Chapter 2 Review

1. Based on the pattern, what are the next two terms of the sequence?
   9, 15, 21, 27, . . .
   A. 33, 972        B. 39, 45        C. 162, 972        D. 33, 39

2. What conjecture can you make about the twentieth term in the pattern A, B, A, C, A, B, A, C?
   A. The twentieth term is C.        C. The twentieth term is B.
   B. The twentieth term is A.        D. There is not enough information.

3. What conjecture can you make about the sum of the first 10 odd numbers?
   A. The sum is $9 \times 10 = 90$.        C. The sum is $10 \times 11 = 110$.
   B. The sum is $10 \times 10 = 100$.        D. The sum is $11 \times 11 = 121$.

4. What conjecture can you make about the sum of the first 40 positive even numbers?
   \[
   \begin{align*}
   2 & = 2 = 1 \cdot 2 \\
   2 + 4 & = 6 = 2 \cdot 3 \\
   2 + 4 + 6 & = 12 = 3 \cdot 4 \\
   2 + 4 + 6 + 8 & = 20 = 4 \cdot 5 \\
   2 + 4 + 6 + 8 + 10 & = 30 = 5 \cdot 6 
   \end{align*}
   \]
   A. The sum is $39 \cdot 40$.        C. The sum is $40 \cdot 41$.
   B. The sum is $41 \cdot 42$.        D. The sum is $40 \cdot 40$.

5. What conjecture can you make about the product of 13 and 8,888,888?
   \[
   \begin{align*}
   13 \cdot 88 & = 1144 \\
   13 \cdot 888 & = 11,544 \\
   13 \cdot 8888 & = 115,544 \\
   13 \cdot 88,888 & = 1,155,544 
   \end{align*}
   \]
   A. 115,555,544        C. 1,155,555,544
   B. 1,115,555,444        D. 11,155,555,444

6. Alfred is practicing typing. The first time he tested himself, he could type 45 words per minute. After practicing for a week, he could type 48 words per minute. After two weeks he could type 51 words per minute. Based on this pattern, predict how fast Alfred will be able to type after 4 weeks of practice.
   A. 61 words per minute        C. 54 words per minute
   B. 57 words per minute        D. 51 words per minute
7. What is a counterexample for the conjecture?
   Conjecture: Any number that is divisible by 4 is also divisible by 8.
   A. 24    B. 40    C. 12    D. 26

8. What is the conclusion of the following conditional?
   A number is divisible by 2 if the number is even.
   A. The sum of the digits of the number is divisible by 2.
   B. If a number is even, then the number is divisible by 2.
   C. The number is even.
   D. The number is divisible by 2.

9. Identify the hypothesis and conclusion of this conditional statement:
   If two lines intersect at right angles, then the two lines are perpendicular.
   A. Hypothesis: The two lines are perpendicular.
      Conclusion: Two lines intersect at right angles.
   B. Hypothesis: Two lines intersect at right angles.
      Conclusion: The two lines are perpendicular.
   C. Hypothesis: The two lines are not perpendicular.
      Conclusion: Two lines intersect at right angles.
   D. Hypothesis: Two lines intersect at right angles.
      Conclusion: The two lines are not perpendicular.

10. Write this statement as a conditional in if-then form:
    All triangles have three sides.
    A. If a triangle has three sides, then all triangles have three sides.
    B. If a figure has three sides, then it is not a triangle.
    C. If a figure is a triangle, then all triangles have three sides.
    D. If a figure is a triangle, then it has three sides.

11. What is the converse of the following conditional?
    If a point is in the fourth quadrant, then its coordinates are negative.
    A. If a point is in the fourth quadrant, then its coordinates are negative.
    B. If a point is not in the fourth quadrant, then the coordinates of the point are not negative.
    C. If the coordinates of a point are not negative, then the point is not in the fourth quadrant.
    D. If the coordinates of a point are negative, then the point is in the fourth quadrant.
12. Which conditional has the same truth value as its converse?
   A. If \( x = 7 \), then \( |x| = 7 \).
   B. If a figure is a square, then it has four sides.
   C. If \( x - 17 = 4 \), then \( x = 21 \).
   D. If an angle has a measure of 80, then it is acute.

