Lesson 1.1: Arithmetic Sequences

Explore Your Understanding Assignment

This assignment includes multiple choice and short answer questions. For multiple choice questions, select the best answer. Each is worth 1 mark. Marks assigned to short answer questions are indicated for each question. Be sure to show all necessary work.

(1) _____ 1. List the first four terms in an arithmetic sequence where $t_1 = 7$ and $d = 22$.

A. 7, 27, 47, 67
B. 7, 29, 51, 73
C. 22, 29, 36, 43
D. 22, 44, 66, 88

(1) _____ 2. Determine the number of terms, n, in the arithmetic sequence $16,\ 13,\ 10,\ ...,\ -116$.

A. -3
B. 44
C. 45
D. 46

(1) _____ 3. Which of the arithmetic sequences contains the term 91?

A. $t_n = 6 + 17n$
B. 420, 417, 414, …
C. $t_1 = 4, d = 7$
D. 2, 11, 20, …

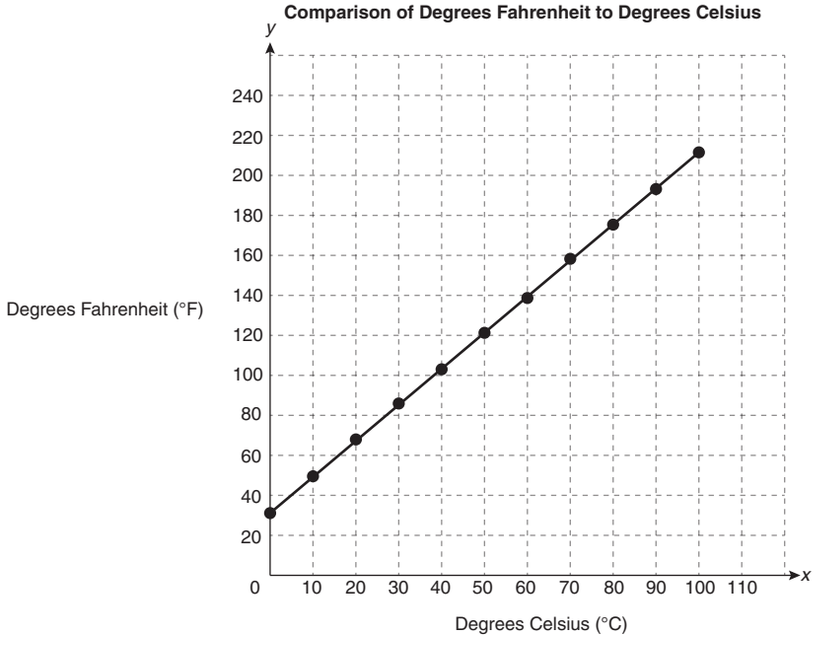
4. From the following list of sequences, identify the arithmetic sequences. For the arithmetic sequences, indicate the values of t_1 and d as well as the simplified general term, t_n. For those that are not arithmetic, be sure to indicate why not.

(1) a. 8, 26, 44, 62, …

(1) b. 98, 91, 82, 71, …

(1) c. $14, 14 + p, 14 + 2p, 14 + 3p, \ldots$

5. The temperature at which water freezes is 0°C or 32°F. The temperature at which water boils is 100°C or 212°F. The relationship between degrees Celsius and degrees Fahrenheit is shown through the graph below.



(1) a. Given that 1°C is 33.8°F (or $t_1 = 33.8$) and $d = 1.8$, write out the general formula, t_n, that represents the relationship between degrees Fahrenheit and degrees Celsius. Be sure to define the variables.

(2) b. Given two points on the graph, the freezing point of water at 0°C or 32°F and the boiling point of water at 100°C or 212°F, calculate the slope of the line. Explain how this value relates to the general formula found in part a.

(2) c. Looking at the graph, what is the y-intercept? Explain how this value relates to the general formula found in part a.

6. In preparing for a marathon run in the spring, Joelle runs 5 miles in week four of training and 10 miles in week 14. Joelle's weekly increase in mileage follows an arithmetic sequence.

(2) a. Write the general term that relates the number of miles to the week number of training.

(1) b. An official marathon is 26 miles long. In which week would Joelle run at least 26 miles?

(2) c. What assumption is made in order to answer part b.? What are some reasons why this may not be a good assumption?

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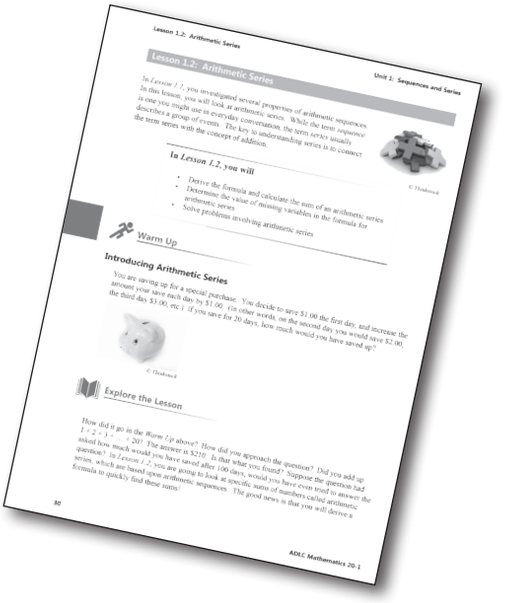
You have completed *Lesson 1.1 Explore Your Understanding Assignment*. Please return to the *Module* and continue your exploration with *Lesson 1.2*.



Lesson 1.2: Arithmetic Series

Unit 1: Sequences and Series

Lesson 1.2: Arithmetic Series

In *Lesson 1.1*, you investigated several properties of arithmetic sequences. In this lesson, you will look at arithmetic series. While the term *sequence* is one you might use in everyday conversation, the term *series* usually describes a group of events. The key to understanding series is to connect the term series with the concept of addition.

In *Lesson 1.2*, you will

- Derive the formula and calculate the sum of an arithmetic series
- Determine the value of missing variables in the formula for arithmetic series
- Solve problems involving arithmetic series

Warm Up

Introducing Arithmetic Series

You are saving up for a special purchase. You decide to save $1.00 the first day, and increase the amount your save each day by $1.00. (In other words, on the second day you would have $2.00, the third day $3.00, etc.) If you save for 20 days, how much would you have saved up?

Explore the Lesson

How did it go in the *Warm Up* above? How did you approach the question? Did you add up $1 + 2 + 3 + \cdots + 20$? The answer is $210. Is that what you found? Suppose the question had asked how much would you have saved after 100 days, would you have even tried to answer the question? In *Lesson 1.2*, you are going to look at specific sums of numbers called arithmetic series, which are based upon arithmetic sequences. The good news is that you will derive a formula to quickly find these sums!

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