WRITING A SUMMARY IN MATHEMATICS

Dr. LIU Fung Ming, Christy
Dr. XIAO Yangyu, Shirley
Department of Linguistics and Modern Language Studies
The Education University of Hong Kong

Objectives of the workshop

- Understand what is a summary;
- Recognise characteristics of a good summary;
- Learn the strategies in writing a good summary;
- Practise writing a summary through hands-on experience.

Why do we need a summary?

- Readers can write a summary of a text to let someone else know the main ideas.

- In your study or work, you need to write abstracts of articles, executive summaries of reports, research findings, conclusions, and minutes of meetings – they are all some kinds of summaries.

- You are also using summary skills in daily communication.

What does a summary look like?

Who Says Math Has to Be Boring?

American students are bored by math, science and engineering. They buy smartphones and tablets by the millions but don't pursue the skills necessary to build them. Engineers and physicists are often portrayed as clueless geeks on television, and despite the high pay and the importance of such jobs to the country's future, the vast majority of high school graduates don't want to go after them.

Nearly 90 percent of high school graduates say they're not interested in a career or a college major involving science, technology, engineering or math, known collectively as STEM, according to a survey of more than a million students who take the ACT test. The number of students who want to pursue engineering or computer science jobs is actually falling, precipitously, at just the moment when the need for those workers is soaring. (Within five years, there will be 2.4 million STEM job openings.

One of the biggest reasons for that lack of interest is that students have been turned off to the subjects as they move from kindergarten to high school. Many are being taught by teachers who have no particular expertise in the subjects. They are following outdated curriculums and textbooks. They become convinced they're "no good at math," that math and science are only for nerds, and fall behind.

That's because the American system of teaching these subjects is broken. For all the reform campaigns over the years, most schools continue to teach math and science in an off-putting way that appeals only to the most fervent students. The mathematical sequence has changed little since the Sputnik era: arithmetic, pre-algebra, algebra, geometry, trigonometry and, for only 17 percent of students, calculus. Science is generally limited to the familiar trinity of biology, chemistry, physics and, occasionally, earth science.

These pathways, as one report from the National Academy of Education put it, assume that high school students will continue to study science and math in college. But fewer than 13 percent do, usually the most well-prepared and persistent students, who often come from families where encouragement and enrichment are fundamental. The system is alienating and is leaving behind millions of other students, almost all of whom could benefit from real-world problem solving rather than traditional drills.

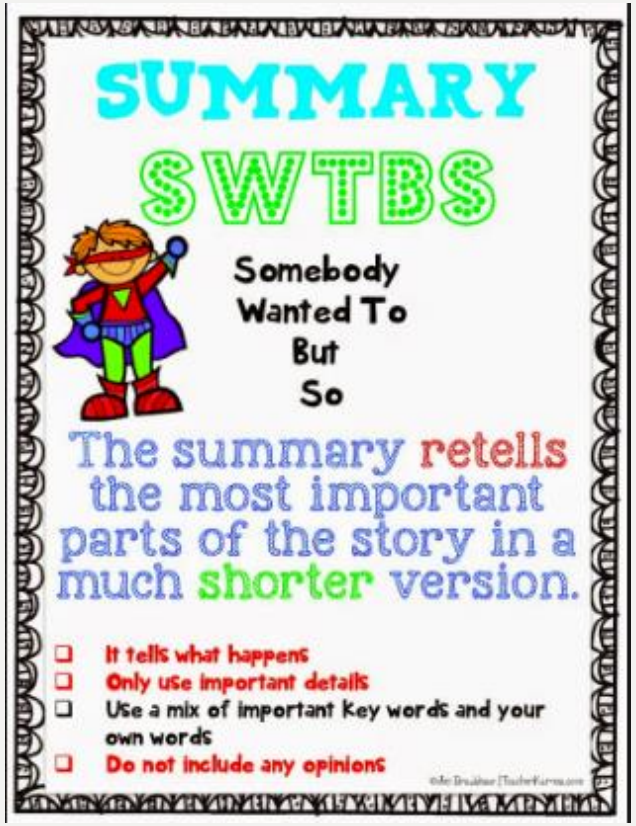
Only 11 percent of the jobs in the STEM fields require high-level math, according to Anthony Carnevale, director of the Center on Education and the Workforce at Georgetown University. But the rest still require skills in critical thinking that most high school students aren't getting in the long march to calculus.

