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MCE makes world-class educational content more accessible through a seamless experience that integrates both print and digital resources. We provide holistic and end-to-end solutions customised to the school's requirements, with professional development to help educators implement the curriculum.

We've worked with ministries, policymakers, educators, and parents in over 85 countries, designing education solutions in 14 languages for Pre-K to 12. MCE is the only Asia-based publisher that is an endorsement partner of Cambridge Assessment International Education.

www.mceducation.com

Series architecture

- Student's Book
- Workbook
- Teacher's Guide
- eBooks*
- Additional Digital Resources*

**These resources will not go through the Cambridge International endorsement process.*

Cambridge IGCSE™ Mathematics

Core and Extended

and

Cambridge IGCSE™ & O Level Additional Mathematics



Scan here to access
the MCE Cambridge
IGCSE™ Mathematics
website

BROCHURE

**Beyond Basics,
Reset Education**

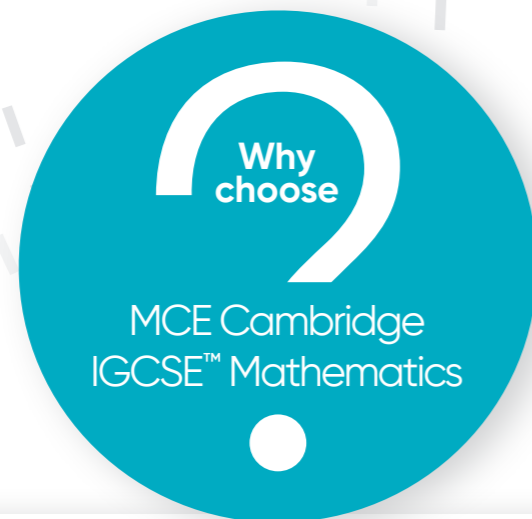
We are working with Cambridge Assessment International Education towards endorsement of this series.

Overview

The **MCE Cambridge IGCSE™ Core and Extended Mathematics** and **MCE Cambridge IGCSE™ & O Level Additional Mathematics** series have been developed to deliver the latest Cambridge IGCSE and IGCSE (9–1) Mathematics syllabuses (0580/0980) and Cambridge IGCSE and O Level Additional Mathematics syllabuses (0606/4037) for examination from 2025. While the series are fully aligned to the Cambridge syllabuses, the pedagogies and teaching practices follow those used in Singapore – one of the top performing countries in international assessments such as Trends in International Maths and Science Study (TIMSS) and Programme for International Student Assessment (PISA).

Both series are anchored on the belief that all learners can learn and succeed in Maths regardless of their learning readiness. The series emphasise on developing learners' conceptual understanding and problem-solving skills, allowing them to eventually achieve mastery.

The series also comes complete with a comprehensive suite of print and digital resources that help the 21st century learners and teachers succeed.



1. Engage in motivating and meaningful learning experiences

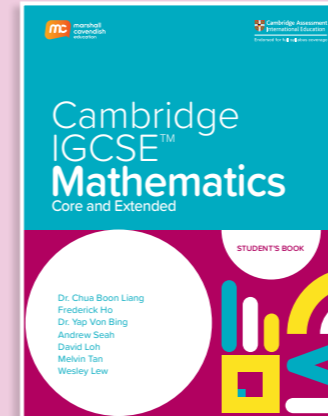
2. Adopt the idea of “slow-thinking”

3. Experience a personalised practice pathway

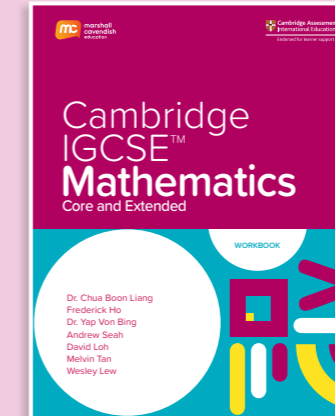
What's in Our Package?

MCE Cambridge IGCSE™ Core & Extended Mathematics

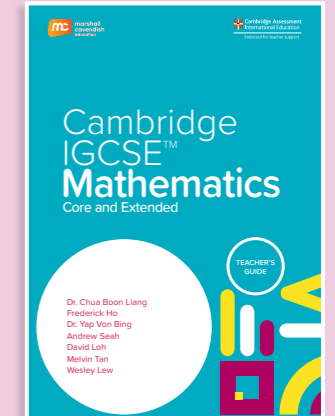
Student's Book
ISBN 9789814913065



Workbook
ISBN 9789814913072

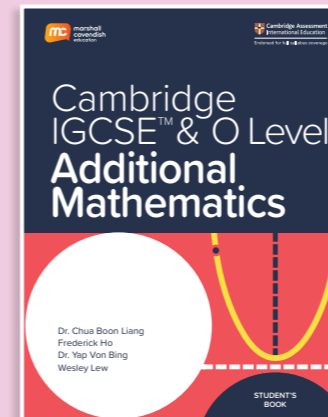


Teacher's Guide
ISBN 9789814913089

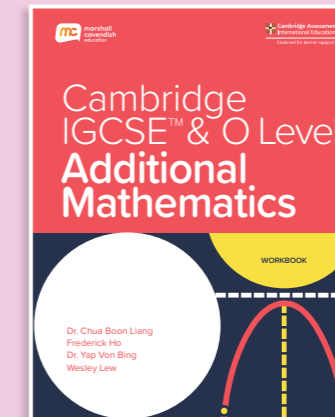


MCE Cambridge IGCSE™ & O Level Additional Mathematics

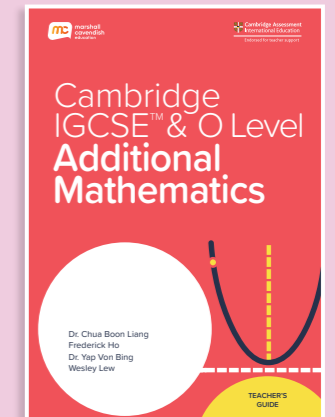
Student's Book
ISBN 9789814913096



Workbook
ISBN 9789814913102



Teacher's Guide
ISBN 9789814913119



Additional Digital Resources*

- Annotatable eBooks
- Worked Solutions
- Editable Resources
 - Scheme of Work (SOWs)
 - Lesson Plans
- Question Bank
- AI-driven Personalised Learning Pathway

*These resources will not go through the Cambridge International endorsement process.

