

Notes Section 10.2 - Arithmetic Sequences and Series

arithmetic sequence

a sequence in which the difference between successive terms is constant. the constant is referred to as the common difference (d)

the n^{th} term of an arithmetic sequence

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

the sum of a finite arithmetic sequence

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

1. find the common difference and the next four terms of the arithmetic sequence. $-53, -36, -19, \dots$

$$d = -36 + 53 = \boxed{17}$$

$$\boxed{-2, 15, 32, 49}$$

explicit
recursive

2. find the formula for the n^{th} term of the arithmetic sequence
14, 3, -8, ...

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

$$a_n = 14 + (n-1)(-11)$$

$$a_n = 14 - 11n + 11$$

$$\boxed{a_n = 25 - 11n}$$

3. find the 45th term of -17, -11, -5, ...

$$a_{45} = -17 + (45-1)(6)$$

$$= -17 + 44(6) = \boxed{247}$$

4. find the first term of the sequence for $a_{44} = 229$ and $d = 8$

$$229 = a_1 + (44-1)(8)$$

$$229 = a_1 + 344$$

$$\boxed{a_1 = -115}$$

5. write an arithmetic sequence that has five arithmetic means between 6.2 and -1.6

$$6.2, \text{---}, \text{---}, \text{---}, \text{---}, \text{---}, -1.6$$

$$-1.6 = 6.2 + (7-1)d$$

$$-1.6 = 6.2 + 6d$$

$$-7.8 = 6d$$

$$d = -1.3$$

$$\boxed{6.2, 4.9, 3.6, 2.3, 1, -0.3, -1.6}$$

6. find the 20th partial sum of 27, 30, 33...

$$S_{20} = \frac{20}{2}(27 + 84)$$

$$S_{20} = 10(111) = \boxed{1110}$$

$$a_{20} = 27 + (20-1)(3) \rightarrow a_{20} = 84$$

7. find the sum

$$\sum_{n=10}^{32} (n+6)$$

$$S_{23} = \frac{23}{2}(16 + 38) = \boxed{621}$$