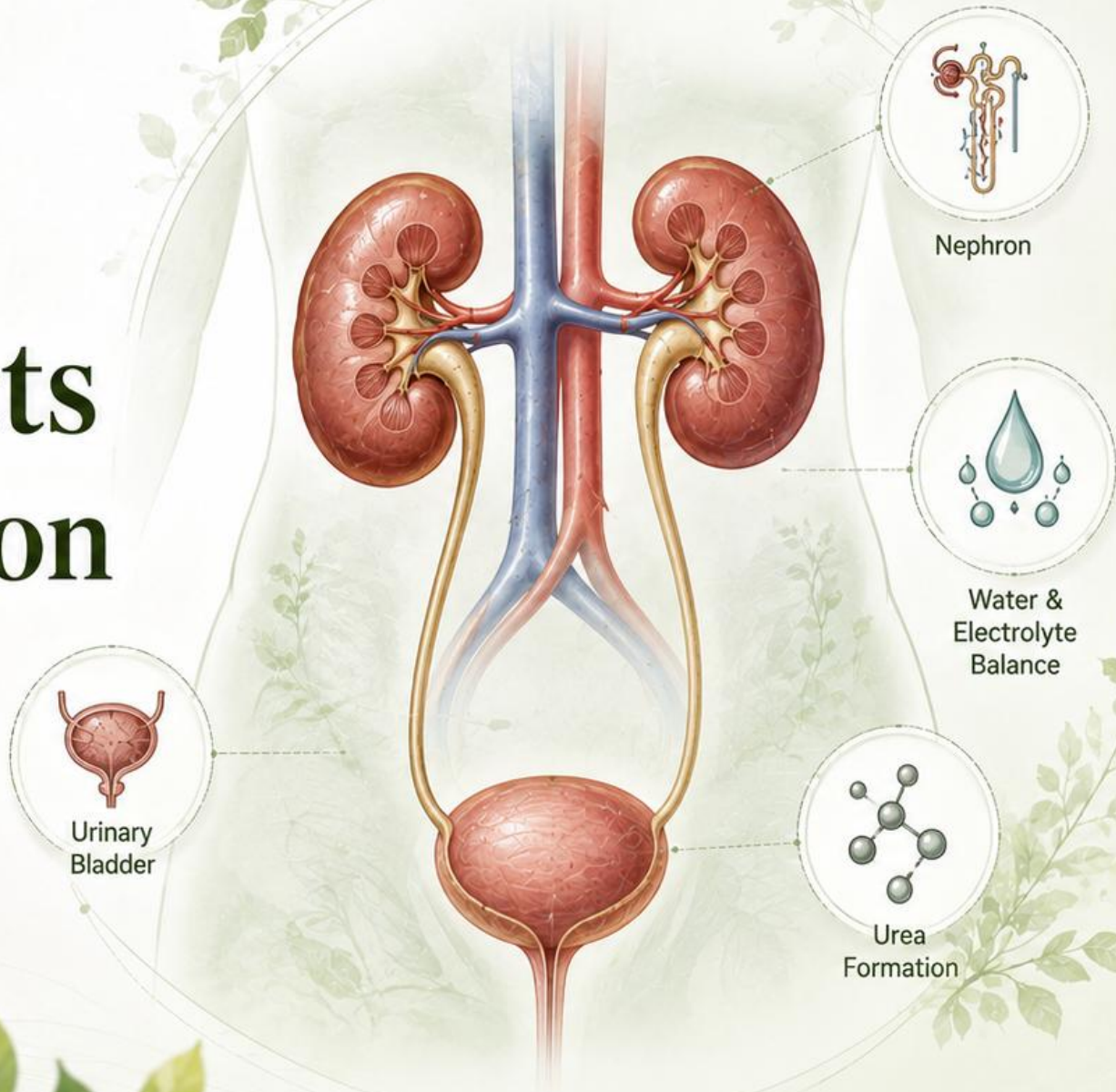


Chapter 16 : Excretory Products and their Elimination

Biology Notes | Class 11



NITROGENOUS WASTES & EXCRETORY STRATEGIES

DEFINITION:

EXCRETION = removal of metabolic wastes and excess ingested substances.

