

Preface

The learning of Mathematics imparts many skills that contribute to the development of the human mind. It trains the learner to think methodically and rationally, analyse various types of situations, anticipate and plan, make decisions and solve problems. Mathematics also serves as a tool that facilitates the gaining of knowledge related to science and technology. Mathematical skills and knowledge are indeed essential to enhance our standard and quality of living in the modern area.

The Basic Education Core Curriculum aims to inculcate the following five key competencies among students:

1. Communication Skill
2. Thinking Skill
3. Problem – Solving Skill
4. Applying Life Skill
5. Technological Application Skill

The learning areas in the study of mathematics are designed to enable students to acquire mathematical skills and knowledge according to their utmost potential. The learning areas are as follows:

- **Numbers and Operations:** numerical concepts and sense of perception; real number system; properties of real numbers; operation of numbers; ratio; percentage; problem-solving involving numbers; and application of numbers in real life.

- **Measurement:** length; distance; weight; area; volume and capacity; money and time; measuring units; estimation for measurement; trigonometric ratio; problem-solving regarding measurement; and application of measurement in various situations

- **Geometry:** geometric figures and properties of one-dimensional geometric figures; visualization of geometric models; geometric theories; and geometric transformation through translation, reflection and rotation

- **Algebra:** pattern; relationship; function; sets and their operations; reasoning; expression; equation; equation system; inequality; graph; arithmetic order; geometric order; arithmetic series; and geometric series

- **Data Analysis and Probability:** determining an issue; writing questions; determining methods of study; study; data collection, systematization and presentation; central tendency and data distribution; data analysis and interpretation; opinion polling; probability; application of statistical knowledge and probability; application of probability in explaining various situations as well as for facilitating decision-making in real life

- **Mathematical Skills and Processes:** problem-solving through diverse methods; reasoning; communication; communication and presentation of mathematical concepts; linking mathematics with other disciplines; and attaining ability for creative thinking

Strands and Learning Standards

Strand 1: Numbers and Operations

- Standard M1.1: Understanding diverse methods of presenting numbers and their application in real life
- Standard M1.2: Understanding results of operations of numbers, relationships of operations, and application of operations for problem-solving
- Standard M1.3: Use of estimation in calculation and problem-solving
- Standard M1.4: Understanding of numerical system and application of numerical properties

Strand 2: Measurement

- Standard M2.1: Understanding of the basics of measurement; ability to measure and estimate the size of objects to be measured
- Standard M2.2: Solving measurement problems

Strand 3: Geometry

- Standard M3.1: Ability to explain and analyse two-dimensional and three-dimensional geometric figures
- Standard M3.2: Ability for visualisation, spatial reasoning and application of geometric models for problem-solving

Strand 4: Algebra

- Standard M4.1: Understanding and ability to analyse pattern, relation and function
- Standard M4.2: Ability to apply algebraic expressions, equations, inequalities, graphs and other mathematical models to

represent various situations as well as interpretation and application for problem-solving

Strand 5: Data Analysis and Probability

Standard M5.1: Understanding and ability to apply statistical methodology for data analysis

Standard M5.2: Application of statistical methodology and knowledge of probability for valid estimation

Standard M5.3: Application of knowledge of statistics and probability for decision-making and problem-solving

Strand 6: Mathematical Skills and Processes

Standard M6.1: Capacity for problem-solving, reasoning; communication and presentation of mathematical concept; linking various bodies of mathematical knowledge and linking mathematics with other disciplines; and attaining ability for creative thinking

For common understanding and correct interpretation, the curriculum prescribes various codes for learning standards and indicators. One example is shown below:

M 1.1 Gr 9/2	
M	Subject area of Mathematics
1.1	First subject area, Standard 1
Gr9/2	Indicator 2 for Grade 9 (Mathayom 3)

Learners' Quality

- Understand concepts of numbers, ratio, proportion, percentage, real numbers expressed in exponential notation with integer indices, square root and cube root of real numbers; can carry out operations involving integral numbers, fractions, decimals, exponents, square roots and cube roots of real numbers; can apply numerical knowledge in real life.

- Have knowledge and understanding of surface areas of prisms and cylinders, and volume of prisms, cylinders, pyramids, cones and spheres; can appropriately choose units of the various systems of measuring length, area, and volume; and can apply knowledge of measurement in real life.

- Can construct and explain stages of constructing two-dimensional geometric figures with compass and straight edge; can explain characteristics and properties of three-dimensional geometric figures, i.e., prisms, pyramids, cylinders, cones and spheres.

- Understand properties of congruence and similarities of triangles, parallels, Pythagoras' theorems and converse; can apply these properties for reasoning and problem-solving; and understand geometric transformation through translation, reflection and rotation.

- Can visualise and explain characteristics of two-dimensional and three-dimensional geometric figures.

- Can analyse and explain relationships of patterns, situations or problems; and can use single-variable linear equations, two-variable linear equation systems, single-variable linear inequality, and graphs in problem-solving.

- Can determine an issue, write questions about a problem or a situation, determine methods of study and collect and present data by utilizing pie charts or any other forms of presentation.

- Understand concepts of the measures of central tendency, arithmetic mean, median, and mode of non-frequency distribution data that can be chosen appropriately for application, as well as apply knowledge in considering statistical data and information.

- Understand the concepts of random sampling and probability; can apply knowledge of probability for projecting and for decision-making in various situations.

- Can apply diverse methods for problem-solving; avail mathematical and technological knowledge, skills and processes appropriately to solve problems faced in various situations; can suitably provide reasoning for decision-making and appropriately present the conclusion reached; can use mathematical language and symbols for communication; can communicate and present mathematical concepts accurately and clearly; can link various bodies of mathematical knowledge; can link mathematical knowledge, principles and processes with other disciplines; and have attained ability for creative thinking.

