**DRAFT**

**Mathematics - Class 2**

**Suggested Guidelines**

**Domain: Number and Operations**

| **STEP 1** | |
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| **Standard*.*:***Students will be able to count, read, write, compare, order, round and make estimate to the nearest tens, add, subtract, multiply and divide numbers. They will be able to recognize fractions as part of the whole, represent fractions, order and add and subtract fractions. They will be able to solve problems in contexts using appropriate number operations.* | |
| **Student Learning Outcomes**:  **Counting, place value, compare and order, rounding numbers, ordinal numbers, roman numbers and reading and writing numbers.**  *Students will be able to:*   * *Count, read and write 3-digit numbers up to 999.* * *Recognize the place value of each digit in 3-digit numbers (hundreds, tens, ones/units).* * *Compare and order numbers up to 999 using appropriate language and <, > and = signs.* * *Round numbers to the nearest tens using concrete objects and pictorial representations.* * *Recognize the position of objects and write it using ordinal numbers up to 20.* * *Read and write Roman numbers up to 12.* * *Read and write numbers up to 999 in numerals and up to 99 in words.*   ***Addition and Subtraction:***  *Students will be able to:*   * *Find, recall and use addition and subtraction facts to 100.* * *Add and subtract numbers mentally and in formal written form  (with and without regrouping) including:* * *3-digit number and a 1-digit number.* * *3-digit number and tens.* * *3-digit number and a 2-digit number.* * *Two 3-digit numbers.* * *Estimate the answer to an addition and subtraction question (using various approaches).* * *Identify international currency and denominations (for instance, dollar).* * *Solve real-world word problems with addition and subtraction (involving missing numbers, money, quantities and measures).*   ***Money:***  *Students will be able to:*   * *Identify international currency and denominations (for instance, dollar).* * *Solve money problems involving addition and subtraction of Pakistani money and a few selected international currency notes, (for instance, dollar).*   ***Multiplication and Division:***  *Students will be able to:*   * *Recognize even and odd numbers.* * *Count and write in 3s, 4s, 5s, 10s and 100s.* * *Recognize counting in 3s, 4s as multiplication tables of three and four.* * *Recognize multiplication as repeated addition and develop multiplication tables (times tables) for 2, 3, 4, 5 and 10.* * *Write multiplication statements (i.e. sentences) using concrete and pictorial representations.* * *Recognize using concrete and pictorial representations that the multiplication of any two numbers can be done in any order.* * *Multiply mentally and in written form using the tables that they know:* * *1 digit number by another 1 digit number.* * *2-digit number by a 1-digit number using the multiplication grid.* * *Multiply a number with 0 and 1.* * *Recognize division as repeated subtraction through concrete and pictorial representation.* * *Write division statements (i.e. sentences) using concrete and pictorial representations.* * *Recognize using concrete and pictorial representation that the division of one number by another cannot be done in any order.* * *Divide mentally and in written form:* * *1-digit number by another 1-digit number (without remainder).* * *2-digit number by a 1-digit number (without remainder).* * *Solve real-world word problems involving multiplication and division using any method (for instance materials, repeated addition/subtraction, groups, arrays, mental and or written methods).* * *Solve real-world word problems (including Pakistani currency) involving addition, subtraction, multiplication and division.*   ***Fractions:***  *Students will be able to:*   * *Identify, name and write:* * *Unit fractions* * *Non-unit fractions* * *Like fractions* * *Unlike fractions*   *of a discrete set of objects using pictorial representations.*   * *Compare and order unit fractions and like fractions (with denominators up to 10) using <, > and = sign.* * *Add and subtract like fractions within one whole (e.g. + = ).* * *Know and recognise that tenths arise by dividing an object into ten equal parts and in dividing single digit numbers and quantities by ten (using concrete and pictorial representations).* | |
| **Counting, place value, compare and order, rounding numbers, ordinal numbers, roman numbers and read and write numbers.**  **Knowledge:**  Students will be able to:   * Know counting forward and backward from any given 3-digit number. * Know place value of 3-digit numbers (hundreds, tens, ones/units). * Compare numbers up to 999. * Round numbers to the nearest tens. * Know ordinal numbers from 1 to 20. * Know Roman numbers up to 12. * Read and write numbers to 999 in numerals and 99 in words.   **Addition and Subtraction:**  Students will be to:   * Know addition and subtraction facts up to 100. * Addition and subtraction of numbers mentally and in formal written form  (with and without regrouping) including: * 3-digit number and a 1-digit number. * 3-digit number and tens. * 3-digit number and a 2-digit number. * Two 3-digit numbers. * Know estimation as an approach to find answers to a variety of situations. * Addition and subtraction of real world problems (involving missing numbers, money, quantities and measures).   **Money:**  Students will be able to:   * Know international currency and its denominations (for instance, dollar). * Know addition and subtraction of Pakistani and a few selected international currency (for instance, dollar).   **Multiplication and Division:**  Students will be able to:   * Know even and odd numbers. * Know count in 3s, 4s and 100s. * Know multiplication tables of three and four. * Know multiplication as repeated addition. * Write multiplication statements (i.e. sentences) * Know multiplication of: * 1 digit number by another 1 digit number. * 2-digit number by a 1-digit number using the multiplication grid. * 0 and 1. * Know division as repeated subtraction. * Write division statements (i.e. sentences). * Divide mentally and in written form: * 1-digit number by another 1-digit number (without remainder). * 2-digit number by a 1-digit number (without remainder). * Know multiplication and division of real-world word problems. * Know which operation to use to find answer to a given real world problem (addition, subtraction, multiplication or division).   **Fractions:**  Students will be able to:   * Know: * Unit fractions * Non-unit fractions * Like fractions * Unlike fractions   of a discrete set of objects using pictorial representations.   * Compare and order unit fractions and like fractions (with denominators up to 10) using <, > and = sign. * Know addition and subtraction of like fractions within one whole *(e.g. + = )*. * Know tenths of an object, single digit numbers and quantities. | **Counting, place value, compare and order, rounding numbers, ordinal numbers and read and write numbers.**  **Skills:**  Students will be able to:   * Count numbers up to and across 999 (3-digit numbers) forwards and backwards, beginning from zero or one, or from any given number using concrete objects (such as counters, pebbles, base ten material, popsicle sticks etc.) and pictorial representations (such as thousand square grid, number line etc.). * Recognize the place value of each digit in 3-digit numbers (hundreds, tens, ones/units). * Compare and order numbers up to 999 using appropriate language and <, > and = signs. * Round numbers to the nearest tens using different concrete objects and pictorial representations. * Recognize the position of objects and write it using ordinal numbers up to 20. * Read and write Roman numbers up to 12. * Read and write numbers up to 999 in numerals and in words.   *Advanced/Additional:*   * *Read and write Roman numbers up to 20*.   **Addition and Subtraction:**  Students will be able to:   * Find, recall and use addition and subtraction facts to 100. * Reinforce addition and subtraction of: * 2 digit number and a 1 – digit number. * Two 2-digit numbers. * Add and subtract numbers mentally and in formal written form  (with and without regrouping) including: * 3-digit number and a 1-digit number. * 3-digit number and tens. * 3-digit number and a 2-digit number. * Two 3-digit numbers. * Estimate the answer to an addition and subtraction question. (using various approaches) * Solve real-world word problems with addition and subtraction (involving missing numbers, money, quantities and measures).   *Advanced/Additional:*   * *Recognize and use the inverse relationship between addition and subtraction to check calculations.* * *Recognize that the addition of two numbers can be done in any order (commutative) while subtraction of one number from another cannot.*   **Money:**  Students will be able to:   * Identify international currency and denominations (for instance, dollar). * Solve money problems involving addition and subtraction of Pakistani money and a few selected international currency notes, (for instance, dollar).   *Advanced/Additional:*   * *Solve money problems involving addition and subtraction of Pakistani money and a few selected international currency notes. (for instance dollar, pound, riyal, dirham etc. as per the need/interest of the students).*   **Multiplication and Division:**  Students will be able to:   * Recognize even and odd numbers. * Count and write in 3s, 4s, 5s, 10s and 100s. * Recognize counting in 3s, 4s as multiplication tables of three and four. * Recognize multiplication as repeated addition and develop multiplication tables (times tables) for 2, 3, 4, 5 and 10. * Write multiplication statements (i.e. sentences) using concrete and pictorial representations. * Recognize using concrete and pictorial representations that the multiplication of any two numbers can be done in any order. * Multiply mentally and in written form using the tables that they know: * 1 digit number by another 1 digit number. * 2-digit number by a 1-digit number using the multiplication grid. * Multiply a number with 0 and 1. * Recognize division as repeated subtraction through concrete and pictorial representation. * Write division statements (i.e. sentences) using concrete and pictorial representations. * Recognize using concrete and pictorial representation that the division of one number by another cannot be done in any order. * Divide mentally and in written form: * 1-digit number by another 1-digit number (without remainder). * 2-digit number by a 1-digit number (without remainder). * Solve real-world word problems involving multiplication and division using any method (for instance materials, repeated addition/subtraction, groups, arrays, mental and or written methods). * Solve real-world word problems (including Pakistani currency) involving addition, subtraction, multiplication and division.   *Advanced/Additional:*  *Students will be able to*   * *Multiply mentally and in written form using the tables that they know:* * *1 digit number by another 1 digit number.* * *2-digit number by a 1-digit number with or without the multiplication grid.*   **Fractions:**  Students will be able to:   * Identify, name and write: * Unit fractions * Non-unit fractions * Like fractions * Unlike fractions   of a discrete set of objects using pictorial representations.   * Compare and order unit fractions and like fractions (with denominators up to 10) using <, > and = sign. * Add and subtract like fractions within one whole (e.g. ¼ + ¾ = 4/4). * Know and recognize that tenths arise by dividing an object into ten equal parts and in dividing single digit numbers and quantities by ten (using concrete and pictorial representations).   *Advanced/Additional:*  *Students will be able to:*   * *Identify, name and write:* * *Unit fractions* * *Non-unit fractions* * *Like fractions* * *Unlike fractions* * *Equivalent fractions.*   *of a discrete set of objects using pictorial representations.* |
| **STEP 2** | |
| **Assessments**  **Formative Assessments**  Some of the types of formative assessment teacher may use are:   * Question & Answer(open and closed) * Quick Quiz * Learning Walks * Projects * Selected responses (may include MCQs, true: false, matching short answers, fill-in-the blanks, etc.). * Observation diaries * Inquiry charts * Four Corners: Gather students in the middle of the room, and read multiple-choice questions and their possible answers aloud. Students then move to the corner that represents what they believe is the correct answer. The top left room corner can be option A, the bottom-left can be B and so on   **Summative Assessments** Some of the forms of summative assessment are:   * End of Unit Test * Class Test * Periodic/Monthly Tests * Mid-year Exam * End of Year Exam * Standardized Tests * External Exams   **Some of the sample questions that can be used as part of summative assessment are:**   1. Encircle the correct answers. 2. Which is **not** equal to 3+3+3+3?   **a)** 6×2 **b)** 4×3 **c)** 3×4 **d)** 5×3   1. Which is the **same** as 4 groups of 5?   **a)** 4+5 **b)** 4×5 **c)** 4+4+4+4 **d)** 5+5+5+5+5   1. Which has the **same** answer as 9×2?   **a)** 6×3 **b)** 2×5 **c)** 3×3 **d)** 4×5   1. ⬜ × ⬜ = 100   What number does ⬜ stand for?  **a)** 5 **b)** 10 **c)** 20 **d)** 50   1. 2×5 = \_\_\_\_\_\_ ten   **a)** 1 **b)** 10 **c)** 7 **d)** 5   1. Which of the following is **not** correct?   **a)** 1×2 = 1+2  **b)** 2×10 = 10+10  **c)** 3×5 = 3+3+3+3+3  **d)** 4 groups of 2 = 2 groups of 4   1. Read the given clues and find the numbers. Then write the numbers in words. 2. The number is a 3-digit number.   It is the biggest 3-digit number.  What is the number?  **Number:** \_\_\_\_\_\_\_\_\_\_\_\_\_  **Words:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_   1. The number is between 450 and 460.   The sum of its all digits is 15.  **Number:** \_\_\_\_\_\_\_\_\_\_\_\_  **Words:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_   1. Fill in the missing numbers.  |  | 2 |  |  |  |  |  | 8 | 1 |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | - | 1 | 2 |  |  |  | - | 6 |  |  |  |  | |  | 1 | 5 |  |  |  |  | 1 | 6 |  |  |  |  1. Find the missing numbers. | |
| **STEP 3** | |
| **Learning Activities**  *Students will be able to:*   1. *Count, read and write 3-digit numbers up to 999.* 2. *Recognize the place value of each digit in 3-digit numbers (hundreds, tens, ones/units).* 3. *Compare and order numbers up to 999 using appropriate language and <, > and = signs.* 4. *Round numbers to the nearest tens using concrete objects and pictorial representations.* 5. *Recognize the position of objects and write it using ordinal numbers up to 20.* 6. *Read and write Roman numbers up to 12.* 7. *Read and write numbers up to 999 in numerals and up to 99 in words.*   **Activity 1:**  **Place Value:**  **Teachers /students resource:**   * Video ‘Place value’ from the link <https://youtu.be/np-0GyOqHRc>.  1. View the video to make notes for yourself regarding the topic. You may also use it to show your students during the lesson. 2. Help your students understand the relationship between numbers and place value. Explain that place value is the value of a digit depending on its position in the number, such as ones, tens, hundreds, and thousands places. 3. Remind your students that a number is made up of digits or numerals. For example, the number 3 has one digit, while the number 987 has three digits, 9, 8, and 7. 4. Discuss numbers with your students. What is the biggest number they can find in the room? What is the biggest number they can think of? 5. Help students understand that numbers can be infinitely big or small. Each digit in a number stands for a group, called a place value. Our system of number or writing numbers is called a base-ten system because it is based on groupings of 10. 6. Show the numbers 1 through 9 to your students and name them out loud. You may also want to count different groups of items up to 9 and write the number on the board. We recommend demonstrating with base-ten blocks or connecting cubes. Numbers with one digit have only one place value, the ones place. 7. Remind your students that when you combine 10 ones, you get a group of ten. Write the number 10 on the board. The digit 1 shows that there is 1 one group of ten and 0 ones. 8. Then show a two-digit number such as 36. The digit farthest to the right is the ones place. That number tells you how many ones are in the number. The digit to its left is the tens place. It tells you how many tens are in the number. 9. Any number can be broken down by its place value. For example, 32 can been broken down into 32 ones or 3 groups of ten and 2 ones. Number 56 can be shown with 56 ones or 5 tens and 3 ones. 10. Use base-ten blocks or connecting cubes to show that 56 can be shown with 56 ones or with 5 groups of ten and 6 ones. 11. We recommend giving your students plenty of manipulatives to explore and represent a variety of numbers. For instance, begin with representing/showing a two digit number, another way, other than connecting cubes and easier to obtain is the counters/buttons etc.). You can give them 2 coloured counters such as red and green. Explain that red counters represent tens while green represent ones. 12. Show them how these counters would represent the number 32. I.e. you will pick 3 red counters and 2 green counters to represent the number 32. 13. Now hand over coloured counters to students and call out different 2 digit numbers and ask them to use counters to represent the numbers you call out. 14. When you are sure your students thoroughly understand tens and ones, explain that when you combine 100 ones, you get a group of one hundred. When you combine 10 tens, you get a group of one hundred. 15. You can demonstrate different groupings using connecting cubes or base-ten blocks. The third digit from the right shows how many hundreds are in the number. So the number 954 has 9 hundreds, 5 tens, and 4 ones. The number 520 has 5 hundreds, 2 tens, and no ones. 16. You may want to explore using the blocks and writing out the numbers in expanded form: 954 = 900 + 50 +4 and 520 = 500 + 20 + 0. 17. Remind your students that when they read a three-digit number, they must read the first digit, then say “hundred,” and then say the rest of the number, as in nine hundred fifty-four and five hundred twenty. 18. Reading numbers with zeros or ones in the middle can be challenging for some students because they must remember to hold the place of the digit without saying its exact name. 19. Demonstrate how to read numbers like three hundred eight, four thousand twenty one, six hundred twelve, or five thousand four hundred nineteen. It’s helpful to remind students to read the final two numerals together as a simple two-digit number. 20. Expose your students to a wide variety of numbers in different contexts, such as in books or on flyers and signs. 21. Have them read different numbers out loud and explore how they can be divided into their place values. 22. We recommend using number lines, connecting cubes, base-ten blocks, place value charts, and hundred charts to help students visualize numbers in different ways.   **Activity 2:**  **Place Value Bingo**   1. Make bingo cards using different numbers. You may want students to make their own bingo cards using one-, two-, or three-digit numbers and then have them swap cards with other students. 