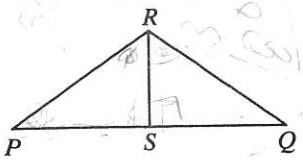
7. Every triangle has three medians and three altitudes.
8. The perpendicular bisector of a segment is the line that is perpendicular to the segment at its midpoint.
9. A point lies on the perpendicular bisector of a segment if and only if the point is equidistant from the endpoints of the segment.
10. A point lies on the bisector of an angle if and only if the point is equidistant from the sides of the angle.
11. Inductive reasoning is the process of observing individual cases and then reaching a general conclusion suggested by them. The conclusion is probably, but not necessarily, true.

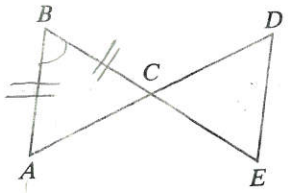
## Chapter Review

**The two triangles shown are congruent. Complete.** 3-1



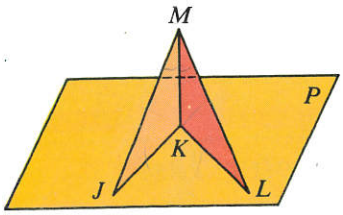

1. $\triangle RSP \cong$ ___?___
2. $\angle PRS \cong$ ___?___
3. Since $PS =$ ___?___, $S$ is the ___?___.
4. If $m\angle P = 42$, then $m\angle SRQ =$ ___?___ (numerical answer).

**Can two triangles be proved congruent? If so, write the congruence and name the postulate that can be used.** 3-2



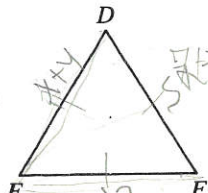

5. Given: $\overline{BE}$ bisects $\overline{AD}$; $\overline{AD}$ bisects $\overline{BE}$.
6. Given: $\overline{AB} \cong \overline{ED}$; $\overline{BC} \cong \overline{CD}$
7. Given: $\angle A \cong \angle D$; $\overline{AC} \cong \overline{DC}$
8. Given: $\angle A \cong \angle E$; $\angle B \cong \angle D$

**Write two-column proofs.** 3-3




9. Given: $\overline{JM} \cong \overline{LM}$; $\overline{JK} \cong \overline{LK}$
   Prove: $\angle MJK \cong \angle MLK$
10. Given: $\angle JMK \cong \angle LMK$; $\overline{MK} \perp$ plane $P$
    Prove: $\overline{JK} \cong \overline{LK}$

3-4

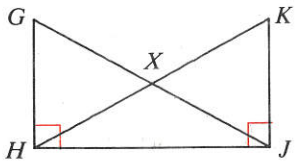



11. If $\overline{DE} \cong \overline{EF}$, which angles must be congruent? State the theorem that justifies your answer.
12. If $\angle D \cong \angle E$, $DF = 7t - 12$, and $FE = 12 - t$, find the value of $t$ and the length of $\overline{DF}$.
13. If $\triangle DEF$ is equiangular, $DE = x + y$, $EF = 12$, and $DF = 5x - y$, find the values of $x$ and $y$.

**Write two-column proofs.**

**14.** Given: $\overline{GH} \perp \overline{HJ}$; $\overline{KJ} \perp \overline{HJ}$; $\angle G \cong \angle K$
Prove: $\triangle GHJ \cong \triangle KJH$

**15.** Given: $\overline{GH} \perp \overline{HJ}$; $\overline{KJ} \perp \overline{HJ}$;
$\overline{GJ} \cong \overline{KH}$
Prove: $\overline{GH} \cong \overline{KJ}$



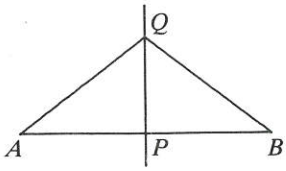

3-5

**16.** Draw a scalene right triangle $ABC$ with hypotenuse $\overline{AC}$. Sketch the altitude from $B$ and the median from $A$. 3-6

**17.** If $\overleftrightarrow{PQ}$ is the perpendicular bisector of $\overline{AB}$, name four things you can conclude about the diagram.

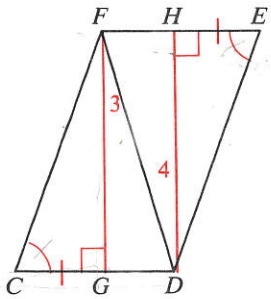
**18.** If $P$ is equidistant from $\overrightarrow{QA}$ and $\overrightarrow{QB}$, then $P$ lies on ___?___.

**19.** If $\overline{QP} \perp \overline{AB}$, then $\overline{QP}$ is a(n) ___?___ of $\triangle ABQ$.




**Exs. 17–19**

**20.** Supply the reason for each key step.
Given: $\angle C \cong \angle E$; $\overline{CG} \cong \overline{EH}$;
$\overline{FG} \perp \overline{CD}$; $\overline{DH} \perp \overline{EF}$
Prove: $\angle 3 \cong \angle 4$
1. $\triangle CGF \cong \triangle EHD$
2. $\overline{GF} \cong \overline{HD}$
3. $\overline{DF} \cong \overline{DF}$
4. $\triangle GFD \cong \triangle HDF$
5. $\angle 3 \cong \angle 4$




3-7

**21.** Marla tosses a penny six times and gets "tails" on each toss. 3-8
**a.** What might she conclude about the seventh toss?
**b.** Is it possible that her conclusion isn't valid? Explain.