Finding ways to make math and science exciting for students who are in the middle of the pack could have a profound effect on their futures, providing them with the skills that will help them get technical jobs in the fields of food science, computer networking or medicine. It would entice many students who are insecure in their own abilities into advanced careers. But it is going to require a fundamentally different approach to teaching these subjects from childhood through high school. Here are a few of the many possible ideas to begin that change.

Majority of American high school students showed little interest in math. The reasons accounting for this phenomenon include students being taught by math teachers with little expertise in math, outdated curriculum and textbooks, student's shaped impression that they are not good at math, and the broken national math education system. Even though some students continued to study math in higher education, they were only equipped with math knowledge but lacked critical thinking skills. One approach, a change in math teaching method, is proposed to solve this problem.

The American system of teaching Science and Math is generally frustrating. The way Math and Science education being handled in schools has a lot of loopholes: students have little interest in Science and Math learning; teachers have little expertise in relevant disciplines; curriculum and textbooks are outdated; students are even convinced that there is no good in learning Science and Math. The National Academy of Education reports that students still manage to study Science and Math only those with good family orientation and encouragement will do that. The system is very hostile that Math and Science are not explained in a meaningful and practical way. However, steps are gradually taken by the American system of education to address this current situation of Math and Science learning. Motivating more students to be enthusiastically inclined with Mathematics and Science is seen as very vital for the students to be fully-equipped with the skills for technical jobs in some fields. With this, they will be enticed to take career path related to Mathematics and Science.

What is a summary



A summary is a **shortened/condensed passage** of a long original article.

A summary contains only **main points** and **key supporting details**.

A summary is written in **your own words.**

Readers will develop an understanding of the original article when reading your summary.

Writing a summary is an important academic writing skill that you need to use in writing up your assignments, papers, thesis, and reports writing in your own work.

What are the characteristics of a good summary?

Activity one: Understand the features of a good summary

Task description:

Read quickly through P.1 of the article – Who said Math Has to Be Boring and the four sample summaries.

Which summaries do you think are good summaries and why? Which summaries need to be improved and why?

10 minutes

Sample One

American students are not interested in Math and Science due to the lack of motivation and poor curriculum.

Sample Two

American students are bored by math, science and engineering. Most of high school graduates say they're not interested in STEM. One of the biggest reasons is that students have been turned off to the subjects as they move from kindergarten to high school. That's because the American system of teaching these subjects is broken. These curriculum pathways assume that high school students will continue to study science and math in college. Finding ways to make math and science exciting for students who are in the middle of the pack could have a profound effect on their futures, providing them with the skills that will help them get technical jobs.

Sample Three

Majority of American high school students showed little interest in math. The reasons accounting for this phenomenon include students being taught by math teachers with little expertise in math, outdated curriculum and textbooks, student's shaped impression that they are not good at math, and the broken national math education system. Even though some students continued to study math in higher education, they were only equipped with math knowledge but lacked critical thinking skills. One approach, a change in math teaching method, is proposed to solve this problem.

Sample Four

American students are not interested in science and math. They are not interested in pursue skills in building smartphones and tablets. Among high school graduates, 90% of them are not interested in pursuing a major involving STEM in college. A major reason is that students were not motivated to study. The math curriculum change little since the Sputnik era and science mainly focuses on biology, chemistry, physics and earth science. However, only 11% of jobs requires high-tech math; thus, developing a new curriculum that can provide students with skills, such as critical thinking skills, to use in future career is needed.

Characteristics of a good summary

- A good summary communicates **main ideas** and **key supporting details.**
- A good summary is **brief.**
- A good summary is **objective** (no writer's own opinion).
- A good summary **truly reflects ideas** in the source text (avoid misinterpretations).
- **Synthesizing and paraphrasing** skills should be used (no direct copying).
- **References** should be included where necessary.

How to write a good summary

Read

- **Read** through the whole article carefully.
- **Identify** the position of the article (main ideas).
- **Take notes or highlight** key points (key supporting details).

Plan

- **Plan** the points you will include.
- **Plan** the structure of the essay.

Write

Start with a topic sentence indicating the main ideas.
Re-organise the key supporting points.
Connect ideas coherently.
Paraphrase and **substitute** words.
Do not add your own ideas.
Write a **first draft** including all key points; **revise and condense** later.

