Extra Practice

Chapter 6

Lesson 6-1

Find the sum of the interior angle measures of each polygon.

1. octagon 1080
2. 16-gon 2520
3. 42-gon 7200

Find the missing angle measures.

4. $x = 100; (x + 5) = 105$
5. $x = 110; y = 102; z = 82$
6. $x = 122; (x - 6) = 116$

Find the measure of one interior angle and the measure of one exterior angle in each regular polygon.

7. nonagon interior: 140, exterior: 40
8. 20-gon interior: 162, exterior: 18
9. 45-gon interior: 172, exterior: 8

Lesson 6-2

Find the values of the variables in each parallelogram.

10. $x = 12; y = 84$
11. $x = 30; y = 55$
12. $x = 8; y = 25$
13. $x = 1; y = 7$
14. $x = 26; y = 11$
15. $x = 8; y = 4$
16. Given: $PQRS$ and $QDCA$ are parallelograms.

Prove: $AP = BS$

Since $PQRS$ is a $\square$, its opp. sides are $\parallel$, so $\overline{PA} \parallel \overline{SB}$ and $\overline{PS} \parallel \overline{QR}$. Since $QDCA$ is a $\square$, $\overline{AB} \parallel \overline{QR}$. Thus, $\overline{PS} \parallel \overline{AB}$ because two lines $\parallel$ to the same line $\parallel$. $PABS$ is a $\square$ by def. of $\square$, and $AP = BS$ since opp. sides of a $\square$ are $\equiv$.

17. Given: $\square ABCD$

Prove: $\overline{PM} \parallel \overline{AD}$

Since $\overline{PM}$ bisects each other, so $P$ is the midpt. of $AC$.

$P$ and $M$ are midpts. of two sides of $\triangle ACD$ so, by the $\triangle$ Midseg. Thm., $\overline{PM} \parallel \overline{AD}$. 
Chapter 6

18. In the figure, $BD = DF$. Find $DG$ and $EG$.

$DG = 3.2; EG = 2.05$

Lesson 6-3

Based on the markings, decide whether each figure must be a parallelogram.

19. yes

20. yes

21. no

22. yes

23. no

24. yes

25. Describe how you can use what you know about parallelograms to construct a point halfway between a given pair of parallel lines.

Sample answer: Mark two $\parallel$ segments on each of the two $\parallel$ lines. The two segments are opposite sides of a $\parallel$. Construct (draw) the diagonals of the $\parallel$. The diagonals intersect at their midpts., which is the desired point halfway between the $\parallel$ lines.

26. Given: $\square ABCD$

$BX \perp AC, DY \perp AC$

Prove: $BXDY$ is a parallelogram.

$ABCD$ is a $\square$ (given), so $\overline{AB} \parallel \overline{DC}$ and $\overline{AB} \equiv \overline{DC}$. $\angle BAX \equiv \angle DCY$ by the Alt. Int. $\triangle$ Thm. $\angle AXB$ and $\angle CYD$ are rt. $\triangle$ and therefore $\equiv$. $\triangle AXB \equiv \triangle CYD$ by AAS and $\overline{BX} \equiv \overline{DY}$ by CPCTC.

Since $BX \perp AC$ and $DY \perp AC$ (given), $\overline{BX} \equiv \overline{DY}$. $BXDY$ has a pair of sides $\parallel$ and $\equiv$, so $BXDY$ is a $\square$.

Lessons 6-4 and 6-5

For each parallelogram, determine the most precise name and find the measures of the numbered angles.

27. square;

$m\angle 1 = 45$;

$m\angle 2 = 45$

28. rhombus;

$m\angle 1 = 50$;

$m\angle 2 = 90$;

$m\angle 3 = 40$;

$m\angle 4 = 40$

29. $\square$;

$m\angle 1 = 45$;

$m\angle 2 = 45$;

$m\angle 3 = 80$;

$m\angle 4 = 55$

30. rectangle;

$m\angle 1 = 116$;

$m\angle 2 = 64$;

$m\angle 3 = 32$;

$m\angle 4 = 58$

31. rhombus; $m\angle 1 = 90$; $m\angle 2 = 27$;

$m\angle 3 = 63$; $m\angle 4 = 63$

32. rectangle;

$m\angle 1 = 40$;

$m\angle 2 = 100$;

$m\angle 3 = 50$;

$m\angle 4 = 80$
33. Use the information in the figure.
   Explain how you know that $ABCD$ is a rectangle.
   By the Conv. of the Isos. △Thm. and given that $PA = PB$, it follows that $PD = PA = PB = PC$. Thus, the diagonals of $ABCD$ bisect each other (so $ABCD$ is a □) and are $\perp$ (by the Seg. Add. Post.), so $ABCD$ is a rectangle.
   What value of $x$ makes each figure the given special parallelogram?

