} = 45$
 - (4) decagon $\frac{360}{10} = 36$
- $$60(8) = 480$$

14. In which regular polygon would a rotation of 135° carry the shape onto itself?

- 45(3)
- (1) octagon $\frac{360}{8} = 45$
- (2) square $\frac{360}{4} = 90$
- (3) hexagon $\frac{360}{6} = 60$
- (4) pentagon $\frac{360}{5} = 72$