

Teacher's Guide



Mathematics

Primary
Education
Smart+

Prathomsuksa

3



Based on the Basic Education Curriculum B.E. 2551
(Revised Edition B.E. 2560)

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Preface

Why do we have to learn mathematics?

In the 21st century learning, mathematics plays an important role because mathematics helps people to have creative reasoning and systematic thinking and enables people to analyze problems or situations considerably. As a result, they can predict, plan, decide and solve real-life problems appropriately, practically and efficiently. Mathematics is also a tool in the study of science, technology and other subjects which is a fundamental of human resource development. To develop the economy of the country to be equal to other countries, the study of mathematics is needed to continually update and develop according to the social and economic conditions while the knowledge of advanced science and technology has been progressing so fast in the globalized world.

Indicators and content of mathematics revised edition B.E. 2561 (A.D. 2018) according to the Basic Education Core Curriculum B.E. 2551 (A.D. 2008) encourages students to have the skills they need for learning in the 21st century: analytical thinking, critical thinking, creative thinking, problem solving, the use of technology and communication and collaboration. Consequently, learners will be aware of the changes of economy, society, culture and environment, they will be competitive and live with global community.

A successful mathematics education needs to prepare the learners to be ready for learning things and working after graduation or furthering their study at higher levels, therefore schools should provide the appropriate learning according to learners' ability.

What is learned in mathematics?

Mathematics is divided into 3 strands, namely number and algebra, measurement and geometry, and statistics and probability.

❖ Number and Algebra

Learning about real number system, the properties of numbers, ratio, percentage, estimation, problem-solving involving numbers, applying real numbers in real life, patterns, the relation of function and set, logic, expressions, monomial, polynomial, equation, equation system, and inequality, graphs, the interest and value of money, sequences and series and applying the knowledge of numbers and algebra in various situations.

❖ Measurement and Geometry

Learning about length, distance, mass, area, volume and capacity, money and time, measuring units, estimation for measurement, trigonometric ratio, geometric figures and properties, visualization of geometric models, geometric theories, geometric transformation through translation, reflection and rotation, and applying the knowledge of measurement and geometry in various situations.

❖ Statistics and Probability

Learning about statistical enquiry, data collection, statistic calculation, presentation and interpretation of qualitative and quantitative data, the fundamental counting principle, probability, applying the knowledge of statistics and probability in explaining various situations as well as for facilitating decision-making in real life.

Strands and Learning Standards

Strand 1: Numbers and Algebra

Standard M.1.1: Understand various ways of numbers presentation, number system, number operations, the result of number operations and the properties of operations.

Standard M.1.2: Understand and analyze patterns, relations, function, sequences and series and application.

Standard M.1.3: Use expressions, equations and inequalities, explanation of relations or facilitating problem-solving as given.

Strand 2: Measurement and Geometry

Standard M.2.1: Understand the fundamental of measurement, measure and estimate the sizes of wanted objects and application.

Standard M.2.2: Understand and analyze geometric figures, the properties of geometric figures, the relationship between geometric figures and geometric theories, and application.

Strand 3: Statistics and Probability

Standard M.3.1: Understand the statistical process and use statistics knowledge to solve problems.

Standard M.3.2: Understand the fundamental counting principle, probability and application.

Mathematical Skills and Processes

Mathematical skills and processes are the ability of applying the knowledge in learning other subjects in order to gain the knowledge and apply it into daily life efficiently. Skills and processes in mathematics as mentioned above focus particularly on the essential ones that need to be developed in learners' abilities as followings:

1. **Problem-solving** is the ability to understand, analyze, plan and solve the problems, as well as choose the appropriate method by considering the reasoning and validity of the answers.
2. **Mathematical communication and representation** are the abilities to use mathematical language and symbols in communication, representation, summary and presentation accurately and clearly.
3. **Connection** is the ability to use the knowledge of mathematics as a tool in learning mathematics, other contents, other sciences and apply the knowledge in real life.
4. **Reasoning** is the ability to give reasons, provide and listen to the reasons to support or argue leading to the inferences underlined with the mathematical facts.
5. **Creative thinking** is the ability to enhance the previous concept that they have already known or create the new concepts to improve and develop the body of knowledge.

Learners' Quality of Grade 3 Students

- ❖ Read, write numbers and numbers in words not exceeding 100,000 and 0, have number sense and skills in number operations; addition, subtraction, multiplication and division and apply the knowledge in various situations.
- ❖ Have fraction number sense with not more than 1 place and skills in fraction operations with the same denominator; addition and subtraction and apply the knowledge in various situations.
- ❖ Estimate and measure length, weight, capacity and volume, select the appropriate tools and units, tell the time and the amount of money and apply the knowledge in various situations.
- ❖ Distinguish and describe the features of polygons, circles, ellipses, rectangular prism, spheres, cylinders, and cones, draw polygons, circles and ellipses using models, identify geometric figures with axis of symmetry and the number of axis of symmetry and apply the knowledge in various situations.
- ❖ Read and write pictograms, one-way table and apply the knowledge in various situations.

Yearly Teaching Plan

Mathematics Prathomsuksa 3 (Grade 3)

13 chapters

200 hours

Learning areas	Time (hours)
1. Numbers up to 100,000 <ul style="list-style-type: none">• Writing and reading numbers• Place value and expanded form• Comparing numbers• Ordering numbers• Number sequences	15
2. Addition and subtraction within 100,000 <ul style="list-style-type: none">• Addition within 100,000• Subtraction within 100,000• Relationship between addition and subtraction• Using addition and subtraction to solve word problems• Combined operations (addition and subtraction)• Using combination of addition and subtraction to solve word problems• Creating addition and subtraction word problems	20
3. Multiplication <ul style="list-style-type: none">• Multiplication of a 1-digit number by a 3-digit number• Multiplication of a 1-digit number by a 4-digit number• Multiplication of a 2-digit number by a 2-digit number• Using multiplication to solve word problems• Creating multiplication word problems	15
4. Division <ul style="list-style-type: none">• Division of a 2-digit dividend by a 1-digit divisor• Division of a 3-digit dividend by a 1-digit divisor	15

<ul style="list-style-type: none"> • Division of a 4-digit dividend by a 1-digit divisor • Using division to solve word problems • Creating division word problems 	
5. Combined operations <ul style="list-style-type: none"> • Combined operations • Using combined operations to solve word problems • Creating word problems involving combined operations 	9
6. Fractions <ul style="list-style-type: none"> • Reading and writing fractions • Comparing and ordering fractions • Simplest form of fractions • Operations involving fractions • Solving word problems involving addition and subtraction of fractions 	22
7. Money <ul style="list-style-type: none"> • Coins and bills • Reading and writing an amount of money using a dot • Exchanging money • Comparing amounts of money • Reading and writing expenditure • Solving problems involving money 	22
8. Time <ul style="list-style-type: none"> • Telling the time • Duration of time • Comparing the duration of time • Reading and writing activity records with specified time • Solving word problems involving time and the duration of time 	20
9. Length <ul style="list-style-type: none"> • Measuring length • Estimating length in meters and centimeters • Relationships between units of length 	17

<ul style="list-style-type: none"> • Comparing lengths • Solving word problems involving length 	
10. Mass <ul style="list-style-type: none"> • Choosing appropriate weighing scales • Estimating mass in kilograms and kheeds • Relationships between units of mass • Comparing masses • Solving word problems involving mass 	15
11. Volume and capacity <ul style="list-style-type: none"> • Measuring volume and capacity in liters and milliliters • Estimating volume and capacity in liters • Relationships between units of volume • Comparing volumes and capacities • Solving word problems involving volume and capacity 	15
12. Shapes and symmetry <ul style="list-style-type: none"> • Lines of symmetry • Number of lines of symmetry 	5
13. Data analysis and presentation <ul style="list-style-type: none"> • Collecting and categorizing data • Reading and drawing pictograms • One-way tables 	10

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 Numbers up to 100,000

Time: 15 hours

Strand 1 Numbers and algebra

Standard M.1.1 (Numbers)

Indicators:

M1.1 Gr3/1 Read and write Hindu- Arabic, Thai numerals and numbers in words showing cardinal numbers not exceeding 100,000.

M1.1 Gr3/2 Compare and arrange sequence of cardinal numbers not exceeding 100, 000 from various situations.

M1.1 Gr3/9 Show mathematical methods to solve 2-step word problems of cardinal numbers not exceeding 100,000 and 0.

Standard M. 1.2

M1.2 Gr3/1 Identify the missing numbers in number patterns which numbers increase or decrease in equal amount each time.

Learning objectives:

- Read and write Hindu- Arabic, Thai numerals and numbers in words.
- Compare and order numbers up to 100,000.
- Write the place value of digit in a number.
- Show mathematical methods to solve 2-step word problems of cardinal numbers not exceeding 100,000 and 0.
- Recognize and extend number patterns formed by counting on and counting back in equal intervals.

Competency:

- Communication capacity
- Thinking capacity
- Problem-solving capacity

Start up:

- Assess students' prior knowledge about numbers by asking what they knew and what they want to know more about numbers.
- Ask them to write all their prior knowledge (Part K) on page 1 and have students share what they know about numbers. Then ask students to write some questions which they want to know (Part W) on page 1.

Teaching/learning activities:

1st – 2nd hours (Writing and reading numbers)

1. Show them number cards of 11,111. Then ask them whether each digit has the same value.
2. Guide students to count by ones, tens, hundreds and thousands. Refer to the examples on pages 2 and 3.
3. Use an abacus to represent numbers up to 100,000. Ask students to read out the numbers and write them on the board in numerals and words.
4. Help them to recall the spellings for numbers 1 to 20 and the words 'thousand' and 'hundred'.
5. Have students try Practice on page 4 and discuss the answers with them.
6. Assign them to complete Exercises A to C in the workbook on pages 3 to 5 as their homework.

3rd – 5th hours (Place value and expanded form)

1. Introduce the place values and digit values of the digits in some numbers. Refer to page 5.
2. Write a five-digit number on the board and explain the place value of each digit and its value. Emphasize that even a zero in a number has a place value.
3. Get three students to write numbers containing not more than six digits. Then, get other students to state the place value of each digit in each number and its value.

4. When expanding numbers, it is better for them to present a number in a place value table first before writing it in expanded form. Try a few numbers with them and remember to have numbers with zero.
5. Use the examples on page 5 for further explanation.
6. Have the students try Practice on page 6 and discuss the answers with them.
7. Assign them to do Exercises D to H in the workbook on pages 6 and 7 as their homework.

6th – 8th hours (Comparing numbers)

1. Remind students of the signs and the terms used in comparison such as ‘greater than’, ‘more than’, ‘fewer than’, ‘less than’, ‘smaller than’, ‘the greatest’, ‘the smallest’, ‘equal’ and ‘not equal to’.
2. Emphasize that when they compare the numbers with the same number of digits, they should compare the values of the digits starting from the leftmost ones. Use the examples on pages 7 and 8.
3. Do a quiz on comparing numbers.
4. Guide them to answer the question in Let’s Think on page 9.
5. Have the students try Practice on page 9 and discuss the answers with them.
6. Assign them to do Exercises I to K in the workbook on page 8 as their homework.

9th – 11th hours (Ordering numbers)

1. Remind students the meanings of ‘ascending’ and ‘descending’.
2. Use the examples on pages 10 and 11 to explain further.
3. Ask the students to try Practice on page 12 and discuss the answers with them.
4. Assign them to do Exercises L and M in the workbook on page 9 as their homework.

12th – 14th hours (Number sequences)

1. Guide students to count forward and backward by 500, 1,000, 2,000, 5,000 and 10,000. You may use the examples on pages 13 and 14.
2. Explain what a number pattern is.
3. Guide them on how to analyze a number pattern by comparing every two consecutive numbers and recognize the repeating pattern. Refer to page 15.
4. Have the students try Practice on pages 15 and 16. Discuss the answers with them.
5. Assign them to complete Exercises N and O in the workbook on page 10 as their homework.

