roblem Solving

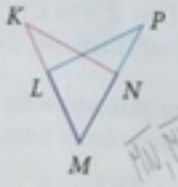
ample

mple 1

ge 224)

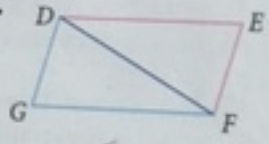
In each diagram, the red and blue triangles are congruent. Identify their common side or angle.

1.



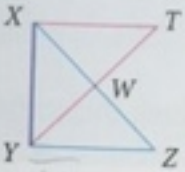
$\overline{KN}, \overline{ML}, \angle M$

2.



$\overline{DF}$

3.



$\overline{XY}$

ngruent Triangles

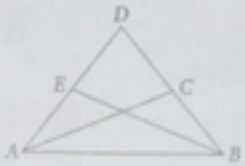
Separate and redraw the indicated triangles. Identify any common angles or sides.

4. $\triangle PQS$ and $\triangle QPR$

5. $\triangle ACB$ and $\triangle PRB$

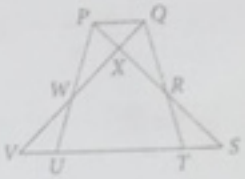
6. $\triangle TRQ$ and $\triangle PQR$

7. $\triangle ABE$ and $\triangle BAC$



8. $\triangle JKL$ and $\triangle MLK$

9. $\triangle PSU$ and $\triangle QVT$

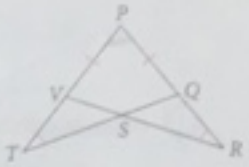


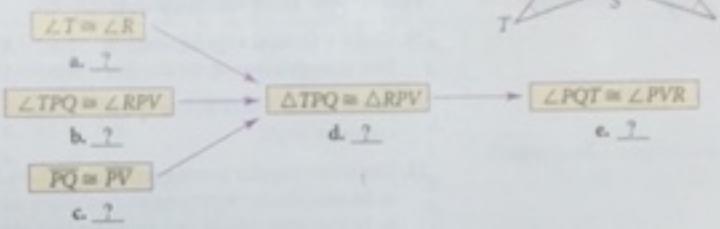
mple 2
ge 225)

10. **Developing Proof** Complete the flow proof.

Given: $\angle T \cong \angle R, \overline{PQ} \cong \overline{PV}$

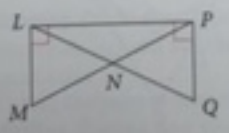
Prove: $\angle PQT \cong \angle PVR$



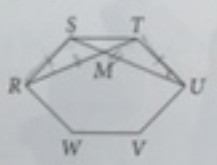


Developing Proof **Name a pair of overlapping congruent triangles in each diagram. State whether the triangles are congruent by SSS, SAS, ASA, AAS, or HL.**

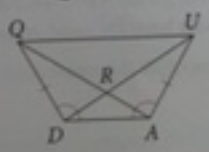
11. **Given:** $\overline{MP} \cong \overline{QL}, \overline{LP} \perp \overline{LM}, \overline{LP} \perp \overline{PQ}$



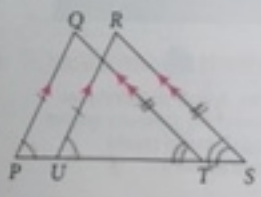
12. **Given:** $\overline{RS} \cong \overline{UT}, \overline{RT} \cong \overline{US}$



13. **Given:** $\overline{QD} \cong \overline{UA}$, $\angle QDA \cong \angle UAD$



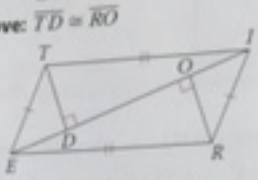
14. **Given:** $\overline{PQ} \parallel \overline{UR}, \overline{TQ} \parallel \overline{SR}$, $\overline{TQ} \cong \overline{SR}$



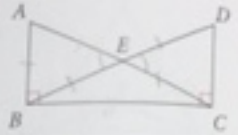
amples 3, 4
225 and 226)

Developing Proof **Plan a proof. As part of your plan, separate the overlapping triangles you use.**

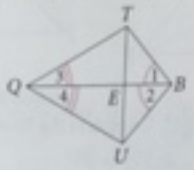
15. Given: $\overline{TE} \cong \overline{RI}$, $\overline{TI} \cong \overline{RE}$, $\angle TDI$ and $\angle ROE$ are right $\triangle$.
Prove: $\overline{TD} \cong \overline{RO}$



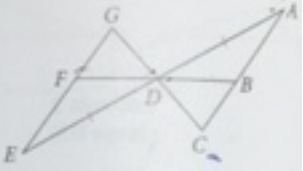
16. Given: $\overline{AB} \perp \overline{BC}$, $\overline{DC} \perp \overline{BC}$, $\overline{AC} \cong \overline{DB}$
Prove: $\overline{AE} \cong \overline{DE}$



17. Given: $\angle 1 \cong \angle 2$, $\angle 3 \cong \angle 4$
Prove: $\triangle QET \cong \triangle QEU$



18. Given: $\overline{AD} \cong \overline{ED}$, D is the midpoint of $\overline{BF}$
Prove: $\triangle ADC \cong \triangle EDG$



ur Skills

Open-Ended **Draw the diagram described.**

19. Draw a vertical segment on your paper. On the right side of the segment draw two triangles that share the given segment as a common side.

