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DepED
DEPARTMENT OF EDUCATION

Lesson Exemplar for Mathematics

Quarter 4
Lesson
6

Lesson Exemplar for Mathematics Grade 8
Quarter 4: Lesson 6 (Week 6)
SY 2025-2026

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I. CURRICULUM CONTENT, STANDARDS, AND LESSON COMPETENCIES	
A. Content Standards	Learners demonstrate knowledge and understanding of … 1. measures of variability for ungrouped data. 2. interpretation and analysis of graphs from primary and secondary data. 3. experimental and theoretical probability. 4. the Fundamental Counting Principle.
B. Performance Standards	By the end of the quarter, the learners are able to … 1. calculate measures of variability for ungrouped data. (DP) 2. interpret and analyze graphs from primary and secondary data. (DP) 3. determine the number of possible outcomes of an experiment using the Fundamental Counting Principle. (DP) 4. calculate the probability of a single event and the probability of simple combined events. (DP)
C. Learning Competencies and Objectives	***Learning Competency*** By the end of the lesson, the learners are able to 1. use the Fundamental Counting Principle (FCP) to determine the number of possible outcomes of an experiment 2. solve problems involving FCP
D. Content	Fundamental Counting Principle Problems Involving FCP
E. Integration	Optional

II. LEARNING RESOURCES
CK-12. Applying the Fundamental Counting Principle. https://flexbooks.ck12.org/cbook/ck-12-conceptos-de-matem%C3%A1ticas-de-la-escuela-secundaria-grado-7-en-espa%C3%B1ol/section/12.10/related/lesson/applying-the-fundamental-counting-principle-alg-ii/ Cuemath. Fundamental Counting Principle. https://www.cuemath.com/data/fundamental-counting-principle/ Study.com. Fundamental Counting Principle. https://study.com/learn/lesson/fundamental-counting-principle-examples-formula-rules.html Walpole, R. E., (2003). Introduction to Statistics. 3rd Edition. Pearson. Prentice Hall.

III. TEACHING AND LEARNING PROCEDURE		NOTES TO TEACHERS
A. Activating Prior Knowledge	**DAY 1** **1. Short Review** Instruction: Multiply the following numbers. 1) 6 x 8 x 15 = — 1. 720 2) 7 x 4 x 16 = — 2. 448 3) 24 x 12 x 8 = — 3. 2,304 4) 16 x 28 x 7 = — 4. 3,136 5) 18 x 17 x 16 = — 5. 4,896 6) 8 x 7 x 6 x 5 = — 6. 1680 7) 16 x 15 x 14 x 13 = — 7. 43,680 8) 27 x 25 x 23 x 21 = — 8. 326,025 9) 6 x 5 x 4 x 3 x 2 x 1 = — 9. 720 10) 10 x 9 x 8 x 7 x 6 x 5 x 4 x 3 x 2 x 1 = — 10. 3,628,800 **2. Feedback** To explain the activity's answers, let the learners give their thoughts on why multiplication is important. The learners should have different answers. This will allow the teacher to introduce the concept of easy counting without really counting by hand (e.g., the number of squares in a chess board, among others).	Let the learners answer the short activity. The teacher will unlock the main topic by activating the prior knowledge of learners. The teacher may also add more activities when it is necessary. Students can do this on a separate worksheet provided. The teacher should give feedback after the learner answers the short activity.
B. Establishing Lesson Purpose	**1. Lesson Purpose** Consider you are in the cafeteria for lunch. If you can select from four soups, three kinds of fish menu items, five desserts, and four drinks, how many lunches are possible? To find out how many possible lunches, the Fundamental Counting Principle can help us answer this problem. **2. Unlocking Content Area Vocabulary** *The Fundamental Counting Principle (or the Multiplication Rule)* is a way of finding how many possibilities can exist when combining choices, objects, or results. This is done by multiplying each total choice count from each group being combined. Stated differently, the *Fundamental Counting Principle* states that the number of ways in which multiple events can occur can be determined by multiplying the number of possible outcomes for each event.	In this part, the teacher should explain the importance of the lesson to the students. Giving real-world examples is helpful in engaging them to learn the lesson.