15th hour (Conclusion)

1. Get students to tick what they have learned and understood on page 16 (Part L).
2. Guide the whole class to conclude the concept of numbers up to 100,000 with these activities:
 - (a) A number construction game
Put 10 pieces of folded paper with each containing a number 0 to 9 on it into a box. Get 5 students to get a piece of the folded paper without looking. Ask them to write their digits in a row as a 5-digit number. Then, get other students to read the number and write the number in expanded form. Repeat this activity a few times.
 - (b) Comparing numbers
Get students into groups of 5. Ask each group to create five 5-digit numbers and write them on cards. Get them to compare the numbers.
Which is the largest number?
Which is the smallest number?
Get them to arrange the numbers in ascending and then in descending order.

Learning materials:

- Primary Education Smart Plus Mathematics Textbook Prathomsuksa 3
- Primary Education Smart Plus Mathematics Workbook Prathomsuksa 3
- Abacus
- Number cards

Assessment:

1. To assess cognitive behavior, test on page 16 (Part L column).
2. To assess affective behavior, refer to Scoring Rubric for Affective Domain.
3. To assess thinking process skills, refer to Analytic Scoring Scale and Process-based Scoring Rubrics.

Chapter 2 Addition and subtraction within 100,000

Time: 20 hours

Strand 1 Numbers and Algebra

Standard M.1.1 (Numbers)

Indicator:

M 1.1 Gr.3/5 Find the unknown numbers in addition and subtraction equations of cardinal numbers exceeding 100,000 and 0.

Learning objectives:

- Perform addition of numbers within 100,000.
- Perform subtraction of numbers within 100,000.
- Perform computations involving addition and subtraction to solve word problems.

Competency:

- Thinking capacity
- Problem-solving capacity
- Capacity for applying life skill

Start up:

- Assess students' prior knowledge about addition and subtraction within 100,000 by asking what they knew and what they want to know more about addition and subtraction within 100,000.
- Ask students to write all their prior knowledge (Part K) on page 17 and have students share what they know about addition and subtraction within 100,000. Then ask them to write some questions which they want to know (Part W) on page 17.

Teaching/learning activities:

1st – 3rd hours (Addition within 100,000)

1. Guide students to recall the meaning of addition.
2. Guide them to add two numbers using the standard written method. Emphasize that they should add up digits of the same place values starting from the ones. Refer to page 18.
3. Guide them on how to add with regrouping.
4. Assign them to do Exercises A and B in the workbook on pages 12 and 13 as their homework.
5. Demonstrate how to add three numbers using the standard written method. Refer to the example on page 19. Guide them on how to verify the answers.
6. Write a few addition questions on the board and get a few students to answer them. Guide them on how to verify the answers.
7. Have the students try Practice on page 20 and discuss the answers with them.
8. Assign them to do Exercise C in the workbook on page 14 as their homework.

4th – 6th hours (Subtraction within 100,000)

1. Guide students to subtract a number from the other number by using the examples on pages 21 and 22. Remind them on how to regroup and how to verify the answers.
2. Have them try Practice on page 22 and carry out Activity Corner on page 23.
3. Assign them to complete Exercises D and E in the workbook on pages 15 and 16 as their homework

7th – 8th hours (Relationship between addition and subtraction)

1. Explain the relationship between addition and subtraction and how to use this relationship to check for accuracy. Refer to the example on page 24.
2. Have students try Practice on page 24 and discuss the answers with them.
3. Assign them to do Exercise F in the workbook on page 17 as their homework.

9th – 11th hours (Using addition and subtraction to solve word problems)

1. Explain how to solve word problems step by step using the examples on page 25. Always emphasize that they have to understand the question first before writing the number sentence and solving it.
2. Teacher may ask them to imagine that the answer will be more or less. Another way of solving is to encourage them to illustrate what they understand.
3. Have them try Practice on page 26 and discuss the answers with them.
4. Assign them to do Exercise G in the workbook on pages 18 and 19 as their homework

12th – 14th hours (Combined operations (addition and subtraction))

1. Guide students to do combined operations of addition and subtraction by using the examples on page 27.
2. Write a few questions of combined operations of addition and subtraction on the board and get some students to solve them.
3. Have students try Practice on page 28 and discuss the answer with them.
4. Assign them to do Exercises H and I in the workbook on pages 20 and 21 as their homework and discuss the answers with them.

15th – 17th hours (Using combination of addition and subtraction to solve word problems)

1. Remind them how to solve combined operations involving addition and subtraction.
2. Using the examples on page 29, guide students to solve the word problems involving combined operations of addition and subtraction step by step.
3. Write a word problem involving combined operations on the board. Then ask them to try and discuss the answers with them.
4. Have them try Practice on page 30 and discuss the answers with them.

5. Assign them to do Exercise J in the workbook on pages 22 and 23 as their homework.

18th – 19th hours (Creating addition and subtraction word problems)

1. Remind them how to solve combined operations word problems.
2. Write a number sentence involving combine operations of addition and subtraction and then ask them try to create a word problem.
3. Refer to pages 31 and 32.
4. Ask one group of students to write a number sentence and ask another group to write a word problem based on it and to solve it.
5. Have them try Practice on page 32 and discuss the answers with them.
6. Assign them to do Exercise K in the workbook on page 24 as their homework.

20th hour (Conclusion)

1. Get students to tick what they have learned and understood on page 32 (Part L).
2. Guide the whole class to conclude the concept of addition and subtraction within 100,000 with these sample activities:
 - (a) Give students some problems of addition or subtraction and ask them to solve the problems.
 - (b) Ask them to work in pairs. One should give two numbers and another one should create a word problem based on the given numbers.

Learning materials:

- Primary Education Smart Plus Mathematics Textbook Prathomsuksa 3
- Primary Education Smart Plus Mathematics Workbook Prathomsuksa 3
- Abacus

Assessment:

1. To assess cognitive behavior, test on page 32 (Part L column).
2. To assess affective behavior, refer to Scoring Rubric for Affective Domain.
3. To assess thinking process skills, refer to Analytic Scoring Scale and Process-based Scoring Rubrics.

Chapter 3 Multiplication

Time: 15 hours

Strand 1 Numbers and algebra

Standard M.1.1)Numbers(

Indicators:

M.1.1 Gr.3/6 Find the unknown numbers in multiplication equations of not more than 4 digit numbers by one digit number and 2-digit by 2-digit numbers.

Learning objectives:

- Multiply any two numbers with the highest product of 100,000.
- Solve word problems involving multiplication.

Competency:

- Communication capacity
- Thinking capacity
- Problem-solving capacity
- Capacity for applying life skill

Start up:

- Assess students' prior knowledge about multiplication by asking what they knew and what they want to know more about multiplication.
- Ask them to write all their prior knowledge)Part K(on page 33 and have students share what they know about multiplication. Then ask students to write some questions which they want to know)Part W(on page 33.

Teaching/learning activities:

1st – 3rd hours (Multiplication of a 1-digit number by a 3-digit number)

1. Have students review multiplication tables by playing this simple games:
Pair up students and give each pair two dices. Ask them to roll the dices and multiply the numbers.
2. Guide students on how to multiply a 1-digit number by hundreds. Use the examples on page 34.
3. Then, demonstrate how to multiply without and with regrouping step by step. Refer to the examples on pages 34 to 36 and show them how to verify the answers. Remind them to always multiple the ones first.
4. Write a few multiplication problems on the board and get students to answer them.
5. Have them try Practice on page 36 and discuss the answers with them.
6. Assign them to do Exercises A to D in the workbook on pages 26 and 27 as their homework.

4th – 6th hours (Multiplication of a 1-digit number by a 4-digit number)

1. Guide students on how to multiply a 1-digit number by thousands. See page 37.
2. Then, demonstrate how to multiply without and with regrouping step by step. Use the examples on pages 37 and 38. Show them how to verify the answers. Remind them to always multiple the ones first.
3. Have them try Practice on page 38 and discuss the answers with them.
4. Ask students to work on Exercises E to H in the workbook on pages 28 and 29 as their homework.

7th – 9th hours (Multiplication of a 2-digit number by a 2-digit number)

1. Guide students on how to multiply a 2-digit number by 20, 30, ... 90. Refer to the examples on page 39.

2. Then, demonstrate how to multiply without and with regrouping step by step. Use the examples on pages 39 to 42 and show them how to verify the answers. Remind them to always multiply the ones first.
3. Have the students try Practice on page 42 and discuss the answers with them.
4. Assign them to complete Exercises I to L in the workbook on pages 30 and 31 as their homework.

10th – 12th hours (Using multiplication to solve word problems)

1. When solving word problems, always ask students to understand the problems first and then write the number sentences. Reiterate the importance of writing the number sentence before solving it.
2. Use the example on page 43 for a step by step explanation and guide them how to verify the answers.
3. Have the students try Practice on page 44 and discuss the answers with them.
4. Assign them to do Exercise M in the workbook on pages 32 and 33 as their homework.

13th – 14th hours (Creating multiplication word problems)

1. Use the example on page 45 to make students understand the steps of creating multiplication word problems.
2. Write a number sentence involving multiplication on the board. Ask a few students to make up word problems based on that number sentence and other students to solve them.
3. Have the students try Practice on page 45 and discuss the answers with them.
4. Assign them to do Exercise N in the workbook on page 34 as their homework.

15th hour (Conclusion)

1. Get students to tick what they have learned and understood on page 45 (Part L).
2. Guide the whole class to conclude the concept of multiplication with these sample activities:
 - (a) Give students a few multiplication equations and ask them to solve and verify their answers.
 - (b) Let them create their own word problems involving multiplication and find the answers.
 - (c) Ask them to work in pairs. One should give a multiplication sentence and another one should create a word problem based on it.

Learning materials:

- Primary Education Smart Plus Mathematics Textbook Prathomsuksa 3
- Primary Education Smart Plus Mathematics Workbook Prathomsuksa 3
- Multiplication tables
- Dices

Assessment:

1. To assess cognitive behavior, test on page 45 (Part L column).
2. To assess affective behavior, refer to Scoring Rubric for Affective Domain.
3. To assess thinking process skills, refer to Analytic Scoring Scale and Process-based Scoring Rubrics.

Chapter 4 Division

Time: 15 hours

Strand 1 Numbers and algebra

Standard M.1.1)Numbers(

Indicator:

M.1.1 Gr3/7 Find the unknown numbers in division equations that dividend is not more than 4 digits and divisor is 1 digit.

Learning objectives:

- Divide a number less than 100,000 by a 1-digit divisor.
- Solve word problems involving division.

Competency:

- Thinking capacity
- Problem-solving capacity
- Capacity for applying life skill

Start up:

- Assess students' prior knowledge about division by asking what students knew and what they want to know more about division.
- Ask students to write all their prior knowledge)Part K(on page 46 and have them share what they know about division. Then ask students to write some questions which they want to know)Part W(on page 47.

Teaching/learning activities:

1st – 3rd hours (Division of a 2-digit dividend by a 1-digit divisor)

1. Remind students of these terms – division, remainder, dividend, divisor and quotient.
2. Guide students on how to divide a 2-digit dividend by a 1-digit divisor without a remainder. Refer to the examples on pages 47 and 48. Show them how to check the answers.
3. Guide them divide using the long and short division methods. Refer to page 48.
4. Then, demonstrate how to divide with a remainder using the examples on page 49 and show them how to verify the answers.
5. Ask the students to try Practice on page 50 and discuss the answers with them.
6. Assign them to do Exercises A to E in the workbook on pages 36 to 38 as their homework.

4th – 6th hours (Division of a 3-digit dividend by a 1-digit divisor)

1. Guide students on how to divide a 3-digit dividend by a 1-digit divisor without a remainder using the long division method. Use the example on page 51. Show them how to check the answers.
2. Write a few questions of division without a remainder and ask students to solve them on the board.
3. Guide students on how to divide a 3-digit dividend by a 1-digit divisor with a remainder using the long division method. Refer to the example on page 52. Show them how to check the answers.
4. Write a few questions of division with a remainder and ask students to solve them on the board.
5. Have the students try Practice on page 52 and discuss the answers with them.
6. Assign them to do Exercises F to I in the workbook on pages 39 and 40 as their homework.

