

EXAMPLE 2 Write a rule for the n th termWrite a rule for the n th term of the sequence. Then find a_{15} .

a. 4, 9, 14, 19, ...

b. 60, 52, 44, 36, ...

Solution

- a. The sequence is arithmetic with first term $a_1 = 4$ and common difference $d = 9 - 4 = 5$. So, a rule for the n th term is:

$$a_n = a_1 + (n - 1)d \quad \text{Write general rule.}$$

$$= 4 + (n - 1)5 \quad \text{Substitute 4 for } a_1 \text{ and 5 for } d.$$

$$= -1 + 5n \quad \text{Simplify.}$$

$$\text{The 15th term is } a_{15} = -1 + 5(15) = 74.$$

- b. The sequence is arithmetic with first term $a_1 = 60$ and common difference $d = 52 - 60 = -8$. So, a rule for the n th term is:

$$a_n = a_1 + (n - 1)d \quad \text{Write general rule.}$$

$$= 60 + (n - 1)(-8) \quad \text{Substitute 60 for } a_1 \text{ and } -8 \text{ for } d.$$

$$= 68 - 8n \quad \text{Simplify.}$$

$$\text{The 15th term is } a_{15} = 68 - 8(15) = -52.$$

AVOID ERRORS

In the general rule for an arithmetic sequence, note that the common difference d is multiplied by $n - 1$, not n .

EXAMPLE 3 Write a rule given a term and common differenceOne term of an arithmetic sequence is $a_{19} = 48$. The common difference is $d = 3$.

- a. Write a rule for the
- n
- th term.

- b. Graph the sequence.

Solution

- a. Use the general rule to find the first term.

$$a_n = a_1 + (n - 1)d \quad \text{Write general rule.}$$

$$a_{19} = a_1 + (19 - 1)d \quad \text{Substitute 19 for } n.$$

$$48 = a_1 + 18(3) \quad \text{Substitute 48 for } a_{19} \text{ and 3 for } d.$$

$$-6 = a_1 \quad \text{Solve for } a_1.$$

So, a rule for the n th term is:

$$a_n = a_1 + (n - 1)d \quad \text{Write general rule.}$$

$$= -6 + (n - 1)3 \quad \text{Substitute } -6 \text{ for } a_1 \text{ and 3 for } d.$$

$$= -9 + 3n \quad \text{Simplify.}$$

- b. Create a table of values for the sequence.

The graph of the first 6 terms of the sequence is shown. Notice that the points lie on a line. This is true for *any* arithmetic sequence.

n	1	2	3	4	5	6
a_n	-6	-3	0	3	6	9

