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GENERAL KNOWLEDGE / AFCAT EXAMINATION

Must-Know GK for AFCAT

Your GK revision at a glance

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The essentials for your AFCAT preparation

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Your GK recall map

Every topic is linked. Number ranges locate the entries within each subject.

1 Defence and Air Power

Services, institutions and training	1-10	**5**
Commissioned-rank equivalents and gallantry	11-20	**6**
Platforms, missiles and technical distinctions	21-30	**6**
Days and operations: keep the year attached	31-40	**7**
Operational roles and technical vocabulary	41-47	**8**
IAF identity, milestones and aviation roles	48-55	**8**
Exercises: identify service and partner	56-63	**9**
Operations and peacekeeping associations	64-68	**10**

2 History and Freedom Movement

Ancient India: sites, texts and ideas	69-78	**11**
Mauryas, Guptas and southern kingdoms	79-88	**12**
Sultanate, Mughals and regional powers	89-98	**12**
Company rule, resistance and reform	99-111	**13**
National movement: 1885-1919	112-121	**14**
National movement: 1920-1947	122-131	**15**
World changes and Indian foundations	132-140	**15**

3 Art, Culture and Personalities

Faith, architecture and classical dance	141-147	**17**
Books, newspapers and their authors	148-157	**18**
National symbols and civilian honours	158-162	**19**
Folk performance, festivals and regional pairs	163-170	**19**
Scripts, music, painting and cultural figures	171-177	**20**
Memorials, monuments and world heritage	178-181	**20**

Your GK recall map

Every topic is linked. Number ranges locate the entries within each subject.

4 Sports and Sporting Honours		
Olympic symbols and National Sports Day	182-183	**21**
Cups, trophies and competition categories	184-189	**21**
Players, terms and scoring clues	190-196	**22**
Olympic milestones and award distinctions	197-204	**22**
Sporting personalities and landmark associations	205-211	**23**
5 Geography and World Locations		
Earth, coordinates and time	212-220	**24**
Solar system and Earth's interior	221-230	**25**
Landforms, rocks and drainage	231-240	**26**
Atmosphere, oceans and monsoons	241-258	**27**
Indian rivers, passes and islands	259-272	**28**
Soils, crops and resource regions	273-280	**29**
Capitals, passages and boundary distinctions	281-286	**30**
Ocean floors, drainage and geographic zones	287-295	**31**
6 Environment and Sustainable Development		
Ecology, conservation and environmental agreements	296-305	**33**
Air, water and pollution	306-312	**34**
Climate, conservation and sustainability targets	313-320	**34**
7 Indian Polity and Governance		
Constitutional foundations	321-330	**36**
Rights, duties and guiding principles	331-340	**37**
Parliament and Union executive	341-353	**38**
Courts, institutions and federalism	354-367	**39**
Electoral and executive statement traps	368-371	**40**

Your GK recall map

Every topic is linked. Number ranges locate the entries within each subject.

8 Economy and Development		
Income, prices and development	372-381	**41**
Money, banking and financial institutions	382-391	**42**
Budget, taxes and the external sector	392-404	**43**
Planning, farming and social development	405-413	**44**
Institutions, investment and policy routes	414-417	**44**
9 Basic Science and Everyday Applications		
Motion, forces and energy	418-430	**45**
Pressure, heat and everyday devices	431-445	**46**
Sound, light and vision	446-457	**48**
Electricity and electromagnetic waves	458-468	**49**
Atoms, reactions and common materials	469-487	**50**
Acids, bases and familiar formulas	488-502	**52**
Cells, heredity and plant functions	503-516	**53**
Human organs and circulation	517-526	**55**
Digestion, hormones and coordination	527-536	**56**
Nutrition, diseases and immunity	537-555	**57**
Sound production, carbohydrates and statement checks	556-561	**58**
10 Science, Technology and Space		
Indian space and scientific associations	562-571	**60**
Orbits, sensing and scientific instruments	572-574	**61**
Nuclear, digital and emerging-technology basics	575-583	**61**
11 Organisations, Awards and Observances		
United Nations and international frameworks	584-593	**62**
Organisations and headquarters	594-603	**63**
Institutional distinctions and observances	604-608	**64**
Important days and award categories	609-616	**64**
Essential formulas: one-page reference		**65**
Common confusions: compare in seconds		**66**

Use it actively: cover the right part of a line, recall the answer, then check it. Revisit the topic behind every incorrect practice answer.