Every Learner can Learn and Succeed in Maths when They are Provided with Motivating and Meaningful Learning Experiences

Underpinning the **MCE Cambridge IGCSE™ Mathematics** series is the belief that every learner can learn Maths if they are motivated and given the opportunities to construct their own understanding and knowledge. For effective learning to take place, learners need to be provided with meaningful, engaging and stimulating learning activities for them to explore concepts and construct understanding. Learners must also be provided with opportunities to apply the concepts and skills learnt in real-world contexts, articulate their reasoning clearly and appreciate the power and beauty of mathematics.

For these reasons, our **MCE Cambridge IGCSE™ Mathematics** series have been written with a focus to create meaningful and engaging learning experiences that develop learners' conceptual understanding and problem-solving skills.

Engage with Relatable Contexts that Connect Maths to the Real World

CHAPTER
12
Binomial Theorem

Chapter Opener

To pique students' interest, each chapter begins with a Chapter Opener on a real-world problem that provides them with the rationale and motivation to learn. The visuals help students see the link in Mathematics to the real-world problem, providing a sense of familiarity and making the real-world problem more relatable. The discussion question prompts students to start thinking and get them engaged to learn.

When you save money in a bank, you are paid a yearly interest. Suppose the bank offers you an annual rate of 1% compound interest and you put \$500 into a saving account for a total of 10 years. The exact amount in your account after 10 years is $\$500 \times 1.01^{10}$. How would you get an approximate answer without the use of a calculator?

At the end of this chapter, you will learn how to:

- use the Binomial Theorem for expansion of $(a + b)^n$, for positive integer n
- use the general term $\binom{n}{r} a^{n-r} b^r$, $0 \leq r \leq n$

1

Recall and Review What They Know

Recall

To help students recall and revisit relevant pre-requisite concepts so that they can build on their existing schema and create new knowledge and learn new skills.

Chapter 12

Recall

- 1 Expand $a(b + c)$ and $(a + b)^2$.
- 2 Simplify $(a^m)^n$.
- 3 State $\binom{n}{r}$.
- 4 State $n!$.
- 5 State $0!$.

TAKE NOTE

$a^2 + 2ab + b^2$ has three terms: a^2 , $2ab$ and b^2 .
The coefficients of a^2 and b^2 are both 1 because $a^2 = 1a^2$ and $b^2 = 1b^2$.
The coefficient of ab is 2.

12.1 Binomial Expansion



Consider the identity $(a + b)^2 = a^2 + 2ab + b^2$. The expression $(a + b)$ contains two terms, a and b , connected by a "+" sign. An expression containing the sum of two terms is called a **binomial**.



Think Is the expression $(a - b)$ a binomial? Why? What are two other examples of a binomial?

In this section, we will learn to expand the cube and higher powers of binomials, for example, $(a + b)^3$, $(a + b)^4$, $(a + b)^7$ and $(a + b)^{10}$. When we expand $(a + b)^n$, where n is a non-negative integer, we are multiplying the products of n binomials into a sum of terms. This expansion is known as a **binomial expansion**. Let us now explore how we can expand $(a + b)^3$, $(a + b)^4$ and $(a + b)^5$.

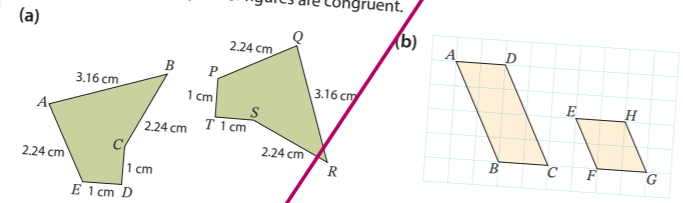
Think and Make Observations, and Make Sense and Process New Knowledge and Skills

Pause and Discover

To sustain students' interest, students are provided opportunities to explore, discover, and construct new mathematical knowledge through scaffolded learning tasks found in Pause and Discover. Students will find these activities meaningful and engaging as they gain new knowledge and skills in the process of doing them.

Try 1

Explain if the following pairs of figures are congruent.



Chapter 10

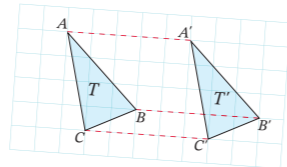
Discover

In this activity, you will learn to

- determine if a triangle and its translated image are congruent.
- determine if a triangle and its reflected image are congruent.
- determine if a triangle and its rotated image are congruent.



Use a graphing software or grid paper to construct the two triangles T and T' .



Points A, B and C are each translated horizontally 3 units to the right to form triangle T' . The images of A, B and C are A', B' and C' respectively.

(a) $AB = A'B', BC = \quad$ and $AC = \quad$
 $\angle A = \quad, \angle B = \quad$ and $\angle C = \quad$

(b) Are triangles T and T' congruent? Why or why not?

Think

Triangle T is transformed to T' by a translation. Will any triangle be congruent to its translated image?

The learning activities are scaffolded step-by-step.

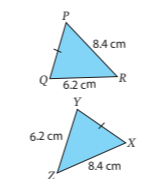
Work on Practice Questions to Reinforce Concepts and Master New Procedural Skills

For students to master mathematical concepts, it is important that they are given sufficient guidance with clear explanations to learn through worked examples followed by practice of questions that are similar to these examples. Such practice should include repetition and variation, including questions to achieve proficiency and flexibility. Outside of the classroom, meaningful and appropriate amount of practice questions should be given to students to reinforce and consolidate their learning, as well as to deepen their understanding of concepts and skills.

Chapter 10

Try 6

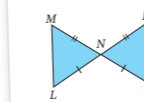
Prove that $\triangle PQR$ is congruent $\triangle XYZ$.



TAKE NOTE
 The vertices of congruent triangles must be written in a corresponding order.