2. Then call out different numbers or clues such as “any number with 3 in the ones place” or “any number with no tens.” 3. The first person to get bingo can call out numbers in the next round. 4. Repeat this with several numbers until a student runs out of his/her index cards.   **Activity 3:**  **Bean Bag Number Toss**   1. Take 10 separate pieces of paper and label them each from 0 to 9. 2. Then give a student one, two, or three bean bags to throw at different numbers to create a number. For example, if a student throws bags on a 2 and a 3, he or she forms the number 23. 3. Write the number on the board and have students say the number out loud and model the number using manipulatives. 4. Have students take turns throwing the bean bags.   **Activity 4:**  **Number Clues**   1. Model a number story for your students, such as “There are 7 tens, 1 one, and 9 hundreds.” 2. Then have students write their answers. 3. Divide the students into small groups and have them write or tell each other their own number stories. 4. You may want them to use place value charts to help them solve problems.   **Activity 5:**  **Roll to 100**   1. Students work in pairs to play this collaborative game. 2. They take turns rolling one or two dice and then showing the total of their roll with interlocking cubes or base-ten blocks. 3. They keep rolling and amassing more cubes or blocks and when they have a group of 10 ones, they can swap it for a rod of 10. 4. They can keep track of how many cubes they have by lining them up on or next to a hundred charts. When they have collected 100 cubes, they can play again.   **Activity 6:**  **Empty Number Line:**   1. The activity focuses on identifying numbers, their place value and comparing numbers. 2. Draw the number line on the board. number line. 3. Ask: *Where would you draw the number 70?* 4. Get the student to put a mark on the number line. 5. Ask: *Why did you put it there?* 6. Repeat with other volunteers. 7. Repeat the discussion with other numbers. 8. Now follow the same sequence of steps by drawing a number line for a 3-digit number. For instance, you may take an empty number line from 154 to 786 etc.   **Activity 7:**  **Greater than and smaller than >, <, and =**  **Teacher’s/Students resource:**   * Video ‘Comparing Numbers’ from the link <https://youtu.be/UF4QlDAJJPQ>  1. Teachers may view the video to develop their notes for explaining >, < and + signs or they may show it to their students during the lesson. 2. When your students practice comparing numbers, they develop number sense and build number relationships. 3. We recommend using plenty of counters, base-ten blocks, number lines, hundred charts, and place value charts to help them understand how numbers are ordered. 4. In Maths, an inequality is a statement about the relative size or order of two objects, numbers, or values. 5. Introduce your students to the three basic symbols used in inequalities: greater than (>), less than (<), and equal to (=). 6. Show your class two small groups of cubes, pennies, or other small objects and ask them which group has the greater number. Explain that in Maths the word “greater” usually means “more”. 7. Draw or show a number line from 0 to 10 to your students and pick a number, such as 4. Ask them to pick a number on the number line that is greater than 4. 8. Students should pick 5, 6, 7, 8, 9, or 10. Explain that since these numbers come after 4 on a number line, they are larger or greater. 9. Have students practice writing or saying a statement using the term “greater than.” For example, a student might say that “5 is greater than 4.” 10. Try the activity again using a hundred chart and broadening the range of numbers they can choose. 11. Review with your students that > is greater than sign. Have them rewrite their sentences using the symbol, as in “5 > 4”. The wider part of the symbol faces the bigger number. 12. Repeat these same activities, starting with the number line, to introduce the symbol for “less than”. Show your students that the corner, or point, of the symbol faces the smaller number. 13. Many students become confused with the direction the greater than and less than signs should face. It is helpful for many students to imagine that the symbol is the mouth of a hungry alligator or duck. It always wants to eat a bigger number! 14. Have students practice writing different inequalities using the symbols. Point out how if you reverse the positions of a number in an inequality, the sign reverses direction too, as in 3 < 4 and 4 > 3. 15. Together, create a number sentence, such as 2 + 3 = 5. Point out the equal sign and remind them that the equal sign means that the values on either side are equal, or the same. 16. You may want to use counters to demonstrate that a group of 2 and a group of 3 have the same number of counters in all as a group of 5, and show the corresponding number sentence on a chart. 17. Both sides of the equal sign are the same value. Pick a number on a number line or hundred chart and ask them what number is equal. 18. Explain that when you compare larger numbers that are two or three digits long, they should look at the highest place value. So 138 is greater than 41 because 138 has one hundred while 41 has no hundred. 19. If numbers have the same number of places, students should compare the highest and then go down by place to compare the numbers. So, while 245 and 238 both have two hundreds, 245 has four tens while 238 only has three tens. Therefore, 245 is greater than 238. 20. Remind them to look carefully and make sure they compare the same place values in each number. For example, just because 245 has more tens than 327, doesn’t mean that it is a larger number. 21. Expose your students to number lines and hundreds charts and give them plenty of manipulatives so they can have hands-on experience working with numbers. Concrete examples help students develop strong number sense and allow them to see patterns and understand how numbers are connected.   **Activity 8:**   1. On the board write sets of numbers with a blank space (containing a dot) in between. 2. You may write some of the numbers in dots/asterisks (e.g. \*\*\*\* \_\_\_\_\_ \*\*\*\*\*\*) 3. The blank space is the placeholder for students to put the greater than ‘>’ or smaller than ‘<’ or ‘=’ sign. 4. Now ask students to take turns and put the relevant sign between the sets of numbers on the board.   **Activity 9:**  **Class Hundreds/Thousands Chart**   1. Using hundred pieces of scrap paper, index cards, sticky notes, or chalk, have your whole class create a large hundred chart on the floor. 2. Extension: You may ask students to create a thousands chart by ones or by tens. 3. Then have a few student volunteers pick a number and stand on it (the hundred’s chart or the thousands chart). 4. Each student should call their number out. 5. Then give different directions, such as “Find a number that is greater than the number you are standing on” or “Find a number that is 10 less than the number you are standing on.” 6. Take turns, so every student gets to stand and move on different numbers.   **Addition and Subtraction:**  *Students will be able to:*   * *Find, recall and use addition and subtraction facts to 100.* * *Add and subtract numbers mentally and in formal written form  (with and without regrouping) including:* * *3-digit number and a 1-digit number.* * *3-digit number and tens.* * *3-digit number and a 2-digit number.* * *Two 3-digit numbers.* * *Estimate the answer to an addition and subtraction question (using various approaches).* * *Identify international currency and denominations (for instance, dollars).* * *Solve real-world word problems with addition and subtraction (involving missing numbers, money, quantities and measures).*   **Activity 10:**  **Addition and Subtraction fact families:**  **Resources required:** Video Addition and Subtraction fact families from the link <https://youtu.be/ujuCuY7MPAU>; internet, index cards (with one addition and subtraction sentence written on it)   1. Preview the movie ‘Addition and Subtraction Fact Families’ to plan for any adaptations. 2. Write out sets of addition/subtraction fact families on index cards with one number sentence per card, so there are enough for the whole class. For example, 22 + 43 = 65; 43 + 22= 65; 65 - 43 = 22; 65 - 22 = 45). 3. Write the following two number sentences on the board: 22 + 43 = 65; 43 + 22= 65. Ask students what they notice? They should notice that both sentences include the same numbers. They may also observe that the order of the two numbers you’re adding doesn’t matter--that either way the sum is 6. 4. Now write these two sentences on the board along with the first two: 65 - 43 = 22; 65 - 22 = 45. Again, ask students what they notice. They should observe that both sentences include the same numbers and that both begin with 6. 5. Finally ask them to look at all four sentences together. What do they notice? Help them recognize that all four statements include just the numbers 22, 43, and 65. Explain that these are a fact family. 6. Tell students that today they will learn about fact families and then play a game where they reunite facts from the same family. Play the BrainPOP video ‘Addition and Subtraction Fact Families’ for the whole class. 7. Pause as needed to reinforce student understanding of key concepts and vocabulary. 8. After the movie, distribute a fact family index card (see Preparation) to each student. Tell students that they need to find the rest of their family for a family reunion! Allow students time to walk around the classroom finding the other three facts that make up their family. 9. Finally, invite each family to review their facts and then present themselves to the rest of the class. If time allows, challenge them to put the numbers that make up their fact family on a fact family triangle. 10. Conclude the lesson by challenging students to the Easy or Hard Quiz to assess their understanding.   **Activity 11:** **Fact Family Home**Invite students to draw a picture of a four-storey home with three windows in every storey.Put two minus signs between the first two windows on the bottom floors, and a plus sign between the first two windows on the top floors.Then put an equal sign between the last two windows on all four floors.Ask students to fill the windows with fact family equations?You can also fill in the fourth floor with 32 + 46 = 78 and have your student complete the other equations. **Activity 12:**  **Basic addition and subtraction using a variety of pictorial strategies.**  Resources:   * Video ‘Basic Addition’ from the link <https://youtu.be/cJ_boPjzKtI> * Video ‘Basic Subtraction’ from the link <https://youtu.be/yTYVVV1_nJw>. * Video ‘Doubles’ from the link <https://youtu.be/PGa0yVoOLVM>.  1. Play the video ‘Basic Adding’ to help students know how addition can be done, as well as to know the vocabulary for addition and subtractions procedures. 2. Demonstrate a few questions to add. 3. Give a few questions to make students practice basic addition using any method that they prefer. 4. Now play the video ‘Basic Subtraction’ to help students know various strategies to subtract. 5. Demonstrate a few questions to subtract. 6. Give a few questions to make students practice basic subtraction using any method that they prefer. 7. Show the video ‘Doubles’ to build student understanding of this mental math strategy.   **Activity 13:**  **Using variety of strategies to add single digit numbers through an online game**  **Resources:**   * Online game ‘Addition blocks’ from the link <https://www.brainpop.com/games/additionblocks/>. * Video ‘Doubles’ from the link <https://youtu.be/PGa0yVoOLVM>.  1. This lesson plan uses a free online game called Addition Blocks. The game is useful for providing practice with additional facts, but does not explicitly teach addition, so make sure students have already had some practice with mental math strategies prior to playing the game. 2. Before introducing the game to your students, preview it yourself by diving right into game play, or click on "How to Play" for directions. You can easily differentiate the game for students by instructing them to click "Options" and then select a specific speed and level of difficulty. The following is recommended: **1st - 3rd grade** Speed: Slow; Difficulty: Easy. 3. Show the video ‘Doubles’ as well as ‘basic adding’ to build student understanding as well as recap this mental maths strategy before playing the game. 4. Project the online game ‘Addition Blocks’ for the class to see. Show students how to set the speed and difficulty level by clicking on "Options," and then demonstrate game play. 5. Model how to play the game. Use think-aloud strategies to show students how you use mental math during game play. You might also want to have a few student volunteers play and share their thoughts, as well. 6. Provide 10-15 minutes for students to explore the game on their own or with a partner. 7. Lead students in a whole-class discussion about the mental maths strategies they used during game play. Was it easier to combine two numbers or more than two numbers to create the target number? Why? Which combinations were the easiest to add, and which were the hardest? 8. Explain that students will now practice mental maths strategies for addition by creating and playing a hands-on game with a partner. Pass out 25-50 blank index cards to each pair of students, or give students construction paper and have them create cards by folding and cutting the paper into equal sized squares. Instruct students to write one digit numbers on the cards. Younger students may want to write only digits from 1-9. 9. Encourage students to work with their partner to create an addition game using their cards. They can spread their cards in an array like in the Addition Block game, then take turns selecting a target number for their partner to make with cards. Or, they can create their own original concept for a game. Provide at least 10 minutes for students to plan and practice playing their games. 10. Allow students to revisit the Addition Blocks game as well as their original games throughout the school year to build fluency with addition facts. You might also want to pair students up with different partners and allow them to teach one another their games. Encourage students to talk about their mental maths strategies together.   **Activity 14:**  **Using a variety of strategies to add and subtract 3 digit numbers.**  **Strategy 1: Base-Ten Blocks**  **Resources for teacher support:**   * Video ‘Adding Using base ten blocks’ from the link <https://youtu.be/aQMjLFlbsDA> * Video ‘Subtracting using base-ten blocks’ from the link <https://youtu.be/hkQhlXQjGT0>.  1. View the two videos ‘Adding using base ten blocks and subtracting using base ten blocks’ to know how to add and subtract up to 3-digit numbers with a single digit, a ten or another 3 –digit number. 2. If you are short of resources, you could always create rods by gluing ten beans/buttons on a popsicle stick to represent rods and using individual beans/buttons to represent ones. You could use pictorial representations such as sticks to represent tens, while circles or dots to represent ones. 3. You may search for other videos on Youtube to know how to use base ten blocks to add and subtract either through concrete experience or through pictorial representations. 4. Using base ten blocks to add and subtract two digit numbers is a very concrete model for students to use. It’s very easy for them to visually see the process of putting together the tens and ones plus the act of regrouping is a lot easier to visually see here as well. 5. You can help students use base ten blocks in two ways:  * The first would be to actually use base ten blocks as they’re adding and subtracting for every single problem. * The next option would be to draw sticks and circles to represent tens and ones if your classroom is limited on base ten block materials.  1. If you give students a whiteboard it is very easy for them to draw out every single problem that they can add or subtract without using base ten blocks. But ideally they will have their hands on practice on those manipulatives to visually see their problems being solved.   **Strategy 2: Break-apart (partitioning or expanding) strategy**  **Resources for teacher’s support:**   * Video ‘Simple tricks to help with partitioning and addition’ from the link <https://youtu.be/1Cf08KP92zo>. * Website Addition with partitioning from the link <https://www.mathswithmum.com/addition-by-partitioning/>. (Interactive demonstration, video, worksheets and a lesson) * Video ‘Addition and subtraction: Mental calculations’ from the link <https://youtu.be/-18qLbg1Gmk>.  1. View the 2 videos given above to know about the partitioning method to add numbers. You may search other videos and websites to learn more about this easy method to add numbers. 2. Strategy number 2 is all about the break-apart method which also could be known as the expanded form method. The reason it is called break apart is because the students are actually taking apart the two digits and splitting it into tens and ones. 3. Then they can add the tens from each number and the ones from each number and make their maths a little bit easier. It does get a bit difficult when students have to do some regrouping on their addition or subtraction problem so that is definitely a big step that you have to teach when using this strategy. However, without regrouping it is quite an easy method to use. 4. You may scaffold students learning of this method by providing blanks to help students develop a further understanding of how to break apart/partition numbers.   **Strategy 3: Give and Take away (or Rounding and Adjusting):**  **Resources for Teachers support:**   * Adding and subtracting using rounding and adjusting from the website link - <https://classroom.thenational.academy/lessons/adding-and-subtracting-using-the-round-and-adjust-strategy-chk64e>. (It includes a video, questions and other support material to help understand this method) * Video ‘Addition and subtraction: Mental calculations’ from the link <https://youtu.be/-18qLbg1Gmk>.  1. Use the teachers resources provided to know in detail about this strategy. You may search more to gain further information about this strategy. The second resource gives a lot of strategies to add and subtract numbers (including partitioning, number line, bridging, rounding and adjusting etc.). 2. Third 3-digit addition and strategy is the give-and-take method. The process of this method is different between the addition and subtraction problems. So it is important that you give the students a lot of practice here. 3. When you have an addition problem if you take two/three from one number you have to add two to the other number. 4. However, on a subtraction problem if you take two/three from one number you have to take two from the second number as well. 5. This strategy does require a lot of practice because the students really have to focus on which strategy fits with addition or subtraction; however, once given practice it is the easiest to use. Giving them lots of hands-on ways to practice is one suggestion. 6. It’s also very important to teach the strategy of finding the number thatis closest to a 10 to make their problem as easy as possible.   **Strategy 4: Open number line**  **Resources for teachers support:**   * Video ‘Adding and subtracting – using a number line’ from the link <https://youtu.be/ucDucqYbffs>. * Video ‘Addition and subtraction: Mental calculations’ from the link <https://youtu.be/-18qLbg1Gmk>.  