Static core: use the monthly current-affairs PDFs for changing appointments, recent exercises, awards and events. This book makes no claim of a PYQ-frequency ranking.

Defence and Air Power

SELECTED RANK EQUIVALENTS: ROWS ARE NOT CONSECUTIVE

ARMY	NAVY	AIR FORCE
Lieutenant	Sub Lieutenant	Flying Officer
Captain	Lieutenant	Flight Lieutenant
Major	Lieutenant Commander	Squadron Leader
Colonel	**Captain**	**Group Captain**

The same word can denote very different seniority in different services.

Remember. Match service, role and partner country; attach a year to every operation.

1 Services, institutions and training

Three armed services. Indian Army, Indian Navy and Indian Air Force have distinct land, maritime and air roles, with increasing joint operations.

Supreme command. The President holds supreme command of the Defence Forces under Article 53, exercised within the constitutional and legal system.

Chief of Defence Staff. Supports jointness and heads the Department of Military Affairs as Secretary; not another name for the Chief of the Army Staff.

NDA. National Defence Academy at Khadakwasla, Pune, provides joint pre-commission training for cadets of the three services.

Army training pair. Indian Military Academy: Dehradun; Officers Training Academy: Chennai. Entry routes and commissioning schemes differ.

2 Institutions and security organisations

Naval and air academies. Indian Naval Academy: Ezhimala, Kerala; Air Force Academy: Dundigal near Hyderabad, Telangana.

DRDO. Defence Research and Development Organisation, formed in 1958, headquartered in New Delhi; works with laboratories, services and industrial partners.

HAL. Hindustan Aeronautics Limited is a major aerospace public-sector enterprise headquartered in Bengaluru; ADA leads Tejas design and HAL is its principal production partner.

Coast Guard. Maritime law-enforcement and safety roles; distinct from the Navy. Coast Guard Day is observed on 1 February.

CAPF distinction. BSF, CRPF, CISF and ITBP operate under the Ministry of Home Affairs; the Army is under the Ministry of Defence.

1 Commissioned-rank equivalents and gallantry

First commissioned ranks	Army Lieutenant ↔ Navy Sub Lieutenant ↔ Air Force Flying Officer.
Next rank pair	Army Captain ↔ Navy Lieutenant ↔ Air Force Flight Lieutenant; a Navy Captain is a much more senior rank than an Army Captain.
Field-officer equivalents	Major ↔ Lieutenant Commander ↔ Squadron Leader; Lieutenant Colonel ↔ Commander ↔ Wing Commander.
Colonel equivalents	Colonel ↔ Captain ↔ Group Captain. Read the service name before interpreting a rank.
One-star equivalents	Brigadier ↔ Commodore ↔ Air Commodore; these are not the chiefs' four-star ranks.

2 Senior ranks and gallantry awards

Two-star equivalents	Major General ↔ Rear Admiral ↔ Air Vice Marshal.
Three-star equivalents	Lieutenant General ↔ Vice Admiral ↔ Air Marshal.
Four-star equivalents	General ↔ Admiral ↔ Air Chief Marshal; exceptional five-star ranks form a separate category.
Gallantry in face of enemy	Param Vir Chakra → Maha Vir Chakra → Vir Chakra, within that award family, highest first.
Gallantry otherwise than face of enemy	Ashoka Chakra → Kirti Chakra → Shaurya Chakra, within that family; the war/peace shorthand is less precise than the award conditions.

1 Platforms, missiles and technical distinctions

Ballistic versus cruise. Ballistic missiles follow a largely ballistic trajectory after powered phases; cruise missiles use sustained aerodynamic flight and propulsion.

Missile-role pairs. Agni/Prithvi: surface-to-surface ballistic families; Akash: surface-to-air; Nag: anti-tank guided missile family.

BrahMos. India-Russia joint cruise-missile programme; a cruise missile is not automatically subsonic.

Pinaka. Multi-barrel rocket-launcher system; do not classify every rocket as a guided ballistic missile.

Tejas. Indian light combat aircraft programme; aircraft manufacturer, designer and user service have different responsibilities.

2 Naval systems and technical distinctions

INS Vikrant. India's first indigenously built aircraft carrier was commissioned in 2022; not India's first aircraft carrier of any origin.

INS Arihant. Indigenously built nuclear-powered ballistic-missile submarine; nuclear propulsion and nuclear armament describe different features.

