Revision Exercise for MATH/BMED Freshmen 2018-19: Follow-up Advice

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Introduction.

1. The Revision Exercise is designed to cover various topics in **school mathematics** in which MATH/BMED freshmen are supposed to be well-versed.

2. It is hoped that by attempting the questions, you have discovered by yourself which topics you have not learnt at school, or have forgotten after leaving school, so that you will have a chance to amend the situation in time.

3. For more detail on the various topics and on the learning resources, refer to **School mathematics topics and resources**.

4. For specific advice suitable to you, please go through the questions in the **Directory for specific advice** and proceed according to your answers to the rest of this booklet.

Directory for specific advice.

1. *Are you a local JUPAS student?*

   - If yes, go to **Question (3)**.
   - If no, go to **Question (2)**.

2. *Are you a Mainland student who did Gaokao?*

   - If yes, go to **Question (4)**.
   - If no, read **Section A** first and then come back for **Question (4)**.

3. *Did you do 'Module 2' at school?*

   - If yes, go to **Question (4)**.
   - If no, read **Section B** first and then come back for **Question (4)**.

4. *How much time on average does it take you to get the answer of one question in the Revision Exercise?*
   - If it is less than 5 minutes, read **Section C1**.
   - If it is between 5 minutes to 12 minutes, read **Section C2**.
   - If it is more than 12 minutes, read **Section C3**.

School mathematics topics and resources.

1. What the Revision Exercise has covered are these topics in **school mathematics**:

   (a) Surds

   (b) ** Quadratic polynomials and quadratic equations

   (c) Manipulation of polynomials, Remainder Theorem and Factor Theorem

   (d) Simultaneous equations with two unknowns

   (e) * Absolute value

   (f) Indices and logarithms

   (g) Ratios and proportions

   (h) ** Algebraic inequalities

   (i) * Mathematical Induction

   (j) * Binomial Theorem

   (k) Arithmetic progressions and geometric progressions

   (l) * Radian measure

   (m) ** Trigonometric functions

   (n) * General solutions of trigonometric equations

   (o) * Solutions of triangles

   (p) * Vectors in $\mathbb{R}^2$ and $\mathbb{R}^3$

   (q) * Complex numbers, (including modulus and argument)

   (r) ** Plane coordinate geometry (for lines and circles)

   (s) * Differentiation of elementary functions

   (t) * Applications of differentiation

   (u) * Definite integrals and indefinite integrals

   (v) * Applications of integration

2. For more detail on what is expeced of you in each topic in the list above, you may refer to:

   ⊕ the item *Form IV-V* in

   > https://www.edb.gov.hk/en/curriculum-development/kla/ma/curr/sec-math-1985.html

   ⊗ the various items listed under the *syllabus* in

   > http://www.edb.gov.hk/en/curriculum-development/kla/ma/curr/add-math-1992.html

   For the topics marked with one star in the list, you may refer to ⊗. For those marked with two stars, you may refer to both ⊕ and ⊗. The unmarked topics are the relatively basic ones; you may refer to ⊕.

3. You are encouraged to treat the questions in the past examination papers of the 'old-curriculum' HKCEE *Mathematics* and *Additional Mathematics* as further revision exercises.

   You may find these examination papers in the University Library and the Chung Chi College Library.

4. You may try to find second-hand textbooks for HKCEE *Mathematics* and *Additional Mathematics* for self study. Some are available in the Chung Chi College Library.

5. Below are some old books, each covering almost every topic listed above at an accessible level. They are freely available in electronic form:

   (a) B. D. Bunday, H. Mulholland, *Pure Mathematics for Advanced Level*, Butterworths 1970.

   > https://archive.org/details/PureMathematicsForAdvancedLevel

   (b) R. I. Porter, *Further Mathematics*, Bell and Hyman Limited 1970.

   > https://archive.org/details/FurtherMathematics

   (c) C. J. Tranter, *Advanced Level Pure Mathematics*, The English Universities Press.

   > https://archive.org/details/in.ernet.dli.2015.285850

Section A: Advice to non-JUPAS non-Mainland MATH freshmen.

1. We suppose you went through the most difficult mathematics syllabus in one of GCE A-levels, IB, SAT, or something equivalent. Very likely you have had an exposure in most of the topics that this Revision Exercise covers. (The syllabus you went through is even better than the most difficult syllabus for local students.)

2. However, if you feel that you were struggling in the Revision Exercise, it is most likely because the syllabus you went through might put less emphasis on 'drilling of techniques'. As a consequence you have difficulty when you run into questions which are not straightforward. Such a question tends to involve complicated calculation and combination of skills.

3. Please be reminded that being able to make complicated calculation and to combine various skills in handling a problem is an integral part of mathematical training at the university level. We urge you to spend the next few weeks on serious self-study, so that you are better prepared for the rest of the academic year.

4. Please refer to **School mathematics topics and resources** for resources which you may use for catching up.

5. Now return to **Question (4)** of **Directory for specific advice**.

Section B: Advice to MATH/BMED freshmen from JUPAS with Module 1.