1. Use the resources provided for teachers support to know about addition and subtraction with an open number line. You may browse for more videos as there are many supportive resources available on net. 2. Open number lines are the fourth strategy for 2/3-digit addition and subtraction problems. An open number line is where students have make jumps in order to represent adding or subtracting tens and ones. 3. On a subtraction problem the students will begin on the biggest number. Then, they will jump back the number that they are supposed to subtract. 4. When a student makes these jumps, they will represent the tens with a bigger jump and the ones with smaller jumps. 5. It is important that the students label each of these jumps at the bottom (or top) of the number line. This will help them see the act of taking 10/1 or adding 10/1.   **Strategy 5: Simple Algorithms**   1. This 2/3-digit addition subtraction strategy is the standard algorithm. 2. The standard algorithm is lining up the addition or subtraction problem vertically where the tens and ones are stacked on top of each other. 3. This can be done with or without regrouping. 4. It is suggested that you break up your lessons into teaching the standard algorithm without regrouping first. Once your student has mastered that, then you can start teaching standard algorithm with regrouping.   **Activity 15:**  **Addition with regrouping**  **Teachers /Students resources:**   * Video ‘Adding with regrouping’ from the link <https://youtu.be/pZuj5s-Yjsk>. * Video ‘Basic Addition’ from the link <https://youtu.be/cJ_boPjzKtI> * Video ‘Basic Subtraction’ from the link <https://youtu.be/yTYVVV1_nJw>. * Video ‘Doubles’ from the link <https://youtu.be/PGa0yVoOLVM>.  1. Use the video “Adding with Regrouping’ to build your notes or show it to your students during the lesson. 2. You may also like to view videos “Basic Addition’, ‘Doubles’ to add points to your teaching exposition. 3. Adding with regrouping can be a tricky concept for some students, so we recommend solving different number sentences together using number lines, hundred charts, and hands-on manipulatives, such as base-ten blocks. 4. We also recommend reviewing maths strategies that students can use to help solve number sentences that require regrouping. A few strategies are provided in the videos ‘Basic addition’ and ‘Doubles’ as well as strategies mentioned above in activity 13. 5. Show students the number sentence 8 + 6. Use a number line or hundred chart to solve together. 6. Then use base-ten cubes to show the numbers 8 and 6. Remind students that a tens rod is equal to 10 cubes. They can group 10 cubes together to form 1 tens rod. That means there will be 4 cubes left over. What number does that show? 7. Encourage students to count the ones and the tens to make the number instead of counting each cube one by one. Show that 8 + 6 = 14. 8. Explain to students that when they regroup, they gather ten ones to make one group of ten. Repeat the activity again to solve 15 + 9 and 39 + 6. Use base-ten blocks and have students combine the cubes into rods to find each sum. 9. After students are familiar with regrouping using manipulatives, invite them to solve number sentences using pencil and paper. 10. Show the number sentence 17+ 8 in vertical form. Remind students that when they add numbers with more than one digit, they add the ones column first, then add the tens column. What is 7 + 8? 11. Some students may remember that since 8 + 8 = 16, 7 + 8 will be one less than 16, or 15. 12. Teach them how to write 5 in the total and then carry the 1 over to the tens. 13. Then add the tens column: 1 + 1 = 2. Therefore, 17 + 8 = 25. 14. Solve more examples of number sentences together, such as 56 + 9 and 87 + 4. 15. Present different word problems to students and have them make up their own stories for other people to solve. 16. Have students verbally explain how they add and regroup while solving number sentences using base-ten blocks or with pencil and paper. This will help them visualize and explain the process to themselves and gives you an opportunity to guide their thinking process if they run into errors. 17. Encourage students to not give up or get too frustrated. Regrouping can be challenging but becomes much easier with time and practice.   **Activity 16:**  **Regroup!**   1. Divide students into small groups and give each group a set of base-ten blocks. If you do not have enough sets, print out base ten block drawings from the Internet and cut them out for students. 2. Then, have one student in each group show a large number using only ones cubes. Other group members can discuss how to regroup the ones. 3. Remind students that when they regroup, they gather ten ones to make one group of ten. 4. Have students trade in 10 cubes for a rod. 5. Then have one person in each group write the number represented by the base-ten blocks. 6. Have students swap roles and regroup different numbers.   **Activity 17:**  **Addition Stories**   1. Have students make up their own word problems or addition story problems. 2. Encourage them to use amounts that require addition with regrouping. You may wish to model a few examples for the class before having students write and illustrate their own word problems. 3. You may also allow them to use manipulatives such as base-ten blocks or counters to solve. 4. Afterwards, have students swap their work with a classmate to check over each other’s work. 5. Collect each student’s paper and staple them together into a class book. 6. Title the book “Our Addition Stories” and keep it in the class library for students to read throughout the year.   ***Multiplication and Division:***  *Students will be able to:*   * *Recognize even and odd numbers.* * *Count and write in 3s, 4s, 5s, 10s and 100s.* * *Recognize counting in 3s, 4s as multiplication tables of three and four.* * *Recognize multiplication as repeated addition and develop multiplication tables (times tables) for 2, 3, 4, 5 and 10.* * *Write multiplication statements (i.e. sentences) using concrete and pictorial representations.* * *Recognize using concrete and pictorial representations that the multiplication of any two numbers can be done in any order.* * *Multiply mentally and in written form using the tables that they know:* * *1 digit number by another 1 digit number.* * *2-digit number by a 1-digit number using the multiplication grid.* * *Multiply a number with 0 and 1.* * *Recognize division as repeated subtraction through concrete and pictorial representation.* * *Write division statements (i.e. sentences) using concrete and pictorial representations.* * *Recognize using concrete and pictorial representation that the division of one number by another cannot be done in any order.* * *Divide mentally and in written form:* * *1-digit number by another 1-digit number (without remainder).* * *2-digit number by a 1-digit number (without remainder).* * *Solve real-world word problems involving multiplication and division using any method (for instance materials, repeated addition/subtraction, groups, arrays, mental and or written methods).* * *Solve real-world word problems (including Pakistani currency) involving addition, subtraction, multiplication and division.*   **Activity 18:**  **Even and odd numbers**   1. Make available to the students, number strips, and coloured see–through counters. Have students work in pairs, sharing a number strip, and counters of *one colour only*. (Use a single colour to better focus the student on the concept being developed.) 2. Place in front of the students, a selection of pre-packaged food or drink, which has an even number of individual content items. 3. Have students handle and check the number of items in each package, and then place a counter on that number on their number strip. The result will be that their number strip has several even numbers each covered with a see-through counter. 4. On the class chart or modelling book, record these numbers and have the students tell you what they notice. 5. Elicit from the students, or tell them, that these are all **even numbers**. 6. Have the students suggest reasons why commercial packaging mostly works in this way and record their ideas. (For example, ‘They’re neater that way’, ‘There’s no extra ones sticking out’, ‘The rows are equal’, ‘They’re in pairs’, etc.) 7. Agree that these are all reasons why the identified numbers are known as ***even numbers***. 8. Have students now place counters of the same colour on each even number on their number strip. 9. Have one student read even numbers to twenty aloud, removing the counters as they do so. 10. Then have the other student begin at twenty and count back in even numbers, replacing the counters as they do so. 11. Repeat if necessary. Recognize the pattern that they make: the counters are on every *second* number.   **Odd Numbers:**   1. Place the same packages again in front of the student. 2. Ask if anyone has found packaging that has an **odd** number of items. Point out many packages (bags) of produce, (for example carrots, tomatoes) contain an odd number of items. 3. Discuss possible reasons. (E.g. the items are not always a uniform size and therefore it may take an odd number of them to make up the advertized weight.) 4. Record on the class chart or modeling book, student ***predictions*** of things that they think they will discover about odd numbers. 5. Accept all suggestions, including possible misconceptions such as odd number + odd number = odd number. 6. Make available number strips and see-through plastic and counters of *two colours*. 7. Have them work individually or in pairs, covering the **even numbers**, saying the numbers aloud as they do so. 8. Have them ‘fill in the spaces’, with another colour, saying the numbers aloud as they do so. 9. Identify these as the **odd numbers**. 10. Have them discuss what they notice about the way they are placed on the number strip.   **Activity 19:**  **Even and Odd Numbers**   1. Make available hundreds of charts. 2. Have students place counters on odd numbers greater than 20. 3. Record on the class chart the patterns they see and what they notice about these numbers: ‘they all end in 1, 3, 5, 7, or 9. 4. As they do so, have them notice the similarities and differences in the physical patterns made with the counters on the board, for odd and even numbers. (Columns of odd numbers alternate with columns of even numbers.)   **Activity 20:**  **Variety of strategies to teach skip counting in 3s, 4s, 5s and 10s**   1. Bead the thread: Use beads and a thread to teach students to skip count. Ask them to bead the thread according to selected skip counting. Ask them to count the beads in skip counting. 2. Use the websites:  * <https://www.weareteachers.com/skip-counting/> to explore, choose and use from amongst 21 skip counting activities. Another great website * <https://earlyimpactlearning.com/19-counting-by-2s-activities-easy-medium-and-hard/> which though gives ideas on skip counting by 2s; however many of them could be adopted for skip counting in 3s, 5s and 10s. * <https://mathgeekmama.com/skip-counting-activities/>  1. Once you have given them ample practice of skip counting in two’s, fives and tens, introduce these skip counts as multiplication tables. 2. Again make them skip count with different activities, but this time round ask them to read them as times tables and write them as multiplication statements (such as 2 x 3 = 6 read as 2 three times is six etc.)   **Activity 21:**  **Teaching multiplication through groups and arrays; Introducing and explaining Arrays to students:**  NOTE: Multiplication and division need to be taught through concrete and pictorial representations at this early age. Therefore arrays are the suggested strategy for teaching multiplication and division.  Students may use objects such as beans/buttons/ rocks/ marbles to develop arrays (while providing concrete experience) or draw dots/ flowers/circles etc. to represent arrays (while working through pictorial representations.  A brief introduction to arrays as well as how to introduce arrays and groups to students in order to multiply is provided below for teachers new to concept.  The activity steps provided below and the videos shared serve two purposes. One is to provide guidelines on introducing and using (or drawing) arrays and the second is to introduce repeated addition (with or without arrays) to multiply and find answers.   1. Arrays can help your students develop concepts of multiplication and division. An array is a set of objects organized into equal groups. For example, 6 objects can be arranged into several different arrays: 1 group of 6 objects, 6 groups with 1 object in each group, 3 groups with 2 objects in each group, or 2 groups with 3 objects in each group. 2. Arrays is a set that shows equal groups arranged in rows and columns. Arrays are all around us: A pack of socks might have 3 pairs, a carton of eggs might have 2 rows of 6 eggs, a tray of muffins might have 3 rows of 2 muffins, etc. Together with your students, think of objects that are grouped in sets. 3. Watch the following videos to understand what arrays are and how do you make arrays from groups: you may show it to your students (if resources are available)  * Arrays from the link <https://youtu.be/DdVj0qhvtiU> * Multiplication using Arrays from the link <https://youtu.be/z8lcZUWbqT0>  1. Familiarize your students and yourself with arrays by organizing objects in different ways during your demonstration. Give lots of practice of arrays by demonstrating through different examples, for instance 5 x 3; 4 x 4; 1 x 5 etc. 2. Use both concrete and pictorial representations during your demonstration so that students have ample visual practice of arrays. Explain purpose of arrays using beans/buttons /rocks /counters (or through drawing dots/circles/flowers to represent arrays). 3. Give practice questions and resources to students to solve multiplication sums by developing arrays. If resources are not available, you may ask students to draw arrays to find answers to your given questions. 4. Remind your students that when they multiply, they put equal groups together to find the total. Like addition and subtraction, multiplication is an operation, a way to manipulate numbers. 5. We use the symbol *x* to show multiplication. In the number sentence 3 x 2, you must add the number 3 two times in order to find the product, or answer. This is called repeated addition. You can also add the number 2 three times in order to find the answer. 6. Explain that Arrays can help people count more easily. Explain to your students that instead of counting objects one by one, they can organize the objects into equal groups and count the groups. 7. At this point, show them the videos given below or see them yourself (before the lesson) to make notes for yourself on how to explain arrays and how to use them for multiplication (including explaining multiplication as repeated addition):  * Making equal groups from the link <https://youtu.be/Gh5psiNzayk> * Arrays and repeated addition from the link <https://youtu.be/IXQO5jo2utg> * Array multiplication from the link <https://youtu.be/lRgKavUxvKY> * multiplication with arrays from the link <https://youtu.be/sIIiROTvPKY>  1. Remind students that the order in which numbers are multiplied does not affect the outcome: 3 x 2 will yield the same answer as 2 x 3. 2. Draw or model different arrays and have students write multiplication number sentences that describe them. 3. Introducing your students to arrays at an early age will help build a solid foundation for multiplication and division. Arrays can help your students visualize and understand more complicated maths operations.   NOTE: The same notion of arrays is to be used to explain both multiplication and division. Use the same videos given above (making equal groups) as well as the ones provided below in **activity** **24 – Division through arrays** to build your understanding about arrays and division. Remember multiplication and division are opposites of one another, making groups of equal size and finding the product in an array would yield multiplication while finding the share for each person or group in an array would yield division.  **Activity 22:**  **Multiply with a number (including 0 and 1) – Formal written method including repeated addition method:**  **Teacher’s/students resources:**   * Video ‘Multiply with 0 or 1’ from the link <https://youtu.be/JIZ30u9N67s>.  1. Use the video to develop your teacher exposition or show it to your students during the lesson. 2. This activity will explore multiplying by numbers including 0 and 1. 3. These concepts can be confusing for some students, so we recommend doing plenty of hands-on activities and that is why arrays were explained before the formal written method of multiplication. 4. You may want to solve number sentences together using counters and creating arrays, and watch the video ‘Arrays’ to build background knowledge. 5. Remind students that when they multiply, they put equal groups together to find the total. 6. Write the number sentence 3 + 3 + 3 + 3 = on the board or on a piece of paper. 7. Then use counters and cups to solve the number sentence. Place 3 counters into each of 4 cups and have students count or add the counters to find the sum: 3 + 3 + 3 + 3 = 12. 8. Explain that multiplying is much easier than adding the same number over and over again: 3 x 4 = 12. The multiplication sentence shows that you are adding the number 3 a total of 4 times. 9. Use cups and counters to repeat the same activity with other number sentences, such as 1 + 1 + 1 + 1 + 1 + 1 + 1 = and 5 + 5 + 5 =. 10. Then show 4 cups without counters. How many counters are there? 11. Explain that while there are 4 cups, they are all empty. There are 0 counters in each cup. 12. You can use the number sentence 0 + 0 + 0 + 0 = to show how you are adding 0 counters a total of 4 times. 13. Explain that since there are 0 counters in each cup, there are 0 counters in all. 14. Then write the following multiplication sentence: 4 x 0 = 0. 15. Repeat the activity again, this time with 10 cups without any counters. What multiplication sentence shows the number of counters? 10 x 0 = 0. 16. Help them understand that they could have a million or trillion cups, but if the cups have nothing in them, they are left with 0. 17. Explain that if a number is multiplied by 0, the answer is always 0. 18. Now show 4 cups with 1 counter in each cup. What is the total number of counters? 19. You can use the number sentence 1 + 1 + 1 + 1 = 4 to show how you are adding 1 counter for a total of 4 times. But, an easier way to solve is by using multiplication: 1 x 4 = 4. 20. Repeat the activity again using 12 cups with 1 counter in each cup. 21. Guide students to write the multiplication sentence 12 x 1 = 12. Explain that if a number is multiplied by 1, the answer is always that same number. 22. So if you have 10,000 cups and each has 1 counter, then you have 10,000 counters. 23. Provide different multiplication sentences with 0 or 1 and have students use cups and counters to find the answer. 24. Then create a set of cups with 0 or 1 counter in each cup and have students write a multiplication sentence that describes the set. 25. Ask: *How is multiplying easier than adding the same number over and over again?* 26. Discuss together. 27. Have students continue to practice solving multiplication sentences with 0 or 1. 28. Then extend the concepts by having them solve multiplication sentences with very large numbers.   **Activity 23:**  **Bean Bags**   1. Divide students into small groups and provide each group with clear plastic baggies and small counters, such as blocks or dried beans. 2. Then write multiplication sentences with 0, 1 and another number on the board, such as 3 x 1 = \_\_ or 10 x 1 = \_\_ or 5 x 3 = \_\_. 3. Have students use the baggies and beans to solve the number sentences. 4. Then have one group member put a different number of beans into the baggies and challenge the other group members to come up with the number sentence.   **Activity 24:**  **Addition/Multiplication**   1. On index cards, write a multiplication sentence, such as 3 x 0 = \_\_, 4 x 1 \_\_\_\_, 2 x 6 = \_\_\_\_ etc. 2. On another card, write its related addition sentence, such as 0 + 0 + 0 = \_\_; 1 + 1+ 1+1= \_\_\_\_; 6 + 6=\_\_\_\_\_\_ or 2+2+2+2+2+2= \_\_\_\_\_. 3. Give an index card to each student and have everyone mingle around the room to find their related partner. 4. Then have the partners solve the number sentences together. 5. You can repeat this activity several times so students get an opportunity to solve different sentences. 6. You may wish to have students make more pairs of cards by writing addition and multiplication sentences they create on their own.   **Activity 25:**  **Division through arrays:**  **Activity 20 – Teaching multiplication through groups and arrays** does give information of how to connect division as you teach for multiplication. However for further guidance, a few videos and websites are shared.  Both these activities involve a good comprehensive demonstration by teachers followed by practice questions by students regarding multiplication and division.  Therefore the focus of these activities is to help teachers develop their demonstration and exposition as they explain multiplication and division through arrays (and not through the traditional methods)   1. Watch the following videos to make notes for demonstrating (once again) how arrays can be used to divide.  * Division array strategy from the link <https://youtu.be/EAd8fOTC8Dk> * Arrays division from the link <https://youtu.be/RXdb9X2d-_k>.  1. Visit the following websites to develop your understanding regarding arrays and how multiplication and division are interrelated. It also gives in-depth understanding for the teacher to ensure that students are able to know and understand that multiplication and division are opposite of each other and developing arrays would help solve not only multiplication but division problems as well.  * Teaching relationship between multiplication and division using arrays from the link [https://www.hmhco.com/blog/teaching-relationship-between-multiplication-division-using-arrays#](https://www.hmhco.com/blog/teaching-relationship-between-multiplication-division-using-arrays) * Arrays, multiplication and division from the link <https://nrich.maths.org/8773> * dividing with arrays through the link <https://www.ixl.com/math/lessons/dividing-with-arrays>.  1. Once you have developed a good understanding, demonstrate for students through simple examples such as 15 ÷ 3; 24 ÷ 4 etc. and explain as you develop arrays using beans/buttons/rocks/counters. 2. Give practice questions and resources to students to solve division sums by developing arrays. If resources are not available, you may ask students to draw arrays to find answers to your given questions.   **Activity 26:**  **Division through Making Equal groups**  **Teachers/students resources:**   * Video ‘Making Equal groups’ from the link <https://youtu.be/Gh5psiNzayk>.  1. There are many approaches to teaching division and we recommend employing different strategies and providing plenty of examples to help students visualize and understand division. 2. Making equal groups and exploring different ways to share helps students understand the basic principles behind dividing. 3. You may use arrays as given in the activity – division through arrays to help students understand the relationship between multiplication and division. 4. Explain to your students that when groups are equal, they each have the same number of items. 5. Division can be a difficult for some students to grasp, so it is important to use tangible materials to model real-life division situations. 6. Present your student with 6 counters (pennies, beans, buttons, etc.) and pretend they are cookies. Using cookies or another treat is always a good way to get kids engaged. As soon as you tell them that they will be working with cookies, their investment in making sure there are “fair” groups goes up and their maths skills suddenly improve! 7. Then ask your student to split them into two fair groups. He or she can dole them out one by one or draw pictures or make a tally chart to divide the counters equally to figure out there will be 2 groups with 3 pennies each. 8. Continue practicing with different numbers of counters and dividing them into different numbers of equal groups. 9. Then present your student with a story problem to model, such as “There are 12 cookies that must be divided among 4 friends. How many cookies does each friend get?” 10. Provide your student with 12 counters and have him or her divide them into 4 equal groups. 11. Your students can create an array to help divide them into equal groups. An array is a set of items that show equal groups in rows and columns. Your students can make an array to show 4 rows of 3 counters each. This means that each friend, as represented by the rows, get 3 cookies each. Pose different division problems and have your student use arrays to solve them. 12. Provide another problem for your student that requires him or her to make and count groups. For example, you can pose the following problem: “Aliya collects stickers in a sticker album. She has 15 stickers, and 3 stickers can fit on each page. How many pages can she fill?” 13. To solve this problem, your students can model using counters, drawing pictures, or making tallies.  * He or she can also use a number line and skip count. Have your student start at 0 and skip-count by 3’s to get to 15. Then your student can count the number of times he or she skip-counted to find the answer. * Your student can also start at 15 and subtract 3 as many times needed to get to 0: 15 – 3 = 12, 12 – 3 = 9, 9 – 3 = 6, 6 – 3 = 3, 3 – 3 = 0. Then count the number of times he or she subtracted.   Have your student practice solving problems using different strategies, and then discuss which strategies work best for which type of problem.   1. Remind your students that the symbol ÷ means to divide. To write a division sentence, he or she should write the larger number first, as in 18 ÷ 3 = 6. The number you divide into is called the dividend. The number you are using to divide is called the divisor. The answer to a division problem is called the quotient. 2. In the number sentence above, the dividend is 18, the divisor is 3, and the quotient is 6. 3. Help your student understand the relationship between multiplication and division and realize that they are inverse, or opposite, operations. 4. You can use arrays and a number triangle to help your student see the connection. For example, the equations 3 x 2 = 6 and 2 x 3 = 6 are related to 6 ÷ 2 = 3 and 6 ÷ 3 = 2. Fact families use the same numbers and different operations, so 3, 2, and 6 are in the same fact family. 5. Division can be a tricky subject for students, but students can grasp concepts more easily by working through different examples and employing different strategies and visualization techniques. 6. We encourage students to use counters and model problems to help them understand basic operations and how they are connected.   **Activity 27:**  **Division with Remainders – Formal method of division with signs:**  **Teachers/Students Resource:**   * Video ‘Division with remainders’ from the link <https://youtu.be/npmF_zwQhp4>.  1. This activity will introduce students to division with remainders. Watch the video to make notes for yourself or show it to your students at the beginning or during the lesson. 2. Encourage students to use counters or draw pictures as they practice division with remainders. Help them employ different strategies so they can find the one that works best for them as they develop their maths skills. 3. Teach how to make equal groups. Present 8 counters and tell students to split them into 2 equal groups. How many counters will be in each group? 4. Divide the counters to show that 4 counters will be in each group (Create 2 groups and place /divide/share counters one by one or place 4 counters each altogether in each group). 5. Guide students to write a number sentence to describe what they did: 8 ÷ 2 = 4. 6. Then present the same number of counters and tell students to split them into 3 equal groups. What happens? Each group can have 2 counters, but there are 2 left over. 7. Help students understand that they cannot divide 8 by 3 equally. 8. Explain that a remainder is the number left over after dividing two numbers. 9. Create a division sentence that represents what happened: 8 ÷ 3 = 2 R2. Explain that when you divide 8 items into 3 groups, you have 2 items in each group, and 2 items left over. 10. Be sure to point out that the *R* stands for “remainder.” 11. Solve other number stories that involve division with remainders. For example, you might want to pose the following problem: “Farrukh and Alishba share 11 stickers. How many does each person get? How many are left over?” 12. You can use counters to model the number story together. Have students divide 11 counters into 2 groups, making sure each group has the same number of counters. There will be 5 counters in each group. Then point out how there is 1 counter leftover—that is the remainder. 13. Write the division sentence together: 11 ÷ 2 = 5 R1. 14. Repeat the activity with other scenarios, helping students use their manipulatives and write division sentences. Be sure that students have practice in writing the division problems using both algorithms—in the equation format and in the “long division” format. 15. Break down a division sentence for students: In 22 ÷ 5 = 4 R2, the total number of items is 22, the number of groups is 5, and the number of items in each group is 4. The number of items left over is 2. 16. Encourage students to check their work after they finish solving division number sentences. 17. They can multiply the number of groups by the number of items in each group. Then they can add the product to the remainder. The answer should be the total number of items. So in 22 ÷ 5 = 4 R2, they can multiply 5 x 4 = 20 and then add the remainder: 20 + 2 = 22. 18. Have students solve division sentences and then check their work by multiplying and adding. They should get into the habit of going back over their work, which will not only empower them to self-check but also develop their multiplication and addition skills! 19. Help students understand that in the real world, division problems often have remainders. 20. Have them think of scenarios they have encountered where they could not divide something equally. What did they do? Discuss with students and share stories.   ***Fractions:***  *Students will be able to:*   * *Identify, name and write:* * *Unit fractions* * *Non-unit fractions* * *Like fractions* * *Unlike fractions*   *of a discrete set of objects using pictorial representations.*   * *Compare and order unit fractions and like fractions (with denominators up to 10) using <, > and = sign.* * *Add and subtract like fractions within one whole (e.g. + = ).* * *Know and recognize that tenths arise by dividing an object into ten equal parts and in dividing single digit numbers and quantities by ten (using concrete and pictorial representations).*   **Activity 28:**  **Introduction to Fractions:**  **Teachers Support Resource/Students resources:**   * Video ‘Basic Parts of a Whole’ from the link <https://youtu.be/6UJLduCBjno>. * Video ‘More Fractions’ from the link <https://youtu.be/5Eoo2RnGgAM>.  1. It is highly recommended to review the videos ‘Basic Parts of a Whole’ and ‘More Fractions’ before explaining fractions to students. 2. The two videos introduce fractions and explore unit fractions, including one-half, one-third, and one-fourth. This movie will go beyond unit fractions and further investigate fractions of sets. We encourage students to work with counters, small objects, or even food to help them experiment with different parts of a whole or set. 3. Show the two videos to students. 4. Review with students that a fraction is a number that shows part of a whole. 5. You may wish to introduce a simple fraction such as one-half. You can take a piece of paper and cut it in half to show that there are two equal parts. Remind students that since there are two equal parts, two goes in the denominator, or the bottom of the fraction. Then take one half away. What fraction of the whole paper is left? Point out that there is only one of two parts remaining, so one goes in the numerator, or the top of the fraction. Thus, one-half of the paper is left. 6. You may wish to continue this activity with other unit fractions, (including one-third if you wish), one-fourth, three-fourths, two-fourths. 7. Help students move beyond unit fractions. You can divide a piece of paper into eighths and color two sections blue. Ask students to identify the fraction of the paper that is blue. Help them count the total number of sections (eight) and put that number in the denominator. Then count the total number of blue sections (two) and put that number in the numerator. Thus, two-eighths of the paper is blue (which is one-fourth actually). 8. Repeat the activity by having students identify the fraction of the paper that is *not* blue. Six-eighths of the paper is not blue. 9. Repeat the activity again to explore other fractions, such as three-fourths, (five-sixths, and eight-tenths provided your students are ready and interested to explore further). 10. You may wish to have students work in pairs and trade off coloring in squares and writing fractions that name the colored and plain parts. 11. Help students understand how fractions can name a whole. Divide a piece of paper into fourths and color all the sections blue. What fraction of the paper is blue? Guide students to understand that there are four equal parts, so four is the denominator. How many parts are blue? Guide students to count the blue sections and put four in the numerator. So four-fourths of the paper is blue. That means the whole paper is blue. Help students understand that four-fourths, five-fifths, eight-eighths and so on, all represent a whole. 12. Explain to students that fractions can also name no parts! Take a piece of white paper and divide it into sixths. Since there are six equal parts, six goes in the denominator. How many parts are blue? Since none of the parts are blue, you put zero in the numerator. Repeat this activity to represent other fractions. 13. Explore fractions of sets together. Show a collection of fruit, such as three apples and two bananas. What fraction of the pieces of fruit are apples? Guide students to count all the fruit and put that number (five) in the denominator. Then have them count the number of apples and put that number (three) in the numerator. Thus, three-fifths of the fruit are apples. 14. Then show the same collection and ask what fraction of the fruit are oranges. Help them understand that zero out of the five fruit are oranges! 15. You may want students to work in pairs and use counters or objects to create a set. Then have them challenge each other to name fractions that describe their sets, being sure to write their fractions down. 16. Fractions can be challenging for some students, but hands-on exploration can help young learners understand and practice the concepts so they can become experts!   **Activity 29:**  **Unit fractions/non-unit fractions and comparing fractions**  **Students resources:**   * Cut out of a whole pizza. * Pizza Cut-out each showing: ½ * Pizza cut-out showing ¼ * Pizza cut out showing 1/3 * Pizza cut out showing 1/8.  1. Begin the lesson with the class in a circle. Have pizza cutouts ready with you. 2. Give four students one half, two halves, three halves, and four halves, respectively. Ensure that the pieces are not visible to any students. Tell them that ‘*I gave each person a different number of pieces of pizza. Please reach behind you and count how many pieces of pizza you have.* 3. After each student has told their number of pieces. Ask: *Who has the most pizza pieces?* 4. Students might think the question is trivial, but some may realize that the size of pieces matters, as well as the number of pieces. Having more pieces results in a greater amount only if the pieces are the same size. 5. Ask each student to reveal the amount of pizza they have by arranging the pieces at the front of the class. Record the total amount they have as both words, e.g. three halves, and symbols, e.g. 3/2. 6. Creating improper fractions (numerator greater than the denominator) helps students to recognize the role of both numbers in determining the size of a fraction. 7. Ask: *How else could we write two halves? …three halves? …four halves?* (1, 1 1/2, 2). *What does the top number, the numerator, of a fraction tell you? What does the bottom number, the denominator, tell you?* 8. Ask your students to name the fraction for other amounts of pizza you made. Show each cut out i.e. pizza’s with ½; ¼, 1/3, 1/5, 1/8 one at a time and ask them to name the fraction. 9. Ensure the fractions are non-unit and some fractions are improper. 10. You might also invite students to make or draw given fractions. Asking students to anticipate the size of the amount before it is made is important to their development of imaging, and possibly number properties. High achievers might notice that dividing numerator by denominator gives the number of ones (whole pizzas) that can be made, e.g. 9/3 = 3 found by 9 ÷ 3 = 3.   **Activity 30:**  **Tenths:**  **Dividing by 10 to make tenths**   1. Revisit familiar fractions. Use different representations, including paper shapes, number lines and clocks, to focus on the concept of ‘equal parts’. Also show representations that are not divided into equal parts. 2. Ask: *If Shama says 1/10 is comes after ½ because 10 is greater than 2. Ali says, No! 1/10 is smaller than ½ since the whole is cut into 10 equal parts which is smaller than when the whole is cut into 2 equal parts.* Ask: *Who do you think is correct? How do you know each one shows tenths?* 3. Use a place-value chart to explore the movement of the digits as you divide by ten. Start with the numbers 20 and 30. Model how the single digit, one, can also be divided by ten to show that 1 ÷ 10 = 1/10, 2 ÷ 10 = 2/10 4. Label the new column ‘tenths’ and further explore dividing two by ten. 5. Look at the way in which division statements can be written as fractions and vice versa. 6. Now draw a number from 0 to 1 and show 10 equal divisions on it. 7. Mark 1/10, 2/10, 3/10 and so on ….on divisions in sequence and help students understand tenths. | |
| **References:**  BrainPop (2021) Retrieved from: <https://educators.brainpop.com/topic-lesson-directories/bp-jr-topic/?brainpop-subject=math&subject-title=Math>  BrainPop Jr. (2021) Retrieved from: <https://jr.brainpop.com/math/>  NewZealand Government (2021) Retrieved from: <https://nzmaths.co.nz/units-work>  Elementary Nest (2021) Retrieved from: <https://elementarynest.com/teaching-strategies-for-2-digit-addition-and-subtraction/>  Rising Star Mathematics. Teacher’s Guide. (2017) Hodder Education: London. UK | |

