Intervention Mathematics Level 3

SECTION 1

MAKING SENSE WITH NUMBERS

NUMBERS FOR EVERYDAY LIFE

REAL NUMBER AND NUMERATION SYSTEM

In this section, you will learn to;

1. *Identifying properties of operations on sets and apply them in solving real life problems*
2. *Performing operations on fractions with like and unlike denominators and operate and approximate decimals*

SECTION INTRODUCTION

In this section, you will identify the properties of operations on sets, such as union, intersection and complement and apply them to solve real-life problems, like organising groups, scheduling events and managing resources efficiently. You will also learn to perform operations on fractions with both like and unlike denominators and work with decimals, which are crucial in tasks like cooking and measuring. These skills will enable you to handle mathematical situations in everyday life with confidence and precision.

SETS AND ITS OPERATIONS

FOCAL AREA 1: SETS AND OPERATIONS ON SETS

Imagine you are organising a birthday party and need to invite your friends. You have two groups of friends: one group from your school and another group from your community. Some friends belong to both groups, while others only belong to one. To keep track of who's coming to the party, you decide to make a list of your school friends and a separate list of your community friends.

In mathematics these lists are called "sets." A set is simply a collection of distinct objects or elements. In this case, the set of your school friends and the set of your neighborhood friends are two different sets. Understanding how to work with sets and perform operations on them—like finding which friends belong to both sets or which friends belong to only one set—can help you manage your guest list efficiently.

Why is this important? Sets are a fundamental concept in mathematics that help us organise and understand collections of objects, numbers or even ideas. Whether you're sorting through data, planning an event or solving complex problems, knowing how to use sets and perform operations like union and intersection is essential. These operations allow us to compare groups, identify relationships and make decisions based on the information we have.

Reinforcement Activities

Grouping Objects into Sets

Purpose: To help you understand the concept of sets by grouping everyday objects based on common characteristics.

Materials Needed:

- A variety of small objects (e.g., buttons, coins, coloured paper clips, pencils, or small toys)
- Paper and pencils

Instructions:

Step 1: Grouping into Sets

- o Look at the collection of objects in front of you. Notice that they are different in size, shape, colour or type.
- o Group the objects based on a characteristic of your choice. For example, you can group them by colour, size or type.
- o For instance, if you have different coloured buttons, you can create a set of red buttons, a set of blue buttons and so on.

Step 2: Naming Your Sets

- o After grouping the objects, give each set a name based on the characteristic you used.

For example, you might have the "Red Button Set," "Blue Button Set," or "Large Coin Set."

Step 3: Discussing Your Sets

- o Share your sets with a partner or in a small group.

Discuss why you grouped the objects the way you did and what characteristics you used to define your sets.

Step 4: Exploring Relationships Between Sets

- o Now, look at the sets you've created. Can you find any objects that could belong to more than one set?

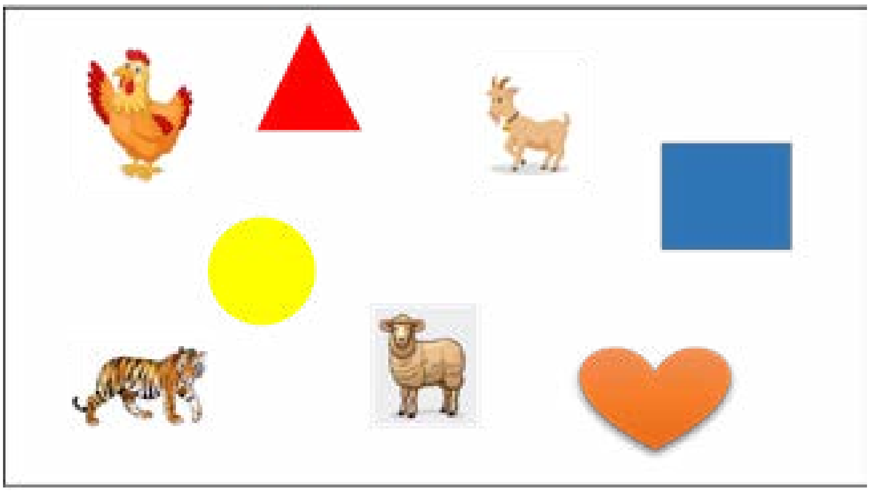
For example, if you grouped by colour and size, do you have a red button that is also large?

- o Discuss with your partner or group how some objects might belong to more than one set. This will help you prepare for learning about "operations on sets," such as union and intersection.

Reflection: Think about how grouping objects into sets can help you organise information. How might this be useful in your daily life or in other subjects you study? Write down your ideas and be ready to share with the class.

WHAT IS A SET?

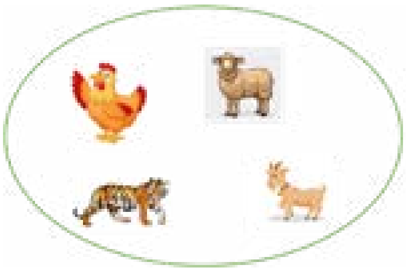
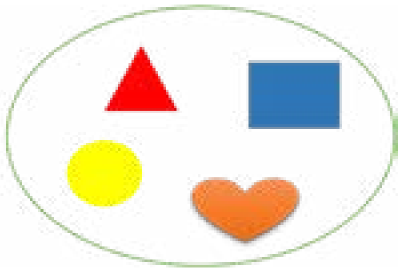
A set is a well-defined collection of numbers, variables or objects. Sets help to organise information, compare groups, and solve problems involving elements or finding out the relationships between them. Take a look at the items here. Assuming you are asked to describe this as a set, what would you call it?



You would say, "A set of …

I suspect you found it difficult to give it a name.

Let's now take a look at this. What can you say about these two group of items? Now, we can easily describe each group. We can say "a set of animal". We can also have a set of shapes. therefore, a set is always defined as a well-defined collection of numbers, variables or objects.

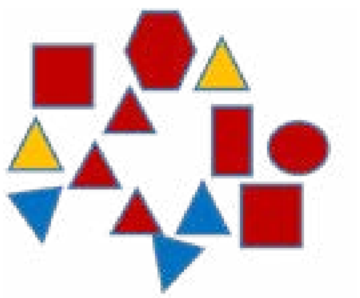
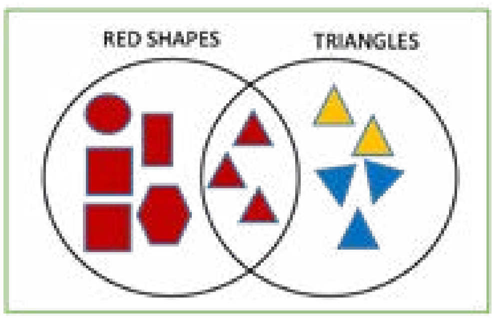



Can you name some more sets?

Examples of sets in everyday life

1. **In Kitchen:** Kitchen is the most relevant example of sets. Our mother always keeps the kitchen well arranged. The plates are kept separate from bowls and cups. Sets of similar utensils are kept separately.
2. **School Bags:** School bags of children is also an example. There are usually divisions in the school bags, where the sets of notebooks and textbooks are kept separately.
3. **Shopping Malls:** When we go shopping in a mall, we all have noticed that there are separate portions for each kind of things. For instances, clothing shops are on another floor whereas the food court is at another part of the mall.
4. **Universe:** As we all know that there are millions of galaxies present in our universe which are separated from each other by some distance. Here, the universe act as a set.
5. **Playlists:** Most of us have a different kind of playlists of songs present in our smartphones and computers. Afrobeat songs are often separated from gospel or any other type. Hence, playlists also form the example of sets.

There is, however, something that you need to know about sets. Sometimes some items may belong to two different sets at the same time. For example, sort the following into two distinct sets (e.g., shapes and colours) using two circles representing the two sets with the left circle labelled “red shapes” and the right circle labelled “triangles.”.

In the example above, we have two sets. They are; “a set of triangles” and “a set of red shapes”. Now, there are some of the shapes that are triangles and at the same time red in colour. Therefore, these shapes will be at the centre of the two sets, since they belong to both sets.

Generally, each item in the set is known as **elements** or **members** of the set. We use curly brackets while writing a set. We can also describe sets of numbers. Numbers can also be put in sets.

Consider an example of a set $A = \{1,3,5,7,9\}$. The set has five elements. It is a set of odd numbers from 1 to 10. Can you give more examples of sets of numbers?

Set Notation

A set is denoted by a capital letter that is, $A = \{a,b,c,d\}$.

Ways of Describing Set

Sets can be described as;

- Listing of members in the Sets
  $A = \{2,3,5,7,11\}$
- Word Description of Sets
  $P = \{\text{Prime numbers less than } 12\}$
- Set-Builder Notation
  $B = \{x{:}1 < x < 12\}$where x is a prime number.

ACTIVITY 1.1: Individual/Pair/Group Work

Exploring and Describing Sets

Purpose: To reinforce your understanding of sets by exploring and describing sets using listing, word description and set-builder notation.