NITROGENOUS WASTES & OTHER EXCRETORY SUBSTANCES:

- NH_3 (ammonia)
- urea
- uric acid
- CO_2 (carbon dioxide)
- H_2O (water)
- Na^+ (sodium ion)
- K^+ (potassium ion)
- Cl^- (chloride ion)
- phosphate
- sulphate

① AMMONOTELIC

Main waste: ammonia (NH_3)

- Most toxic.
- Readily soluble in water.
- Needs a large amount of water.
- Generally diffuses across body surface or gills as NH_4^+ .
- Kidneys have little role.

Examples:



many bony fishes



aquatic amphibians

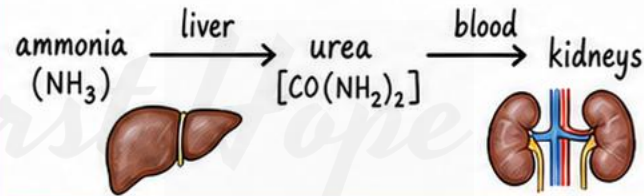


aquatic insects

② UREOTELIC

Main waste: urea [$\text{CO}(\text{NH}_2)_2$]

- Less toxic.
- Needs less water than ammonia.
- Formed in the liver from ammonia and transported to kidneys.



Examples:



mammals



many terrestrial amphibians

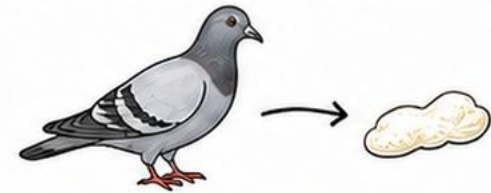


marine fishes

③ URICOTELIC

Main waste: uric acid ($\text{C}_5\text{H}_4\text{N}_4\text{O}_3$)

- Least toxic of the three.
- Poorly soluble in water.
- Expelled as a pellet or paste with minimum water loss.



Examples:



reptiles



birds



land snails

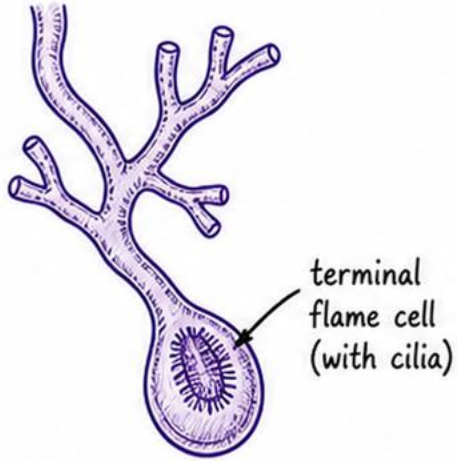


insects

TERRESTRIAL ADAPTATION → LESS-TOXIC WASTE + GREATER WATER CONSERVATION

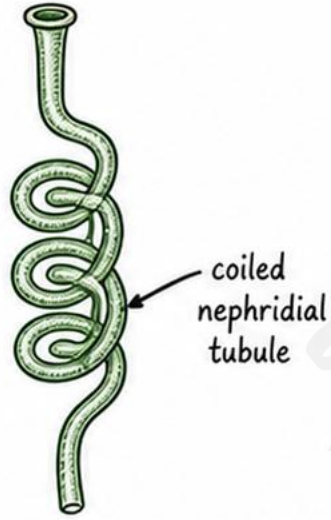
EXCRETORY STRUCTURES ACROSS ANIMAL GROUPS

1. PROTONEPHRIDIA / FLAME CELLS



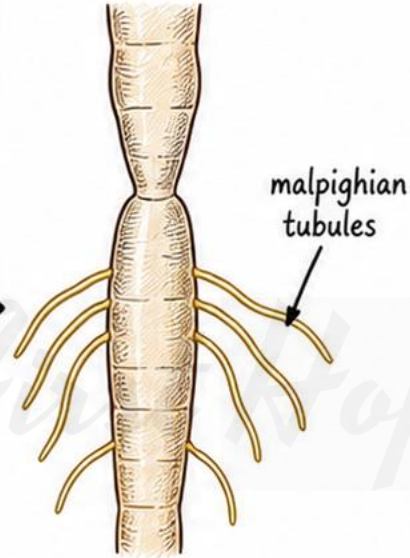
- Organisms: Platyhelminthes such as Planaria, rotifers; some annelids; cephalochordate Amphioxus.
- Function: mainly osmoregulation.

