

Number and Shape Patterns

Name: _____ Date: _____ Score: _____ / 24

Q Quick Review

A **pattern** is a list of numbers or shapes that follows a **rule**. To extend a pattern, first find the rule by looking at how you get from one term to the next — maybe you **add**, **subtract**, or **multiply** by the same amount each time. For example, in 3, 8, 13, 18, ... the rule is **add 5**, so the next term is $18 + 5 = 23$. Patterns also have hidden features: the “add 5” pattern that starts at 3 always lands on numbers ending in 3 or 8. Finding the rule lets you predict what comes next.

◇ **Example:** The pattern is 4, 8, 12, 16, ... What is the rule, and what is the next number?
 ⇒ Look at how the numbers change. From 4 to 8 is +4, from 8 to 12 is +4, and from 12 to 16 is +4. So the rule is **add 4**. To find the next number, add 4 to the last term: $16 + 4 = 20$. Notice every number in this pattern is a multiple of 4.

Answer: Rule: add 4; next = 20

PRACTICE

Find the rule and the next term in each pattern.

- | | |
|------------------------------------------|--------------------------------------------------------------------------|
| 1. Next term: 3, 8, 13, 18, ... _____ | 12. Next term: 9, 18, 27, 36, ... _____ |
| 2. Next term: 2, 6, 10, 14, ... _____ | 13. Next term: 3, 6, 12, 24, ... _____ |
| 3. Next term: 5, 10, 15, 20, ... _____ | 14. Next term: 20, 17, 14, 11, ... _____ |
| 4. Next term: 100, 90, 80, 70, ... _____ | 15. Next term: 0, 10, 20, 30, ... _____ |
| 5. Next term: 1, 3, 5, 7, ... _____ | 16. Next term: 1, 4, 9, 16, ... _____ |
| 6. Next term: 4, 8, 12, 16, ... _____ | 17. Next term: 8, 16, 24, 32, ... _____ |
| 7. Next term: 6, 12, 18, 24, ... _____ | 18. Next term: 81, 72, 63, 54, ... _____ |
| 8. Next term: 2, 4, 8, 16, ... _____ | 19. A shape pattern adds 3 sides each step: 3, 6, 9, 12, ... Next? _____ |
| 9. Next term: 50, 45, 40, 35, ... _____ | 20. Rule: start at 6, add 6. What is the 6th term? _____ |
| 10. Next term: 7, 14, 21, 28, ... _____ | |
| 11. Next term: 1, 2, 4, 8, ... _____ | |

◆ Word Problems

21. At a party, each table seats 4 people. The seating goes 4, 8, 12, 16, ... as more tables are added. How many people can sit at 5 tables? _____
22. Sofia earns 8 stickers on the first day, 16 on the second, 24 on the third, and so on. The pattern adds 8 each day. How many stickers will she have earned on the 6th day? _____
23. A video game starts a level with 100 coins. Each obstacle takes away 7 coins. The coin counts go 100, 93, 86, 79, ... How many coins are left after 4 obstacles? _____
24. In a counting game, the class says the even numbers: 2, 4, 6, 8, ... The rule is add 2 each time. What number does the 10th person say? _____



Answer Keys

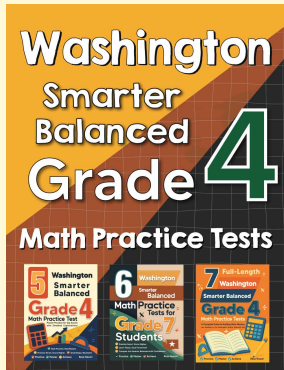
- | | |
|-------------------------------------|----------------------------------------------|
| 1. <input type="text" value="23"/> | 13. <input type="text" value="48"/> |
| 2. <input type="text" value="18"/> | 14. <input type="text" value="8"/> |
| 3. <input type="text" value="25"/> | 15. <input type="text" value="40"/> |
| 4. <input type="text" value="60"/> | 16. <input type="text" value="25"/> |
| 5. <input type="text" value="9"/> | 17. <input type="text" value="40"/> |
| 6. <input type="text" value="20"/> | 18. <input type="text" value="45"/> |
| 7. <input type="text" value="30"/> | 19. <input type="text" value="15"/> |
| 8. <input type="text" value="32"/> | 20. <input type="text" value="36"/> |
| 9. <input type="text" value="30"/> | 21. <input type="text" value="20 people"/> |
| 10. <input type="text" value="35"/> | 22. <input type="text" value="48 stickers"/> |
| 11. <input type="text" value="16"/> | 23. <input type="text" value="72 coins"/> |
| 12. <input type="text" value="45"/> | 24. <input type="text" value="20"/> |

Step-by-Step Explanations

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| <p>1. The rule is add 5, so $18 + 5 = 23$.</p> <p>2. The rule is add 4, so $14 + 4 = 18$.</p> <p>3. The rule is add 5, so $20 + 5 = 25$.</p> <p>4. The rule is subtract 10, so $70 - 10 = 60$.</p> <p>5. The rule is add 2 (the odd numbers), so $7 + 2 = 9$.</p> <p>6. The rule is add 4, so $16 + 4 = 20$.</p> <p>7. The rule is add 6, so $24 + 6 = 30$.</p> <p>8. The rule is multiply by 2 (doubling), so $16 \times 2 = 32$.</p> <p>9. The rule is subtract 5, so $35 - 5 = 30$.</p> <p>10. The rule is add 7, so $28 + 7 = 35$.</p> <p>11. The rule is multiply by 2, so $8 \times 2 = 16$.</p> <p>12. The rule is add 9, so $36 + 9 = 45$.</p> <p>13. The rule is multiply by 2, so $24 \times 2 = 48$.</p> | <p>14. The rule is subtract 3, so $11 - 3 = 8$.</p> <p>15. The rule is add 10, so $30 + 10 = 40$.</p> <p>16. These are square numbers ($1^2, 2^2, 3^2, 4^2$), so next is $5 \times 5 = 25$.</p> <p>17. The rule is add 8, so $32 + 8 = 40$.</p> <p>18. The rule is subtract 9, so $54 - 9 = 45$.</p> <p>19. Each shape adds 3 more sides, so $12 + 3 = 15$.</p> <p>20. The terms are 6, 12, 18, 24, 30, 36, so the 6th term is 36.</p> <p>21. The rule is add 4 for each table. With 5 tables that is $4 \times 5 = 20$ people, continuing the pattern 4, 8, 12, 16, 20.</p> <p>22. The pattern is 8, 16, 24, 32, 40, 48. Each term adds 8, so the 6th term is $8 \times 6 = 48$ stickers.</p> <p>23. The rule is subtract 7. After 4 obstacles that is $100 - (7 \times 4) = 100 - 28 = 72$ coins, matching the pattern 100, 93, 86, 79, 72.</p> <p>24. The nth even number is $2 \times n$. For the 10th person that is $2 \times 10 = 20$.</p> |
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