

Sec 11-2: Arithmetic Sequences

Created by adding the same number each time.

The difference between consecutive terms is constant.

$d = \text{Common Difference} = \text{any term} - \text{previous term}$

$$d = a_n - a_{n-1}$$

Find the Common Difference (d) in each Arithmetic sequence.

$$d = \text{any term} - \text{previous term}$$

1. 14, 22, 30, 38, ... $d = 22 - 14 = 8$

2. 29, 22, 15, 8, ... $d = 22 - 29 = -7$

Given the following Arithmetic Sequence

16, ?, 28, ... Find the value of ?

\uparrow
 $\frac{16 + 28}{2} = \frac{44}{2} = 22$

since the unknown number is exactly in the middle of 16 and 28 you can find this by averaging them (find the mean).

x is called the Arithmetic Mean of 16 and 28.

Find the missing terms of this Arithmetic sequence.

34, _____, _____, _____, 58

$\frac{34 + 46}{2} = \frac{80}{2}$
 $\frac{46 + 58}{2} = \frac{104}{2}$

34, 40, 46, 52, 58

$\frac{34 + 58}{2} = \frac{92}{2}$

the 3rd term is the mean of the 1st & 5th

the 2nd term is the mean of the 1st & 3rd

the 4th term is the mean of the 3rd & 5th

34, 40, 46, 52, 58

$34 + d + d + d + d = 58$
 $34 + 4d = 58$
 -34
 $4d = 24$
 $d = 6$

use this common difference to find the missing terms.

Find the missing terms of this Arithmetic sequence.

-44, __, __, __, __, 16

find the common difference:

distance between terms $\rightarrow \frac{16 - (-44)}{5} = \frac{60}{5} = 12$

of steps to cover that distance \rightarrow

now start with -44 and keep adding 12.

-44, -32, -20, -8, 4, 16

Write the recursive formula for this sequence:

56, 53, 50, 47, ...

this is an arithmetic sequence
where $d = -3$

$$a_1 = 56$$

$$a_n = (a_{n-1}) + -3$$

Recursive Formula for an Arithmetic Sequence:

7, 13, 19, 25, ...

Find d .

$$13 - 7$$

$$d = 6$$

$$a_1 = 7$$

$$a_n = a_{n-1} + 6$$

The recursive formula for
ANY Arithmetic Sequence:

a_1 = Given First Term

$$a_n = a_{n-1} + d$$

Explicit Formula for an Arithmetic Sequence:

5, 9, 13, 17, 21, ...

Find d . $d = 9 - 5 = 4$

$$a_1 = 5$$

$$a_2 = 5 + 4$$

$$a_3 = 5 + 4 + 4$$

$$a_4 = 5 + 4 + 4 + 4$$

$$a_5 = 5 + 4 + 4 + 4 + 4$$

every term has
the first term, 5
and adds a bunch
of 4's. The # of 4's
being added
is always one
less than
the term
(n-1).

Explicit Formula:

$$a_n = 5 + 4(n - 1)$$

Explicit Formula for
any Arithmetic Sequence:

$$a_n = a_1 + (n - 1)d$$

Write the explicit formula for this sequence:

47, 60, 73, 86, ...

arithmetic
 $d = 13$

$$a_n = 47 + 13(n-1)$$

Find the 23rd term for this sequence:

5, 8, 11, 14, ...

arithmetic
w/ $d = 3$

write the explicit formula

$$a_n = 5 + 3(n-1)$$

use the explicit formula to find the 23rd term.

$$a_{23} = 5 + 3(23-1) = 71$$

Given the two terms below are part of an Arithmetic Sequence, find the 16th & 50th terms in the sequence.

$$a_5 = 22$$

$$a_{23} = 94$$

Find the common difference

$$d = \frac{94 - 22}{23 - 5} = \frac{72}{18} = 4$$

Find the first term

$$a_1 = a_5 - 4d$$

$$a_1 = 22 - 4(4)$$

$$a_1 = 22 - 16 = 6$$

use the explicit formula to find the 16th and 50th terms:

$$a_{16} = 6 + 4(16-1) = 66$$

$$a_{50} = 6 + 4(50-1) = 202$$

Write the explicit formula

$$a_n = 6 + 4(n-1)$$

You can now finish Hwk #30:

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Problems 2-5, 15, 16, 26, 27, 53, 54, 63