Submarine contrasts. SSBN: nuclear-powered ballistic-missile submarine; SSN: nuclear-powered attack submarine; conventional submarines use different propulsion arrangements.

Radar versus SONAR. Radar uses electromagnetic waves; SONAR uses sound, commonly for underwater detection/ranging.

Guidance versus propulsion. Guidance controls the flight path; propulsion provides thrust. Range, payload, speed and accuracy are separate performance measures.

1 Days and operations: keep the year attached

Army Day	15 January; commemorates K.M. Cariappa taking over as the first Indian Commander-in-Chief of independent India's Army in 1949.
Air Force Day	8 October; associated with the establishment of the Indian Air Force in 1932.
Navy Day	4 December; commemorates naval achievements including Operation Trident's 1971 attack on Karachi.
Flag Day and Vijay Divas	Armed Forces Flag Day: 7 December; Vijay Divas: 16 December, associated with victory in the 1971 war.
Kargil Vijay Diwas	26 July; commemorates the successful conclusion of the 1999 Kargil conflict's operations.

2 Operations: remember the year

Operation Vijay ambiguity	Used for Goa's liberation in 1961 and the Kargil operation in 1999; the year/context determines the answer.
Operation Meghdoot	1984 operation associated with securing positions in the Siachen area.
Operation Cactus	1988 Indian military intervention in the Maldives following an attempted coup.
Operation Pawan	Associated with Indian Peace Keeping Force operations in Sri Lanka from the late 1980s.
Operation Raahat	2015 evacuation operation associated with Yemen; evacuation operations are not the same category as combat offensives.

1 Operational roles and technical vocabulary

Jointness versus identical roles. Joint planning integrates different service capabilities; it does not erase the land, maritime and air domains or make all equipment interchangeable.

Carrier versus submarine. An aircraft carrier supports embarked air operations; a submarine operates submerged. Nuclear-powered does not automatically mean nuclear-armed.

Missile seeker versus engine. A seeker senses/tracks a target; the engine provides thrust; navigation/guidance/control link information to flight corrections.

Air defence versus air superiority. Air defence protects against aerial threats; air superiority concerns a degree of control of air operations in a specified area/time.

2 Operational techniques and performance

Amphibious operation. Projects forces from sea toward land; an airborne operation uses air delivery. A joint operation can combine both.

Electronic warfare. Uses the electromagnetic spectrum for sensing, protection and attack; it is broader than simply jamming every radio signal.

Precision and range. Long range does not itself establish accuracy, payload capacity or target type; compare the actual parameter named in the question.

1 IAF identity, milestones and aviation roles

RudraM-II role. An indigenous air-to-surface missile; DRDO flight-tested it from an IAF Su-30MKI off Odisha on 29 May 2024. Not a surface-to-surface missile tested in Kerala.

First Indian Air Chief. Subroto Mukerjee became the first Indian Chief of the Air Staff on 1 April 1954.

IAF motto. Nabhah Sparsham Deeptam means Touch the Sky with Glory; distinguish a service motto from an operation's codename.

Sekhon and the PVC. Flying Officer Nirmal Jit Singh Sekhon received the Param Vir Chakra posthumously for the 1971 war; an August 2026 IAF release identifies him as its sole PVC recipient.

2 Honours, ranks and aviation roles

Param Vir Chakra design. The PVC is a circular bronze medal, with four replicas of Indra's Vajra around the State Emblem; not an octagonal silver medal.

Marshal of the Air Force. Arjan Singh was conferred the five-star rank in 2002; this is distinct from the four-star rank Air Chief Marshal.

Airlift versus fighter role. C-17 and C-130J are transport aircraft; Rafale and Su-30MKI are combat aircraft. Role and origin are separate matching clues.

Airborne enablers. AWACS/AEW&C provide airborne surveillance and control; aerial refuelling extends endurance. Neither term simply means fighter aircraft.

1 Exercises: identify service and partner

Indradhanush	India-United Kingdom air-force exercise; do not confuse it with the public-health Mission Indradhanush.
Eastern Bridge	India-Oman air exercise, involving the IAF and Royal Air Force of Oman.
Veer Guardian	India-Japan bilateral air exercise; Dharma Guardian is the India-Japan army exercise.
Desert Knight	The January 2024 exercise involved India, France and the UAE; participant lists must be tied to the relevant edition.

