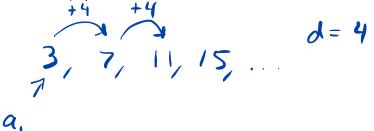
## Section 11.2: Arithmetic Sequences and Series

## Video 1: Arithmetic Sequences

An **arithmetic sequence** is a sequence in which each term differs from the preceding term by a fixed constant (**common difference**, *d*).



The common difference of an arithmetic sequence is given by  $d = a_n - a_{n-1}$ .

1) List the first 5 terms of the given arithmetic sequence.

a) The first term is 8 and the common difference is 10.



b) 
$$a_1 = 6$$
,  $d = -5$ 

## Video 2: nth Term of an Arithmetic Sequence

In an arithmetic sequence with first term  $a_1$  and common difference d, the *n*th term  $a_n$  is given by the following:

$$a_{n} = a_{1} + (n-1) \cdot d$$

$$3rd \quad 2d$$

$$4th \quad 3d$$

$$4th \quad 4th$$

$$4th \quad 3d$$

$$4th \quad 4th$$

$$4th \quad 3d$$

$$4th \quad 4th$$

$$4th$$

$$4th \quad 4th$$

$$4th$$

$$4th \quad 4th$$

$$4th \quad 4th$$

$$4th$$

3) If an arithmetic sequence has terms  $a_2 = 16$  and  $a_3 = 9$ , find  $a_n$  and  $a_{12}$ .

$$d = a_{3} - a_{2} = 9 - 16 = -7$$

$$a_{1} + d = a_{3}$$

$$a_{n} = a_{1} + (n - 1) \cdot d$$

$$a_{1} + (-7) = 16$$

$$+7 + 7$$

$$a_{1} = 23$$

$$a_{10} = 23 + (n - 1)(-7)$$

$$= 23 + (12 - 1)(-7)$$

$$= 23 + (12 - 1)(-7)$$

$$= 23 + (12 - 1)(-7)$$

$$= 23 + (12 - 1)(-7)$$

$$= 23 - 77$$

$$a_{10} = 30 - 7n$$

$$= -54$$

4) If an arithmetic sequence has terms  $a_9 = 22$  and  $a_{15} = 76$ , find  $a_1$ .

$6 \cdot d = 76 - 22$ 6d = 54 d = 9	$\alpha_q = \alpha_1 + (9-1) \cdot d$
	$\partial \mathfrak{d} = \mathfrak{Q}' + \mathfrak{g} \cdot \mathfrak{g}$
	$\partial \lambda = \alpha_1 + 7 \lambda$ -7 $\lambda$ -7 $\lambda$
	-72 -72
	-50 = a

6 d's

## Video 3: Arithmetic Series

If an arithmetic sequence has first term  $a_1$  and common difference d, the sum  $S_n$  of the first n terms is given by:

$$S_n = \frac{n}{2} (a_1 + a_n)$$

5) Find the sum of the first 100 positive integers.



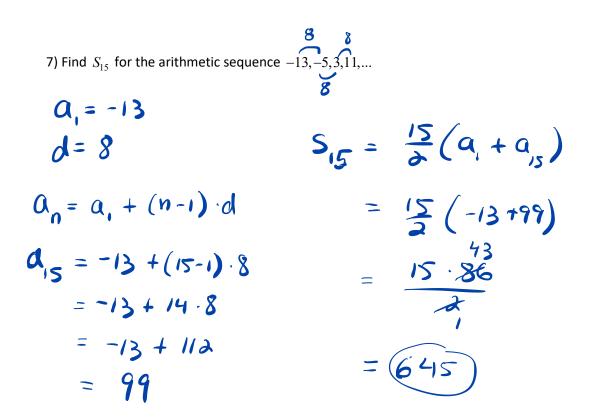
6) Find the sum of the first 15 odd positive integers.

$$a_{i}=1$$
  $1$   $3$   $5$   $\dots$   $d=2$ 

$$\begin{array}{rcl}
a_{n} &=& a_{i} + (n-i) \cdot d \\
&=& 1 + (n-i) \cdot 2 \\
a_{i5} &=& 1 + (15-i) \cdot 2 \\
&=& 1 + 14 \cdot 2 \\
&=& 29
\end{array}$$

$$S_{15} = \frac{15}{2}(1+29)$$
  
=  $\frac{15\cdot 30}{2} = 225$ 

50 101's



8) If the sum of the first 20 terms of an arithmetic sequence is 4 and  $a_1$  and d.

$$S_{20} = 3600$$

$$a_{20} = 351$$

$$S_{n} = \frac{n}{2} (a_{1} + a_{n})$$

$$S_{0} = \frac{20}{2} (a_{1} + 351)$$

$$3600 = 10 (a_{1} + 351)$$

$$\frac{342}{79} = \frac{194}{79}$$

Video 4: Summation Notation and Arithmetic Series