Try 7

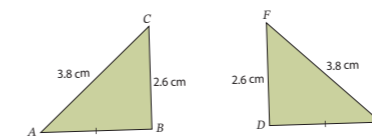
Prove that $\triangle LMN$ is congruent $\triangle PRN$.



Worked Example 6

(Prove two triangles are congruent using the SSS Congruency Test)

Prove that $\triangle ABC$ is congruent to $\triangle EDF$.



$AB = ED$ (given)
 $AC = EF = 3.8 \text{ cm}$
 $CB = FD = 2.6 \text{ cm}$
 $\therefore \triangle ABC \cong \triangle EDF$ (SSS)

Worked Example 7

(Prove two triangles are congruent using the SAS Congruency Test)

Prove that $\triangle GHL$ is congruent to $\triangle JKL$.



Student's Book Worked Examples

Carefully selected questions are presented with step-by-step solutions with clear explanations to help scaffold students' learning and understanding.

Chapter 12

Worked Example 2

(Expand binomial with difference of two variables using Pascal's Triangle)

Expand $(a - b)^6$.

$(a - b)^6$ as $(a + (-b))^6$.

Worked Example 1,

$$(a + b)^6 = a^6 + 6a^5b + 15a^4b^2 + 20a^3b^3 + 15a^2b^4 + 6ab^5 + b^6$$

Using b in the expansion with $-b$, we get

$$(a - b)^6 = a^6 + 6a^5(-b) + 15a^4(-b)^2 + 20a^3(-b)^3 + 15a^2(-b)^4 + 6a(-b)^5 + (-b)^6$$

re,

$$(a - b)^6 = a^6 - 6a^5b + 15a^4b^2 - 20a^3b^3 + 15a^2b^4 - 6ab^5 + b^6$$

Think

- Compare the two expansions of $(a + b)^6$ and $(a - b)^6$. What remains the same? What is different?
- Can you expand $(a - b)^6$ without using the expansion of $(a + b)^6$?

TAKE NOTE

$(-y)^2$ is not $-y^2$.
 It is $(-y) \times (-y) = y^2$.
 $(-y)^3 = (-y) \times (-y) \times (-y) = -y^3$

Student's Book Pause and Try

Consists of questions that mirror questions in the worked examples to help students reinforce learning in class and achieve mastery of important procedural skills.

Try 2

Using the expansion of $(a + b)^7$ in the **Pause and Try 1**, expand $(a - b)^7$.

MCE Cambridge IGCSE & O Level Additional Mathematics Student's Book

Chapter 12

Exercise 12.1

- Expand each of the following.
(a) $(c + 2)^4$ (b) $(1 - h)^6$ (c) $(3 + p)^5$ (d) $(m - \frac{1}{2})^3$
- Find, in descending powers of x , the expansion of each of the following.
(a) $(2x + 3)^5$ (b) $(3x^2 - 1)^4$ (c) $(\frac{x}{4} - 2)^6$ (d) $(3x + \frac{1}{2})^3$
- Find, in ascending powers of y , the expansion of each of the following.
(a) $(3 - y)^5$ (b) $(1 + 2y)^6$ (c) $(2 + \frac{y}{3})^4$ (d) $(1 - y^2)^3$
- The row of coefficients in the expansion of $(a + b)^n$ is 1, a , 55, b , 330, c , 462, d , 165, e , f , 1. Find the values of a, b, c, d, e, f and n . Explain clearly how you obtained each value.
- Expand each of the following.
(a) $(2a + 3b)^4$ (b) $(c - \frac{1}{2})^5$
- Find the first four terms in the expansion of $(2 + 3y)^5$. Hence, deduce the first four terms in the expansion of each of the following.
(a) $(2 - 3y)^5$ (b) $(2 + 3y^2)^5$
- (a) Expand $(2 - p)^6$.
(b) Find, in ascending powers of p , the first three terms in the expansion of $(2 + p)(2 - p)^6$.
(c) Find the coefficient of p^3 in the expansion of $(1 - \frac{2}{p})(2 - p)^6$.
- Find the first four terms of the expansion of $(1 - 3x)^6$ in ascending powers of x .
(a) If the expansion in (a) were to be used to approximate the value of $(0.97)^6$, what would be a suitable value of x to take?
(b) By substituting the value of x obtained in (a) into the expansion in (a), find an approximate value of $(0.97)^6$.

Basic Level

Intermediate Level

Student's Book Exercise
Basic and Intermediate level questions are found in the exercises of the Student's Books.

MCE Cambridge IGCSE & O Level Additional Mathematics Student's Book

Chapter 12

Theorem

11

Review Questions

- After John had expanded $(a + 1)^6$ into a sum of terms, he made three observations. State whether each of his observations is true or false. If his observation is false, provide the correct answer.
(a) There are 6 terms in the sum.
(b) The coefficients of the terms are 1, 6, 15, 15, 6, 1.
(c) $6a$ and $6a^2$ are two terms in the sum.
- Susan made the following two observations about the expansion of $(c - 2)^9$. State whether each of her observations is true or false. If her observation is false, provide the correct answer.
(a) The 2nd term in the expansion is $-9c$.
(b) The 5th term in the expansion is $\binom{9}{5}c^4(-2)^5$.
- The row of coefficients in the expansion of $(a + b)^7$ is 1, 7, 21, 35, 35, 21, 7, 1. Write down the row of coefficients in the expansion of each of the following.
(a) $(a + b)^8$
(b) $(a + b)^9$
- The expansion of $(2 + 3x)^6$ using the Binomial Theorem is shown below. Fill in the boxes and then simplify the terms.
 $(2 + 3x)^6 = 1(2)^6 + \binom{6}{1}(2)^5(3x) + 15(2)^4(3x)^2 + \binom{6}{3}(2)^3(3x)^3 + 15(2)^2(3x)^4 + \binom{6}{5}(2)(3x)^5 + 1(3x)^6$
- (a) Using the formula $\binom{n}{r} = \frac{n!}{r!(n-r)!}$, evaluate each of the following.
(i) $\binom{n}{0}$ (ii) $\binom{n}{n}$
(b) Hence, write down a relationship connecting $\binom{n}{0}$ and $\binom{n}{n}$.
(c) Draw the Pascal's Triangle for $n = 0, 1, 2, 3, 4$ and 5, circle the locations of $\binom{n}{0}$ and $\binom{n}{n}$ as n goes from 0 to 5.