AIR EXERCISES: READ THE PARTNER COUNTRY

Indradhanush	→	United Kingdom
Eastern Bridge	→	Oman
Veer Guardian	→	Japan
Desert Knight (Jan 2024)	→	France + UAE

India is a participant in all four. Participants, venue and frequency depend on the edition.

2 Service and partner associations

Garuda and Varuna	Garuda: India-France air exercise; Varuna: India-France naval exercise. The partner is the same, the service differs.
MILAN	Indian Navy-hosted multilateral maritime exercise; not an exclusively bilateral India-Japan event.
Tiger Triumph	India-US tri-service exercise focused on humanitarian assistance and disaster relief; do not infer its venue from the name.
LAMITIYE	India-Seychelles exercise; verify the edition's participating services and dates rather than assuming it is annual.

1 Operations and peacekeeping associations

Safed Sagar. IAF air operations during the Kargil conflict of 1999; Operation Vijay refers to the wider Kargil campaign in that context.

Operation Rajiv. 1987 operation to capture Quaid Post in the Siachen region, later named Bana Post; Army Day does not commemorate this operation.

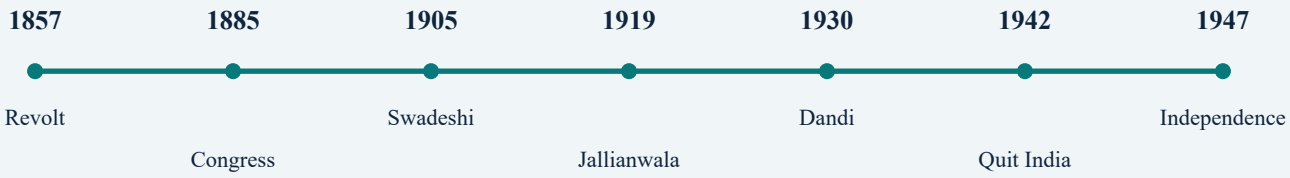
Operation Ganga. 2022 evacuation of Indian citizens from war-hit Ukraine; keep it distinct from maritime evacuation operations.

Blue Helmets. UN peacekeepers are associated with the UN's light blue colour; peacekeeping is not a separate principal organ of the UN.

Hammarskjöld Medal. The UN Dag Hammarskjöld Medal honours personnel who lose their lives serving UN peacekeeping; it is distinct from a sports or civilian literary award.

History and Freedom Movement

NATIONAL MOVEMENT: FIX THE CHRONOLOGY



Selected milestones; schematic spacing, not a chronological scale.

Remember. Fix the person, event and date together; check every statement independently.

1 Ancient India: sites, texts and ideas

Harappan chronology. The mature Harappan phase is conventionally dated about 2600-1900 BCE; Harappa and Mohenjo-daro are in present-day Pakistan.

Harappan site pairs. Dholavira and Lothal: Gujarat; Kalibangan: Rajasthan; Rakhigarhi: Haryana. Mohenjo-daro is associated with the Great Bath.

Harappan economy. Urban settlements used standardised weights, craft production and long-distance trade; their script remains undeciphered.

Vedic texts. Rigveda: hymns; Samaveda: chants; Yajurveda: sacrificial formulae; Atharvaveda: varied hymns and spells. Upanishads develop philosophical enquiry.

Mahajanapadas. Sixteen major states are described in early Buddhist traditions; Magadha rose around the middle Ganga region.

2 Buddhist and Jain traditions

Buddha's life places. Lumbini: birth; Bodh Gaya: enlightenment; Sarnath: first sermon; Kushinagar: mahaparinirvana.

Buddhist core. Four Noble Truths and the Eightfold Path; the Tripitaka is a major canonical collection in the Pali tradition.

Jainism. Mahavira is the twenty-fourth Tirthankara; Rishabhanatha is traditionally the first. Ahimsa is central to Jain ethics.

Jain vows. Nonviolence, truthfulness, non-stealing, non-possession and celibacy; do not confuse Jain Tirthankaras with Buddhist councils.

Early-language distinction. Pali is especially associated with Theravada Buddhist texts; Prakrits with many early Jain texts; Sanskrit has a wider literary/religious range.

1 Mauryas, Guptas and southern kingdoms

Mauryan foundation. Chandragupta Maurya founded the dynasty; Chanakya/Kautilya is associated with his statecraft tradition and the Arthashastra.

Ashoka and Kalinga. Ashoka's Kalinga conquest is conventionally placed around 261 BCE; Rock Edict XIII discusses the war and its consequences.