Check

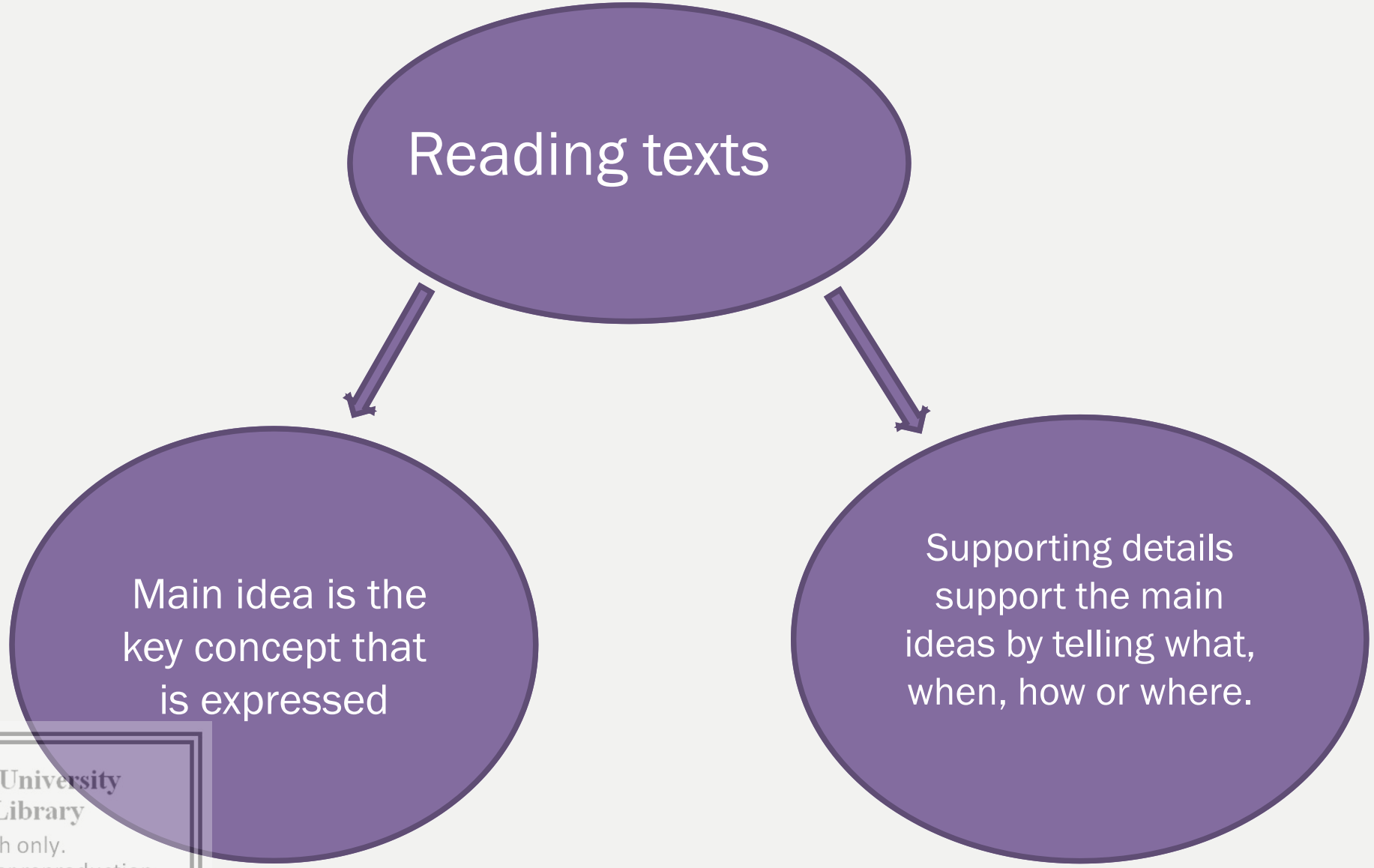
- Read the summary alone to see if the meaning gets through.
- Compare the summary with the original one to make sure you haven't changed the meaning.

Two important summary writing strategies we will practise

- Identify main ideas and major supporting details

- Re-write the key points in one's own words

Identify main ideas and key supporting details



Identify main ideas

- **Main ideas:** Every paragraph or text has a key concept or main idea. The main idea is the most important piece of information that the author wants you to know about the concept in that paragraph.
- The main ideas can be ***explicitly stated*** or ***implied***.

Quiz – identify main ideas

What is the main idea of the following paragraph?

