Arithmetic Patterns

Spot mistakes, reason, and work backward

Name _____ **Date** _____ **Score** _____ / 8

QUICK REVIEW

Check at least two changes before naming a pattern. In $2, 7, 12, 17$, each term increases by 5: $7 - 2 = 5$ and $12 - 7 = 5$. In the 4 times table, $4, 8, 12, 16$ also increase by 4 and every total is even.

Worked example

Continue $2, 5, 8, \square, \square$. State the rule.

1. The difference is $5 - 2 = 3$ and $8 - 5 = 3$.

2. Continue: $8 + 3 = 11$, then $11 + 3 = 14$.

Answer: $11, 14$; add 3.

Practice Problems

Show your thinking.

1. A rule is add 8. Find and repair the wrong number: $2, 10, 19, 26$.

2. A pattern adds the same number each time: $4, \square, 18, 25$. Find the rule and missing number.

3. Look at the first four multiples of 3. Are they all even, all odd, or alternating? Explain.

4. For each input, subtract the Times 4 value from the Times 7 value. Complete the Difference column and explain its pattern.

Input	Times 4	Times 7	Difference
1	4	7	3
2	8	14	6
3	12	21	☐
4	16	28	☐

5. The table adds its row and column headings. Repair the wrong cell and explain the horizontal and vertical changes.

+	1	2	3
2	3	4	5
4	5	7	7

6. In the addition table for $1, 2, 3, 4$, the diagonal cells add a number to itself. List the diagonal totals and explain their pattern.

7. An output rule is multiply by 6. The outputs are $6, 12, 18, 24$. Find the input that gives 42 and explain the output jump from 36.

8. Compare the Times 3 and Times 6 columns. How can the Times 3 values be used to get the Times 6 values?

Input	Times 3	Times 6
1	3	6
2	6	12
3	9	18
4	12	24

Answer Key

1. Replace 19 with 18.
2. Add 7; missing 11.
3. The totals alternate odd, even, odd, even.
4. Differences $3, 6, 9, 12$; add 3.
5. Replace 7 with 6; rightward adds 1, downward adds 2.
6. $2, 4, 6, 8$; add 2, all even.
7. Input 7; the jump is 6.
8. Double each Times 3 value.

Step-by-Step Solutions

Follow each calculation, then check your own work.

Problem 1

1. From the second term, $10 + 8 = 18$, not 19.
2. The repaired term works next too: $18 + 8 = 26$.

Problem 2

1. The last two terms give the step: $25 - 18 = 7$.
2. Add it to the first term: $4 + 7 = 11$; $11 + 7 = 18$ checks it.

Problem 3

1. The totals are $3, 6, 9, 12$. The factor 3 is odd.
2. Adding odd 3 changes even to odd or odd to even; 3 is odd but 6 is even.

Problem 4

1. The first differences are $7 - 4 = 3$, $14 - 8 = 6$, and $21 - 12 = 9$.
2. The next is $28 - 16 = 12$. The gap between factors is $7 - 4 = 3$, so each new input adds 3 to the difference.

Problem 5

1. The wrong cell is row 4, column 2: $4 + 2 = 6$, not 7.
2. Across, $5, 6, 7$ grows by 1. Down the second column, $2 + 2 = 4$ and $4 + 2 = 6$ differ by 2.

Problem 6

1. The diagonal calculations are $1 + 1 = 2$, $2 + 2 = 4$, $3 + 3 = 6$, $4 + 4 = 8$.
2. Each move adds 1 to both addends, so each total grows by $1 + 1 = 2$. Every result is a pair count.

Problem 7

1. The unknown input solves $6 \times \square = 42$, so $42 \div 6 = 7$.
2. Input 6 gives 36; input 7 gives 42. The output changes by $42 - 36 = 6$ for one extra input unit.

Problem 8

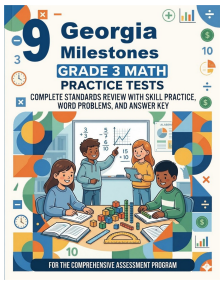
1. The first pairs show $3 \times 2 = 6$ and $6 \times 2 = 12$.
2. The next pairs give $9 \times 2 = 18$ and $12 \times 2 = 24$. Doubling the factor from 3 to 6 doubles each output.

TESTINAR

Keep Building Grade 3 Math Skills

Choose the practice book matched to your state assessment and turn worksheet practice into a complete test-prep plan.

All Grade 3 books



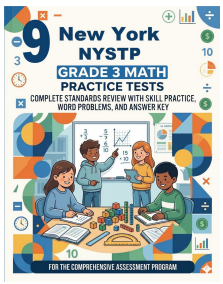
GEORGIA MILESTONES

9 Full-Length Math Practice Tests

Build Grade 3 accuracy, confidence, and test stamina with 9 printable practice tests.

Printable eBook • Instant PDF access

View eBook



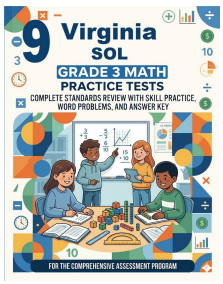
NEW YORK NYSTP

9 Full-Length Math Practice Tests

Build Grade 3 accuracy, confidence, and test stamina with 9 printable practice tests.

Printable eBook • Instant PDF access

View eBook



VIRGINIA SOL

9 Full-Length Math Practice Tests

Build Grade 3 accuracy, confidence, and test stamina with 9 printable practice tests.

Printable eBook • Instant PDF access

View eBook

Need a different state?
Testinar has Grade 3 math practice books for state assessments across the country.

TESTINAR.COM/GRADES/3