2 CHAPTER SUMMARY

BIG IDEAS

For Your Notebook

Big Idea 1

Using Inductive and Deductive Reasoning

When you make a conjecture based on a pattern, you use inductive reasoning. You use deductive reasoning to show whether the conjecture is true or false by using facts, definitions, postulates, or proven theorems. If you can find one counterexample to the conjecture, then you know the conjecture is false.

Big Idea 2

Understanding Geometric Relationships in Diagrams

The following can be assumed from the diagram:

A, *B*, and *C* are coplanar.

$\angle ABH$ and $\angle HBF$ are a linear pair.

Plane *T* and plane *S* intersect in $\overleftrightarrow{BC}$.

$\overleftrightarrow{CD}$ lies in plane *S*.

$\angle ABC$ and $\angle HBF$ are vertical angles.

$\overleftrightarrow{AB} \perp$ plane *S*.

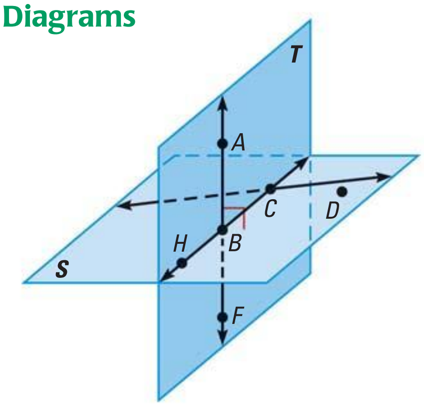

Diagram assumptions are reviewed on page 97.

Big Idea 3

Writing Proofs of Geometric Relationships

You can write a logical argument to show a geometric relationship is true. In a two-column proof, you use deductive reasoning to work from GIVEN information to reach a conjecture you want to PROVE.

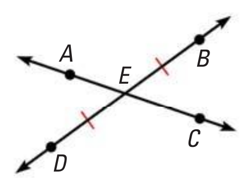

Diagram of geometric relationship with given information labeled to help you write the proof

GIVEN ▶ The hypothesis of an if-then statement

PROVE ▶ The conclusion of an if-then statement

STATEMENTS	REASONS
1. Hypothesis	1. Given
______	______
______	______
______	______
n. Conclusion	*n.* ______

Statements based on facts that you know or conclusions from deductive reasoning

Use postulates, proven theorems, definitions, and properties of numbers and congruence as reasons.

Proof summary is on page 114.

2 CHAPTER REVIEW

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- Multi-Language Glossary
- Vocabulary practice

REVIEW KEY VOCABULARY

See pp. 926–931 for a list of postulates and theorems.

- conjecture, *p. 73*
- inductive reasoning, *p. 73*
- counterexample, *p. 74*
- conditional statement, *p. 79*
  converse, inverse, contrapositive
- if-then form, *p. 79*
  hypothesis, conclusion
- negation, *p. 79*
- equivalent statements, *p. 80*
- perpendicular lines, *p. 81*
- biconditional statement, *p. 82*
- deductive reasoning, *p. 87*
- line perpendicular to a plane, *p. 98*
- proof, *p. 112*
- two-column proof, *p. 112*
- theorem, *p. 113*

VOCABULARY EXERCISES

1. Copy and complete: A statement that can be proven is called a(n) __?__.

2. **WRITING** *Compare* the inverse of a conditional statement to the converse of the conditional statement.

3. You know $m\angle A = m\angle B$ and $m\angle B = m\angle C$. What does the Transitive Property of Equality tell you about the measures of the angles?

REVIEW EXAMPLES AND EXERCISES

Use the review examples and exercises below to check your understanding of the concepts you have learned in each lesson of Chapter 2.

2.1 Use Inductive Reasoning *pp. 72–78*

EXAMPLE

Describe the pattern in the numbers 3, 21, 147, 1029, ..., and write the next three numbers in the pattern.

Each number is seven times the previous number.

3 → 21, → 147, → 1029, . . . →
$\times 7$ $\times 7$ $\times 7$ $\times 7$

So, the next three numbers are 7203, 50,421, and 352,947.

EXERCISES

EXAMPLES 2 and 5 on pp. 72–74 for Exs. 4–5

4. *Describe* the pattern in the numbers −20,480, −5120, −1280, −320, ... Write the next three numbers.

5. Find a counterexample to disprove the conjecture:

If the quotient of two numbers is positive, then the two numbers must both be positive.

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Chapter Review Practice

2.2 Analyze Conditional Statements

pp. 79–85

EXAMPLE

Write the if-then form, the converse, the inverse, and the contrapositive of the statement "Black bears live in North America."

a. If-then form: If a bear is a black bear, then it lives in North America.

b. Converse: If a bear lives in North America, then it is a black bear.

c. Inverse: If a bear is not a black bear, then it does not live in North America.

d. Contrapositive: If a bear does not live in North America, then it is not a black bear.

EXERCISES

EXAMPLES 2, 3, and 4 on pp. 80–82 for Exs. 6–8

6. Write the if-then form, the converse, the inverse, and the contrapositive of the statement "An angle whose measure is 34° is an acute angle."

7. Is this a valid definition? *Explain* why or why not.

"If the sum of the measures of two angles is 90°, then the angles are complementary."

8. Write the definition of *equiangular* as a biconditional statement.

2.3 Apply Deductive Reasoning

pp. 87–93

EXAMPLE

Use the Law of Detachment to make a valid conclusion in the true situation.

If two angles have the same measure, then they are congruent. You know that $m\angle A = m\angle B$.

▸ Because $m\angle A = m\angle B$ satisfies the hypothesis of a true conditional statement, the conclusion is also true. So, $\angle A \cong \angle B$.

