

BIODIVERSITY AND CLASSIFICATION

PART A: Biodiversity in your surrounding

Biodiversity comes from two words, biology and diversity. Biological diversity means variety of living organisms found on earth. Different types of organisms are found dwelling 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.

Leena, a class 9 student loves to stroll in the garden next to her house. She likes to look at different birds, insects and observe their behavior. One day, Leena noticed a big rock in the garden. She collected some soil under the rock in a cup and brought them 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 and very closely associated with soil particles. She decided to draw the structures of these animals to understand their basic body structures. For this, she chose some basic shapes like triangles, squares, rectangles, ovals etc. to draw. As for leaves, she noted the different shapes and features of leaves. She was really surprised to see so much of diversity in that small garden.

Task 1:

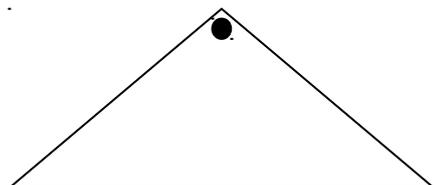
Let us help Leena to complete her work. For animals, she has written basic body structures she was able to observe using the hand lens. We will recreate those organisms using the basic shapes given below by following the body description given by her.

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

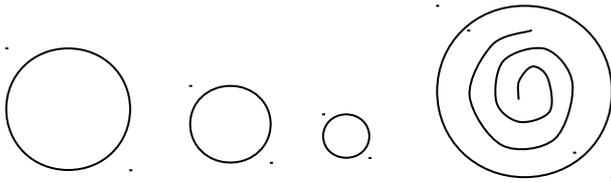
SHAPES FOR RECONSTRUCTING ANIMALS

Triangle

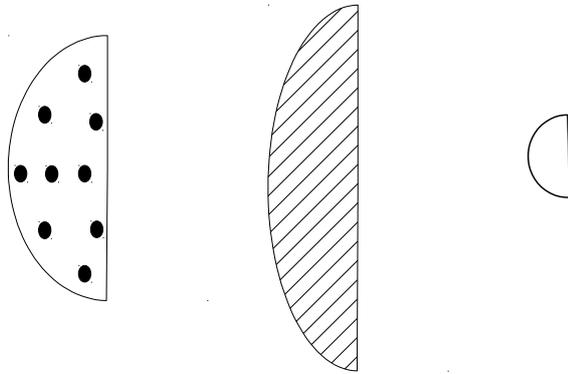


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Circles



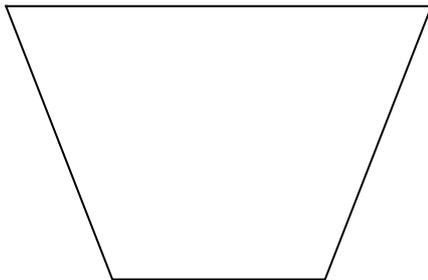
Semicircle



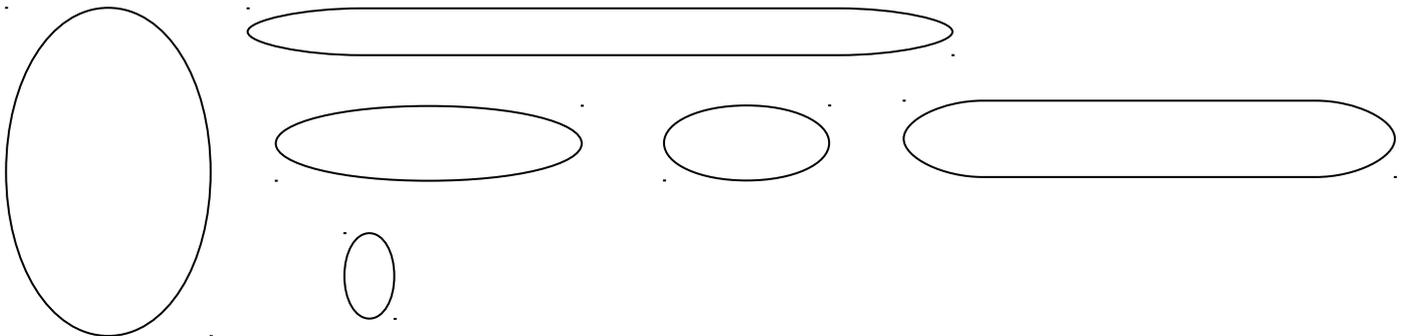
Rectangles



Trapezium



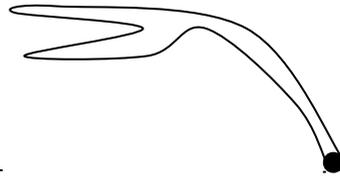
Ovals



L - shaped



Branching structures



DESCRIPTIONS OF ANIMALS

1.

