

PREFACE

Grade 10 Biology guides students and encourages them to study fundamental life science dealing with microorganisms, plants and animals including humans. Students will learn that Biology deals with the study of all living organisms that live or have ever lived on the earth.

Each chapter in this book begins with learning outcomes and ends with chapter concept map. The learning outcomes of the chapters are more or less in sequence and are explained in straight forward language. Photographs and full-colour illustrations are provided to support the text, with annotations to elaborate the context and functions. Review questions at the end of each chapter will definitely aid students to review and assess their ability of attaining knowledge. Scientific terms in Biology are explained thoroughly in this text. Most of the terms are given in the glossary. References are also provided for further reading to gain more knowledge.

Studying this book will result in students gaining much knowledge on Biology and able to do critical thinking, reasoning and analyzing logically. It is hoped that students will be able to participate successfully in 21st century learning based on the skills through the 5 C's:

Collaboration – in lessons, students will be learning to work in groups, share ideas with their classmates and find out the solutions together

Communication – students will develop verbal and non-verbal communication skills in group works

Critical thinking and Problem solving – students will be given interesting problems to solve – finding and explaining solutions, looking for errors

Creativity and Innovation – thinking ‘outside the box’ is an important 21st century skill. Students will be encouraged to explore new ideas and solve problems in new ways

Citizenship – students will join the school community and develop fairness and conflict resolution skills.

The contents in the textbook include Chapter 1: Introduction to Biology, Chapter 2: Cell Structure and Organization, Chapter 3: Support and Locomotion, Chapter 4: A Body System to Sustain Life and Chapter 5: Continuation of Life.

After the completion of Grade 10, students will be able to describe the context in this text conceptually, explain the importance of life processes, discuss the inheritance of new generations and be able to carry out all types of experiments skillfully in the laboratory.

PRACTICAL 1

OBSERVING ORGANISMS BY USING MICROSCOPE

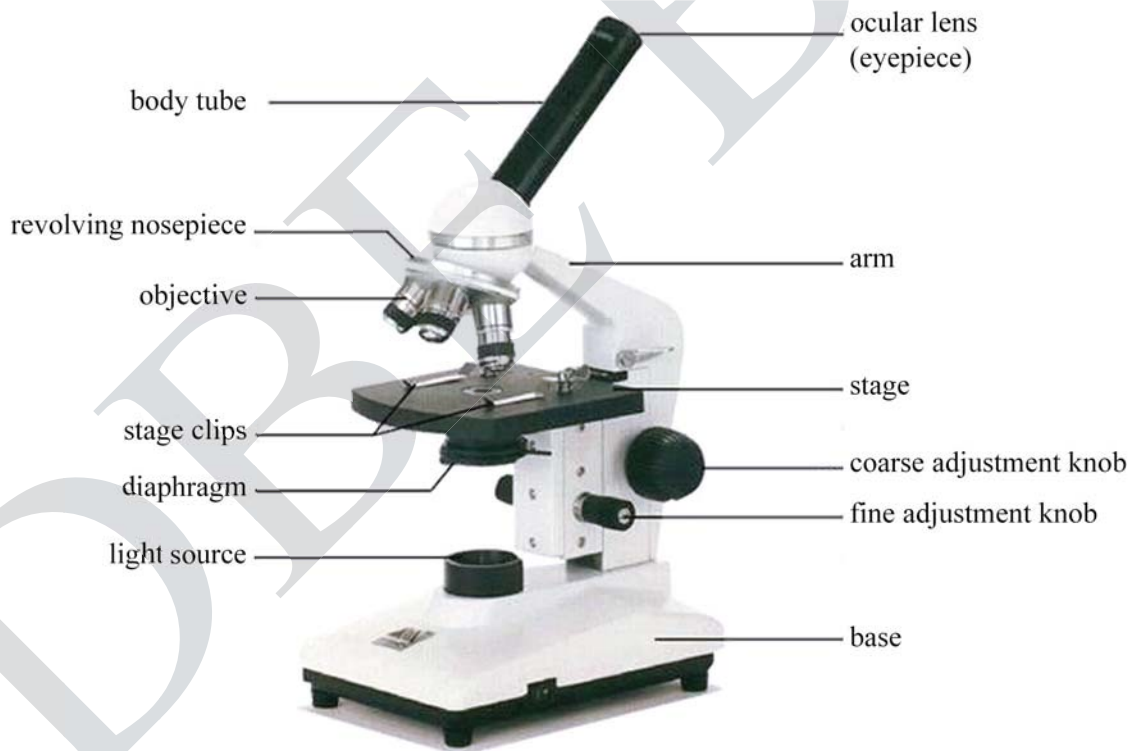
Activity (1) Study the structure of a light microscope

Objectives : To know the parts of the light microscope and their functions
To learn how to use the microscope

Practical outcomes : The student will be able to:
- describe the parts of the microscope
- explain the function of each part of the microscope

Materials required : (1) Microscope
(2) Notebook
(3) Pencil or ball pen

Introduction : A microscope is an instrument used to see various objects that are too small to be seen by the naked eye. Microscopy is the science of investigating small objects and structures.



Compound light microscope



Dissecting microscope

Functions of the parts of a microscope:

No.	Parts	Functions
1.	Base	Supports the upright pillar.
2.	Arm	Supports the stage and the body tube.
3.	Coarse adjustment	Permits rapid raising or lowering of the body tube.
4.	Fine adjustment	Makes finer adjustment of the position of the body tube.
5.	Body tube	Holds the revolving nosepiece on the lower end.
6.	Low power objective	Usually marked (4X), attached to the revolving nosepiece.
7.	Middle power objective	Usually marked (10X), attached to the revolving nosepiece.
8.	High power objective	Usually marked (40X), attached to the revolving nosepiece.
9.	Eyepiece	Usually marked (10X), fits loosely into the upper end of the body tube.
10.	Stage clips	Hold the slide in place.
11.	Diaphragm	Regulates the amount of light passing through, attached to the underside of the stage.
12.	Mirror	Reflects the passing light.
13.	Stage	Presence of a hole in the centre, the slide or object to be viewed is placed on it.

A summary for using a compound light microscope

1. Place the slide with specimen on the microscope's stage.
2. Rotate the lowest power objective into place. Center the specimen below the objective.
3. Look through the eyepiece while using the coarse adjustment to focus on the specimen. Center the area of the specimen that you want to examine.
4. Next, slowly rotate the high power objective into place. Look through the objective while you use the fine adjustment to focus on the specimen.
5. If your specimen moves out of focus when you switch from low power to high power, retrace the previous steps, paying special attention to keep the specimen in the center of the field of vision.

Procedures :

Step 1. Observe the parts of a microscope.

Step 2. Write the labels in the given diagram of a microscope.



Caption. _____

- | | |
|----------|-----------|
| 1. _____ | 7. _____ |
| 2. _____ | 8. _____ |
| 3. _____ | 9. _____ |
| 4. _____ | 10. _____ |
| 5. _____ | 11. _____ |
| 6. _____ | 12. _____ |

Activity (2) Study the magnification of an object by using the microscope

Objective : To know how to calculate magnification of an object

Practical outcome : The student will be able to:
- calculate the magnification of the specimen by using a microscope

Materials required : (1) Microscope
(2) Pencil or ball pen
(3) Specimen
(4) A figure or a photograph of an animal or a plant

Procedures : Step 1. Observe the specimen using a microscope (use an available microscopic specimen to study under microscopic magnification).
Step 2. Calculate the magnification of the given specimen under objectives of different power.
Step 3. Fill the correct answer in the blanks in the table given below.



Cycloid (100X) Nga-Be-Phyu



Ctenoid (40X) Nga-Phal

Examples of fish scales for use as specimens

Magnification = Eyepiece x Objective

Eyepiece	Objective	Magnification
10X	4X	?
?	10X	100X
10X	?	400X
10X	100X	?

Exercises

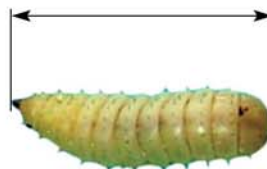
1. Calculate the magnification for the figure of a fish by using the given formula. Measure the length of the fish in the figure. The real fish was 40 cm long. (Any real specimen can be used.)

$$\text{magnification} = \frac{\text{size of drawing}}{\text{size of real object}} = ?$$



The figure is times smaller than the real object.

2. Calculate the magnification for the figure of a maggot by using the given formula. Measure the length of the maggot in the figure. The real maggot was 0.5 cm long. (Any real specimen can be used.)

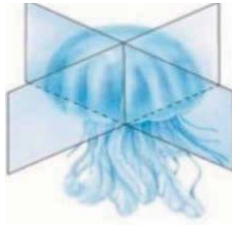


Calculation result shows the figure is times bigger than the real object.