EXERCISES

EXAMPLES 1, 2, and 4 on pp. 87–89 for Exs. 9–11

9. Use the Law of Detachment to make a valid conclusion.

If an angle is a right angle, then the angle measures 90°. $\angle B$ is a right angle.

10. Use the Law of Syllogism to write the statement that follows from the pair of true statements.

If $x = 3$, then $2x = 6$.

If $4x = 12$, then $x = 3$.

11. What can you say about the sum of any two odd integers? Use inductive reasoning to form a conjecture. Then use deductive reasoning to show that the conjecture is true.

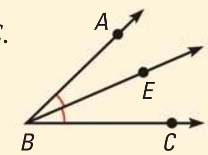
2 CHAPTER REVIEW

2.4 Use Postulates and Diagrams pp. 96–102

EXAMPLE

∠*ABC*, an acute angle, is bisected by $\overrightarrow{BE}$. Sketch a diagram that represents the given information.

1. Draw ∠*ABC*, an acute angle, and label points *A*, *B*, and *C*.
2. Draw angle bisector $\overrightarrow{BE}$. Mark congruent angles.



EXERCISES

EXAMPLES 3 and 4 on p. 98 for Exs. 12–13

12. Straight angle *CDE* is bisected by $\overrightarrow{DK}$. Sketch a diagram that represents the given information.

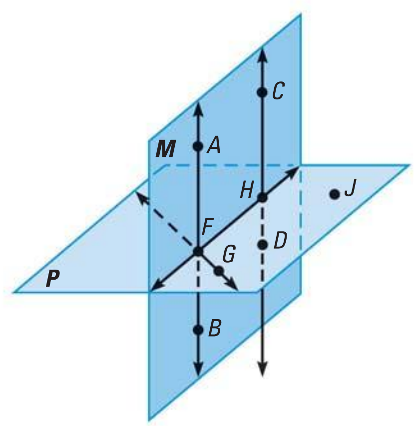
13. Which of the following statements *cannot* be assumed from the diagram?

Ⓐ *A*, *B*, and *C* are coplanar.

Ⓑ $\overleftrightarrow{CD}$ ⊥ plane *P*

Ⓒ *A*, *F*, and *B* are collinear.

Ⓓ Plane *M* intersects plane *P* in $\overleftrightarrow{FH}$.



2.5 Reason Using Properties from Algebra pp. 105–111

EXAMPLE

Solve 3*x* + 2(2*x* + 9) = −10. Write a reason for each step.

$3x + 2(2x + 9) = -10$	Write original equation.
$3x + 4x + 18 = -10$	Distributive Property
$7x + 18 = -10$	Simplify.
$7x = -28$	Subtraction Property of Equality
$x = -4$	Division Property of Equality

EXERCISES

EXAMPLES 1 and 2 on pp. 105–106 for Exs. 14–17

Solve the equation. Write a reason for each step.

14. $-9x - 21 = -20x - 87$
15. $15x + 22 = 7x + 62$
16. $3(2x + 9) = 30$
17. $5x + 2(2x - 23) = -154$

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Chapter Review Practice

2.6 Prove Statements about Segments and Angles *pp. 112–119*

EXAMPLE

Prove the Reflexive Property of Segment Congruence.

GIVEN ▶ $\overline{AB}$ is a line segment.
PROVE ▶ $\overline{AB} \cong \overline{AB}$

STATEMENTS	REASONS
1. $\overline{AB}$ is a line segment.	**1.** Given
2. AB is the length of $\overline{AB}$.	**2.** Ruler Postulate
3. $AB = AB$	**3.** Reflexive Property of Equality
4. $\overline{AB} \cong \overline{AB}$	**4.** Definition of congruent segments

EXERCISES

EXAMPLES 2 and 3 on pp. 113–114 for Exs. 18–21

Name the property illustrated by the statement.

18. If $\angle DEF \cong \angle JKL$, then $\angle JKL \cong \angle DEF$.

19. $\angle C \cong \angle C$

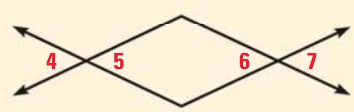
20. If $MN = PQ$ and $PQ = RS$, then $MN = RS$.

21. Prove the Transitive Property of Angle Congruence.

2.7 Prove Angle Pair Relationships *pp. 124–131*

EXAMPLE

GIVEN ▶ $\angle 5 \cong \angle 6$
PROVE ▶ $\angle 4 \cong \angle 7$

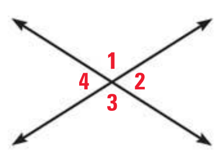


STATEMENTS	REASONS
1. $\angle 5 \cong \angle 6$	**1.** Given
2. $\angle 4 \cong \angle 5$	**2.** Vertical Angles Congruence Theorem
3. $\angle 4 \cong \angle 6$	**3.** Transitive Property of Congruence
4. $\angle 6 \cong \angle 7$	**4.** Vertical Angles Congruence Theorem
5. $\angle 4 \cong \angle 7$	**5.** Transitive Property of Congruence

EXERCISES

EXAMPLES 2 and 3 on pp. 125–126 for Exs. 22–24

In Exercises 22 and 23, use the diagram at the right.



22. If $m\angle 1 = 114°$, find $m\angle 2$, $m\angle 3$, and $m\angle 4$.

23. If $m\angle 4 = 57°$, find $m\angle 1$, $m\angle 2$, and $m\angle 3$.

24. Write a two-column proof.

GIVEN ▶ $\angle 3$ and $\angle 2$ are complementary.
$m\angle 1 + m\angle 2 = 90°$
PROVE ▶ $\angle 3 \cong \angle 1$