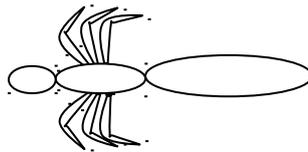
- Attach three oval shapes in increasing order of size.



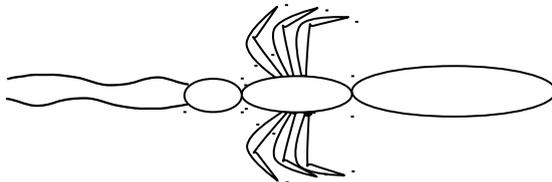
- Label the smallest oval shape as head (anterior end).



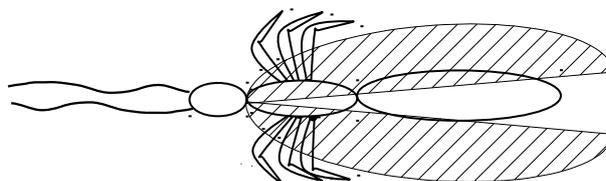
- Draw 3 L-shapes on either side of central oval shape.



- Draw two long lines from head to represent antennae.



- Draw two textured semi circle along the middle and last oval - keep their one end attached to the head, while the other end is slightly shifted outside (Inverted V shape).



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2.

- Attach two oval shapes of different sizes.
- Label the smaller oval shape as head (anterior end).
- Then draw 4 L-shapes on either side at the joint between the two ovals.

3.

- Attach three circular shapes in increasing order of size.
- Label the smallest round shape as head (anterior end).
- Draw 3 small L-shapes on either side of central oval shape.
- Draw two short lines from the head.
- Draw two overlapping dotted semi-circles along the middle and last round shapes - keep their one end attached to the head, while the other end is slightly shifted outside (Inverted V shape).

4.

- Use a semi-circle without dots.
- Draw a long rectangle to the flat side of the semi-circle making sure the size of the rectangle and semi-circle is same.
- Label semi-circle as head (anterior end) and the other end as tail (posterior end).
- Make horizontal lines perpendicular to the length of rectangle from head to tail (the space between two horizontal line is called a segment).
- Draw 2 small L shapes on either side for each segment to represent appendages.
- Draw two short lines from the head.

5.

- Draw a long oval (tube like) shape with pointy ends.
- Label one end of the oval as head (anterior end) and the other as tail (posterior end).
- Make horizontal lines from head to tail perpendicular to the length of the oval.
- Draw a filled rectangle on the body closer to the head making sure the size of rectangle and oval is same.

6.

- Attach three oval shapes in increasing order of size.
- Label the smallest oval shape as head (anterior end).
- Draw 3 L-shapes on either side of central oval shape.
- Draw two short lines from head (L shaped lines).

7.

- Draw a semi-circle without dots.
- Then draw a long rectangle to the flat side of the semi-circle making sure the size of the rectangle and semi-circle is same.
- Label semi-circle as head (anterior end) and the other end as tail (posterior end).

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- Make about ten equidistant horizontal lines from head to tail perpendicular to the length (Space between two horizontal lines is called a segment.)
- Draw one small L- shape on either side for each segment.
- Draw two short lines from head.

8.

- Draw a medium oval shape horizontally.
- Label one end as the head (anterior end) on the horizontal plane.
- Draw a round shape with spiral marking on the oval slightly towards the posterior end.
- Draw two short lines and two longer lines on the head.

9.

