BIODIVERSITY AND CLASSIFICATION

Organizing objects into categories or themes is one of the basic human tendency such that these objects are related to each other in a meaningful way. Classifying helps us to find or recognize objects easily. The most popular example of classification is the clothes arranged in cupboard. You can check how clothes are separated in your home. They might be separated based on their use in different weathers, by ownership, and based on its utility like daily wear, special occasions or uniforms.

To classify objects, one must examine them carefully to find the differences and similarities between them. Ideally, every object should be placed in only one category and selecting the most appropriate category is very important. To organize objects within a category more, you can make sub categories if the objects can be classified further.

Q.1. Can you think of any place (than clothes separated in cupboard) where you use classification?

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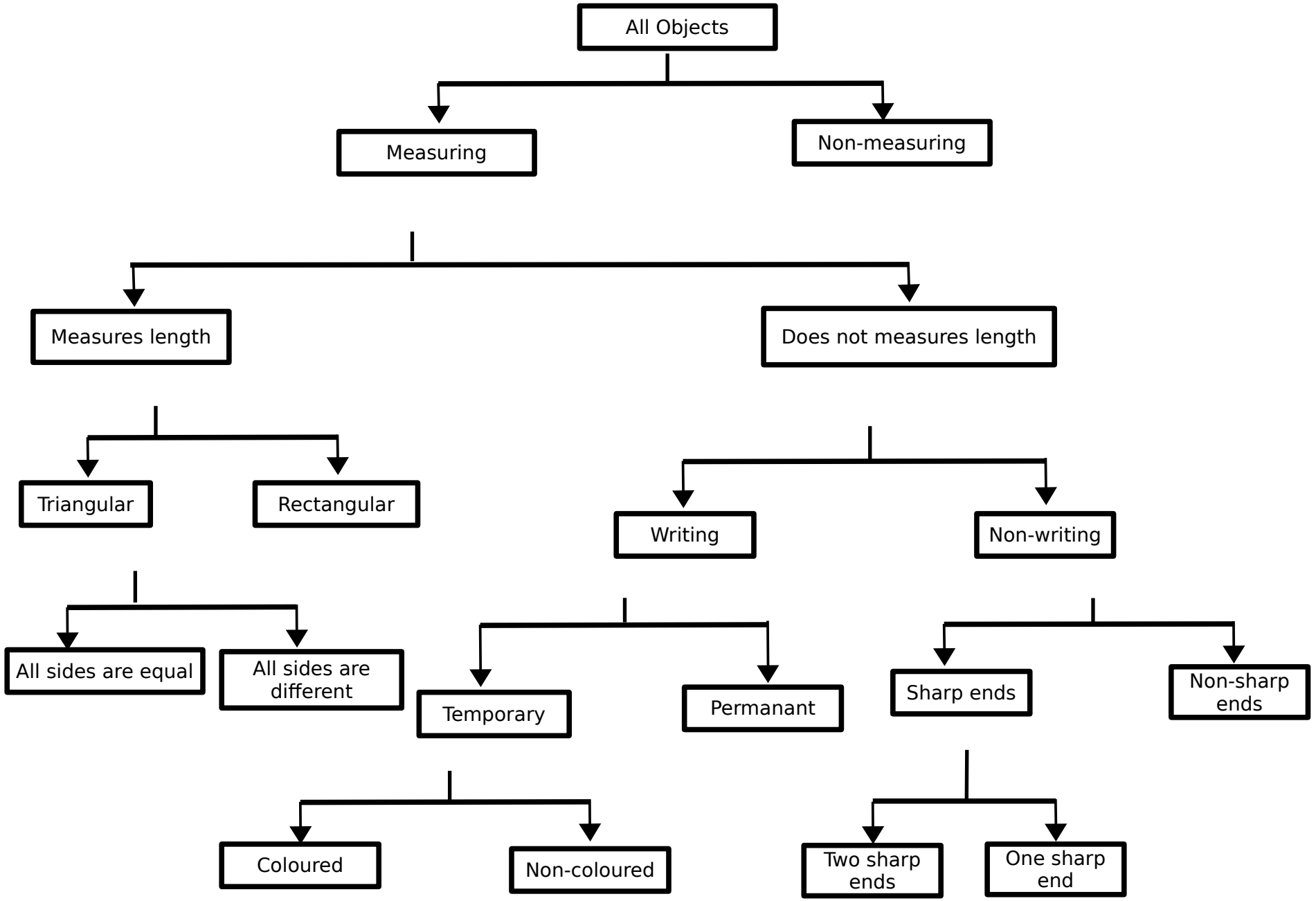
In the task below, we will classify objects we commonly found in our geometry boxes. Complete the classification tree by sorting the objects and writing below whichever category they belong to.