3. State the appropriate types of the symmetry for the following animals.
Examples,



Asymmetry



Radial symmetry



Bilateral symmetry



A. _____



B. _____



C. _____



D. _____



E. _____



F. _____



G. _____



H. _____



I. _____

PRACTICAL 2

STRUCTURES OF FUNGI AND PLANTAE

Activity (1) Structure of fungi (*Rhizopus* and Mushroom)

Objective : To be familiar with the microscopic structure of the fungi and visual structure of the Mushroom

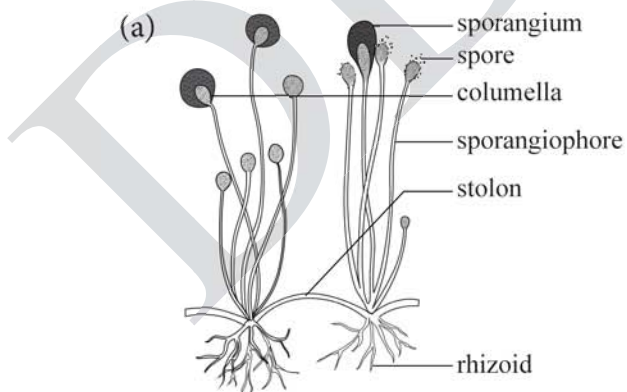
Practical outcome : The student will be able to familiar microscopic structure of fungi

Materials required : Microscope, slide, coverslip, petridish, needle, forceps, fresh specimens of fungi (*Rhizopus* and Mushroom), practical notebook, pencil or ballpen

Introduction : Microscopic fungi (*Rhizopus*) - The plant body of *Rhizopus* consists of fine thread-like hyphae. They intertwine to form a dense white mass, the mature mycelium, is differentiated into three types of hyphae; stolon, rhizoid and sporangiophore.

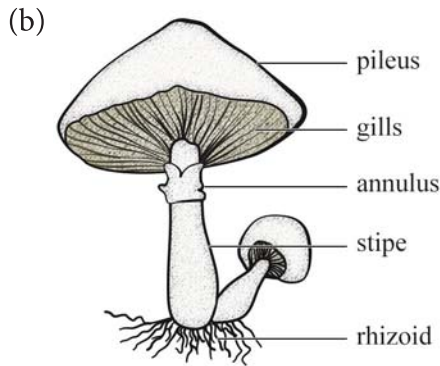
Visual fungi (Mushroom) - Mushroom consists of three components: the visible fruiting body, which grows above ground, a web hidden in the soil (mycelium) and the fungal filaments (hyphae). The fruiting body growing over ground consists of cap and stipe. The bottom of the cap is covered with fine gills or tubes. They contain the Mushroom's reproductive organs, the spores, which can only be seen under the microscope.

- Procedures :**
- (1) Study about the nature of *Rhizopus* and Mushroom from introduction and given diagrams.
 - (2) Observe the specimen of *Rhizopus* (bread mould) under the dissecting microscope and fresh specimen of Mushroom.
 - (3) Draw and label the diagram as given.
 - (4) Write the observation and conclusion.



Structure of *Rhizopus*





Structure of Mushroom



Observations : _____

Conclusion : _____

Activity (2) Hierarchical classification scheme of mango

Objective : To study the sequences of hierarchical classification scheme of mango

Practical outcome : The student will be able to know the sequences of the hierarchical classification scheme of mango

Materials required : Pencil or ballpen

- Procedures :**
- (1) Study the hierarchical scheme of paddy in Textbook.
 - (2) Observe the following given words.
 - (3) Match the words.
 - (4) Rearrange the sequence as in the given example in Textbook.

Family	: Sapindales	1. _____	:	_____
Division	: <i>Mangifera</i>	2. _____	:	_____
Species	: Plantae	3. _____	:	_____
Kingdom	: Eudicots	4. _____	:	_____
Order	: Anacardiaceae	5. _____	:	_____
Genus	: Magnoliidae	6. _____	:	_____
Class	: <i>Mangifera indica</i>	7. _____	:	_____

Activity (3) Kingdom Plantae

Objective : To understand the divisions of the Kingdom Plantae and its groups

Practical outcome : The student will be able to understand the divisions of the Kingdom Plantae and its groups

Materials required : Pencil or ballpen

Introduction : There are five divisions in the Kingdom Plantae: Thallophyta, Bryophyta, Pteridophyta, Gymnospermae and Angiospermae. Among them, Angiosperm is the flowering plants and the rest divisions are the non-flowering plants.

- Procedures :**
- (1) Observe the plants around your school campus.
 - (2) Name the kingdom of plants you observed.
 - (3) Observe the following given figures of plants.
 - (4) Write down the name of each plant and their divisions.
 - (5) List the flowering plants and non-flowering plants of the given figures.

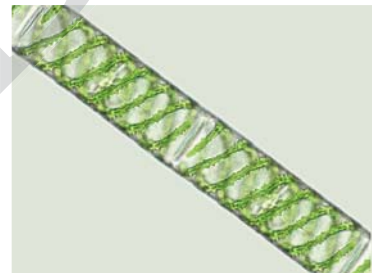
Observations :



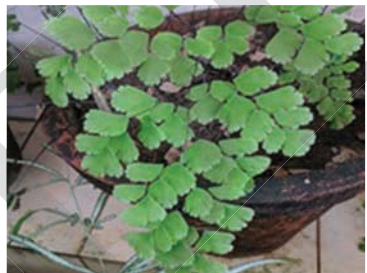
Division _____
Name _____



Division _____
Name _____



Division _____
Name _____



Division _____
Name _____



Division _____
Name _____



Division _____
Name _____

Flowering Plants : _____

Non-flowering Plants : _____

PRACTICAL 3

GROUPING AND CLASSIFICATION OF ANIMALS

Activity (1) Identify invertebrates and vertebrates

Objective : To know invertebrates and vertebrates among given animals

Practical outcome : The student will be able to identify invertebrates and vertebrates visually

Materials required : (1) Notebook
(2) Pencil or ball pen

Introduction : Kingdom Animalia is categorized into invertebrates (animals without a backbone) and vertebrates (animals with a backbone).

Procedures :
Step 1. Observe the animals around your school campus.
Step 2. List the animals you observed.
Step 3. Sort out the animals into invertebrates and vertebrates.
Step 4. List invertebrates and vertebrates in a separate column.

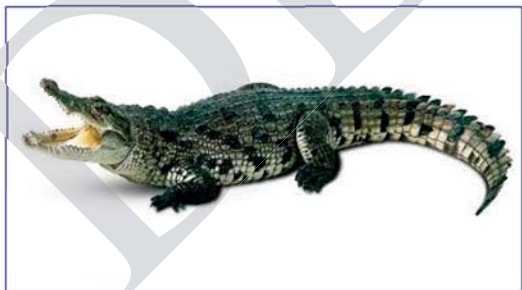
Activity (2) Write down the Phylum of the listed animals in activity (1).
If these samples are unavailable around your school campus, go to activity (3) and (4).

OR

Activity (3) Identify invertebrates and vertebrates from the following diagrams.

Procedures :
Step 1. Observe the figures of the animals given.
Step 2. List the animals you observed.
Step 3. Sort out the animals into invertebrates and vertebrates.
Step 4. List invertebrates and vertebrates in a separate column.

Activity (4) Write down the Phylum of the listed animals in activity (3).



(A)



(B)



(C)



(D)



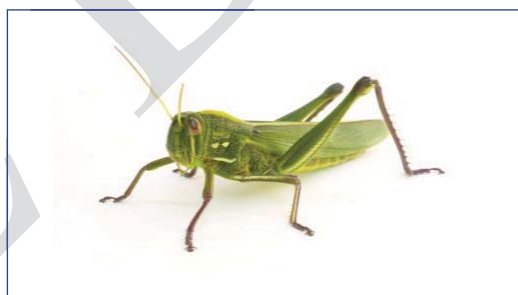
(E)



(F)



(G)



(H)



(I)



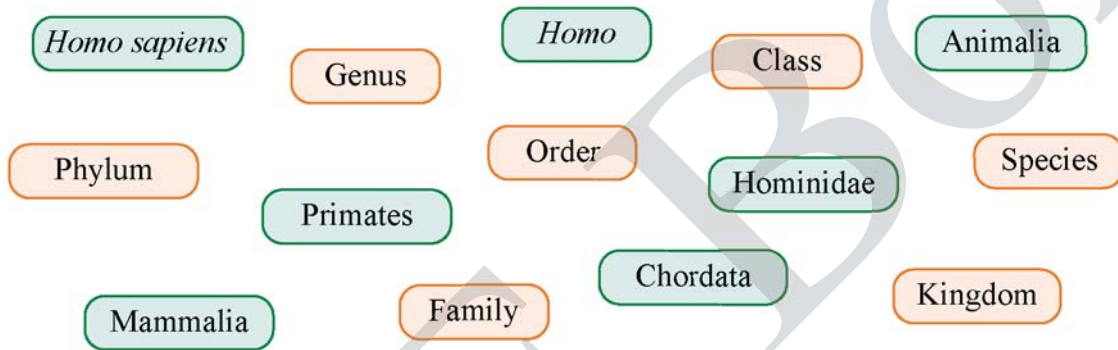
(J)

Activity (5) Arrange the systematic position of Human in sequences

Objective : To know the systematic position of Human

Practical outcome : The student will be able to state the systematic position of Human

- Procedures :**
- Step 1. Observe the cards given by your teacher.
 - Step 2. Arrange the systematic position of Human using the cards.
 - Step 3. Stick the cards on board in a correct arrangement.
 - Step 4. Check and rearrange if it is needed.
 - Step 5. Discuss with your friends.



Eg.