Materials Needed:

- Paper and pencils
- A list of everyday items (e.g., types of fruit, animals, numbers, school supplies)

Instructions:

Step 1: Creating Sets

- o Think about the following categories and create sets by listing members that belong to each category:
  - **Fruits** (e.g., apples, bananas, oranges)
  - **Animals** (e.g., lions, elephants, cats)
  - **School Supplies** (e.g., pens, notebooks, erasers)
  - **Numbers less than 10 that are even** (e.g., 2, 4, 6, 8)
  - o Write down the members of each set using curly brackets { }. For example: {apple, banana, orange}.

Step 2: Word Description of Sets

- o Now, describe each set in words. For example, if your set is {apple, banana, orange}, your word description could be: "The set of all types of fruits I eat at home." Or if your set of numbers is B = {3,6,9,12}, the description is "the set of multiples of 3 less than 15".
- o Write a word description for each set you created in Step 1.

Step 3: Using Set-Builder Notation

- o For each set, use set-builder notation to describe it. Set-builder notation uses a variable to represent an element in the set and describes the property that the elements share.
- o For example, for the set {2, 4, 6, 8}, your set-builder notation might look like:

  $\{x \mid x$ is a positive even number less than 10$\}$.
- o Write the set-builder notation for each set you created.

Step 4: Group Discussion

- o Pair up with a classmate and share your sets, word descriptions and set-builder notations. Discuss how you described the sets and whether you would describe them differently.
- o Look at your partner's sets and think about any other ways to describe them.

Step 5: Create Your Own Sets

- o Create at least two more sets of your choice. List the members of these sets, describe them in words and write their set-builder notation.

- Be creative! Think about things you enjoy or topics you are interested in (e.g., sports, hobbies or favorite foods).

Reflection: After completing the activity, write a short paragraph explaining why it's important to understand different ways of describing sets. How can this skill help you in organising information in everyday life or in other subjects? Be ready to share your thoughts with the class.

Types of Set

1. **Finite Set:** A set whose last member can be found or counted. For example, a set of natural numbers from 1 to 9.

   $N = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$

2. **Infinite Set:** A set whose last member cannot be found. For example, a set of numbers divisible by 3.

   $D = \{3, 6, 9, 12, 15, \ldots\}$

3. **Null (Empty) Set:** A set which has no element or member. It is denoted by a Greek letter phi φ.

   $D = \{\}$ or $D = \varphi$

4. **Universal Set (U):** A set of all objects under discussion.

   For example, the set of learners in a class can be the universal set if, and only if, we can create other set(s) within the class.

5. **Equivalent Sets:** Two sets are said to be equivalent if they have the same number of elements.

   For example, the set $A = \{3, 6, 7\}$ and $B = \{11, 12, 13\}$. Both sets have 3 elements, so Sets A and B are equivalent

6. **Equal Sets:** Two sets are said to be equal if they have the same elements and the same number of elements.

   For example, the set $F = \{3, 6, 7\}$ and $G = \{6, 7, 3\}$ are equal

7. **Disjoint Sets:** Two sets are said to be disjoint if they have no member(s) in common, i.e. if their intersection is empty

   For example, given the set $M = \{1, 3, 7, 9\}$ and $N = \{2, 4, 6, 8\}$, $N \cap M = \{\}$. This implies that the sets M and N are disjoints.

8. **Subset:** If all the members of set **A** belong to a set **B**, then the **A** is said to be a subset of **B**, or **B** contains **A.**

ACTIVITY 1.2: Individual/Pair/Group Work

Exploring Types of Sets

Purpose: To reinforce your understanding of the different types of sets, including empty sets, finite sets, infinite sets, equal sets and equivalent sets.

Materials Needed:

- Paper and pencils
- A list of various objects or concepts (e.g., numbers, letters, shapes, colours)
- A set of index cards

Instructions:

Step 1: Review Types of Sets

- o Review the definitions of different types of sets:
  - **Empty Set (Null Set):** A set with no elements, denoted by { } or ∅.
  - **Finite Set:** A set with a countable number of elements.
  - **Infinite Set:** A set with an uncountable number of elements.
  - **Equal Set:** Two sets with exactly the same elements.
  - **Equivalent Set:** Two sets with the same number of elements, but not necessarily the same elements.

Step 2: Create Your Own Sets

- o Use the list of objects or concepts provided (e.g., numbers, letters, shapes, colours) to create examples of different types of sets. Write each set on an index card.
- o For example:
  - An **empty set** might be: { } (no elements).
  - A **finite set** might be: {1, 2, 3, 4, 5}.
  - An **infinite set** might be: {x | x is a positive integer}.
  - An **equal set** might be: {a, b, c} and {c, b, a}.
  - An **equivalent set** might be: {apple, banana, cherry} and {dog, cat, bird}.

Step 3: Sort and Classify Sets

- o On your own, or with a partner, sort the index cards into different categories based on the type of set they represent.

- o Label each category with the type of set (e.g., Empty Set, Finite Set, Infinite Set, etc.).
- o Make sure that each card is placed in the correct category.

Step 4: Create and Share

- o Now, create at least two new sets that fit into each category (e.g., create two finite sets, two infinite sets, etc.). Write them on new index cards.
- o Once you've created your sets, exchange your cards with another group or partner.

  Challenge each other to correctly classify the sets.

Step 5: Reflection and Discussion

- o Reflect on the activity by discussing the following questions with your classmates:
  - How did you determine the type of each set?
  - Were there any sets that were difficult to classify? Why?
  - How can understanding types of sets help you in other areas of mathematics or in real-life situations?

Step 6: Create a Real-Life Example

- o Think of a real-life situation where understanding the types of sets could be useful. Write a short paragraph or draw a picture to explain your example.
- o Share your example with the class.

Extension Activity:

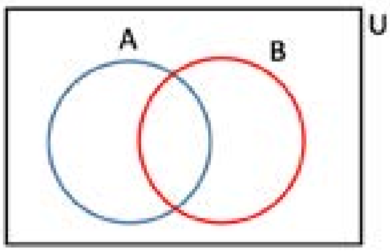
- If time permits, work with a group to create a poster that illustrates the different types of sets. Include examples and explanations for each type. Display your poster in the classroom for others to learn from.

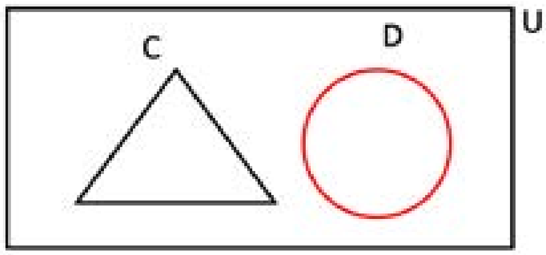
REPRESENTATION OF SETS IN A VENN DIAGRAM

Sets can be represented using a Venn diagram. A Venn diagram is a visual tool that uses plane geometric shapes to show the logical relationship between two or more sets of items.

Venn diagrams are named after British logician John Venn. He wrote about them in 1880

Example:





Operations on Sets

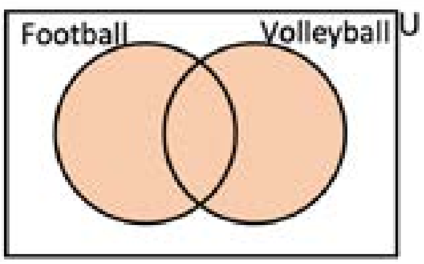
Union of Sets

We have a basket containing apples and a basket containing oranges. When we put them together, we have a set of apples and oranges. This is the union of sets.

Using another example; on a school field, 13 play football, 8 play volley ball and 5 play both football and volleyball. The **union** will involve learners who play football and volleyball and those who engage in both sports.

The **union** (U) of two sets **A** and **B** is the set of elements that can be found in **either A** or **B** or both.

This is written as $A \cup B$. It can be represented using a Venn diagram as;



The shaded region represents the union of the set of football and volleyball players.

Example

Given the sets $A = \{1, 3, 7, 9, 11\}$and $B = \{3, 6, 9, 12\}$,

$A \cup B = \{1, 3, 6, 7, 9, 11, 12\}$.

Intersection of Sets

Basket A contains apples and oranges, and basket B contains only oranges. What is common in the two baskets is the intersection. In this case, orange is the intersection.

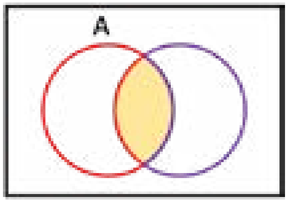
Examples

1. In a class of 30 learners, 17 play only football, 12 play only volley ball and 5 play both football and volleyball.

The five learners who played both football and volleyball are the **intersection** of the set of football and volleyball learners.

The intersection (∩) of two sets **A** and **B** is the set of elements common to **both A** and **B**.

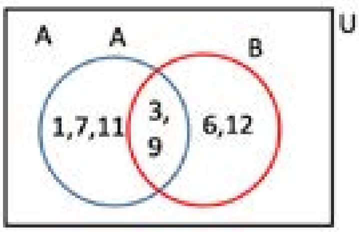
This is written as $A \cap B$. It can be represented using a Venn diagram as



The shaded portion is the intersection of A and B.