C. Developing and Deepening Understanding	**TOPIC 1: FUNDAMENTAL COUNTING PRINCIPLE (No Repetition)** **1. Explicitation** **Fundamental Counting Principle** *Fundamental Counting Principle (FCP)* states that the number of ways in which multiple events can occur can be determined by multiplying the number of possible outcomes for each event. To illustrate, let us say you have one pair of shoes (S), two pants (PA, PB), and three shirts (SA, SB, SC). In how many ways can you dress? So, if we start with shoes, we have these possibilities: 1) S, PA, SA 2) S, PA, SB 3) S, PA, SC 4) S, PB, SA 5) S, PB, SB 6) S, PB, SC Notice that there are 6 possibilities which is 1 x 2 x 3 = 6 done by FCP. **2. Worked Example** **Example 1 (I-do).** Suppose you have 3 pairs of shoes, 4 pants, and 12 shirts. How many ways can you dress up? Solution: We have 3 choices for shoes, 4 choices for pants, and 12 choices for shirts. Applying the Fundamental Principle of Counting (FCP), we have… 3 choices x 4 choices x 12 choices = **144** ways. Shoes pants shirts Therefore, you have 144 ways to dress up. **Example 2 (We-do)**. A coffee shop offers a special coffee deal. Customers can choose from one of three sizes, five flavors, and three kinds of milk. How many coffee combinations can be made? Solution: There are 3 sizes, 5 flavors, and 3 kinds of milk to choose from. Therefore, using FCP, we have… 3 choices x 5 choices x 3 choices = **45** coffee combinations. Sizes flavors milk Therefore, there are 45 coffee combinations for the special deal.	Make sure that students already learned how to multiply. Note that we can list all the possibilities to ensure our count is accurate. But with FCP, we can determine the number of possibilities without really counting them. In this part, the teacher will employ interactive discussion, the I-do-We-do-You-do strategy, or other effective techniques. The teacher writes the blanks first corresponding to the groups or events being combined. Then, s/he may ask students how many choices there are for each event or group.

	Example 3 *(You-do).* How many 3-digit numbers can be formed from the digits 1, 2, 4, 7, and 9 if each digit can be used only once? Solution: There are 5 digits to choose from, and we form 3-digit numbers. For the hundreds place/position, we have 5 choices. Since each digit can be used only once, we have 4 choices left for the tens position (one is already chosen in the hundreds position). So, for the units position, we are left with 3 choices. Therefore, using FCP, we have… $\underline{5 \text{ choices}} \times \underline{4 \text{ choices}} \times \underline{3 \text{ choices}} = \mathbf{60}$ 3-digit numbers Position: hundreds tens units Therefore, there are 60 3-digit numbers that can be formed.	The same result is if one starts with the units position. Why is that so? To further the discussion, the teacher may add more learning activities.
	Example 4-5. Think-Pair-Share **Example 4.** How many 4-digit numbers can be formed from the digits 1, 2, 4, 7, and 9 if each digit can be used only once? Solution: There are 5 digits to choose from, and we form 4-digit numbers. For the thousands place/position, we have 5 choices. Since each digit can be used only once, we have 4 choices left for the hundreds position (one is already chosen in the thousands position). So, we have 3 choices for the tens position, and for the units position, we are left with 2 choices. Therefore, using FCP, we have $\underline{5 \text{ choices}} \times \underline{4 \text{ choices}} \times \underline{3 \text{ choices}} \times \underline{2 \text{ choices}} = \mathbf{120}$ Position: thousands hundreds tens units Therefore, there are 120 4-digit numbers that can be formed. **Example 5.** If each digit can be used only once, how many even 3-digit numbers can be formed from the digits 1, 2, 4, 7, and 9? Solution: Since the 3-digit number should be even, we need the unit digit to be even. There are two choices for the unit digits, 2 and 4. The rest have no restrictions. $\underline{3 \text{ choices}} \times \underline{4 \text{ choices}} \times \underline{2 \text{ choices}} = \mathbf{24}$ even 3-digit numbers Position: hundreds tens units Therefore, there are 24 even 3-digit numbers that can be formed.	For this part, the teacher may use Think, Pair, Share, and other strategies to engage learners in deepening the lesson.