7th – 9th hours (Division of a 4-digit dividend by a 1-digit divisor)

1. Explain division of a 4-digit dividend by a 1-digit divisor using the long division method. Refer to the example on pages 53 and 54. Guide them on how to check the answers.
2. Write a few questions on division without and with a remainder and ask the students to solve them on the board.
3. Have the students try Practice on page 54 and discuss the answers with them.
4. Assign them to do Exercises J to M in the workbook on pages 41 and 42 as their homework.

10th – 12th hours (Using division to solve word problems)

1. Guide students on how to solve word problems and reiterate the importance of understanding the problems first and writing the number sentence before solving it.
2. For some students, suggest them to draw a picture or imagine a picture that illustrate the word problem.
3. Guide them on how to check the answers and use the examples on page 55 for further explanation.
4. Have the students try Practice on page 56 and discuss the answers with them.
5. Assign them to complete Exercise N in the workbook on pages 43 and 44 as their homework.

13th – 14th hours (Creating division word problems)

1. Explain how to create division word problems step by step using the example on page 57.
2. Have them try Practice on page 57 and discuss the answers with them.
3. Assign them to complete Exercise O in the workbook on page 45 as their homework.

15th hour (Conclusion)

1. Get students to tick what they have learned and understood on page 57)Part L(.
2. Guide the whole class to conclude the concept of division with these simple activities:
 - Give students a few division equations. Ask them to solve and check their answers.
 - Let them create their own word problems involving division and find out the answers.
 - Ask them to work in pairs. One should give a division sentence and another one should create a word problem based on it.

Learning materials:

- Primary Education Smart Plus Mathematics Textbook Prathomsuksa 3
- Primary Education Smart Plus Mathematics Workbook Prathomsuksa 3

Assessment:

1. To assess cognitive behavior, test on page 57 (Part L column).
2. To assess affective behavior, refer to Scoring Rubric for Affective Domain.
3. To assess thinking process skills, refer to Analytic Scoring Scale and Process-based Scoring Rubrics.

Chapter 5 Combined operations

Time: 9 hours

Strand 1 Numbers and Algebra

Standard M.1.1)Numbers(

Indicator:

M.1.1 Gr.3/8 Find the answers of mixed addition, subtraction, multiplication and division of cardinal numbers not exceeding 100,000 and 0.

Learning objective:

- Perform combined operations involving addition, subtraction, multiplication and division.

Competency:

- Thinking capacity
- Problem-solving capacity
- Capacity for technological application

Start up:

- Assess students' prior knowledge about combined operations by asking what they knew and what they want to know more about combined operations.
- Ask them to write all their prior knowledge)Part K(on page 58 and have them share what they know about combined operations. Then ask they to write some questions which they want to know)Part W(on page 58.

Teaching/learning activities:

1st – 3rd hours (Combined operations)

1. Remind students of these terms – addition, subtraction, multiplication and division.
2. Help students to recall on how to do simple operations.
3. Emphasize that they need to do the operations in the brackets first for any combined operations. Use the examples on pages 59 and 60 to explain further.
4. Ask student to think more complex problems. Refer to Let's Think on page 60.
5. Ask students to try Practice on page 61 and discuss the answers with them.
6. Assign them to do Exercises A to C in the workbook on pages 47 to 49 as their homework.

4th – 6th hours (Using combined operations to solve word problems)

1. Remind students to understand the word problem first. Then they need to write the number sentence before finding out the answer.
2. Use the examples on pages 62 for further explanation.
3. Have the students try Practice on page 63 and discuss the answers with them.
4. Assign them to complete Exercise D in the workbook on pages 50 to 52 as their homework.

7th – 8th hours (Creating word problems involving combined operations)

1. Review with students how to create word problems.
2. Write a number sentence involving combined operation on the board and then have a few students to create word problems based on the given number sentence.
3. Use the example on page 64 to explain further.
5. Have the students try Practice on pages 64 and discuss the answers with them.
6. Assign them to complete Exercise E in the workbook on page 53 as their homework.

9th hour (Conclusion)

1. Get students to tick what they have learned and understood on page 64 (Part L).
2. Guide the whole class to conclude the concept of combined operations with these simple activities:
 - Get some supermarket brochures and a shopping list. Ask students to plan and calculate the total value of the items in the shopping list.
 - Give them some word problems and get them to find the answers.

Learning materials:

- Primary Education Smart Plus Mathematics Textbook Prathomsuksa 3
- Primary Education Smart Plus Mathematics Workbook Prathomsuksa 3
- Brochures from supermarkets, a shopping list

Assessment:

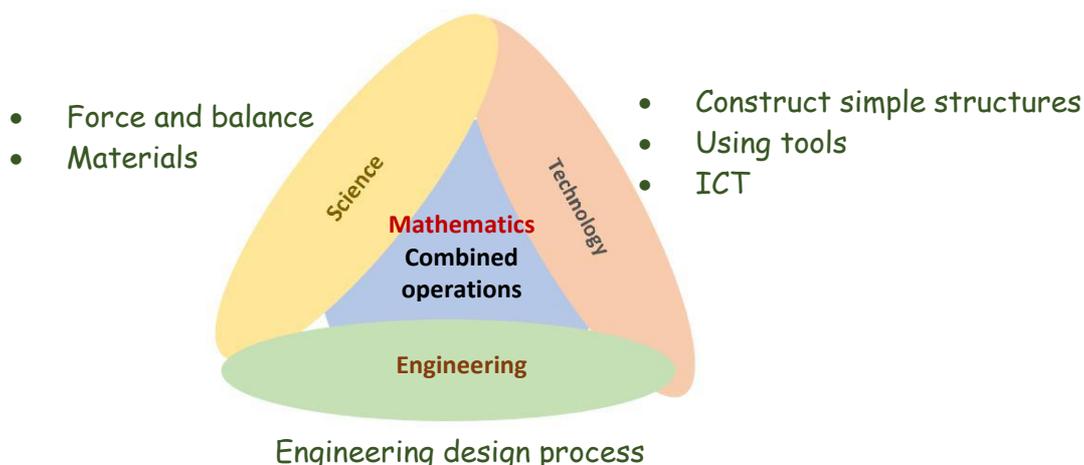
1. To assess cognitive behavior, test on page 65 (Part L column).
2. To assess affective behavior, refer to Scoring Rubric for Affective Domain.
3. To assess thinking process skills, refer to Analytic Scoring Scale and Process-based Scoring Rubrics.

STEM Activity: Gumdrops tower

Overview

In this activity, students will apply their knowledge of mathematics on combined operations. They are required to design and create a tower with a limited budget. They will learn the fact that the engineers have to work under the tight conditions of time and budget limitations besides having a proper plan and design.

Subject integration



Activity Guide

Time: 3 hours

Start up:

1. Divide students into groups of 3 to 4 students.
2. Let them know that this is the first activity that they will apply science, technology, engineering, and mathematics concepts to design and create something. We call it the “STEM education”.
3. Get them to recall the STEM activities they have done in Grade 2.
 - Which is their most favorite activity? Why?
 - What did you get from those STEM activities?

Lesson Development:

1. Assign students to read the situation on page 65. Then, lead students to discuss and identify the problem by answering to these questions:
 - (a) What are you required to do?
 - (b) What are your missions?
 - (c) What is the problem of this situation?
 - (d) What do you need to know to get started?
2. Remind students of their knowledge of how to build a strong construction. Then encourage students to explore and make connections between science, technology, engineering and mathematics by posing some of these following questions:
 - (a) If you want to build a tall and stable tower, what do you have to consider?
 - (b) Think about the shape of your tower. How will its top and bottom look like?
 - (c) What shape will enable the tower to stand firmly - triangle, square or other shapes? Why?
 - (d) What are the causes of success or failure in your last work?
 - (e) What did you learn from your failures?
 - (f) What shape should your tower have?
 - (g) What are your limited materials in this activity?
 - (h) What is the meaning of freestanding?
 - (i) What are the properties of toothpicks and gumdrops?
 - (j) What are your challenges in this activity?
 - (k) Can you use other materials?
 - (l) Can you search for more information about gumdrop tower?
3. Ask students to think about how to assess their project. Guide them to discuss in class and set their criteria by these following questions:
 - (a) What are the achievement criteria?)The height of the tower, finish on time, cost saving, stability of the tower, etc.(
 - (b) How do you evaluate your success?)Creativity, height, budget(

4. Get students to brainstorm and draw their design. They need to list the materials and label their design. Then, let them execute their plan.
5. After they have finished their work, ask them to assess their gumdrop tower by using the criteria stated in no.3. Teacher may pose these following questions:
 - (a) Did your tower meet the criteria?
 - (b) Do you and your team feel satisfied with your work? Why?
 - (c) What works? What does not work?
 - (d) Can it stand freely?
 - (e) How much weight can it hold?
 - (f) Can you figure out the weak points of your tower?
 - (g) How will you modify your solution to make it better?
6. Let them improve their design. Point out their weak points and then motivate them to think about how to improve it.)Teacher may skip this step due to time constraint and may ask them to explain the need to do so and how to do it instead.(
7. Get each group to prepare a presentation of their work and explain their journey of creating it.)Teacher may suggest them a suitable type of presentation and/or assign them the topics for presentation such as team members, product, journey of their works, problems, how to test and improvement.(

Conclusion:

1. End the lesson by asking the students the following questions:
 - (a) Do you think that you have acted as an engineer? Why?
 - (b) What is the engineering design process?
 - (c) Did you apply the engineering design process into your work?
 - (d) Did each team come up with the same design? Why?
 - (e) What are the key success factors that affect your group work?)Teamwork, creative thinking, etc.(
 - (f) Do you think that teamwork is important? Why?
 - (g) What subject knowledge did you apply into this activity?

- (h) What are the benefits of this activity?
- (i) What will happen if you build the tower without a proper plan and design?
- (j) What did you learn from this activity?

Suggested materials:

Gummy bears or gumdrops and toothpicks

Assessment:

Refer to Scoring Rubric for STEM Activities

Chapter 6 Fractions

Time: 22 hours

Strand 1 Numbers and Algebra

Standard M.1.1)Numbers(

Indicators:

M.1.1 Gr.3/3 Tell, read and write fractions that show the quantities of objects, and show objects as given fractions.

M.1.1 Gr.3/4 Compare fractions with equivalent numerators and numerators are less than or equivalent to denominators.

M.1.1 Gr.3/10 Find positive results of fractions that denominators are equivalent and the products are not more than 1. Find negative results of fractions with equivalent denominators.

Learning objectives:

- Tell, read and write fractions.
- Show objects as given fractions.
- Compare and order fractions.
- Find positive results of fractions.

Competency:

- Thinking capacity
- Problem-solving capacity
- Capacity for applying life skill
- Capacity for technological application

Start up:

- Assess students' prior knowledge about fractions by asking what they knew and what they want to know more about fractions.
- Ask students to write all their prior knowledge)Part K(on page 67 and have them share what they know about fractions. Then ask students to write some questions which they want to know)Part W(on page 67.

Teaching/learning activities:

1st – 4th hours (Reading and writing fractions)

1. Encourage students to do this following activity:

Divide students into groups of 3. Give each group a rectangular paper, a square paper and a circular paper. Ask them to fold each paper. Get them to compare the shapes of paper.

Which has unequal parts after folding?

Which has equal parts after folding?

2. Help students understand equal parts and non-equal parts by using the examples on page 68.
3. Explain numerators and denominators of fractions. What do they mean? Refer to page 68.
4. Guide students on how to read and write fractions. Refer to pages 68 and 69.
5. Write a few fractions on the board and a few circles. Ask students to shade the circles correctly to represent each fraction. Have them read the fractions aloud.
6. Explain more details. Refer to the examples on page 70.
7. Give each student a square paper. Ask them to fold the paper and shade a part of the paper. Ask him or her to write the fraction to represent the shaded part. Refer to Activity Corner on page 71.

8. Have students try Practice on pages 72 and 73 and discuss the answers with them.
9. Assign them to do Exercises A to F in the workbook on pages 58 to 60 as their homework.

