**Recursive and Explicit Rules for Arithmetic Sequences**

A **sequence** is a list of numbers which follow a specific pattern. Each number in the sequence is called a term. An **arithmetic sequence** is a sequence in which consecutive terms differ by a constant amount.

1. Find the next three terms of each sequence.
2. 2, 5, 8, 11, \_\_\_\_\_\_, \_\_\_\_\_\_, \_\_\_\_\_\_ (b) 12, 7, 2, -3, \_\_\_\_\_\_, \_\_\_\_\_\_, \_\_\_\_\_\_

A **recursive rule** for a sequence is a rule which uses the value of one term (or the value of multiple terms) in the sequence to define the value of the next term in the sequence. You must state a beginning value.

An **explicit rule** for a sequence is a formula that determines any term in the sequence. Depending on your data, the beginning term could be the 0th or 1st term.

1. Every week, Jane, a travel agent, gets paid $900 (her base salary) plus an additional $100 for each cruise she books.
2. Complete the table below by identifying her salary based on the number of cruises she books in a week.

|  |  |  |
| --- | --- | --- |
| **Cruises** | **Salary** | **Recursive Pattern** |
| 0 | 900 | 900 |
| 1 | 1000 | 900 + 100 |
| 2 |  | 1000 + 100 |
| 3 |  |  |
| 4 |  |  |

1. What is a recursive rule for the sequence of salaries?
2. Write an explicit rule for the sequence of salaries. Let *c* represent the number of cruises she books and *s* represent her salary.

1. Find Jane’s salary when she books 8 cruises.
2. You bring $20 to a carnival to buy tickets for an arcade game. You spend $1.50 for each ticket. You play the game several times until you win.
3. Complete the table below by identifying the amount of money you have left after buying tickets for different numbers of games.

|  |  |  |
| --- | --- | --- |
| **Games** | **Amount of Money** | **Recursive Pattern** |
| 0 | 20.00 | 20.00 |
| 1 | 18.50 | 20.00 – 1.50 |
| 2 |  |  |
| 3 |  |  |
| 4 |  |  |

1. What is a recursive rule for the sequence of amounts?
2. Write an explicit rule for the sequence of amounts. Let *a* represent the amount of money you have left and *g* represent the number of games.

1. How much money do you have left after 8 games?
2. You buy an Xbox 360 game system for $250 and you spend $50 for each additional game.
3. Complete the table below by identifying the total cost for the Xbox 360 and the indicated number of games.

|  |  |  |
| --- | --- | --- |
| **Games** | **Total Cost** | **Recursive Pattern** |
| 0 | 250 | 250 |
| 1 | 300 | 250 + 50 |
| 2 |  |  |
| 3 |  |  |
| 4 |  |  |

1. What is a recursive rule for the sequence of total costs?
2. Write an explicit rule for the sequence of total costs. Let *t* represent the total costs and *g* represent the number of video games purchased.

1. What is the total cost if you buy 10 games?
2. Identify a recursive rule and an explicit rule for the sequence: 2, 5, 8, 11, …
3. Identify a recursive rule and an explicit rule for the sequence: 12, 7, 2, -3,…