11.1 Intro to Sequences and Series

std. 22.0

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

2, 6, 18, 54, . . . , a_n

1st term, 2nd term, nth term

$a_1, a_2, a_3, a_4, \ldots, a_n$

n ← which term

ex. 1

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

nth term rule

$a_1 = 5^0 = 1$

$a_2 = 5^1 = 5$

$a_3 = 5^2 = 25$

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

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

n = 1 2 3 4 5

b) 3, 6, 9, 12, $\boxed{15}$ $\quad a_n = 3n$

n = 1 2 3 4 5

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

$1 + 3 + 5 + 7$ finite series $\qquad 1 + 3 + 5 + 7 + \ldots$ infinite series

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

$$\sum_{n=1}^{5} 4n = 4\cdot 1 + 4\cdot 2 + 4\cdot 3 + 4\cdot 4 + 4\cdot 5$$

index (n)

$$\sum_{n=1}^{\infty} 4n = 4\cdot 1 + 4\cdot 2 + 4\cdot 3 + \cdots$$

infinity (∞)

ex. 3 Find the sum of the series

$$\sum_{i=3}^{7} 2i^2 = 2\cdot 3^2 + 2\cdot 4^2 + 2\cdot 25 + 2\cdot 36 + 98$$

($2\cdot 7^2$ = 98; OR ... OR)

$$18 + 32 + 50 + 72 + 98 = 270$$

ex. 4 Write the series with summation notation

$- 8 - 9 - 10 - 11 - 12$

$$\sum_{n=7}^{11} -(n+1) \qquad \sum_{n=8}^{12} -n \qquad \sum_{n=1}^{5} -(n+7)$$