5th – 10th hours (Comparing and ordering fractions)

1. Demonstrate how to compare fractions with the same denominator step by step to students with the use of play dough or the pictures of cakes or pizzas.
2. Remind them of the signs used in comparison. Use the examples on page 74 to explain further.
3. Write a few fractions with the same denominator on the board and ask students to identify the smaller and larger fractions.
4. Demonstrate how to compare fractions with the same numerator step by step to students with the use of play dough or the pictures of cakes or pizzas.
5. Use the examples on page 75 for further explanation.
6. Write a few fractions with the same numerator on the board and ask students to identify the smaller and greater fractions. Emphasize that the fraction with a smaller denominator is the greater fraction.
7. Write a few fractions with numerators which are less than denominators and ask students to identify which the smaller and greater fractions. Refer to page 76.
8. Write a few fractions with numerators which are equivalent to denominators and ask students to compare them. Remind them that when a fraction has a numerator that is the same as the denominator, it is equal to 1. Refer to page 77.
9. Remind them of the concept of ascending and descending orders.
10. Clearly explain how to order fractions on page 76.
11. Write a few fractions on the board, then ask students to arrange them in ascending and descending orders.
12. Have students try Practice on page 79 and discuss the answers with them.
13. Assign them to finish Exercises G to K in the workbook on pages 61 and 62 as their homework.

11th – 14th hours (Simplest form of fractions)

1. Explain the concept of simplest form of fractions by using page 80.
2. Write two fractions on the board and ask students to determine whether they are in the simplest form or not.
3. Ask students to demonstrate their understanding of simplest form of fractions by using play dough, folding the paper or drawing the pictures to the class.
4. Remind them when both the numerator and denominator of a fraction are indivisible by any whole number other than 1, the fraction is said to be in its simplest form.
5. Explain that we divide the numerator and the denominator by the same number when we want to write the fraction in its simplest form. Refer to page 81.
6. Have students try Practice on pages 81 and discuss the answers with them.
7. Assign them to do Exercises L and M in the workbook on page 63 as their homework.

15th - 18th hours (Operations involving fractions)

1. Demonstrate how to add fractions with the same denominator step by step on the board.
2. Use the examples on page 82 for further explanation.
3. Demonstrate how to subtract fractions with the same denominator step by step on the board.
4. Use the examples on pages 83 for further explanation.
5. Have students try Practice on page 84 and discuss the answers with them.
6. Assign them to complete Exercises N to P in the workbook on pages 64 and 65 as their homework.

19th – 21st hours (Solving word problems involving addition and subtraction of fractions)

1. Guide students to solve word problems involving fractions by using the example on page 85.
2. Remind them the steps of solving word problems. Refer to page 86.
3. Have students try Practice on page 87 and discuss the answers them.
4. Assign them to do Exercise Q in the workbook on pages 66 to 68 as their homework.

22nd hour (Conclusion)

1. Get students to tick what they have learned and understood on page 88 (Part L).
2. Guide the whole class to conclude the concept of fractions with these sample activities:
 - Ask students to work in pairs. They can either use clay, fold paper or draw pictures to represent the fractions called out. Any pairs of students who do correctly will get one point. Each student will change their partner for each command (approximately 10 commands). The winner will be ones who earn the most points.

Learning materials:

- Primary Education Smart Plus Mathematics Textbook Prathomsuksa 3
- Primary Education Smart Plus Mathematics Workbook Prathomsuksa 3
- Pizza picture, play dough

Assessment:

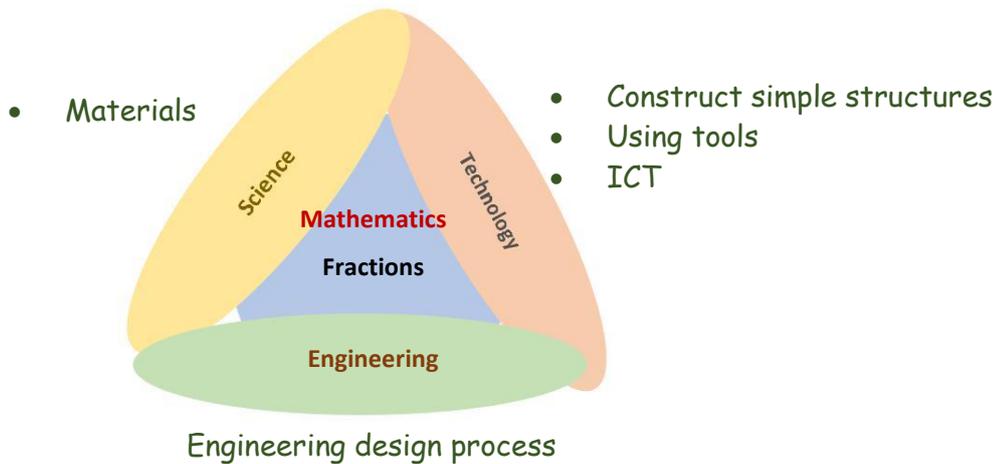
1. To assess cognitive behavior, test on page 88 (Part L column).
2. To assess affective behavior, refer to Scoring Rubric for Affective Domain.
3. To assess thinking process skills, refer to Analytic Scoring Scale and Process-based Scoring Rubrics.

STEM Activity: Pizza Fractions project

Overview

We can use pizzas to understand fractions. We can create pizzas with portions of different toppings. In this chapter, students have to apply their fraction concept to a pizza for that purpose using unwanted materials. They are required to create and decorate a box for pizza, as well.

Subject integration



Activity Guide

Time: 3 hours

Start up:

1. Divide students into groups of 3 to 4.
2. Talk about their previous STEM activities by asking the following questions:
 - Do you like those activities? Why?
 - Which is your favorite activity? Why?
 - Did you learn from those activities? Can you say about them?
 - Did you work alone or work as a team? How was your team?
 - Did your team work collaboratively?
 - What did you help your team? Are you a good team member?

- What is the process that you used to design and create your works?
- Can you apply it in your daily life?

Lesson development:

1. Let students read the situation on page 88. Then, guide the whole class to discuss and identify the problem by answering these questions:
 - (a) What will you have to do?
 - (b) What are your missions?
 - (c) What do you need to know to get started?
 - (d) What is the problem of this situation?
2. Encourage students to explore and make connections between science, technology, engineering and mathematics by posing these following questions:
 - (a) What do you know about fractions?
 - (b) How do we use pizza to determine fractions?
 - (c) Will you use colors to represent each topping such as peperoni, chesses and pizza dough?
 - (d) How do you use the materials to represent each part of the pizza?
 - (e) What kinds of materials are used to make the pizza box and pizza? What are their properties?
 - (f) What are the steps of the engineering design process?
 - (g) Do you need any materials for this construction?
3. Ask students to think about how to assess their project. Lead them to discuss in class and set their criteria by these following questions:
 - (a) What are the achievement criteria? (correct fraction concept, etc.)
 - (b) How do we evaluate our success? (Creativity, interesting and beautiful designs, easy to understand, cost etc.)
4. Get students to brainstorm and draw their design. They need to list the materials and label their design. Then, let them execute their plan.

5. After they have finished their work, ask them to assess their product by using the criteria stated in no.3. Teacher may pose these following questions:
 - (a) Did your pizza meet the criteria?
 - (b) Do you and your team feel satisfied with your work? Why?
 - (c) What works? What does not work?
 - (d) How will you modify your solution to make it better?
6. Let them improve their design. Teacher may point out their weak points and then motivate them to think how to improve it. (Teacher may skip this step due to time constraint and may ask them to explain the need to do so and how to do it instead.)
7. Get each group to prepare a presentation of their work and explain their journey of creating it. (Teacher may suggest them a suitable type of presentation and/or assign them the topics for presentation such as teamwork, the product, the process, the problems, the evaluation, and improvement.)

Conclusion:

1. End the lesson by asking students the following questions:
 - (a) Did you all come up with the same design? Why? Why not?)They should answer that they all have different ideas, and this tells the importance of the role of diversity in engineering and problem-solving. Engineering is a career that follows this design process for creating new things, offering solutions and providing conveniences for our life.(
 - (b) What are the steps in the design process to create this pizza?)It called “the engineering design process” that teacher should tell them.(
 - (c) What are the benefits of this activity?

Suggested materials:

Scissors, old magazines, glue, color paper, cardboard, construction paper

Assessment:

Refer to Scoring Rubric for STEM Activities

Chapter 7 Money

Time: 22 hours

Strand 2 Measurement & Geometry

Standard M.2.1

Indicator:

M.2.1 Gr.3/1 Demonstrate how to solve word problems involving money.

Learning objectives:

- Find and show how to solve problems involving money.
- Use and apply knowledge of money in real life.

Competency:

- Problem-solving capacity
- Capacity for applying life skill

Start up:

- Assess students' prior knowledge about money by asking what they knew and what they want to know more about money.
- Ask students to write all their prior knowledge)Part K(on page 90 and have students share what they know about money. Then ask students to write some questions which they want to know)Part W(on page 90.

Teaching/learning activities:

1st – 4th hours (Coins and bills)

1. Suggest students to observe the coins and bills we use. Refer to pages 91 and 92. What are printed on the surfaces of the coins and bills? What are their colors?

2. Ask students how much they get from their parents every day. Let them observe their coins or bills.
3. Let them practice by using coins. Ask each pair of students to prepare the amount of money (coins) demanded by teacher or another pair of students.
4. Have students try Practice on pages 93 and discuss the answers with them.
5. Assign them to complete Exercises A to C in the workbook on pages 76 to 78 as their homework.

5th – 7th hours (Reading and writing an amount of money using a dot)

1. Introduce the lesson by doing some of these activities:
 - (a) Show some coins and bills. Get the students to identify and tell the values of each coin and bill quickly.
 - (b) Ask two students to role-play a shop assistant and a customer. Give 100 Baht to the ‘customer’ to buy things not more than 100 Baht. The ‘shop assistant’ has to calculate and prepare the change.
 - (c) Divide students into 4 groups and give each group some different supermarket brochures. Call aloud a type of goods such as soap and then ask each group to search for the prices. Then, guide the whole class to discuss which supermarket is the cheapest. What is the difference between the cheapest price and the most expensive price?
2. Use the examples on pages 94 and 95 to explain how to write and read the amount of money using a dot.)The dot is used to separate the Baht and Satang.(
3. Write some amounts of money on the board using dots. Ask students to read them out aloud.
4. Divide the class into groups of four. Give them some money which includes coins and bills. Ask them to write and read the amount of money given.
5. Have them try Practice on page 96 and discuss the answers with them.
6. Assign them to complete Exercises D and E in the workbook on pages 79 and 80 as their homework.

8th – 11th hours (Exchanging money)

1. Guide students to understand that we can have different combination of coins and bills for the same amount of money. Refer to page 97. Remind them that 1 Baht is equal 100 Satang.
2. Use the examples on pages 98 and 99 to explain in more details.
3. Gather some coins and bills. Call out an amount of money and ask students to prepare that amount of money using different combinations of coins and bills. Repeat with other amounts of money.
4. Practice with them how to exchange money in their daily life situation. Let one group of students to state an amount of money and the other group to prepare that amount of money.
5. Have them try Practice on page 100 and discuss the answers with them.
6. Assign them to complete Exercises F to H in the workbook on pages 81 to 83 as their homework.

12th – 15th hours (Comparing amounts of money)

1. Remind students of the signs and the terms used in comparison such as ‘greater than’, ‘more than’, ‘fewer than’, ‘less than’, ‘smaller than’, ‘the greatest’, ‘the smallest’, ‘equal’ and ‘not equal to’.
2. Emphasize that when they compare amounts of money, they should compare the values of the leftmost digits.
3. Use the examples on pages 101 and 102.
4. Have the students try Practice on page 103 and discuss the answers with them.
5. Assign them to do Exercise I in the workbook on page 84 as their homework.

16th – 18th hours (Reading and writing expenditure)

1. Explain to students that an expenditure represents an amount of money that is spent to purchase goods or services. When we receive money, it is called an income. Refer to page 104.