13. For the following true conditional statement, write the converse. If the converse is also true, combine the statements as a biconditional.
   If \( x = 7 \), then \( x^2 = 49 \).
   A. If \( x^2 = 49 \), then \( x = 7 \). True; \( x^2 = 49 \) if and only if \( x = 7 \).
   B. If \( x^2 = 49 \), then \( x = 7 \). True; \( x = 7 \) if and only if \( x^2 = 49 \).
   C. If \( x^2 = 49 \), then \( x = 7 \). False
   D. If \( x^2 = 7 \), then \( x = 49 \). False

14. What is the converse of the following true conditional? If the converse is true, rewrite the statements as a biconditional. If either is false, give a counterexample.
   If two lines are parallel, they do not intersect.
   A. If two lines do not intersect, they are parallel. One statement is false. If two lines do not intersect, they could be skew.
   B. If two lines do not intersect, they are parallel. One statement is false. If two lines are parallel, they may intersect twice.
   C. If two lines do not intersect, they are parallel. Both statements are true. Two lines are parallel if (and only if) they do not intersect.
   D. If two lines do not intersect, they are not parallel. Both statements are true. Two lines are not parallel if (and only if) they do not intersect.
15. What is the value of $x$? Identify the missing justifications.

$m\angle PQR = x - 5$, $m\angle SQR = x - 7$, and $m\angle PQS = 100$.

\[
m\angle PQR + m\angle SQR = m\angle PQS\]

\[
x - 5 + x - 7 = 100\]

\[
2x - 12 = 100\]

\[
2x = 112\]

\[
x = 56\]

**A.** Angle Addition Postulate; Subtraction Property of Equality

**B.** Angle Addition Postulate; Addition Property of Equality

**C.** Protractor Postulate; Addition Property of Equality

**D.** Protractor Postulate; Subtraction Property of Equality

**16.** Transitive Property of Congruence

If $\overline{CD} \cong \overline{EF}$ and $\overline{EF} \cong \overline{GH}$, then ______.

**A.** $\overline{EF} \cong \overline{EF}$

**B.** $\overline{CD} \cong \overline{EF}$

**C.** $\overline{EF} \cong \overline{GH}$

**D.** $\overline{CD} \cong \overline{GH}$
17. Complete the two-column proof.

Given: $12x - 6y = 5; x = -5$

Prove: $\frac{-65}{6} = y$

\[
\begin{align*}
12x - 6y &= 5; x = -5 & \text{a. \underline{\phantom{a}} } \\
-60 - 6y &= 5 & \text{b. \underline{\phantom{b}} } \\
-6y &= 65 & \text{c. \underline{\phantom{c}} } \\
y &= \frac{-65}{6} & \text{d. \underline{\phantom{d}} } \\
\frac{-65}{6} &= y & \text{e. \underline{\phantom{e}} }
\end{align*}
\]

A. a. Given 
   b. Substitution Property 
   c. Addition Property of Equality 
   d. Division Property of Equality 
   e. Symmetric Property of Equality 

B. a. Given 
   b. Substitution Property 
   c. Addition Property of Equality 
   d. Addition Property of Equality 
   e. Symmetric Property of Equality 

C. a. Given 
   b. Symmetric Property of Equality 
   c. Addition Property of Equality 
   d. Division Property of Equality 
   e. Reflexive Property of Equality 

D. a. Given 
   b. Substitution Property 
   c. Addition Property of Equality 
   d. Division Property of Equality 
   e. Reflexive Property of Equality 

18. Complete the two-column proof.

Given: $\frac{x}{5} + 9 = 11$

Prove: $x = 10$

\[
\begin{align*}
\frac{x}{5} + 9 &= 11 & \text{a. \underline{\phantom{a}} } \\
\frac{x}{5} &= 2 & \text{b. \underline{\phantom{b}} } \\
x &= 10 & \text{c. \underline{\phantom{c}} }
\end{align*}
\]

A. a. Given 
   b. Subtraction Property of Equality 
   c. Division Property of Equality 

B. a. Given 
   b. Subtraction Property of Equality 
   c. Multiplication Property of Equality 

C. a. Given 
   b. Addition Property of Equality 
   c. Multiplication Property of Equality 

D. a. Given 
   b. Addition Property of Equality 
   c. Division Property of Equality
19. What is the value of $x$?

$$\begin{align*}
(8x - 8)^\circ & \quad (7x + 8)^\circ \\
\text{Drawing not to scale} \\
\text{A.} & \quad -16 \quad \text{B.} \quad 120 \quad \text{C.} \quad 60 \quad \text{D.} \quad 16
\end{align*}$$

