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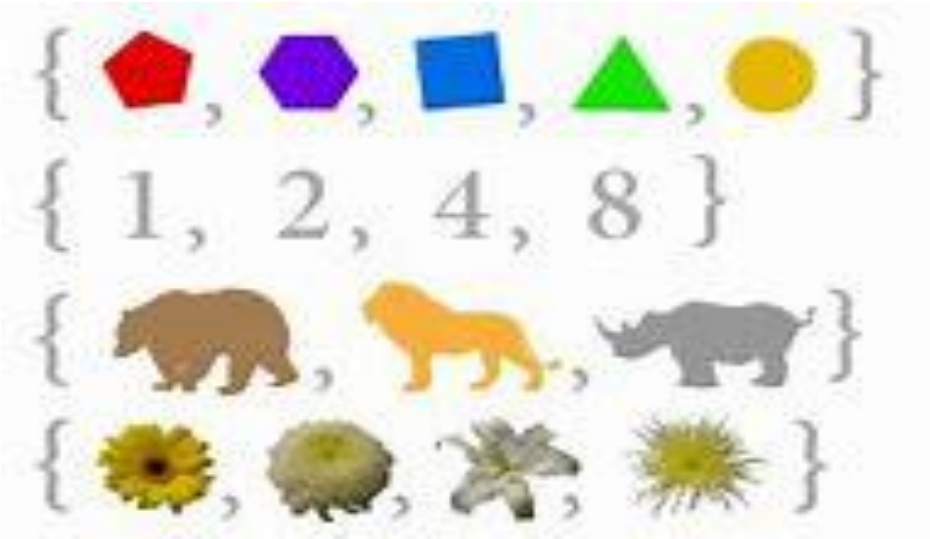
Mathematics

Types of Sets



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Shaoma Prep Lesson Plans Online

Mathematics Lesson plans: **Term 1** **Unit 1** **Focus Question: 1**
Christmas Term 2020

Subject: Mathematics

Content Strand: Numbers

Grade Level: Six

Duration: (60 minutes x 3 days) x 5 weeks

Sub-title: Sets

Focus Question: What the special symbols and language I use when working with sets?

Standard Number Representation:
Know the value of numerals, associate them with their names, numbers, ordinals and use concrete objects to model patterns, expressions, and numbers.

Attainment Target:

Make and interpret Venn Diagram
know the value of numbers and associate them with their names and numbers

Benchmarks:

Identify members of a set and associate same with the property of the given set.

Objectives:

- ✓ Identify members of finite and infinite sets.
- ✓ Associate the members of a set with the properties of that set.
- ✓ Name and list members in the intersection and union of two sets.
- ✓ Draw Venn diagrams to show the intersection or union of two sets.
- ✓ Use the symbols associated with the set operations – intersection and union.

Prerequisite Knowledge:

Students would have known what a set is as well as some classification of sets.
Checks will be made see that students can:

- ✓ Define and describe a set including the empty set.
- ✓ Name any set using braces.
- ✓ Differentiate between sets of counting, whole, odd, even, prime, composite, and fractional numbers.

Key Vocabulary: Elements, member, finite, infinite set, limited, unlimited, intersection, union, Equivalent set, Equal set, Disjoint sets Venn diagram, symbols, Null/empty set.

Key Skills: Sorting, drawing Venn Diagrams, Reasoning, interpreting a given Venn diagram, Solve Problem, Cooperative Learning, operate electronic device, use productive tools to communicate information.

Materials/Resources: Attribute pieces, Worksheet, Strings, Equivalent set cards, pictures, Computers and any other available resources, Internet**.**

Content Outline:

A set is a collection of items usually of the same kind. The items which belong to a set are called members or elements of the set. We use braces {} to show the members or elements of a set. A set without members or elements is called an **empty** or **null** set.

Symbols	**Meanings**
{}	braces
{}, Ø	empty or null set
∈	element of or member of
∉	not an element of or not a member of

Finite and Infinite Sets

When the members or elements of a set can be written down or counted, the set is called a **finite set**. A finite set is a set whose number of elements are fixed and limited and can be determined.

Example: B = {days of the week beginning with the letter S}
B = {Sunday, Saturday}

When the members or elements of a set cannot be listed or counted, the set is called an infinite set. An infinite set is a set whose number of elements are not fixed, they are unlimited and cannot be determined. It is represented by ……to show that it continues.