**Use inductive reasoning to guess the next two numbers of each sequence.**

**22.** 1, 8, 27, 64, . . .

**23.** 100, −10, 1, $-\frac{1}{10}$, . . .

## Chapter Test

**Complete.**

**1.** If $\triangle LEG \cong \triangle ARM$, then $\overline{GL} \cong$ ___?___ and $\triangle RMA \cong$ ___?___.

**2.** In isosceles $\triangle ABC$, $m\angle A = 130$. The legs are sides ___?___ and ___?___. $m\angle B =$ ___?___ (numerical answer).

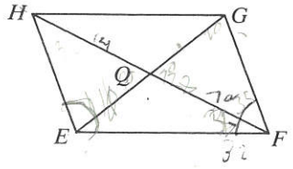
**3.** You want to prove $\triangle RST \cong \triangle XYZ$ by SAS. If you have $\overline{ST} \cong \overline{YZ}$ and $\angle T \cong \angle Z$, you must show that ___?___ $\cong$ ___?___.

## Chapter Summary

1. A parallelogram has these properties:
   - **a.** Opposite sides are parallel.
   - **b.** Opposite sides are congruent.
   - **c.** Opposite angles are congruent.
   - **d.** Diagonals bisect each other.
2. The chart on page 164 lists five ways to prove that a quadrilateral is a parallelogram.
3. If three parallel lines cut off congruent segments on one transversal, then they cut off congruent segments on every transversal.
4. A line that contains the midpoint of one side of a triangle and is parallel to another side bisects the third side.
5. Rectangles, rhombuses, and squares are parallelograms with additional properties.
6. The median of a trapezoid is parallel to the bases and has a length equal to half the sum of the lengths of the bases.
7. The segment that joins the midpoints of two sides of a triangle is parallel to the third side and has a length equal to half the length of the third side.
8. You begin an indirect proof by assuming temporarily that what you wish to prove true is *not* true. If this temporary assumption leads to a contradiction of a known fact, then your temporary assumption must be false and what you wish to prove true must be true.
9. In $\triangle RST$, if $RT > RS$, then $m\angle S > m\angle T$. If $m\angle S > m\angle T$, then $RT > RS$.
10. The sum of the lengths of any two sides of a triangle is greater than the length of the third side.
11. You can use the SAS and the SSS Inequality Theorems to compare lengths of sides and measures of angles in two triangles.

## Chapter Review

**In parallelogram *EFGH*, $m\angle EFG = 70$.**

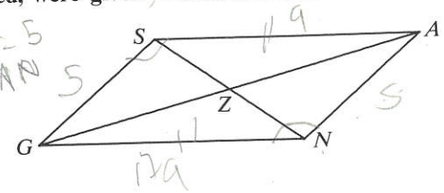



4-1

1. $m\angle HEF =$ ?
2. If $HQ = 14$, then $HF =$ ?.
3. If $m\angle EFH = 32$, then $m\angle EHF =$ ?.
4. If $EH = 8x - 7$ and $FG = 5x + 11$, then $x =$ ?.



**In each exercise you could prove that quad. *SANG* is a parallelogram if one more fact, in addition to those stated, were given. State that fact.**




4-2

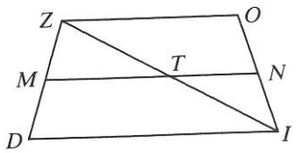
5. $GN = 9$; $NA = 5$; $SA = 9$
6. $\angle ASG \cong \angle GNA$
7. $\overline{SZ} \cong \overline{NZ}$
8. $\overline{SA} \parallel \overline{GN}$; $SA = 17$

**Write the best name for the figure described.**

4-3

9. A quadrilateral with diagonals that bisect each other.
10. A rhombus with a right angle.
11. A quadrilateral in which four sides are congruent but not all four angles are congruent.
12. A parallelogram in which two consecutive angles are congruent.

**$\overline{MN}$ is the median of trapezoid *ZOID*.**




4-4

13. The bases of trap. *ZOID* are ? and ?.
14. If $ZO = 8$ and $MN = 11$, then $DI =$ ?.
15. If $ZO = 8$, then $TN =$ ?.
16. If trap. *ZOID* is isosceles and $m\angle D = 80$, then $m\angle O =$ ?.

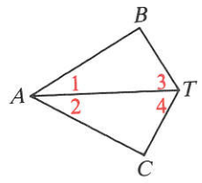
4-5

17. Write the letters (a) to (d) in such an order that the sentences provide an indirect proof of the statement: If $n^2 + 6 = 32$, then $n \neq 5$.
    - **(a)** But this contradicts the fact that $n^2 + 6 = 32$.
    - **(b)** Our temporary assumption must be false, and it follows that $n \neq 5$.
    - **(c)** Assume temporarily that $n = 5$.
    - **(d)** Then $n^2 + 6 = 31$.

4-6

18. In $\triangle TEX$, if $TE > XE$, then $m\angle T < m\angle$ ?.
19. In $\triangle BAN$, if $m\angle A > m\angle N$, then ? > ?.
20. Two sides of a triangle have lengths 9 and 12. The length of the third side must be greater than ? and less than ?.

**Use one of the symbols $<$, $=$, or $>$ to complete the statement.**




4-7

21. If $\overline{AB} \cong \overline{AC}$ and $m\angle 1 > m\angle 2$, then $BT$ ? $CT$.
22. If $\overline{TB} \cong \overline{TC}$ and $AB < CA$, then $m\angle 3$ ? $m\angle 4$.
23. If $\angle 1 \cong \angle 2$ and $\angle 3 \cong \angle 4$, then $AB$ ? $AC$.
24. If $\overline{TB} \cong \overline{TC}$ and $m\angle 3 > m\angle 4$, then $AB$ ? $AC$.