1.	-----	-----
2.	-----	-----
3.	-----	-----
4.	-----	-----
5.	-----	-----
6.	-----	-----
7.	-----	-----

Exercises

1. Match items in column ‘A’ and column ‘B’.

Column A

1. Histology
2. Embryology
3. Ecology

4. Cytology
5. Biodiversity
6. Taxonomy

7. Physiology
8. Microbiology
9. Molecular Biology

10. Anatomy
11. Genetics
12. Biotechnology

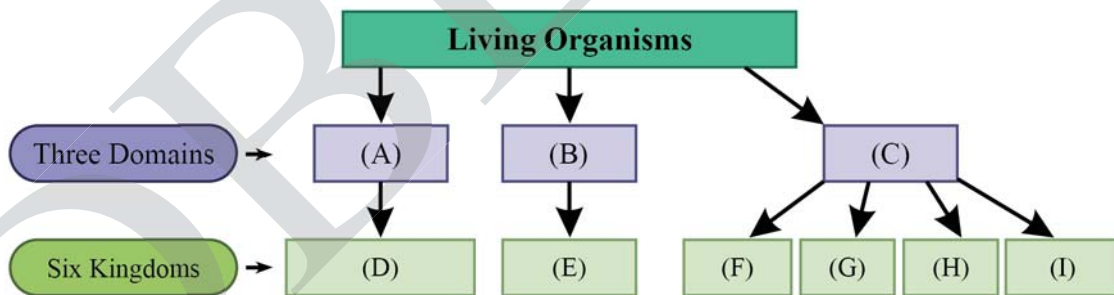
Column B

- a. Study of cells
- b. Study of classification of organisms
- c. Study of living processes or functions of the various parts of organisms
- d. Study of heredity and variations
- e. Study of microscopic structure of tissues
- f. Study of the relationships of organisms to their environments
- g. Study of microscopic organisms
- h. Study of early development of organisms
- i. Study of utilization of living organisms in industrial processes
- j. Study of molecules in organisms
- k. Study of varieties among living organisms
- l. Study of gross internal structures

Answer;

Column A	1	2	3	4	5	6	7	8	9	10	11	12
Column B												

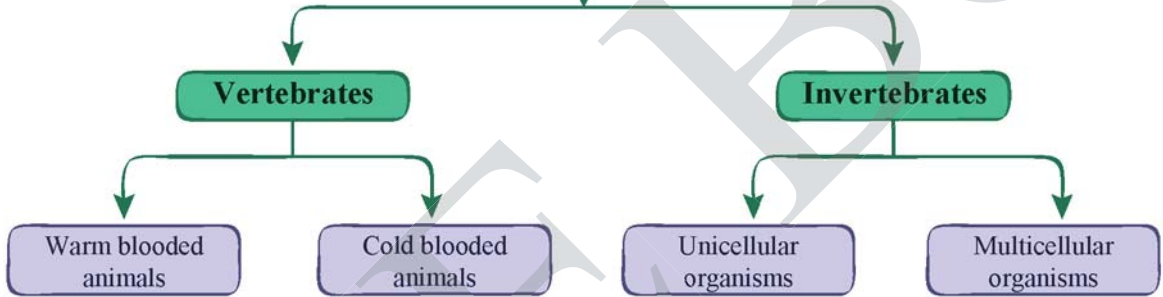
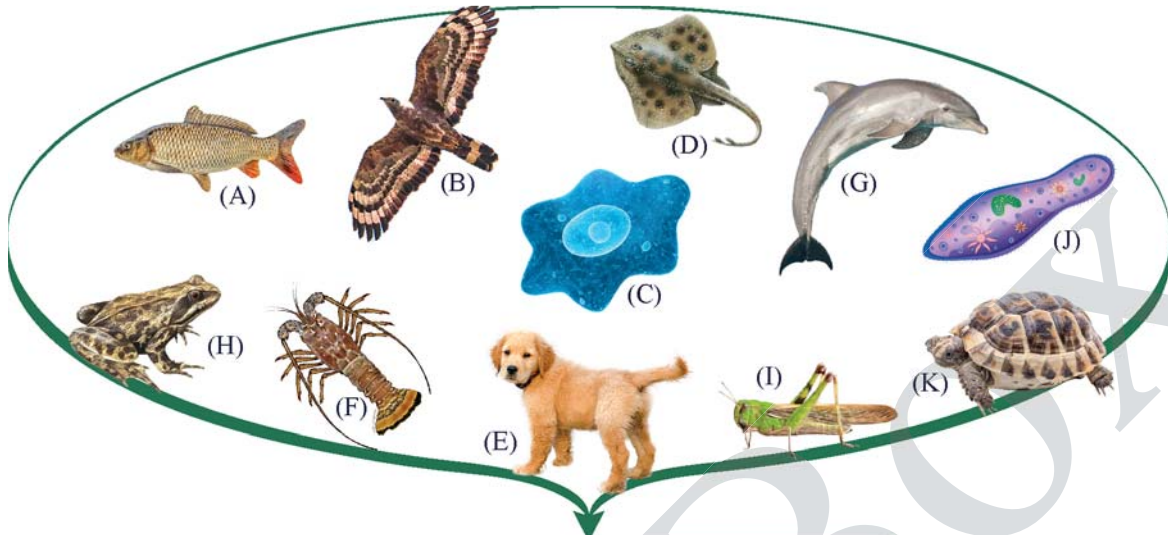
2. Fill in the blanks related to the boxes in the figure.



- A.
- B.
- C.
- D.
- E.

- F.
- G.
- H.
- I.

3. Classify the following vertebrates and invertebrates into suitable groups.



- | | | | |
|---------|---------|---------|---------|
| 1. | 1. | 1. | 1. |
| 2. | 2. | 2. | 2. |
| 3. | 3. | | |
| | 4. | | |

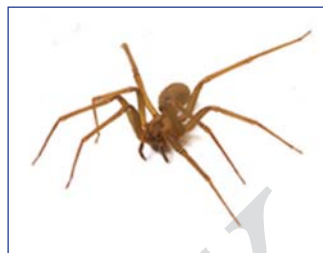
4. Identify the following organisms using the dichotomous tree and the facts given.



(A)



(B)



(C)



(D)



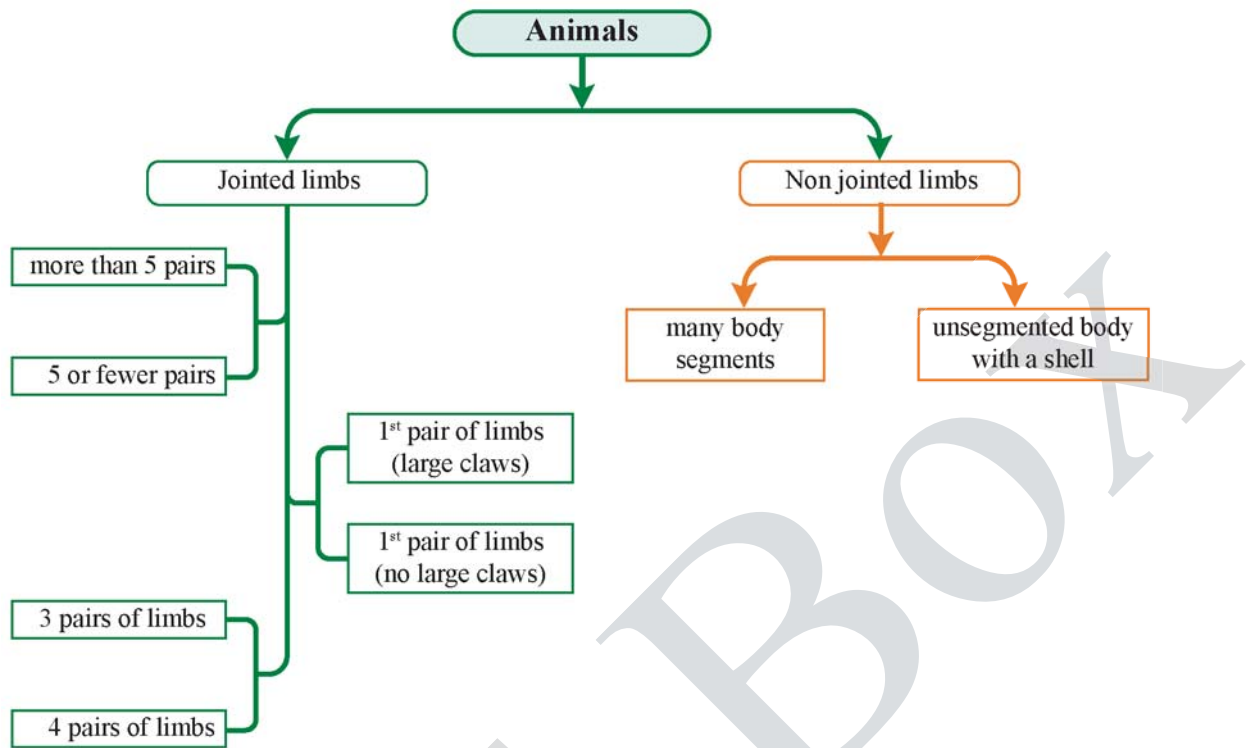
(E)



(F)



(G)



1. Jointed limbs _____
 No jointed limbs _____
2. More than 5 pairs of jointed limbs _____
 5 or fewer pairs of jointed limbs _____
3. First pair of limbs form large claws _____
 No large claws _____
4. 3 pairs of limbs _____
 4 pairs of limbs _____
5. Body of many segments of similar size _____
 Unsegmented body with a shell _____

PRACTICAL 4

OBSERVING PLANT CELLS

Activity - Structures of plant cells

Objectives: To know the structures of the plant cells
To prepare and study the slides of plant cells

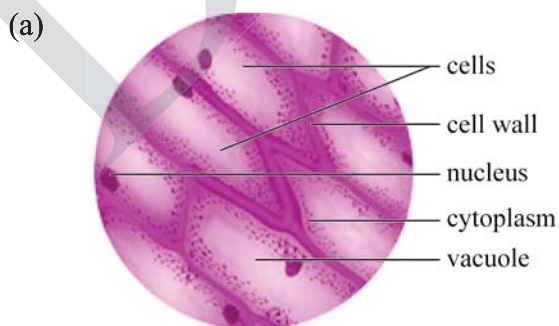
Practical outcomes : The student will be able to know that the different plants generally have the same cell structure

Materials required : Onion bulb, leaf of *Hydrilla* sp., safranin solution, distilled water, filter paper, light microscope, slides, cover slips, scalpel, forceps, dropper, mounting needles

Introduction : Cells are the basic units of living organisms. The living component of a cell is protoplasm, surrounded by a plasma membrane. The protoplasm is made up of cytoplasm and nucleus. The cytoplasm contains organelles such as vacuole, nucleus, mitochondria and chloroplasts.

