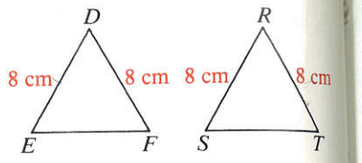
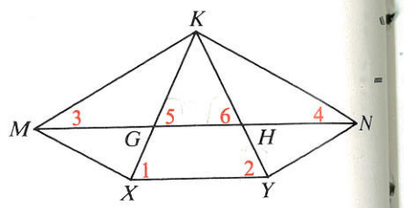
4. $\triangle DEF$ and $\triangle RST$ are isosceles, with legs 8 cm long. Name all pairs of angles that are congruent.



5. If $\angle 1 \cong \angle 2$, then $\underline{?} \cong \underline{?}$.
6. If $m\angle 3 = m\angle 4$, then $\underline{?} = \underline{?}$.
7. If $\angle 5 \cong \angle 6$, then $\underline{?} \cong \underline{?}$.
8. True or false? $MK = NK$ if and only if $m\angle 3 = m\angle 4$.

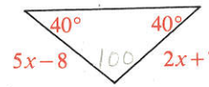


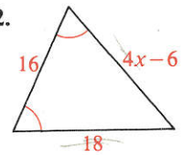
9. Prove Theorem 3-1.
10. Explain how Corollary 1 follows from Theorem 3-1.
11. Explain how Corollary 2 follows from Corollary 1.
12. What is the converse of Corollary 1? Is this converse true?
13. Use the diagram for Theorem 3-1 to explain why Corollary 3 is true.

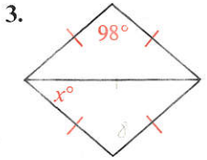
Written Exercises

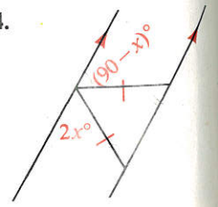
Find the value of x.

A

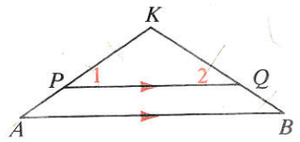
1. 

2. 

3. 

4. 

5. Supply the missing statements and reasons.
Given: $\overline{KA} \cong \overline{KB}$; $\overline{PQ} \parallel \overline{AB}$
Prove: $\overline{KP} \cong \overline{KQ}$

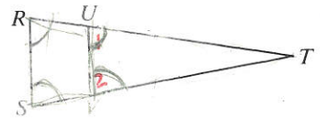


Proof:

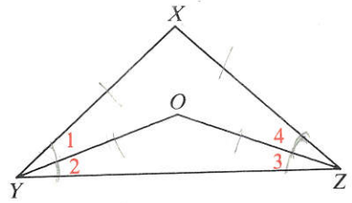
Statements	Reasons
1. $\overline{KA} \cong \overline{KB}$	1. $\underline{?}$
2. $\angle A \cong \underline{?}$	2. $\underline{?}$
3. $\overline{PQ} \parallel \overline{AB}$	3. $\underline{?}$
4. $\angle KPQ \cong \underline{?}$; $\angle B \cong \underline{?}$	4. $\underline{?}$
5. $\underline{?}$	5. Transitive Prop. (Steps 2 and 4)
6. $\overline{KP} \cong \overline{KQ}$	6. $\underline{?}$

Write proofs in two-column form.

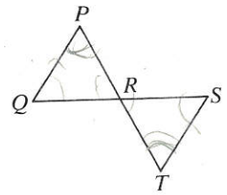
6. Given: $\angle R \cong \angle S$; $\angle TUV \cong \angle TVU$
Prove: $RU = SV$



7. Given: $\overline{TU} \cong \overline{TV}$; $\overline{UV} \parallel \overline{RS}$
Prove: $\angle R \cong \angle S$
8. Given: $\overline{XY} \cong \overline{XZ}$; $\overline{OY} \cong \overline{OZ}$
Prove: $m\angle 1 = m\angle 4$
9. Given: $\overline{XY} \cong \overline{XZ}$;
$\overrightarrow{YO}$ bisects $\angle XYZ$;
$\overrightarrow{ZO}$ bisects $\angle XZY$.
Prove: $\overline{YO} \cong \overline{ZO}$

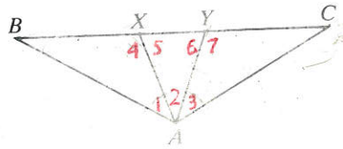


10. Given: $PQ = PR$; $TR = TS$
Which one(s) of the following *must* be true?
(1) $\angle T \cong \angle P$ (2) $\overline{ST} \cong \overline{QP}$ (3) $\overline{ST} \parallel \overline{QP}$
11. Given: $\angle S \cong \angle T$; $\overline{ST} \parallel \overline{QP}$
Which one(s) of the following *must* be true?
(1) $\angle P \cong \angle Q$ (2) $PR = QR$
(3) R is the midpoint of $\overline{PT}$.



Write proofs in two-column form.