2. Given the sets $A = \{1, 3, 7, 9, 11\}$and $B = \{3, 6, 9, 12\}$, $A \cap B = \{3, 9\}$.

This can be represented using a Venn diagram as;



3. Given $A = \{2,4,6,8\}$, $B = \{2,3,7,9\}$ and $C = \{1,3,5,7\}$

$A \cap B = \{2\}$

$A \cup B = \{2,3,4,6,7,8,9\}$

$A \cap C = \{\ \}$

$B \cap C = \{3,7\}$

$A \cup C = \{1,2,3,4,5,6,7,8\}$

$B \cup C = \{1,2,3,5,7,9\}$

ACTIVITY 1.3: Individual/Pair/Group Work

Exploring Set Operations (Union and Intersection)

Purpose: To reinforce your understanding of the set operations "Union" and "Intersection" by working with real-life examples and practising with Venn diagrams.

Materials Needed:

- Two different coloured markers or crayons
- Large sheets of paper or a whiteboard
- Venn diagram templates (two overlapping circles)
- A list of different objects or categories (e.g., fruits, animals, colours, sports, hobbies)

Instructions:

Step 1: Review Set Operations

- o **Union of Sets ($A \cup B$):** The set of all elements that are in Set A, Set B or both.
- o **Intersection of Sets ($A \cap B$):** The set of all elements that are common to both Set A and Set B.

Step 2: Create Sets

- o Divide into pairs or small groups. Choose two categories from the provided list (e.g., fruits and colours).
- o Each group should write down a list of items for each category to create Set A and Set B.

  For example:

  - Set A (Fruits): {apple, banana, orange, pear, grape}
  - Set B (Colours): {red, yellow, blue, green, orange}

Step 3: Draw Venn Diagrams

- o On your paper or whiteboard, draw a Venn diagram with two overlapping circles. Label one circle as Set A and the other as Set B.
- o Write the elements of Set A inside the first circle and the elements of Set B inside the second circle.

Step 4: Find the Intersection

- o Identify the elements that are common to both Set A and Set B (the Intersection).
- o Write these common elements in the overlapping section of the Venn diagram.
  - For example, if the common element is "orange," write "orange" in the overlapping section of the Venn diagram.

Step 5: Find the Union

- o Now, identify all the elements that belong to Set A or Set B or both (the Union).
- o Write all these elements in the Venn diagram, making sure that each element is placed correctly, either in the individual circles or in the overlapping section.

Step 6: Discuss and Share

- o Discuss the results of your Venn diagram with your group or partner.
- o Compare your Union and Intersection results with another group. Did you find the same results? Why or why not?

Step 7: Apply to Real-Life Situations

- o Think of a real-life situation where you might need to use Union and Intersection of sets. For example:
  - "You want to find learners in your class who either play football, play basketball or both."
  - Write a short paragraph explaining how you would use Union and Intersection to solve this problem.
- o Share your real-life scenario with the class.

Step 8: Create Your Own Venn Diagram

- o Create a new Venn diagram using two different categories of your choice (e.g., animals and sports).
- o Fill in the Venn diagram with items that belong to each category and then find the Union and Intersection.
- o Share your Venn diagram with your classmates and explain your findings.

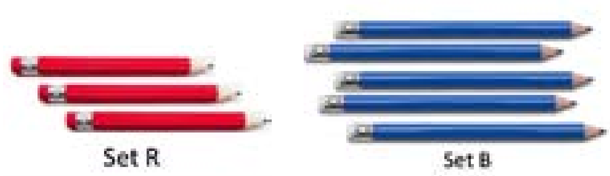
Extension Activity:

- For an extra challenge, create a Venn diagram with three circles (three sets). Choose three categories (e.g., fruits, vegetables, and colours) and find the Union and Intersection for all three sets. Present your findings to the class and explain any interesting overlaps.

Properties of Operations on Sets

We now know the operation on sets of union and intersection. Just like addition and multiplication of numbers, these have certain rules, operations on sets also follow specific properties. These properties help us simplify problems and make working with sets easier.

Commutative Property



Combining the two set R and set B

This property says the order in which we perform the operation does not affect the result.

That is, $A \cap B = B \cap A$ or $A \cup B = B \cup A$

Given the set $A = \{1, 2, 3, 4, 5\}$ and $B = \{2, 4, 6\}$From the set A and B above $A \cap B = \{2, 4\}$ and $B \cap A = \{2, 4\}$

$A \cup B = \{1, 2, 3, 4, 5, 6\}$ and $B \cup A = \{1, 2, 3, 4, 5, 6\}$

Associative Property

The grouping of sets **does not** affect the result. That is:

(A U B) U C = A U (B U C) or (A ∩ B) ∩ C = A ∩ (B ∩ C)

Example 1

Given the Set A = {1, 2, 3}, Set B = {3, 4} and Set C = {5, 6, 7}. The operation U is commutative if (A U B) U C = A U (B U C)

- (A U B) U C = ({1, 2, 3} U {3, 4}) U {5, 6, 7}
  = {1, 2, 3, 4} U {5, 6, 7}
  = {1, 2, 3, 4, 5, 6, 7}
- A U (B U C) = {1, 2, 3} U ({3, 4} U {5, 6, 7})
  = {1, 2, 3} U {3, 4, 5, 6, 7}
  = {1, 2, 3, 4, 5, 6, 7}

Since both results are the same, {1, 2, 3, 4, 5, 6, 7}, therefore, operation U is commutative

Similarly,

- (A ∩ B) ∩ C = ({1, 2, 3} ∩ {3, 4}) ∩ {5, 6, 7}
  = {3} ∩ {5, 6, 7}
  = { }
- A ∩ (B ∩ C) = {1, 2, 3} ∩ ({3, 4} ∩ {5, 6, 7})
  = {1, 2, 3} ∩ { }
  = { }

Since both results are the same, { }, therefore, operation ∩ is commutative

Distributive Property

This property applies to both union and intersection and helps us deal with multiple sets at once.

- For Union: A ∩ (B U C) = (A ∩ B) U (A ∩ C)
- For Intersection: A U (B ∩ C) = (A U B) ∩ (A U C)

Given the Set A = {1, 2, 3}, Set B = {2, 3, 4}, and Set C = {4, 5, 6, 7}.

- A ∩ (B U C) = {1, 2, 3} ∩ ({2, 3, 4}) U {4, 5, 6, 7})
  = {1, 2, 3} ∩ {2, 3, 4, 5, 6, 7}
  = {2, 3}
- (A ∩ B) U (A ∩ C) = ({1, 2, 3} ∩ {2, 3, 4}) U ({1, 2, 3} ∩ {4, 5, 6, 7}
  = {2, 3} U { }
  = {2, 3}

Since the LHS = RHS, therefore, operation ∩ is distributive over operation U.

ACTIVITY 1.4: Individual/Pair/Group Work

Exploring Properties of Operations on Sets

Purpose: To deepen your understanding of the properties of operations on sets—Commutative, Associative and Distributive—through interactive and practical examples.

Materials Needed:

- Large sheets of paper or a whiteboard
- Markers or crayons (different colours)
- Index cards or small slips of paper
- A list of different objects or categories (e.g., animals, fruits, colours, hobbies)

Instructions:

Step 1: Review the Properties of Operations on Sets

1. **Commutative Property:**
   - o Union: $A \cup B = B \cup A$
   - o Intersection: $A \cap B = B \cap A$
2. **Associative Property:**
   - o Union: $(A \cup B) \cup C = A \cup (B \cup C)$
   - o Intersection: $(A \cap B) \cap C = A \cap (B \cap C)$
3. **Distributive Property:**
   - o Intersection over Union: $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$
   - o Union over Intersection: $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$

Step 2: Create Sets

- Divide into small groups. Each group will create three sets using the provided categories.
- For example, if you choose "animals" as a category, create three different sets, such as:
  - o Set A: {dog, cat, lion}
  - o Set B: {lion, tiger, elephant}
  - o Set C: {elephant, giraffe, dog}

Step 3: Explore the Commutative Property

- **Activity:**
  - On your large sheet of paper, list Set A and Set B.
  - Find the union A∪B and the intersection A∩B.
  - Now, switch the order and find B∪A and B∩A.
  - Compare your results. Did the union and intersection change when you switched the order? Explain how this demonstrates the Commutative Property.

Step 4: Explore the Associative Property

- **Activity:**
  - Using your three sets (A, B, and C), first calculate (A∪B)∪C.
  - Then, calculate A∪(B∪C).
  - Compare the results. Are they the same? Discuss how this shows the Associative Property.
  - Repeat the process with intersection: (A∩B)∩C and A∩(B∩C).

Step 5: Explore the Distributive Property

- **Activity:**
  - On your paper, start by calculating A∩(B∪C).
  - Then, calculate (A∩B)∪(A∩C).
  - Compare the results. Are they the same? Discuss how this demonstrates the Distributive Property.
  - Now, explore the other distributive property by calculating A∪(B∩C) and (A∪B)∩(A∪C).

Step 6: Group Discussion

- Discuss with your group how the properties of operations on sets make problem-solving easier.
- Write down a real-life situation where each property could be useful.
  - For example: "If you're planning a party and want to know which friends can come on either Friday or Saturday (union) but not both (intersection)."

Step 7: Create Your Own Examples

- Each group will create their own sets and test the Commutative, Associative and Distributive properties.
- Write your examples on your paper, including the calculations and results.
- Present your findings to the class, explaining how each property works.

