11.1 Intro to Sequences and Series

std. 22.0

A *sequence* is a list of numbers, called *terms*.

terms → 2, 6, 18, 54, . . . , a_n ← nth term

a_1 a_2 a_3

$n =$ 1 2 3

ex. 1 Write the first 3 terms of the sequence given by: $a_n = 5^{n-1}$

$a_1 = 5^{1-1} = 1$ $a_2 = 5^1 = 5$ $a_3 = 5^2 = 25$ rule

ex. 2 Find the next term and write a rule for the *n*th term

a) $\frac{1}{3}, \frac{1}{4}, \frac{1}{5}, \frac{1}{6}, \boxed{\frac{1}{7}}$ $a_n = \frac{1}{n+2}$

$n =$ 1 2 3 4 5

b) 3, 6, 9, 12, 15 $a_n = 3n$

3·1 3·2 3·3

A *series* is the sum of the terms of a sequence.

1 + 3 + 5 + 7 finite series 1 + 3 + 5 + 7 + . . . infinite series

We can use *sigma notation* or *summation notation* for a series.

$\sum_{n=1}^{5} 4n = 4\cdot1+4\cdot2+4\cdot3+4\cdot4+4\cdot5 = 4+8+12+16+20 = 60$

$\sum_{n=1}^{\infty} 4n = 4+8+12+\cdots$

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ex. 3 **Find the sum of the series**

$$\sum_{i=3}^{7} 2i^2 = 2(3^2) + 2(4^2) + 2(5^2) + 2(6^2) + 2(7^2)$$

$$18 + 32 + 50 + 72 + 98$$

$$270$$

ex. 4 **Write the series with summation notation**

- 8 - 9 - 10 - 11 - 12 $= -8 + -9 + -10 + -11 + -12$

$$\sum_{n=8}^{12} -n \quad \left| \quad \sum_{n=7}^{11} -n - 1 \right.$$