Nearly 90 percent of high school graduates say they're not interested in a career or a college major involving science, technology, engineering or math, known collectively as STEM, according to a survey of more than a million students who take the ACT test. The number of students who want to pursue engineering or computer science jobs is actually falling, precipitously, at just the moment when the need for those workers is soaring. Within five years, there will be 2.4 million STEM job openings.

A. The number of students studying STEM subject is falling.

B. The study reports results of a survey of more than a million students.

C. A majority of students are not interested in STEM subjects.

D. More STEM job openings will be offered in the next five years.

Quiz – identify main ideas

What is the main idea of the following paragraph?

That's because the American system of teaching these subjects is broken. For all the reform campaigns over the years, most schools continue to teach math and science in an off-putting way that appeals only to the most fervent students. The mathematical sequence has changed little since the Sputnik era: arithmetic, pre-algebra, algebra, geometry, trigonometry and, for only 17 percent of students, calculus. Science is generally limited to the familiar trinity of biology, chemistry, physics and, occasionally, earth science.

A. Schools only teach math and science in a way that favours students of great passion in mathematics.

B. The sequence how mathematics are taught changed little.

C. There are limited areas that science is taught.

D. American educational system is broken.

Quiz – identify main ideas

What is the main idea of the following paragraph?

Finding ways to make math and science exciting for students who are in the middle of the pack could have a profound effect on their futures, providing them with the skills that will help them get technical jobs in the fields of food science, computer networking or medicine. It would entice many students who are insecure in their own abilities into advanced careers. But it is going to require a fundamentally different approach to teaching these subjects from childhood through high school. Here are a few of the many possible ideas to begin that change.

Identify main ideas

- 1. Read through the article carefully to develop a general understanding of the text.
- 2. Pay attention to the following aspects:

  Title – subject of the article

  Subtitle – focus of the article

  Headings – key ideas

  Introduction

  Topic sentence

  Conclusion

Identify major supporting details

We should focus on this in writing a summary

- **Major/key supporting details:** primary points that support the main idea.

- Reasons
- Points in an arguments
- Points of a comparison
- Further elaboration of a main idea

- **Minor supporting details**: specific examples and figures to support major supporting details.

- Examples
- Specific details
- Specific instance
- Statistics

Identify major supporting details and take notes

- Look for points which directly explain develop, or illustrate the main idea.

- Major supporting details are the principal points the author is making about the topic.

- Take notes according to the sequence these points appear in text.

Quiz – major and minor supporting details

Read the section - Better Teacher Preparation – and classify the following details as major and minor supporting details.

A. Too many science and math teachers lack that preparation.

B. More than half of the 6.7 million students are learning from teachers who are not in these subjects.

C. Only 64% of physical science teachers are certified and 78% of math teachers are certified.

D. Schools give extra training to science and math teachers, pair them up according to experience and train more STEM teachers.

E. The Carnegie Corporation has led a coalition of businesses, universities and other institutions to make it happen at the ground level.

F. The University of Chicago will train 500 new teachers for Chicago's public schools over five years.

Activity two: identify main ideas and supporting details

Now read page 2 -3 of the article – *Who Says Math Has to be boring?* Work with a peer and Identify main ideas and supporting details of each section:

A More Flexible Curriculum

Very Early Exposure to Numbers

Better Teacher Preparation

Experience in the Real World

20 minutes

Re-write major supporting details in one's own words

- 1. list key points according to the order that they appear in the article.
- 2. Paraphrase - substitute words with synonyms and change sentence structures.
- 3. Re-write two or more sentences into one sentence with similar key points.
- 4. Use transitions and attributive tags to move your reader from one idea to the next.
- 5. Write more about major supporting details on a certain aspect if the author writes more about a certain aspect in the text.
- 6. Do not include your personal opinions in the summary.

Re-write major supporting details

Strategy one - paraphrase

- Expressing the meaning using different words and structures**, e.g.**

Most schools continue to teach math and science in an off-putting way that appeals only to the most fervent students.

Re-write major supporting details

Strategy two - Re-write two or more sentences into one sentences with similar key points. e.g.

Finding ways to make math and science exciting for students who are in the middle of the pack could have a profound effect on their futures, providing them with the skills that will help them get technical jobs in the fields of food science, computer networking or medicine. It would entice many students who are insecure in their own abilities into advanced careers. But it is going to require a fundamentally different approach to teaching these subjects from childhood through high school. Here are a few of the many possible ideas to begin that change.

Re-write major supporting details

Strategy three - Use transitions and attributive tags to move your reader from one idea to the next.