Task 1

Requirement -

1. Ruler
2. Protractor
3. Sets square (45-45-90)
4. Sets square (30-60-90)
5. Divider
6. Compass
7. Pen
8. Eraser
9. Sharpner
10. Pencil
11. Colour pencil


All Objects
Measuring
Non-measuring
Measures length
Does not measures length
Triangular
Rectangular
Writing
Non-writing
All sides are equal
All sides are different
Temporary
Permanant
Sharp ends
Non-sharp ends
Coloured
Non-coloured
Two sharp ends
One sharp end

Q.2. Do you think you can use any other crieria (than measuring or non measuring) for starting the classification? Try making such a classification tree in your notebook.
Do you think this classification tree is more useful than the previous one? Why?

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Biodiversity comes from two words, biology and diversity. Biological diversity means variety of living organisms found on earth. Different types of organisms are found living on land, air and water. Each of these organisms shows variation in the shape, size, color and various body functions. Each organism, whether big or small, plays an important role in various life processes occurring on earth. This diversity has evolved over millions of years since life first originated on earth.

Task 2

Leena, a class 9 student, got hand lens on her 14th birthday as a gift from her parents. She goes around holding it against objects, in awe of the magnified view it provides. Once she was walking in a garden with her hand-lens and stumbles upon the sight of things moving in the soil. She collected some soil in a cup and brought it back home.

After reaching home, she started observing the soil sample carefully using a hand lens. She was surprised to see so many small animals in it. Most of them were alive. She decided to draw the shapes of these animals to understand their basic body structures. For this, she chose some basic shapes like triangles, squares, rectangles, ovals etc. to draw.

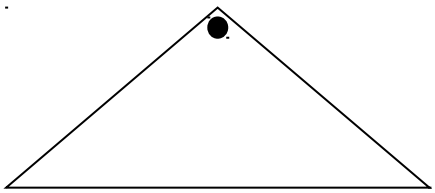
Let us help Leena to complete her work. For animals, she has written outlined basic body shapes she was able to observe. We will recreate those organisms using the basic shapes given below by following the body description given by her. When you finish drawing, guess the name of the animal. In the last page, a Biodiversity Table is given. Looking at your drawings and description, fill the blank boxes with appropriate answers in that table.

Requirements:

1) Printouts of sheets - ‘Shapes for reconstructing animals’ to each group
2) Blank paper sheet (for students to draw the shapes)
3) Pen / Pencil