	3. Lesson Activity **Independent Practice** **Exercise 1.** Use the Fundamental Counting Principle to answer the following questions. Show complete solutions for each of the items. 1) How many lunches are possible consisting of a soup, a fish menu, dessert, and a drink if you can select from 4 soups, 3 kinds of fish menu, 5 desserts, and 4 drinks? 2) Peter tosses a coin and then rolls a die. How many different outcomes are possible? 3) Mario rolls a die, spins a spinner with four numbers, and tosses a coin. How many possible outcomes are there? 4) How many 3-digit numbers can be formed from the digits 0, 1, 2, 3, 4, 5, 6, 7, 8, and 9 if each digit can be used only once? (Hint: A 3-digit number cannot start with a 0) 5) How many odd 3-digit numbers can be formed from the digits 0, 1, 2, 3, 4, 5, 6, 7, 8, and 9 if each digit can be used only once? 6) In the Jai-Alai game, a bettor will select 3 numbers (no repetition) from numbers 1 to 10. How many possible winning combinations in Jai-Alai? (FYI: A P10 bet could win a minimum of P4 thousand).	Students can do this on a separate worksheet provided. To further the discussion, the teacher may add more learning exercises. If time does not permit, checking of answers to the independent practice may be the starting point of the next meeting's discussion. **Exercise 1 Answers:** 1) 240 2) 12 3) 48 4) 9 x 9 x 8 = 648 5) 8 x 8 x 5 = 320 6) 10 x 9 x 8 = 720
	DAY 2 **1. Explicitation** Discussion of the answers (in detail, if needed) to the independent practice. In all of the problems worked out yesterday, the choices for each event/ position were not repeated. **2. Worked Example** Click the link: https://www.pcso.gov.ph/Games/Lotto/MegaLotto645.aspx In the Mega Lotto 6/45, one picks 6 numbers from 1 to 45. How many possible bets (*taya)* can be made? **5,864,443,200** **3. Lesson Activity** **Independent Practice** **Exercise 2.** Use the Fundamental Counting Principle to answer the following questions. Show complete solutions for each of the items.	In the explication part, the teacher emphasizes that the items encountered previously were all choices that were not repeated (e.g., "digits can only be used once"). The teacher may now mention the answer to the Mega Lotto question is a very good reason not to bet at all. The teacher can use the think-pair-square strategy.

	1) A men's department store sells 3 different suit jackets, 6 different shirts, 8 different ties, and 4 different pairs of pants. How many different suits consisting of a jacket, shirt, tie, and pants are possible? 2) A baseball manager determines the team's batting order. The team has 9 players, but the manager definitely wants the pitcher to bat last. How many batting orders are possible? 3) How many eight-digit numbers can be formed if the leading digit cannot be a zero and the last number cannot be 1? 4) The standard configuration for a license plate is 3 letters followed by 4 digits. How many different license plates are possible if letters and digits can not be repeated? 5) A single die is rolled. How many ways can you roll a number less than 3, then an even, and then an odd? 6) A single die is rolled. How many ways can you roll a number that is prime, followed by a 6? 7) A red die and a blue die are rolled – in how many ways can you get a sum of 6? 8) From a standard deck of cards, how many ways can you pick a king card, an ace, then a nine? 9) You are taking a survey on your experience at Jollibee. For the first five questions, you can answer: Below Average, Average, or Above Average for each question. You can respond with either Agree or Disagree in the last three questions. How many total outcomes are there for this survey? 10) Suppose you have totally forgotten the combination to your locker. The combination has three numbers, and you're sure each number is different. The numbers on the lock's dial range from 0 to 35. If you test one combination every 12 seconds, how long (in days to the nearest hundredth) will it take to test all possible combinations? **DAY 3** **TOPIC 2: FUNDAMENTAL COUNTING PRINCIPLE (With Repetition)** **1. Explicitation** Use Day 2's explication as a springboard. Ask the question, "What if the choices can now be repeated?"	Exercise 2: https://mi01000971.schoolwires.net/cms/lib/MI01000971/Centricity/Domain/429/Probability%20Day%201%20Worksheet%2016%2017.pdf **Exercise 2 Answers:** 1) 576 2) 40,320 3) 81,000,000 4) 78,624,000 5) 18 6) 3 7) 5 8) 144 9) 1,944 10) 42,840 combinations; 5.95 days

