

# Arithmetic and Geometric Series Tests ... Set 2

## Arithmetic and Geometric Cheat Sheet

	<b>ARITHMETIC</b>	<b>GEOMETRIC</b>
<b>DEFINITION</b>	add to get next term (common difference)	multiply to get next term (common ratio)
<b>KEY WORDS</b>	"arithmetic", "common difference"	"geometric", "common ratio"
<b>SEQUENCE FORMULA (rule)</b>	$u_n = u_1 + (n - 1)d$	$u_n = u_1 \cdot r^{n-1}$
<b>SERIES FORMULA (rule)</b>	$S_n = \frac{n}{2}[2u_1 + (n - 1)d]$	$S_n = \frac{u_1(1 - r^n)}{1 - r}$
<b>FINDING THE PATTERN</b>	$d = u_2 - u_1$  or  $d = \frac{y_2 - y_1}{x_2 - x_1}$	$r = \frac{u_2}{u_1}$
<b>WORD PROBLEMS</b>	"increasing by a constant"  "decreasing by a constant"	"increasing by a percent"  "decreasing by a percent"  "doubles", "triples", "halves", etc..

- Before you begin to answer the questions, be sure to identify if the sequence is **arithmetic** or **geometric**.
- Look for **keywords in the question** that can inform you if it is arithmetic or geometric.
- Write out the sequence and determine if you are **adding** or **multiplying** to get to your next term.
- Identify what the variable **n** represents in the context of the question. (*n*th row, *n*th day, *n*th year, etc...)
- Carefully read the question to see if they are asking you to find **n** or **u<sub>n</sub>**. Use the context of the question!
- Determine if the given question requires the use of the **sequence** or **series** formulas.

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### **IB TEST QUESTIONS**

1. The first three terms of a geometric sequence are  $u_1 = 512$ ,  $u_2 = 128$ ,  $u_3 = 32$

(a) Find the value of  $r$ , the common ratio of the sequence.

(b) Find the value of  $n$  for which  $u_n = 2$

(c) Find the sum of the first 25 terms of the sequence.

2. The sixth term of an arithmetic sequence is 24. The common difference is 8.

(a) Calculate the first term of the sequence.

(b) Calculate the sum of the first 15 terms of the sequence.

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3. The population of Bangor is growing each year. At the end of 1996, the population was 40000. At the end of 1998, the population was 44100. Assuming that these annual figures follow a **geometric progression**, calculate:

- (a) the population of Bangor at the end of 1997;
- (b) the population of Bangor at the end of 1995.

4. The first term of an arithmetic sequence is 3 and the seventh term is 33.

- (a) Calculate the common difference;
- (b) Calculate the 95<sup>th</sup> term of the sequence;
- (c) Calculate the sum of the first 250 terms.

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5. On Vera's 18<sup>th</sup> birthday she was given an allowance from her parents. She was given the following choices.

Choice A \$100 every month of the year.

Choice B \$75 the first month and an increase of \$5 every month thereafter.

Choice C \$80 the first month and an increase of 5% every month.

(a) Calculate

(i) Vera's allowance during the third month for choice C.

(ii) Vera's allowance during the third month for choice B.

(b) Write down an expression for

(i) Vera's allowance during the  $n$ th month for choice C.

(ii) Vera's allowance during the  $n$ th month for choice B.

(c) Assuming that Vera does not spend any of her allowance during the year, calculate, for each of the three choices, the **total** amount of money she would have at the end of the year.

(d) Which of the choices do you think that Vera should choose? Give a reason for your answer.