Transitions:

Transitions connect ideas and indicates the logical relationship between ideas.

Attributive tags: Attributive tags are phrases like "the article states. . . ," "the author claims. . . ," "Smith concludes. . .," etc.

LOGICAL RELATIONSHIP	TRANSITIONAL EXPRESSION
Similarity	also, in the same way, just as … so too, likewise, similarly
Exception/Contrast	but, however, in spite of, on the one hand … on the other hand, nevertheless, nonetheless, notwithstanding, in contrast, on the contrary, still, yet
Sequence/Order	first, second, third, … next, then, finally
Time	after, afterward, at last, before, currently, during, earlier, immediately, later, meanwhile, now, recently, simultaneously, subsequently, then
Example	for example, for instance, namely, specifically, to illustrate
Emphasis	even, indeed, in fact, of course, truly
Place/Position	above, adjacent, below, beyond, here, in front, in back, nearby, there
Cause and Effect	accordingly, consequently, hence, so, therefore, thus
Additional Support or Evidence	additionally, again, also, and, as well, besides, equally important, further, furthermore, in addition, moreover, then
Conclusion/Summary	finally, in a word, in brief, briefly, in conclusion, in the end, in the final analysis, on the whole, thus, to conclude, to summarize, in sum, to sum up, in summary

Activity Three: write a summary

Read page 2 and page 3 of the article - ‘Who said the mathematics will be boring’ and summarise in 200 words the approach to teach science and math as suggested by the author.

Put your summaries on the on-line learning platform:

http://corpus.eduhk.hk/moodle/course/view.php?id=2

20 minutes

Go to:

http://corpus.eduhk.hk/moodle/course/view.php?id=2

Log in with your user name and password:

Please remember to do a self-reflection on-line after submitting your summaries!

Announcements

Summary writing

Summarise general mathematics articles

Task 1 - Who Says Math Has to Be Boring? - Part One

Self-reflection on Task 1

Task 2 - Who Says Math Has to Be Boring? Part Two

Self-reflection on Task 2

Task 3 - Critical Thinking and Mathematical Reasoning

Self-reflection on Task 3

Summarise mathematics literature

What are the three approaches measuring perimeter?

Self-reflection on approaches to measure perimeter

Task 4 - Perimeter in the curriculum

Self-reflection on Task 4

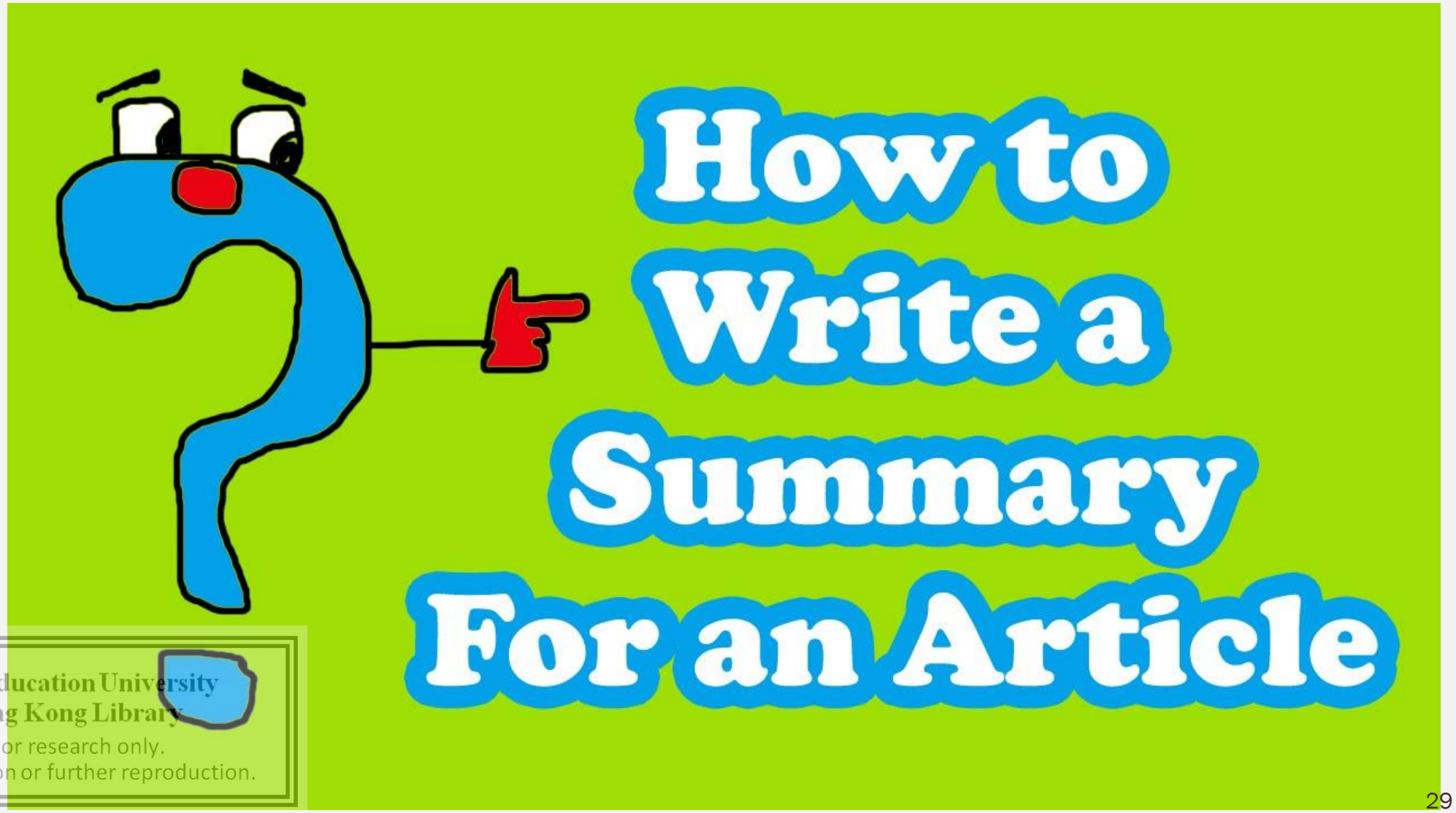
Task 5 - To define or not to define: The case of (-8)^(1/3)

