

Patterns

OBJECTIVE:

Represent and analyze patterns, rules and functions, using physical materials, tables and graphs.

TRANSLATION:

Students must be able to look at a pattern in a picture, graph or table and identify the rule. Students must be able to use the rule to extend the pattern forward or backward.

EXAMPLE 1:

A number pattern is shown.

1, 6, 16, 36, 76 ...

What is the rule that describes how to find the next term in the pattern?

EXPLANATION 1:

What must be done to 1 to get 6? (This answer needs to work each step in the pattern.) (Make sure you try multiple operations.)

Multiply 2 to the previous term and then add 4, SO

1×2 is 2. $2 + 4$ is 6. 6×2 is 12. $12 + 4$ is 16. 16×2 is 32. $32 + 4$ is 36. 36×2 is 72. $72 + 4$ is 76.

You can then extend the pattern by continuing using the rule.

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EXAMPLE 2:

A number pattern is shown.

... 7, 22, 67, 202, 607

What is the rule that describes this pattern? What is the term that comes before the first term given?

EXPLANATION 2:

What must be done to 7 to get 22?

Multiply 3 to the previous term and then add 1, SO

7×3 is 21. $21 + 1$ is 22. 22×3 is 66. $66 + 1$ is 67. 67×3 is 201. $201 + 1$ is 202. 202×3 is 606. $606 + 1$ is 607.

To find a term at the beginning, you must work backwards.

If the rule is $\times 3$, then $+1$, backwards is -1 then $\div 3$.

$607 - 1$ is 606. $606 \div 3$ is 202. $202 - 1$ is 201. $201 \div 3$ is 67. $67 - 1$ is 66. $66 \div 3$ is 22. $22 - 1$ is 21. $21 \div 3$ is 7. $7 - 1$ is 6. $6 \div 3$ is 2.

The term before 7 is 2.

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1. A number pattern is shown.

2, 10, 60, 182, 370 ...

State the rule for this pattern. Extend the pattern by three terms.

2. A number pattern is shown.

300, 148, 72, 34, 15 ...

State the rule for this pattern. Extend the pattern by three terms.

3. A number pattern is shown.

5, 11, 23, 47, 95 ...

State the rule for this pattern. Extend the pattern by three terms.

4. A number pattern is shown.

90, 27, 6, 3, -2 ...

State the rule for this pattern. Extend the pattern by three terms.

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5. A number pattern is shown.

... 20, 45, 95, 195, 395

State the rule for this pattern. Show the first three terms of this pattern.

6. A number pattern is shown.

... 31, 63, 127, 255, 511

State the rule for this pattern. Show the first three terms of this pattern.

7. A number pattern is shown.

... 128, 256, 512, 1024, 2048

State the rule for this pattern. Show the first three terms of this pattern.

8. A number pattern is shown.

... 5, 12, 26, 54, 110

State the rule for this pattern. Show the first three terms of this pattern.