Yearly Teaching Plan

Mathematics

Grade 9 (Mathayom 3)

8 chapters

120 hours

Learning area	Duration (hours)
1. Surface Area <ul style="list-style-type: none">• Prisms, pyramids, cylinders, cones and spheres• Surface area	9
2. Volume <ul style="list-style-type: none">• Volumes of cuboids• Volumes of right circular cylinders and right prisms• Volumes of right pyramids and right circular cones• Volumes of spheres• Volumes of composite solids	24
3. Similar Triangles <ul style="list-style-type: none">• Similar triangles	6
4. Linear Equations <ul style="list-style-type: none">• Linear equations in two variables• Simultaneous linear equations in two variables	10
5. Linear Inequalities <ul style="list-style-type: none">• Inequality• Linear inequalities in one unknown• Performing computation on inequalities• Solving inequalities in one variable• Simultaneous linear inequalities in one variable	21
6. Graphs of Functions <ul style="list-style-type: none">• Function• Graphs of function	11

7. Statistics <ul style="list-style-type: none"> • Statistics and data • Frequency • Pictograms, bar charts and line graphs • Mode, median and mean 	26
8. Probability <ul style="list-style-type: none"> • Events and outcomes • Probability • Outcomes from independent events 	13

Note: The hours needed for each subtopic can be changed when necessary. The above allocated hours are just a suggestion. Total hours for this subject is as prescribed in the basic learning time structure, while the learners must attain the standard as prescribed in the learning standards and indicators.

Chapter 1 Surface Area

Indicators and learning areas (9 hours)

Indicator	Learning Area
M3.3.Gr9/1 Explain characteristics and properties of prisms, pyramids, cylinders, cones and spheres	<ul style="list-style-type: none">• Prisms, pyramids, cylinders, cones and spheres
M2.1 Gr9/1 Find the surface area of prisms and cylinders M2.1 Gr9/4 Appropriately use estimation for measurement in various situations. M2.2 Gr9/1 Apply knowledge of area, surface area, length and volume for problem-solving in various situations	<ul style="list-style-type: none">• Surface area

Learning Objectives

Students will be taught to:

1. Understand the characteristics and properties of prisms, pyramids, cylinders, cones and spheres.
2. Find the areas of prisms, pyramids, cylinder and cones.
3. Use estimation to calculate areas.

Learning Outcomes

Students will be able to:

1. Know and understand the characteristics and properties of prisms, pyramids, cylinders, cones and spheres.
2. Know the terms to describe geometrical solids.
3. Understand the formulae for various areas of prisms, pyramids, cylinders and cones.
4. Solve problems involving surface areas.

Learning Areas

- Prisms, pyramids, cylinders, cones and spheres
- Surface area

Teaching and Learning Activities

1st – 2nd hours (Geometric properties of prisms, pyramids, cylinders, cones and spheres)

1. Ask a few volunteers to draw a prism, pyramid, cylinder, cone and sphere. Ask them to describe the properties of those figures.
2. Go through the properties of prisms, pyramids, cylinders, cones and spheres with the students.
3. Test their understanding by asking them to try Test Yourself 1.1.

3rd – 8th hours (Surface areas)

1. Show students the formulae for surface areas of prisms, pyramids, cylinders and cones. Explain to them the formula for each part of the surface of the figures.
2. Use Examples 1 and 2 to guide students to find the areas of prisms, pyramids, cylinders and cones.
3. Have four students try Question 1 in Test Yourself 1.2.

4. Have students do Question 1 on page 2 of the workbook as their homework.
5. Show students the formula for the surface area of a sphere. Use Example 3.
6. Have a volunteer work on Question 2 in Test Yourself 1.2.
7. Have students do Question 2 on page 3 of the workbook as their homework.
8. Using Examples 4 to 7, guide students to find the length of side, height, slant height, radius and diameter of figures when the surface areas are given.
9. Have three students try Questions 3 to 5 in Test Yourself 1.2.
10. Have students do Question 3 on page 4 of the workbook as their homework.
11. Guide students to solve Example 8 and also Questions 6 to 8 in Test Yourself 1.2.
12. Have students do Question 4 on page 5 of the workbook as their homework.

9th hour (Conclusion)

1. Explain the mistakes shown in the Common Mistake column on page 9.
2. Ensure students understand the terms used in this chapter by referring to the Mathematical Terms column.
3. Revise the lesson using the Quick Revision column on page 10.
4. Randomly select 5 objective questions and 5 subjective questions from the Mastery Practice in the Textbook and have students solve them in the class. Have students to work on the rest of the questions at home.
5. Ask students to do the Enrichment Exercises in the Workbook to test their understanding of this chapter as their homework.

Emphasized Characteristics:

1. Thinking skill
2. Problem-solving skill
3. Analysing skill

Learning Materials:

- Focus Smart Textbook Mathematics M3
- Focus Smart Workbook Mathematics M3



Learning Outcome Form

Name-Surname:

No.

Mathayom:

Date:

Chapter 1 Surface Area

Explanation: Summary of learning outcomes

Contents that you need for teacher to explain further:
.....
.....
.....
.....
.....

Feeling after learning this chapter:
.....
.....
.....
.....

Knowledge gained from this chapter:
.....
.....
.....
.....
.....

Chapter 1
Surface Area

Contents that you like the most in this chapter (give your reason):
.....
.....
.....
.....
.....

Application of knowledge from this chapter on your daily life:
.....
.....
.....
.....
.....

Exercises that you like and want to be selected as the outstanding work:
.....
.....
.....
.....

Chapter 2 Volume

Indicators and learning areas (24 hours)

Indicator	Learning Area
M2.1 Gr9/2 Find the volume of prisms, cylinders, pyramids, cones and spheres.	<ul style="list-style-type: none">• Volumes of cuboids
M2.2 Gr9/3 Compare units for measuring volume or capacity of the same or different systems and choose appropriate units of measure.	<ul style="list-style-type: none">• Volumes of right circular cylinders and right prisms
M2.2 Gr9/4 Appropriately use estimation for measurement in various situations.	<ul style="list-style-type: none">• Volumes of right pyramids and right circular cones
M2.2 Gr9/1 Apply knowledge of area, surface area, length and volume for problem-solving in various situations.	<ul style="list-style-type: none">• Volumes of spheres• Volumes of composite solids

Learning Objectives

Students will be taught to:

1. Understand the units of volumes.
2. Calculate volumes of cuboids, right circular cylinder, right prisms, right pyramids, right circular cones, spheres and composite solids.
3. Solve problems involving cuboids, right circular cylinder, right prisms, right pyramids, right circular cones, spheres and composite solids.
4. Convert volume in one metric unit to another.

