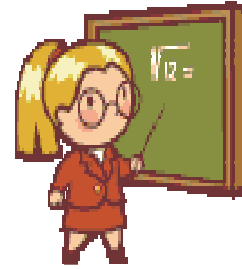


Elizabeth Evans
Riverside Elementary
6th Grade
Patterns



WHAT'S NEXT?

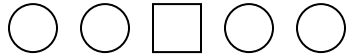
Teaching Objectives

Recognize and continue a number pattern.

State a rule to explain a number pattern.

Instructional Activities

1. Divide students into groups of four.
2. Draw the illustration below on the board.



3. **Ask:** What is next? *a square*
4. Draw the illustration below on the board.



5. Ask the students to continue the next four terms. *heart, star, lightning, and circle*
6. **Ask:** How did you know the next term in the sequence? *notice a pattern*
7. **Say:** These are patterns. They are called shape patterns. Today, we are going to work with number patterns. When working with number patterns, you may be asked to find the rule for the pattern that the numbers follow. You will also be asked to use the rule to continue the number pattern. Keep in mind that these rules may involve one operation or a combination of operations.
8. Give each student a copy of Attachment #1. (student copy)
9. Write example #1 on the board. (Attachment #1)
10. **Say:** Let's look at number one.
11. **Ask:** What do you need to do to each number to get the next number? *add 2*
12. **Ask:** What are the next three terms? *11, 13, and 15*
13. Continue steps 9-12 with problems 2-4.
14. Point out to students that examples 1-3 are called arithmetic sequences.
15. **Say:** Arithmetic sequences are addition or subtraction number patterns in which the difference between any two consecutive terms is constant. This constant difference is called the common difference. You can use the common difference to find the *n*th term in a sequence.
16. Write example #5 on the board.
17. **Ask:** What do you need to do to each number to get the next number? *multiply by 4*
18. **Ask:** What are the next three terms? *256, 1024, and 4096*
19. Have students work on example #6 with their team members. Have students write the rule for the sequence and find the missing number.

20. Write example #6 on the board.
21. **Ask:** What rule is being used to create this number sequence? *divide by 2*
22. **Ask:** What is the missing number? *6*
23. **Say:** Examples 5 and 6 are called geometric sequences. Geometric sequences are multiplication or division number patterns.
24. Give each student a copy of attachments #2 and #3 (student copy).
25. Give each student a pair of scissors and allow time for them to cut out their triangle.
26. Have students identify the shape, number of vertices, and number of sides. Complete this with students. Have students record zero for the number of cuts because no cuts have been made at this point.
27. **Say:** Cut off a vertex. (See attachment #5 for demonstration.)
28. **Ask:** What happened to the triangle? *it became a quadrilateral*
29. Have students complete the second line on the table.
30. Cut another vertex.
31. Have students complete the third line on the table.
32. Continue until the table is complete.
33. Have students look for one pattern in the table. *Each cut added one more side and one more vertex to the shape (or the answer in #35)*
34. Discuss the rest of the table with students. Show attachment #3 (teacher copy).
35. Have students look for another pattern in the table. *three is being added to the first column to create the second and third columns*
36. **Ask:** How is the three related to this table? *it represents the smallest polygon possible- triangle*
37. **Ask:** How many sides will the polygon have if you make 21 cuts to this triangle? *24 sides*
38. Tell students that they will be given a handout (Attachment #4). Explain to the students that they will be allowed to use the strategies discussed today to help them complete the handout.

Materials and Resources:

1. Attachment #1 (teacher made) - teacher copy; one per student
2. Attachment #1 - student copy
3. Attachment #2 – one per student
4. Attachment #3 (teacher made) – student copy; one per student
5. Attachment #3 – teacher copy
6. Attachment #4 (teacher made) – student copy; one per student
7. Attachment #4 – teacher copy
8. Attachment #5 – demonstration of attachment #2
- 9.

Assessment:

1. Give each student a copy of Attachment #4 and allow time for students to complete.
2. Take up responses.
3. Check and discuss answers with students.

Attachment #1 (teacher copy)

Number Patterns

1. 1, 3, 5, 7, 9, ____, ____, ____

Rule: skipping even numbers
Missing #s: 11, 13, 15

2. 5, 10, 15, 20, ____, 30, 35, . . .