20. What is the value of $x$?

$$\begin{align*}
(2x + 24)^\circ & \quad 144^\circ \\
\text{Drawing not to scale} \\
\text{A.} \quad 84 \quad \text{B.} \quad 36 \quad \text{C.} \quad 120 \quad \text{D.} \quad 60
\end{align*}$$

21. $m\angle 2 = 30$. Find $m\angle 4$.

$$\begin{align*}
\text{A.} \quad 150 \quad \text{B.} \quad 30 \quad \text{C.} \quad 160 \quad \text{D.} \quad 20
\end{align*}$$
22. Find the values of \(x\) and \(y\).

\[
\begin{align*}
4y^\circ &< 112^\circ \\
7x + 7^\circ &< 112^\circ
\end{align*}
\]

Drawing not to scale

A. \(x = 15, y = 17\)  
B. \(x = 112, y = 68\)  
C. \(x = 68, y = 112\)  
D. \(x = 17, y = 15\)

23. Write the converse of the statement. If the converse is true, write \textit{true}; if not true, provide a counterexample.

If \(x = 4\), then \(x^2 = 16\).

24. What is the value of \(x\)? Identify the missing justifications.

\[
\begin{align*}
m\angle AOC &= 150 \\
m\angle AOB + m\angle BOC &= m\angle AOC & \text{a.} \ \ \ \text{_____} \\
2x + 6(x - 3) &= 150 & \text{b.} \ \ \ \text{_____} \\
2x + 6x - 18 &= 150 & \text{c.} \ \ \ \text{_____} \\
8x - 18 &= 150 & \text{d.} \ \ \ \text{_____} \\
8x &= 168 & \text{e.} \ \ \ \text{_____} \\
x &= 21 & \text{f.} \ \ \ \text{_____}
\end{align*}
\]

$$4x - 9 = 99$$
Chapter 2 Review

Answer Section

1. ANS: D  PTS: 1  DIF: L3
   REF: 2-1 Patterns and Inductive Reasoning
   OBJ: 2-1.1 To use inductive reasoning to make conjectures
   NAT: CC G.CO.9 | CC G.CO.10 | CC G.CO.11 | G.5.a
   TOP: 2-1 Problem 1 Finding and Using a Pattern
   KEY: pattern | inductive reasoning

2. ANS: A  PTS: 1  DIF: L3
   REF: 2-1 Patterns and Inductive Reasoning
   OBJ: 2-1.1 To use inductive reasoning to make conjectures
   NAT: CC G.CO.9 | CC G.CO.10 | CC G.CO.11 | G.5.a
   TOP: 2-1 Problem 2 Using Inductive Reasoning
   KEY: inductive reasoning | pattern | conjecture

3. ANS: B  PTS: 1  DIF: L4
   REF: 2-1 Patterns and Inductive Reasoning
   OBJ: 2-1.1 To use inductive reasoning to make conjectures
   NAT: CC G.CO.9 | CC G.CO.10 | CC G.CO.11 | G.5.a
   TOP: 2-1 Problem 3 Collecting Information to Make a Conjecture
   KEY: inductive reasoning | conjecture | pattern

4. ANS: C  PTS: 1  DIF: L3
   REF: 2-1 Patterns and Inductive Reasoning
   OBJ: 2-1.1 To use inductive reasoning to make conjectures
   NAT: CC G.CO.9 | CC G.CO.10 | CC G.CO.11 | G.5.a
  TOP: 2-1 Problem 3 Collecting Information to Make a Conjecture
   KEY: inductive reasoning | pattern | conjecture

5. ANS: A  PTS: 1  DIF: L3
   REF: 2-1 Patterns and Inductive Reasoning
   OBJ: 2-1.1 To use inductive reasoning to make conjectures
   NAT: CC G.CO.9 | CC G.CO.10 | CC G.CO.11 | G.5.a
   TOP: 2-1 Problem 3 Collecting Information to Make a Conjecture
   KEY: pattern | inductive reasoning | conjecture

