Determine which angle has the greatest measure.
11. \( \angle 1, \angle 2, \angle 4 \)
12. \( \angle 2, \angle 4, \angle 6 \)
13. \( \angle 3, \angle 5, \angle 7 \)
14. \( \angle 1, \angle 2, \angle 6 \)
15. \( \angle 5, \angle 7, \angle 8 \)
16. \( \angle 2, \angle 6, \angle 8 \)

Use the Exterior Angle Inequality Theorem to list all angles that satisfy the stated condition.
17. measures less than \( m\angle 5 \)
18. measures greater than \( m\angle 6 \)
19. measures greater than \( m\angle 10 \)
20. measures less than \( m\angle 11 \)

Determine the relationship between the measures of the given angles.
21. \( \angle KAJ, \angle A JK \)
22. \( \angle M J Y, \angle J Y M \)
23. \( \angle S M J, \angle M J S \)
24. \( \angle A K J, \angle J A K \)
25. \( \angle M Y J, \angle J M Y \)
26. \( \angle J S Y, \angle J Y S \)

Determine the relationship between the lengths of the given sides.
27. \( \overline{ZJ}, \overline{YR} \)
28. \( \overline{SR}, \overline{ZS} \)
29. \( \overline{RZ}, \overline{SR} \)
30. \( \overline{ZY}, \overline{RZ} \)
31. \( \overline{TY}, \overline{ZY} \)
32. \( \overline{TY}, \overline{ZT} \)

PROOF Write a two-column proof.
33. Given: \( \overline{JM} \cong \overline{JL} \)
\( \overline{JL} \cong \overline{KL} \)
Prove: \( m\angle 1 > m\angle 2 \)

34. Given: \( \overline{PR} \cong \overline{PQ} \)
\( QR > QP \)
Prove: \( m\angle P > m\angle Q \)

35. TRAVEL A plane travels from Chicago to Atlanta, on to Austin, and then completes the trip directly back to Chicago as shown in the diagram. Name the legs of the trip in order from longest to shortest.
36. **COORDINATE GEOMETRY** Triangle KLM has vertices K(3, 2), L(−1, 5), and M(−3, −7). List the angles in order from the least to the greatest measure.

37. If \( AB > AC > BC \) in \( \triangle ABC \) and \( \overline{AM}, \overline{BN}, \) and \( \overline{CO} \) are the medians of the triangle, list \( AM, BN, \) and \( CO \) in order from least to greatest.

38. **SKATEBOARDING** The wedge at the right represents a skateboard ramp. The values of \( x \) and \( y \) are in inches. Write an inequality relating \( x \) and \( y \). Then solve the inequality for \( y \) in terms of \( x \).

39. **ALGEBRA** Find the value of \( n \). List the sides of \( \triangle PQR \) in order from shortest to longest for the given angle measures.
   - \( m\angle P = 9n + 29, \ m\angle Q = 93 - 5n, \ m\angle R = 10n + 2 \)
   - \( m\angle P = 12n - 9, \ m\angle Q = 62 - 3n, \ m\angle R = 16n + 2 \)
   - \( m\angle P = 9n - 4, \ m\angle Q = 4n - 16, \ m\angle R = 68 - 2n \)
   - \( m\angle P = 3n + 20, \ m\angle Q = 2n + 37, \ m\angle R = 4n + 15 \)
   - \( m\angle P = 4n + 61, \ m\angle Q = 67 - 3n, \ m\angle R = n + 74 \)

40. **PROOF** Write a paragraph proof for the following statement.
   - If a triangle is not isosceles, then the measure of the median to any side of the triangle is greater than the measure of the altitude to that side.

41. **REASONSING** Is the following statement *always*, *sometimes*, or *never* true? Justify your answer.
   - In \( \triangle KLM \) with right angle \( J \), if \( m\angle J \) is twice \( m\angle K \), then the side opposite \( \angle J \) is twice the length of the side opposite \( \angle K \).

42. **OPEN ENDED** Draw \( \triangle ABC \) such that \( m\angle A > m\angle B > m\angle C \). Do not measure the angles. Explain how you know the greatest and least angle measures.