Extension Activity:

- Challenge yourself by creating a more complex set of data, such as using three different categories (e.g., favourite sports, favourite colours and favourite foods) and apply all three properties. Share your results with the class.

Reflection:

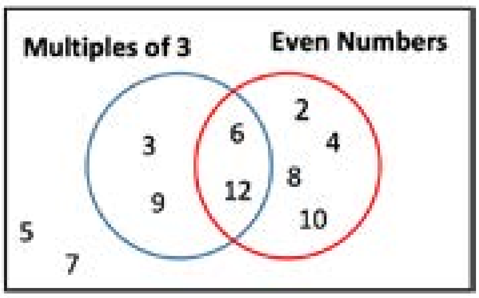
- After completing the activity, write a short paragraph explaining why understanding these properties is important in mathematics and how they can help you solve problems more effectively.

FOCAL AREA 2: TWO SETS PROBLEMS

Two set problems, often involve comparing, combining or contrasting different sets of elements to show patterns and relationships hidden within them.

Given each of the following numbers on cardboard, where does each belong on the Venn diagram?

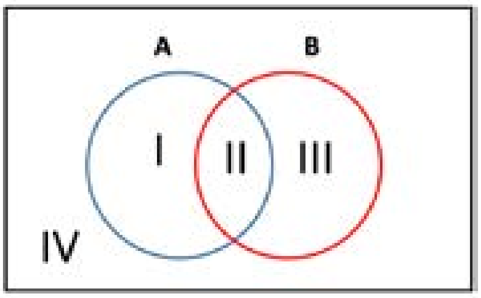
2, 3, 4, 5, 6, 7, 8, 9, 10, 12



From the diagram, you should observe that, the numbers in the set;

- {3, 9} are **multiples of 3** only and are not **even numbers**.
- {6, 12} are both **multiples of 3** and **even numbers.**
- {2. 4, 8, 10} are only **even numbers** and not **multiples of 3**.
- {5, 7} are neither **multiples of 3** nor **even numbers**.

From the above illustration, the following can be concluded:



Region I: A only = $A \cap B'$

Region II: Both A and B = $A \cap B$

Region III: B only = $A' \cap B$

Region IV: Not in A and B = $A' \cap B'$

Note, B' is the complement of B, which means all the elements which are NOT in B.

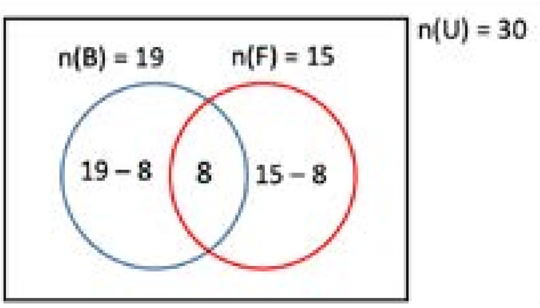
Examples

1. In a class of 30 learners, 19 learners like basketball, 15 learners like football and 8 learners like both sports.
How many learners like:

a. only basketball?

b. only football?

c. neither basketball nor football?



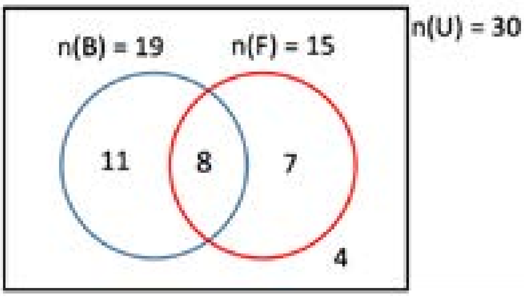
Solution

From the Venn diagram,

a. The number of learners who like basket only is 19 – 8 = 11

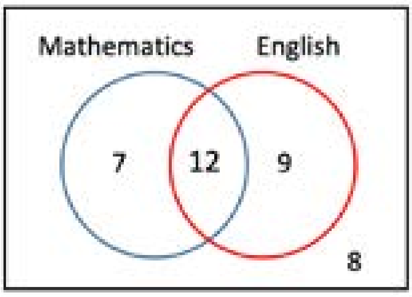
b. The number of learners who like football only is 15 – 8 = 7

c. The number of learners who do not like either game is $30 - (11 + 7 + 8) = 4$



2. A group of learners in class were asked whether they like Mathematics or English as their favourite subject.

The results are illustrated in the Venn diagram below.



a. Explain what each region in the Venn diagram represents

b. How many learners like only one subject?

c. How many learners like Mathematics and/or English?

d. How many learners are in the class?

Solution

a. The region with 7, indicates that 7 learners like only mathematics

The region with 12, indicates that 12 learners like mathematics and English

The region with 9, indicates that 9 learners like only English

The region with 8, indicates that 8 learners in the class don't have mathematics or English as their favourite subjects.

b. The number of learners who like only one subject is $7 + 9 = 16$

c. The number of learners who like Mathematics and/or English is $7+9+12=28$

d. The number of learners in the class is $7 + 9 + 12 + 8 = 36$

ACTIVITY 1.5: Individual/Pair/Group Work

Solving Two Sets Problems with Real-Life Scenarios

Purpose: To apply your understanding of set operations to solve real-life problems involving two sets, using Venn diagrams to visualise and analyse the relationships.

Materials Needed:

- Large sheets of paper or a whiteboard
- Markers or crayons (different colours)
- Index cards or small slips of paper

Instructions:

Step 1: Review Set Operations

- Before we start, let's quickly review the key set operations:
  - o **Union**: The set of elements that belong to either Set A or Set B or both.
  - o **Intersection**: The set of elements that belong to both Set A and Set B.

Step 2: Real-Life Scenario 1: Favorite Subjects

- Imagine your class is surveyed to find out how many learners like Mathematics and how many like Science. Here's the data:
  - o 15 learners like Mathematics.
  - o 12 learners like Science.
  - o 7 learners like both Mathematics and Science.
  - o 0 learners like neither Mathematics and/or Science

  Your Task:

  1. **Draw a Venn Diagram:**
     - o Draw two overlapping circles on your paper, one for Mathematics and one for Science.
     - o Label them accordingly.
  2. **Fill in the Venn Diagram:**
     - o Start with the intersection (learners who like both subjects). Write the number 7 in the overlapping part.

- o Now, fill in the part of the Mathematics circle that does not overlap with Science.
- o Do the same for Science.

3. **Calculate the Total Number of Learners:**
   - o Add the numbers in all parts of your Venn diagram to find the total number of learners surveyed.
   - o Compare the total with the sum of learners liking Mathematics or Science to check your work.
4. **Interpret the Results:**
   - o How many learners like either Mathematics or Science or both?
   - o How many learners like only Mathematics? Only Science?

Step 3: Real-Life Scenario 2: Extracurricular Activities

- In a school, learners can choose between two extracurricular activities: Soccer and Drama. The school's data shows:
  - o 18 learners participate in Soccer.
  - o 14 learners participate in Drama.
  - o 6 learners participate in both Soccer and Drama.

Your Task:

1. **Draw a Venn Diagram:**
   - o Just like before, draw two overlapping circles, one for Soccer and one for Drama.
   - o Label them accordingly.
2. **Fill in the Venn Diagram:**
   - o Write the number 6 in the overlapping section.
   - o Calculate and write the number of learners who participate only in Soccer.
   - o Calculate and write the number of learners who participate only in Drama.
3. **Analyse the Data:**
   - o How many learners are involved in at least one activity?
   - o How many learners are only in one activity?

- o How many learners are not involved in either activity if there are 30 learners in total?

4. **Class Discussion:**
    - o Discuss why using a Venn diagram is helpful in visualising the data and solving the problem.
    - o Think about other real-life situations where you could use this method to solve problems.

Step 4: Create Your Own Real-Life Problem

- **Your Challenge:**
    - o Think of another situation in your daily life where two sets might overlap (e.g., favourite sports, TV shows, types of pets).
    - o Create a two-set problem based on your situation.
    - o Draw the Venn diagram, fill in the data and solve the problem.
    - o Swap problems with a partner and solve each other's problems.

Reflection:

- After completing the activity, reflect on how understanding two sets and their relationships can help you solve problems more effectively in real-life situations.
- Write a short paragraph about how you might use this knowledge outside of maths class.

WEEK 2: FRACTIONS AND DECIMALS

FOCAL AREA 1: OPERATIONS ON FRACTIONS

Imagine you're baking a cake for a family gathering. The recipe calls for $1\frac{1}{2}$ cups of flour, $\frac{3}{4}$ cup of sugar and $\frac{2}{3}$ cup of milk. However, you realise that you only have a $\frac{1}{4}$ cup measuring spoon. To make sure you add the correct amount of each ingredient, you need to understand how to work with fractions—adding, subtracting and multiplying them.

Now, let's say the recipe is for a cake that serves 8 people, but you have 10 guests coming over. You'll need to adjust the ingredients by multiplying or dividing the quantities. This is where knowing how to operate with fractions and decimals becomes essential.

Why Is It Important?

In everyday life, we frequently encounter situations where we need to use fractions and decimals. Whether you're cooking, shopping, sharing a utility bill or even managing time, being able to perform operations on fractions and decimals helps you make accurate calculations and informed decisions.