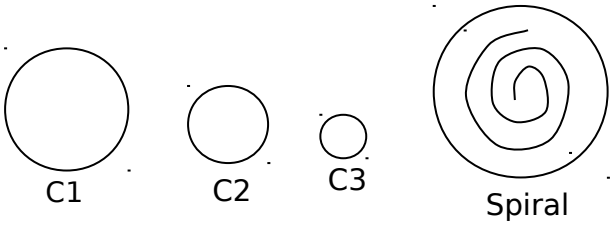
SHAPES FOR RECONSTRUCTING ANIMALS

Triangle

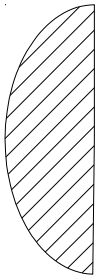


With Dot

Circles



Semicircle



Lined

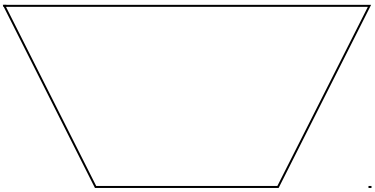
Plain

Rectangles

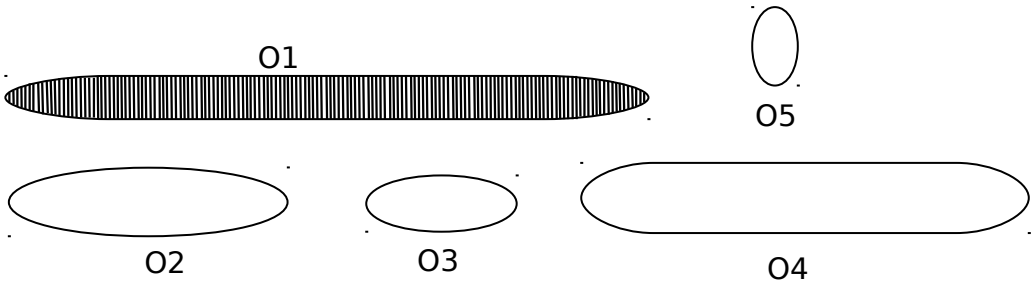
LR

Filled

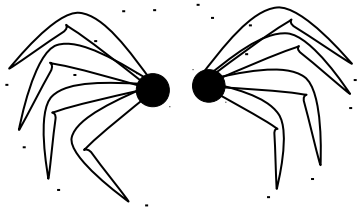
Trapezium



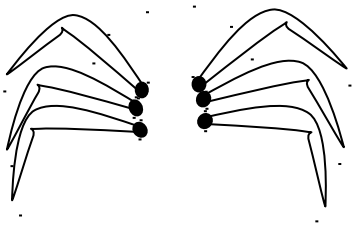
Ovals



L – shaped legs

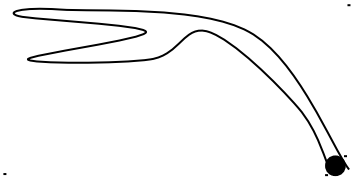


Joint



Separate

Branching structures



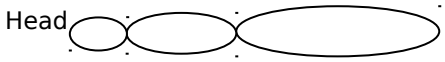
DESCRIPTIONS OF ANIMALS

An example of reconstructing shapes using description is as follows:

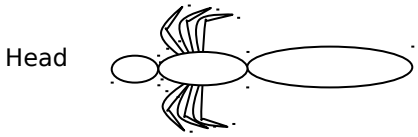
1.

- Attach three ovals (O3, O4 and O6) on the high curvature side in increasing order of size.

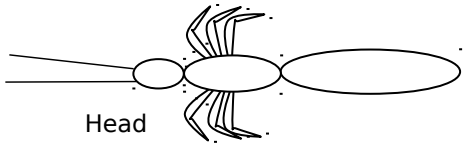
- Label the smallest oval shape as head (anterior end).



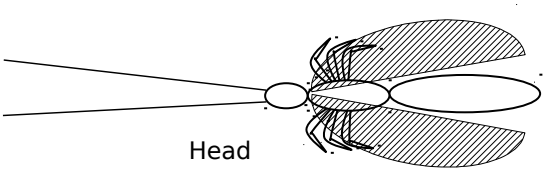
- Draw the separate L-shapes on the both sides of middle oval.



- Draw two straight long lines from head to represent antennae.



- Draw two lined semi-circles along the middle and last oval attaching one end near the junction of anterior and middle one.



2.

- Use a plain semi-circle without dots.
- Draw a rectangle (LR) joined to the flat side of the semi-circle making sure the size of the shorter side of rectangle and semi-circle is same.
- Label semi-circle as head (anterior end) and the other end as tail (posterior end).
- Each of smaller rectangles in LR represent a segment.
- Draw 2 small L shapes on either side for each segment to represent legs.
- Draw two short lines from the head.

3.

- Draw a long oval (O1).
- Label one end of the oval as head (anterior end) and the other as tail (posterior end).
- Draw a filled rectangle overlapping the body closer to the head making sure the width of rectangle and oval is same.

4.

- Attach three ovals (O2, O3 and O5) on the sharp curvature side in increasing order of size.
- Label the smallest oval shape as head (anterior end).

- Draw separate L-shapes on either side of middle oval.
- Draw two short lines from head (L shaped lines) to represent antennae.

5.
- Draw a medium flattened oval (O4) horizontally.
- Label one of the curved ends as the head (anterior end) and other as the tail.
- Draw the spiral circle on top of the oval slightly towards the posterior end.
- Draw two short lines on the head.
- Draw two longer lines behind the short lines.

6.
- Draw a trapezium with lower side shorter than the upeer side (as shown in the figure).
- Draw a triangle with dot using the longer side of trapezium as base.
- Mark the dotted end as mouth.
- Draw joint L shapes on either side of the trapezium.
- Then draw two branching structures one on each side of the triangle.

➢ Can you guess which animals you recreated on paper?
➢ You can take help of the Biodiversity table (page 9) to identify the organisms you have drawn

(Ant / Cockroach / Crab / Earthworm / Millipede / Snail)

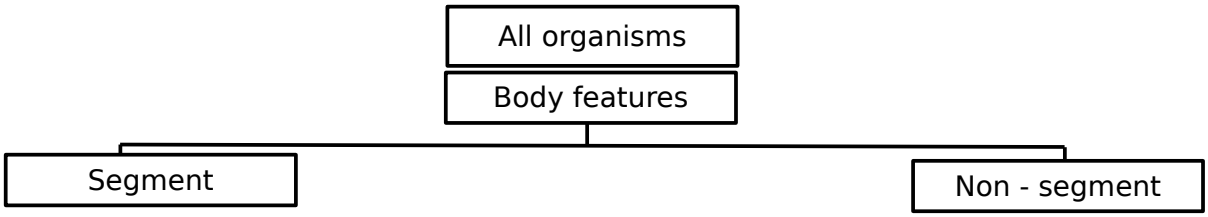
BIODIVERSITY TABLE							
No.	**Animals**	**Body Division**	**Description of body parts**	**Antennae present or absent**	**Body features**	**Wings**	**Legs**
1	Crab	2 parts	Cephalothorax* and abdomen	One pair of antennae present	Segmented	Absent	Five pairs
2	Millipede	2 parts	Head and trunk		Segmented		2 pairs on each segment
3	Cockroach	3 parts	Head, thorax and abdomen		Segmented	Present	
4	Ant		Head, thorax and abdomen		Segmented		
5	Snail	3 parts	Head, visceral mass and foot.	Two pairs of antennae present	Not segmented		Muscular mass called foot present
6	Earthworm	1 part	Body not divided.		Segmented	Absent	Absent