Rule: multiples of 5
Missing #: 25

3. 5, 8, 11, 14, 17, 20, ____

Rule: adding 3 to last term
Missing #: 23

4. 15, 13, 11, ____, 7, 5

Rule: subtracting 2 from last term
Missing #: 9

5. 1, 4, 16, 64, ____, ____, ____

Rule: multiplying by 4
Missing #s: 256, 1024, 4096

6. 48, 24, 12, ____, 3

Rule: dividing by 2
Missing #: 6

Number Patterns

1. 1, 3, 5, 7, 9, _____, _____, _____

Rule: _____

2. 5, 10, 15, 20, _____, 30, 35, . . .

Rule: _____

3. 5, 8, 11, 14, 17, 20, _____

Rule: _____

4. 15, 13, 11, _____, 7, 5

Rule: _____

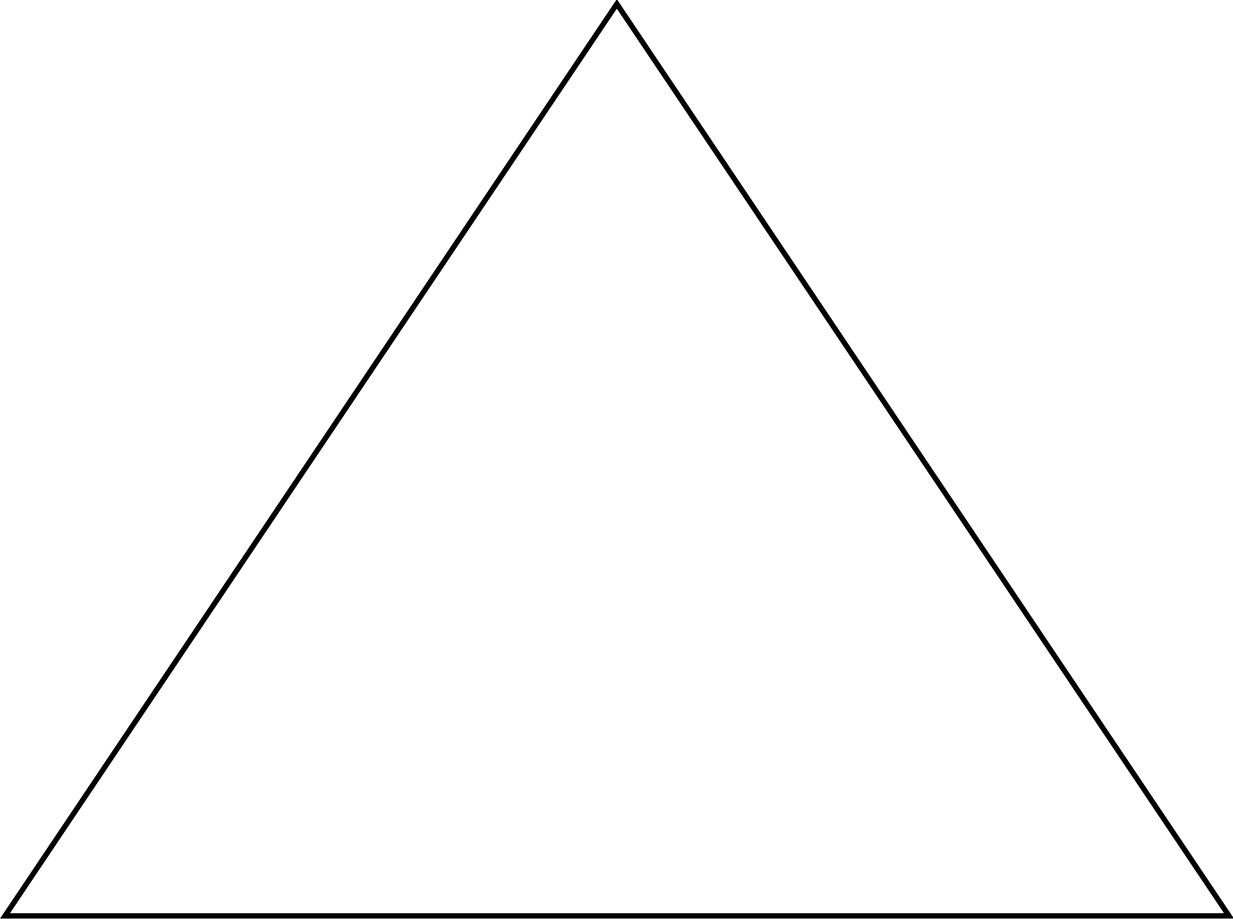
5. 1, 4, 16, 64, _____, _____, _____

Rule: _____

6. 48, 24, 12, _____, 3

Rule: _____

Attachment #2



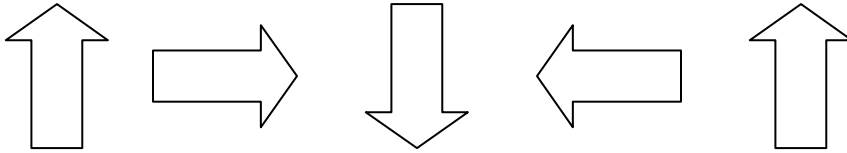
Attachment #3 (teacher copy)