By mastering operations on fractions and decimals, you'll be able to:

- Adjust quantities in recipes or measurements.
- Understand prices, discounts and interest rates.
- Make precise calculations in various real-life scenarios.

REINFORCEMENT ACTIVITIES

Reviewing Basic Fraction and Decimal Concepts

Purpose: To refresh your understanding of basic fraction and decimal concepts before learning how to perform operations on them.

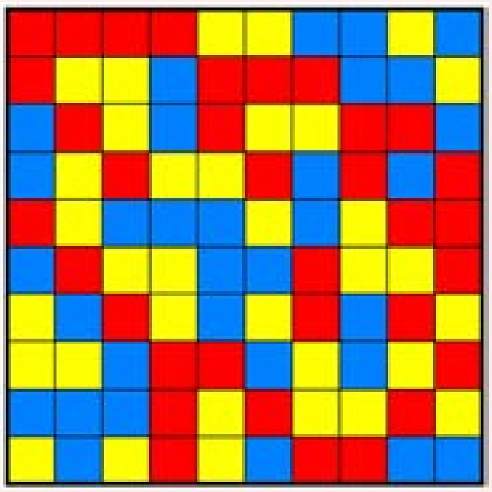
Activity Instructions:

1. Fractions Review

- o Take a piece of paper and divide it into 4 equal parts.
- o Shade 1 out of the 4 parts. What fraction of the paper is shaded? Write it down.

- Now, divide the paper into 8 equal parts. If you shade 2 out of the 8 parts, what fraction of the paper is shaded? Write it down.
- Compare the two fractions. Are they equivalent? How can you tell?

Using the grid below, find the fractions of the various colours to the total number of square units in the grid. The diagram represents a whole with 100 equal divisions.



1. What fraction does the colour red represent?
2. What fraction does the colour blue represent?
3. What fraction does the colour yellow represent?

In this case, count the total squares in the entire grid and the total number of red squares. Divide the total number of red squares by the total number of squares.

Total number of small squares = 100

Total number of red squares = 34

The fraction of red square units = $\frac{4}{100} = \frac{17}{50}$

a) The fraction of the colour blue in the square represents…

b) The fraction of the colour yellow in the square represents…

2. Decimals Review

- Take 10 small objects (like buttons or coins) and place them in a row.
- Imagine that these 10 objects represent a whole (1). If you take away 3 objects, what fraction of the whole is left? Write the fraction.

- Now, express that fraction as a decimal. (Hint: Think about what part of 10 is 7).
- Practice converting these fractions to decimals:
  - $\frac{1}{2}$
  - $\frac{1}{4}$
  - $\frac{3}{4}$

3. **Fractions to Decimals Conversion**
   - On your paper, list the fractions $\frac{1}{2}$, $\frac{1}{4}$, and $\frac{3}{4}$.
   - Beside each fraction, write its decimal equivalent.
   - Discuss with a partner: Why do you think fractions and decimals are used in different situations?

   Give an example where each would be more appropriate.

4. **Estimation Practice**
   - Imagine you have $\frac{3}{4}$ of a pizza left. If you want to share it equally between you and a friend, how much pizza will each of you get? Write your answer as both a fraction and a decimal.
   - If a shirt costs GH¢19.99, and you have GH¢20, estimate how much change you would get.

Wrap-Up Discussion:

- Discuss with your classmates why it's important to understand fractions and decimals before learning how to perform operations on them.
- Share examples from your daily life where you have encountered fractions or decimals.

Addition and subtraction of fractions with common denominators

Add and subtract the following fractions on the grid paper.

Example 1

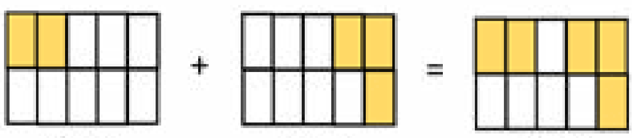
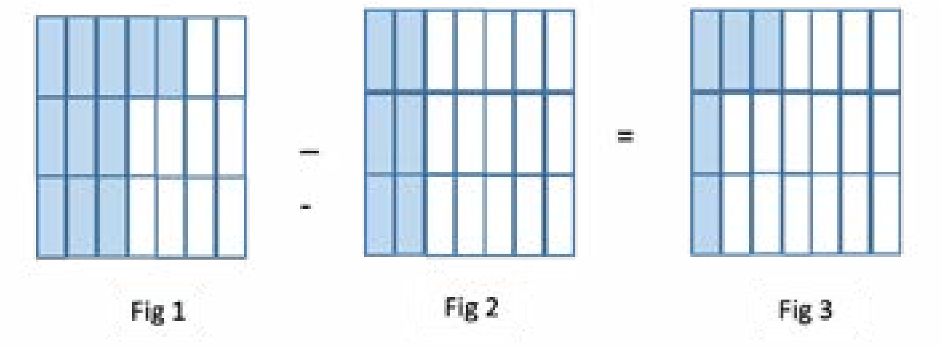


Fig. 1 Fig. 2 Fig. 3

Here the fraction for Fig 1 is $\frac{2}{10}$ and the fraction for Fig 2 is $\frac{3}{10}$. Therefore, to add the fractions in fig 1 and 2, we count the number of considered or the shaded parts in both fig 1 and 2 to get fig 3.

This implies that $\frac{2}{10} + \frac{3}{10} = \frac{5}{10}$

Example 2



Here, the fraction for Fig 1 is $\frac{11}{21}$ and the fraction for Fig 2 is $\frac{6}{21}$ therefore to subtract the fraction in fig. 2 from fig. 1, we take away the shaded parts in fig 2 from fig. 1 to get fig 3.

This implies that, $\frac{11}{21} - \frac{6}{21} = \frac{5}{21}$.

From the above activities we can conclude that, fractions with the same denominators can be added or subtracted directly by keeping the denominator the same and adding or subtracting the numerators. Therefore, the number 21 in the fraction $\frac{5}{21}$ is the Lowest Common Multiple (LCM) of the fractions given in the question

Let's try these other examples

Add and subtract the following fractions

Example 1:

$\frac{3}{8} + \frac{2}{8}$

Solution

They have a common denominator which is 8. $\frac{3}{8} + \frac{2}{8} = \frac{3+2}{8} = \frac{5}{8}$

Example 2:

$\frac{17}{24} - \frac{8}{24}$

Solution

They have a common denominator which is 24.

$\frac{17}{24} - \frac{8}{24} = \frac{17-8}{24} = \frac{9}{24}$ (which can be simplified to $\frac{3}{8}$)

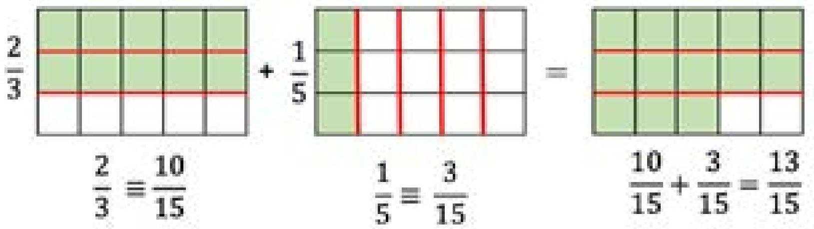
Addition and subtraction of fractions with different denominators

Add and subtract the following fractions using grid paper.

Example 1:

$\frac{2}{3} + \frac{1}{5}$

In this case, the denominators in the question given will determine the size of the grid. So, in the above question, the size of the grid is the lowest common multiple of 3 and 5. Or we can use the product of the two numbers. In this case, the lowest common multiple is the product of 3 and 5 (i.e. $3 \times 5 = 15$). This means that there are small equal parts in a 3 by 5 grid.

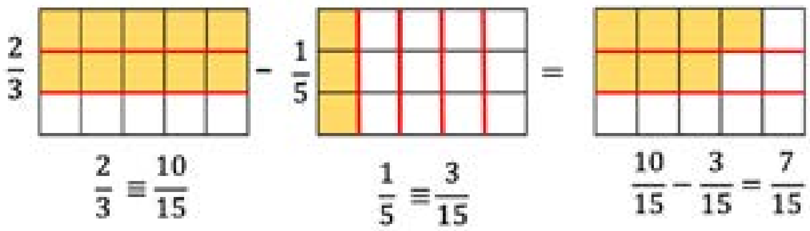


From the above diagram, $\frac{2}{3} + \frac{1}{5} = \frac{2 \times 5}{3 \times 5} - \frac{1 \times 3}{5 \times 3} = \frac{10}{15} + \frac{3}{15} = \frac{10+3}{15} = \frac{13}{15}$.

Example 2:

$\frac{2}{3} - \frac{1}{5}$

Again the 3 and the 5 indicate that the size of the grid must be 3 by 5, or a size 15 grid.



From the above diagram, $\frac{2}{3} - \frac{1}{5} = \frac{2 \times 5}{3 \times 5} - \frac{1 \times 3}{5 \times 3} = \frac{10}{15} - \frac{3}{15} = \frac{10-3}{15} = \frac{7}{15}$.

Based on the above examples, we can conclude that fractions with different denominators can be added or subtracted by finding a common denominator. The common denominator is the lowest common multiple (LCM) of the individual denominators.