- Draw a triangle with a dot.
 - Mark the dotted end as mouth.
 - Draw a trapezium to the base of the triangle such that sides of equal length touch each other (lower base of trapezium should shorter than side touching the triangle)
 - Draw four L shapes on either side.
 - Then draw two branching structures one on each side of the head.
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- 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 / Beetle / Earthworm / Millipede / Centipede / Snail / Spider

PART B: Classification

What do you understand by the term 'Classification'?

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 two-volume narrative of his travels in South America - The Naturalist on the River Amazon. This splendid work was one of the finest scientific travel books of the nineteenth century.

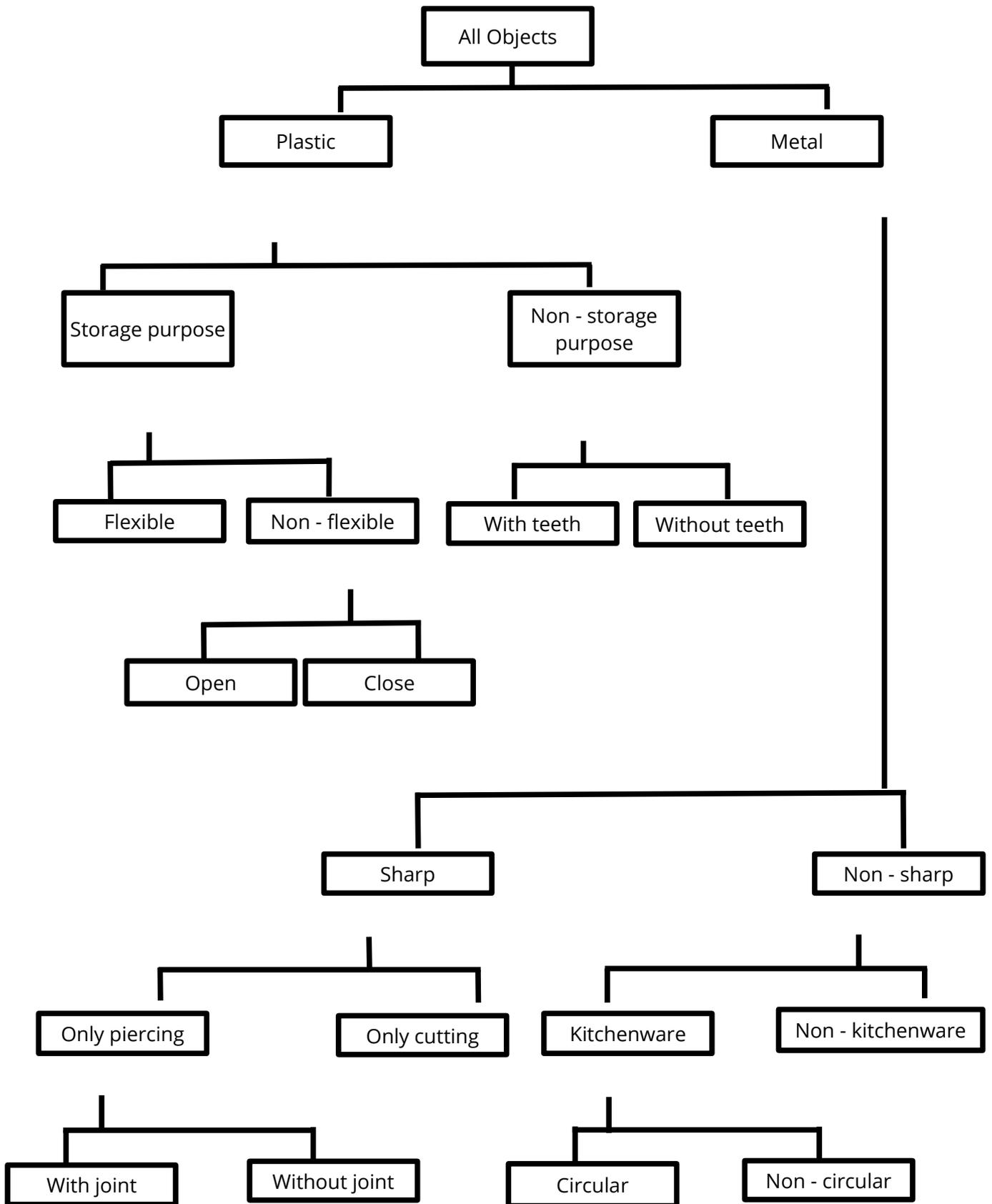
Do you think it would have been easy for other explorers to cross check whether a animal species found by them at Amazon was already reported by Bates?