2. Explain that we can use a statement of incomes and expenses to record our money.
3. Show and explain them the components of a statement of incomes and expenses. Explain how to fill in each cell of the statement. Refer to pages 104 to 106.
4. Have the students try Practice on pages 107 to 109 and discuss the answers with them.
5. Assign them to do Exercises J and K in the workbook on pages 85 and 86 as their homework.

19th – 21st hours (Solving problems involving money)

1. Remind them to be extra careful when come to regrouping during addition or subtraction of money. They have to remember the relationship between Baht and Satang.
2. Using the examples on page 110, guide students to solve simple problems. Show that they can draw pictures or use imagination when adding or subtracting. Refer to the examples on pages 110 and 111.
3. Using the examples on page 112, guide students to solve simple word problems. Always emphasize that they have to understand the question first before writing the number sentence and solving it.
4. Ask them to predict if the answer will be more or less. Another way of solving is to engage them to draw a picture for solving problem.
5. Have them try Practice on page 113 and discuss the answers with them.
6. Assign them to do Exercises L and M in the workbook on pages 87 to 89 as their homework.

22nd hour (Conclusion)

1. Get students to tick what they have learned and understood on page 114 (Part L).

2. Guide the whole class to conclude the concept of money by doing a shopping role-play (the role of merchants and buyers). The owner of the shop, the shop assistant and buyers have to create their statements of incomes and expenses too.

Learning materials:

- Primary Education Smart Plus Mathematics Textbook Prathomsuksa 3
- Primary Education Smart Plus Mathematics Workbook Prathomsuksa 3
- Supermarket brochures

Assessment:

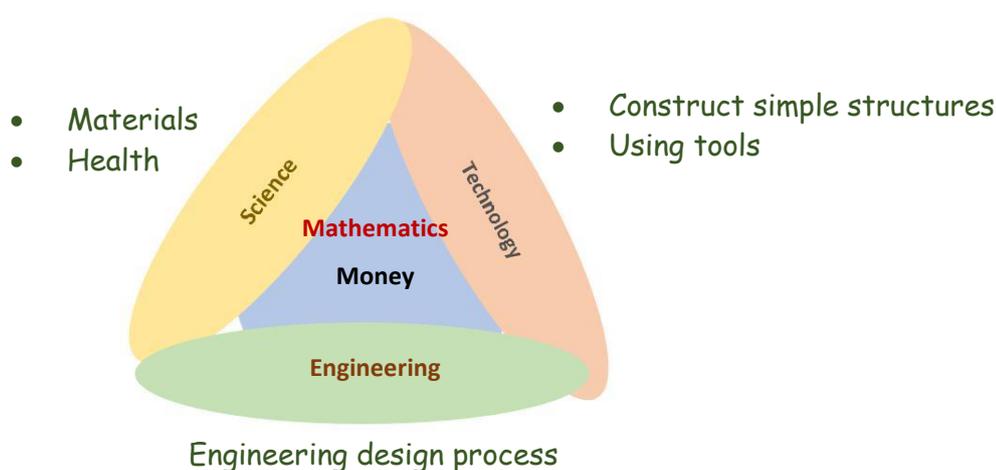
1. To assess cognitive behavior, test on page 114 (Part L column).
2. To assess affective behavior, refer to Scoring Rubric for Affective Domain.
3. To assess thinking process skills, refer to Analytic Scoring Scale and Process-based Scoring Rubrics.

STEM Activity: Be careful!

Overview

In this activity, students will collect data on the common causes of accidents in their school. They will learn how to protect and reduce the causes of injuries and accidents. They are required to create five warning signs with the limited budget of not more than 100 Baht.

Subject integration



Activity Guide

Time: 3 hours

Start up:

1. Divide students into groups of 3 to 4.
2. Talk about their previous STEM activity:
 - (a) What is the process of creating the pizza fraction project? How was it?
 - (b) Are you satisfied? Why?
 - (c) Did you work alone or work with your team members? How was your team?
 - (d) Did your team work collaboratively?
 - (e) What did you help your team? Are you a good team member?

Lesson Development:

1. Let the students read the situation on page 114. Then, guide the whole class to discuss and identify the problem by answering these questions:
 - (a) What will you have to do?
 - (b) What are your missions?
 - (c) What do you need to know to get started?
 - (d) What is the problem of this situation?
2. Encourage students to explore and make connections between science, technology, engineering and mathematics by posing these following questions:
 - (a) Have you seen warning signs before? What are they about?
 - (b) What do you think of the warning signs? Are they useful?
 - (c) Where can you see the warning signs?
 - (d) What kinds of materials are used to make the signs?
 - (e) What are the steps of the engineering design process?
 - (f) Do you need any materials for this construction?
3. Ask the students to think about how to assess their project. Lead them to discuss in class and set their criteria by these following questions:
 - (a) What are the achievement criteria?)A satisfaction survey, etc.(
 - (b)How do we evaluate our success?)Creativity, interesting and beautiful designs, easy to understand, cost etc.(
4. Get students to brainstorm and draw their design. They need to list the materials and label their design. Then, let them execute their plan.
5. After they have finished their work, ask them to assess their warning signs by using the criteria stated in no.3. Teacher may pose these following questions:
 - (a) Did your warning signs meet the criteria?
 - (b) Do you and your team feel satisfied with your work? Why?
 - (c) What works? What does not work?
 - (d) How will you modify your solution to make it better?

6. Let them improve their design. Teacher may point out their weak points and then motivate them to think how to improve it.)Teacher may skip this step due to time constraint and may ask them to explain the need to do so and how to do it instead.(
7. Get each group to prepare a presentation of their work and explain their journey of creating it.)Teacher may suggest them a suitable type of presentation and/or assign them the topics for presentation such as teamwork, the product, the process, the problems, the evaluation, and improvement.(

Conclusion:

1. End the lesson by asking students the following questions:
 - (a) What is the engineering design process? Did you apply the engineering design process into your work?
 - (b) Did each team come up with the same design? Why?
 - (c) Do you think that teamwork is important? Why?
 - (d) What are the key success factors that affect your group work?)Teamwork, creative thinking, etc.(
 - (e) What subject knowledge did you apply into this activity?
 - (f) What are the benefits of this activity?
 - (g) What will happen if you create the warning signs without a proper plan and design?
 - (h) What did you learn from this activity?

Suggested materials:

Different types of cardboard, glue, crayons, scissors, yarn

Assessment:

Refer to Scoring Rubric for STEM Activities

Chapter 8 Time

Time: 20 hours

Strand 2 Measurement & Geometry

Standard M. 2.1

Indicator:

M.2.1 Gr.3/2 Demonstrate the methods of finding answers to word problems involving time and the period of time.

Learning objectives:

- Tell time in o'clock and minutes.
- Read and write time.
- Compare durations of time.
- Read and write records with specified time.
- Find answer to word problems involving time and the duration of time.

Competency:

- Communication capacity
- Problem-solving capacity
- Capacity for applying life skill

Start up:

- Assess students' prior knowledge about time by asking what they knew and what they want to know more about time.
- Ask them to write all their prior knowledge)Part K(on page 116 and have them share what they know about time. Then ask students to write some questions which they want to know)Part W(on page 116.

Teaching/learning activities:

1st – 5th hours (Telling the time)

1. Ask students to identify and differentiate the hour hand and the minute hand using an analog clock. Scan the QR code below and watch the video.



Then, ask these simple questions:

- (a) What is the song about?
 - (b) How many hands are there on a clock? What are they?
 - (c) What are the differences between the hour hand and the minute hand?
2. Introduce students to the 24-hour system. Guide them on how to write and read the time in the 24-hour system using the examples on pages 117 to 119.
 3. Remind them that when writing the time, we can use either a dot or a colon to separate the hours and minutes.
 4. Introduce the 12-hour system. Explain the meaning of a.m. and p.m. and emphasize that they need to indicate a.m. or p.m. when they read and write the time.
 5. Guide the students to read aloud the times of the 12-hour system shown on pages 120 to 122.
 6. Carry out the Activity Corner on page 123.
 7. Draw a few clocks on the board. Then ask a few students to draw the hour hand and the minute hand on each clock including the times of the day such as in the morning, in the afternoon or at night. Have other students to write the time of each clock using a 12-hour system with a.m. and p.m. on the board. Then randomly ask a student to read the time in at least 2 different ways. Get another group to write the times in 24-hour system.
 8. You may repeat the previous activity but ask them to write and tell time on a 12-hour digital clock and on an analog clock.
 9. Have the students try Practice on pages 123 and 124 and discuss the answers with them.

10. Assign them to do Exercises A to C in the workbook on pages 93 to 96 as their homework

6th – 9th hours (Duration of time)

1. Use the examples on pages 125 and 126 to explain how to calculate duration of time.
2. Get them to draw the clocks and count the hours and minutes.
3. Remind students that there are 60 minutes in an hour.
4. Have students try Practice on pages 126 and 127. Discuss the answers with them.
5. Assign them to do Exercise D in the workbook on pages 97 and 98 as their homework.

10th – 13th hours (Comparing the duration of time)

1. Use the examples on pages 128 and 129 to explain how to compare duration of time.
2. Ask them to draw the clocks to count the hours and minutes.
3. Remind students that there are 60 minutes in an hour
4. Have students try Practice on page 130 and discuss the answers with them.
5. Assign them to do Exercise E in the workbook on pages 99 and 100 as their homework.

14th – 16th hours (Reading and writing activity records with specified time)

1. Get them to read and extract information from a schedule (program) on page 131 and ask them:
 - (a) Whose time table is it?
 - (b) What time did she wake up?
 - (c) How long did she have lunch?
2. Ask students to make and answer questions from the schedule.
3. Then, let them try Practice on page 132 and discuss the answers with them.
4. Assign them to do Exercises F and G in the workbook on pages 101 and 102 as their homework.

17th – 19th hours (Solving word problems involving time and the duration of time)

1. Help students recall the relationships of the units of time, minutes and hours.
2. Demonstrate how to solve word problems involving time using the examples on page 133.
3. Remind the students to be extra careful and remember the relationships of the units of time when they regroup the units. Also ask them to draw clocks to make calculation easier.
4. Have the students try Practice on page 134 and discuss the answers with them.
5. Assign them to do Exercise H in the workbook on pages 103 and 104 as their homework.

20th hour (Conclusion)

1. Get students to tick what they have learned and understood on page 134 (Part L).
2. Guide the whole class to conclude the concept of time with these simple activities:
 - Show them an analog clock and ask them to read time in the 12-hour and 24- hour systems.
 - Assign each group to create a diary and some word problems related to the diary. Then, ask other groups to solve them.

Learning materials:

- Primary Education Smart Plus Mathematics Textbook Prathomsuksa 3
- Primary Education Smart Plus Mathematics Workbook Prathomsuksa 3
- Analog and digital clocks

Assessment:

1. To assess cognitive behavior, test on page 134 (Part L column).
2. To assess affective behavior, refer to Scoring Rubric for Affective Domain.
3. To assess thinking process skills, refer to Analytic Scoring Scale and Process-based Scoring Rubrics.

Chapter 9 Length

Time: 17 hours

Strand 2 Measurement & Geometry

Standard M.2.1

Indicators:

M.2.1 Gr.3/3 Use appropriate measurement tools to measure and tell length of various objects in centimeters and millimeters, meters and centimeters.

M.2.1 Gr.3/4 Estimate length in meters and centimeters.

M.2.1 Gr.3/5 Compare the length between centimeters and millimeters, meters and centimeters, kilometers and meters in various situations.

M.2.1 Gr.3/6 Demonstrate the methods of finding answers to word problems involving length in centimeters and millimeters, meters and centimeters, kilometers and meters.

Learning objectives:

- Measure and compare lengths using standard units.
- Choose the appropriate measuring tools.
- Estimate length in meters and centimeters.
- Compare lengths.
- Solve word problems involving length.

Competency:

- Thinking capacity
- Problem-solving capacity
- Capacity for applying life skill
- Technological application capacity

Start up:

- Assess students' prior knowledge about length by asking what they knew and what they want to know more about length.
- Ask them to write all their prior knowledge)Part K(on page 135 and have them share what they know about length. Then ask students to write some questions which they want to know)Part W(on page 135.