Ashokan inscriptions. Most edicts use Prakrit and Brahmi; some northwestern inscriptions use Kharosthi, Greek or Aramaic.

Megasthenes. Greek envoy associated with Chandragupta Maurya's court; his account is known as Indica through later fragments.

Gupta associations. Samudragupta: Prayaga/Allahabad pillar inscription by Harishena; Chandragupta II: traditionally associated with the title Vikramaditya.

2 Scholars, travellers and southern kingdoms

Classical scholars. Kalidasa: Sanskrit literature; Aryabhata: mathematics/astronomy; Charaka: medicine; Sushruta: surgery tradition.

Travel accounts. Faxian visited during the Gupta period; Xuanzang visited during Harsha's reign. They were different Chinese travellers.

Sangam literature. Early Tamil literary tradition associated with the Chera, Chola and Pandya regions; not a single royal chronicle.

Chola administration. Rajaraja I built the Brihadisvara temple at Thanjavur; Rajendra I expanded Chola power, including overseas expeditions.

Pallava and Chalukya sites. Mamallapuram is associated with Pallavas; Badami, Aihole and Pattadakal with early Chalukyas.

1 Sultanate, Mughals and regional powers

Delhi Sultanate order. Mamluk/Slave → Khalji → Tughlaq → Sayyid → Lodi. The Sultanate preceded Mughal rule in Delhi.

Iltutmish and Razia. Iltutmish consolidated early Sultanate rule; Razia ruled Delhi as Sultan in the thirteenth century.

Alauddin Khalji. Associated with market regulations, military expansion and measures to strengthen central control.

Muhammad bin Tughlaq. Associated with the Daulatabad capital-transfer experiment and token currency; Firoz Shah Tughlaq is a different ruler.

First Battle of Panipat. 1526: Babur defeated Ibrahim Lodi; Mughal rule began. Second: 1556, Akbar's forces defeated Hemu.

2 Mughals and regional powers

Akbar. Introduced the mansabdari framework and pursued sulh-i kul; his court historian Abul Fazl wrote Akbarnama and Ain-i Akbari.

Mughal monuments. Humayun's Tomb: Delhi; Taj Mahal: Agra, commissioned by Shah Jahan; Buland Darwaza: Fatehpur Sikri, associated with Akbar.

Sher Shah Suri. Associated with administrative and road reforms and a standard silver rupiya; his Sur rule interrupted early Mughal rule.

Vijayanagara. Founded in 1336 by Harihara and Bukka; Krishnadevaraya belonged to the Tuluva dynasty. Talikota: 1565.

Maratha rise. Shivaji was crowned in 1674 at Raigad; the Ashtapradhan was his council of eight ministers.

1 Company rule, resistance and reform

European arrivals. Vasco da Gama reached Calicut in 1498; the English East India Company received its charter in 1600.

Plassey and Buxar. Plassey: 1757; Buxar: 1764. Diwani rights over Bengal, Bihar and Orissa followed in 1765.

Land-revenue systems. Permanent Settlement: zamindars; Ryotwari: cultivator settlement; Mahalwari: village/estate-based assessment. Regional practice varied.

Subsidiary alliance versus lapse. Subsidiary alliance is associated with Wellesley; Doctrine of Lapse with Dalhousie. They were different expansion methods.

2 Resistance, rule and economic critique

1857 outbreak. The uprising began at Meerut on 10 May 1857 before rebels moved to Delhi; causes extended beyond the cartridge controversy.

1857 leadership pairs. Delhi: Bahadur Shah II; Kanpur: Nana Sahib; Jhansi: Lakshmibai; Lucknow: Begum Hazrat Mahal; Bihar: Kunwar Singh.

1858 transfer. Government of India Act 1858 transferred rule from the Company to the British Crown; Company rule and British rule are not identical periods.

Early colonial regulation. Regulating Act: 1773; Pitt's India Act: 1784. The former created the Governor-General of Bengal's office.

Economic critique. Dadabhai Naoroji articulated the drain-of-wealth critique; R.C. Dutt also analysed colonial economic effects.

Peasant and tribal resistance. Indigo revolt: 1859-60; Santhal uprising: 1855-56; Birsa Munda's movement arose in the Chotanagpur region.

3 Reform, education and social change

Reform organisations. Brahmo Samaj: Raja Rammohan Roy, 1828; Arya Samaj: Dayanand Saraswati, 1875.