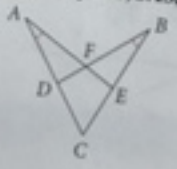
20. Draw an angle. On your angle draw two triangles that have the given angle as a common angle.

21. Draw two regular pentagons, each with its five diagonals.
a. In one, shade two triangles that share a common angle.
b. In the other, shade two triangles that share a common side.

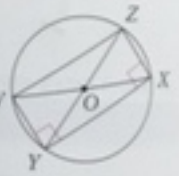
22. Draw two regular hexagons and their diagonals. For these diagrams, do parts (a) and (b) of the preceding exercise.

Proof **Name a pair of overlapping congruent triangles in each diagram. State whether the triangles are congruent by SSS, SAS, ASA, AAS, or HL. Plan and write a proof.**

23. Given: $\overline{AC} \cong \overline{BC}$, $\angle A \cong \angle B$



24. Given: $\overline{WY} \perp \overline{YX}$, $\overline{ZX} \perp \overline{YX}$, $\overline{WX} \cong \overline{ZY}$



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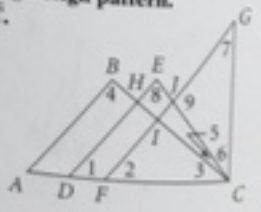
Clothes Design **The figure at the right is part of a clothing design pattern. In the figure, $\overline{AB} \parallel \overline{DE} \parallel \overline{FG}$, $\overline{AB} \perp \overline{BC}$, and $\overline{GC} \perp \overline{AC}$. $\triangle DEC$ is isosceles with base $\overline{DC}$, and $m\angle A = 56$.**

25. Find the measures of all the numbered angles in the figure.

26. $\overline{AB} \cong \overline{FC}$. Name two congruent triangles and tell how you can prove them congruent.

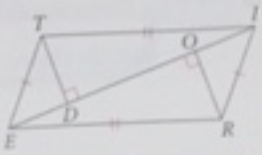


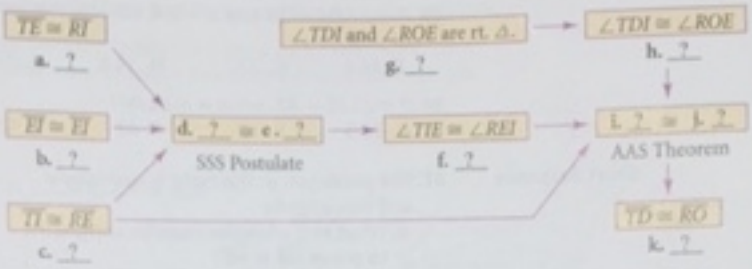
ruent Triangles

Developing Proof **Exercises 27 and 28 are proofs for Exercises 15 and 16. Copy and complete each proof. Does the proof match your plan?**

27. Given: $\overline{TE} \cong \overline{RI}, \overline{TI} \cong \overline{RE}$, $\angle TDI$ and $\angle ROE$ are right angles.

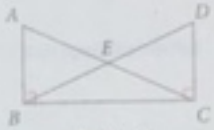
Prove: $\overline{TD} \cong \overline{RO}$





28. Given: $\overline{AB} \perp \overline{BC}, \overline{DC} \perp \overline{BC}, \overline{AC} \cong \overline{DB}$

Prove: $\overline{AE} \cong \overline{DE}$



Statements	Reasons
1. $\overline{AB} \perp \overline{BC}, \overline{DC} \perp \overline{BC}$	a. ?
2. $\angle ABC$ and $\angle DCB$ are right angles.	b. ?
3. $\triangle ABC$ and $\triangle DCB$ are right triangles.	c. ?
4. $\overline{AC} \cong \overline{DB}$	d. ?
e. ? ≅ ?	f. ? Property of Congruence
6. $\triangle ABC \cong \triangle DCB$	g. ?
7. $\angle A \cong \angle D, \overline{AB} \cong \overline{DC}$	h. ?
i. $\angle AEB \cong \angle$?	j. ?
9. $\triangle ABE \cong \triangle DCE$	k. ?
l. ? ≅ ?	m. ?

Proof **Follow your plan for the given Exercise and write a proof.**

29. Exercise 17

30. Exercise 18

Challenge

31. Reasoning Draw a quadrilateral $ABCD$ with $\overline{AB} \parallel \overline{DC}$ and $\overline{AD} \parallel \overline{BC}$, and its diagonals $\overline{AC}$ and $\overline{DB}$ intersecting at E. Label your diagram to indicate the parallel sides.

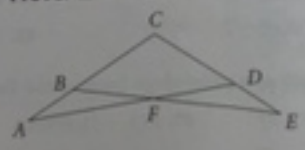
a. List all the pairs of congruent segments that you can find in your diagram.

b. Writing Explain how you know that the segments you listed are congruent.

Proof **Write a proof.**

32. Given: $\overline{AC} \cong \overline{EC}, \overline{CB} \cong \overline{CD}$

Prove: $\angle A \cong \angle E$



33. Given: $\overline{QT} \perp \overline{PR}$, $\overline{QT}$ bisects $\overline{PR}$, $\overline{QT}$ bisects $\angle VQS$.

Prove: $\overline{VQ} \cong \overline{SQ}$