6. ANS: B  PTS: 1  DIF: L3
   REF: 2-1 Patterns and Inductive Reasoning
   OBJ: 2-1.1 To use inductive reasoning to make conjectures
   NAT: CC G.CO.9 | CC G.CO.10 | CC G.CO.11 | G.5.a
   TOP: 2-1 Problem 4 Making a Prediction
   KEY: conjecture | inductive reasoning | word problem | problem solving

7. ANS: C  PTS: 1  DIF: L2
   REF: 2-1 Patterns and Inductive Reasoning
   OBJ: 2-1.1 To use inductive reasoning to make conjectures
   NAT: CC G.CO.9 | CC G.CO.10 | CC G.CO.11 | G.5.a
   TOP: 2-1 Problem 5 Finding a Counterexample
   KEY: conjecture | counterexample

8. ANS: D  PTS: 1  DIF: L3
   REF: 2-2 Conditional Statements
   OBJ: 2-2.1 To recognize conditional statements and their parts
   NAT: CC G.CO.9 | CC G.CO.10 | CC G.CO.11 | G.5.a
   TOP: 2-2 Problem 1 Identifying the Hypothesis and the Conclusion
   KEY: conditional statement | conclusion
OBJ: 2-2.1 To recognize conditional statements and their parts
NAT: CC G.CO.9| CC G.CO.10| CC G.CO.11| G.5.a
TOP: 2-2 Problem 1 Identifying the Hypothesis and the Conclusion
KEY: conditional statement | hypothesis | conclusion

10. ANS: D  PTS: 1  DIF: L2  REF: 2-2 Conditional Statements
OBJ: 2-2.1 To recognize conditional statements and their parts
NAT: CC G.CO.9| CC G.CO.10| CC G.CO.11| G.5.a
TOP: 2-2 Problem 2 Writing a Conditional
KEY: hypothesis | conclusion | conditional statement

11. ANS: D  PTS: 1  DIF: L2  REF: 2-2 Conditional Statements
OBJ: 2-2.2 To write converses, inverses, and contrapositives of conditionals
NAT: CC G.CO.9| CC G.CO.10| CC G.CO.11
TOP: 2-2 Problem 4 Writing and Finding Truth Values of Statements
KEY: conditional statement | converse of a conditional

12. ANS: C  PTS: 1  DIF: L3  REF: 2-2 Conditional Statements
OBJ: 2-2.2 To write converses, inverses, and contrapositives of conditionals
NAT: CC G.CO.9| CC G.CO.10| CC G.CO.11
TOP: 2-2 Problem 4 Writing and Finding Truth Values of Statements
KEY: conditional statement | converse of a conditional | truth value

13. ANS: C  PTS: 1  DIF: L3  REF: 2-3 Biconditionals and Definitions
OBJ: 2-3.1 To write biconditionals and recognize good definitions
NAT: CC G.CO.9| CC G.CO.10| CC G.CO.11| G.1.c
TOP: 2-3 Problem 1 Writing a Biconditional
KEY: conditional statement | converse of a conditional | biconditional statement

14. ANS: A  PTS: 1  DIF: L3  REF: 2-3 Biconditionals and Definitions
OBJ: 2-3.1 To write biconditionals and recognize good definitions
NAT: CC G.CO.9| CC G.CO.10| CC G.CO.11| G.1.c
TOP: 2-3 Problem 1 Writing a Biconditional
KEY: conditional statement | converse of a conditional | biconditional statement | counterexample

15. ANS: B  PTS: 1  DIF: L3  REF: 2-5 Reasoning in Algebra and Geometry
OBJ: 2-5.1 To connect reasoning in algebra and geometry
NAT: CC G.CO.9| CC G.CO.10| CC G.CO.11| G.5.b
TOP: 2-5 Problem 1 Justifying Steps When Solving an Equation
KEY: Properties of Equality | Angle Addition Postulate | deductive reasoning

16. ANS: D  PTS: 1  DIF: L3  REF: 2-5 Reasoning in Algebra and Geometry
OBJ: 2-5.1 To connect reasoning in algebra and geometry
NAT: CC G.CO.9| CC G.CO.10| CC G.CO.11| G.5.b
TOP: 2-5 Problem 2 Using Properties of Equality and Congruence
KEY: Properties of Congruence | Transitive Property
17. **ANS:** A  **PTS:** 1  **DIF:** L3  
**REF:** 2-5 Reasoning in Algebra and Geometry  
**OBJ:** 2-5.1 To connect reasoning in algebra and geometry  
**NAT:** CC G.CO.9| CC G.CO.10| CC G.CO.11| G.5.b  
**TOP:** 2-5 Problem 3 Writing a Two-Column Proof  
**KEY:** Properties of Equality | Proof | Two-column Proof  

