Mathematics

數學科

Sequences

數列

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Sequences 數列

HKCEE Mathematics Syllabus – Sequences:

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會考數學課程 -

課題	整體課程	基礎課程
數列.	● 數列之通項. ● 等差(算術)數列及等比(幾何)數列. n 項和. 等比數列無限項之和. 現實生活問題之應用	● 數列之通項.

1. <u>Definition of Sequences</u>
<u>數列之定義</u>

Sequences: An arrangement of a series of numbers according to a specified set of rules.

[數列: 根據特定法則排列的一連串數字.]

e.g. 1, 2, 3, … n-1, n. **Relationship:__________**

e.g. 2, 4, 6, … n-2, n. **Relationship:__________**

e.g. 1, 3, 9, … 3^{n-2}, 3^{n-1} **Relationship:__________**

e.g. 1, -1, 1, … $(-1)^{n-2}$, $(-1)^{n-1}$ **Relationship:__________**

e.g. $1, \frac{1}{2}, \frac{1}{4}, \ldots \left(\frac{1}{2}\right)^{n-2}, \left(\frac{1}{2}\right)^{n-1}$ **Relationship:__________**

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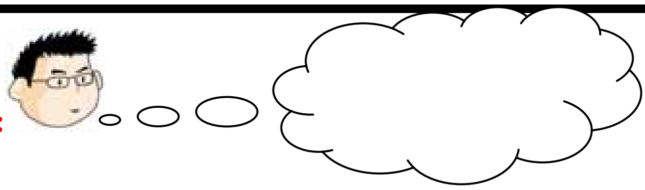

2. <u>The general terms of sequences</u> <u>數列之通項</u>

The general term of a sequence: A term can generalize all the other terms in the sequence.

[數列之通項**:** 一項可概括在同一數列的其他項**.]**

A Sequences is composed of [數列是由**]:**

T(1): The First Term 第一項

T(2): The Second Term 第二項

T(3): The Third Term 第三項

…

T(r): The rth Term 第 **r** 項

…

T(n-1): The n-1th Term 第 **n-1** 項

T(n): The nth Term 第 **n** 項

<u>T(n) is also called the general term of the sequences.</u>

[<u>T(n)</u><u>也都被叫做該數列之通項</u>**.]**

e.g. 1, 2, 3, … n-1, n. **General Term:________**

e.g. 1, 3, 9, … 3^{n-2}, 3^{n-1} **General Term:________**

e.g. 1, -1, 1, … $(-1)^{n-2}$, $(-1)^{n-1}$ **General Term:________**

3. <u>Arithmetic and Geometric Sequences</u>
<u>等差(算術)數列及等比(幾何)數列</u>

<u>Arithmetic Sequences (A.S.)</u>: Every term after the first term is obtained by adding a constant to its preceding term.

[<u>等差(算術)數列</u>**:** 在首項後，每一個項都是由之前的一個項加上一個常數.**]**

The general term T(n) i.e. the nth term of a A.S.: $T(n) = a + (n-1)d$

a is the first term, d is the common difference and n is a no. of term

[通項 $T(n)$ **i.e.** 等差**(**算術**)**數列第 **n** 項**:** $T(n) = a + (n-1)d$ **]**

[*a* 是首項，***d*** 是公差及 ***n*** 是一個項數**]**

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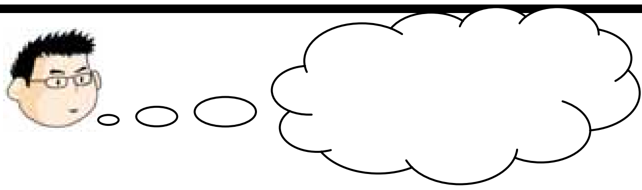

<u>Geometric Sequences (G.S.)</u>: Every term after the first term is obtained by multiplying a constant to its preceding term.

[<u>等比(幾何)數列</u>: 在首項後，每一個項都是由之前的一個項乘上一個常數.**]**

The general term T(n) i.e. the nth term of a G.S.: $T(n) = ar^{n-1}$

a is the first term, r is the common ratio and n is a natural number.