Self-reflection on Task 5

Thanks for completing the summary. Now you can spend two minutes reflecting on your summary.

Please click here.

Writing a summary of mathematics literature



Writing a summary in mathematics

Except for produce answers to given problems, exercises, and questions, why do we need to write, or write a summary in the discipline of mathematics?

For example:

- to explain solution of a problem and exercises;
- to demonstrate how well you understand mathematical ideas and concepts;
- to explain different points of views about foundations of mathematics;
- to write up your honors project report.

Summarise mathematics literature

Does writing a summary in mathematics require similar skills that we used in writing a summary in a general mathematic reading?

YES! – We need to include MAIN IDEAS and KEY supporting details too.

BUT! – We need to read the task carefully to identify what we are expected to summarise.

The Task

Read the following article and write a summary in 300 words.

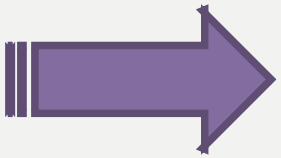
Danielson, C. (2005). Perimeter in the curriculum. *For the Learning of Mathematics* 25(1). 30-33.

The summary should include information of all three aspects below:

1. Describe the situations that give rise to the need to clarify the concept of perimeter.
2. Summarize possible approaches to deal with controversies found in measuring perimeter.
3. How does the notion of perimeter in primary school curriculum relate to more advanced study of mathematics?

Pre-writing – understand the task requirement

What shall we focus on in this task?



What kinds of main ideas and supporting details shall we look for....

1. Why does the **concept of perimeter** needs to be clarified?
2. What are the **three approaches** measuring perimeter?
3. How does the **notion of perimeter** in primary school curriculum relate to **more advanced study** of mathematics?

Identify main ideas and supporting details

Read through the text carefully. Identify the **main ideas** and **key supporting details** on the topic below.

> Summarise possible approaches to deal with controversies found in measuring perimeter.

Think about the following questions:

- *What are the main purpose of these sections? (Main idea)*

- *How perimeter can be measured in different approaches (key supporting details).*

15 minutes

Activity Four: Write a summary of an academic literature

Write a summary on the following topic and input your summaries on the learning platform.

What are the three approaches to measure perimeter?

Please remember to do a self-reflection on-line after submitting your summaries!

Viewing your personalized feedback

You may log in to the learning platform 2 weeks after the workshop to view your personalized feedback offered by us.

I will email you once all feedback is ready to view. Thanks

Please fill in the **workshop evaluation questionnaire** before you leave. If you are interested in participating in **a paid post-workshop interview**, please indicate in the questionnaire.