Let's solve these other examples;

Example 1:

$\frac{5}{8} + \frac{1}{4}$

Solution

1. $\frac{5}{8} + \frac{1}{4}$

The lowest common multiple of 8 and 4 is 8

$$\frac{5}{8} + \frac{1}{4} = \frac{5}{8} + \frac{1 \times 2}{4 \times 2} = \frac{5 + 2}{8} = \frac{7}{8}$$

Example 2:

$\frac{7}{12} - \frac{3}{4}$

The lowest common multiple of 12 and 4 is 12

$$\frac{7}{12} - \frac{3}{4} = \frac{7}{12} - \frac{3 \times 3}{4 \times 3} = \frac{7 - 9}{12} = \frac{-2}{12} = \frac{-1}{6}$$

ACTIVITY 1.6: Individual/Pair/Group Work

Mix and Match Fractions!

Purpose: To practise and reinforce your understanding of adding and subtracting fractions with different denominators through a hands-on and interactive activity.

Materials Needed:

- A set of fraction cards (each card should have a fraction with different denominators, e.g., $\frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \frac{2}{5}, \frac{3}{8}$, etc.)
- Blank paper and pencils
- Calculators (optional, for checking answers)
- Whiteboard and markers (optional)

Instructions:

Group Formation:

- Form small groups of 3-4 learners.
- Each group will receive a set of fraction cards.

Card Selection:

- Each group should shuffle their fraction cards and lay them face down on the table.
- Each group member will take turns picking two cards at a time.

Addition or Subtraction Decision:

- Once you pick two fraction cards, decide as a group whether to add or subtract the fractions.
- Write down the fractions and the operation you've chosen on a piece of paper.

Find the Common Denominator and Perform the Operation:

- Work together to find the lowest common denominator (LCD) for the two fractions.
- Convert both fractions to have the same denominator.
- Add or subtract the fractions as chosen.
- Simplify the resulting fraction if possible.

Check Your Work:

- Use a calculator to check your answers or have a group member double-check the work by redoing the steps.
- If you have a whiteboard, write your final answer on the board for other groups to see.

Repeat the Process:

- Continue taking turns picking fraction cards, deciding on an operation and solving until all cards have been used.
- The goal is to practise as many different combinations of fractions and operations as possible.

Group Challenge (Optional):

- o Once all groups have completed their fraction operations, each group can choose their most challenging problem and present it to the class.
- o The class can work together to solve the problem on the board.

Reflection & Extension:

- After completing the activity, discuss as a class which problems were the most difficult and why.
- Share any strategies you used to make finding the common denominator easier or how you simplified fractions.
- If you finish early, try combining three or more fractions in one problem, either by adding or subtracting them.

Multiplication and Division of Fractions

Multiplying fractions allows us to combine different parts of wholes while dividing fractions enables us to distribute quantities proportionally.

Multiplication of fractions

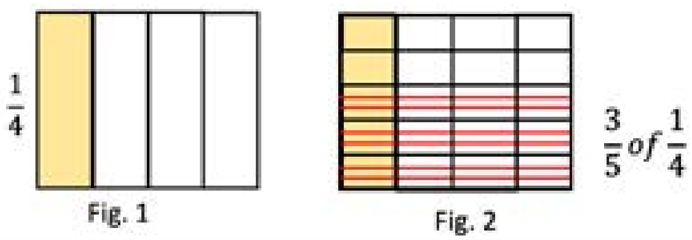
Example 1:

Evaluate $\frac{1}{4} \times \frac{3}{5}$

Step 1: Shade a rectangular shape into $\frac{1}{4}$

Step 2: Shade the $\frac{3}{5}$ of the $\frac{1}{4}$ rectangle

Step 3: Count the double shaded divided by the total divisions in fig. 2.



Therefore; $\frac{1}{4} \times \frac{3}{5} = \frac{1 \times 3}{4 \times 5} = \frac{3}{20}$

Example 2:

Evaluate $\frac{1}{2} \times \frac{2}{3}$

Step 1: Shade a rectangular shape into $\frac{1}{2}$

Step 2: Shade the $\frac{2}{3}$ of the $\frac{1}{2}$ rectangle.

Step 3: Count the double shaded divided by the total divisions in fig. 2.

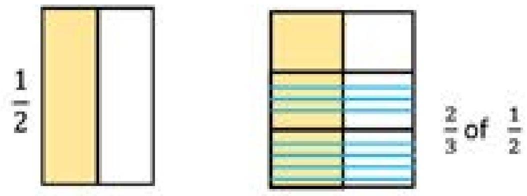


Fig. 1 Fig. 2

Therefore; $\frac{1}{2} \times \frac{2}{3} = \frac{1 \times 2}{2 \times 3} = \frac{2}{6} = \frac{1}{3}$

Multiplication rule

Therefore, from the above, we can conclude that when multiplying fractions, we multiply the numerators together to get the numerator of the product and multiply the denominators together to get the denominator of the product.

Let's solve some more examples

Example 1:

Solve $\frac{21}{4} \times \frac{3}{7}$

Solution

$\frac{21}{4} \times \frac{3}{7} = \frac{63}{28} = 2\frac{9}{28}$

Example 2:

A recipe calls for $\frac{3}{5}$ of a cup of sugar and Sarah wants to make $\frac{1}{2}$ of the recipe.

How much sugar does she need?

Solution

To find $\frac{1}{2}$ of the recipe, we multiply $\frac{3}{5}$ cups by $\frac{1}{2}$

That is, $\frac{3}{5} \times \frac{1}{2} = \frac{3}{10}$

Therefore, Sarah needs $\frac{3}{10}$ cups of sugar.

Division of Fractions

Example 1:

Akua has $\frac{2}{3}$ of a chocolate bar and wants to share it with her friends, so that each gets $\frac{1}{6}$ of the chocolate bar. How many friends can she share with?

Solution

Mathematically this implies, $\frac{2}{3} \div \frac{1}{6}$. If $\frac{2}{3} \div \frac{1}{6}$, then, the size of the chocolate is 3 by 6 whole.

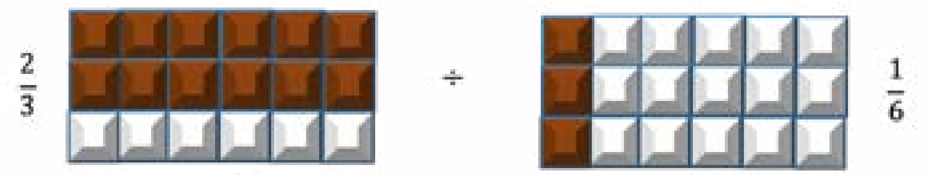


Fig. 1 Fig. 2

How many of the one-sixth in fig. 2 can be found in two-thirds in fig 1?

There are four one-sixth in two-thirds of the chocolate. Hence four friends shared two-thirds of the chocolate.

Therefore, $\frac{2}{3} \div \frac{1}{6} = 4$

From the above activity, we can conclude that division of fractions involves finding out how many times one fraction is contained within another.

This question can also be solved by reciprocating the divisor and changing the division sign to a multiplication sign.

Therefore, $\frac{2}{3} \div \frac{1}{6} = \frac{2}{3} \times \frac{6}{1}$

$= \frac{12}{3} = 4$

Division rule for fractions.

When dividing one fraction by another, we multiply the first fraction by the reciprocal of the second fraction.

Mathematically $\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \times \frac{d}{c}$

Let's solve these examples

Examples

Evaluate the following:

a. $\frac{1}{2} \div \frac{1}{4}$

b. $\frac{5}{7} \div \frac{3}{4}$

c. $\frac{3}{14} \div \frac{6}{7}$

Solution

a. $\frac{1}{2} \div \frac{1}{4} = \frac{1}{2} \times \frac{4}{1}$

$= \frac{4}{2} = 2$

b. $\frac{5}{7} \div \frac{3}{4} = \frac{5}{7} \times \frac{4}{3}$

$= \frac{20}{21}$

c. $\frac{3}{14} \div \frac{6}{7} = \frac{3}{14} \times \frac{7}{6}$

$= \frac{21}{84} = \frac{1}{4}$

ACTIVITY 1.7: Individual/Pair/Group Work

Fraction Relay Challenge!

Purpose: To practise and reinforce your understanding of multiplying and dividing fractions through a fun and interactive relay-style activity.

Materials Needed:

- Fraction cards (each card should have a fraction, e.g., $\frac{1}{2}$, $\frac{3}{4}$, $\frac{2}{5}$, $\frac{7}{8}$, etc.)
- Problem cards (each card should have a multiplication or division problem involving fractions, e.g., $\frac{1}{2} \times \frac{3}{4}$, $\frac{2}{5} \div \frac{1}{3}$)
- Answer sheets
- Pencils and erasers
- A timer or stopwatch
- Small whiteboards and markers (optional)

Instructions:

Group Formation:

o Form small groups of 4-5 students.

- o Each of your groups will be assigned a specific area in the classroom to work.

Setting Up the Relay:

- o Each group will receive a stack of fraction cards and problem cards.
- o Place the problem cards face down in the centre of your group.

Starting the Relay:

- o When the teacher says "Go!" the first person in each group will pick up a problem card and solve the multiplication or division problem on the card.
- o Write down the problem and the solution on the answer sheet.