Teaching/learning activities:

1st – 4th hours (Measuring length)

1. Challenge students to think by asking them some questions such as:
My house is 5 meters tall. The tree is 600 centimeters tall and the pole is 550 centimeters tall. Which is the tallest?
2. Ask students for the standard measuring tools for measuring lengths that they usually use such as meter rulers, rulers, measuring tapes and metal measuring tapes.
3. Guide them to realize the appropriate measuring tools for measuring different things such as the length of the classroom, the height of a boy, the length of a pencil and the thickness of an eraser.
4. Get a few items for students to measure in millimeters, centimeters and meters, such as a cupboard, a board, a book and an eraser.
5. Use the examples on pages 136 to 138 for further explanation.
6. Carry out Activity Corner on page 139.
7. Explain units of length that are the kilometers and meters, how to measure and the appropriate measuring tools to use.
8. Use the examples on pages 140 for further explanation
9. Have students try Practice on pages 141 and 142 and discuss the answers with them.
10. Assign students to do Exercises A to D in the workbook on pages 108 to 111 as their homework.

5th – 7th hours (Estimating length in meters and centimeters)

1. Explain the concept of estimation of length and use the examples on page 143 and 144 for more understanding.
2. Then, let students practice estimating length of objects around them or distances with proper units of length.
3. Have students try Practice on page 145 and discuss the answers with them.
4. Assign students to do Exercise E in the workbook on page 112 as their homework.

8th – 10th hours (Relationships between units of length)

1. Remind students of using the proper measuring tools in different situations such as measuring the length of the football field, the length of a scout rope and the height of a shelf.
2. Ask them to list the units of length and their relationships.
3. Use the examples on page 146 to explain.
4. Guide them on how to convert between the units of length using the examples on pages 146.
5. Have a quiz. Divide the class into two groups. Write a few measurements with different units of length on the board and ask them to convert either to a larger unit or a smaller unit within a time frame. The group with the most correct answers wins.
6. Ask them to answer the question in let's Think on page 147.
7. Ask the students to try Practice on page 147 and discuss the answers with them.
8. Assign them to complete Exercise F in the workbook on pages 113 as their homework.

11th - 13th hours (Comparing lengths)

1. Have students compare the lengths of the items in the classroom and ask them these following questions:
 - (a) Which one is higher/ taller?
 - (b) Which one is shorter?

(c) Which one is the highest/ tallest?

(d) Which one is the shortest?

2. Demonstrate how to compare and convert units of length by using the examples on pages 148 to 150.
3. Ask the students to try Practice on pages 150 and 151 and carry out Activity Corner on page 151. Then, discuss the answers with them.
4. Assign them to do Exercises G to I in the workbook on pages 114 and 115 as their homework.

14th – 16th hours (Solving word problems involving length)

1. Guide students on how to solve word problems involving length on pages 152 and 153.
2. When solving word problems involving length, remind them to be careful about the relationships and conversions between units of length.
3. Have the students try Practice on pages 153 and 154 and discuss the answers with them.
4. Assign them to complete Exercise J in the workbook on pages 116 and 117 as their homework.

17th hour (Conclusion)

1. Get students to tick what they have learned and understood on page 155)Part L(
2. Guide the whole class to conclude the concept of length with these simple activities:
 - Ask students to suggest the appropriate units for measuring the length of a paper clip, a pencil, a jump rope and a football field. Ask them to explain their suggestions.
 - Give students some objects of different lengths and ask them to measure in meters and/or in centimeters and/or millimeters. Have them compare them using the vocabulary of comparison.

- Let them create their own word problems involving length. Then, ask them to find out the answers.

Learning materials:

- Primary Education Smart Plus Mathematics Textbook Prathomsuksa 3
- Primary Education Smart Plus Mathematics Workbook Prathomsuksa 3
- Some standard measuring tools for length such as meter rulers, rulers, measuring tapes and metal measuring tapes
- A variety of objects such as clips, erasers, books, pencils, ropes and tables

Assessment:

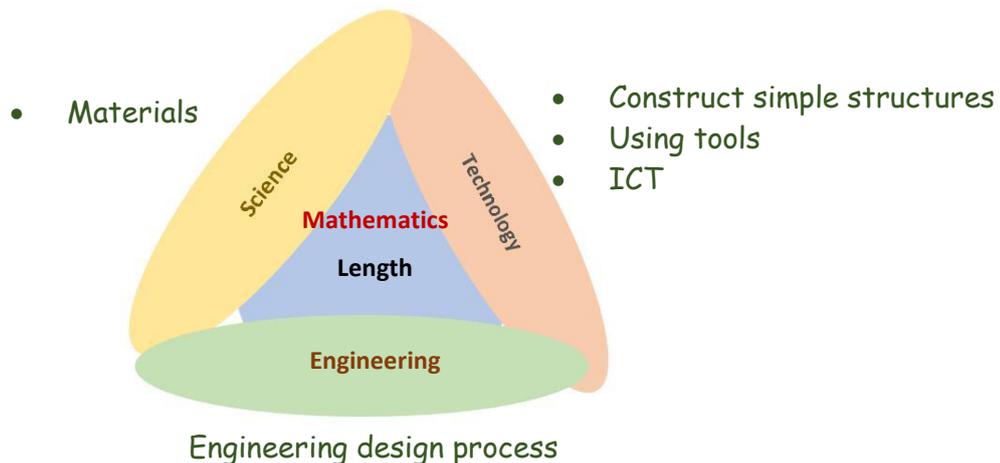
1. To assess cognitive behavior, test on page 155 (Part L column).
2. To assess affective behavior, refer to Scoring Rubric for Affective Domain.
3. To assess thinking process skills, refer to Analytic Scoring Scale and Process-based Scoring Rubrics.

STEM Activity: Pipe cleaners)part 1(

Overview

In this activity, students will learn and explore how engineers work. Engineers are the people who design, construct and maintain structures, materials and systems while considering the limitations imposed by practicality, regulation, safety and cost. Students are required to design and construct the tallest freestanding structure by using only 15 pipe cleaners. They will be challenged with limited materials.

Subject integration



Activity Guide

Time: 3 hours

Start up:

1. Introduce students to what an engineer does with this video clip.



2. Divide students into groups of 3 to 4.
3. Talk about their previous STEM activities with these sample questions:

- What is an engineer? How many questions do engineers have to ask themselves before starting their work?
- How many types of engineer are there? What types of engineering are you interested in? Why?
- What is the main job of engineers?
- Have you ever acted as an engineer before? What did you do?
- Did you work alone or work as a team?
- What did you help your team? Are you a good team member? How?

Lesson Development:

1. Let students read the situation on page 155 Then, guide the whole class to discuss and identify the problem by answering to these questions:
 - (a) What is the situation about?
 - (b) What will you have to do?
 - (c) What are your missions?
 - (d) What do you need to know to get started?
2. Encourage students to explore and make connections between science, technology, engineering and mathematics by watching a video clip here.



Then, pose some of these following questions to guide and motivate them:

- (a) If you want to construct a strong and high structure, what do you have to consider?
- (b) Think about the shape of your structure. How will its top and bottom be like?
- (c) What shape will enable the structure to stand firmly - triangle, square or other shapes? Why?

- (d) What conclusion can be drawn after watching this video clip?
 - (e) What are the factors of success or failure in your last work?
 - (f) What did you learn from your failures?
 - (g) What shape should you design for your structure?
 - (h) What is your limited material in this activity?
 - (i) What is the meaning of freestanding?
 - (j) What are the properties of pipe cleaners?
 - (k) Can you use other materials?
 - (l) What are your challenges in this activity?
 - (m) Can you search for more information about pipe cleaner structures?
 - (n) How do you measure your pipe cleaner structure? What is an appropriate tool and standard unit to measure length?
- 3.** Ask the students to think about how to assess their project. Guide them to discuss in class and set their criteria by these following questions:
- (a) What are the achievement criteria?)The height of the structure, finish on time, strength, etc.(
 - (b) How do you evaluate your success?)The accuracy of measuring length and time, teamwork, creativity(
- 4.** Get students to brainstorm and draw their design. They need to list the materials and label their design. Then, let them execute their plan.
- 5.** After they have finished their work, ask them to assess their pipe cleaner structure by using the criteria stated in no.3. Teacher may pose these following questions:
- (a) Did your work meet the criteria?
 - (b) What works? What does not work?
 - (c) How will you modify your solution to make it better?
- 6.** Let them improve their design. Point out their weak points and then motivate them to think about how to improve it.)Teacher may skip this step due to time constraint and may ask them to explain the need to do so and how to do it instead.(

7. Get each group to prepare a presentation of their work and explain their journey of creating it.)Teacher may suggest them a suitable type of presentation and/or assign them the topics for presentation such as team members, product, journey of their works, problems, how to test and improvement.(

Conclusion:

1. End the lesson by asking students the following questions:
- (a) Do you think that you have acted as an engineer? Why?
 - (b) What is the engineering design process?
 - (c) Did you apply the engineering design process into your work?
 - (d) Did each team come up with the same design? Why?
 - (e) What subject knowledge did you apply into this activity?
 - (f) What did you learn from this activity?
 - (g) What are the key success factors that affect your group work?)Teamwork, creative thinking, etc.(
 - (h) What will happen if you build the pipe cleaner structure without a proper plan and design?

Suggested materials:

15 pipe cleaners

Assessment:

Refer to Scoring Rubric for STEM Activities

Chapter 10 Mass

Time: 15 hours

Strand Measurement & Geometry

Standard M.2.1

Indicators:

M.2.1 Gr.3/7 Choose appropriate weighing machines, measure and tell weight in kilograms and kheids, kilograms and grams.

M.2.1 Gr.3/8 Estimate weight in kilograms and kheids.

M.2.1 Gr.3/9 Compare weight between kilograms and grams, metric tons and kilograms in various situations.

M.2.1 Gr.3/10 Demonstrate the methods of finding answers to word problems involving weight in kilograms and grams, metric tons and kilograms.

Learning objectives:

- Choose the appropriate measuring tools.
- Estimate mass in kilograms and kheids.
- Measure and compare masses using standard units.
- Solve word problems involving mass.

Competency:

- Communication capacity
- Thinking capacity
- Problem-solving capacity
- Capacity for applying life skill
- Capacity for technological application

Start up:

- Assess students' prior knowledge about mass by asking what they knew and what they want to know more about mass.
- Ask students to write all their prior knowledge)Part K(on page 157 and have students share what they know about mass. Then ask students to write some questions which they want to know)Part W(on page 157.

Teaching/learning activities:

1st – 2nd hours (Choosing appropriate weighing scales)

1. Show students some standard measuring tools for mass such as balance scales, spring scales, bathroom scales, platform scales and digital scales, and discuss their properties with them.
2. Demonstrate how to use the suitable scales to measure masses of different objects such as a chair, a boy, a pencil and a book. Refer to page 158.
3. Ask the students to try Practice on page 158 and discuss the answers with them.
4. Assign them to do Exercise A in the workbook on page 120 as their homework.

3rd – 5th hours (Estimating mass in kilograms and kheeds)

1. Explain the concept of estimation of mass and use the examples on page 159 and 160 for explanation.
2. Then, let students practice estimating the masses of objects around them with proper units of mass.
3. Have students try Practice on page 161 and discuss the answers with them.
4. Assign students to do Exercises B and C in the workbook on pages 121 and 122 as their homework.

6th – 8th hours (Relationships between units of mass)

1. Remind students of the relationships between units of mass, such as kilograms, grams, kheeds and hectograms.

2. Guide them to convert between units of mass using the examples on pages 162 and 163.
3. Have a quiz. Divide the class into two groups. Write measurements using different units of mass on the board and ask them to convert either to a larger unit or a smaller unit within a time frame. The group with the most correct answers wins.
4. Let the students try Practice on page 163 and discuss the answers with them.
5. Assign them to complete Exercise D in the workbook on page 123 as their homework.