Example: C = {even numbers}
C = {2, 4, 6, 8…….}

Equivalent and Equal sets

Equivalent sets are sets that have the same number of members or elements. The numbers can be matched to show a one-to-one correspondence.

Two sets are equal if they have the same members or elements. The order of the listing does matter.

Symbols	**Meanings**
⟷	Equivalent
⟷ (with slash)	Not equivalent

=	equal
≠	not equal

The Intersection and Union of sets

The intersection of two sets, is the set of elements or members common to both sets.
The union of two sets is the set of elements or members contained in both sets.

The symbol ∩ means intersection and the symbol **U** means union.

Symbol	Meaning
∩	intersection
U	union

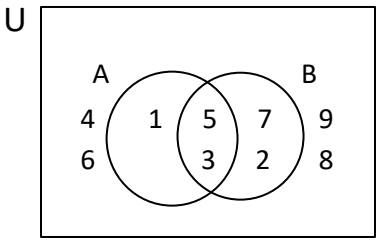
Venn Diagram

A Venn diagram is used to show the relationship of sets.
The universal set is the set that contains all the elements for a problem.
It is represented by the symbol U.

Example: U = {counting numbers less than 10}
= {1, 2, 3, 4, 5, 6, 7, 8, 9}

Set A = {odd numbers less than 6}
Set B = {prime number less than 10}

A∩ B = {3, 5}
A U B = {1, 2, 3, 5, 7}



Subsets

When all the members or elements of a set (Set B) are also members or elements of another set (Set A).
We say that Set B is a subset(C) of Set A and Set C is not a subset(⊄) of Set A.

Example: Set A = {Kay, John, Marica, Omar}
Set B = {Omar, Marica}
Set C = {Peter}

Symbol	Meanings
C	is a subset of
⊄	is not a subset of

WEEK 1: **Lesson Plans for the week beginning September 7, 2020 to September 11, 2020.**

Day One: Monday, September 7, 2020

Duration: 60 minutes

Sub-title: Introduction to Sets

Specific Objectives: At the end of the lesson, the students should be able to:

- ✓ Define the concept of a set.
- ✓ Describe a set.
- ✓ Name and list members of any given set.

Key Vocabulary: sets, elements, members

Key Skills: identifying, sorting, reasoning, describing, listing, defining, naming

Materials: Video - https://youtu.be/l3-A0O42Lyo, pictures of different groups, stories, classroom and home environment

Teaching/Learning Activity:

Engage and Explain:

Students will watch video entitled, **'What are sets? /Set Theory' -** https://youtu.be/l3-A0O42Lyo**.**

Based on their understanding of information given in video, students will then examine the picture below very carefully. After which they will complete the guided exercise that follows.

Instructional Guide: Students will in their notebooks:

1. List some of the objects that they see, then write a caption for the above picture.
2. Place the objects they have listed in three or more groups.
3. They will then answer the following questions based on the above activity.
    a. How many groups did you make?
    b. Do you have any object(s) that belong to more than one group? Write them down.
    c. In pairs, compare your list and group names. Explain to your partner how you decided on the different groups?

Teacher will then reinforce students understanding of the concept – sets, from the above activities, by encouraging students in their own words to give a brief description of a set.

Teacher will then give the definition below:

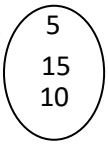
A set is a collection of items usually of the same kind. The items which belong to a set are called ***members*** or ***elements*** of the set. We use braces **{}** to show the members or elements of a set.

Examples:

a. {cellular phone, tablet, laptop, computer} may be described as the **set of electronic devices.**
b. {5, 10, 15} may be described as the **set of multiples of 5 that are less than 16.**

A set may be represented in three ways:

a. By **listing the elements**, example **{5, 10, 15}**
b. By **description**, example **the set of multiples of 5 less than 16.**
c. By drawing a diagram, example **A**



We use curly brackets(braces), {}, to write about sets in mathematics. {} means “the set of”.

Therefore, A = {5, 10, 15} should be read as “A is the set of multiples of 5 that are less than 16.