	Fundamental Counting Principle *Fundamental Counting Principle (FCP)* states that the number of ways in which multiple events can occur can be determined by multiplying the number of possible outcomes for each event. To illustrate FCP with repetition, in PCSO's *Swertres* game, for example, a bettor selects 3 digits from 0 to 9, but repetition is allowed (i.e., the combination 222 could be a winner). How many possible winning combinations in the *Swertres* game? $10 \times 10 \times 10 =$ **1,000** **2. Worked Example** **Example 1.** How many 3-digit numbers can be formed from the digits 1, 2, 4, 7, and 9 with no restrictions? Solution: There are 5 digits to choose from, and we form 3-digit numbers. For the hundreds place/position, we have 5 choices. Since there are no restrictions, meaning we can repeat numbers, we have 5 choices for the tens position and also 5 choices for the units position. Therefore, using FCP, we have $\underline{\text{5 choices}} \times \underline{\text{5 choices}} \times \underline{\text{5 choices}} =$ **125** 3-digit numbers Position: hundreds tens units Therefore, there are 125 3-digit numbers that can be formed. **Example 2.** How many 4-digit numbers can be formed from the digits 1, 2, 4, 7, and 9 with no restrictions? Solution: There are 5 digits to choose from, and we form 4-digit numbers. For the thousands place/position, we have 5 choices. Since there are no restrictions, meaning we can repeat numbers, we have 5 choices for the hundreds position, 5 choices for the tens position, and 5 choices for the units position. Therefore, using FCP, we have $\underline{\text{5 choices}} \times \underline{\text{5 choices}} \times \underline{\text{5 choices}} \times \underline{\text{5 choices}} =$ **625** 4-digit numbers Position: thousands hundreds tens units Therefore, there are 625 4-digit numbers that can be formed.	The teacher can expect that this item may come up as a question during discussion in this part.

Example 3. How many even 3-digit numbers can be formed from the digits 1, 2, 4, 7, and 9 with no restrictions?

Solution: Since the 3-digit number should be even, we need the unit digit to be even. There are only two choices for the unit digit: 2 and 4. The rest have no restrictions.

	5 choices	x	5 choices	x	2 choices	= **50** even 3-digit numbers
Position:	hundreds		tens		units	

Therefore, there are 50 even 3-digit numbers that can be formed.

3. Lesson Activity

Use the Fundamental Counting Principle to answer the following questions. Show the complete solution for each item.

1) How many 3-digit numbers can be formed from the digits 0, 1, 2, 3, 4, 5, 6, 7, 8, and 9 with no restrictions? (Hint: A 3-digit number cannot start with a 0).
2) How many odd 3-digit numbers can be formed from the digits 0, 1, 2, 3, 4, 5, 6, 7, 8, and 9 with no restrictions?
3) A computer password consists of 3 digits followed by 5 letters. How many passwords are possible if:
   (a) digits and letters can be repeated, and
   (b) digits and letters cannot be repeated.

Lesson Activity Answers:

1) 9 x 10 x 10 = 900
2) 9 x 10 x 5 = 450
3)
   (a) 10 x 10 x 10 x 26 x 26 x 26 x 26 x 26 = 11,881,376,000;
   (b) 5,683,392,000

Independent Practice

Exercise 3. Use the Fundamental Counting Principle to answer the following questions. Show the complete solution for each item.

1) From a standard deck of cards, how many ways can you pick a face card, then a spade provided you put the first card back?
2) From a standard deck of cards, how many ways can you pick a king, a heart, and then a five, provided you put the previous 2 cards back into the deck?
3) Find the number of possible 9-digit social security numbers if the digits may be repeated.
4) License plates have 3 letters followed by 4 numbers. If letters and numbers may be repeated, how many plates can be made?