Learning Outcomes

Students will be able to:

1. Understand the meaning of volumes and its units.
2. Know the formulae for the volumes of cuboids, right circular cylinder, right prisms, right pyramids, right circular cones and spheres.
3. Calculate the volumes of cuboids, right circular cylinder, right prisms, right pyramids, right circular cones, spheres and composite solids.
4. Solve problems involving the volumes of cuboids, right circular cylinder, right prisms, right pyramids, right circular cones, spheres and composite solids.
5. Convert volume in one metric unit to another.
6. Use estimation to measure volumes.

Learning Areas

1. Volumes of cuboids
2. Volumes of right circular cylinders and right prisms
3. Volumes of right pyramids and right circular cones
4. Volumes of spheres
5. Volumes of composite solids

Teaching and Learning Activities

1st – 4th hours (Volumes of cuboids)

1. Remind students of the metric units used in measuring volumes. Also introduce to students the units used in the British system.
2. Have a student to explain what volume is.
3. Test students' understanding by asking them to try Question 1 in Test Yourself 2.1.
4. Remind students of the formula for the volume of a cuboid by using Example 1.

5. Have students try Questions 2 to 4 in Test Yourself 2.1.
6. Using Examples 2 and 3, guide students to solve problems involving the volume of cuboids.
7. Ask them to try Questions 5 to 7 in Test Yourself 2.1.
8. Have students do the questions of this subunit in the workbook as homework.

5th – 9th hours (Volumes of right circular cylinders and right prisms)

1. Explain how we derive the formula for the volume of a right circular cylinder.
2. Use Example 5 to further explain the formula and have two volunteers to try Question 1 in Test Yourself 2.2.
3. Guide students to find the height of a right circular cylinder using Example 6.
4. Have two students try Question 2 in Test Yourself 2.2. Discuss the answers with them.
5. Using Example 7, show students how to find the base radius of a right circular cylinder.
6. Random get two students to try Question 3 in Test Yourself 2.2. Discuss the answers with them.
7. Have students work on the Questions 1 to 4 on pages 12 to 15 of the Workbook as their homework.
8. Show students how the formula for the volume of a right prism is derived.
9. Use example 8 to guide them to find the volume of right prisms.
10. Have two students try Question 4 in Test Yourself 2.2. Discuss the answers with them.
11. Using Examples 9 and 10, explain to students how to find the height and the area of base of a right prism when its volume is given.

12. Ask four students to try Questions 5 and 6 in Test Yourself 2.2.
13. Have students work on Questions 5 to 8 on pages 16 to 18 of the Workbook as their homework.
14. Explain to students how to convert volume in one metric unit to the other.
15. Use Examples 11 and 12 to further explain the conversion. Have six students try Question 7 in Test Yourself 2.2.
16. Have students work on Question 8 on pages 18 to 19 of the Workbook as their homework.
17. Using Example 13, guide students to find the volume of liquid in a container.
18. Have two volunteers try Question 8 in Test Yourself 2.2. Discuss the answers with them.
19. Guide students to solve problems involving volume of right circular cylinders and right prisms in Examples 14 and 15.
20. Get three volunteers to try Questions 9 to 11 in Test Yourself 2.2. Discuss the answers with them.
21. Have students work on Questions 9 to 11 on pages 18 to 22 of the Workbook as their homework.

10th – 14th hours (Volumes of pyramids and right circular cones)

1. Explain the formula of volume for a right pyramid and guide them to find volumes of right pyramids in Example 16.
2. Have four volunteers try Question 1 in Test Yourself 2.3.
3. Have students work on Questions 1 and 2 on page 23 of the Workbook as their homework.
4. Guide students to find the height of a right pyramid using Example 17.
5. Randomly get four students to try Questions 2 in Test Yourself 2.3. Discuss the answers with them.

6. Guide students to find the area of base of a right pyramid using Example 18.
7. Test their understanding by asking them to try Question 3 in Test Yourself 2.3.
8. Have students work on Questions 3 and 4 on pages 24 and 25 of the Workbook as their homework.
9. Explain the formula of volume for a right circular cone. Use Example 19 for further explanation.
10. Have two volunteers try Question 4 in Test Yourself 2.3. Discuss the answers with them.
11. Guide students to find the height and the base radius of a right circular cone using Examples 20 and 21.
12. Test their understanding by asking them to try Questions 5 and 6 in Test Yourself 2.3.
13. Have students work on the Questions 5 to 7 on pages 26 to 28 of the Workbook as their homework.
14. Show students how to solve problems involving volume of right pyramids and right circular cones using Example 22.
15. Have students try Questions 7 to 9 in Test Yourself 2.3. Discuss the answers with them.
16. Have students work on the Question 8 on pages 28 to 30 of the Workbook as their homework.

15th – 19th hours (Volumes of spheres)

1. Explain the formula of volume for spheres. Use Example 23 for further explanation.
2. Have four students try Question 1 in Test Yourself 2.4. Discuss the answers with them.
3. Guide students to find the radius of spheres by using Example 24.

4. Have four students try Question 2 in Test Yourself 2.4.
5. Have students work on Questions 1 and 2 on pages 30 and 31 of the Workbook as their homework.
6. Guide students to solve problems involving volume of spheres using Examples 25 and 26.
7. Ask students to try Questions 3 to 5 in Test Yourself 2.4 to test their understanding.
8. Have students work on Question 1 on pages 31 to 33 of the Workbook as their homework.

20th – 23rd (Volumes of composite solids)

1. Explain to students what composite solids are. Guide students to identify the types of solids that make up the composite solid. Use Example 27 for further explanation.
2. Test their understanding by asking to try Question 1 in Test Yourself 2.5. Discuss the answers with them.
3. Guide students to solve problems involving volume of solid composite solids using Example 28.
4. Have three volunteers try Questions 2 to 4 in Test Yourself 2.5. Discuss the answers with them.
5. Have students work on Questions 1 and 2 on pages 33 to 35 of the Workbook as their homework.

24th hour (Conclusion)

1. Explain the mistakes shown in the Common Mistake column on page 43.
2. Ensure students understand the terms used in this chapter by referring to the Mathematical Terms column.
3. Revise the lesson using the Quick Revision column on page 44.