Note: A set without members or elements is called an **empty** or **null** set. An empty or null set is represented by the symbol **{} or Ø.**

Explore:

Students will be presented with six pictures of different groups of things as shown below.

Vegetables, transportation, furniture, fruits, musical instruments, and **toys.**

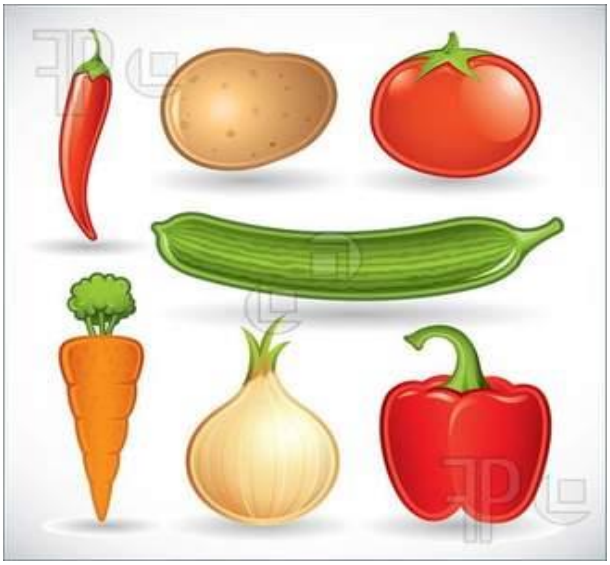
A set of transportation

A set of musical instruments

A set of fruits

A set of toys

A set of furniture



A set of vegetable

They will be asked/encouraged to examine each picture carefully then identify/name each group as a set. Teacher will engage students in a discussion about each picture with the following questions, as a guide to help students to correctly name each set.

- ✓ What are on each of the pictures you just looked at?
- ✓ What have you noticed about each picture?
- ✓ A group can also be called a _____.
- ✓ Can you say in your own words what is a set?
- ✓ Can you describe each group/set?
- ✓ Can you name things in the set in each picture?
- ✓ Do you know how many things are in each picture?
- ✓ What is one word that can be used to name each group/set?

Students will look around the classroom. In their notebook, list the objects that they see, then put the objects that have been listed in to three or more groups. They will then answer the following questions based on the activity above.

1. How many groups did you make?
2. Do you have any objects that belong to more than one group?

Write them down.

3. In pairs compare your list and group names. Explain to your partner how you decided on the different groups.

Based on the observation made in pairs, say what they would have done differently and why.

Elaborate:

Students will discuss in groups the following questions. Write down and place each answer in a set suitable set, then share their answers with the class. Groups should be able to justify their answers.

1. I grow on various trees and you can eat me. I make you healthy. There are many like.
2. You use me when you are tired because I make you comfortable. I am found in bedrooms but sometimes in stores. My feet and yours add up to six.
3. Students wear me to school. Some people wear me to work. I am sometimes white, but I often appear in other colours such as brown, green, or with red stripe.
4. I am found in stores and libraries. I can be fat or thin, depending on what is within. I can be hard or soft on the outside, but I provide lots of information on the inside.
5. I come in many colours, shapes and sizes, and I am found in many places worldwide. People use me to transport items wherever they go. Schoolchildren like to wear me on their heads.

Evaluate:

Students will read the story about **"The Hernandez Family",** after which they will do the activities that follow.

Mr. and Mrs. Hernandez have three children, two girls and one boy. Their names are Jada, Jasmine and Justin. They all love to watch television, so Mr. Hernandez sets aside Sunday afternoons for them to do so. While watching TV, they eat their favourite snack of carrot sticks and bean dip. They used to have buttery popcorn as their snack during TV time, but Justin disliked it. He is happy that they now have carrot sticks instead.

Mrs. Hernandez is happy too. She, Justin, and Jasmine are vegetarians and the carrot sticks are a healthy snack for them.

All the family members have similar interests. They all like to watch Comedy Hour, Nightly News, Sports Watch, and the road to success. All these television programmes are aired on Sunday between the hours of 4:00 p.m. and 7:30 p.m.

Students will write the answers of the following questions in their notebook.