Passing the Baton:

- o Once the first person solves the problem, they pass the answer sheet to the next person in the group, who picks a new problem card and repeats the process.
- o The relay continues until everyone in the group has had a turn and all problem cards have been solved.

Checking the Answers:

- o After completing the relay, you will review your answers together.
- o Use a calculator or work together to double-check each solution.

Class Discussion:

- o After all groups have completed the relay, the teacher will lead a class discussion.
- o Groups can share any tricky problems they encountered and explain how they solved them.

Bonus Challenge (Optional):

- o If you finish early, try creating your own fraction multiplication or division problems for other groups to solve.

Reflection:

- Discuss, as a group, what strategies worked best for solving multiplication and division problems with fractions.

- Reflect on any challenges you faced and how you overcame them.

Extension Activity:

- For an additional challenge, try solving problems that combine both multiplication and division of fractions in one problem, or include mixed numbers.

FOCAL AREA 2: ROUNDING OFF DECIMAL FRACTIONS

Rounding decimals to the nearest whole number

Imagine, you are embarking on a road trip, navigating through a scenic highway. Along the way, you come across road signs showing distances to your destination in decimal fractions, like 2.70 kilometres.

Rounding decimal fractions is like finding the distance to your destination to the nearest whole number as you navigate on your road trip. Rounding allows you to simplify these distances to whole numbers, providing a clearer understanding of your progress towards your destination. Rounding decimal fractions plays an important role in our everyday life such as estimating distances, quantities or measurements.

Throughout our lesson, we will explore rounding decimal fractions to the nearest whole number, tenth, hundredth, etc. using visual models such as the number line.

Reinforcement Activities

Decimal Number Line Exploration

Purpose: To help you understand the concept of rounding decimal fractions by exploring the position of decimal numbers on a number line.

Materials Needed:

- A long number line marked from 0 to 10 (can be drawn on the board or a large piece of paper)
- Small sticky notes or paper strips
- Markers or pencils

Instructions:

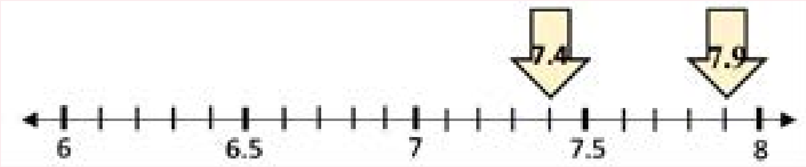
1. **Understanding the Number Line:**
   - The teacher will draw a large number line on the board or provide a printed number line on a sheet.
   - The number line will be marked from 0 to 10, with increments of 0.1 (e.g., 0.1, 0.2, 0.3 and so on).
2. **Placing Decimals on the Number Line:**
   - You will each receive a sticky note or paper strip with a decimal number written on it (e.g., 1.25, 3.67, 5.49, 7.83, etc.).
   - Your task is to place your decimal number in the correct position on the number line.
   - As a class, discuss why you placed your number where you did.
3. **Rounding Off to the Nearest Whole Number:**
   - Once all the decimals are placed on the number line, the teacher will ask you to round off your number to the nearest whole number.
   - Look at your decimal number's position on the number line and decide whether it should be rounded up or down.
   - Discuss the results as a class. Look at these examples

Example 1: Round this 2.70 kilometres to the nearest kilometre using the number line.

From the number line above, compare the distance 2.70 km is to the distance 2km and 3km and check which one is closer.

Therefore, 2.70 rounded to the nearest whole number is 3 because it is closer to 3km than to 2km.

Example 2: Round **7.4** and **7.9** to the nearest positive integers.



Solution

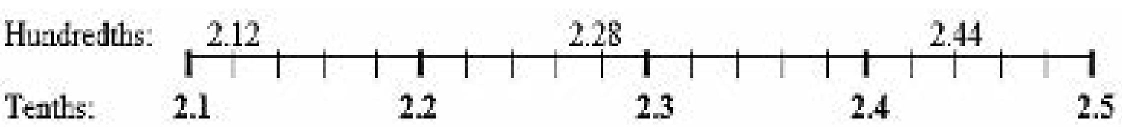
From the diagram 7.4 is between 7 and 8 and is closer to the number 7. Therefore, 7.4 rounds to 7 to the nearest integer. 7.9 is closer to the number 8. Therefore, 7.9 rounded the nearest integer is **8.**

4. **Exploring More Rounding Off:**
   - The teacher will now ask you to round your decimal number to the nearest tenth.
   - Use the number line to help you visualise whether to round your decimal up or down.
   - Place your sticky note on the appropriate spot to show the rounded number.
5. **Reflection:**
   - After completing the activity, discuss how the number line helped you understand rounding.
   - Think about why it's important to know how to round decimal numbers in everyday situations, like when dealing with money or measurements.

ROUNDING DECIMALS TO THE NEAREST TENTH

Example 1

The number line below has a graduation that increases by 0.02. The numbers below the line are tenths, the numbers above the line are in hundredths.



From the diagram, we can see that, **2.12** is close to **2.1** and is therefore rounded to 2.1 to the nearest tenth.

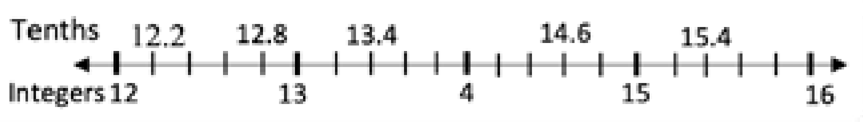
Then **2.28** is closer to **2.3** and is therefore rounded to 2.3 to the nearest tenth.

2.44 is closer to **2.4** and is therefore rounded to 2.4 to the nearest tenth.

Example 2

Round the following numbers to the nearest integer using the diagram below;

12.2, 12.8 13.4 14.6 15.4



Solution

1. **(a)** 12.2 is closer to 12 and is therefore rounded to 12.

(b) 15.4 is closer to 15 and is therefore rounded to 15.

(c) 14.6 is closer to 15 and is therefore rounded to 15.

(d) 13.4 is closer to 13 and is therefore rounded to 13.

(e) 12.8 is closer to 13 and is therefore rounded to 13.

From the above examples, to round a decimal fraction to a specific place value, we first identify the place value we need and check the next place value. If the next place value is 5 or greater (i.e., 5, 6, 7, 8, and 9), we add 1 to our targeted place value. If it is less than 5 (i.e. 1, 2, 3, and 4) we discard it and write our decimal to the targeted place value.

Rounding to the nearest hundredth

To round up to the nearest hundredth using a number line, look at the position value of the hundredth closest to the number you want to round.

Round **4.053** and **4.077** to the nearest hundredths.

The number 4.053 is between 4.05 and 4.06.

Therefore, **4.053** is closer to **4.05** and is rounded to 4.05.

The number 4.077 is between 4.07 and 4.08. Therefore, **4.077** is closer to **4.08** and is therefore rounded to 4.08.

ACTIVITY 1.8: Individual/Pair/Group Work

Rounding Decimal Fractions to the Nearest Tenth and Hundredth

Objective: To reinforce your understanding of rounding decimal fractions to the nearest tenth and hundredth by engaging in a hands-on activity using real-world examples.

Materials Needed:

- A set of decimal cards (each card has a different decimal number, e.g., 2.34, 5.678, 7.92, etc.)
- Number lines (one for each group, marked from 0 to 10, with increments of 0.1)
- Sticky notes or small pieces of paper
- Pencils and erasers

Instructions:

1. **Grouping and Distribution:**
   - o You will be divided into small groups, with each group receiving a set of decimal cards, a number line, and sticky notes.
2. **Placing Decimals on the Number Line:**
   - o Each group will take turns picking a card and placing the decimal number on the number line by marking it with a sticky note.
   - o Discuss within your group where the decimal should be placed based on its value.
3. **Rounding to the Nearest Tenth:**
   - o After placing your decimals on the number line, round each decimal to the nearest tenth.
   - o Write the rounded number on a sticky note and place it next to the original decimal on the number line.
   - o Compare and discuss whether the decimal rounded up or down, and why.

4. **Rounding to the Nearest Hundredth:**
    - o Next, round each decimal to the nearest hundredth.
    - o Write the rounded number on another sticky note and place it next to the original decimal on the number line.
    - o Discuss how the rounding differs when rounding to the nearest tenth compared to the nearest hundredth.
5. **Real-Life Application Scenarios:**
    - o Imagine you are shopping and the prices of items are written as decimals (e.g., GH¢2.34). Round the prices to the nearest cedi to estimate your total cost more easily.
    - o Discuss in your group how rounding decimals can help in real-life situations, like shopping, cooking, or measuring.
6. **Group Presentation:**
    - o Each group will present one example to the class, explaining how they placed the decimal on the number line and how they rounded it to the nearest tenth and hundredth.
    - o Highlight any challenges or interesting findings your group encountered during the activity.
7. **Reflection:**
    - o Think about how rounding decimals can make calculations simpler and how this skill might be useful in your daily life.
    - o Write a short reflection on what you learned from the activity and how confident you feel about rounding decimals.