Student's Book Review Questions

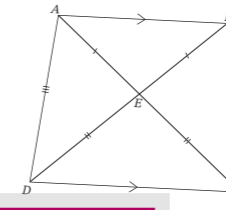
A consolidated list of questions at the end of the chapter to help students combine their understanding of concepts and mastery of procedural skills.

MCE Cambridge IGCSE Core & Extended Mathematics Workbook

Chapter 10

Further Exercise 10.2 Congruency Tests

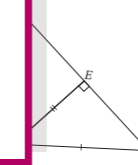
- In the diagram, $ABCD$ is a quadrilateral. The diagonals AC and BD intersect at E . $AE = BE$, $DE = CE$, $AD = BC$ and $AB \parallel DC$. Name two pairs of congruent triangles and state the reason of congruence.



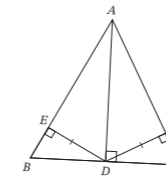
Workbook Further Exercise

Questions that require higher-order thinking skills are found in the further exercises of the Workbook.

- ABC is a triangle. P is the midpoint of BC and $\angle BAC = 84^\circ$. D and E lie on AB and AC respectively such that $\angle BEP = \angle CEP = 90^\circ$ and $PD = PE$. Find $\angle EPC$.



- In the diagram, ABC is a triangle. E and F lie on AB and AC respectively such that DE is perpendicular to AB and DF is perpendicular to AC . AD is a perpendicular bisector to BC . Given that $DE = DF$, explain why the areas of $\triangle BDE$ and $\triangle CDF$ are equal.



Workbook Chapter Opener Revisit

Prompts students to look back and solve the problem in the Chapter.

Chapter 10

Chapter Opener Revisit

Let's take a look at the original questions in the Chapter Opener of the Student Book:
An architect wants to create a blueprint for a square piece of land to build a resort. The resort consists of a hotel building, a theme park, a shopping arcade and a swimming pool. He comes up with two proposals on how to divide the land to build the facilities.
Proposal 1: The land is cut into two identical rectangles and two similar squares, which areas are in the ratio 4 : 1.
Proposal 2: The land is cut into four identical quadrilaterals that are not rectangles or squares.
How would you decide if the proposals are feasible?

MCE Cambridge IGCSE Core & Extended Mathematics Workbook

Learning can be Enhanced when Learners are Given Opportunities to Practise “Slow-Thinking”

For effective learning to take place, the learning of mathematics must go beyond the memorisation of facts and procedures. Instead, a greater emphasis should be placed on developing the learners conceptual understanding and problem-solving skills.

The series adopts the idea of “slow thinking” to provide students with sufficient time and opportunities at important junctures during learning activities to understand the why, and not just the what and how behind the mathematical definitions, formulae, rules, and procedures. Knowing the why empowers students to learn the new maths concepts and skills.

Such an approach enhances the students’ learning experiences as well as deepen their conceptual understanding. This helps keep students motivated and engaged throughout the process of learning and hone their metacognition skills, which is an important 21st century skill that forms one of the key components in the Singapore Mathematics Curriculum Framework.

Here are examples of how students can practise “slow-thinking” in the series.

Chapter 12

Fun with Maths!

You have learnt two methods of expanding $(a + b)^n$ by applying the Pascal’s Triangle, and the Binomial Theorem. You will now learn another interesting method for binomial expansion.

Here are the steps for expanding $(a + b)^n$:

- Step 1: The first 1st term is a^n .
- Step 2: The coefficient of the 2nd term is n and its variable component is $a^{n-1}b$.
- Step 3: For each subsequent term, its coefficient can be found using the formula:

$$\frac{\text{Coefficient of the previous term} \times \text{Power of } a \text{ of the previous term}}{\text{Position of the previous term in the expansion}}$$

Its variable component can be derived from the decreasing powers of a and the increasing powers of b .

- Step 4: The last term is b^n .

To expand $(a + b)^6$, note that there are 7 terms in the expansion of $(a + b)^6$.

Step 1	The 1st term is a^6 .
Step 2	The coefficient of the 2nd term is 6. The variable component is a^5b . So, the 2nd term is $6a^5b$.

Workbook Fun with Maths!

Provides activities that extend students’ creative thinking skills and learning.

MCE Cambridge IGCSE & O Level Additional Mathematics Workbook

Monitoring Their Own Learning

MCE Cambridge IGCSE & O Level Additional Mathematics Student’s Book

Chapter 12

Review

Put a tick if you are able to do the following tasks.

Learning Outcomes	I can do the following:	✓
Use Pascal’s Triangle for expansion of $(a + b)^n$, for positive integer n .	1. Write out the coefficients of the terms in the expansion of $(a + b)^n$, for n up to 10, using Pascal’s Triangle.	<input type="checkbox"/>
	2. Expand $(a + b)^n$ using Pascal’s Triangle.	<input type="checkbox"/>
Use the Binomial Theorem for expansion of $(a + b)^n$, for positive integer n .	1. State $n! = n \times (n - 1) \times (n - 2) \times \dots \times 3 \times 2 \times 1$ for any positive integer n .	<input type="checkbox"/>
	2. State $\binom{n}{r} = \frac{n!}{r!(n-r)!}$, where n is a non-negative integer and r is an integer such that $0 \leq r \leq n$.	<input type="checkbox"/>
	3. Recognise five observations about the expansion of $(a + b)^n$: (i) There are $n + 1$ terms in the expansion. (ii) The power of a starts with n and decreases to 0. The power of b starts with 0 and increases to n . (iii) The coefficient of the 2nd term is always n . (iv) The coefficients of the terms are symmetrical. (v) The sum of the powers of a and b in each term is always n .	<input type="checkbox"/>
4. Apply the following: $(a + b)^n = \binom{n}{0} a^n + \binom{n}{1} a^{n-1}b + \binom{n}{2} a^{n-2}b^2 + \binom{n}{3} a^{n-3}b^3 + \dots + \binom{n}{r} a^{n-r}b^r + \dots + \binom{n}{n-1} ab^{n-1} + \binom{n}{n} b^n$		<input type="checkbox"/>

Student’s Book Review

Provides a checklist that helps students evaluate and monitor their mastery of the mathematical concepts and skills.