Exercise 3 Answers:

1) 156
2) 208
3) answer may vary
4) answer may vary
5) 450,000
6) answer may vary

	5) How many even 6-digit numbers are there? 6) You found a BPI ATM card while walking down the street one day and entertained the idea of withdrawing money using it. You know that such a card needs a 6-digit PIN. How many possible PINs are there? Will you still try withdrawing money with it? Why or why not.	
D. Making Generalizations	**DAY 4** **1. Learners' Takeaways** *The Fundamental Counting Principle (or the Multiplication Rule)* is a way of finding how many possibilities can exist when combining choices, objects, or results. This is done by multiplying each total choice count from each group being combined. Stated differently, the *Fundamental Counting Principle* states that the number of ways in which multiple events can occur can be determined by multiplying the number of possible outcomes for each event. The Fundamental Counting Principle is a method to determine the total number of possibilities/outcomes of event/s without really listing or counting them. **2. Reflection on Learning** Let students share their reflections.	The teacher may ask questions that lead to abstractions of the lesson. In this part, students may write a reflection about the lesson's importance in real-life representation (e.g., gambling/betting).

IV. EVALUATING LEARNING: FORMATIVE ASSESSMENT AND TEACHER'S REFLECTION		**NOTES TO TEACHERS**
A. Evaluating Learning	**1. Formative Assessments** Independent Practice Sets - Days 1 – 3 **2. Summative Assessment** Use the Fundamental Counting Principle to answer the following questions. Show complete solution for each item. 1) How many lunches are possible consisting of a soup, a fish menu, dessert, and a drink if you can select from 4 soups, 6 kinds of fish menu, 8 desserts, and 5 drinks? 2) Peter tosses a coin twice and then rolls a die. How many different outcomes are possible? 3) Mario rolls a die, spins a spinner with four numbers, and tosses a coin twice. How many possible outcomes are there?	The teacher should assess learners collaboratively and individually in these lessons. Students can do this in the separate worksheet provided. **Summative Assessment Answers:** 1) 960 2) 24 3) 96 4) 8 x 8 x 7 = 448 5) 8 x 7 x 4 = 224

	4) How many 3-digit numbers can be formed from the digits 0, 1, 2, 3, 4, 5, 6, 7, and 8 if each digit can be used only once?) 5) How many odd 3-digit numbers can be formed from the digits 0, 1, 2, 3, 4, 5, 6, 7, and 8 if each digit can be used only once? 6) In a track event where there are 8 runners competing, how many ways can the first-place, second-place, and third-place finish? 7) How many 3-digit numbers can be formed from the digits 0, 1, 2, 3, 4, 5, 6, 7, and 8 with no restrictions? 8) A coach must choose how to line up his five starters from a team of 12 players. How many different ways can the coach choose the starters? 9) In how many different ways can a true-false test consisting of 10 questions be answered? 10) Car license plates consist of 3 letters followed by 3 digits (e.g., WCP 757). How many car license plates are possible?			6) 8 x 7 x 6 = 336 7) 8 x 9 x 9 = 648 8) 12 x 11 x 10 x 9 x 8 = 95,040 9) 2^{10} = 1,024 10) 26 x 26 x 26 x 10 x 10 x 10 = 17,576,000
B. Teacher's Remarks	*Note observations on any of the following areas:*	**Effective Practices**	**Problems Encountered**	The teacher may take note of some observations related to the effective practices and problems encountered after utilizing the different strategies, materials used, learner engagement, and other related stuff. Teachers may also suggest ways to improve the different activities explored/lesson exemplar.
	strategies explored			
	materials used			
	learner engagement/ interaction			
	others			
C. Teacher's Reflection	*Reflection guide or prompt can be on:* • *<u>principles behind the teaching</u>* *What principles and beliefs informed my lesson?* *Why did I teach the lesson the way I did?* • *<u>students</u>* *What roles did my students play in my lesson?* *What did my students learn? How did they learn?* • *<u>ways forward</u>* *What could I have done differently?* *What can I explore in the next lesson?*			Teacher's reflection in every lesson conducted/facilitated is essential and necessary to improve practice. You may also consider this as an input for the LAC/Collab sessions.