LESSON MAKER PRO

# Sequence Pattern Lab

*Write rules and solve arithmetic sequence problems.*

**HIGH SCHOOL · MA.912.AR.10.1**

**MA.912.AR.10.1** "Given a mathematical or real-world context, write and solve problems involving arithmetic sequences."

NAME _____ DATE _____

## THE BIG IDEA

An arithmetic sequence adds or subtracts the same amount each time. Use $a_n = a_1 + (n - 1)d$, where $a_1$ is the first term and d is the common difference. Substitute the term number for n to find any term.

## WORKED EXAMPLE

An arithmetic sequence has $a_1 = 8$ and $d = 7$. Find $a_5$.

1. Use $a_n = a_1 + (n - 1)d$.
2. Substitute: $a_5 = 8 + (5 - 1)(7)$.
3. Simplify: $a_5 = 8 + 28 = 36$.

**Answer: 36**

## PRACTICE 6 problems

**1** The sequence is 14, 20, 26, ... Write an explicit rule for $a_n$.

**ANSWER** _____

**2** An arithmetic sequence has $a_1 = -3$ and $d = 4$. Find $a_9$.

**ANSWER** _____

**3** An arithmetic sequence has $a_{12} = 50$ and $d = 3$. Find $a_1$.

**ANSWER** _____

**4** Write the first four terms of the sequence $a_n = 31 - 2(n - 1)$.

**ANSWER** _____

**5** Does 73 appear in the sequence 13, 19, 25, ...? If so, what term number is it?

**ANSWER** _____

_____

**6** An arithmetic sequence has $a_3 = 21$ and $a_9 = 45$. Find d and $a_1$.

**ANSWER** _____

_____

## APPLY IT Show your work

**1** In a game, the first weekly challenge gives 140 bonus coins. Each new weekly challenge gives 18 more coins than the one before. How many bonus coins does the 13th challenge give?

WORK SPACE

**ANSWER** _____

**2** A student saves $24 during the first month of a fundraiser and plans to save $9 more each month than the month before. During which month will the student save $123?

WORK SPACE

**ANSWER** _____

## CHALLENGE One step up

An arithmetic sequence has $a_4 = 11$ and $a_{15} = 55$. Write an explicit rule for the sequence and find $a_{30}$.

WORK SPACE AND ANSWER

**ANSWER KEY** # Sequence Pattern Lab

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## PART 1 · PRACTICE

| # | PROBLEM | ANSWER |
|---|---|---|
| 1 | The sequence is 14, 20, 26, ... Write an explicit rule for $a_n$. | **$a_n = 14 + 6(n - 1)$** |
| 2 | An arithmetic sequence has $a_1 = -3$ and $d = 4$. Find $a_9$. | **29** |
| 3 | An arithmetic sequence has $a_{12} = 50$ and $d = 3$. Find $a_1$. | **17** |
| 4 | Write the first four terms of the sequence $a_n = 31 - 2(n - 1)$. | **31, 29, 27, 25** |
| 5 | Does 73 appear in the sequence 13, 19, 25, ...? If so, what term number is it? | **Yes, it is the 11th term.** |
| 6 | An arithmetic sequence has $a_3 = 21$ and $a_9 = 45$. Find d and $a_1$. | **$d = 4$, $a_1 = 13$** |

## PART 2 · APPLY IT

1. **356 bonus coins** Use $a_{13} = 140 + (13 - 1)(18)$. The result is 356.
2. **The 12th month** Solve $24 + (n - 1)9 = 123$. This gives $n = 12$.

## CHALLENGE

**$a_n = -1 + 4(n - 1)$; $a_{30} = 115$**

Accept equivalent explicit rules, such as $a_n = 6n + 8$ for the first problem and $a_n = 4n - 5$ for the challenge. Students may show different valid algebra steps as long as their common difference, rule, and requested term are correct.