2. NEPHRIDIA



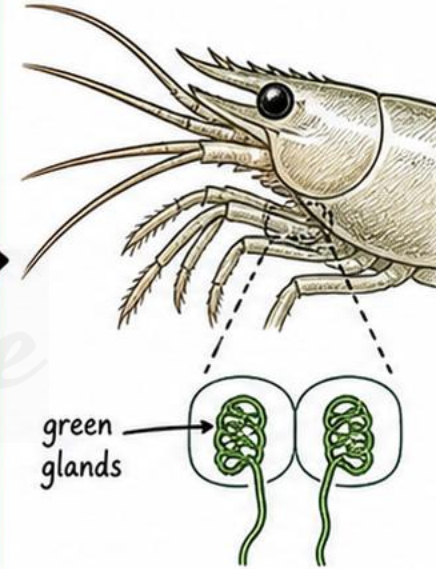
- Organisms: earthworms and other annelids.
- Function: nitrogenous-waste removal + fluid/ion balance.

3. MALPIGHIAN TUBULES



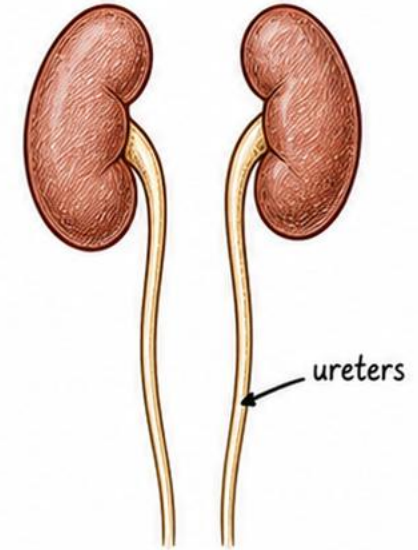
- Organisms: most insects, including cockroach.
- Function: nitrogenous-waste removal + osmoregulation.

4. ANTENNAL / GREEN GLANDS



- Organisms: crustaceans such as prawns.
- Function: excretion.