4. Randomly select 5 objective questions and 5 subjective questions from the Mastery Practice in the Textbook and have students solve them in the class. Have students to work on the rest of the questions at home.
5. Ask students to do the Enrichment Exercises in the Workbook to test their understanding of this chapter as their homework.

Emphasized Characteristics

1. Thinking skill
2. Problem-solving skill
3. Analysing skill

Learning Materials

- Focus Smart Textbook Mathematics M3
- Focus Smart Workbook Mathematics M3



Learning Outcome Form

Name-Surname:

No.

Mathayom:

Date:

Chapter 2 Volume

Explanation: Summary of learning outcomes

Chapter 2 Volume

Contents that you need for teacher to explain further:
.....
.....
.....
.....
.....

Feeling after learning this chapter:
.....
.....
.....
.....

Knowledge gained from this chapter:
.....
.....
.....
.....
.....

Contents that you like the most in this chapter (give your reason):
.....
.....
.....
.....
.....

Exercises that you like and want to be selected as the outstanding work:
.....
.....
.....
.....

Application of knowledge from this chapter on your daily life:
.....
.....
.....
.....
.....
.....

Chapter 3 Similar Triangles

Indicators and learning areas (6 hours)

Indicators	Learning Areas
M3.2 Gr9/1 Use properties of similar triangles for reasoning and problem-solving.	<ul style="list-style-type: none">Similar triangles

Learning Objectives

Students will be taught to:

1. Understand similar triangles.
2. Solve problems involving similar triangles.

Learning Outcomes

Students will be able to:

1. Know the properties of similar triangles.
2. Determine if a pair of triangles is similar triangles.
3. Solve problems involving similar triangles.

Learning Areas

- Similar triangles

Teaching and Learning Activities

1st – 5th hours (Similar triangles)

1. Explain what similar triangles are and how to determine them by using Example 1.
2. Test students' understanding by asking them to try Question 1 in Test Yourself 3.1.

3. Guide students to find lengths of similar triangles using Examples 2 and 3.
4. Ask students to try Questions 2 to 4 in Test Yourself 3.1. Discuss the answers with them.
5. Have students work on Questions 1 and 2 on pages 38 to 40 of the Workbook as their homework.

6th hour (Conclusion)

1. Explain the mistakes shown in the Common Mistake column on page 56.
2. Ensure students understand the terms used in this chapter by referring to the Mathematical Terms column.
3. Revise the lesson using the Quick Revision column on page 57.
4. Have students work on the questions in the Mastery Practice in the Textbook.
5. Ask students to do the Enrichment Exercises in the Workbook to test their understanding of this chapter as their homework.

Emphasized Characteristics

1. Thinking skill
2. Problem-solving skill
3. Analysing skill

Learning Materials

- Focus Smart Textbook Mathematics M3
- Focus Smart Workbook Mathematics M3



Learning Outcome Form

Name-Surname:

No.....

Mathayom:

Date:

Chapter 3 Similar Triangles

Explanation: Summary of learning outcomes

Contents that you need for teacher to explain further:

.....

.....

.....

.....

.....

Feeling after learning this chapter:

.....

.....

.....

.....

Knowledge gained from this chapter:

.....

.....

.....

.....

.....

Chapter 3
Similar Triangles

Application of knowledge from this chapter on your daily life:

.....

.....

.....

.....

.....

.....

Exercises that you like and want to be selected as the outstanding work:

.....

.....

.....

.....

Contents that you like the most in this chapter (give your reason):

.....

.....

.....

.....

.....

Chapter 4 Linear Equations

Indicators and learning areas (10 hours)

Indicators	Learning Areas
M4.2 Gr9/5 Solve systems of linear equations with two variables which can be applied for problem-solving, as well as be aware of the validity of the answer.	<ul style="list-style-type: none">• Linear equations in two variables• Simultaneous linear equations in two variables

Learning objectives

Students will be taught to:

1. Understand the meaning of linear equations in two variables.
2. Determine the possible solutions for linear equations in two variables.
3. Understand simultaneous linear equations in two variables.
4. Solve problems involving two simultaneous equations in two variables.

Learning Outcomes

Students will be able to:

1. Understand the meaning of linear equations in two variables.
2. Write linear equations in two variables from given information
3. Determine the value of a variable given the other variable.
4. Determine the possible solutions for a linear equation in two variables.
5. Understand what simultaneous linear equations in two variables are.
6. Solve two simultaneous linear equations in two variables.
7. Solve problems involving simultaneous linear equations in two variables.

Learning Areas

- Linear equations in two variables
- Simultaneous linear equations in two variables

Teaching and Learning Activities

1st – 3rd (Linear equations in two variables)

1. Explain what a linear equation in two variables is. Use Example 1 for further explanation.
2. Test their understanding by asking them to try Question 1 in Test Yourself 4.1.
3. Guide them to write equations in two variables from given information using Examples 2 and 3.
4. Randomly pick a few students to try Question 2 to 4 in Test Yourself 4.1.
5. Have students work on Questions 1 and 2 in the Workbook on pages 43 to 44 as their homework.
6. Guide students to determine the value of a variable when given the other variable using Example 4.
7. Have students try Questions 5 and 6 in Test Yourself 4.1.
8. Using Example 5, show students how to determine the possible solutions for a linear equation in two variables.
9. Randomly select a few students to try Questions 7 and 8 in Test Yourself 4.1. Discuss the answers with them.
10. Have students work on Questions 3 and 4 on pages 44 and 45 of the Workbook as their homework.

4th – 9th (Simultaneous linear equations in two variables)

1. Explain what simultaneous linear equations in two variables are using Example 6.
2. Have six students try Question 1 in Test Yourself 4.2. Discuss the answers with them.
3. Guide students to solve two simultaneous linear equations in two variables using substitution and elimination methods. Use Examples 7 to 9 for further explanation.
4. Have students try Questions 2 to 4 in Test Yourself 4.3. Discuss the answers with them.
5. Guide students to solve problems involving two simultaneous equations in two variables, using Example 10.
6. Test their understanding by asking them to try Questions 5 to 9 in Test Yourself 4.2. Discuss the answers with them.
7. Have students to work on Questions 1 to 5 on pages 46 to 50 of the Workbook as their homework.

