2-6 Proving Angles Congruent

Vocabulary

Review

Complete each sentence with *proof* or *prove*.

1. Galileo wanted to _?_ that the planets revolve around the sun. _____

2. His observations and discoveries supported his theory but were not a _?_ of it. _____

Vocabulary Builder

theorem (noun) THEE uh rum

Definition: A **theorem** is a conjecture or statement that you prove true.

Main Idea: You use definitions, postulates, properties, and previously proven theorems to prove **theorems.**

Use Your Vocabulary

Write T for *true* or F for *false*.

_____ 3. A postulate is a *theorem*.

_____ 4. A *theorem* may contain definitions.

_____ 5. An axiom is a *theorem*.

Complete each statement with *lines, planes,* or *points.*

6. **Postulate 1-1** Through any two _?_ there is exactly one line. _____

7. **Postulate 1-2** If two distinct _?_ intersect, then they intersect in exactly one point. _____

8. **Postulate 1-3** If two distinct _?_ intersect, then they intersect in exactly one line. _____

9. **Postulate 1-4** Through any three noncollinear _?_ there is exactly one plane. _____

take note

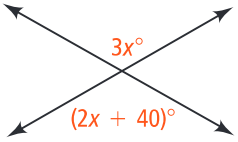
Theorem 2-1 Vertical Angles Theorem

Vertical angles are congruent.

10. If $\angle A$ and $\angle B$ are vertical angles and $m\angle A = 15$, then $m\angle B =$ _____.

Problem 1 Using the Vertical Angles Theorem

Got It? What is the value of x?



11. Circle the word that best describes the labeled angle pair in the diagram.

corresponding perpendicular vertical

12. Circle the word that best describes the relationship between the labeled angles in the diagram.

congruent perpendicular supplementary

13. Use the labels in the diagram to write an equation.

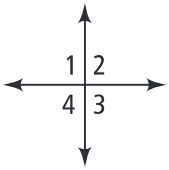
$3x =$ _____

14. Now solve the equation.

15. The value of x is _____.

Problem 2 Proof Using the Vertical Angles Theorem

Got It? Use the Vertical Angles Theorem to prove the following.



Given: $\angle 1 \cong \angle 2$

Prove: $\angle 1 \cong \angle 2 \cong \angle 3 \cong \angle 4$

16. Write a reason for each statement below.

Statements	Reasons
1) $\angle 1 \cong \angle 2$	1) _____
2) $\angle 1 \cong \angle 3$	2) _____
3) $\angle 2 \cong \angle 4$	3) _____
4) $\angle 1 \cong \angle 2 \cong \angle 3 \cong \angle 4$	4) _____

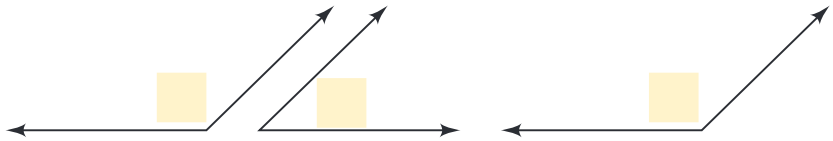
take note

Theorem 2-2 Congruent Supplements Theorem

If two angles are supplements of the same angle (or of congruent angles), then the two angles are congruent.

If $\angle 1$ and $\angle 3$ are supplements and $\angle 2$ and $\angle 3$ are supplements, then $\angle 1 \cong \angle 2$.

17. Complete the diagram below to illustrate Theorem 2-2.



18. If $m\angle D = 135$ and $m\angle G = 45$ and $\angle F$ and $\angle G$ are supplements, then $m\angle F =$ ____.

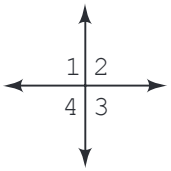
If $\angle A$ and $\angle B$ are supplements and $m\angle C = 85$ and $m\angle B = 95$, then $m\angle A =$ ____.

Problem 3 Writing a Paragraph Proof

Got It? Write a paragraph proof for the Vertical Angles Theorem.

Given: $\angle 1$ and $\angle 3$ are vertical angles.

Prove: $\angle 1 \cong \angle 3$



Circle the correct word to complete each sentence.

19. $\angle 1$ and $\angle 3$ are _?_ angles because it is given. — supplementary / vertical

20. $\angle 1$ and $\angle 2$ are _?_ angles because they form a linear pair. — supplementary / vertical

21. $\angle 2$ and $\angle 3$ are _?_ angles because they form a linear pair. — supplementary / vertical

22. $m\angle 1 + m\angle 2 = 180$ because the sum of the measures of _?_ angles is 180. — complementary / supplementary

23. $m\angle 2 + m\angle 3 = 180$ because the sum of the measures of _?_ angles is 180. — complementary / supplementary

24. By the _?_ Property of Equality, $m\angle 1 + m\angle 2 = m\angle 2 + m\angle 3$. — Reflexive / Transitive

25. By the _?_ Property of Equality, $m\angle 1 = m\angle 3$. — Subtraction / Symmetric

26. Angles with the same _?_ are congruent, so $\angle 1 \cong \angle 3$. — properties / measure

take note

Theorem 2-3 Congruent Complements Theorem

If two angles are complements of the same angle (or of congruent angles), then the two angles are congruent.

27. $\angle A$ is a supplement of a 165° angle. $\angle B$ is a complement of a 75° angle. Circle the relationship between $\angle A$ and $\angle B$.

complementary congruent supplementary

take note

Theorems 2-4 and 2-5

Theorem 2-4 All right angles are congruent.

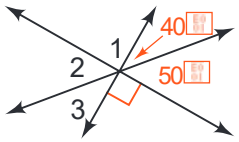
Theorem 2-5 If two angles are congruent and supplementary, then each is a right angle.

28. If $\angle R$ and $\angle S$ are right angles, then _____ $\cong$ _____.

29. If $\angle H \cong \angle J$ and $\angle H$ and $\angle J$ are supplements, then $m\angle H = m$_____ $=$ _____.

Lesson Check • Do you know HOW?

What are the measures of $\angle 1$, $\angle 2$, and $\angle 3$?



30. Cross out the theorem you CANNOT use to find an angle measure.

Congruent Complements Theorem	Congruent Supplements Theorem	Vertical Angles Theorem

31. $m\angle 1 =$ _____

32. $m\angle 2 =$ _____

33. $m\angle 3 =$ _____

Lesson Check • Do you UNDERSTAND?

Reasoning If $\angle A$ and $\angle B$ are supplements, and $\angle A$ and $\angle C$ are supplements, what can you conclude about $\angle B$ and $\angle C$? Explain.

34. Since $\angle A$ and $\angle B$ are supplements, $m\angle A + m\angle B =$ _____.

35. Since $\angle A$ and $\angle C$ are supplements, $m\angle A + m\angle C =$ _____.

36. By the Transitive Property of Equality, _____ $+ m\angle B =$ _____ $+ m\angle C$.

37. By the Subtraction Property of Equality, $m\angle B =$ _____, so $\angle B \cong$ _____.

Math Success

Check off the vocabulary words that you understand.

☐ theorem ☐ paragraph proof ☐ complementary ☐ supplementary ☐ right angle

Rate how well you can write proofs.

Need to review 0 2 4 6 8 10 Now I get it!