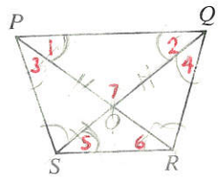
12. Given: $\overline{AB} \cong \overline{AC}$; $\overline{AX}$ and $\overline{AY}$ trisect $\angle BAC$.
(This means $\angle 1 \cong \angle 2 \cong \angle 3$.)
Prove: $\overline{AX} \cong \overline{AY}$



B

13. Given: $\angle 4 \cong \angle 7$; $\angle 1 \cong \angle 3$
Prove: $\triangle ABC$ is isosceles.

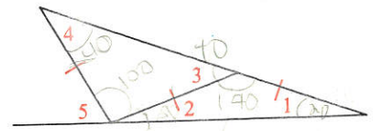
14. Given: $\angle 1 \cong \angle 2$; $\angle 3 \cong \angle 4$
Prove: $\angle 5 \cong \angle 6$



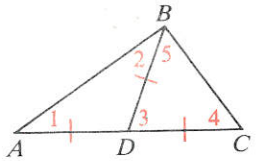
15. Given: $PO = QO$; $RO = SO$
a. If you are also given that $m\angle 1 = 40$, find the measures of $\angle 2$, $\angle 7$, $\angle 5$, and $\angle 6$. Then decide whether $\overline{PQ}$ must be parallel to $\overline{SR}$.
b. If $m\angle 1 = x$, find the measures of $\angle 2$, $\angle 7$, $\angle 5$, and $\angle 6$. Is $\overline{PQ} \parallel \overline{SR}$?

16. Draw an isosceles $\triangle ABC$ whose vertex angle, $\angle A$, has measure 80.
a. Draw $\overrightarrow{AX}$, the bisector of an exterior angle at A. Is $\overrightarrow{AX} \parallel \overline{BC}$? Explain.
b. Would your answer change if the measure of $\angle A$ changed?

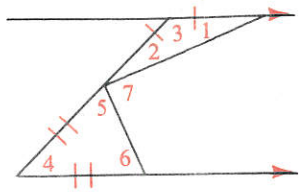
17. a. If $m\angle 1 = 20$, then $m\angle 3 = \underline{?}$, $m\angle 4 = \underline{?}$, and $m\angle 5 = \underline{?}$.
b. If $m\angle 1 = x$, then $m\angle 3 = \underline{?}$, $m\angle 4 = \underline{?}$, and $m\angle 5 = \underline{?}$.



18. **a.** If $m\angle 1 = 35$, then $m\angle ABC =$ ___?___.
b. If $m\angle 1 = x$, then $m\angle ABC =$ ___?___.



19. **a.** If $m\angle 1 = 23$, then $m\angle 7 =$ ___?___.
b. If $m\angle 1 = x$, then $m\angle 7 =$ ___?___.



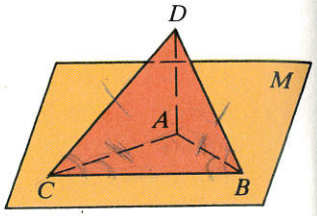
Solve for x and y.

20. $\triangle ABC$ is equiangular, $AB = 4x - y$, $BC = 2x + 3y$, and $AC = 7$.

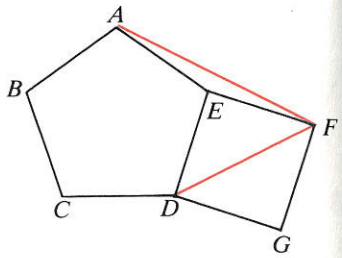
21. $\triangle DEF$ is equilateral, $m\angle D = x + y$, and $m\angle E = 2x - y$.

22. In $\triangle JKL$, $\overline{JK} \cong \overline{KL}$, $m\angle J = 2x - y$, $m\angle K = 2x + 2y$, and $m\angle L = x + 2y$.

23. Given: $\triangle ABC$ in plane M; D not in plane M;
$\angle ACB \cong \angle ABC$; $\angle DCB \cong \angle DBC$
Name a pair of congruent triangles.
Prove your answer correct.

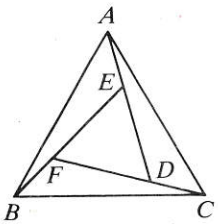


24. $ABCDE$ is a regular pentagon and $DEFG$ is a square. Find the measures of $\angle EAF$ and $\angle AFD$.

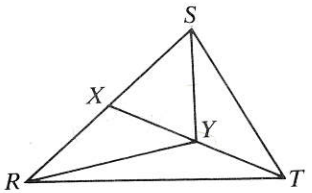


C **25.** Draw an isosceles triangle and then join the midpoints of its sides to form another triangle. What can you deduce about this second triangle? Explain.

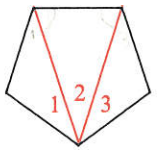
26. Given: $\triangle ABC$ is equilateral;
$\angle CAD \cong \angle ABE \cong \angle BCF$
Prove something interesting about $\triangle DEF$.

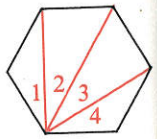


27. Given: $\overline{RX} \cong \overline{SX} \cong \overline{SY}$;
$\overline{XY} \cong \overline{YT}$
Prove: $\overline{ST} \cong \overline{RY}$



28. **a.** The figure on the left is a regular pentagon. Find the measures of $\angle 1$, $\angle 2$, and $\angle 3$.
b. The figure on the right is a regular hexagon. Find the measures of $\angle 1$, $\angle 2$, $\angle 3$, and $\angle 4$.





3-5 Other Meth Triangles C

The SSS, SAS, and ASA Post congruent. In this section w

Theorem 3-3 AAS

If two angles and a non-inc corresponding parts of anoth

Given: $\triangle ABC$ and $\triangle DEF$;
$\angle C \cong \angle F$; $\overline{AC} \cong \overline{D}$
Prove: $\triangle ABC \cong \triangle DEF$

Plan for Proof: From the to two angles of the other, co to reach the desired conclus

Do you see overlappi photograph? Sometimes you certain overlapping triang For example, suppose you problem:

Given: $\overline{AD} \cong \overline{AE}$;
$\angle B \cong \angle C$
Prove: $\triangle ABD \cong \triangle ACE$

B

You may find it helps you ence if you redraw the two below. Now you can see th mon to both triangles, th congruent by the AAS Th