Why do you think we need classification?

Task 2.a:

Complete the classification table by sorting the objects mentioned below.

- | | |
|----------------|------------------|
| 1. Plastic bag | 9. Nail |
| 2. Steel plate | 10. Mobile cover |
| 3. Plastic mug | 11. Water bottle |
| 4. Comb | |
| 5. Safety pin | |
| 6. Spoon | |
| 7. Key | |
| 8. Scissors | |

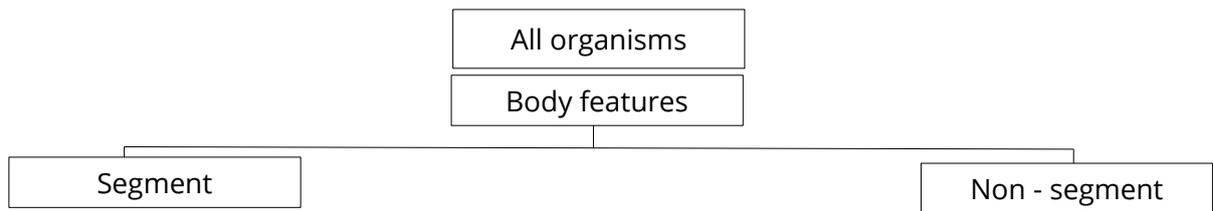


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Instead of first grouping the objects by material (plastic or metal), what would happen if we use any other criteria first? Try making such a tree. Do you think this classification is more useful? Why?

Task 2.b:

Try to classify the animals that you recreated in Task 1 using any of the criteria given in the table.



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| No. | Animals | Body Division | Description of body parts | Antennae present or absent | Body features | Covering on body | Wings | Legs |
|-----|-----------|---------------|-------------------------------|-------------------------------|---------------|------------------|---------|-----------------------------------|
| 1 | Crab | 2 parts | Cephalothorax and abdomen | One pair of antennae present | Segmented | Hard shell | Absent | Five pairs |
| 2 | Millipede | 2 parts | Head and trunk | | Segmented | Chitinous | | 2 pairs on each segment |
| 3 | Cockroach | 3 parts | Head, thorax and abdomen | | Segmented | Chitinous | Present | |
| 4 | Ant | | Head, thorax and abdomen | | Segmented | Chitinous | | |
| 5 | Spider | | Cephalothorax and abdomen | Antennae absent | Segmented | Chitinous | Absent | |
| 6 | Earthworm | 1 part | Body not divided. | | Segmented | Mucilagenous | Absent | Absent |
| 7 | Snail | 3 parts | Head, visceral mass and foot. | Two pairs of antennae present | Not segmented | Hard shell | | Muscular mass called foot present |
| 8 | Centipede | | Head and trunk | | Segmented | Chitinous | Absent | |
| 9 | Beetle | | Head, thorax and abdomen | | Segmented | Chitinous | | |

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| No. | Animals | Body Division | Description of body parts | Antennae present or absent | Body features | Covering on body | Wings | Legs |
|-----|-----------|---------------|---------------------------|----------------------------|---------------|------------------|---------|-----------------------------------|
| 1 | Land slug | 3 parts | Head, mantle and foot. | | Not segmented | No hard cover | Absent | Muscular mass called foot present |
| 2 | Termite | 3 parts | Head, thorax and abdomen | | Segmented | Chitinous | Present | |
| 3 | Roundworm | 1 part | Body not divided. | Antennae absent | Not segmented | Mucilagenous | | |

[Ref: Invertebrate Zoology - Jordan and Verma]

Cephalon: Head region

Thorax: Region between head and abdomen, comparable to chest in humans.

Visceral mass: Body mass that holds the bulk of the digestive, reproductive, excretory, and respiratory systems.

Chitinous: Made up of organic substance 'chitin'.

Mucilaginous: Viscous fluid secretion.