Education and service. Aligarh movement: Sir Syed Ahmad Khan; Ramakrishna Mission: Swami Vivekananda, 1897.

Social reform legislation. Sati abolition in Bengal: 1829, under William Bentinck; Hindu Widows' Remarriage Act: 1856, associated with Vidyasagar's campaign.

1 National movement: 1885-1919

Congress foundation. Indian National Congress first met at Bombay in 1885; first president: W.C. Bonnerjee; A.O. Hume helped organise it.

Moderate versus extremist phase. Naoroji, Gokhale and Pherozeshah Mehta are associated with Moderates; Lal-Bal-Pal with assertive nationalism.

Bengal partition and Swadeshi. Partition announced under Curzon in 1905; Swadeshi/boycott expanded in protest; partition was annulled in 1911.

Muslim League and Surat. All-India Muslim League founded at Dacca in 1906; Congress split at Surat in 1907.

Home Rule. Tilak and Annie Besant launched separate Home Rule Leagues in 1916; Lucknow Pact also belongs to 1916.

2 Gandhi, reforms and resistance

Gandhi's early campaigns. Champaran: 1917, indigo cultivators; Ahmedabad mill strike and Kheda campaign: 1918.

Rowlatt Act. 1919 legislation extended extraordinary detention/trial powers; Gandhi organised opposition to it.

Jallianwala Bagh. 13 April 1919, Amritsar; troops under Brigadier-General Reginald Dyer fired on the gathering.

Constitutional reforms of 1919. Government of India Act 1919 introduced provincial dyarchy; do not confuse it with 1935 provincial autonomy.

Revolutionary associations. Ghadar movement grew among overseas Indians; Hindustan Socialist Republican Association is associated with Bhagat Singh and colleagues.

1 National movement: 1920-1947

Non-Cooperation. Launched in 1920; Gandhi suspended it in 1922 after the Chauri Chaura violence.

Simon Commission. Appointed in 1927, arrived in 1928; opposition highlighted its lack of Indian members.

Lahore Congress. 1929 session under Jawaharlal Nehru adopted the complete-independence goal; 26 January 1930 was observed as Independence Day.

Salt Satyagraha. Gandhi's Dandi March: 1930; Civil Disobedience challenged the salt laws and wider colonial authority.

Gandhi-Irwin Pact. 1931; Gandhi then attended the Second Round Table Conference, not all three conferences.

2 From the Poona Pact to independence

Poona Pact. 1932 agreement between Ambedkar and Gandhi's side provided reserved seats within joint electorates, replacing the separate-electorate arrangement for Depressed Classes.

Government of India Act 1935. Provided provincial autonomy and a proposed federation; the federation did not come into operation as planned.

Quit India. Congress adopted the resolution at Bombay in August 1942 after the Cripps Mission failed; 'Do or Die' is associated with it.

INA leadership. Mohan Singh organised the first INA in 1942; Subhas Chandra Bose later reorganised and led it and the Azad Hind government.

Transfer of power. Cabinet Mission: 1946; Mountbatten Plan: 3 June 1947; Indian Independence Act: 1947; independence: 15 August 1947.

1 World changes and Indian foundations

Renaissance. European cultural/intellectual revival with a major Italian beginning; not identical to the later Industrial Revolution.

American independence. Declaration: 1776; US Constitution drafted: 1787. Independence and constitutional adoption are different milestones.

French Revolution. Began in 1789; associated with liberty, equality and fraternity and challenges to the old social order.

Industrial Revolution. Began in Britain; mechanised production, steam power and factory organisation transformed industry and society.

Russian Revolution. 1917: February Revolution ended Tsarist rule; October Revolution brought Bolsheviks to power under Lenin, using the old Russian calendar labels.

2 War and independent India

World wars. First: 1914-18; Second: 1939-45. League of Nations followed the First; United Nations followed the Second.

Integration of India. Sardar Vallabhbhai Patel and V.P. Menon played central roles in integrating princely states after independence.

Gandhian ideas. Sarvodaya means welfare/uplift of all; Gandhi developed the idea through, among other influences, Ruskin's Unto This Last.

Bhoodan. Vinoba Bhave began the land-gift movement at Pochampally in 1951; voluntary land donation was its central method.