MCE Cambridge IGCSE & O Level Additional Mathematics Student’s Book

Chapter 12

Discover

In this activity, you will learn to

- expand $(a + b)^n$ for $n = 3, 4$ and 5.
- make five observations about the expansions.
- use the five observations to write the expansion of $(a + b)^n$.
- use Pascal’s Triangle to expand $(a + b)^n$.

1(a) Expand $(a + b)^3$.

$$\begin{aligned} (a + b)^3 &= (a + b)(a + b)(a + b) \\ &= (a + b)(a^2 + 2ab + b^2) \\ &= a(a^2 + 2ab + b^2) + b(a^2 + 2ab + b^2) \\ &= a^3 + 3a^2b + 3ab^2 + b^3 \end{aligned}$$

(b) Expand $(a + b)^4$.

$$\begin{aligned} (a + b)^4 &= (a + b)(a + b)(a + b)(a + b) \\ &= (a + b)(a^3 + 3a^2b + 3ab^2 + b^3) \\ &= a^4 + 4a^3b + 6a^2b^2 + 4ab^3 + b^4 \end{aligned}$$

THINK How can you expand $(a + b)^4$ using $(a + b)^3$ instead? Which method do you prefer? Why?

(c) Expand $(a + b)^5$. Show clearly how you did it.

Pause and Discover

Students are guided through scaffolded learning tasks in Pause and Discover, where they are given sufficient time to construct new knowledge.

TAKE NOTE

Distributive Law
The expansion of $(a + b)Y$ is $aY + bY$.

If $Y = (a + 1)$, then
 $(a + b)(a + 1)$
 $= a(a + 1) + b(a + 1)$

If $Y = (a + c + 1)$, then
 $(a + b)(a + c + 1)$
 $= a(a + c + 1) + b(a + c + 1)$

Example 3

sum of a variable and an integer using Pascal’s Triangle)

six terms in the expansion of $(a + b)^5$ are 1, 5, 10, 10, 5, 1.

six terms in the expansion, n is 1(a^n).

Pause and Think

At appropriate junctures, guiding questions found in Pause and Think prompt students to think about and focus on key ideas. This develops and hones students’ metacognition.

Pause and Try

Students devote time to formative assessments that are found in Pause and Try so that timely feedback on students’ learning can be provided.

PAUSE Try 3

Expand $(a + 3)^4$.

Hence, $(a + 2)^5 = a^5 + 10a^4 + 40a^3 + 80a^2 + 80a + 32$.

Every Learner can be a Self-Directed Learner through a Personalised Practice Pathway

Different learners bring with them a wide range of knowledge, skills, and experiences. It is important to recognise this diversity and acknowledge that no two learners are alike. To cater to their diverse learning needs, our series aim to make the learning and practicing of mathematics concepts and skills more personalised. Using an AI-driven software*, our series has incorporated a personalised practice pathway to help every student attain Mathematical mastery.

As a student attempts the practice questions, the AI engine monitors the student's progress, providing immediate feedback and depending on whether the student answers correctly or incorrectly, generates questions based on the student's current readiness level.

The software will automatically adjust the level of the question to cater to the progress and performance of the student. Regardless of the student's readiness level, this pathway is AI-driven to allow every student to progress independently through a series of questions of progressive difficulty levels and become self-directed learners.

Personalised Learning Pathway that is AI-driven.

*This resource will not go through the Cambridge International endorsement process.

Every Teacher can Facilitate Effective Learning through the Comprehensive Suite of Resources

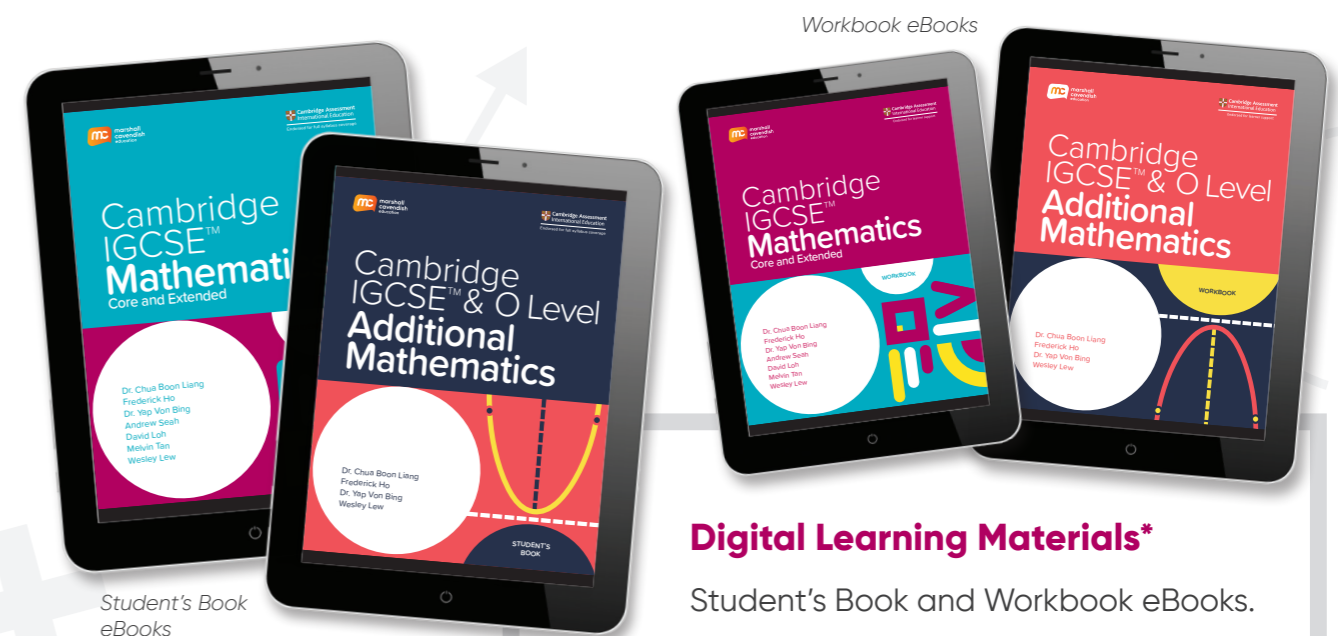
The post-covid world has changed the way lessons can be carried out. Regular lessons are now not limited to being carried out within the confines of a physical classroom in schools, they can also be carried out through home-based learning. In certain cases, hybrid lessons are being carried out with some students attending lessons in person.