10th hour (Conclusion)

1. Explain the mistakes shown in the Common Mistake column on page 73.
2. Ensure students understand the terms used in this chapter by referring to the Mathematical Terms column.
3. Revise the lesson using the Quick Revision column on page 74.
4. Randomly select 5 objective questions and 5 subjective questions from the Mastery Practice in the Textbook and have students solve them in the class. Have students work on the rest of the questions at home.
5. Ask students to do the Enrichment Exercises in the Workbook to test their understanding of this chapter as their homework.

Emphasized Characteristics

1. Thinking skill
2. Problem-solving skill

Learning Materials

- Focus Smart Textbook Mathematics M3
- Focus Smart Workbook Mathematics M3



Learning Outcome Form

Name-Surname:

No.

Mathayom:

Date:

Chapter 4 Linear Equations

Explanation: Summary of learning outcomes

**Chapter 4
Linear Equations**

Contents that you need for teacher to explain further:
.....
.....
.....
.....
.....

Feeling after learning this chapter:
.....
.....
.....
.....

Knowledge gained from this chapter:
.....
.....
.....
.....
.....

Contents that you like the most in this chapter (give your reason):
.....
.....
.....
.....
.....

Exercises that you like and want to be selected as the outstanding work:
.....
.....
.....
.....

Application of knowledge from this chapter on your daily life:
.....
.....
.....
.....
.....

Chapter 5 Linear Inequalities

Indicators and learning areas (21 hours)

Indicators	Learning Areas
M4.2 Gr9/1 Apply knowledge of linear inequalities with one variable for problem-solving, as well as be aware of the validity of the answer.	<ul style="list-style-type: none">• Inequality• Linear inequality in one unknown• Performing computation on inequalities• Solving inequalities in one variable• Simultaneous linear inequalities in one variable

Learning Objectives

Students will be taught to:

1. Understand what inequalities are.
2. Understand what linear inequalities in one unknown are.
3. Perform computation on inequalities.
4. Solve inequalities in one variable.
5. Understand the common values represented by two simultaneous linear inequalities on a line.
6. Solve two simultaneous linear inequalities.

Learning Outcomes

Students will be able to:

1. Identify the relationship ‘greater than’, ‘greater than or equal to’, ‘less than’ and ‘less than or equal to’.
2. Determine if a given relationship is a linear inequality in one unknown.
3. Determine the possible solutions for a given linear inequality in one unknown.
4. Represent a linear inequality on a number line and vice versa.
5. Construct linear inequalities.
6. Perform computation on inequalities.
7. Construct inequalities from given information.
8. Solve a linear inequality in one variable by adding or subtracting a number.
9. Solve a linear inequality in one variable by multiplying or dividing a number.
10. Solve linear inequalities in one variable using a combination of operations.
11. Represent the common values of two simultaneous linear inequalities on a number line.
12. Determine the equivalent inequalities for two given linear inequalities.
13. Solve two simultaneous linear inequalities.

Learning Areas

- Inequalities
- Linear inequalities in one unknown
- Performing computation on inequalities
- Solving inequalities in one variable
- Simultaneous linear inequalities in one variable

Teaching and Learning Activities

1st – 3rd hours (Inequality)

1. Remind students of the relation ‘greater than’ and ‘less than’. Use Examples 1 and 2 for further explanation.
2. Test their understanding by asking them to try Questions 1 and 2 in Test Yourself 5.1.
3. Remind students of the relation ‘greater than or equal to’ and ‘less than or equal to’. Use Example 3 for further explanation.
4. Test their understanding by asking them to try Question 3 in Test Yourself 5.1.
5. Have students work on Questions 1 to 3 on pages 54 and 55 of the Workbook as their homework.

4th – 8th hours (Linear inequalities in one unknown)

1. Explain what a linear inequality in one unknown is. Use Example 4 for further explanation.
2. Ask them to try Question 1 in Test Yourself 5.2.
3. Guide students to determine the possible solutions for a given linear inequality in one unknown using Example 5.
4. Have four volunteers try Question 2 in Test Yourself 5.2.
5. Have students work on Questions 1 and 2 on pages 55 and 56 in the Workbook as their homework.
6. Guide students to represent a linear inequality on a number line and vice versa using Examples 6 and 7.
7. Have eight students to try Questions 3 and 4 in Test Yourself 5.2. Discuss the answers with them.
8. Using Example 8, show students how to construct linear inequalities.
9. Have four volunteers try Questions 5 in Test Yourself 5.2.
10. Have students to work on Questions 3 to 5 on pages 56 and 57 of the Workbook as their homework.

9th – 11th hours (Performing computation on inequality)

1. Guide students to add and subtract a number from both sides of an inequality using Example 9.
2. Have students try Questions 1 and 2 in Test Yourself 5.3.
3. Guide students to multiply and divide both sides of an inequality by a number, using Example 10.
4. Have students try Questions 3 and 4 in Test Yourself 5.3.
5. Using Examples 11 and 12, show students how to construct inequalities from given information.
6. Have three volunteers try Questions 5 to 8 in Test Yourself 5.3. Discuss the answers with them.
7. Have students work on Questions 1 to 5 on pages 57 to 60 of the Workbook as their homework.

12th – 16th hours (Solving inequalities in one variable)

1. Guide students to solve linear inequalities in one variable by adding or subtracting a number. Use Example 13 for further explanation.
2. Test their understanding by asking them to try Questions 1 and 2 in Test Yourself 5.4.
3. Using Examples 14 and 15, show students how to solve linear inequalities in one variable by multiplying or dividing a number.
4. Have a few volunteers try Questions 3 and 4 in Test Yourself 5.4.
5. Guide students to solve linear inequalities in one variable using a combination of operations. Use Examples 16 and 17 for further explanation.
6. Get a few students to try Questions 5 and 6 in Test Yourself 5.4.
7. Have students work on Questions 1 to 3 on pages 60 to 62 of the Workbook as their homework.