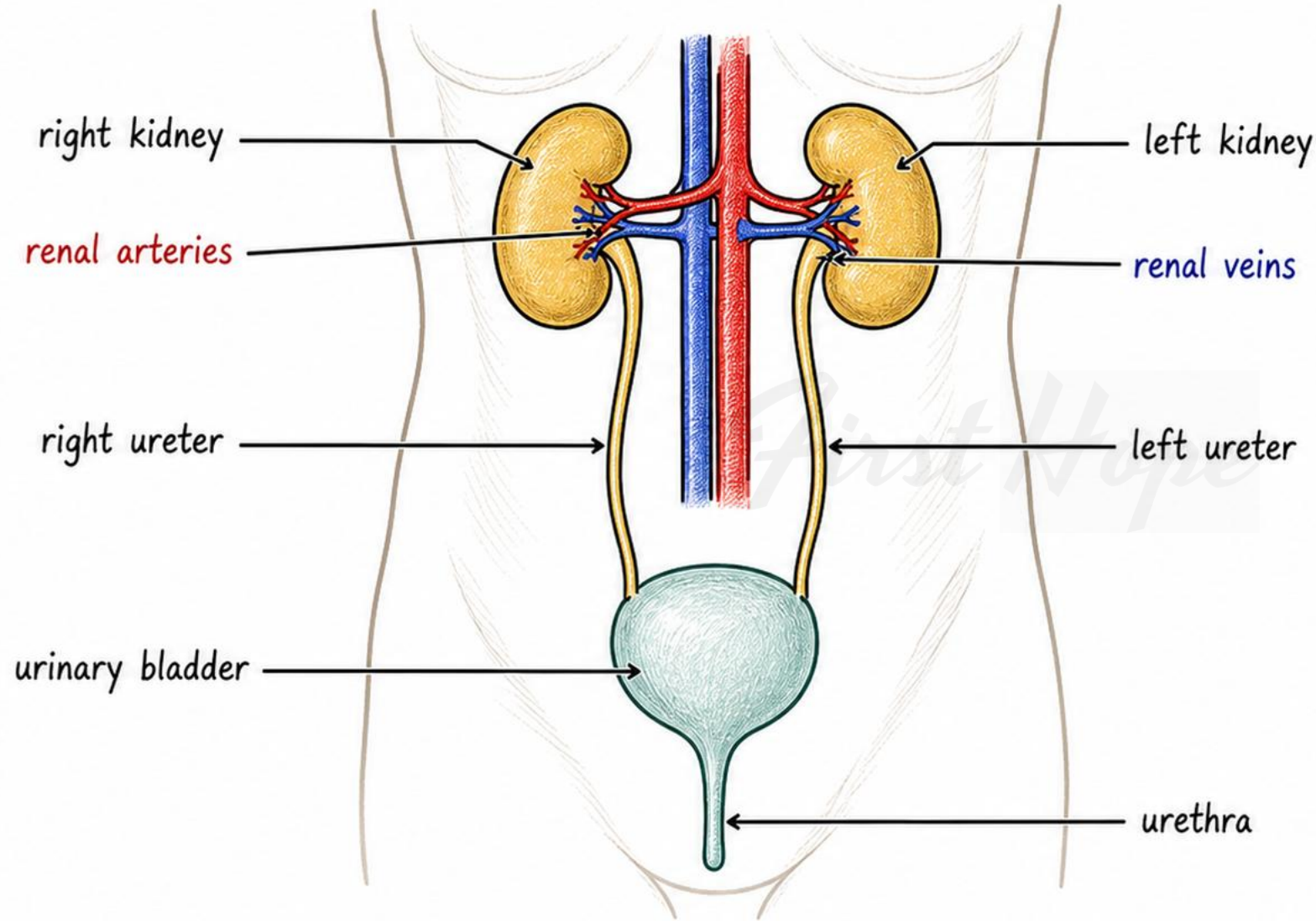
5. KIDNEYS



- Organisms: vertebrates.
- Function: waste removal + water, ion and acid-base regulation.

EXCRETORY ORGANS REMOVE WASTES; MANY ALSO PERFORM OSMOREGULATION.

HUMAN URINARY SYSTEM & URINE ROUTE



KIDNEYS

Bean-shaped, reddish-brown organs, situated near the dorsal inner abdominal wall (retroperitoneal), spanning approximately the last thoracic to third lumbar vertebral levels.