**Domain: Algebra**

| **STEP 1** |
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| **Standard*.*:***Students will be able to explore patterns in a variety of ways.* | |
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| **Student Learning Outcomes**: *Students will be able to:*   * *Complete geometrical patterns (e.g. on a square grid) according to one or two of the following orientations:* * *Shape* * *Size* * *Color* * *Explore patterns in a variety of ways using 2-D and 3\_d shapes.* * *Identify and extend repeating, increasing and decreasing number patterns (for e.g. on a number line or on a hundreds chart).* | |
| **Knowledge:**  Students will be able to:   * Know about patterns (including patterns by shapes, objects, colour, size, orientation and number patterns). | **Skills:**  Students will be able to:   * Complete geometrical patterns (e.g. on a square grid) according to one or two of the following orientations: * Shape * Size * Color * Explore patterns in a variety of ways using 2-D and 3- D shapes. * Identify and extend repeating, increasing and decreasing number patterns (for e.g. on a number line or on a hundreds chart).   *Advanced/Additional:*   * *Identify and extend growing and shrinking patterns using shapes and objects.* * *Explore simple tessellations.* |

| **STEP 2** |
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| **Assessments**  **Formative Assessments**  Some of the types of formative assessment teacher may use are:   * Question & Answer(open and closed) * Quick Quiz * Learning Walks * Projects * Selected responses (may include MCQs, true: false, matching short answers, fill-in-the blanks, etc.) * Observation diaries * Inquiry charts * Four Corners: Gather students in the middle of the room, and read multiple-choice questions and their possible answers aloud. Students then move to the corner that represents what they believe is the correct answer. The top left room corner can be option A, the bottom-left can be B and so on.   **Summative Assessments** Some of the forms of summative assessment are:   * End of Unit Test * Class Test * Periodic/Monthly Tests * Mid-year Exam * End of Year Exam * Standardized Tests * External Exams   **Some of the sample questions that can be used as part of summative assessment are:**   * + - 1. Cross figure that does not belong to each pattern?  |  |  | | --- | --- | |  |  |  * + - 1. What comes next? Draw the shapes.  |  |  | **\_\_\_\_\_\_\_\_\_\_** | | --- | --- | --- | |  |  | **\_\_\_\_\_\_\_\_\_\_** |  * + - 1. ⊙ × 6 = 30   ⊙ × 8 = ⬜  The missing number in ⬜ is \_\_\_\_\_\_\_\_\_ |
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| **STEP 3** |
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| **Learning Activities**  *Students will be able to:*   * *Complete geometrical patterns (e.g. on a square grid) according to one or two of the following orientations:* * *Shape* * *Size* * *Color* * *Explore patterns in a variety of ways using 2-D and 3 - d shapes.* * *Identify and extend repeating, increasing and decreasing number patterns (for e.g. on a number line or on a hundreds chart).*   **Activity 1:**  **Patterns Introduction and exposition:**  **Teachers/Students resources:**   * Video ‘Patterns” from the link <https://youtu.be/MBrdGGqUu1E>.   There are many tasks provided within this activity 1. You may split it into number of lessons as per your need or follow the sequence and do all tasks of this activity (if you have ample time).   1. Patterns are great ways to introduce and develop algebraic thinking. Encourage your students to build patterns and experiment in different ways by using shapes, colors, sounds, or movements. 2. Challenge your students to find patterns all around them, in their surroundings, on their clothes, or even in music. Help them to identify the unit that repeats in the pattern and predict what comes next. 3. **Review** with your students that a pattern is something that repeats over and over again. Patterns can use colors, shapes, sizes, sounds, and movements, as in dance routines. 4. Show different examples of patterns and encourage your students to find them on their own. 5. Show the video ‘Pattern’ to students to help explain patterns. 6. Then go through different patterns of movement, such as alternating jumping jacks with hopping once. You can also create sound patterns together by stomping, clapping, snapping, and tapping. If possible, play music for your students or bring in examples of music and have students identify the pattern. 7. **Encourage**your students to make their own patterns using two to four elements in a unit. They can use pattern blocks, different coloured marbles or counters, or other small objects. They can also draw pictures or draw or paint stripes of different colours. 8. Instruct them to select two to four items or colors, and arrange them in a specific order. This is their unit of pattern. Then have them build the pattern by repeating the unit over and over again. 9. Have your students practice creating patterns using a variety of materials and challenge them to break the patterns into individual units. 10. Then, ask them to begin patterns for someone else to continue. Help your students to identify what type of pattern they have created: ABAB, ABC, ABB, or others. 11. **Present** a simple pattern to your students and have them figure out what comes next. Guide them to look for the individual unit first. Then follow the pattern with the unit in mind to figure out what comes next. 12. They may want to take notes, use words or sounds, or draw pictures to help them keep track of items in the pattern. For example, when using a sound pattern, such as clap, clap stomp, clap, clap, stomp, clap, clap, stomp, students can write down what happens in words, use abbreviations, or use colours or counters to represent each movement. Then help them read their symbols to figure out what comes next; a clap! 13. **Draw** or use shapes to create a pattern, but leave one shape out. Ask your students to find the missing shape. Guide them to find the unit and see where the missing shape falls in the sequence. 14. Invite students to create their own missing shape patterns and take turns guessing. This activity promotes algebraic thinking and problem solving skills. 15. Explain that patterns are everywhere. There are plenty of examples found in nature, such as stripes on a zebra or the arrangement of petals on a flower. Encourage your students to explore the world around them and see maths in unexpected places.   **Activity 2:**   1. Clap out a simple pattern and invite students to join in. Experiment with other basic patterns using clapping, foot stomping, and other movements. Invite students to describe and explain the patterns you created. Introduce the term pattern, which means "something that repeats over and over again." 2. Provide some experience with visual patterns. Read the pattern out loud together (e.g. "triangle, triangle, square") and help students decide what comes next. 3. Use the website <https://www.topmarks.co.uk/Search.aspx?q=FINISH%20THE%20PATTERN> to choose an interactive game for your students where they complete the patterns. 4. Allow students to explore patterns in small groups using manipulatives. They may want to make patterns with cars and trucks, different colored bears, etc. Other students may want to create patterns using art supplies. 5. Have volunteers share patterns they created. Encourage students to look for more patterns throughout the day. 6. You may want to line them up in a boy-girl pattern on the way to lunch and have them identify patterns in the school that they see on their walk.   **Activity 3:**  **Clap and Tap**   1. Clap and tap out a pattern for your students to follow, such as clap, clap, tap, clap, clap, tap, clap, clap, tap. Make sure you repeat the pattern at least three times to help students find the unit. 2. Stop the pattern and have students figure out what comes next, a clap or a tap. Then invite student volunteers to clap and tap their own patterns for other students to guess.   **Activity 4:**  **AABB**   1. Post a pattern for your students to follow, such as AABB, ABC, ABCD, etc. 2. Then have them use whatever items they wish to create the pattern. They may want to use beads, marbles, pattern blocks, connecting cubes, or draw pictures. 3. Have students check each other’s work. Then have student volunteers share their patterns with the class.   **Activity 5:**  **In the Garden**   1. Give each student a piece of square grid paper, for example a 4x4 grid. 2. Students are to draw a design by colouring in the squares to make a pattern. 3. They make 3 or 4 copies of this pattern. 4. Stick these in a row to make a row of tiles with repeating patterns. |
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| **References:**  BrainPop (2021) Retrieved from: <https://educators.brainpop.com/topic-lesson-directories/bp-jr-topic/?brainpop-subject=math&subject-title=Math>  BrainPop Jr. (2021) Retrieved from: <https://jr.brainpop.com/math/>  NewZealand Government (2021) Retrieved from: <https://nzmaths.co.nz/units-work>  Rising Star Mathematics. Teacher’s Guide. (2017) Hodder Education: London. UK |

**Domain: Measurement**

| **STEP 1** |
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| **Standard *1, 2, 3, etc.*:***Students will be able to measure, compare and order lengths, mass, and capacity using standard units such as meters/centimeters, kilograms/grams and liters/ milliliters; read, write and compare time (hours and minutes).*  *They will also be able to solve problems in context involving lengths, mass/weight, capacity and time.* | |
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| **Student Learning Outcomes**: *Students will be able to:*   * *Measure, compare and order lengths, mass, capacity using standard units such as meters/centimeters, kilograms/grams and liters/ milliliters using <, >, and = signs.* * *Add and subtract lengths, mass, capacity given in the same units.* * *Read and write time in hours and minutes (with five minute intervals, half past, quarter past and quarter to) from analogue and digital clocks.* * *Show time in hours and minutes on an analogue clock.* * *Read and write temperature to the nearest appropriate unit i.e.* ( ) *using pictorial representations and relating temperature scale to number line.* * *Compare and order temperature using <, >, and = signs.* * *Recognize intervals of time (for instance to estimate/give a rough calculation of the time taken by particular events or tasks).* * *Use Solar and Islamic Calendar to find a particular day/date in real-life situations.* * *Recognize perimeter and area.* | |
| **Knowledge:**  Students will be able to know:   * Appropriate standard units that can be used to measure: * heights/ lengths of two or more objects (m/cm).. * mass/ weight of two or more objects (Kg/g). * capacity of two or more objects (litres/ml). * Appropriate symbol/sign to compare and order : * heights and lengths of two or more objects in any direction. * Mass/ weight of two or more objects * Capacity of two or more objects. * Addition of length, mass, capacity (given in the same units) to solve real world problems. * Intervals of time. * Reading of temperature scale as numbers on a horizontal and vertical number line. * Particular days of the week and date of both Solar and Islamic calendar year. * Area and perimeter of 2 D shapes (square and rectangle).   *Advanced/Additional*:   * *Know appropriate standard unit to measure temperature ( )* | **Skills:**  Students will be able to:   * Measure and record the: * Lengths of different objects using standard units (meters/centimeters). * Mass of different objects using standard units (Kilograms/ grams) * Capacity using standard units (liters/ milliliters). * Compare the lengths of different objects and record the result using <, >, and = signs. * Compare the mass of different objects and record the result using <, >, and = signs. * Compare the capacity of different objects and record the result using <, >, and = signs. * Add and subtract length, mass and capacities given in the same units to solve real life problems. * Read and write time in hours and minutes (with five minute intervals, half past, quarter past and quarter to) from analogue and digital clocks. * Read and write temperature to the nearest appropriate unit i.e. () using pictorial representations and relating temperature scale to number line. * Draw the hands on an analogue clock face to show the time in hours and minutes. * Compare durations of events [e.g. to estimate/give a rough calculation of the time taken by particular events or tasks] * Find a particular day and date from solar calendar and from Islamic calendar. * Recognize area and perimeter of 2D shapes.   *Advanced/Additional:*   * *Measure area and perimeter of 2D shapes (square and rectangle).* |