Procedures :

- (1) About 1cm x 1cm piece of fleshy scale leaf from onion bulb is cut off by using a scalpel.
- (2) An epidermis layer from the fleshy leaf is stripped off by using a pair of forceps.
- (3) The strip of epidermis is mounted on the slide with a drop of water.
- (4) Cover the tissue with a cover slip with the help of a mounting needle.
- (5) A few drops of safranin are dropped at one edge of the cover slip.
- (6) Then a piece of filter paper is placed on the opposite side of the cover slip to draw the safranin solution and also to remove the excess solution.
- (7) Then the specimen on the slide is observed under 10X objective of a light microscope.
- (8) Draw and label the observed specimen as seen under the microscope.
- (9) Prepare another slide of *Hydrilla* sp. by using the same procedure as above. Observe it under a light microscope in a similar way. Draw and label the observed cells.



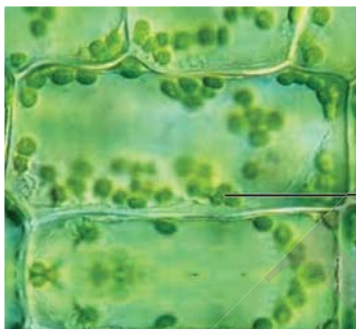
Cells of onion scale leaf



Observations : _____

Conclusion : _____

(b)



chloroplast

Hydrilla cells

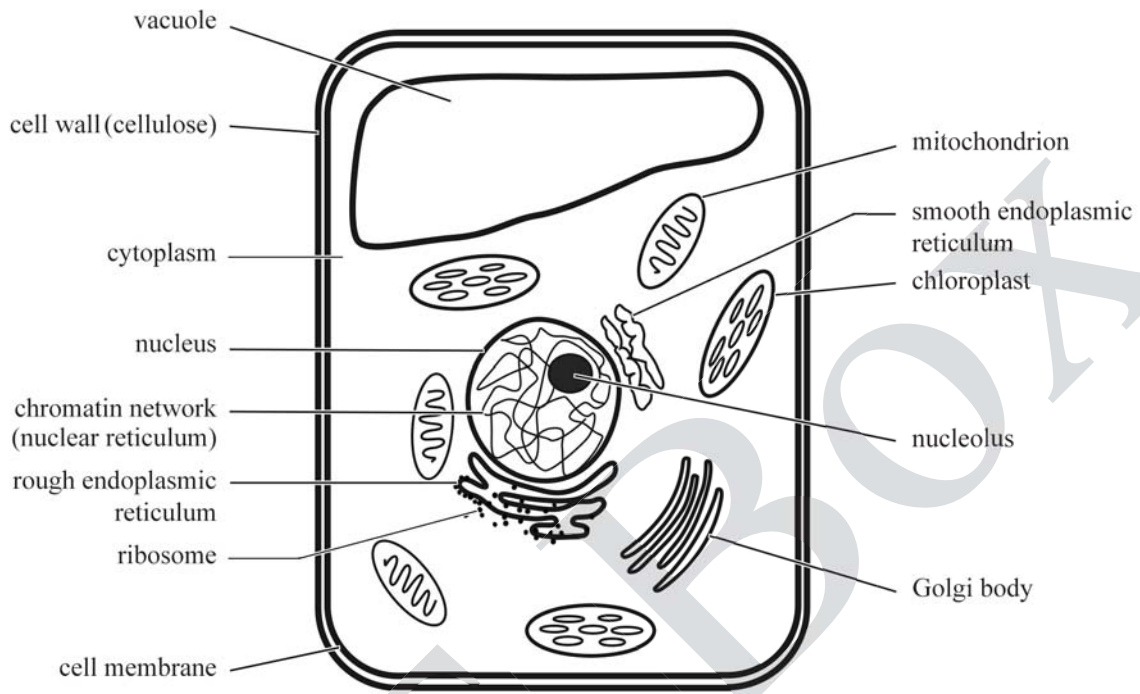


Observations : _____

Conclusion : _____

Exercises

1. Learn the figure of a typical plant cell.

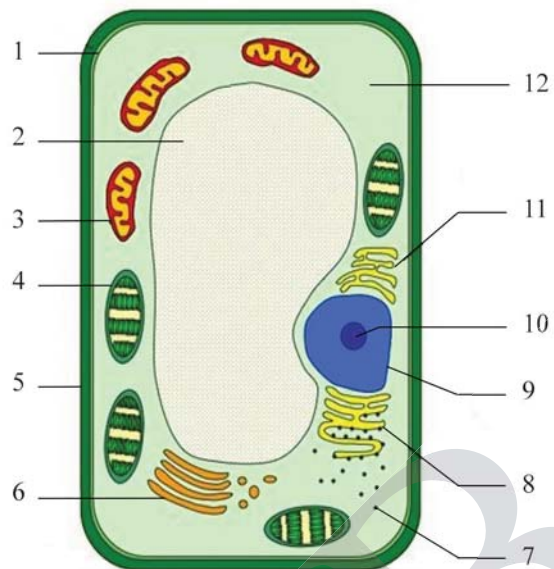


A typical plant cell

2. Draw and label the diagram of a typical plant cell.



3. Fill in the blank with suitable labels according to the numbers.



Caption. _____

- | | |
|----------|-----------|
| 1. _____ | 7. _____ |
| 2. _____ | 8. _____ |
| 3. _____ | 9. _____ |
| 4. _____ | 10. _____ |
| 5. _____ | 11. _____ |
| 6. _____ | 12. _____ |

PRACTICAL 5 OBSERVING THE COMPONENTS IN ANIMAL CELL

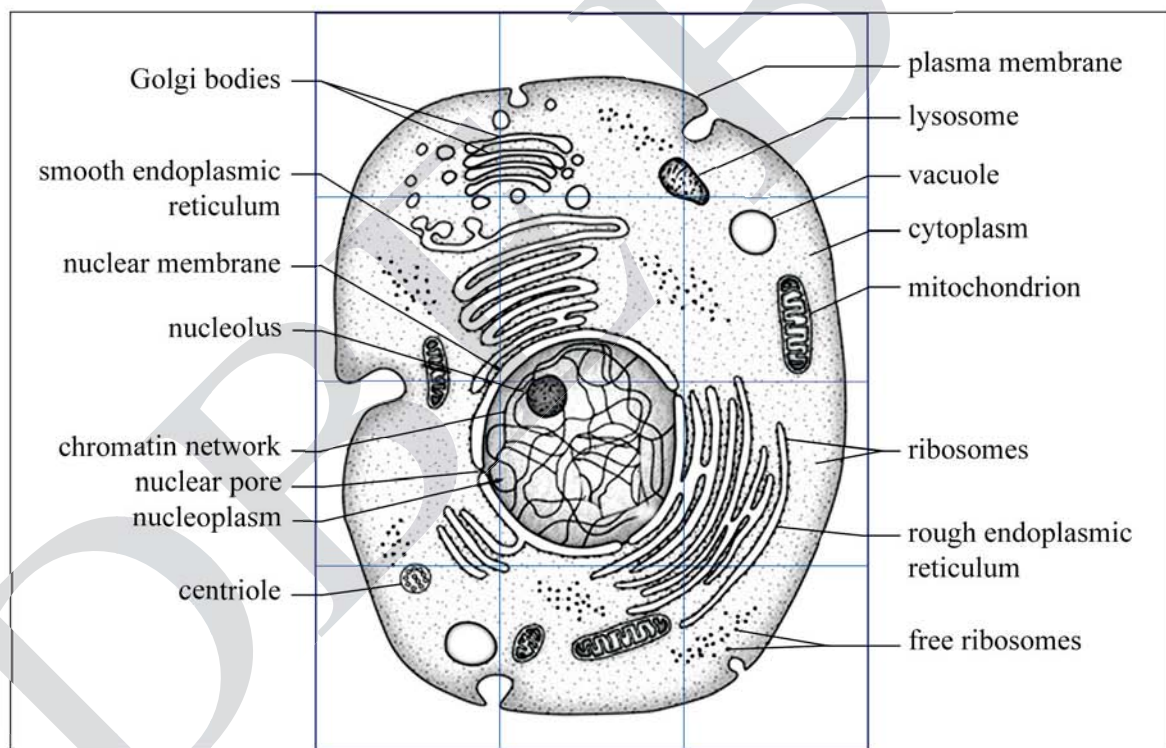
Activity (1) Draw the given diagram and fill the location and function of each component in the table.