17th – 20th hours (Simultaneous linear inequalities in one variable)

1. Guide students to represent the common values of two simultaneous linear inequalities on a number line. Use Example 18 for further explanation.
2. Have six students try Question 1 in Test Yourself 5.5.
3. Have students work on Question 1 on pages 62 and 63 of the Workbook as their homework.
4. Using Examples 19 and 20, guide students to determine the equivalent inequalities for two given linear inequalities.
5. Test their understanding by asking them to try Questions 2 in Test Yourself 5.5.
6. Guide students to solve two simultaneous linear inequalities. Use Examples 21 and 22 for further explanation.
7. Ask students to try Questions 3 and 4 in Test Yourself 5.5.
8. Have students work on Questions 2 and 3 on pages 63 and 64 of the Workbook as their homework.

21st hour (Conclusion)

1. Explain the mistakes shown in the Common Mistake column on page 100.
2. Ensure students understand the terms used in this chapter by referring to the Mathematical Terms column.
3. Revise the lesson using the Quick Revision column on page 101.
4. Randomly select 5 objective questions and 5 subjective questions from the Mastery Practice in the Textbook and have students solve them in the class. Have students work on the rest of the questions at home.
5. Ask students to do the Enrichment Exercises in the Workbook to test their understanding of this chapter as their homework.

Emphasized Characteristics

1. Thinking skill
2. Problem-solving skill
3. Analysing skill

Learning Materials

- Focus Smart Textbook Mathematics M3
- Focus Smart Workbook Mathematics M3



Learning Outcome Form

Name-Surname:

No.

Mathayom:

Date:

Chapter 5 Linear Inequalities

Explanation: Summary of learning outcomes

**Chapter 5
Linear
Inequalities**

Contents that you need for teacher to explain further:
.....
.....
.....
.....
.....

Feeling after learning this chapter:
.....
.....
.....
.....

Knowledge gained from this chapter:
.....
.....
.....
.....
.....

Contents that you like the most in this chapter (give your reason):
.....
.....
.....
.....
.....

Exercises that you like and want to be selected as the outstanding work:
.....
.....
.....
.....

Application of knowledge from this chapter on your daily life:
.....
.....
.....
.....
.....

Chapter 6 Graphs of Functions

Indicators and learning areas (11 hours)

Indicators	Learning Areas
M4.2 Gr9/2 Write a graph showing link of two sets of quantities with linear relationship.	<ul style="list-style-type: none">• Function• Graphs of functions
M4.2 Gr9/3 Draw graphs of linear equations with two variables.	
M4.2 Gr9/4 Read and interpret meaning of systems of linear equations with two variables and other graphs.	
M4.2 Gr9/5 Solve systems of linear equations with two variables which can be applied for problem-solving, as well as be aware of the validity of the answer.	

Learning Objectives

Students will be taught to:

1. Understand the relationship between two variables.
2. Understand draw graphs of functions.
3. Solve problems involving graphs of functions.

Learning Outcomes

Students will be able to:

1. Understand the relationship between the two variables.
2. Understand the meaning of dependent variables and independent variables.
3. Calculate the value of the dependent variable when given the value of the independent variable.
4. Construct tables of values.
5. Draw graphs of functions using given scales.
6. Determine from graphs the values of variables.
7. Solve problems involving graphs of functions.

Learning Areas

- Function
- Graphs of functions

Teaching and Learning Activities

1st – 3rd hours (Function)

1. Guide students to identify the variables in situations that show a relationship. Use Example 1 for further explanation.
2. Have three volunteers try Questions 1 to 3 in Test Yourself 6.1.
3. Have students work on the Question 1 on page 67 of the Workbook as their homework.
4. Explain to students what dependent variables and independent variables are. Use Example 2.
5. Test their understanding by asking to try Question 2 in Test Yourself 6.1. Discuss the answers with them.
6. Show students how to calculate the value of the dependent variable when the value of the independent variable is given. Use Example 3 for further explanation.
7. Randomly pick four students to try Question 3 in Test Yourself 6.1.
8. Have students work on Questions 2 and 3 on pages 67 to 69 of the Workbook as their homework.

4th – 10th (Graphs of functions)

1. Guide students on how to construct tables of values of a function. Use Example 4 for further explanation.
2. Have three students try Question 1 in Test Yourself 6.2.
3. Explain what graphs of function are.
4. Use Examples 5 to 7 to explain the steps to draw graphs of function.
5. Randomly pick three students to try Question 2 in Test Yourself 6.2. Discuss the answer with them.

6. Guide students on how to determine values of variables from graphs of function. Use Examples 8 to 11.
7. Have students try Questions 3 and 4 in Test Yourself 6.2. Discuss the answers with them.
8. Show students how to solve problems involving graphs of functions, using Example 12.
9. Test their understanding by asking them to try Questions 5 and 6 in Test Yourself 6.2.
10. Have students work on Questions 1 to 4 on pages 69 to 74 of the Workbook as their homework.

11th hour (Conclusion)

1. Explain the mistakes shown in the Common Mistake column on page 117.
2. Ensure students understand the terms used in this chapter by referring to the Mathematical Terms column.
3. Revise the lesson using the Quick Revision column on page 118.
4. Randomly select 5 objective questions and 5 subjective questions from the Mastery Practice in the Textbook and have students solve them in the class. Have students to work on the rest of the questions at home.
5. Ask students to do the Enrichment Exercises in the Workbook to test their understanding of this chapter as their homework.

Emphasized Characteristics

1. Thinking skill
2. Problem-solving skill
3. Analysing skill

Learning Materials

- Focus Smart Textbook Mathematics M3
- Focus Smart Workbook Mathematics M3
- Grid paper



Learning Outcome Form

Name-Surname:

No.

Mathayom:

Date:

Chapter 6 Graphs of Functions

Explanation: Summary of learning outcomes

**Chapter 6
Graphs of
Functions**

Contents that you need for teacher to explain further:
.....
.....
.....
.....
.....

Feeling after learning this chapter:
.....
.....
.....
.....

Knowledge gained from this chapter:
.....
.....
.....
.....
.....

Application of knowledge from this chapter on your daily life:
.....
.....
.....
.....
.....

Exercises that you like and want to be selected as the outstanding work:
.....
.....
.....
.....

Contents that you like the most in this chapter (give your reason):
.....
.....
.....
.....
.....