It's all in a Triangle

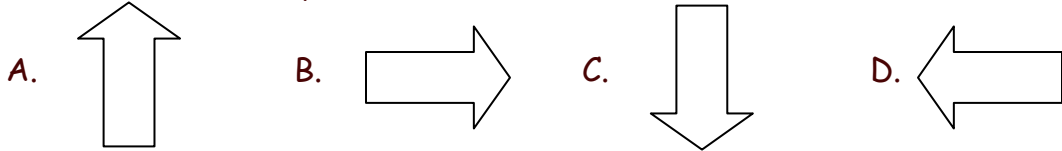
# of Cuts Made	# of Vertices	# of Sides	Name of Polygon
0	3	3	Triangle
1	4	4	Quadrilateral
2	5	5	Pentagon
3	6	6	Hexagon
4	7	7	Heptagon
5	8	8	Octagon
6	9	9	Nonagon
7	10	10	Decagon
8	11	11	Undecagon
9	12	12	Dodecagon

Sample Test Items

1. Laura arranged the row of arrows below.



If Laura continues this pattern, which arrow will be next in the row?



2. How many squares will appear in row 5 in order to continue the pattern?

Row 1

Row 2

Row 3

Row 4

Row 5 ?

A. 9

B. 10

C. 12

D. 16

3. Jan increased her reading each day for five days in a row. She read 5, 10, 16, 23, and then 31 pages. If this pattern continues, how many pages will Jan read on the sixth day?

A. 40

B. 41

C. 42

D. 43

Attachment #4 (student copy) continued

4. What is the next term in the following pattern?

2, 6, 18, 54, 162, ...

- A. 404 B. 486 C. 566 D. 648

5. Which rule describes the following pattern?

12, 20, 28, 36, 44, ...

- A. add 8
B. subtract 3
C. divide by 9
D. multiply by 6

6. Which pattern follows the rule +18?

- A. 2, 20, 38, 56, 72, ...
B. 3, 21, 39, 57, 73, ...
C. 5, 23, 41, 59, 75, ...
D. 7, 25, 43, 61, 79, ...

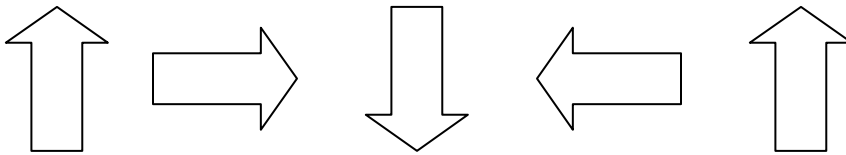
7. What is the missing term in the following sequence?

64, 32, 16, _____, 4, 2, 1

- A. 9 B. 8 C. 7 D. 6

Sample Test Items

1. Laura arranged the row of arrows below to form a pattern.



If Laura continues this pattern, which arrow will be next in the row?



2. How many squares will appear in row 5 in order to continue the pattern?

Row 1

Row 2

Row 3

Row 4

Row 5 ?

- A. 9 B. 10 C. 12 D. 16
3. Jan increased her reading each day for five days in a row. She read 5, 10, 16, 23, and then 31 pages. If this pattern continues, how many pages will Jan read on the sixth day?

- A. 40 B. 41 C. 42 D. 43

Attachment #4 (teacher copy) continued

4. What is the next term in the following pattern?

2, 6, 18, 54, 162, . . .

- A. 404 B. **486** C. 566 D. 648

5. Which rule describes the following pattern?

12, 20, 28, 36, 44, . . .

- A. **add 8**
B. subtract 3
C. divide by 9
D. multiply by 6

6. Which pattern follows the rule +18?

- A. 2, 20, 38, 56, 72, . . .
B. 3, 21, 39, 57, 73, . . .
C. 5, 23, 41, 59, 75, . . .
D. **7, 25, 43, 61, 79, . . .**

7. What is the missing term in the following sequence?

64, 32, 16, _____, 4, 2, 1

- A. 9 B. **8** C. 7 D. 6

Attachment #5 (demonstration)