Objectives : To know the structure of an animal cell
To know the location and function of each component found in the animal cell

Practical outcome : The student will observe the locations and functions of the organelles in the animal cell

Materials required : (1) Notebook
(2) Pencil or ball pen

Introduction : Cells are the basic structure and functional unit of all living organisms. Cells are made up of a number of different subunits called organelles which are microscopically small.



A typical animal cell

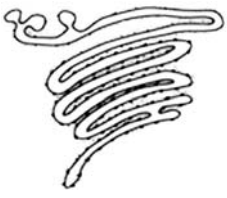







No.	Names of components	Locations	Functions
1.	Cytoplasm		
2.	Nucleus		
3.	Mitochondrion		
4.	Golgi apparatus		
5.	Lysosome		
6.	Centrosome and centrioles		

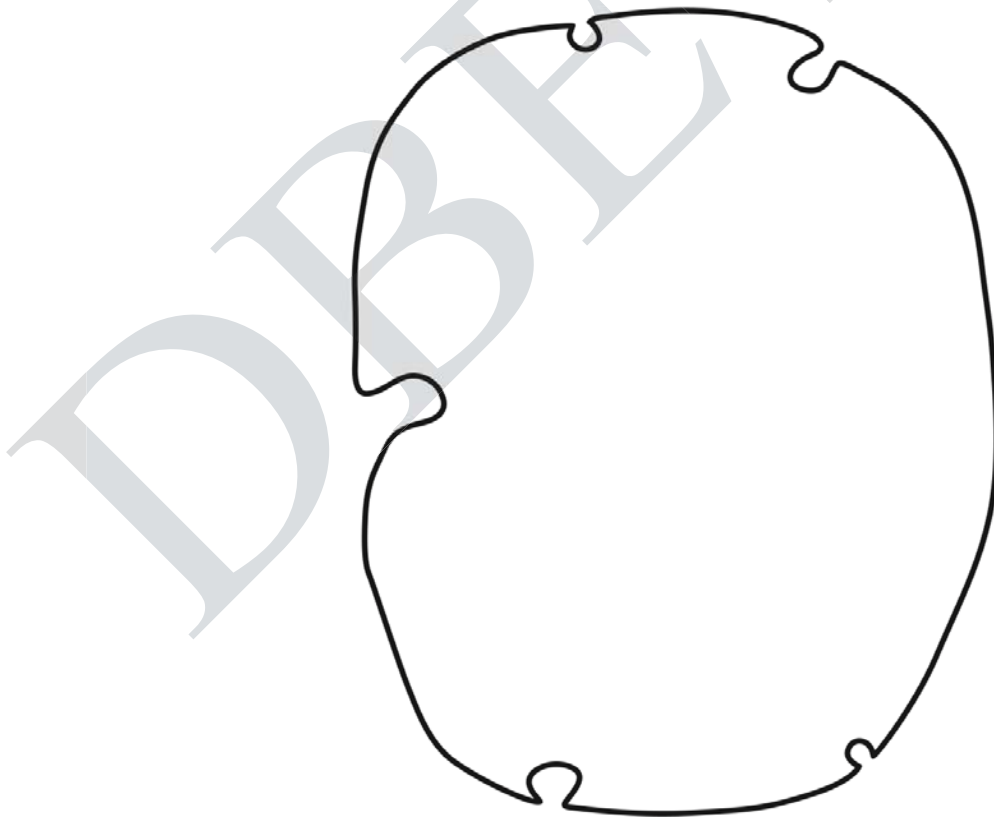
Activity (2) Study the structure of an animal cell

Procedures :

Step 1. Name the given diagrams below.

Step 2. Fill the given organelles in the outline of an animal cell with their respective positions.

			
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-----	-----	-----	-----



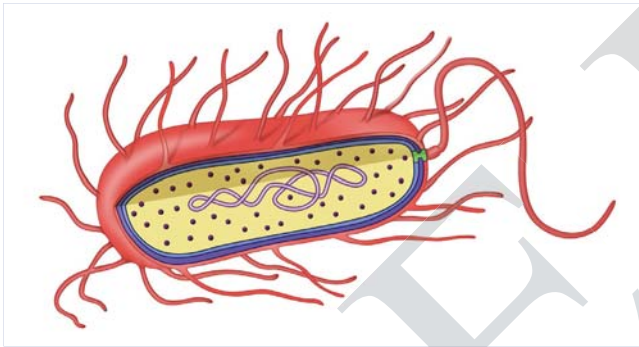
Exercises

1. Complete the following statements with correct words.

- a. The kidneys, which filter toxic waste materials from the blood belong to..... system.
- b. The lungs, which exchange oxygen and carbon dioxide, are parts of..... system.
- c. Endocrine glands secrete hormones, which act as messengers.
- d. The digestive system is composed of the digestive tract, liver, gall bladder and
- e. The heart and blood vessels in the system, transport materials around the body.

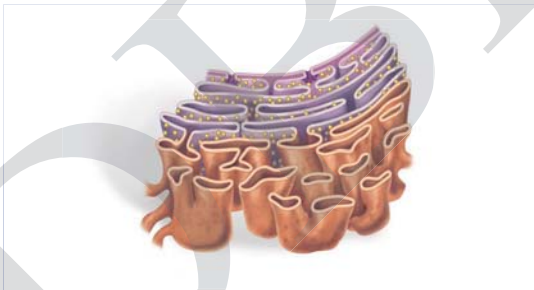
- a.
- b.
- c.
- d.
- e.

2. Name the type of the cell in the given diagram.



.....

3. Identify the given organelles.



A



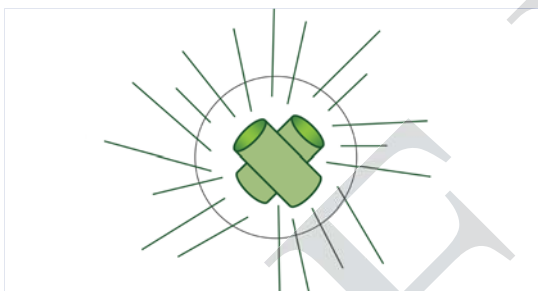
B



C



D



E

DBLEBOX

PRACTICAL 6

OSMOSIS AND TURGOR PRESSURE

Activity - Observation on osmosis and turgor pressure

Objectives : To observe the movement of water in and out of the cells by osmosis
To observe the turgor pressure in the cells and its effect

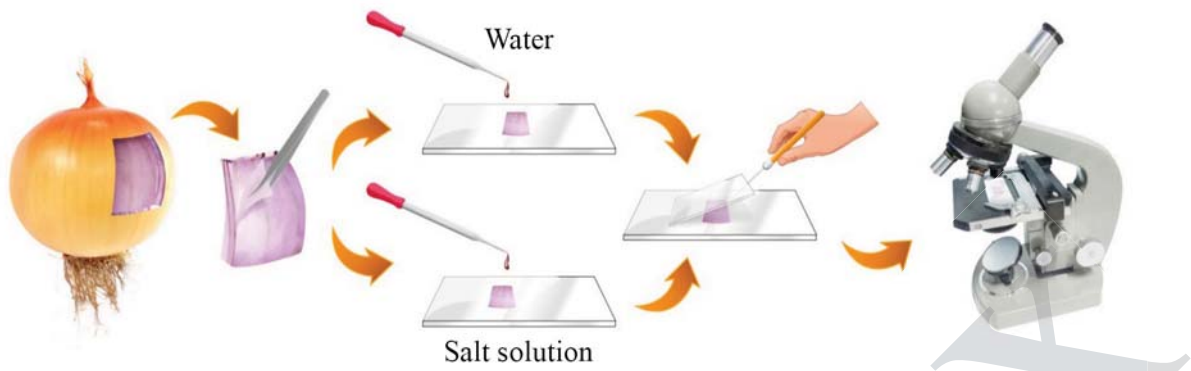
Practical outcome : The student will be able to understand the movement of water in and out of the cells by osmosis

Materials required : Fresh onion, microscope, slide, coverslip, water (H₂O), 2.5% salt solution (NaCl), pipette, forceps and blade, marker pen

Introduction : Osmosis is the movement of water molecules through a semipermeable membrane from a region of low solute concentration to a region of high solute concentration. This phenomenon can be observed under the microscope in living cells. When water moves into a plant cell, the vacuole becomes larger and pushing the cell membrane against the cell wall. This force is called the turgor pressure. Once increase the turgor pressure inside the cell, make the cell firm or turgid. The pressure created by the cell wall stops too much water entering and prevents cell lysis. If plants do not receive enough water, the cells cannot remain turgid and become flaccid and the plant wilts.

Procedures :

1. Peel off the outermost dry scale leaf of the onion.
2. Cut out a small piece of fleshy scale leaf of the onion.
3. Label the two slides: 'water' and 'salt solution'.
4. Use forceps or your finger nails to peel off the outer skin of the fleshy scale leaf.
5. Then put the outer skin on a slide and add a drop of water on it.
6. Gently cover it with the coverslip using a mounting needle.
7. Place the slide onto the stage of the microscope and find a group of cells.
8. Study the cells carefully and watch for the changes in their appearance.
9. Using the same procedure, prepare another slide adding salt solution instead of water.