| **STEP 2** |
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| **Assessments**  **Formative Assessments**  Some of the types of formative assessment teacher may use are:   * Question & Answer(open and closed) * Quick Quiz * Learning Walks * Projects * Selected responses (may include MCQs, true: false, matching short answers, fill-in-the blanks, etc.) * Observation diaries * Inquiry chart * Four Corners: Gather students in the middle of the room, and read multiple-choice questions and their possible answers aloud. Students then move to the corner that represents what they believe is the correct answer. The top left room corner can be option A, the bottom-left can be B and so on.   **Summative Assessments** Some of the forms of summative assessment are:   * End of Unit Test * Class Test * Periodic/Monthly Tests * Mid-year Exam * End of Year Exam * Standardized Tests * External Exams   **Some of the sample questions that can be used as part of summative assessment are:**   1. One line has 2 endpoints. How many endpoints does 3 and a half lines have?      1. Fill in the blanks.      1. Ayesha cycled from home to the library. \_\_\_\_\_\_\_ 2. The Bank is \_\_\_\_\_\_ m from the home. 3. The school is \_\_\_\_\_\_\_ m from the library. 4. The total distance between Ayesha’s home to school is \_\_\_\_\_. 5. How far did Ayesha cycle from her house to the library? \_\_\_\_\_ 6. Look at the picture and answer the following questions.      1. The tea spoon is \_\_\_\_\_\_ cm shorter than the table spoon. 2. The fork is \_\_\_\_\_\_\_ cm longer than the table spoon. 3. The \_\_\_\_\_ is the longest. 4. The table spoon is \_\_\_\_\_\_\_ than the tea spoon by \_\_\_\_\_ cm. 5. The \_\_\_\_\_\_\_\_ is the shortest. |
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| **STEP 3** |
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| **Learning Activities**  *Students will be able to:*   * *Measure, compare and order lengths, mass, capacity and time using standard units such as meters/centimeters, kilograms/grams and liters/ milliliters using <, >, and = signs.* * *Add and subtract lengths, mass, capacity given in the same units.*   **Activity 1:**  **Teacher Exposition and Introduction to Standard Units of Measurement:**  **Teacher’s/Students response:**   * Video Inches and Feet from the link <https://youtu.be/QdA_ZcngoJI>. * Video ‘Centimeters, meters and kilometers’ from the link <https://youtu.be/1OBf_dmp9n0>.  1. Explain that measurement is an important part of every elementary curriculum. Students should become familiar with working with nonstandard and English/U.S. customary units and using different measurement tools such as rulers, tape measures, and yardsticks. 2. The metric system is also an important part of elementary education and will be covered as a separate topic. 3. Review with your students that length is how long an object is and the width is how wide an object is. The height is the measurement of how tall or high the object is. 4. Show them the video, ‘Inches and Feet’ to begin explaining the standard units of measuring length and width. Note: Please ensure that you see it before the lesson. 5. Most students use nonstandard units when they first learn how to measure. Encourage them to use different objects to measure lengths. Explain that objects that are flat and straight work best when measuring length. The objects should be lined up, end to end with no gaps, next to the object they are measuring. Students should start measuring from the end of the object to get an accurate measurement. 6. Explain that standard units of measurement are important because they provide reference points that everyone can use. Historically, an inch was equivalent to the width of a thumb and in many languages the word for *inch* is the same as the word for *thumb*. Similarly, the length of a person’s foot represented a foot. Since hands and feet differed in size, a more accurate system of measurement was necessary. 7. The customary units used in the U.S. include inches, feet, yards, and miles. Students should know that 1 foot is equal to 12 inches. 8. Inform students that the abbreviations for customary units: inch (in.) and foot (ft.). 9. Give a few flat things to students to measure. Remember when young students use a ruler to measure, it should be stressed to line up the end of the object with the 0 on the tool. When they identify the number and mark on the ruler that lines up with the end of the object, they should record their results with both the number and the unit of measurement. 10. Familiarize students with the language and vocabulary associated with measurement. For example, *about, close to, between, just under, less than,* and *greater than* are all words used to help describe measurements. 11. Encourage them to notice that many things do not measure to an exact inch or foot. Prompt them to use describing words(adjectives) to help explain how close the object is to the nearest inch or foot. 12. Encourage your students to explore the world around them and measure objects using nonstandard and standard units of measurement. They will begin to notice particular units and tools work better for different tasks.   **Activity 2:**  **Teacher Exposition and Introduction to measuring lengths using centimeters and meters.**  **Teacher’s/Students response:**   * Video ‘Centimeters, meters and kilometers’ from the link <https://youtu.be/1OBf_dmp9n0>. * Video ‘Comparing Numbers’ from the link <https://youtu.be/UF4QlDAJJPQ>.  1. Familiarize students with metric measurements. 2. Show them the video ‘Centimeters, meters and kilometers’. You may pause the video when it explains kilometers (if you feel students are not ready for it). It will help students get an understanding of each measurement and how they are related. 3. It is recommended that plenty of hands-on activities with rulers and tape measures and with non-standard units of measurement are done by the students. 4. After seeing the movie, review with students that a centimeter is a unit of measurement. A thumbnail is about 1 centimeter wide. Ask: *What else is about 1 centimeter wide?* Brainstorm different objects. 5. Then have students measure small objects using a centimeter ruler. 6. Remind them that when they measure, they should line up the end of the object with the 0 on the ruler. Talk about what might happen if they do not line up the 0 with the end of the object. You may want to demonstrate. 7. Review with students that centimeters are often used to measure small or medium-sized objects. Ask: *What is the length and width of a desk? What is the height of a glass?* 8. Practice measuring objects and writing down the measurements in a chart. Then order the objects you’ve measured from shortest to longest. At this point, you may not use the symbols to compare lengths. 9. Be sure to remind students that the abbreviation for centimeters is *cm*, and that unlike customary units of measure, no periods are used after metric abbreviations. 10. Review that a meter is equal to 100 centimeters. A student’s arm span is about 1 meter, as is the length of a baseball bat. Ask: *What else is 1 meter long or wide?* 11. Brainstorm ideas and measure to find examples. 12. Explain that we use meters to measure longer or bigger dimensions. For example, we can use meters to measure the height of a ceiling or the length of a swimming pool. 13. Ask: *Why would we use meters instead of centimeters?* Have students explain their answers. 14. Use a meter stick or a tape measure to measure different objects and order the measurements from shortest to longest. 15. Remind students that the abbreviation for meter is *m*. 16. Help students choose the correct unit to use to measure different objects. Ask: *Why would you measure a pencil in centimeters? Why shouldn’t you use a meter to measure a crayon?* 17. Discuss together and have students point out what units they would use to measure different objects. 18. Provide opportunities to students to measure different lengths and widths of objects in the classroom. 19. Optional: Explain that lengths are represented by numbers. We can compare numbers. Show them the video ‘Comparing Numbers’ and explain that we can use symbols to compare numbers. (NOTE: This is a good opportunity to explain <, > signs, if you have not already done so in the strand ‘Numbers and Operations’). 20. Explain symbols >, <, and + sign to compare objects, numbers and quantities. Ask them to use the symbols to compare lengths/widths which they have measured in step 18. 21. Understanding metric measurements is important because most parts of the world use the metric system. In addition, people in science and engineering fields work with metric units. Help students become masters of measurement!   **Activity 3:**  **Measurement Hunt**   1. On an index cards, write different measurements such as 5 centimeters, 3 meters, and 1 meter/centimeter. 2. You may also want to use abbreviations so your students become accustomed to reading them. 3. Put the index cards in a hat and have each student or pairs of students draw a card. 4. Then have them measure things in the classroom to find an object that matches the measurement.   **Activity 4:**  **Body Part Measurements**   1. Have pairs of students draw an outline of their bodies on large sheets of butter paper. 2. Then have students measure their body parts in nonstandard and standard units. 3. You may wish to provide a list of parts to measure, such as the length of the foot, width of the neck, the hip bone to the knee, the span of the shoulders, and the distance between the middle finger tip to the elbow. 4. Students can help each other measure using different units and record their measurements on their outlines. 5. Post the outlines around the classroom so students can compare measurements with each other.   **Activity 5:**  **Dinosaurs**   1. Some dinosaurs were much bigger than animals living today. The Argentinosaurus was about 37 meters from head to tail! 2. Have students research the lengths of different dinosaurs. Record their lengths on a piece of paper. 3. Then have small groups or pairs go outside with sidewalk chalk and a meter stick or tape measure. 4. They can measure and mark the animals’ lengths on the ground. This is a fun activity that allows students to explore dinosaurs and help them understand relative sizes.   **Activity 6:**  **Teacher Exposition and Introduction to measuring volume using millilitres and litres**  **Teacher’s/Students resource:**   * Video ‘Millitres and Litres’ from the link <https://youtu.be/aemJphVn9KM>. * Video ‘Comparing Numbers’ from the link <https://youtu.be/UF4QlDAJJPQ>.  1. Show students a bottle filled with water. Ask: *How much water do you think the bottle holds?* 2. Take their responses. 3. Now introduce that just like length, there are standard units of measurement for measuring volume. Ask: *Do you know what is volume?* Take their response. 4. Show them the video ‘ Liters and Milliliters’ to explain and to understand volume and standard measurement of units for measuring volume. 5. After watching the video, review with your students that volume is the amount of space something takes up, and that it describes how much a container can hold. 6. Remind students that we measure volume using different units, such as cups or pints. Invite them to brainstorm other units we use to measure volume. 7. Remind students that to measure small amounts of volume, we use a unit called a milliliter, which we abbreviate as ml. Explain that a big drop of water is equal to about a milliliter. A milliliter of water doesn’t even fill a teaspoon! Show examples of items measured in milliliters, such as a small water bottle, small milk container, and a bottle of shampoo. Have them look at the containers to identify how many milliliters are in each. Ask what else we might measure in milliliters. 8. Now display items measured in liters, such a pitcher of water, large soda bottle, can of paint, etc. 9. Explain that we use liters to measure larger amounts of volume and review that 1 liter is equal to 1,000 milliliters. 10. Remind students that we abbreviate liters as l. 11. Point out that a pitcher of water holds about one liter. 12. Have students look at different bottles and identify the number of liters in each. 13. Ask: *What else do we measure in liters?* Lead a discussion. 14. If possible, show a dropper and a measuring cup. Ask students which they’d use to measure milliliters and which they’d use to measure liters. 15. Help them recognize that they’d use the dropper to measure milliliters since it’s such a small unit, while a measuring cup is more useful for measuring liters. 16. Ask: *When might they measure in milliliters? When might they measure in liters?* Answers may include baking, cooking, conducting experiments, and measuring medicine. 17. Discuss why we wouldn’t measure water in a swimming pool in milliliters. Remind students that it is important to choose the right unit when they measure. 18. Provide opportunities for students to measure volume in liters and milliliters. Ask them to compare their volumes. Ask them to measure and compare different volumes of objects and use key terms such as “greater than” or “less than” as you compare. You may want to have students record volumes in a chart or graph. 19. Optional: Explain that lengths are represented by numbers. We can compare numbers. Show them the video ‘Comparing Numbers’ and explain that we can use symbols to compare numbers. (NOTE: This is a good opportunity to explain <, > signs, if you have not already done so in the strand ‘Numbers and Operations’) 20. Explain symbols >, <, and + sign to compare objects, numbers and quantities. Ask them to use the symbols to compare volumes which they have measured in step 18. 21. Model how to pour liquid into a measuring tool, such as a measuring cup or a graduated cylinder. 22. Explain how to read the measurement—by looking at the bottom of where the liquid curves in the vessel and seeing where it lines up with the numbers on the tool.   **Activity 7:**  **Volume Match-Up**   1. Bring in a variety of containers such as a shampoo container, soda bottle, soup can, milk carton, etc. 2. On separate pieces of paper, write the liter or milliliter information for each container. Keep a key for yourself. 3. Then remove the labels or cover the volume information. 4. Now have students try and match the volume with the container!   **Activity 8:**  **Comparing Volume**   1. Have your students bring in different empty containers from home, such as water bottles, large and small milk cartons, shampoo containers, medicine bottles, soda cans, soda bottles, etc. 2. Then have students identify the volume of each container. 3. Have students order the containers from smallest to largest volumes.   **Activity 9:**  **Teacher Exposition and Introduction to measuring Mass using grams and kilograms**  **Teacher’s/students resources:**   * Video ‘Grams and kilograms’ from the link <https://youtu.be/bPwCNT26R_g>. * Video ‘Comparing Numbers’ from the link <https://youtu.be/UF4QlDAJJPQ>.  1. Show students a mobile and a brick (or a sack of potatoes). Ask: *what do you think is the weight of this mobile or of this brick(sack of potatoes)?* 2. Take their responses. 3. Now introduce that just like length and volume, there are standard units of measurement for measuring mass. Ask: *Do you know what is a mass?* 4. Take their response. 5. Show them the video ‘GGrams and Kilograms’ to explain and to understand mass and standard measurement of units for measuring mass. This video will explore grams and kilograms. It will also explain how to use a balance scale and compare masses. 6. Remind students that everything around us is made of matter. Our computer, keyboard, mouse, table, chair, and the clothes on our backs are made of matter. Even the air we breathe is made of matter. Mass is the amount of matter in something. We can use metric units like grams and kilograms to measure mass. 7. Explain that a gram is the base unit of mass. A paper clip, a pen cap, and a peanut each have a mass of about one gram. Ask: *What other objects have a mass of one gram?* If possible, use a scale to measure masses of small objects. Remind students that the abbreviation for grams is “g.” 8. Provide plenty of hands-on experience by encouraging students to explore and measure the objects around them. Ask them to measure and compare different masses of objects and use key terms such as “greater than” or “less than” as you compare. You may want to have students record masses in a chart or graph. 9. If possible, have students use a balance scale to measure or compare mass. Explain that a balance scale has a tilting beam with a container or pan on each end. To calculate the mass of an object, you can place it on one end of the beam and place known weights or masses on the other until the beam is balanced. Most scales have a guide that tells when the scale is balanced. You can also use the balance scale to compare the weights or masses of objects. 10. Together with students, use a balance to compare masses. Which has a greater mass, an apple or an orange? A pencil or a pen? A marble or an eraser? Have students make predictions and use the scale to test their predictions. 11. Ask students to note down the masses of the things they measured. 12. Optional: Explain that lengths are represented by numbers. We can compare numbers. Show them the video ‘Comparing Numbers’ and explain that we can use symbols to compare numbers. (NOTE: This is a good opportunity to explain <, > signs, if you have not already done so in the strand ‘Numbers and Operations’) 13. Reinforce symbols >, <, and = sign to compare objects, numbers and quantities. Ask them to use the symbols to compare masses which they have measured in step 10. 14. Remind students that a kilogram is equal to 1,000 grams. A baseball bat, a dictionary, a pineapple, and a bag of flour are each about one kilogram. Remind students that the abbreviation for kilograms is “kg.” 15. Provide large/heavy objects to measure such as a book, a sack of potatoes, a pack of sugar, a dictionary, a watermelon, or a pair of boots etc. Ask them to calculate the masses of large objects in kilograms and if possible, use a scale to compare larger masses. Have students predict the masses of large objects. 16. It is important for students to choose appropriate units when they measure mass. Explain that grams are a good unit to use when they measure thing with smaller masses. For example, a carrot, a zucchini, and an onion are pretty lightweight and most likely have masses less than a kilogram. So, it makes more sense to measure in grams. In contrast, a pumpkin can be fairly heavy and have a mass greater than a kilogram. Thus, using kilograms is a better option. 17. Provide opportunities for students to now measure objects in grams or kilograms. Give a mix of small/light as well as large/heavy objects so that they also learn to choose whether a certain thing would be measured in grams or in kilograms. Help them get familiar with units of mass. 18. Challenge students to make a prediction about an object’s mass using the appropriate measurement unit and test their predictions with a scale.   **Activity 10:**  **Comparing Mass**   1. Show the video ‘Comparing Numbers’ (link shared above) and then have small groups of students use a scale to measure and compare the mass of different objects. 2. They can write number sentences to compare the measurements by using the greater than, less than, or equal symbols. 3. If students are using a balance scale, they may want to draw pictures of their scales to go along with their number sentences. 4. Be sure to remind students that on a balance scale, the beam tilts toward the object with the greater mass.   **Activity 11:**  **As Big As A Whale**   1. Have students pair up to research the mass of different animals. 2. Encourage them to choose different types of animals, both large and small. 3. Then have them find equivalent masses to help put the measurements in perspective. For example, a lion has a mass of about 200 kilograms. That’s the same as about eight students in their class! 4. Have students work together to come up with facts and share them with the whole class.   **Student Learning outcomes:**  *Students will be able to:*   * *Read and write time in hours and minutes (with five minute intervals, half past, quarter past and quarter to) from analogue and digital clocks.* * *Show time in hours and minutes on an analogue clock.* * *Read and write temperature to the nearest appropriate unit i.e. (C) using pictorial representations and relating temperature scale to number line.* * *Compare and order temperature using <, >, and = signs.* * *Recognize intervals of time (for instance to estimate/give a rough calculation of the time taken by particular events or tasks)*   **Activity 12:**   * Video ‘Time to the hour’ from the link <https://youtu.be/0TDtQMW4ZGo>. * Video ‘Parts of a clock’ from the link <https://youtu.be/PJ7LBQo_t58>.  1. Explain the notion of time to students. Tell them that time is how we divide the day into units. Learning to tell time will help you schedule your day and gain greater control of your surroundings. 2. Explain that although many clocks that you will see are digital, learning to tell time from an analog clock is a necessary skill. 3. For a quick and fun review, show the video “Parts of a Clock” to your students. This video covers the basics of the clock—its parts, how the hands move, and how we use time to plan our day. You may wish to do some of the activities or assign the quizzes to ensure that your students have a firm grasp on the parts of a clock. Then they will be ready to tell time to the hour. 4. Now show the video ‘Time to the hour’ to students. 5. Revise that on a clock, the hour hand, or short little hand, points to the hours while the minute hand, or big long hand, points to the minutes. 6. Explain that when we say the time, we tell the hours first, followed by the minutes. For example, when the hour hand is on the 10 and the minute hand is on the 12, we say the time is ten o’clock. 7. Emphasise that the term “o’clock” means “of the clock” or “according to the clock.” This phrase is used only with times that are exactly on the hour. Ten o’clock can be written in two other ways: 10 o’clock and 10:00. When we write the time using only numbers, we use a colon to separate the hours from the minutes. Furthermore, we always write the minutes to two places (10:00, 10:01, 10:02, and so on). 8. Explain to your students that as time passes, the hands move. When the minute hand moves all the way around the clock, the hour hand moves from one number to the next. This is an hour. 9. Prompt your students to observe that the minute hand moves faster than the hour hand. Since there are twenty-four hours in a day, but only twelve numbers on a clock, the hour hand must go around the entire clock twice. This is why we have a six o’clock in the morning and a six o’clock in the evening. 10. Explain that Twelve o’clock during the day, when the sun is high in the sky, is commonly known as *noon*. Twelve o’clock when the moon is high in the sky is known as *midnight* because it is the middle of the night. 11. The hands on a clock only move in one direction—toward the right, or clockwise. The opposite direction is called counterclockwise. Though the hands never move that way, the term is important to learn. 12. The best way to learn how to tell time is to practice. Use a demonstration clock or any analog clock and present different times on the hour for your student to read. This will help them prepare to learn time to the quarter-hour, half-hour, and minute in the future.   **Activity 13:**   1. Ask students to watch the sand running through a one minute timer to get an idea of how long one minute is. Explain that the best way to get to know how long a minute is, is to do something in that minute, such as hopping or clapping. Do an activity while students count how many times you do it. Ask if they think you would do the activity more or less times if you did it faster. Repeat the same activity faster to show that you do more. Give students lots of opportunities to time themselves for a minute. 2. Revisit to explore the concept of slowness. Explain that when you do something slower, you take more time to do it so you can do less of it in a particular length of time. It takes more time to do the same thing when you do it slower.   **Activity 14:**  **Earlier, later**   1. Talk about how we use our senses to tell us that time is passing, e.g. we feel hungry because it is a long time since we last ate. 2. Explain that clocks and calendars help us to think about time passing. Show students an analogue clock and talk through what each hand does. Starting with both hands pointing to 12 o’clock, show how to move the minute hand all the way round the clock, so one hour has passed; the hour hand must now move on to the 1 to show 1 o’clock, an hour later. Explain that you are just showing how the clock hands work and that over an hour, the hands move so slowly that we don’t notice them moving. 3. Once students are familiar with setting the clock to a particular hour, explore one hour later (one more hour) and one hour earlier (one less hour), being careful not to cross 12 o’clock at this stage.   **Activity 15:**  **Gone in Sixty Minutes**   1. Have students make their own clocks out of paper plates, construction paper, and brass brads. 2. Students can label the numbers on their clocks, but instead of using hatch marks between the numbers, they can write out the minutes. This will help students understand that each hatch mark represents one minute and there are sixty minutes in an hour. 3. Talk about what happens when sixty minutes have passed. Then have students work in small groups or pairs and move the hands around their clocks to show different times. 4. Have students write each time down in a list, and later, they can call out each time on the list for a different partner to show on the clock.   **Activity 16:**  **Time to Write**   1. Have each student write a time on an index card to the minute, quarter hour, half hour, or hour. 2. This time can be written with numbers, words, or with numbers and words. 3. Have students place the index cards in a box or hat. Then draw a card from the hat and have students show the time on individual clock manipulatives.   **Activity 17:**  **Begin and End**   1. On a piece of paper, have your students draw two separate clocks without hour and minute hands. 2. Before they begin an independent activity, have them draw the hands on one clock to show their start time. 3. When they complete the activity, they should fill in the second clock to reflect their end time. 4. Students should label the clocks with the name of the activity or assignment they completed. 5. You may want your students to draw several pairs of clocks in order to record the time for different activities.   **Activity 18:**  **Timeline**   1. Assign each student a time to the hour, half hour, or quarter hour during the school day. 2. When their time comes up on the clock, the student is responsible for recording the activity that class is doing at that particular time. For example, a student who is assigned 10:15 may write a description about their activity or draw a picture. 3. At the end of the school day, collect all the pictures and/or descriptions and put it up in a timeline in the classroom.   **Activity 19:**  **Line time**   1. On index cards, write different times, such as 9:00, 9:15, 9:30, 10:00, 10:15, 10:30, etc. 2. You may want to add pictures of clocks with the corresponding times or give picture cards to some students and number cards to others, depending on their abilities and needs. 3. Then have each student draw an index card out of a box or hat. 4. Explain to students that they will put themselves in time order without talking. 5. Students can show each other their cards and decide if their times come before or after. 6. You can repeat the activity using A.M. and P.M. times. |
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| **References:**  BrainPop (2021) retrieved from: <https://educators.brainpop.com/topic-lesson-directories/bp-jr-topic/?brainpop-subject=math&subject-title=Math>  BrainPop Jr. (2021) Retrieved from: <https://jr.brainpop.com/math/>  NewZealand Government (2021) Retrieved from: <https://nzmaths.co.nz/units-work>  Rising Star Mathematics. Teacher’s Guide. (2017) Hodder Education: London. UK |