1. It is natural that you are unfamiliar with a substantial amount of the questions in the Revision Exercise. Besides, it is likely that you struggle a lot with the calculations.

2. We urge you to spend the next few weeks on serious self-study on *Module 2*, or even better, old-curriculum *Additional Mathematics*. This is important if you want to stay in touching distance with classmates who did *Module 2*.

3. The questions in the Revision Exercise which you struggle suggest which area(s) you should focus on.

   Our experience suggests that they are most likely amongst the items highlighted with the sharp symbol ($\sharp$) in this list:

   (a) Surds

   (b) ** Quadratic polynomials and quadratic equations

   (c) Manipulation of polynomials, Remainder Theorem and Factor Theorem

   (d) Simultaneous equations with two unknowns

   (e) $\star$ Absolute value ($\sharp$)

   (f) Indices and logarithms

   (g) Ratios and proportions

   (h) ** Algebraic inequalities ($\sharp$)

   (i) $\star$ Mathematical Induction ($\sharp$)

   (j) $\star$ Binomial Theorem

   (k) Arithmetic progressions and geometric progressions

   (l) $\star$ Radian measure ($\sharp$)

   (m) ** Trigonometric functions ($\sharp$)

   (n) $\star$ General solutions of trigonometric equations ($\sharp$)

   (o) $\star$ Solutions of triangles ($\sharp$)

   (p) $\star$ Vectors in $\mathbb{R}^2$ and $\mathbb{R}^3$ ($\sharp$)

   (q) $\star$ Complex numbers, (including modulus and argument)

   (r) ** Plane coordinate geometry (for lines and circles) ($\sharp$)

   (s) $\star$ Differentiation of elementary functions ($\sharp$)

   (t) $\star$ Applications of differentiation ($\sharp$)

   (u) $\star$ Definite integrals and indefinite integrals ($\sharp$)

   (v) $\star$ Applications of integration ($\sharp$)

   Refer to **School mathematics topics and resources** for the resources which you may use for catching up.

4. (a) If you are a MATH student, also refer to the Academic Advice for MATH students in the Department Homepage:

   $$\text{http://www.math.cuhk.edu.hk/student-centre/academic-advice}$$

   (b) If you are a BMED student, also refer to the Academic Advice for BMED students distributed during the Academic Counselling Session.

5. Now returen to **Question (4)** of **Directory for specific advice**.

Section C1.

1. Congratulations. You have learnt school mathematics well and have not forgotten it after the summer vacation. We believe that you will encounter very few problems in our level-1000 courses, as long as you treat the coursework seriously.

   You may proceed cautiously to do some self-study on multi-variable calculus, and perhaps beyond. A good textbook is Fitzpatrick's *Advanced Calculus*.

2. You may also be interested in the challenges offered by the **First-Year Honours Scheme 2018-19**:

   `http://www.math.cuhk.edu.hk/student-centre/first-year-mathematics-honours-scheme-2018`

   More detail will be announced in due course.

   The First Year Honours Scheme will help you prepare for the level-2000 courses, probably in the second year.

3. For more advice on study, please visit the website

   `http://www.math.cuhk.edu.hk/student-centre/academic-advice`

Section C2.

1. We suggest you spend some time over the next weeks to recall what you might have forgotten in school mathematics. In general we hope you will 'step up a gear' in mathematics. This will help you a lot for the rest of the academic year.

   The questions in the Revision Exercise which have given you the greatest trouble suggest where you need start your review. You may use as reference the topics listed in **School mathematics topics and resources**. Also refer to the resources mentioned there.

2. We hope you will not encounter too many problems in our level-1000 courses, provided you remember that as a full-time student, your priority is to study.

3. We hope you will participate the **First-Year Honours Scheme 2018-19**:

   `http://www.math.cuhk.edu.hk/student-centre/first-year-mathematics-honours-scheme-2018`

   More detail will be announced in due course.

   Our experience suggests that students who participate in the First-Year Honours Scheme will perform substantially better in the longer run than those who do not.

4. For more advice on study, please visit the website

   `http://www.math.cuhk.edu.hk/student-centre/academic-advice`

Section C3.

1. We are concerned that one or more of the things below has happened:

   (a) You have forgotten some important mathematics over the summer.

   (b) You may have missed out altogether some important mathematics that your school teacher should have covered.

   (c) You have missed out nothing, but you did not have, or were not expected to have, the kind of training that this level requires.

2. If you seriously hope to try to graduate in the MATH/BMED programme, we urge you to first find out what has happened to you.

   The questions in the Revision Exercise which have given you the greatest trouble suggest where you need start your review. You may use as reference the topics listed in **School mathematics topics and resources**. Also refer to the resources mentioned there.

   We urge you to do some serious review on school mathematics over the next few weeks, and pay attention in the level-1000 courses; otherwise you are likely to struggle to pass the level-1000 courses.

3. For more advice on study, please visit the website

$$\texttt{http://www.math.cuhk.edu.hk/student-centre/academic-advice}$$