Our series provides a comprehensive solution for both teachers and students in the various learning and teaching scenarios. It comes complete with both print and digital Student's Books, Workbooks and Teacher's Guides, for use in the physical and online classrooms.

For Students

The suite of digital learning materials* includes the Student's Book and Workbook eBooks. These eBooks are annotatable so that students can scribble, take notes, or write their answers and save them for viewing later. Within the Student Book eBook, digital resources such as the interactive software (GeoGebra) and the Personalised Learning Pathway are tagged at the point of use.

The Personalised Learning Pathway is AI-driven and caters to the needs of every student. As the AI-driven practice questions come with immediate feedback, this functionality allows every student to progress independently without the need for frequent teacher intervention. Students are then able to become independent self-directed learners without being overly reliant on teacher's help.



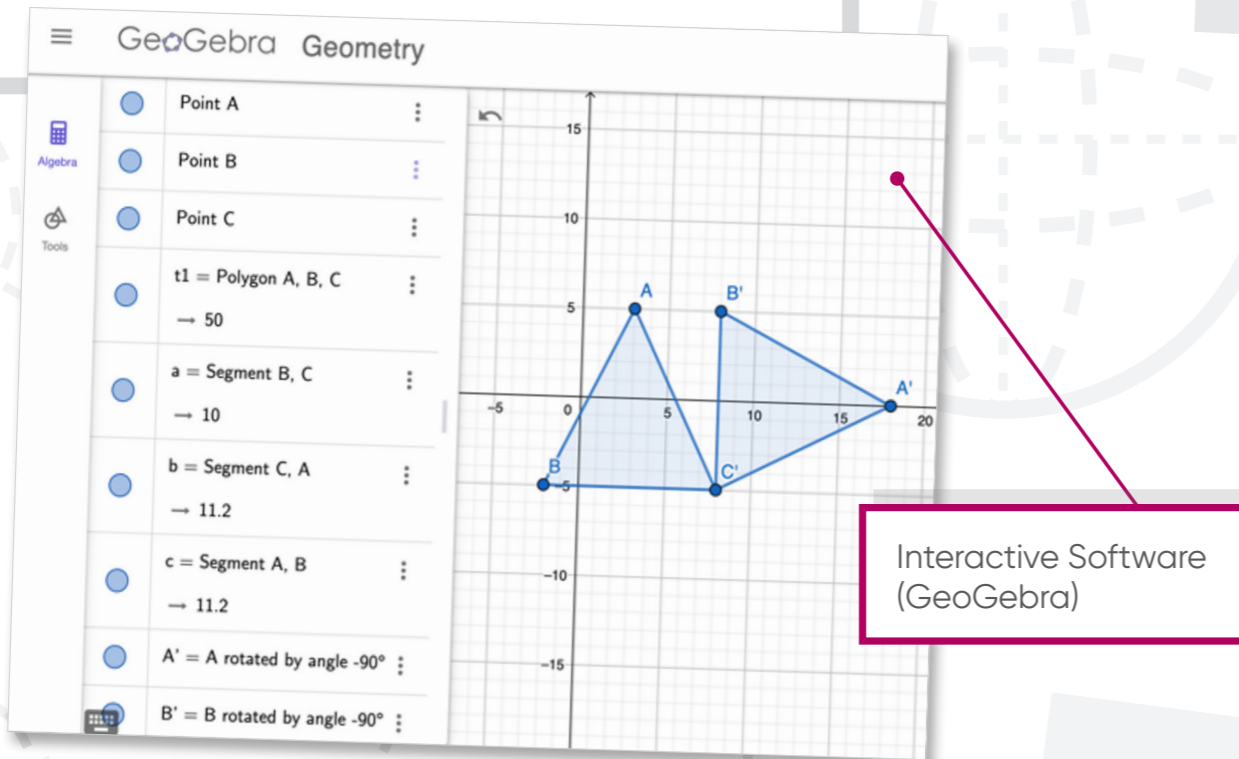
Our digital resources are available on

mc EduHub

*These resources will not go through the Cambridge International endorsement process.