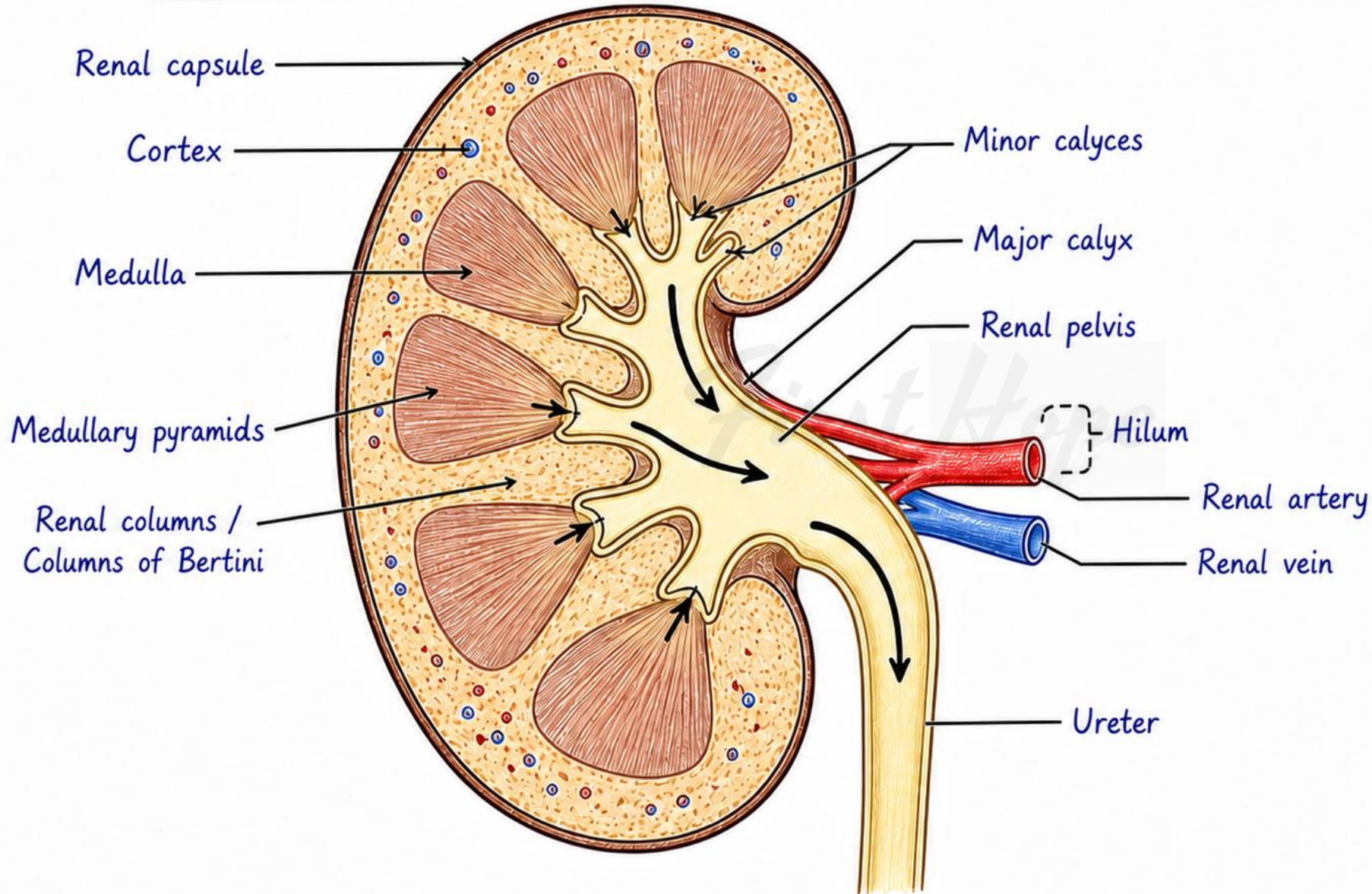
Adult kidney values:

- Length : 10–12 cm
- Width : 5–7 cm
- Thickness : 2–3 cm
- Mass : 120–170 g

— red = arterial blood
— blue = venous blood
— mustard = urinary organs

NEPHRONS → COLLECTING DUCTS → RENAL PELVIS → URETER → URINARY BLADDER → URETHRA

KIDNEY LONGITUDINAL SECTION & DRAINAGE



- **HILUM**: ureter, blood vessels and nerves pass through the medial notch.

- **CORTEX** extends between pyramids as renal columns.

- **PELVIS** is the funnel-shaped beginning of the ureter.

	Arterial blood
	Venous blood
	Urine pathway
	Renal tissue



FREE PREVIEW

[Click here to visit our website](#)

SCHOOL NOTES & NCERT SOLUTIONS

Complete notes and
NCERT solutions are
available on
FirstHope app only.



[Scan or click here](#)

Click here to get the app



Available on Google Play

JOIN THE FIRSTHOPE COMMUNITY

Join our Telegram channel

Click here to join Telegram



[Scan or click here](#)

@FirstHope_CBSE_Notes

Instagram

@firsthope.school

[Click here to follow >](#)

YouTube channel

@firsthope.school

[Click here to watch >](#)

FirstHope website

firsthope.co.in

[Click here to visit our website >](#)

CBSE / Class 9 / Class 10 / Class 11 / Class 12

Preview notes and NCERT solutions. Full PDFs in the FirstHope app.