1. Create as many sets as you can from the story.
2. Represent one of yours using a diagram. Give the set a name.
3. List the members of the set of children who watch Nightly News on a Sunday in the Hernandez home. Then write the name for another set that the same children could be a part of.
4. List all the television programmes that are aired on Sundays between 12 midday and 8:00 pm for any two stations that you watch. Note the similarities between programmes and place them in the appropriate sets, such as News, Movies and Sports. Use your research skills to help find the answer if you do not know.

Extended Work: For homework students will complete exercise to:

- ✓ Describe given sets in words.
- ✓ List members or elements of given sets.
- ✓ Identify the empty set in the given.

Evaluation (Teacher):

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Comments:
Areas of strengths:

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Areas of weaknesses:

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Actions to be taken:

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Day Two: Wednesday, September 9, 2020

Duration: 60 minutes

Sub-title: Sets – Using the symbols ϵ or $\notin$

Specific Objectives: At the end of the lesson, the pupils should be able to:

- ✓ Identify the symbols associated with the meanings; "is an element of "and "is not an element of".
- ✓ Differentiate between and use symbols "an element of "and "not an element of".
- ✓ Use given symbols to Name and list members of any given set.

Skills: Identify, sort, reasoning, differentiate, creating

Materials: video**,** cards, worksheets, classroom environment, real life scenarios

Teaching/Learning Activity:

Engage and Explain:

Students will watch video entitled, **'How to identify the Elements of a set'** - https://youtu.be/eltZlBtWhd4, they will then demonstrate their understanding of the information received from video by participating in given activity.

Teacher will engage students in whole class activity. Four Students (boys) will be asked to stand at the front of the class. With guided questions teacher will encourage a discussion about the four boys standing at the front of the class:

1. What do you see at the front of the class?
2. How many boys are there?
3. What can we say about the boys standing at the front of the class?
4. Instead of group, what other word can use to identify boys?
5. What is a set?
6. How can we identify a set?
7. What is common to the members of this set?
8. Can you describe the set in your own words?
9. Taking out one of the boys, would you say that he is an element of set B?
10. How do we say that something is a member or an element of a particular set?

Teacher will then reinforce the concept **"is an element of"** by associating the meaning with its symbol.

What is an element or a member of a set?

Remember that each item within a set is called an element or a member of the set. Members of a set are separated by a comma (,).

The symbol **∈** means **"is an element of"** or **"is a member of".**

Example:
The set of students in Grade 6 at Cave Valley Primary School whose first names begin with the letter A would be written as:

A = {Akeil, Anthoneil, Adonie, Amyca}

This set could also be written as, A **= {Students in Grade 6 at Cave Valley Primary School whose first names begin with the letter A}.**

The names Akeil, Anthoneil, Adonie and Amyca are all **members** of the set. Therefore:

Akeil ∈ A means that Akeil is a member or an element of set A.

Anthoneil ∈ A means that Akeil is a member or an element of set A.

Adonie ∈ A means that Akeil is a member or an element of set A.

Amyca ∈ A means that Akeil is a member or an element of set A.

Elaborate:

Teacher will now engage students in another discussion to bring out the concept "**not a member of**" or "**not an element of"** with the following questions:

1. What if I wanted to add Areanna to set A, could she be added/included as a member of an element of set A?
2. What about Zidon, would we be able to add him as a member of set A?
3. Areanna is a girl, all the member of set A are boys. Why are we able to add Areanna as a member or element of set A and not Zidon?

Teacher will then write the following sentences on the board:

Areanna **∈** A, means that Areanna is a member or an element of set A.

Zidon **∉** A, means Zidon is not a member or not an element of set A.

All the members of set A names begins with the letter A, therefore Zidon is not a member of or an element of Set A.

When something is not a member or an element of a given set, we say that it's not a member of or not an element of that set.

The symbol ∉ means, **"is not a member of or is not an element of".** We can therefore write the following:

"July is not a member of the set of days of the week".

July ∉ {days of the week}

Students will look at the example below and participate in discussion, then explain their choice of response.

If **set A = {2, 4, 6, 8, 10, 12},** are the following statements T**RUE** or **False**?

a. 2 **∈** A _____ c. 13 **∈** A _____

b. 5 ∉ A _____ d. 10 **∈** A _____

Solution:

a. 2 **∈** A – True, the element 2 belongs to the given set A.

b. 5 ∉ A – True, since the element 5 **does not** belong to given set A.

c. 13 **∈** A - False, since the element **does not** belong to the given set A

d. 6, 10 **∈** A – True, since the elements 6 and 10 both belong to the given set A.