REVIEW QUESTIONS

1.

a. Describe the following sets

i. {January, February, March, April, May}

ii. {1, 3, 5, 7, 9}

iii. {a, b, c, d, e, f}

b. Which of the following statement can produce an infinite set?

i. Letters in the English alphabet

ii. Odd numbers

iii. Two digit prime numbers.

iv. Numbers less than 12

c. Find the union of the of sets; A= {2, 4, 6}and B= {1, 2, 3}

d. Given the sets A = {a, b, c, d, e, f} and B = {a, c, e, g, h i}. Find:

i. $A \cup B$

ii. $A \cap B$

e. Given the sets; P= {2, 4, 6}and Q = {1, 2, 3}and R= {1, 2, 3, 4, 5}. Find

i. $P \cup R$

ii. $P \cap Q$

iii. $Q \cap P \cap R$

vi. $Q \cup P \cup R$

f. Identify the following sets:

i. {Monday, Tuesday, Wednesday}

ii. {2, 4, 6, 8, 10}

iii. {apple, orange, banana}

iv. { }

2. **a.** Perform the following operations on sets:

i. A = {1, 2, 3}, B = {3, 4, 5}. Find A ∪ B.

ii. A = {red, blue, green}, B = {green, yellow}. Find A ∩ B.

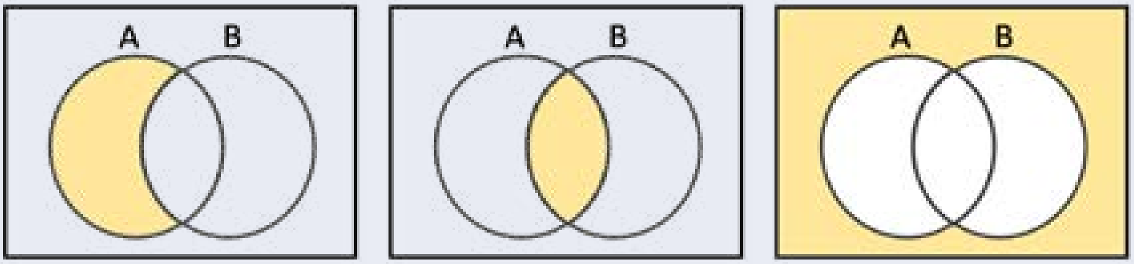
iii. A = {1, 2, 3, 4, 5}, B = {3, 4, 5, 6, 7}. Find A ∩ B and A ∪ B.

b. Create your own set with at least 3 elements. What type of set is it (finite, infinite, empty etc,)?

c. Perform the union operation on sets A = {red, blue} and B = {blue, green}.

d. Can a set have duplicate elements? Why or why not?

3. **a.** Identify and explain the following regions in the diagram below.



a. b. c.

b. In a group of 60 learners, 40 learners like dogs as their pet, 35 like cats as their pet, and 25 like both. How many learners like only cats?

4. **a.** At a bookstore, there are 90 learners. 60 learners like Literatures, 45 like motivational books, and 30 like both.

i. Illustrate this information on a Venn diagram

ii. How many learners like only literature?

b. In a school club, there are 50 learners. 30 learners like painting, 25 like singing, and 15 like both.

i. Illustrate this information on a Venn diagram

ii. How many learners like only singing?

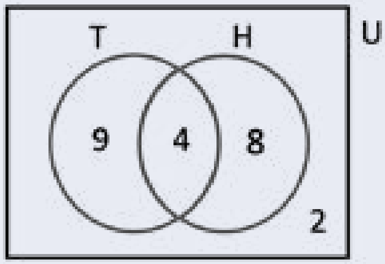
5. In a group of 70 learners, 45 learners play basketball, 30 play soccer, and 15 play neither basketball nor soccer.

i. Illustrate this information on a Venn diagram

ii. How many learners play both games?

iii. How many played only soccer.

6. The Venn diagram shows the number of people in a sporting club who play tennis (T) and hockey (H). Find the number of people:



- **i.** in the club
- **ii.** who plays hockey
- **iii.** who play at least one of these sports
- **iv.** who play tennis but not hockey.

7. Perform the following operations and simplify your answers:

- **i.** $\frac{3}{4} + \frac{3}{4}$
- **ii.** $\frac{5}{6} - \frac{4}{6}$
- **iii.** $\frac{2}{3} \times \frac{7}{3}$
- **iv.** $\frac{2}{5} \div \frac{4}{5}$

8. Round off the following decimal fractions to the nearest whole number.

- **i.** 2.1
- **ii.** 10.7
- **iii.** 6.9

9. Solve the following fractional operations.

- **i.** $\frac{1}{3} + \frac{5}{4}$
- **ii.** $\frac{2}{5} - \frac{1}{3}$
- **iii.** $\frac{2}{3} \times \frac{3}{5}$
- **iv.** $\frac{4}{6} \div \frac{2}{3}$

10. Round off the following decimal fractions to the nearest tenth and whole numbers.

- **i.** 3.75
- **ii.** 5.23
- **iii.** 9.15

11. Evaluate the following fractions**.**

- **i.** $2\frac{2}{3} + 3\frac{3}{5}$
- **ii.** $5\frac{3}{4} - 2\frac{1}{3}$
- **iii.** $1\frac{1}{3} \times 3\frac{3}{5}$
- **iv.** $7\frac{2}{3} \div \frac{4}{5}$

12. Round off the following decimal fractions to the nearest, hundredth, tenth and whole numbers.

i. 8.953

ii. 7.819

iii. 4.366

13. Solve the following questions.

i. A pizza is divided into 8 equal slices. Tom ate 3 slices. What fraction of the pizza did he eat?

ii. Mary has $\frac{2}{3}$ of a cake left. If she wants to divide it equally among 4 friends, how much of the whole cake will each friend get?

iii. Jack and Jill are participating in a race. Jack finishes $\frac{3}{4}$ of the race, whereas Jill finishes $\frac{5}{8}$. Who covers a larger fraction of the race?

ANSWERS TO REVIEW QUESTIONS

1.

(a) **i.** The first five months of the year

ii. The first five odd numbers

iii The first six letters of the alphabet

(b) **i.** A finite list of 26 letters

ii. Infinite – it has no ending

iii. A finite list of 2 digit prime numbers

iii. A finite list if we just consider the positive numbers, otherwise it is an infinite list

(c) $A \cup B = \{1,2,3,4,6\}$

(d) **i.** $A \cup B = \{a, b,c,d,e,f,g,h,i\}$

ii. $A \cap B = \{a,ce\}$

(e) **i.** $P \cup R = \{1,2,3,4,5,6\}$

ii. $P \cap Q = \{2,4\}$

iii. $Q \cap P \cap R = \{2\}$

iv. $Q \cup P \cup R = \{1,2,3,4,5,6\}$

(f) **i.** The first 3 days of the week

ii. The first five positive even numbers

iii. Three fruits I eat at home

iv. The null/empty set

2.

(a) **i.** $A \cup B = \{1,2,3,4,5\}$

ii. $A \cap B = \{green\}$

iii. $A \cap B = \{3,4,5\}$ and $A \cup B = \{1,2,3,4,5,6,7\}$

(b) Your own created set – defined as finite, infinite, empty etc.

(c) $A \cup B = \{\}$

(d) A set cannot have duplicate elements. An element is either a member of a set or not. It cannot be in the set twice.

3.

(a) **a.** A’ ∪ B

b. A ∩ B

c. (A ∪ B)’

(b) 35 – 25 = 10, so 10 learners like only cats.

4.

(a) **i.** Venn diagram illustrating the data.

ii. 30 learners like only Literature

(b) **i.** Venn diagram illustrating the data.

ii. 10 learners like only Singing

5. **i.** Venn diagram illustrating the data

ii. 20 learners play both soccer and basketball

iii. 10 played only soccer

6. **i.** $9 + 4 + 8 + 2 = 23$ people altogether

ii. $4 + 8 = 12$ people play hockey

iii. $9 + 4 + 8 = 21$ people play at least one sport

iv. 9 people play tennis but not hockey

7. **i.** $\frac{6}{4} = 1\frac{1}{2}$

ii. $\frac{1}{6}$

iii. $\frac{14}{9} = 1\frac{5}{9}$

iv. $\frac{2}{4} = \frac{1}{2}$

8. **i.** 2

ii. 11

iii. 7

9. **i.** $\frac{19}{12} = 1\frac{7}{12}$

ii. $\frac{1}{15}$

iii. $\frac{2}{5}$

iv. 1

10. i. 3.8 and 4

ii. 5.2 and 5

iii. 9.2 and 9

11. i. $\frac{94}{15} = 6\frac{4}{15}$

ii. $\frac{41}{12} = 3\frac{5}{12}$

iii. $\frac{24}{5} = 4\frac{4}{5}$

iv. $\frac{115}{12} = 9\frac{7}{12}$

12. i. 8.95, 9.0 and 9

ii. 7.82, 7.8 and 8

iii. 4.37, 4.4 and 4

13 i. $\frac{3}{8}$

ii. $\frac{1}{6}$

iii. Jack covers a larger fraction as $\frac{3}{4} > \frac{5}{8}$

ACKNOWLEDGEMENTS

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List of Contributors

Name	Institution
Gideon Kwame Ahiadziefe	OLA SHS
Evelyn Adjei	St. Vincent College of Education, Yendi
Adablah Mensah	St. Paul's Senior High School and Minor Seminary
Juliana Opare	St. Paul's Senior High School and Minor Seminary