34. □$ABCD$ is a rhombus. What is the relationship between $\angle 1$ and $\angle 2$?
   △$ABC$ and △$ACD$ are congruent isosceles triangles with their vertex angles at point $P$. What kind of figure is $ABCD$? Be sure to consider all the possibilities.
   △$ABK$ and △$BCD$ are congruent isosceles triangles with their vertex angles at point $P$. What kind of figure is $ABCD$? Be sure to consider all the possibilities.

35. rhombus
   
   \[
   (5x - 15)° \\
   (4x + 1)° \\
   x = 16
   \]

36. rectangle
   
   \[
   3x + 3 \\
   5x - 11 \\
   x = 7
   \]

37. rhombus
   
   \[
   x = 8 \\
   (4x + 5)° \\
   (7x - 3)°
   \]

**Lesson 6-6**

Find $m\angle 1$ and $m\angle 2$.

38.
   
   \[
   m\angle 1 = 110, \\
   m\angle 2 = 25
   \]

39.
   
   \[
   m\angle 1 = 67, \\
   m\angle 2 = 23
   \]

40.
   
   \[
   m\angle 1 = 53, \\
   m\angle 2 = 74
   \]

41.
   
   \[
   m\angle 1 = 110, \\
   m\angle 2 = 70
   \]

42.
   
   \[
   m\angle 1 = 70, \\
   m\angle 2 = 70
   \]

43.
   
   \[
   m\angle 1 = 74, \\
   m\angle 2 = 106
   \]

44. Suppose you manipulate the figure so that △$PAB$, △$PBC$, and △$PCD$ are congruent isosceles triangles with their vertex angles at point $P$. What kind of figure is $ABCD$? Be sure to consider all the possibilities.
   △$ABK$ and △$BCD$ are congruent isosceles triangles with their vertex angles at point $P$. What kind of figure is $ABCD$? Be sure to consider all the possibilities.
   △$ABC$ and △$ACD$ are congruent isosceles triangles with their vertex angles at point $P$. What kind of figure is $ABCD$? Be sure to consider all the possibilities.

Find $EF$ in each trapezoid.

45.
   
   \[
   A \quad \frac{x + 1}{3x - 2} \\
   B \quad 10 \\
   E \quad F \\
   D \quad C
   \]
   
   $EF = 7$

46.
   
   \[
   A \quad \frac{x + 5}{4x + 2} \\
   B \quad \frac{x + 3}{2x} \\
   E \quad F \\
   D \quad C
   \]
   
   $EF = 7$

47.
   
   \[
   A \quad \frac{x - 2}{x + 3} \\
   B \quad \frac{x + 3}{2x} \\
   E \quad F \\
   D \quad C
   \]
   
   $EF = 11$
Chapter 6

Lesson 6-7

Graph the given points. Use slope and the Distance Formula to determine the most precise name for quadrilateral $ABCD$.

48. $A(3, 5), B(6, 5), C(2, 1), D(1, 3)$

49. $A(-1, 1), B(3, -1), C(-1, -3), D(-5, -1)$

Lesson 6-8

Give coordinates for points $D$ and $S$ without using any new variables.

50. parallelogram

51. rhombus

52. isosceles trapezoid

Lesson 6-9

53. A square has vertices at $(2a, 0), (0, 2a), (-2a, 0),$ and $(0, -2a)$.

Use coordinate geometry to prove that the midpoints of the sides of a square determine the square.

Given: Square $DRSQ$ with $K, L, M, N$ midpts. of $DR, RS, SQ$ and $QD$, respectively.

Prove: $KLMN$ is a square. $K(a, a), L(-a, -a), M(-a, a),$ and $N(-a, -a)$ are midpts. of the sides of the square. $KL = LM = MN = NK = 2a$. The slopes of $KL$ and $MN$ are undefined. The slopes of $LM$ and $NK$ are 0, so adj. sides are $\perp$ to each other. Since all $\angle$ are rt. $\triangle$, the quad. is a rectang. A rectang with all $\equiv$ sides is a square.

54. In the figure, $\triangle PQR$ is an isosceles triangle. Points $M$ and $N$ are the midpoints of $PQ$ and $PR$, respectively.

Give a coordinate proof that the medians of isosceles triangle $PQR$ intersect at $H\left(0, \frac{2b}{3}\right)$.

The line through $R(2a, 0)$ and $M(-a, b)$ is $y = -\frac{b}{3a}(x - 2a)$.

The line through $Q(-2a, 0)$ and $N(a, b)$ is $y = \frac{b}{3a}(x + 2a)$. For each line, when $x = 0$, $y = \frac{2b}{3}$, so the three medians all contain point $H\left(0, \frac{2b}{3}\right)$.