**Domain: Geometry**

| **STEP 1** |
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| **Standard *1, 2, 3, etc.*:***Students will be able to use properties to describe two dimensional and three dimensional shapes and describe positions, movement, directions, turns using appropriate vocabulary.* | |
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| **Student Learning Outcomes**:  *Students will be able to:*   * *Recognize and identify 2-D shapes (Rectangle, square, circle and triangle) and 3-D shapes (cube, cuboid, cone, cylinder and sphere) with respect to their characteristics/properties.* * *Make 3-D shapes using varied modelling materials.* * *Describe the position, direction, movement and turns of an object using appropriate positional language including moving clockwise, anti-clockwise, quarter, half and three quarters turns.* * *Recognize turn as a rotation.* * *Identify straight lines, horizontal and vertical lines and curved lines.* * *Identify pairs of perpendicular and parallel lines.* * *Identify quarter turns.* | |
| **Knowledge:**  Students will be able to know:   * 2- D shapes (rectangle, square, triangle, circle, semi-circle and quarter circle) and their properties. * 3-D shapes (cube, cuboid, cone, cylinder and sphere) and their properties. * Pairs of parallel and perpendicular lines using 3-d shapes. * Position, direction, movement and turns as rotation. * Straight lines, horizontal and vertical lines and curved lines. * Pairs of parallel and perpendicular lines.   *Additional/Advanced:*  *Students will be able to know:*   * *2-D shapes (Rectangle, square, circle, triangle, semi-circle and quarter-circle) with respect to their characteristics (i.e. vertices, sides and line of symmetry in a vertical line).* | **Skills:**  Students will be able to:   * Recognize and identify 2-D shapes (Rectangle, square, circle, triangle, semi-circle and quarter-circle). * Describe 2-D shapes with respect to their characteristics/properties including the number of sides and corners) * Draw 2-D shapes. * Recognize and identify 3-D Shapes in different orientations (cube, cuboid, cone, cylinder and sphere). * Use modelling material (such as play dough, tooth picks, popsicle sticks, match sticks, glue, cardboards, recycled material etc.) to make 3-D Shapes * Describe 3–D shapes with respect to their characteristics/properties including the number of sides, vertices and edges. * Identify pairs of perpendicular and parallel lines. * Describe the position, direction and movement of an object including moving clockwise, anti-clockwise, quarter, half and three quarters turns (for instance, on a grid, on the floor etc.) using positional language (for instance:  inside, outside, above, below, over, under, far, near, before, after, beside, between, left, right and in front of, quarter turn, half turn, three quarter turns, clockwise, anti- clock wise and behind). * Recognize turn as a rotation. * Identify and differentiate between a straight and curved line. * Identify quarter turns. * Identify horizontal and vertical lines.   *Advanced/Additional:*   * *Recognize and identify 2-D shapes (Rectangle, square, circle, triangle, semi-circle and quarter-circle) with respect to their characteristics (i.e. vertices, sides and line of symmetry in a vertical line.)* * *Recognize and identify 3-D Shapes in different orientations (cube, cuboid, cone, cylinder, sphere, prism and pyramid).* * *Recognize and identify quarter turns as a right angle (and vice versa), half and three quarters turns (clockwise and anti-clockwise) as two and three right angles respectively.* |

| **STEP 2** |
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| **Assessments**  **Formative Assessments**  Some of the types of formative assessment teacher may use are:   * Question & Answer(open and closed) * Quick Quiz * Learning Walks * Projects * Selected responses (may include MCQs, true: false, matching short answers, fill-in-the blanks, etc), * Observation diaries * Inquiry charts * Four Corners: Gather students in the middle of the room, and read multiple-choice questions and their possible answers aloud. Students then move to the corner that represent what they believe is the correct answer. The top left room corner can be an option A, the bottom-left can be B and so on.   **Summative Assessments** Some of the forms of summative assessment are:   * End of Unit Test * Class Test * Periodic/Monthly Tests * Mid-year Exam * End of Year Exam * Standardized Tests * External Exams   **Some of the sample questions that can be used as part of summative assessment are:**   1. Look at the word below.   PAKISTAN   1. Which letters contain straight lines only? \_\_\_\_\_\_\_\_\_\_ 2. Which letters contain curves only? \_\_\_\_\_\_\_\_\_\_\_ 3. Which shape can you get if you join two triangles of the same size?      1. What is similar in these two shapes? |
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| **STEP 3** |
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| **Learning Activities**  *Students will be able to:*   * *Recognize and identify 2-D shapes (Rectangle, square, circle and triangle) and 3-D shapes with respect to their characteristics/properties.* * *Make 3-D shapes using varied modelling materials.*   **Activity 1:**  **Plane Shapes and Solid Shapes**  **Teacher’s /students resources:**   * Video ‘Plane Shapes’ from the link <https://youtu.be/sp_r5zC2g_E>. * Solid resources that have a circle, a rectangle, a square, a triangle and an oval as one of its face. * Video ‘Solid shapes’ from the link <https://youtu.be/KSPG24GMufo>.  1. Show the video ‘Plane shapes’. 2. After the video draw the plane shapes on board and explain each one by one. 3. Explain that a circle is a round shape with no corners or sides. The distance from the center to any point on its line (circumference) is equal. A wheel, analog school clock, and coin are all usually circles. 4. An oval is shaped like an egg—an oblong circle. 5. A square is a shape with four corners and four sides. The length of each side is equal. A sandwich, window, and a tile can be squares. 6. A rectangle is a shape with four corners and four sides. Each pair of opposite sides has the same length. Most refrigerators, computer screens, and bookcases are rectangles. 7. A triangle is a shape with three corners and three sides. The sides do not have to be the same length, nor do all of the angles need to be the same. A slice of pizza, a sail in a sailboat, and a yield sign are all triangles. 8. Explain that shapes are everywhere—in the items we use every day and the things we see all around us. 9. Encourage your students to look for shapes in their surroundings. How are shapes useful? When would using a square shape be more useful than using a round shape? 10. Now show the video ‘Solid Shapes’. 11. Now show the objects that you have brought again. Build on their knowledge about solid figures, which are three-dimensional shapes such as cubes, rectangular prisms, pyramids, cylinders, cones, and spheres. 12. Make students identify basic plane shapes on the faces of these objects. 13. Begin by encouraging your students to find basic solid shapes all around them. 14. Most students are familiar with cubes. Give examples that number cubes or dice, ice cubes, and some boxes are shaped like cubes. 15. Now introduce fundamental concepts and vocabulary in Geometry, such as vertex/vertices, edges, faces, and bases as you display a cube and explain the characteristics of a cube. 16. Explain that a cube has six flat surfaces, or faces. Each face is shaped like a square with equal lengths of sides. A cube also has twelve edges and eight vertices. 17. Remind your students that a vertex is a corner of a shape. The plural form of the word *vertex* is *vertices*. 18. Present different examples of cubes to your students and help them identify the faces, edges, and vertices. 19. Pick up a cuboid (such as a rectangular tissue box) and explain that a cuboid is a solid figure that has the same number of faces, edges, and vertices as a cube. The faces of a cuboid are shaped like rectangles. Some cuboids have faces that are shaped like rectangles and squares. 20. Explain to your students that a cube is a special kind of a cuboid. Encourage your students to find examples of a cuboid and point out the different faces. Bulletin boards, cereal boxes, shoeboxes, and books are all cuboids. 21. Next pick up an object which is a cylinder. Explain that a cylinder is a solid shape that has two circular faces, no edges, and no vertices. A cylinder has a curved surface and is able to roll. Tuna cans, soup cans, poles, and pipes are all examples of cylinders. 22. You may wish to show how a cylinder can be created by rolling up a rectangle into a tube and attaching two circles to the ends. Conversely, you can take a toilet paper tube and cut it down lengthwise to show that it can turn into a rectangle. 23. Help your students understand that plane shapes can be manipulated to form solid shapes. 24. Next pick up an object which is a cone. A cone is a solid shape that has one curved surface, no edges, and one vertex. Traffic cones, funnels, and ice cream cones are all examples of cones. You may want to draw different examples of cones so students can see how they can vary in dimensions. 25. Lastly show a sphere (such as a ball) and explain that a sphere is a solid figure familiar to all students. Balls, marbles, and oranges are all spheres. A sphere has no face, no edge, and no vertex. Spheres have a curved surface and are able to roll. 26. Studying shapes, both two-dimensional and three-dimensional, are fun ways for your students to explore the world around them. Ask: *How do we use cubes every day? What kind of shape do we drink out of?* 27. Encourage your students to find examples of solid shapes all around them and ask questions about how they use them. Would they rather play soccer using a ball or a box? Why?   **NOTE:** Please refer to class I suggested guidelines for additional activities on 2-D shapes.  **Activity 2:**  **Shape Hunt**   1. Provide a list of solid and plane shapes for your students to find on a scavenger hunt. 2. You can list shapes or write clues, such as “Find a shape that rolls and has two faces.” 3. Then have students or pairs go on a walk at school, on the playground, or in the classroom to find the shapes. 4. Students can draw pictures and describe the items. Then after the activity, have students share the shapes that they found. 5. You can use this opportunity to discuss how shapes are alike and different.   **Activity 3:**  **Trace it!**   1. Use building blocks of different solid shapes and have your students trace all the faces on a piece of paper. What shapes make up a cuboid’s faces? What shapes make up a cylinder’s faces? 2. Together as a class, make tree diagrams showing how a solid figure can be broken down into its faces. 3. This will help your students relate three-dimensional solids with two-dimensional plane shapes.   **Activity 4:**  **Make it**   1. Cut index cards into shapes that fit together as faces of a cube, cuboid, or pyramid. 2. Then put the shapes into separate plastic bags with a drawing of the shape on the front. 3. Give students tape and have them work with partners to build the three-dimensional solids. As an extension, you can have students try to cut up their own cards to make their own three-dimensional shapes and trade them with friends.   **Activity 5:**  **Solid Sort**   1. Have students work in pairs or small groups. Give each pair or group a set of building blocks of different solid shapes or pictures of solid shapes. 2. You may want to cut out photos or pictures from magazines of objects of different solid shapes. 3. Then have one student sort the items and have the other students figure out the sorting parameters. 4. Encourage students to sort not just by shape, color, or texture, but by number of faces, vertices, or edges. 5. Have group members discuss each shape together.   **Student Learning outcomes:**  *Students will be able to:*   * *Describe the position, direction, movement and turns of an object using appropriate positional language including moving clockwise, anti-clockwise, quarter, half and three quarters turns.* * *Recognize turn as a rotation.* * *Identify straight lines, horizontal and vertical lines and curved lines.* * *Identify pairs of perpendicular and parallel lines.* * *Identify quarter turns.*   **Activity 6:**  **Find the Treasure:**   1. Dot various objects around the school grounds and give clues written on a ‘treasure map’ for reaching the objects. 2. Students should work in pairs or small groups. If you position the objects in a circuit you can get the students to start at different points while using the same instructions. 3. Use language that is appropriate to the age and ability of the students in the class. Examples might include, ‘walk forward until you reach…’, ‘turn 90 degrees to the right’ or ‘walk six metres south west’, ‘turn clockwise/anti-clockwise’ ‘take quarter turn’, take half/three quarters turn’. 4. You can also use this opportunity to talk about standard and non-standard measures and why you would use meters instead of paces.   **Activity 7:**  **Follow the Leader**   1. Divide the students into an even number of small groups. 2. Each group walks through the grounds and writes instructions on how to reach a given point (without saying what that point is). 3. Two groups then swap their instructions and follow the new instructions. 4. When they finish they have to write down where they think the end point was supposed to be. 5. This can also be adapted to support whichever topic you are working on – for example, a bear-hunt activity with one group acting as the bear and writing instructions on how to reach the picnic.   **Activity 8:**  **A lion in the night**  **Teacher’s/Students resource:**   * Read aloud video of the book ‘ALlion in the Night’ from the link <https://youtu.be/gl-R4sEcgls>.  1. Prior to reading, explore the students’ understanding of directions, turns and positions and what they represent. 2. Create/share a simple map on the whiteboard with some features such as a pond or river, a bridge, a bush area, a house and a road. 3. Tell a story emphasisng the key vocabulary of position and direction as you ask students to move a character around on your map. 4. You may want to create a word bank with the cards and blue tac, and stick them on the board for reference later on. 5. Share the story ‘A Lion in the Night’ with your students. As you get to one of the vocabulary words ask them to find it from the word bank and make sure the diagram on the card is understood in relation to the key word. 6. Explore the map given in the story book and trace the journey back to the castle emphasizing the vocabulary words again. 7. In response to the story, ask students to work in pairs to create a small scene from blocks or other materials such as toys or boxes. 8. Give each pair a set of the vocabulary cards and ask them to take turns as the director and the follower. 9. The director turns the cards over one at a time and gives a direction. The follower has to listen and move the toy through the scene. 10. Depending on the age and independence of the students you may need to model this before it becomes an independent activity. For example, the director can draw a card and say “*Move the car over the bridge. Now go through the town. Then go under the mountain. Now go across the desert”.* 11. As an extension activity, students can take photos of their “stories” and create maps or slideshows.   **Activity 9:**  **Simon Says ‘Turn’**   1. Explain to students that a turn is when a shape moves around so that it points in a different direction. 2. Show a clock and demonstrate how the hands rotate around and point to different numbers. 3. You may wish to use an arrow and turn it to show how a shape “points” in a different direction as it turns. 4. Have students turn a pattern block by placing one finger on a corner. That’s the corner that will stay put. 5. Then have them place another finger on the shape and turn it around the corner. 6. Explain that during a turn, one spot of the shape stays in the same place. 7. Have them practice turning other shapes to the left and to the right. 8. Give your students a small non-symmetrical toy or object and play “Simon Says turn…” together. 9. Call out turns (three quarters, quarter, half, anti- clockwise, clockwise etc.), while your student holds the object and follows the instructions. 10. Make sure to pause and check your students’ work. 11. Then have your students call out the directions and watch your movements with the toy.   **Activity 10:**  **Leave a Trace:**   1. Divide the class into small groups and give students pattern blocks or alphabet magnets. 2. Have each student select a shape or letter and trace it on a piece of paper. 3. Then have students trace a turn (three quarters, quarter, half, anti- clockwise, clockwise etc.) for their objects and label each one. 4. Have group members compare their drawings. 5. Then have one student from each group choose an object and ask the other group members to draw a corresponding turn. 6. Afterwards, the first student can move the object and trace it to show the correct answer and check the group’s work. 7. Encourage students to help each other and discuss their choices.   **Activity 11:**  **Amazing Mazes:**   1. Draw a simple maze on the board (or photocopy one up to A3). 2. Personalize by creating a scenario that gives purpose to the maze.  For example, a rabbit finding its way back to its burrow, a bee flying to its hive, a pirate finding the treasure. 3. Ask students if they can use their eyes to see the path through the maze. Alternatively, give the students copies of the maze and ask them to trace the path using their fingers and once they have found to trace the path using a pencil. 4. Choose a volunteer to come up and draw the path through the maze. 5. Ask students how they could explain to someone who can’t see the maze where the line has been drawn. Encourage the use of accurate terms like up, down, left, and right. Follow the line through the maze as students describe it. 6. Draw another example on the board. 7. Ask students to describe the route they would take to get through the maze. 8. Draw the route as they describe it. 9. Individual students should only give one direction at a time (i.e. *Go down first*). 10. If students give unspecific instructions such as *go round the corner,* draw an incorrect line and guide them to describe the route accurately.   **Activity 12:**  **Lines, Parallel and Perpendicular**   1. Explain to students that a point is an exact location or position. We represent a point with a dot. 2. Students can visualize points as stars in the sky. Have them draw a series of points right next to each other in succession. What do they see? 3. Explain that a line is actually a set of points that are right next to each other. A line is endless and continues forever in both directions. 4. The arrowheads on each end of a line show that it goes on forever. Help students understand that a line is made up of an infinite number of points. 5. Draw a line segment and explain that it is part of a line. Help students see that there are endpoints on each end. 6. This means a line segment does not go on forever; it has definite ends. 7. Draw two parallel lines and have students observe. 8. Explain that parallel lines never cross and the distance between them is always the same. You can extend parallel lines forever and they will never cross. 9. Invite students to come up with examples of parallel lines or draw their own. 10. Remember, parallel lines can run horizontally, vertically, or diagonally, but never curved. 11. Come up with real-world examples of parallel lines or line segments together. For example, an equal sign is made up of two parallel line segments. A rectangle has two pairs of parallel sides. Telephone lines might be parallel to each other as they extend across the community. 12. In the word *parallel,* the *l*‘s are parallel to each other. This could provide a good mnemonic for students to help remember the concept.   **Activity 13:**  **Picture Hunt**   1. Give small groups or pairs a list of items to find in the classroom or around the school grounds. For example, the list might include an item with two pairs of parallel sides or a shirt with parallel lines. 2. Then have students work together to find the items. 3. They can take digital photos of the items or draw pictures with a short description of where they found the item. 4. Encourage students to be creative and look for objects in unusual places.   **Activity 14:**  **Reading a Map**   1. Help students develop their map-reading skills. 2. Create a simple map of your community, or a fictional one. 3. Make sure street names are clearly marked as well as any landmarks. 4. Then have students answer questions about the map. Which streets run parallel? Which streets are perpendicular to one another? How do you know? 5. This is also a good opportunity to review the position and direction concept. |
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**Domain: Statistics and Probability**