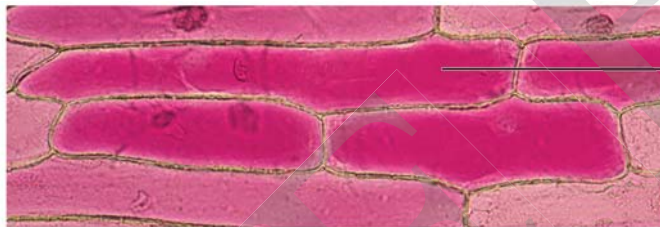


Preparation and investigation of osmosis in fleshy onion cells

Observations : Observe the following diagrams and note down the cell structures.

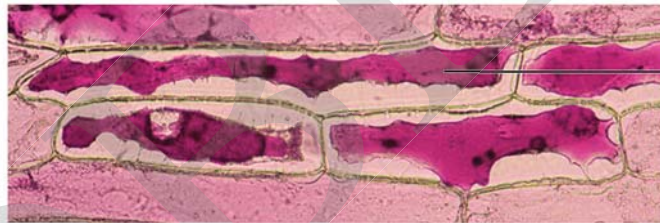
Slide 1-

Slide 2-



Turgid cytoplasm

Slide 1 (Test with water)



Shrinking cytoplasm
(Plasmolysed)

Slide 2 (Test with salt solution)

Conclusions : Slide 1-

.....
.....
.....

Slide 2-

.....
.....
.....

Exercises

1. Plants need turgor pressure to maintain which one of the following?

- (a) nutrients for growth
- (b) the correct amount of solute inside the cell
- (c) rigidity and structure

Answer: _____

2. In plants, turgor pressure is a pressure exerted by water on

- (a) cell membrane
- (b) cell wall
- (c) nuclear membrane

Answer: _____

3. In plant cells, water enters by

- (a) osmosis
- (b) water potential
- (c) turgor

Answer: _____

4. The pressure that builds up in a plant cell due to osmosis and the strength of the cell wall is called

- (a) plasmolysis
- (b) flaccidity
- (c) turgor

Answer: _____

5. When sugar is sprinkled over strawberries, they become juicy and soft. How can we describe the state of their cells?

- (a) flaccid
- (b) turgid
- (c) swollen

Answer: _____

PRACTICAL 7**OBSERVATION AND IDENTIFICATION OF SKELETON IN ANIMALS**

Activity (1) Identify exoskeleton and endoskeleton in animals.

Objective : To differentiate the exoskeleton and the endoskeleton among studied animals

Practical outcome : The student will identify exoskeleton and endoskeleton in animals

Materials required : (1) Notebook
(2) Pencil or ball pen
(3) Gloves
(4) Specimens

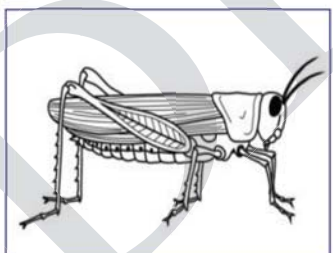
Introduction : An endoskeleton is formed inside the animal's body, while an exoskeleton is formed outside the animal's body. An endoskeleton is usually made of cartilage and bone, while an exoskeleton is often made of chitin and proteins, or calcium carbonate.

Caution : Some insects have poison. Avoid to touch the animal with naked hand and advise to wear gloves.

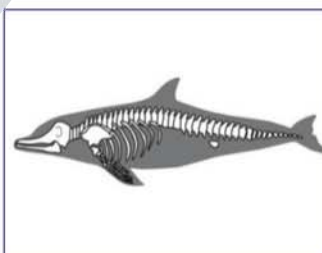
Procedures :
Step 1. Observe the animals around your school campus.
Step 2. List the animals you observed.
Step 3. Sort out the animals that possess the exoskeleton and endoskeleton.
Step 4. List the animals with exoskeleton and endoskeleton with the help of separate column.

If these samples are unavailable around your school campus, go to activity (2).

Activity (2) Select the animals with exoskeleton or endoskeleton in a different column.



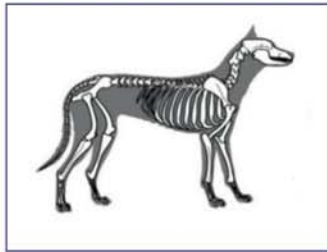
(A)



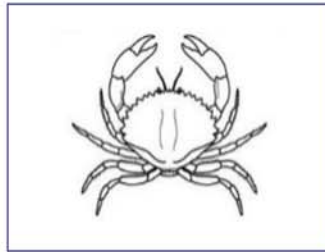
(B)



(C)



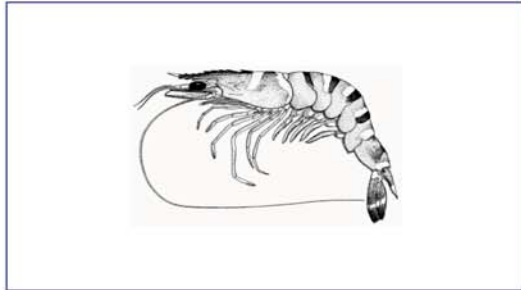
(D)



(E)



(F)



(G)



(H)

Exoskeleton

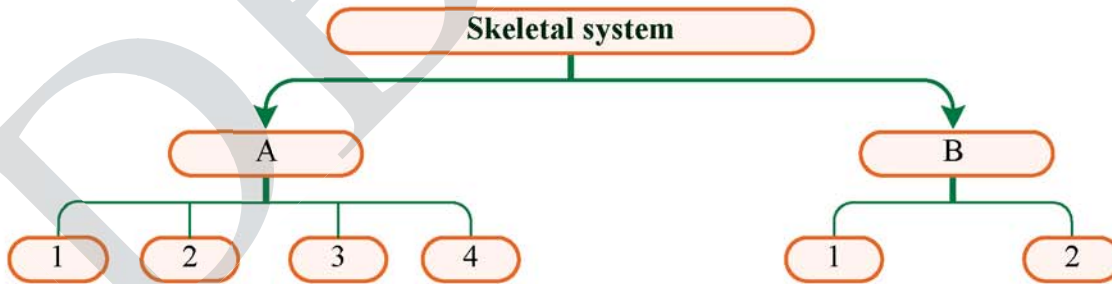
1.
2.
3.
4.

Endoskeleton

1.
2.
3.
4.

Exercises

1. Read the text and fill in the blanks with parts of the skeletal system in human.



- A.
1.
 2.
 3.
 4.

- B.
1.
 2.

2. Distinguish the animals possessing exoskeleton and endoskeleton.



(A)



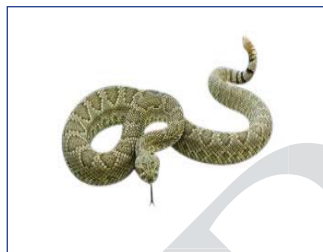
(B)



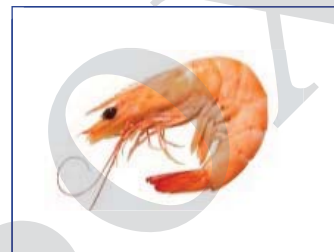
(C)



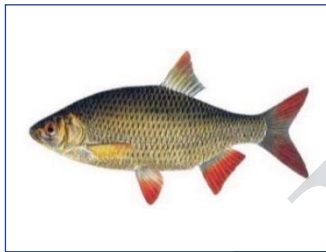
(D)



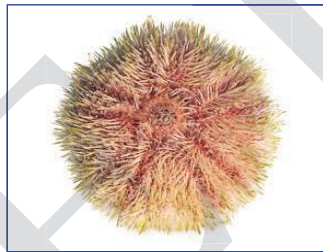
(E)



(F)



(G)



(H)



(I)



(J)



(K)



(L)

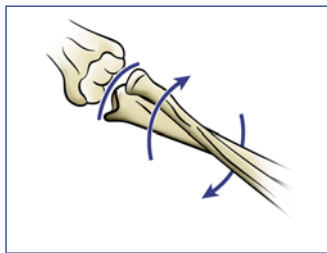
Exoskeleton

1.
2.
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4.
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6.

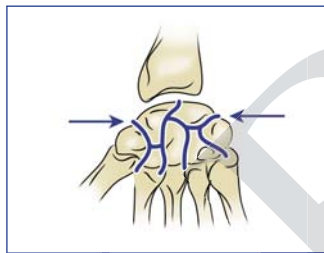
Endoskeleton

1.
2.
3.
4.
5.
6.

3. Observe the figures in the following and name the kinds of synovial joints in human.



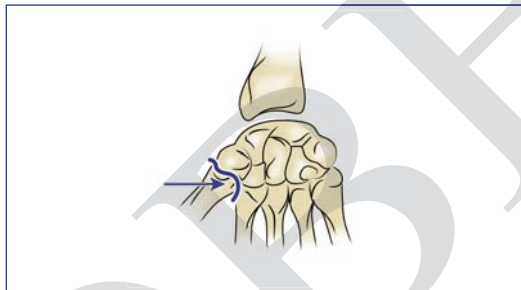
1.