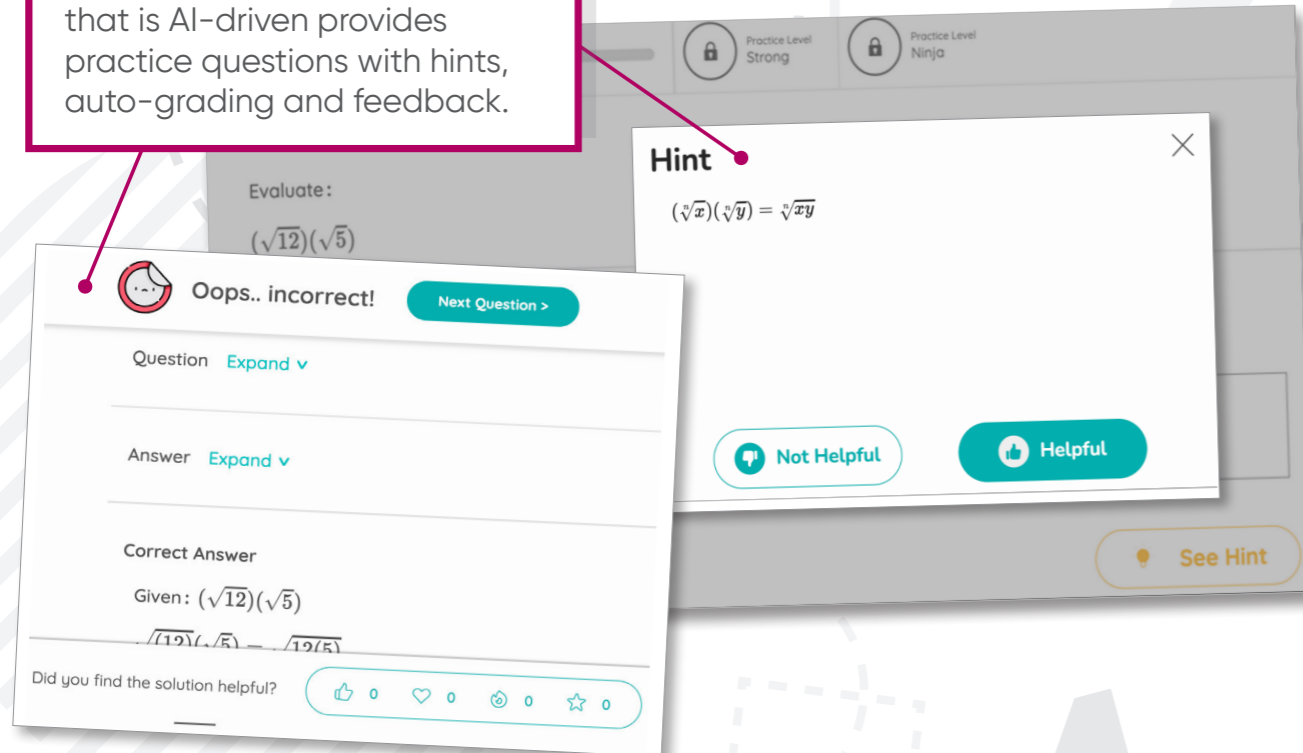
Suite of Digital Learning Resources*

Embedded within the eBooks, tagged at point of use.



Interactive Software (GeoGebra)

Personalised Learning Pathway that is AI-driven provides practice questions with hints, auto-grading and feedback.



For Teachers

Besides the Student's Book and Workbook eBook (Teacher's Edition), the suite of digital teaching resources* also includes the editable SOW, Lesson Plans, Worked Solutions for the Student Book and Workbook as well as the Question Bank.

The digital teaching resources allow for flexibility and customisation depending on the needs of the students. Additionally, teachers have a teacher's account to the Personalised practice pathway to track and monitor students' progress. These resources are aimed to help teachers reduce their time and workload in lesson preparation and are easily accessible via the portal, anytime and anywhere.

Suite of Digital Teaching Resources*

The Teacher's Guide consist of Scheme of Work, Lesson Plans, Worked Solutions and Question Bank.

Teacher's Guide

0580 Chapter X: Congruence and Similarity

Scheme Of Work (SOW)

The SOW here is a very general one, providing teachers with some guidelines and teaching approaches so that teachers can adapt to suit their students' learning profiles.

Section	Key concepts/skills	Suggested length of time	Remarks/Activities
Chapter opener & introduction	- Congruence and similarity exist in real life	5 mins	Silent reading followed by a quick discussion of any simplest way of dividing the land in the 4 equal parts.
X.1: Congruence In Geometry			
X.1.1 Core C4.1 and C4.5)	- Idea of Congruence - Three geometrical transformations that give	About <u>70 mins</u>	- Teacher to print hard copies of appendix before the lesson - Either teacher or students can summarise the key result before

Scheme of Work (SOW)*

Help teachers in lesson preparation by outlining all the learning requirements and the suggested teaching periods or lessons.

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LESSON 1

Warm-up

Chapter Opener (p. X)

Draw students' attention that the topic on sequences and series is closely applicable to our daily life. We can use what we have learnt to analyse interest rate and different types of sport training programme so that we have a better insight on what is the best for us.

Ask: How would you decide which training programme is best? Will the initial distance affect the training plan?

Lesson Plans*

Introduce key mathematical concepts with lesson suggestions and ideas, to help teachers deliver lessons effectively and efficiently.

Recall (p. X)

Ask students to attempt the diagnostic questions on the opening page of the chapter. [Answers at [MCEduHub](#)]

Worked Solutions for Textbook Exercise Questions

**Chapter 1
Quadratic Functions
Worked Solutions for Textbook Exercise Questions**

Exercise 1.1

- 1 (i) $f(x) = 2x^2 + 1$
 $f(3) = 2(3)^2 + 1 = 19$
- (ii) $f(-2) = 2(-2)^2 + 1 = 9$
- (iii) For all real values of x , $x^2 \geq 0$
 $2x^2 \geq 0$
 $2x^2 + 1 \geq 1$
 $f(x) \geq 1$
- 2 (a) $x^2 + 12x = x^2 + 12x + 6^2 - 6^2$
 $= (x + 6)^2 - 36$
- (b) $x^2 - 4x + 1 = x^2 - 4x + 2^2 - 2^2 + 1$
 $= (x - 2)^2 - 4 + 1$
 $= (x - 2)^2 - 3$

Chapter 1 Quadratic Functions

$$= -2\left(x - \frac{5}{4}\right)^2 + \frac{25}{8} + 3$$

$$= -2\left(x - \frac{5}{4}\right)^2 + \frac{49}{8}$$

- 3 (a) $f(x) = (x + 1)^2 - 7$
For all real values of x , $(x + 1)^2 \geq 0$
 $(x + 1)^2 - 7 \geq -7$
The minimum value of $f(x)$ is -7 .
When $f(x)$ is minimum, $x + 1 = 0$
 $x = -1$

- (b) $f(x) = -(x - 1)^2 + 4$
For all real values of x , $(x - 1)^2 \geq 0$
 $-(x - 1)^2 \leq 0$
 $-(x - 1)^2 + 4 \leq 4$
The maximum value of $f(x)$ is 4 .
When $f(x)$ is maximum, $x - 1 = 0$
 $x = 1$

Worked Solutions*

Provide the answers and full worked solutions to the questions found in the Student's Book and the Workbook to assist teachers in the marking of students' assignment and homework

Question Bank

Chapter 17 Applications of Integration

**Chapter 17
Applications of Integration
Question Bank**

Basic

- 1 Evaluate the following definite integrals.
 - (a) $\int_{-1}^1 (2x^3 - 6x + 3) dx$
 - (b) $\int_1^2 (x^2 - 3)^2 dx$
- 2 Evaluate the following definite integrals.
 - (a) $\int_e^{e^2} \frac{1}{x} dx$
 - (b) $\int_e^{5e} \frac{1}{2x - e} dx$
- 3 Evaluate the following definite integrals, giving your answer in 3 significant figures.
 - (a) $\int_0^1 (e^x - 2e^{-x})^2 dx$
 - (b) $\int_{-1}^1 \frac{e^{2x+3} + 2}{e^x} dx$

Question Bank*

Consists of questions with different difficulty levels for teachers to adapt and customise for assessment purposes.