| **STEP 1** |
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| **Standard:***Students will be able to read and interpret data using a variety of data management techniques. They will also be able to explore probability to find the likelihood of an event occurrence.* | |
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| **Student Learning Outcomes**: *Students will be able to:*   * *Read and interpret data using pictographs, block graphs and tally charts (including real-world problems).* * *Describe the likelihood of an event occurring using mathematical language.* | |
| **Knowledge:**  Students will be able to know:   * Simple pictographs, block graphs, bar graphs and tally charts. * Probability of the likelihood of an event occurring. | **Skills:**  Students will be able to:   * Read and interpret data using pictographs, bar charts and tally charts and represent data using tally charts (including real-world problems). * Describe the likelihood that everyday events will occur, using mathematical language (i.e. impossible, less likely, more likely, unlikely and certain). |

| **STEP 2** |
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| **Assessments**  **Formative Assessments**  Some of the types of formative assessment teacher may use are:   * Question & Answer(open and closed) * Quick Quiz * Learning Walks * Projects * Selected responses (may include MCQs, true: false, matching short answers, fill-in-the blanks, etc), * Observation diaries * Inquiry charts * Four Corners: Gather students in the middle of the room, and read multiple-choice questions and their possible answers aloud. Students then move to the corner that represents what they believe is the correct answer. The top left room corner can be option A, the bottom-left can be B and so on.   **Summative Assessments** Some of the forms of summative assessment are:   * End of Unit Test * Class Test * Periodic/Monthly Tests * Mid-year Exam * End of Year Exam * Standardized Tests * External Exams   **Some of the sample questions that can be a part of the formative assessment are:**   1. Show a bar graph and ask questions related to the bar graph. For instance, if the bar graph shown is that of money saved by a few children. Ask: 2. How much less did Hoor save than Rida? 3. Abeera saved Rs. 30 more than Iza. How much did Iza save? 4. How much more must Eshal save so that her saving is equal to the savings of Zahra? 5. How much money did all children save altogether? |
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| **STEP 3** |
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| **Learning Activities**  **Student Learning Outcome:**   * *Read and interpret data using pictographs, block graphs and tally charts (including real-world problems.)*   **Activity 1:**  **Favourite Fruit (plan for either pictograph/bar graph or block graph)**   1. Create a survey together about students’ favourite fruit. Come up with a question together and have students take the survey. 2. Record their answers on the board using a tally chart. You may want students to come up to the board and record their choice on the tally chart themselves. Be sure to instruct them to mark every fifth tally mark across the other four. 3. Then use the data in the tally chart to create a pictograph. To challenge students, have each symbol in the graph stand for more than one vote, such as two or three. 4. Display the pictograph in the classroom. If possible, serve the fruit that gets the most votes.   **Activity 2:**  **Data Miners**   1. Have students bring in a pictograph, bar graph, or other graph into class. Students may want to clip graphs from magazines or newspapers, or find them online and print them out. 2. Then choose a few graphs to discuss and analyze together. 3. Challenge students to take the same information in the graph and display it using another kind of graph.   **Activity 3:**  **Vote for a Sport (plan for either pictograph/bar graph or block graph)**   1. Be active with your students! Create a survey about favorite sports, such as swimming, soccer, basketball, or baseball. 2. Then have your students survey his or her friends about their favorite sport. 3. You may want to review how to record votes using a tally chart. Then create a pictograph to display the information. 4. Afterwards, gather the friends together to play the sport that got the most votes!   **Activity 4:**  **Take a Walk (plan for either pictograph/bar graph or block graph)**   1. Plan a hike or walk with your students. Before your trip, make predictions about what interesting things you might see and create a tally chart to organize the possibilities. 2. Bring the tally chart along on your walk and have your students record what he or she sees. 3. After, analyze the data together. How many birds did you see? How many dogs? How many more squirrels did you see than people? What did you see the most of? The least? 4. Have your students turn the tally chart information into a pictograph and share it with the rest of the family.   **Activity 5:**  **Balloon Investigation**   1. Explain that today we will make a pictograph of our favourite balloon shapes. We are going to answer the investigative question “*What different balloon shapes do the students in our class like?”* 2. Take a bag of balloons and spread out. Discuss shapes. Suggest the investigative question *“What colour balloons do the students in our class like?”* 3. Students choose their favourite shape (or colour if different shaped balloons are not available) and draw it on a piece of paper (one eighth of an A4). 4. As a class, discuss ways to display the data. If matching pictures in 1:1 lines (pictograph) is not suggested, the teacher will need to direct them to this. 5. Students attach their drawings to the class chart. 6. Ask the students what they notice about the information shown on pictograph. Use the prompt *“I notice…”*to start the discussion. These “noticings” could be recorded as "speech" bubbles around the chart. 7. Talk about the need to label the axes and give the chart a title so that others could make sense of the display. A good idea is to write the investigative question as the chart title. 8. Ask analysis questions, to extend the noticing, about the results that require students to combine sets:  * *How many students liked long wiggly balloons?* * *How many students* *liked long straight balloons?* * *How many students* *liked long balloons****altogether****?* * *How can you add the numbers together?* * *How many students* *liked balloons that were not long?* * *How many****more****students* *liked long wiggly balloons than long straight balloons?*  1. Model and reinforce the use of subtraction or addition rather than counting on or back to solve this type of question. 2. Try to find analysis questions that will allow students to use strategies such as near doubles and adding to make 10s.     **Activity 6:**  **Popcorn or Chips**   1. Explain that today we are going to look at using tally marks to record the number of chips in a snack bag or the number of pieces of popcorn in a small cup and a bar graph to display the data.  We are focusing on the data collection and analysis phases. 2. Display a snack bag of chips (or a small cup of popcorn) and ask the students to guess how many chips (popcorn) they think are in the bag (cup). 3. Pose the investigative question: *How many chips are in XXX brand snack bags? (How many popcorns are in the small cups?* 4. We are going to collect data to answer our investigative question by counting how many chips are in each of the snack bags I have here (count the number of popcorns in the small cup). 5. Ask: *How should we do that?* 6. Elicit ideas, including counting them all. 7. *Ask how we could count them and keep a track?* 8. Accept all ideas including using tally marks to keep a track. 9. Now model using tally marks to track how many chips (popcorns) she/he eats. 10. Distribute individual bags of chips to small groups. 11. Students eat chips and use tally marks to record the number of chips each student ate and then altogether in each bag by adding the total of the tally marks each student in the group recorded. 12. Gather the total tallies on the board or a chart. 13. Using a prepared bar graph outline, construct a bar graph with the information from the individual total tallies. 14. Discuss features of the graph and summarize the information shown. *What was the most common number of chips (popcorns)? What was the least common number of chips (popcorns)?* *How many more chips (popcorns) were there in the packet (cup) with the most than there were in the one with the least?* 15. As a class challenge, try to work out how many chips (popcorns) the class ate altogether. *How many chips (popcorns) did the boys eat? How many chips (popcorns) did the girls eat?* 16. *Discuss strategies for adding the numbers together*(for example: combine the numbers that add to 'tidy' numbers; add the tens and then the ones; use doubles or near doubles).   **Student Learning outcome:**   * *Describe the likelihood of an event occurring using mathematical language.*   **Activity 7:**  **Weather Forecast**   1. Ask: what will the weather be like today? Together as a class, review different weather forecasts. 2. Use different forecasts from the internet, newspaper, radio, and news programs on television. 3. You may want to research the weather for the same date in previous years. 4. Then, test their predictions. 5. Have students measure the temperature every day and record their observations of the weather. 6. You can make a rain or snow gauge by placing a plastic ruler in a clear cup and leaving it in an open space. How accurate were the forecasts?   **Activity 8:**  **Toss a Coin**   1. Remind your classroom that it is equally likely for a coin to land on head or tail. 2. Have small groups or pairs toss a coin one hundred times. 3. Have them make a tally chart to record their results. 4. After the tenth, fiftieth, and seventy-fifth tosses, have your students assess how the results have changed. Did their coin land on head or tail the same number of times? Why might tossing the coin over a thousand times get a more accurate result?   **Activity 9:**  **Certain**   1. Discuss what is certain and impossible with your students. 2. Then make a list of goals that you and your students will be certain to accomplish. Goals might include reading every day, learning a new word each day, or learning a new skill. 3. Post the goals in your classroom and refer to them when needed.   **Activity 10:**  **Spinning Spinner**   1. Find a board game that uses a spinner. 2. Together with your students, make your own spinner for the game. 3. Model the same spinner, except change a few elements, such as colours or the size of the sections on the spinner. You can use a pin or a brad to fasten an arrow that spins. 4. Then play the game together using the new spinner. How did the game change? Was it fair or unfair? Why? |
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