9th – 11th hours (Comparing masses)

1. Ask students to compare the masses of the items in the classroom. Which one is heavier? Which one is lighter?
2. Demonstrate how to compare and convert units of masses by using the examples on pages 164 to 166.
3. Ask the students to try Practice on pages 166 and 167. Then, discuss the answers with them.
4. Assign them to complete Exercises E and F in the workbook on pages 124 and 125 as their homework.

12th – 14th hours (Solving word problems involving mass)

1. Guide students on how to solve word problems involving addition and subtraction of masses step by step using the examples on page 168.
2. Always emphasize that they have to understand the question first before writing the number sentence and solving it.
3. Have the students try Practice on page 169 and discuss the answers with them.
4. Assign them to do Exercise G in the workbook on pages 126 and 127 as their homework.

15th hour (Conclusion)

1. Get students to tick what they have learned and understood on page 170 (Part L).
2. Guide the whole class to conclude the concept of mass with these simple activities:
 - Ask students to solve some word problems involving mass. For example:
Dang buys a bag of oranges and a bag of apples. The total mass of the fruits is 3 kg. If the oranges weigh 1 kg, what is the mass of the apples? Which type of fruits is lighter?
 - Give them some objects with different masses and ask them to measure in kilograms and/or in grams and /or in kheeds or hectograms. Let them compare the masses using the vocabulary of comparison.
 - Let them create their own word problems involving addition and subtraction of masses. Then, ask them to find out the answers.
 - Have them work in pairs. One should give two numbers and another one should create a word problem involving mass based on the given numbers.

Learning materials:

- Primary Education Smart Plus Mathematics Textbook Prathomsuksa 3
- Primary Education Smart Plus Mathematics Workbook Prathomsuksa 3
- Some standard measuring tools for mass such as the balance scales, spring scales, bathroom scales, platform scales and digital scales
- A variety of objects such as pencils, books and chairs

Assessment:

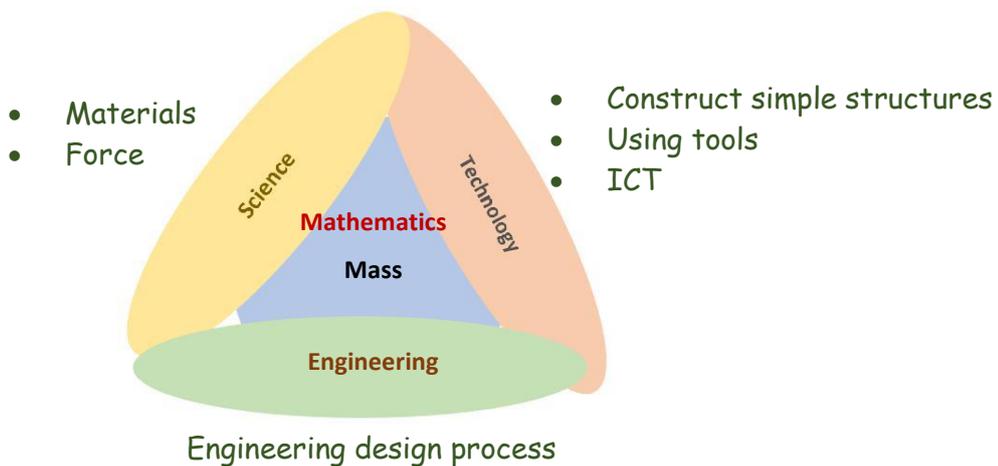
1. To assess cognitive behavior, test on page 170 (Part L column).
2. To assess affective behavior, refer to Scoring Rubric for Affective Domain.
3. To assess thinking process skills, refer to Analytic Scoring Scale and Process-based Scoring Rubrics.

STEM Activity: Pipe cleaners)part 2(

Overview

Students will learn and have more understanding of the engineering design process which is an iterative process. In this activity, they will continue their work from the previous chapter and repeat the steps as many times as they need in order to make improvements. At the same time, they will gain new experiences and keep learning from failures. They are required to design and create a stronger pipe cleaner structure which is able to support thirty 1- Baht coins at least 5 cm above the table for 5 minutes.

Subject integration



Activity Guide

Time: 3 hours

Start up:

1. Divide students into groups of 3 to 4 students. Assign students to work with the same group.
2. Talk about their previous STEM activity by asking the following questions:
 - What was the process of creating a pipe cleaner structure? How was it?
 - Are you satisfied with your work? Why? Why not?
 - Did you work alone or work as a team? How was your team?
 - Did your team work collaboratively?
 - What did you help your team? Are you a good team member?

Lesson Development:

1. Let students read the situation on page 170. Then, guide the whole class to discuss and identify the problem by answering to these questions:
 - (a) What will you have to do?
 - (b) What are your missions?
 - (c) What do you need to know to get started?
 - (d) What is the problem of this situation?
2. Remind them of the knowledge of how to build a strong construction. Then encourage students to explore and make connections between science, technology, engineering and mathematics by using some of these following questions:
 - (a) If you want to make a tall structure stable, what do you have to consider?
 - (b) Think about the shape of your structure. How will its top and bottom be like?
 - (c) What shape will enable the structure to stand firmly - triangle, square or other shapes? Why?
 - (d) What are the factors of success or failure in your last work?
 - (e) What did you learn from your failures?
 - (f) What points should you improve?
 - (g) What shape should you design for a stronger structure?
 - (h) What kind of structure can hold the weight of thirty 1-Baht coins?
 - (i) What is your limited material in this activity?
 - (j) Can you use other materials?
 - (k) What are your new challenges in this activity?
 - (l) Can you search for more information about pipe cleaner structures?
 - (m) How do you measure the mass of 1-Baht coin and thirty 1-Baht coins? What are the appropriate measuring tool and the standard unit?
3. Ask students to think about how to assess their project. Lead them to discuss in class and set their criteria with these following questions:
 - (a) What are the achievement criteria?)The strength of the structure, how much weight can it hold? how long can it support? etc.(

- (b) How do we evaluate our success?)The accuracy of measuring the mass and time, teamwork, creativity.(
4. Get students to brainstorm and draw their design. They need to list the materials and label their design. Then, let them execute their plan.
 5. After they have finished their work, ask them to assess their new pipe cleaner structure by using the criteria stated in no.3. Pose these following questions:
 - (a) Did your work meet the criteria?
 - (b) Can it stand freely and firmly?
 - (c) What is the maximum weight that it can hold?
 - (d) Can you figure out the weak points of the structure?
 - (e) Do you and your team feel satisfied with your work? Why?
 - (f) What works? What does not work?
 - (g) How will you modify your solution to make it better?
 6. Let them improve their design. Point out their weak points and then motivate them to think about how to improve it.)Teacher may skip this step due to time constraint and may ask them to explain the need to do so and how to do it instead.(
 7. Get each group to prepare a presentation of their work and explain their journey of creating it.)Teacher may suggest them a suitable type of presentation and/or assign them the topics for presentation such as team members, product, journey of their works, problems, how to test and improvement.(

Conclusion:

1. End the lesson by asking students the following questions:
 - (a) Did you apply the engineering design process into your work?
 - (b) Did each team come up with the same design? Why?
 - (c) What are the key success factors that affect your group work?)Teamwork, creative thinking, etc.(
 - (d) What subject knowledge did you apply into this activity?

- (e) What will happen if you build the pipe cleaner structure without a proper plan and design?
- (f) What did you learn from this activity?

Suggested materials:

15 pipe cleaners, 30 1-Baht coins

Assessment:

Refer to Scoring Rubric for STEM Activities

Chapter 11 Volume and capacity

Time: 15 hours

Strand 2 Measurement & Geometry

Standard M.2.1

Indicators:

M.2.1 Gr.3/11 Choose appropriate measuring tools, measure and compare volume and capacity in liters and milliliters.

M.2.1 Gr.3/12 Estimate volume and capacity in liters.

M.2.1 Gr.3/13 Demonstrate the methods of finding answers to word problems involving volume and capacity in liters and milliliters.

Learning objectives:

- Measure and compare volumes.
- Measure and compare capacities.
- Choose the appropriate measuring tools.
- Estimate volume and capacity.
- Solve word problems involving volume and capacity.

Competency:

- Thinking capacity
- Problem-solving capacity
- Capacity for applying life skill

Start up:

- Assess students' prior knowledge about volume and capacity by asking what they knew and what they want to know more about volume and capacity.
- Ask them to write all their prior knowledge)Part K(on page 172 and have them share what they know about volume and capacity. Then ask students to write some questions which they want to know)Part W(on page 172.

Teaching/learning activities:

1st – 3rd hours (Measuring volume and capacity in liters and milliliters)

1. Briefly explain what volume is by filling containers of different shapes and sizes such as bottles, canisters, jugs and bowls with different amounts of water. Then ask them:
 - (a) Which container has the largest volume of water?
 - (b) Which container has the smallest volume of water?
2. Remind students of the unit used to measure the volume of a liquid and its abbreviation. Show them some standard measuring tools such as the measuring spoons, measuring cups, measuring cylinders and beakers.
3. Introduce 'milliliter' as a unit of measurement for liquid and its abbreviation. Show them the relationship between liter and milliliter.
4. Refer to pages 173 to 175 for guidance on measuring volume of liquid.
5. Guide students to recall the meaning of capacity. What is the difference between 'volume' and 'capacity'? Refer to page 176.
6. Guide students to measure the capacity of containers by referring to pages 176 and 177.
7. Ask the students to measure the volumes of liquids in different containers such as jugs and bowls using standard measuring tools in liters and milliliters and also their capacities.
8. Have students try Practice on page 178 and 179 and discuss the answers with them.

9. Assign them to do Exercises A to D in the workbook on pages 130 to 133 as their homework

4th – 6th hours (Estimating volume and capacity in liters)

1. We can estimate the volume of liquid by comparing it to the known volume of other liquids or to the known capacity of its container. We can also estimate the capacity of a container with its known volume of liquid in it.
2. Explain the concept of estimation of volume and capacity. Use the examples on page 180 and 181 for more understanding.
3. Then, let students practice estimating the volume and capacity around them by comparing it to the known volume of other liquids.
4. Carry out Activity Corner on pages 181 and 182.
5. Have students try Practice on page 182 and then discuss the answers with them.
6. Assign students to do Exercises E and F in the workbook on pages 134 and 135 as their homework.

7th – 8th hours (Relationships between units of volume)

1. Introduce the relationships between units of volume and their abbreviations such as liters (l), milliliters (ml), teaspoon, tablespoon, metric cup. Refer to page 183.
2. Demonstrate how to convert units of volume step by step. Refer to page 183.
3. Have students try Practice on page 183 and discuss the answers with them.
4. Assign students to do Exercise G in the workbook on page 136 as their homework.

9th – 11th hours (Comparing volumes and capacities)

1. Have students measure and compare the volumes of water in different containers and ask them these questions:
 - (a) Which one has more water?
 - (b) Which one has less water?

2. Use the examples on pages 184 and 185 to explain further on comparison of volumes in liters and milliliters.
3. Use the examples on pages 185 and 186 to explain further on comparison of volumes in teaspoons, tablespoons, metric cups and milliliters.
4. Explain further on comparing capacities in liters and milliliters using the examples on page 187.
5. Explain more in detail of comparing capacities in teaspoons, tablespoons, metric cups and milliliters using the examples on page 188.
6. Ask students to try Practice on pages 189 and 190. Discuss the answers with them.
7. Assign them to do Exercises H to K in the workbook on pages 137 to 140 as their homework.

12th - 14th hours (Solving word problems involving volume and capacity)

1. Guide students to solve word problems involving volume and capacity step by step using the examples on page 191.
2. Always emphasize that they have to understand the question first before writing the number sentence and solving it.
3. Have the students try Practice on page 192 and discuss the answers with them.
4. Assign them to do Exercise L in the workbook on pages 141 and 142 as their homework.

15th hours (Conclusion)

1. Get students to tick what they have learned and understood on page 192 (Part L).
2. Guide the whole class to conclude the concepts of volume and capacity with these simple activities:
 - (a) Fill some containers of different shapes and sizes with different amounts of water and ask students these questions:
Which container has the greatest capacity? Why?
How do you know?