Teacher Dashboard*

To monitor and track student's progress.

Overview Dashboard

Class: Grade 9 Demo

10 students in this class

Who are they	Question list	Progress
Sorted by first name		
Carina Chuah		0%
Chan Mei Shan		0%
Engstudent Zeroone		0%
Engstudent Zeroone		0%
Phooi Qwan Leong		0%

Who are they	Question list	Progress
Sorted by first name		
Gary Liew		0%

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Other Products

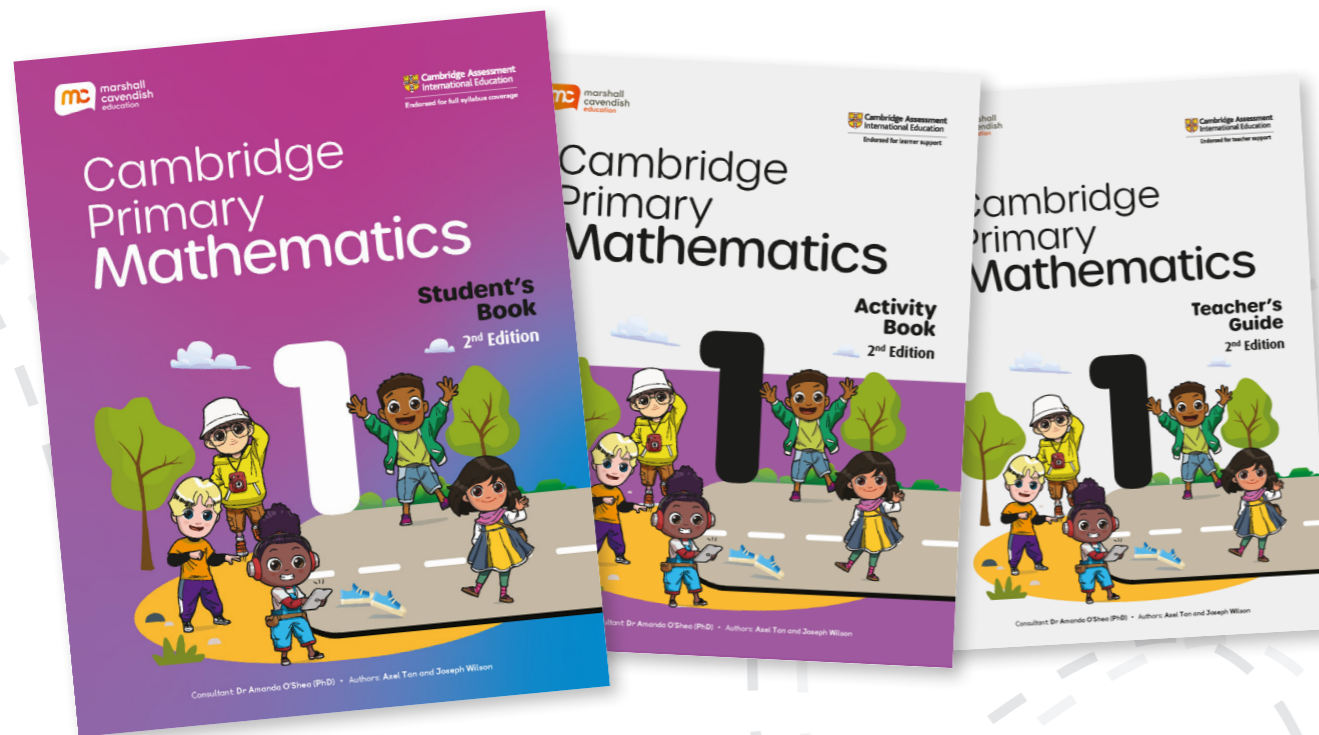
You may also be interested in:



Cambridge Primary Mathematics

Grade 1 - 6 | Age 7 - 12

Scan here to learn more!



The Marshall Cavendish Education (MCE) Cambridge Primary Mathematics (2nd Edition) series is designed to support educators and learners following the Cambridge Primary Mathematics curriculum framework (0096). Our package nurtures active learners, using the Concrete–Pictorial–Abstract (CPA) approach helping them develop conceptual understanding.

The series draws on Singapore's tried and tested methodologies that focus on mastery through sequencing of concepts. Through activities that promote engagement, curiosity, innovation and reflection, learners are encouraged to become more confident and self-directing. Incorporating the new Thinking and Working Mathematically skills, the series develops learners as 21st century mathematical thinkers within a globalised community.

MATHS Ahead

Grade 7 - 9 | Age 13 - 15

Scan here to learn more!



The Marshall Cavendish Education Maths Ahead Series is designed for students from Grades 7 to 9. Focused on building up necessary mathematical knowledge, this series comprises a Student's Book, Workbook, Teacher's Guide, and digital resources for each level.

The Maths Ahead Package espouses the use of comics to enhance students' learning for the development of the 21st century competencies in the Mathematics classroom.



Based on the paper co-written by Dr Toh Tin Lam and other writers, the use of comics in our student book aims to empower learners through the following:

- Capture Interest and impress key mathematical ideas
- Enhance and extend communication of Maths concepts to facilitate understanding
- Minimise apprehension and anxiety by Increasing motivation to learn Mathematics
- Provide a bridge between Maths concepts and real-life context
- Engage and encourage students to participate actively in class discussions and collaboration