43. **FIND THE ERROR** Hector and Grace each labeled \( \triangle QRS \). Who is correct? Explain.

44. **CHALLENGE** Write and solve an inequality for \( x \).
CHECK Your Understanding

Example 1 (p. 296)
Determine whether the given measures can be the lengths of the sides of a triangle. Write yes or no. Explain.

1. 5, 4, 3
2. 5, 15, 10
3. 30.1, 0.8, 31
4. 5.6, 10.1, 5.2

Example 2 (p. 297)
5. MULTIPLE CHOICE An isosceles triangle has a base 10 units long. If the congruent sides have whole number measures, what is the least possible length of the sides?
A 5  B 6  C 17  D 21

Example 3 (p. 298)
6. PROOF Write a proof for Corollary 5.1.
Given: \( \overline{PQ} \perp \) plane \( M \)
Prove: \( \overline{PQ} \) is the shortest segment from \( P \) to plane \( M \).

Exercises

Determine whether the given measures can be the lengths of the sides of a triangle. Write yes or no. Explain.
7. 1, 2, 3  
8. 2, 6, 11  
9. 8, 8, 15  
10. 13, 16, 29  
11. 18, 32, 21  
12. 9, 21, 20  

Find the range for the measure of the third side of a triangle given the measures of two sides.
13. 5 and 11  
14. 7 and 9  
15. 10 and 15  
16. 12 and 18  
17. 21 and 47  
18. 32 and 61

PROOF Write a two-column proof.
19. Given: \( \angle B \cong \angle ACB \)  
Prove: \( AD + AB > CD \)

20. Given: \( HE \cong EG \)  
Prove: \( HE + FG > EF \)

21. Given: \( \triangle ABC \)  
Prove: \( AC + BC > AB \) (Triangle Inequality Theorem)  
(Hint: Draw auxiliary segment \( CD \), so that \( C \) is between \( B \) and \( D \) and \( CD \cong AC \).)

22. HISTORY The early Egyptians used to make triangles by using a rope with knots tied at equal intervals. Each vertex of the triangle had to occur at a knot. How many different triangles can be formed using the rope below?
ALGEBRA Determine whether the given coordinates are the vertices of a triangle. Explain.

23. A(5, 8), B(2, -4), C(-3, -1)
24. L(-24, -19), M(-22, 20), N(-5, -7)
25. X(0, -8), Y(16, -12), Z(28, -15)
26. R(1, -4), S(-3, -20), T(5, 12)

SCRAPBOOKING For Exercises 27 and 28, use the following information.
Carlota has several strips of trim she wishes to use as a triangular border for a spread in her scrapbook. The strips measure 3 centimeters, 4 centimeters, 5 centimeters, 6 centimeters, and 12 centimeters.

27. How many different triangles could Carlota make with the strips?
28. How many different triangles could Carlota make that have a perimeter that is divisible by 3?

PROBABILITY For Exercises 29 and 30, use the following information.
One side of a triangle is 2 feet long. Let m represent the measure of the second side and n represent the measure of the third side. Suppose m and n are whole numbers and that $14 < m < 17$ and $13 < n < 17$.

29. List the measures of the sides of the triangles that are possible.
30. What is the probability that a randomly chosen triangle that satisfies the given conditions will be isosceles?

H.O.T. Problems

31. REASONING Explain why the distance between two nonhorizontal parallel lines on a coordinate plane cannot be found using the distance between their y-intercepts.

32. OPEN ENDED Find three numbers that can be the lengths of the sides of a triangle and three numbers that cannot be the lengths of the sides of a triangle. Justify your reasoning with a drawing.

33. FIND THE ERROR Jameson and Anoki drew $\triangle EFG$ with $FG = 13$ and $EF = 5$. Each chose a possible measure for $GE$. Who is correct? Explain.

34. CHALLENGE State and prove a theorem that compares the measures of each side of a triangle with the differences of the measures of the other two sides.

35. Writing in Math Refer to the information on page 296. Explain why it is not always possible to apply the Triangle Inequality Theorem when traveling.