Evaluate:

Students will complete the following activity in their notebooks:

1. Think about objects at home which belong to each of the sets below.
2. List only three members that belong to each set.

A = {furniture in the house}

B = {items in your refrigerator}

C = {appliances in the kitchen}

D = {cleaning items}

3. What are the **similarities** within and outside of each group?
4. Say, if there are any **differences** within each group.
5. Identify and name other sets that they encounter in their daily life at home.

Extended Learning: For homework students will complete exercise to:

- ✓ Identify and name other sets that you encounter in your daily life at home. Draw them in your scrapbook.
- ✓ A couple has seven daughters and each daughter has one brother. How many children does the couple have altogether? Explain your answer.
- ✓ Create a set to show the members of your family.

Evaluation (Teacher):

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Comments:
Areas of strengths:

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Areas of weaknesses:

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Actions to be taken:

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Day Three: Friday, September 11, 2020.

Duration: 60 minutes

Sub-title: Finite and Infinite sets

Specific Objectives: At the end of the lesson, the pupils should be able to:

- ✓ Define finite set and infinite set.
- ✓ Identify sets as finite set or infinite set.
- ✓ Tell the difference of the finite set and infinite set.
- ✓ Give their examples of finite set and infinite set.

Skills: Classifying sets, identifying sets, justifying responses given.

Materials: Pictures, cards with sets, response cards

Teaching/Learning Activity:

Engage and Explain:

After watching video entitled,
Students will be presented with two pictures as shown below:

Students will be guided in a discussion with the following questions:

1. What have you seen in the first picture?
2. Can you describe them?
3. Do you know what are the exact number of fishes that live in the ocean?
4. How about in the second picture, what can you see there?
5. How many fingers are there?
6. Now, let's go back to the first picture, since you know already what a set is, can we consider this one as a set?
7. How about the second picture? (So, we can label the first picture as set A and the second picture as set B.
8. What difference have you observed in this two sets in terms of the number of elements/members they contained?

Teacher will then explain:

Similarly, in mathematics, there are also two kinds of sets, those whose elements or members are limited, fixed, and can be determined and those whose numbers of elements are not fixed, unlimited and cannot be determined. Now, let us find out what are these sets!)

Explore:

In groups, students will be given cards with examples of the two kinds of sets -
Example A and Example B as shown below:

A = The vowels in the alphabet	B = The set of prime numbers
A = The set of whole numbers between 5 and 12	B = The set of whole numbers
A = Positive multiple of 3 that are less than 10	B = the set of all unit of fractions

The following Guided questions will be used for discussion: -

1. How many sets are there in the example A?
2. How about in the example B? -
3. Can you Identify the elements in each set?
4. List them using the roster notation method on your response cards.

Students will then, compare the two sets of examples written using the roster notation method.

1. What difference have you observed between the two sets?
2. Based from your observations of the difference of the two kinds of sets, what is then a finite set?
3. What is an infinite set?

Students will also be asked to identify things in the environment that can be classified as finite and infinite giving reason.

Elaborate:

In groups, students will be asked to create a scenario showing how applicable is the concept in real world. Each group will present their scenario to the class, who will critique objectively.

Evaluate:

Students will be asked to make a journal entry on what was learnt in the lesson, telling whether or not the information was beneficial.

In two groups, students will participate in a game.

The following sets will be posted, and the students will group them according to the kind of set they belong.

The first group to complete the task correctly will be given 10 points. (3 sets of cards will be posted for a maximum of 30 points).

Cards with sets:

- ✓ the days of a week,
- ✓ set of odd numbers,
- ✓ 2,4,6,8,10, 5,10,15, 20…,
- ✓ the first five letters of the alphabet, and
- ✓ set of counting numbers less than 10.

Extended Learning: For homework students will complete exercise to:

- ✓ Name/give three examples of an infinite set.
- ✓ Name/give three examples of a finite set.
- ✓ Base on your understanding Explain the difference between a finite and an infinite set.

Evaluation (Teacher):

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Comments:
Areas of strengths:

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Areas of weaknesses:

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Actions to be taken:

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