Chapter 7 Statistics

Indicators and learning areas (26 hours)

Indicators	Learning Areas
M5.1 Gr9/1 Determine an issue and write questions about various problems or situations, as well as set appropriate methods for study and for data collection. M5.1 Gr9/3 Present data in appropriate forms.	<ul style="list-style-type: none">• Statistics and data
M5.1 Gr9/4 Read, interpret and analyse the data obtained from presentations. M5.3 Gr9/1 Apply knowledge of statistics and probability for decision-making in various situations. M5.3 Gr9/2 Discuss possible errors in presenting statistical data.	<ul style="list-style-type: none">• Frequency• Pictograms, bar charts and line graphs
M5.1 Gr9/2 Find arithmetic mean, median and mode of non-frequency distribution data, and make appropriate selection for utilization. M5.3 Gr9/1 Apply knowledge of statistics and probability for decision-making in various situations.	<ul style="list-style-type: none">• Mode, median and mean

Learning Objectives

Students will be taught to:

1. Understand how to conduct surveys.
2. Construct tally chart and frequency tables.
3. Construct pictograms, bar charts and line graphs.
4. Solving problems involving pictograms, bar charts and line graphs.
5. Understand mode, median and mean.
6. Solve problems involving mode, median and mean.

Learning Outcomes

Students will be able to:

1. Understand how to conduct surveys.
2. Determine the frequency of data.
3. Determine the highest or lowest frequency or the frequency of a specific value from data.
4. Construct tally charts and frequency tables.
5. Obtain information from frequency tables.
6. Construct pictograms, bar charts and line graphs to present data.
7. Obtain information from pictograms, bar charts and line graphs.
8. Solve problems involving pictograms, bar charts and line graphs.
9. Understand mode and respective frequency.
10. Understand median of data in frequency tables.
11. Understand mean.
12. Solve problems involving mode, median and mean.

Learning Areas

- Statistics and data
- Frequency
- Pictograms, bar charts and line graphs
- Mode, median and mean

Teaching and Learning Activities

1st – 2nd hours (Statistics and Data)

1. Explain what statistics is and how we can collect data.
2. Use Example 1 for explanation.
3. Test their understanding by asking them to try Questions 1 and 2 in Test Yourself 7.1.

4. Have students work on Questions 1 and 2 on page 78 of the Workbook as their homework.

3rd – 5th hours (Frequency)

1. Explain what frequency means and how we determine frequencies.
2. Use Example 2 for explanation.
3. Test their understanding by asking them to try Question 1 in Test Yourself 7.2.
4. Using Examples 3 and 4, guide students on how to determine the highest or the lowest frequency or the frequency of a specific value from data, and to construct tally chart and frequency tables.
5. Use Examples 5 and 6 to guide students to obtain information from frequency tables.
6. Have students try Questions 2 to 5 in Test Yourself 7.2. Discuss the answers with them.
7. Have students work on Questions 1 to 4 on pages 78 to 81 of the Workbook as their homework.

6th – 20th hours (Pictograms, bar charts and line graphs)

1. Explain to students what pictograms are and how to construct a pictogram. Use Example 7.
2. Test their understanding by asking them to try Question 1 in Test Yourself 7.3.
3. Guide students to obtain information from pictograms using Example 8.
4. Have a student try Question 2 in Test Yourself 7.3. Discuss the answer with them.
5. Using Example 9, show students how to solve problems involving pictograms.
6. Get a student to try Question 3 in Test Yourself 7.3. Discuss the answers with them.

7. Have students work on the Questions 1 to 3 on pages 82 to 85 of the Workbook as their homework.
8. Explain to students what bar charts are and how to construct a bar chart. Use Example 11 for further explanation.
9. Have two students construct bar charts in Questions 4 and 5 in Test Yourself 7.3. Discuss the answers with them.
10. Guide students to obtain information from bar chart, using Example 12.
11. Test their understanding by asking them to try Question 6 in Test Yourself 7.3. Discuss the answers with them.
12. Using Examples 13 and 14, guide students to solve problems involving bar charts.
13. Ask students to try Question 7 in Test Yourself 7.3. Discuss the answers with them.
14. Have students work on Questions 4 to 7 on pages 85 to 92 of the Workbook as their homework.
15. Explain to students what line graphs are and how to construct a line graph.
16. Use Example 15 for explanation.
17. Test their understanding by asking them to try Question 8 in Test Yourself 7.3. Discuss the answers with them.
18. Guide students on how to obtain information from line graphs, using Example 16.
19. Have a student try Question 9 in Test Yourself 7.3.
20. Using Example 17, guide students on how to solve problems involving line graphs.
21. Get a student to work on Question 10 in Test Yourself 7.3 and discuss the answers with them.
22. Have students work on Questions 8 to 11 on pages 92 to 98 of the Workbook as their homework.

21st – 25th hours (Mode, median and mean)

1. Explain what mode is.
2. Use Examples 18 to 21 to further explain mode.
3. Have students try Questions 1 to 3 in Test Yourself 7.4. Discuss the answers with them.
4. Have students work on Questions 1 to 3 on pages 98 to 100 of the Workbook as their homework.
5. Explain what median is and how to determine the median from a set of data. Use Example 22.
6. Have two volunteers try Question 4 in Test Yourself 7.4. Discuss the answers with them.
7. Using Example 23, guide students on how to determine the median of data in a frequency table.
8. Test their understanding by asking them try Question 5 in Test Yourself 7.4.
9. Have students work on Questions 4 and 5 on pages 100 and 101 of the Workbook as their homework.
10. Explain what mean is and how to determine the mean of a set of data. Use Example 24 for further explanation.
11. Have four students try Question 6 in Test Yourself 7.4. Discuss the answers with them.
12. Using Example 25, guide students on how to determine the mean of data presented in frequency tables.
13. Get two volunteers to try Question 7 in Test Yourself 7.4. Discuss the answers with them.
14. Show students on how to solve problems involving mode, median and mean, using Example 26.
15. Have students try Questions 8 to 10 in Test Yourself 7.4. Discuss the answers with them.