[*a* 是首項，***d*** 是公比及 ***n*** 是一個項數**]**

[通項 $T(n)$ **i.e.** 等比(幾何)數列第 **n** 項**:** $T(n) = ar^{n-1}$**]**

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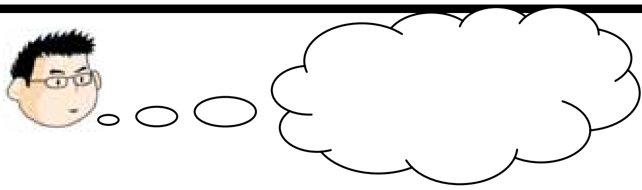

4. <u>Sum to n terms of Arithmetic and Geometric Sequences</u>
<u>等差(算術)數列及等比(幾何)數列之 n 項和</u>

Sum to n terms of A.S.: $S(n)=\dfrac{[a+a(n-1)d]n}{2}$

[等差(算術)數列之 **n** 項和**:** $S(n)=\dfrac{[a+a(n-1)d]n}{2}$ **]**

Sum to n terms of G.S.: $S(n)=\dfrac{a(1-r^{n})}{1-r}$

[等比(幾何)數列之 **n** 項和**:** $S(n)=\dfrac{a(1-r^{n})}{1-r}$ **.]**

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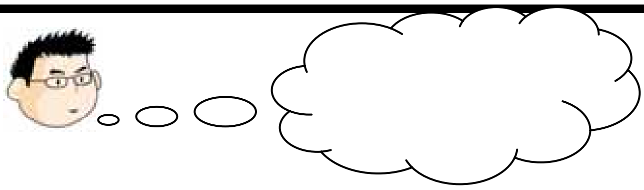

5. Sum to infinity of geometric series
等比(幾何)數列無限項之和

Sum to infinity of G.S.: $S(\infty)=\dfrac{a}{1-r}$ **where** $-1<r<1$**.**

[等比(幾何)數列無限項之和**:** $S(\infty)=\dfrac{a}{1-r}$ 而 $-1<r<1$**.]**

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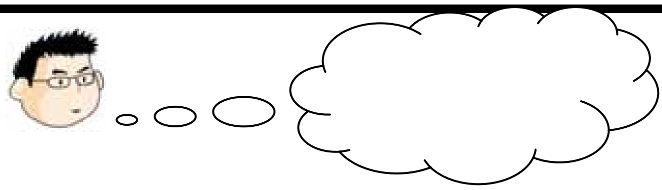

6. <u>Summary of Notes</u>
<u>筆記總結</u>

1. **The general term (The nth term) of a sequence: A term can generalize all the other terms in the sequence. We call it T(n).**
[數列之通項 **(**第 **n** 項**):** 一項可概括在同一數列的其他項**.**我們稱之爲 **T(n).]**

2. **The general term of A.S.:** $T(n) = a + (n-1)d$
[等差數列的通項**:** $T(n) = a + (n-1)d$ **]**

3. **The general term of G.S.:** $T(n) = ar^{n-1}$
[等比數列的通項**:** $T(n) = ar^{n-1}$**]**

4. **Sum to n terms of A.S.:** $S(n) = \frac{[a + a(n-1)d]n}{2}$

[等差數列之 **n** 項和**:** $S(n) = \frac{[a + a(n-1)d]n}{2}$ **]**

Sum to n terms of G.S.: $S(n) = \frac{a(1-r^n)}{1-r}$

[等比數列之 **n** 項和**:** $S(n) = \frac{a(1-r^n)}{1-r}$ **.]**

5. **Sum to infinity of G.S.:** $S(\infty) = \frac{a}{1-r}$ **where** $-1 < r < 1$**.**

[等比**(**幾何**)**數列無限項之和**:** $S(\infty) = \frac{a}{1-r}$ 而 $-1 < r < 1$**.]**