LESSON 159

1. A) false; A line has no endpoints.
B) false; $\overleftrightarrow{AB}$ and $\overleftrightarrow{BA}$ are the same lines.
C) true; $\overrightarrow{AB}$ has endpoint A, but $\overrightarrow{BA}$ has endpoint B.
D) true; All points on a line are coplanar.
E) true
F) false; The intersection of two planes is a line.
G) false; Vertical angles are never adjacent.
H) true
I) false; Only acute angles have complements.
J) false; A straight angle does not have a supplement.
K) false; Angles in a triangle must add up to 180°.
L) true
M) true
N) false; A circle is made of a curve.
O) true; A square is equilateral and equiangular.
P) false; A rectangle has four right angles.

2. Use the Segment Addition Postulate [7.6].
$AB + BC = AC$
$x + (x + 5) = 3x + 1$; $x = 4$
$AC = 3(4) + 1 = 13$

3. A midpoint divides a segment into two ≅ segments.
$PQ = 2PM$
$12 = 2(x - 4)$; $x = 10$

4. An angle bisector divides an angle into two ≅ angles.
$m\angle ABP = m\angle CBP$
$3x + 7 = 5x - 1$; $x = 4$
$m\angle ABP = 3(4) + 7 = 19°$
$m\angle ABC = 2(m\angle ABP) = 2(19) = 38°$

5. linear pairs: ∠3 and ∠4, ∠4 and ∠5
vertical angles: ∠3 and ∠5

6. $m\angle 1 = 90°$
$m\angle 2 = 90 - m\angle 3 = 58°$ (complementary angles)
$m\angle 4 = 180 - m\angle 3 = 148°$ (supplementary angles)
$m\angle 5 = m\angle 3 = 32°$ (vertical angles)

7. $6x + 3x = 90$; $x = 10$

8. 4 pairs

9. yes; ∠1 and ∠2 are alternate exterior angles. If alternate exterior angles are congruent, then lines are parallel.

10. $m\angle 1 = 58°$ (alternate interior angles)
$m\angle 2 = 180 - 90 - 58 = 32°$ (△ angle sum = 180)
$m\angle 3 = m\angle 2 = 32°$ (alternate interior angles)
$m\angle 4 = 180 - m\angle 2 = 148°$ (supplementary angles)

11. $m\angle 1 = 180 - 105 = 75°$ (supplementary angles)
$m\angle 2 = 105°$ (alternate interior angles)
$m\angle 3 = 105°$ (corresponding angles)
$m\angle 4 = 105°$ (alternate interior angles)
$m\angle 5 = 105°$ (corresponding angles)
$m\angle 6 = 180 - m\angle 5 = 75°$ (consecutive interior angles)
$m\angle 7 = m\angle 6 = 75°$ (vertical angles)

12. obtuse; 130° is an obtuse angle.

13. no; The angles do not add up to 180°.

14. Angles in a triangle add up to 180°.
$x + x + 120 = 180$; $x = 30$

15. An exterior ∠ is the sum of its two remote interior ∠s.
$75 + (2x + 4) = 109$; $x = 15$

16. rhombus, square

17. rectangle, square

18. The figure is not a polygon because it is not closed.

19. interior angle sum = $180(n - 2) = 180(7 - 2) = 900°$

20. interior angle sum of a pentagon = $180(5 - 2) = 540°$
$92 + 145 + 3x + 102 + 111 = 540$; $x = 30$

21. exterior angle sum of any polygon = 360°
$80 + 80 + 5x + (5x + 10) = 360$; $x = 19$

22. Let x be each angle of the quadrilateral. Angles in a quadrilateral add up to 360°, so $4x = 360$ and $x = 90$. This means that each angle must be a right angle. A quadrilateral with four right angles is a rectangle.

23. A regular polygon with n sides has n angles.
one interior angle = interior angle sum/# of angles
$= 180(n - 2)/n$

24. exterior angle sum of any polygon = 360°
one exterior angle = exterior angle sum/ # of angles
$= 360/n$