- (b) Give students a few different types of word problems and ask them to solve on the board.

Learning Materials:

- Primary Education Smart Plus Mathematics Textbook Prathomsuksa 3
- Primary Education Smart Plus Mathematics Workbook Prathomsuksa 3
- Some standard measuring tools such as measuring spoons, measuring cups, measuring cylinders and beakers
- Some different containers of water such as jugs, bowls and bottles

Assessment:

1. To assess cognitive behavior, test on page 192 (Part L column).
2. To assess affective behavior, refer to Scoring Rubric for Affective Domain.
3. To assess thinking process skills, refer to Analytic Scoring Scale and Process-based Scoring Rubrics.

Chapter 12 Shapes and symmetry

Time: 5 hours

Strand 2 Measurement & Geometry

Standard M.2.2

Indicator:

M.2.2 Gr.3/1 Identify two-dimensional geometric figures with axis of symmetry and numbers of axis of symmetry.

Learning objective:

- Understand and identify two-dimensional geometric figures with axis of symmetry and numbers of axis of symmetry.

Competency:

- Problem-solving capacity
- Capacity for applying life skill

Start up:

- Assess students' prior knowledge about shapes and symmetry by asking what they knew and what they want to know more about shapes and symmetry.
- Ask them to write all their prior knowledge)Part K(on page 193 and have them share what they know about shapes and symmetry. Then ask students to write some questions which they want to know)Part W(on page 193.

Teaching/learning activities:

1st – 2nd hours (Lines of symmetry)

1. The line that divides/folds the cut-out into two is the line of symmetry. Some of the objects around us have symmetrical shapes. Explain symmetrical shapes and lines of symmetry by using the examples on page 194.
2. Carry out Activity Corner on page 195.
3. Show students that certain shapes can have more than one line of symmetry. Use a square or an equilateral triangle to prove it.
4. Ask students to try Practice on page 196 and discuss the answers with them.
5. Ask students to answer the question in Let's Think on page 196.
6. Assign them to complete Exercises A to C in the workbook on pages 144 to 146 as their homework.

3rd – 4th hours (Number of lines of symmetry)

1. A symmetrical shape may have one or more line of symmetry. Show students some examples on page 197.
2. Follow the instructions in Activity Corner on page 197 and ask them to present their work to the class.
3. Have the students try Practice on page 198. Then, discuss the answers with them.
4. Ask students to answer the question in Let's Think on page 198.
5. Assign them to complete Exercises D and E in the workbook on pages 147 and 148 as their homework.

5th hour (Conclusion)

1. Get students to tick what they have learned and understood on page 198)Part L(
2. Guide the whole class to conclude the concept of symmetry by asking them to give some examples of symmetrical shapes in the nature such as trees, flowers, fruits and animals.

Learning materials:

- Primary Education Smart Plus Mathematics Textbook Prathomsuksa 3
- Primary Education Smart Plus Mathematics Workbook Prathomsuksa 3
- Varieties of shapes and figures

Assessment:

1. To assess cognitive behavior, test on page 198 (Part L column).
2. To assess affective behavior, refer to Scoring Rubric for Affective Domain.
3. To assess thinking process skills, refer to Analytic Scoring Scale and Process-based Scoring Rubrics.

Chapter 13 Data analysis and presentation

Time: 10 hours

Strand 3: Statistics and probability

Standard M. 3.1

Indicators:

M.3.1 Gr.3/1 Draw pictograms and use data from pictograms to solve word problems.

M.3.1 Gr.3/2 Write one-way table from data which are cardinal numbers and using the data from one-way table to find the answers to word problems.

Learning objectives:

- Collect and analyze data.
- Read and draw pictograms.
- Use data from pictograms to solve word problems.
- Read and write one-way table.
- Use the data from one-way table to find the answers to word problems.

Competency:

- Communication capacity
- Problem-solving capacity
- Capacity for applying life skill

Start up:

- Assess students' prior knowledge about data analysis and presentation by asking what they knew and what they want to know more about data analysis and presentation.
- Ask them to write all their prior knowledge)Part K(on page 199 and have them share what they know about data analysis and presentation. Then ask students to write some questions which they want to know)Part W(on page 199.

Teaching/learning activities:

1st – 3rd hours (Collecting and categorizing data)

1. Lead the lesson by asking them some questions about collecting data such as:
 - (a) How do we know the number of our classmates who like swimming?
 - (b) Do you agree if I said that all of you like swimming as a hobby? Why?
 - (c) How can you find out the hobbies of our classmates?
 - (d) How do we know the answers? How do we show all of the answers?
2. Use the examples shown on page 200 to explain how to collect data step by step.
3. Demonstrate how to sort and classify data using the tally method after collecting data. Use the example on page 201.
4. Guide them on how to organize data in a table and then ask them to analyze the data in a table.
5. Ask the students to collect the data regarding their favorite fruits. Get them to repeat the steps and analyze data that they have collected.
6. Have the students try Practice on pages 202 and 203 and discuss the answers with them.
7. Assign them to do Exercise A in the workbook on page 151 as their homework.

4th – 6th hours (Reading and drawing pictograms)

1. Use the example on page 204 to explain about pictograms.
2. Emphasize that the picture used in a pictogram represents a quantity. For instance, in this pictogram, each picture represents 20 boys.
3. Guide students to analyze the pictogram on page 205.
4. Guide students to draw pictograms. Use the example on page 206 to explain how to construct a pictogram with given information step by step. Explain them about the components of pictogram such as the title of pictogram, symbols or pictures and key to the pictogram.
5. Have the students try Practice on 207 to 209 and discuss the answers with them.
6. Assign them to complete Exercises B to F in the workbook on pages 152 to 156 as their homework.

7th – 9th hours (One-way tables)

1. A one-way table displays the information for a single categorical data. Tabulated data enables us to examine the details and make comparisons easily. Guide students on how to extract information from the table by using example on page 210.
2. We can present data in the form of a table. Ask students to collect data of their favorite ice cream, then teach them how to present the data in the form of a table step by step. Then, ask students to create word problem based the table. Get some students to find out the answers.
3. For more understanding of how to present data in a one-way table, ask students to use the data regarding their favorite fruit to develop a one-way table.
4. Have students try Practice on page 211 and discuss the answers with them.
5. Assign them to complete Exercises G and H in the workbook on pages 157 and 158 as their homework.

10th hour (Conclusion)

1. Get students to tick what they have learned and understood on page 211)Part L(.
2. Guide the whole class to conclude the concept of data analysis and presentation with these simple activities:

Get students into groups of 4 and ask them to collect data on their favorite subjects or on other topics by interviewing other students. They have to present their data in a pictogram or a one-way table. Encourage them to extract the information from the data as much as possible.

Learning materials:

- Primary Education Smart Plus Mathematics Textbook Prathomsuksa 3
- Primary Education Smart Plus Mathematics Workbook Prathomsuksa 3
- Examples of pictograms and one-way tables

Assessment:

1. To assess cognitive behavior, test on page 211 (Part L column).
2. To assess affective behavior, refer to Scoring Rubric for Affective Domain.
3. To assess thinking process skills, refer to Analytic Scoring Scale and Process-based Scoring Rubrics.

Scoring Rubric for Affective Domain

Skill	Needs improvement (1)	Partially proficient (2)	Proficient (3)	Advanced (4)
Self-motivation	Consistently fail to meet established deadlines	Take initiative to complete assignments and improve or correct behaviors	Occasionally complete and turn in assignments before the scheduled deadline	Never miss a deadline and often complete assignments well ahead of deadlines
Communication	Unable to speak or write clearly and is unable to correct their behaviors despite intervention by instructors, does not actively listen	Needs work to speak or write clearly, sometimes able to identify alternative communication strategies	Speak clearly, write legibly, listen actively, and adjust communication strategies to various situations	Comfortable utilize a variety of communication styles, write legibly, speak clearly, and listen actively
Teamwork	Manipulate the team or act with disregard to the team, disrespectful to team members, resistant to change or refuse to cooperate in attempts to work out solutions	Sometimes act for personal interest at the expense of the team, act independent of the team or appear non-supportive, and occasionally unwilling to work out a solution	Place the success of the team above self-interest, do not undermine the team, help and support other team members, and show respect for all team members	Place success of the team above self-interest, take a leadership role and use good management skills while leading, and involve all team members in the decision-making process
Neatness	The work appears sloppy and unorganized. It is hard to know what information goes together	The work is organized but may be hard to read at times	The work is neat and organized. It is easy to read	The work is neat, clear, and organized. It is easy to read
Completion	Most of the work is not complete even additional time or suggestions were given	Some work is not complete and need additional suggestions	Some work is not complete and need additional time	All works are complete
Responsibility	Always relies on others to complete assignments	Rarely does the work and needs constant reminders to stay on task	Usually does the work and seldom needs reminders to stay on task	Always does assigned work without being reminded

Analytic Scoring Scale

Understanding the problem	2 points Complete understanding of the problem 1 point Part of the problem misunderstood or misinterpreted 0 point Complete misunderstanding of the problem
Planning a solution	2 points Plan could have led to a correct solution if implemented 1 point Partially correct plan based on part of the problem being interpreted correctly 0 point No attempt or totally inappropriate plan
Getting an answer	2 points Correct answer 1 point Copying error, computational error, partial answer for a problem with multiple answers 0 point No answer or wrong answer based on an inappropriate plan

*The analytic scoring scale from Charles, R., Lester, F., & O'Daffer, P. (1987). How to evaluate progress in problem-solving, Reston, VA: National Council of Teachers of Mathematics retrieve from *Assessing Students' Mathematical Problem-Solving and Problem-Posing Skills*. Available from: https://www.researchgate.net/publication/269519904_Assessing_Students'_Mathematical_Problem-Solving_and_Problem-Posing_Skills [accessed May 19 2019].

Process-based Scoring Rubric

Understanding the concept	4 points Complete understanding 2 points Some understanding 1 point Poor understanding
Solution of the problem	4 points All correct 2 points Partially correct 1 point Attempted to solve
Creativity of the problem	4 points Completely different from the text 2 points Somewhat different from the text 1 point Comparable to types in text
Solution of partner's problem	4 points All correct 2 points Partially correct 1 point Attempted to solve

* The process-based scoring rubric from Kulm, G. (1994). Mathematics assessment: What works in the classroom. San Francisco, CA: Jossey Bass Inc. Permission pending Available from: https://www.researchgate.net/publication/269519904_Assessing_Students'_Mathematical_Problem-Solving_and_Problem-Posing_Skills [accessed May 19 2019].

Scoring Rubric for STEM Activities

Skill	Needs improvement (1)	Partially proficient (2)	Proficient (3)	Advanced (4)
Creativity	The project has little creative and unique aspects	The project has some creative and unique aspects	The project adequate has creative and unique aspects	The project has plenty of creative and unique aspects
Communication and collaboration	The information is not organized. Data is presented inaccurately. There is no drawing plan	Some information is clear and organized. There is a drawing plan without any label	Most information is clear and organized. There is a clearly labelled drawing plan	All information and data are clear and organized. They are presented accurately. There is a clearly labelled drawing plan
Technology operations	No technological resource was used in the project or was used incorrectly	Little technological resource was used in the project or was not used correctly	Technological resource was used in the project correctly	Multiple technological resources were used appropriately
Teamwork	Pupils demonstrate no cooperation, courtesy, enthusiasm, confidence, and accuracy	Pupils demonstrate little cooperation, courtesy, enthusiasm, confidence, and accuracy	Most pupils demonstrate some cooperation, courtesy, enthusiasm, confidence, and accuracy	All pupils demonstrate high level of cooperation, courtesy, enthusiasm, confidence, and accuracy
Presentation	Presentation lacks detail needed to understand the team's solution	Presentation provides adequate explanation of how the solution was developed and how it works	Presentation or visual aids provide clear, effective, and creative explanation of how solution was developed and how it works	Presentation and visual aids provide very clear, effective, and creative explanation of how solution was developed and how it works