18. **ANS:** B  **PTS:** 1  **DIF:** L2  
**REF:** 2-5 Reasoning in Algebra and Geometry  
**OBJ:** 2-5.1 To connect reasoning in algebra and geometry  
**NAT:** CC G.CO.9| CC G.CO.10| CC G.CO.11| G.5.b  
**TOP:** 2-5 Problem 3 Writing a Two-Column Proof  
**KEY:** Properties of Equality | Proof | Two-column Proof  

19. **ANS:** D  **PTS:** 1  **DIF:** L3  
**REF:** 2-6 Proving Angles Congruent  
**OBJ:** 2-6.1 To prove and apply theorems about angles  
**NAT:** CC G.CO.9| G.5.b  
**TOP:** 2-6 Problem 1 Using the Vertical Angles Theorem  
**KEY:** vertical angles | Vertical Angles Theorem  

20. **ANS:** D  **PTS:** 1  **DIF:** L2  
**REF:** 2-6 Proving Angles Congruent  
**OBJ:** 2-6.1 To prove and apply theorems about angles  
**NAT:** CC G.CO.9| G.5.b  
**TOP:** 2-6 Problem 1 Using the Vertical Angles Theorem  
**KEY:** vertical angles | Vertical Angles Theorem  

21. **ANS:** B  **PTS:** 1  **DIF:** L2  
**REF:** 2-6 Proving Angles Congruent  
**OBJ:** 2-6.1 To prove and apply theorems about angles  
**NAT:** CC G.CO.9| G.5.b  
**TOP:** 2-6 Problem 1 Using the Vertical Angles Theorem  
**KEY:** vertical angles | Vertical Angles Theorem  

22. **ANS:** A  **PTS:** 1  **DIF:** L4  
**REF:** 2-6 Proving Angles Congruent  
**OBJ:** 2-6.1 To prove and apply theorems about angles  
**NAT:** CC G.CO.9| G.5.b  
**TOP:** 2-6 Problem 1 Using the Vertical Angles Theorem  
**KEY:** vertical angles | Vertical Angles Theorem  

23. **ANS:**  
If $x^2 = 16$, then $x = 4$. False; if $x^2 = 16$, then $x$ can be equal to $-4$.  

**PTS:** 1  **DIF:** L3  
**REF:** 2-2 Conditional Statements  
**OBJ:** 2-2.2 To write converses, inverses, and contrapositives of conditionals  
**NAT:** CC G.CO.9| CC G.CO.10| CC G.CO.11  
**TOP:** 2-2 Problem 4 Writing and Finding Truth Values of Statements  
**KEY:** conditional statement | converse of a conditional | counterexample | truth value
24. ANS:
   a. Angle Addition Postulate
   b. Substitution Property
   c. Distributive Property
   d. Simplify
   e. Addition Property of Equality
   f. Division Property of Equality

PTS: 1    DIF: L3    REF: 2-5 Reasoning in Algebra and Geometry
OBJ: 2-5.1 To connect reasoning in algebra and geometry
NAT: CC G.CO.9| CC G.CO.10| CC G.CO.11| G.5.b
TOP: 2-5 Problem 1 Justifying Steps When Solving an Equation
KEY: proof | deductive reasoning | Properties of Equality | multi-part question

25. ANS:
   \[4x - 9 = 99\] Given
   \[4x - 9 + 9 = 99 + 9\] Addition Property of Equality
   \[4x = 108\] Simplify
   \[\frac{4x}{4} = \frac{108}{4}\] Division Property of Equality
   \[x = 27\] Simplify

PTS: 1    DIF: L4    REF: 2-5 Reasoning in Algebra and Geometry
OBJ: 2-5.1 To connect reasoning in algebra and geometry
NAT: CC G.CO.9| CC G.CO.10| CC G.CO.11| G.5.b
TOP: 2-5 Problem 1 Justifying Steps When Solving an Equation
KEY: Properties of Equality | proof | deductive reasoning