[Ref: Invertebrate Zoology - Jordan and Verma]

***Cephalpthorax – A body part (in some organisms) where head and thorax are fused together.**

Task 3:

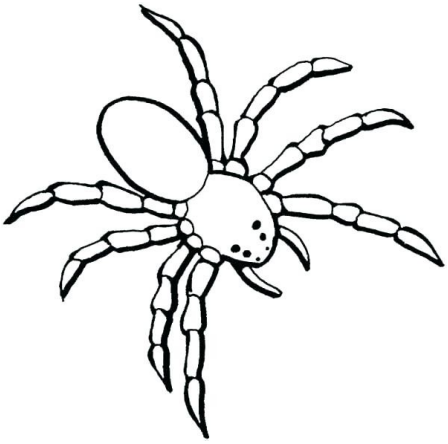
Using the biodiversity table, classify the animals you recreated in Task 2 in your note books. You can start with the “Body Features” criteria first. You can also start the classification tree with a different criteria given in the table.



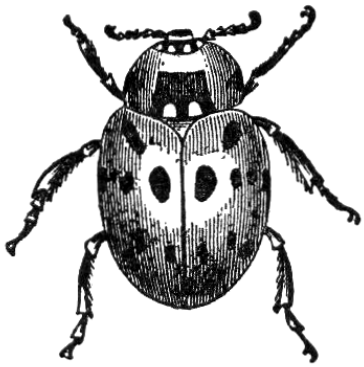
Classify the organisms given below with the help of features given in biodiversity table in your classification tree.

BIODIVERSITY TABLE							
No.	**Animals**	**Body Division**	**Description of body parts**	**Antennae present or absent**	**Body features**	**Wings**	**Legs**
1	Spider	2 parts	Cephalothorax and abdomen	Antennae absent	Segmented	Absent	Four pairs
2	Beetle	3 parts	Head, thorax and abdomen	One pair of antennae present	Segmented	Present	Three pairs
3	Centipede	2 parts	Head and trunk	One pair of antennae present	Segmented	Absent	One pair on every segment

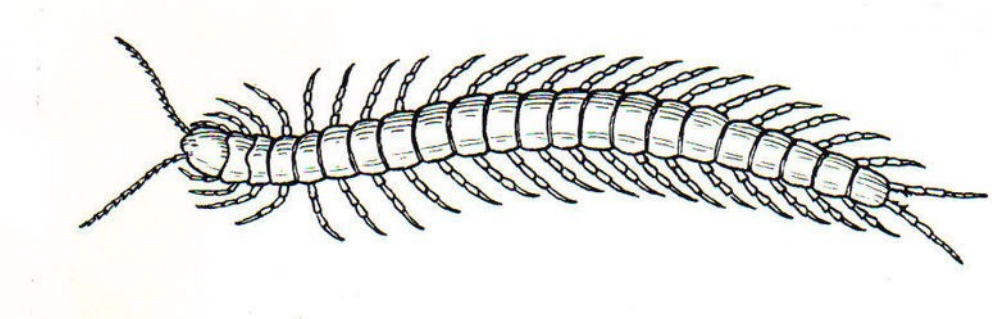
1. Spider



2. Beetle



3. Centipede



Q.3. Did you have to make another branch to classify this three organisms? Did these organisms fit easily in the classification tree?

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Reading:

What you have done is very similar to how Bates and Wallace or another naturalists in 1800s studied animals, plants or insects and classified them.

In the year 1848, Henry Bates and Alfred Wallace from England, started their expedition to the Amazon forest at South America. After 3 years, Wallace returned back to England but Bates continued his exploration. After 11 years in South America, Bates conservatively estimated that he had collected 14,712 animal species (primarily insects) and more than 8,000 of these were new to science. In early 1863, Bates published a book in two parts on his travels in South America - The Naturalist on the River Amazon. This second book was one of the finest scientific travel books of the nineteenth century.

Q.4. Do you think it would have been easy for other explorers to cross check whether an animal species found by them at Amazon was already reported by Bates?

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Q.5. If you see an animal you have never seen before how will you check if it is really 'new' to science? And how will you go about studying?

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Q.6. Why do you think we need classification?

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