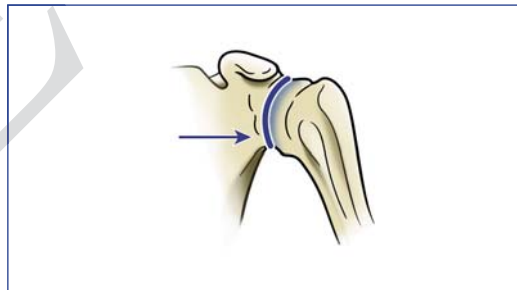
2.



3.



4.



5.

PRACTICAL 8 STARCH TEST

Activity - Starch test in the leaves

Objective : To confirm the presence of starch in the leaves

Practical outcome : The student will be able to identify the presence of starch in the leaves

Materials required :



variegated leaves



tripod stand with
iron gauze



test tube and beaker



spirit lamp
(bunsen burner)



methylated
spirit (alcohol)



iodine
solution







forceps and lighter








Steel holder, glass rod, dropper, brush,
pointer and petri dish

Introduction :

The glucose is manufactured in the green leaves of plants by photosynthesis. It is stored temporarily as starch in the leaves. Starch is the major carbohydrate reserved in tubers (e.g. potato) and seed endosperm (e.g. corn, wheat and rice). In the leaves, the excess glucose is rapidly converted to starch. The iodine test is used to observe the presence of starch. If the starch is present, the leaves turn to blue-black colour. In the absence of starch, the leaves stay on the brown color.

Procedures	Observations	Inferences
<p>1. Take 2-3 variegated leaves from the coleus plant (Ywet-hla)</p>		
<p>2. Boil 100 ml of water in a 250 ml beaker on a tripod stand heated with a bunsen burner</p> <p>Place the variegated leaves into boiling water for a minute by using a forceps</p> <p>Then, remove the bunsen burner from tripod stand and cover the lid to put off a fire</p>		<ul style="list-style-type: none"> - To kill the protoplasm - To prevent further chemical changes - It makes the cells more permeable to iodine solution
<p>3. Take a test tube and transfer a boiled variegated leaf into the bottom of the test tube by a glass rod or a forceps</p> <p>At the same time, the other leaves are taken out from the boiling water, placed them on the petri dish and flatten to see the colour</p>		
<p>4. Pour the methylated spirit into the test tube until the leaf is immersed.</p>		<ul style="list-style-type: none"> - To remove chlorophyll

Procedures	Observations	Inferences
5. Dip the test tube into the beaker containing boiling water until the leaf becomes pale white		<ul style="list-style-type: none"> - The green leaf slowly changes its colour and becomes brittle - The spirit in the test tube turns to green colour
6. Take out the leaf from test tube and rinse the leaf in warm water		<ul style="list-style-type: none"> - The brittle leaf becomes soft when rinse in warm water
7. Spread the leaf inside petri dish by using brush		<ul style="list-style-type: none"> - The soft leaf is easy to spread on the petri dish
8. Add some drops of iodine solution on the spread leaf	 	<ul style="list-style-type: none"> - The leaf portion that contained starch turns to blue-black colour

Observations : _____

Conclusion : _____

Exercises

Multiple choices

1. During photosynthesis, starch is commonly formed and stored in
- (a) animals
 - (b) plants
 - (c) fish

Answer: _____

2. Presence of starch verifies that
- (a) photosynthesis has not taken place
 - (b) it has nothing to do with photosynthesis
 - (c) photosynthesis has taken place

Answer: _____

3. The test for the presence of starch is
- (a) Benedict test
 - (b) Iodine test
 - (c) Biuret test

Answer: _____

4. In the leaves, the starch is rapidly converted from excess
- (a) glucose
 - (b) sucrose
 - (c) fructose

Answer: _____

5. In starch test, methylated spirit is used to
- (a) kill protoplasm
 - (b) become soft leaf
 - (c) remove chlorophyll

Answer: _____

PRACTICAL 9

STUDY OF DIGESTIVE SYSTEM AND TYPES OF TEETH IN VERTEBRATES

Activity (1) Study the structure of the digestive system of a rabbit or a pig foetus.

Objective : To know the parts of the digestive tract

Practical outcome : The student will learn parts of the digestive system

Materials required : (1) Specimen (4) Notebook (7) Gloves
(2) Thread (5) Pencil or ball pen
(3) Label paper (6) Pins or Nails



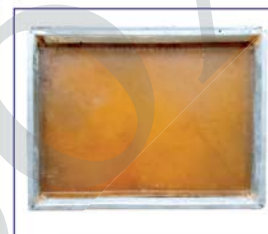
(8) Pointer



(9) Scissors



(10) Forceps



(11) Dissecting tray

Introduction : In vertebrates digestion occurs extracellularly in a digestive tract which starts from a mouth and ends in an anus.

Procedures :

- Step 1. Let the animal lie down in the dissecting tray with the abdominal region exposed upwards.
- Step 2. Pin the hands and legs of the animal with the nails or the pins.
- Step 3. Using the scissors and forceps to cut and open the muscles of the animal from the base of the abdominal region towards the thoracic region.
- Step 4. The muscles should also be pinned outside of the body on the tray to expose the digestive organs clearly.
- Step 5. Observe the parts of the digestive tract in the prepared specimen.
- Step 6. The respective parts of the digestive tract should be labeled using the threads, label papers and pins on the tray.

Activity (2) Study the different types and arrangement of the teeth in human.

Objective : To know the different types and shapes of the teeth

Practical outcome : The student will observe the different types, shapes and positions of the teeth.

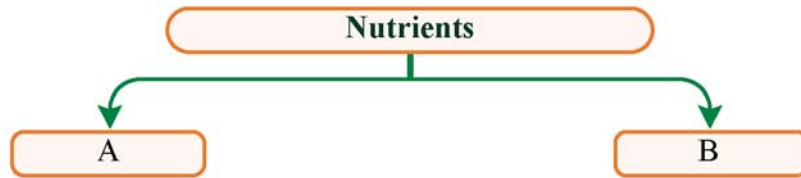
Materials required : (1) Notebook (2) Pencil or ball pen (3) Model

Procedures :

- Step 1. Ask your partner to open his mouth wide.
- Step 2. Observe the different types of teeth.
- Step 3. Write the name, number and shape of the type of teeth you observed.

Exercises

1. Fill in the blanks with appropriate types of nutrient.



A.

B.

2. State the components of the two types of nutrients in animals.

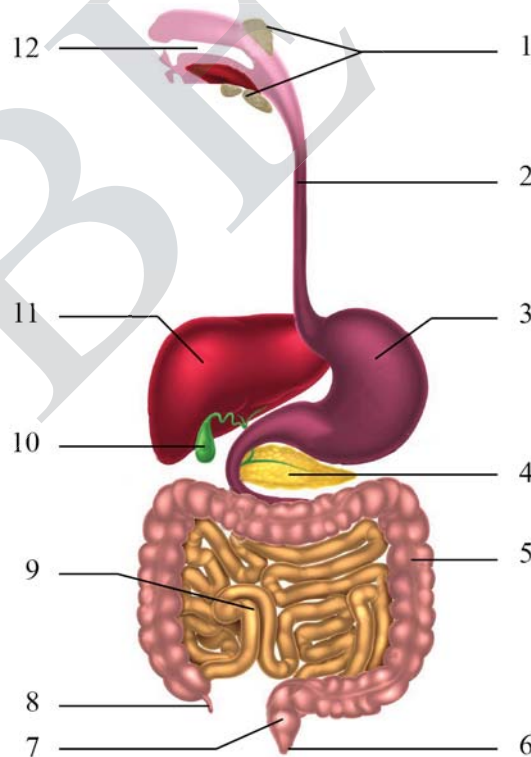
A.

B.

1.
2.
3.
4.
5.

1.
2.

3. Give the caption and labels in the diagram.

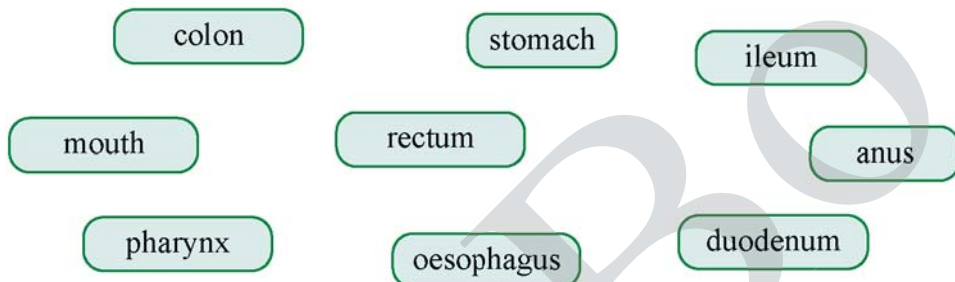


Caption.

1.
2.
3.
4.
5.
6.

7.
8.
9.
10.
11.
12.

