LESSON MAKER PRO

Patterns That Add Up

Find terms and totals in arithmetic sequences.

HIGH SCHOOL · A2.A.3.3

A2.A.3.3 "Solve problems that can be modeled using arithmetic sequences or series given the nth terms and sum formulas. Graphing calculators or other appropriate technology may be used."

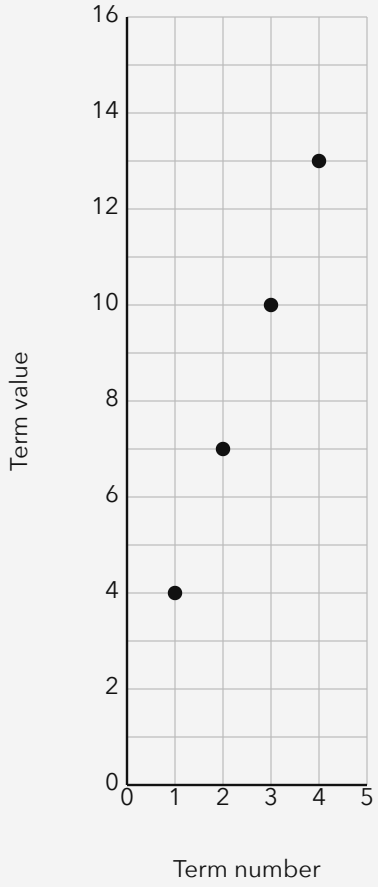
NAME _____ DATE _____

TERM AND SUM RULES

In an arithmetic sequence, the difference between consecutive terms stays the same. Use $a_n = a_1 + (n - 1)d$ to find a term, then use $S_n = n(a_1 + a_n)/2$ to find the sum of the first n terms.

WORKED EXAMPLE

Use the plotted points to find the sum of the first 9 terms.

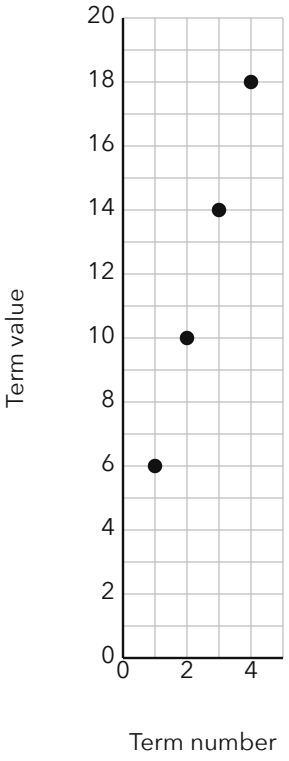


1. The first term is 4, and each term increases by 3.
2. $a_9 = 4 + (9 - 1)(3) = 28$.
3. $S_9 = 9(4 + 28)/2 = 144$.

Answer: 144

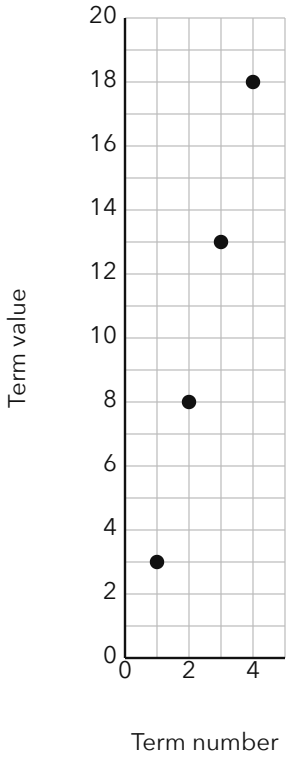
PRACTICE 6 problems

1 Use the plotted points to find the 8th term.



ANSWER _____

2 Use the plotted points to find the sum of the first 7 terms.



ANSWER _____

3 A sequence has $a_1 = 11$ and $d = 6$. Find a_{12}.

ANSWER _____

4 A sequence has $a_1 = 9$ and $d = 4$. Find S_{10}.

ANSWER _____

5 In an arithmetic sequence, $a_4 = 19$ and $d = 5$. Find a_{13}.

ANSWER _____

6 An arithmetic sequence has $a_1 = 17$ and $a_8 = 45$. Find S_8.

ANSWER _____

APPLY IT Show your work

1 You save $12 in the first week for a new phone. Each week after that, you save $3 more than the week before. How much do you save in all during the first 10 weeks?

WORK SPACE

ANSWER _____

2 A student podcast gets 80 plays on its first day. Each day, it gets 15 more plays than the day before. How many plays does it get in all during the first 12 days?

WORK SPACE

ANSWER _____

CHALLENGE One step up

You add 7 songs to a playlist on day 1 and 3 more songs each day than on the day before. After how many days will you have added 140 songs in all? How many songs do you add on that last day? Show how you know.

WORK SPACE AND ANSWER

Patterns That Add Up

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Use the plotted points to find the 8th term.	**34**
2	Use the plotted points to find the sum of the first 7 terms.	**126**
3	A sequence has $a_1 = 11$ and $d = 6$. Find a_{12}.	**77**
4	A sequence has $a_1 = 9$ and $d = 4$. Find S_{10}.	**270**
5	In an arithmetic sequence, $a_4 = 19$ and $d = 5$. Find a_{13}.	**64**
6	An arithmetic sequence has $a_1 = 17$ and $a_8 = 45$. Find S_8.	**248**

PART 2 · APPLY IT

1. **$255** In week 10, you save 12 + 9(3) = 39 dollars. The total is 10(12 + 39)/2 = 255 dollars.
2. **1,950 plays** On day 12, the podcast gets 80 + 11(15) = 245 plays. The total is 12(80 + 245)/2 = 1,950 plays.

CHALLENGE

8 days; 28 songs on day 8. The day 8 amount is 7 + 7(3) = 28, and the total is 8(7 + 28)/2 = 140.

Accept repeated addition or pairing terms instead of the sum formula when the work gives the correct total. In the graph problems, students must use the plotted points to identify the first term and common difference.