16. Have students work on Questions 6 to 8 on pages 101 to 103 of the Workbook as their homework.

26th hour (Conclusion)

1. Explain the mistakes shown in the Common Mistake column on page 157.
2. Ensure students understand the terms used in this chapter by referring to the Mathematical Terms column.
3. Revise the lesson using the Quick Revision column on page 158.
4. Randomly select 5 objective questions and 5 subjective questions from the Mastery Practice in the Textbook and have students solve them in the class. Have students to work on the rest of the questions at home.
5. Ask students to do the Enrichment Exercises in the Workbook to test their understanding of this chapter as their homework.

Emphasized Characteristics

1. Thinking skill
2. Problem-solving skill
3. Analysing skill

Learning Materials

- Focus Smart Textbook Mathematics M3
- Focus Smart Workbook Mathematics M3
- Grid paper



Learning Outcome Form

Name-Surname:

No.

Mathayom:

Date:

Chapter 7 Statistics

Explanation: Summary of learning outcomes

Chapter 7 Statistics

Contents that you need for teacher to explain further:
.....
.....
.....
.....
.....

Feeling after learning this chapter:
.....
.....
.....
.....

Knowledge gained from this chapter:
.....
.....
.....
.....

Contents that you like the most in this chapter (give your reason):
.....
.....
.....
.....
.....

Exercises that you like and want to be selected as the outstanding work:
.....
.....
.....
.....

Application of knowledge from this chapter on your daily life:
.....
.....
.....
.....
.....

Chapter 8 Probability

Indicators and learning areas (13 hours)

Indicators	Learning Areas
M5.2 Gr9/1 Find probability of events from random sampling with equal probability for each result, and apply knowledge of probability for valid projection of events.	<ul style="list-style-type: none">• Events and outcomes• Probability• Outcomes from independent events
M5.3 Gr9/1 Apply knowledge of statistics and probability for decision-making in various situations.	

Learning Objectives

Students will be taught to:

1. Understand events and outcomes.
2. Understand the probability of an outcome.
3. Understand the outcomes from independent events.

Learning Outcomes

Students will be able to:

1. Understand events and outcomes.
2. Understand the equally likely outcomes.
3. Understand the not equally likely outcomes.
4. Understand the probability of an outcome.
5. Understand the probability scale.
6. Calculate probabilities.
7. Understand the tree diagrams.

Learning Areas

- Events and outcomes
- Probability
- Outcomes from independent events

Teaching and Learning Activities

1st – 3rd hours (Events and outcomes)

1. Explain what events and outcomes are. Use Example 1.
2. Test their understanding by asking them to try Question 2 in Test Yourself 8.1.
3. Explain what equally likely and not equally likely outcomes mean. Use Examples 2 and 3.
4. Ask a few students to try Questions 2 to 4 in Test Yourself 8.1. Discuss the answers with them.
5. Have students work on Questions 1 to 3 on pages 108 to 110 of the Workbook as their homework.

4th – 8th hours (Probability)

1. Explain what probability is and how probability can be stated in fraction form.
2. Use Example 4 to explain further.
3. Have two students try Questions 1 in Test Yourself 8.2.
4. Remind students what a probability scale is. Remind them of the terms such as ‘impossible’, ‘not likely’, ‘even’, ‘likely’ and ‘definitely’ used to describe how likely an outcome of an event. Use Examples 5 and 6.
5. Test their understanding by asking them to try Questions 2 and 3 in Test Yourself 8.2. Discuss the answers with them.
6. Have students work on Questions 1 to 3 on pages 111 to 113 of the Workbook as their homework.

7. Guide students to calculate probabilities for events. Use Examples 7 and 8.
8. Have a few students try Questions 4 to 6 in Test Yourself 8.2. Discuss the answers with them.
9. Using Example 9, guide students to calculate probabilities of experiments.
10. Test their understandings by asking them to try Question 7 in Test Yourself 8.2. Discuss the answers with them.
11. Have students work on Questions 4 and 5 on pages 114 to 117 of the Workbook as their homework.

9th – 12th hours (Outcomes from Independent Events)

1. Explain what tree diagrams are and how they are used in calculating probability.
2. Use Example 10 for further explanation.
3. Test their understanding by asking them to try Question 1 in Test Yourself 8.3.
4. Use Example 11 to explain the probability of outcomes of two independent events.
5. Ask students to try Question 2 and 3 in Test Yourself 8.3.
6. Have students work on Questions 1 to 4 on pages 117 to 120 of the Workbook as their homework.

13th hour (Conclusion)

1. Explain the mistakes shown in the Common Mistake column on page 182.
2. Ensure students understand the terms used in this chapter by referring to the Mathematical Terms column.
3. Revise the lesson using the Quick Revision column on page 183.

4. Randomly select 5 objective questions and 5 subjective questions from the Mastery Practice in the Textbook and have students solve them in the class. Have students to work on the rest of the questions at home.
5. Ask students to do the Enrichment Exercises in the Workbook to test their understanding of this chapter as their homework.

Emphasized Characteristics

1. Thinking skill
2. Problem-solving skill
3. Analysing skill

Learning Materials

- Focus Smart Textbook Mathematics M3
- Focus Smart Workbook Mathematics M3



Learning Outcome Form

Name-Surname:

No.

Mathayom:

Date:

Chapter 8 Probability

Explanation: Summary of learning outcomes

Chapter 8 Probability

Contents that you need for teacher to explain further:
.....
.....
.....
.....
.....

Feeling after learning this chapter:
.....
.....
.....
.....

Knowledge gained from this chapter:
.....
.....
.....
.....
.....

Contents that you like the most in this chapter (give your reason):
.....
.....
.....
.....
.....

Exercises that you like and want to be selected as the outstanding work:
.....
.....
.....
.....

Application of knowledge from this chapter on your daily life:
.....
.....
.....
.....
.....

Notes: Strand 6: Mathematical Skills and Processes is inculcated in all the chapters appearing in the textbook and workbooks of Primary Education Plus Series. Through them, students will learn to:

- ❖ Apply diverse methods for problem-solving.
- ❖ Appropriately apply mathematical knowledge, skills and processes for problem-solving in various situations
- ❖ Suitably provide reasoning for decision-making and appropriately present the conclusions reached.
- ❖ Accurately use mathematical language and symbols for communication of concepts and presentation.
- ❖ Link various bodies of mathematical knowledge, and link mathematics with other disciplines.
- ❖ Attain ability for creative thinking.