4. Rearrange the main parts of the alimentary canal of human in sequences.

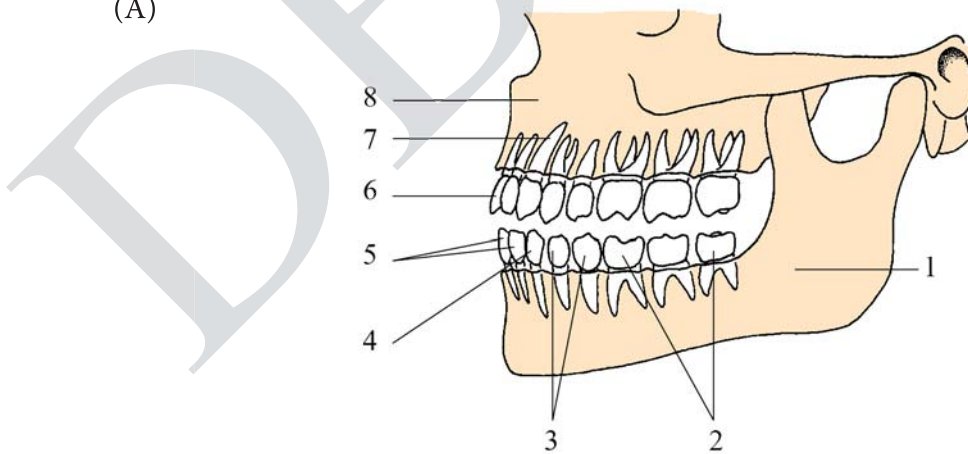


1.
2.
3.
4.
5.

6.
7.
8.
9.

5. Provide labels and caption in the given diagrams.

(A)

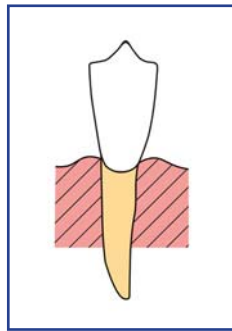


Caption.

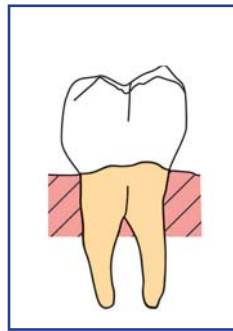
1.
2.
3.
4.

5.
6.
7.
8.

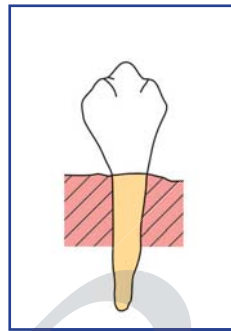
(B)



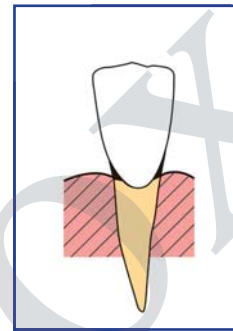
(1)



(2)



(3)



(4)

1.
2.

3.
4.

6. Use the given dental formulae and answer the followings:

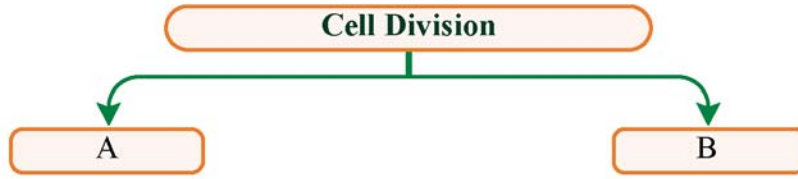
Dog : $i \frac{3}{3} c \frac{1}{1} pm \frac{4}{4} m \frac{2}{3} = 42$

Rabbit : $i \frac{2}{1} c \frac{0}{0} pm \frac{3}{2} m \frac{3}{3} = 28$

Man : $i \frac{2}{2} c \frac{1}{1} pm \frac{2}{2} m \frac{3}{3} = 32$

- (a) the total number of premolars in dog
- (b) the total number of canines in rabbit
- (c) the total number of molars in man
- (d) the total number of incisors in herbivore
- (e) the total number of canines in carnivore
- (f) the total number of molars in omnivore
- (g) the total number of premolars in herbivore

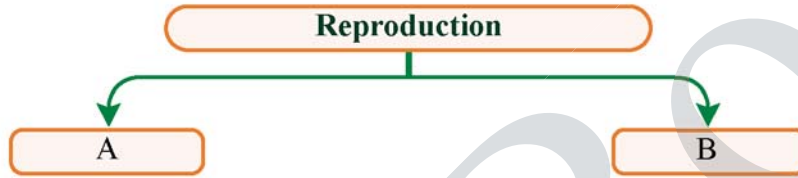
7. Fill in the blanks with different types of cell division.



A.

B.

8. Fill in the blanks with different types of reproduction in animals.



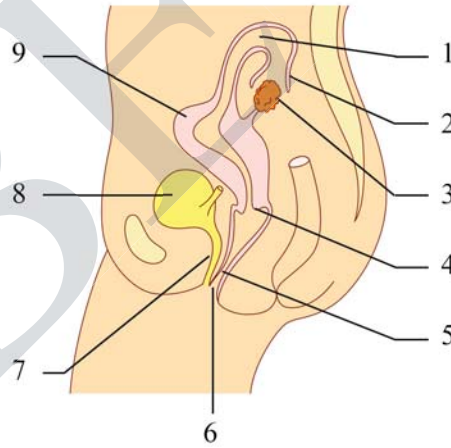
A.

B.

eg ;

eg ;

9. Give the caption and labels in the diagram.

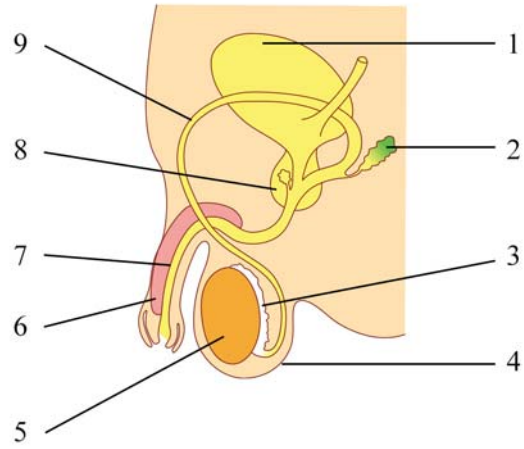


Caption.

- 1.
- 2.
- 3.
- 4.
- 5.

- 6.
- 7.
- 8.
- 9.

10. Give the caption and labels in the diagram.



Caption.

- 1.
- 2.
- 3.
- 4.
- 5.

- 6.
- 7.
- 8.
- 9.

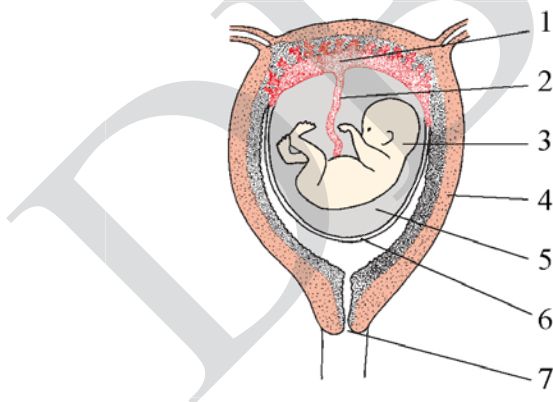
11. Read the text and fill in the blanks with the functions of female reproductive organs.

1. Ovary	..........
2. Funnel of oviduct	..........
3. Oviduct	..........
4. Uterus	..........
5. Cervix	..........
6. Vagina	..........
7. Vestibule	..........

12. Read the text and fill in the blanks with the functions of male reproductive organs.

1.	Testis	..........
2.	Epididymis	..........
3.	Sperm duct	..........
4.	Seminal vesicle	..........
5.	Prostate gland	..........
6.	Scrotum	..........
7.	Urethra	..........
8.	Penis	..........

13. Give labels and caption in the diagram.



1.
2.
3.
4.
5.
6.
7.

Caption

PRACTICAL 10

EXERCISES OF MONOHYBRID CROSSES

Activity - Monohybrid crosses

Objective : To observe the characters and traits in monohybrid crosses

Practical outcome : The student will be able to realize the genotypes and phenotypes of F_1 and F_2 offsprings

Introduction : During fertilization, male gamete fuses with female gamete to produce offspring which have the characters inherited from parents.

Genetic problems

1. List the gametes produced from the genotypes AA, Aa and aa.

Solutions:

-
2. For each of the following, state whether it represents a genotype or gamete.

(a) RR (b) r (c) Yy (d) W (e) ww (f) rr (g) TT (h) Tt

Solutions:

3. For each of the following, state whether it represents a genotype or a gamete and show the cross between homozygous dominant and homozygous recessive genotypes.

- (a) DD (b) Dd (c) D (d) d (e) dd

Solutions:

4. For each of the following genotypes, give all possible gametes and show a cross between the genotypes that consists of more than one gamete.

- (a) WW (b) Ww (c) ww

Solutions:

5. In peas, tall plant habit is dominant over dwarf. If a plant homozygous for tall is crossed with one homozygous for dwarf, what will be the appearance (a) of the F_1 (b) of the F_2 (c) of the offspring of a cross of the F_1 with its tall parent (d) of the offspring of a cross of the F_1 with its dwarf parent?

Solutions:

DBE BOX

DBE BOX

6. Brown eye is due to the dominant allele (B) and blue eye to the recessive allele (b). Determine the genotypes and phenotypes of the offspring that can be expected from the parents of the genotypes (i) BB x Bb and (ii) Bb x bb.

Solutions:

DBE BOX

7. Determine the genotypes produced from the crosses of (a) $RR \times RR$, (b) $RR \times Rr$, (c) $Rr \times Rr$ and (d) $Rr \times rr$ (you need to show the manner of crossing).

Solutions:

DBE BOX