Art, Culture and Personalities

CULTURAL PAIRS: REGION + DISTINCTIVE FORM

KARNATAKA	MIZORAM	CHHATTISGARH
Yakshagana	**Cheraw**	**Gaur Maria**
Costumed dance-drama	Bamboo dance	Bastar dance tradition

Distinguish a folk form from a classical dance, a festival and a musical instrument.

Remember. A form, its region and its identifying feature make a stronger recall pair.

1 Faith, architecture and classical dance

Bhakti associations. Kabir criticised ritual divisions; Mirabai expressed devotion to Krishna; Tulsidas composed Ramcharitmanas in Awadhi.

Sikh Gurus. Guru Nanak founded the Sikh tradition; Guru Gobind Singh founded the Khalsa in 1699 and was the tenth human Guru.

Sufi traditions. Chishti and Suhrawardi were influential orders; a khanqah was a Sufi centre, not a Buddhist monastery.

Temple-style recall. Nagara: broadly northern; Dravida: broadly southern; Vesara: mixed/developed Deccan traditions. Real monuments show regional variation.

Rock-cut and stupa sites. Ajanta: largely Buddhist caves and paintings; Ellora: Buddhist, Hindu and Jain caves; Sanchi: celebrated Buddhist stupas.

2 Classical dance traditions

Classical dance pairs. Bharatanatyam: Tamil Nadu; Kathakali/Mohiniyattam: Kerala; Kuchipudi: Andhra Pradesh; Odissi: Odisha; Sattriya: Assam.

More dance pairs. Kathak: northern India; Manipuri: Manipur. Folk dances and classical forms are different categories.

1 Books, newspapers and their authors

Gandhi's works	Hind Swaraj: M.K. Gandhi; he edited Young India, Navajivan and Harijan during different periods.
Nehru's books	The Discovery of India and Glimpses of World History: Jawaharlal Nehru; India Wins Freedom: Maulana Abul Kalam Azad.
Tagore and Bankim	Gitanjali: Rabindranath Tagore; Anandamath: Bankim Chandra Chattopadhyay. Their national-song associations are different.
Tilak's press	Kesari was in Marathi; The Mahratta in English. Both are associated with Tilak's nationalist journalism.
Economic-nationalist writing	Poverty and Un-British Rule in India: Dadabhai Naoroji; economic drain was a major theme of nationalist critique.

2 Texts, travellers and literary associations

Early nationalist press	Bengal Gazette/Hicky's Gazette began in 1780; it is commonly identified as India's first printed newspaper.
Ancient literary pairs	Abhijnanasakuntalam: Kalidasa; Harshacharita: Banabhatta; Rajatarangini: Kalhana.
Sultanate and Mughal accounts	Baburnama: Babur; Akbarnama: Abul Fazl; Tughlaq-era travel observations are associated with Ibn Battuta.
Travellers' context	Al-Biruni studied Indian society and learning; Ibn Battuta visited during Muhammad bin Tughlaq's reign. They belong to different centuries.
More author pairs	Unhappy India: Lala Lajpat Rai; The Indian Struggle: Subhas Chandra Bose; these are different works and authors.

1 National symbols and civilian honours

National Flag. Adopted by the Constituent Assembly on 22 July 1947; Ashoka Chakra has 24 spokes. Flag proportions are 3:2 length to height.

National Emblem. Adapted from the Sarnath Lion Capital of Ashoka; motto Satyameva Jayate comes from the Mundaka Upanishad.

National Anthem and Song. Jana Gana Mana: Rabindranath Tagore; Vande Mataram: Bankim Chandra Chattopadhyay, appearing in Anandamath.

Civilian award order. Bharat Ratna is the highest civilian award; Padma Vibhushan → Padma Bhushan → Padma Shri is the Padma hierarchy.

Nobel distinction. Original Nobel fields exclude economics; the Sveriges Riksbank economics memorial prize was established in 1968.

1 Folk performance, festivals and regional pairs

Yakshagana. Karnataka's dance-drama tradition, with elaborate costume and makeup and stories often drawn from the epics.

Nautanki and Tamasha. Nautanki is associated with northern India, especially Uttar Pradesh; Tamasha with Maharashtra.

Puppetry pairs. Tholu Bommalata: Andhra Pradesh shadow puppetry; Kathputli: Rajasthan string puppetry.

Cheraw. Mizoram's bamboo dance; the movement among bamboo poles is an identifying clue.

2 Regional dance and festival associations

Gaur Maria. Dance associated with the Maria communities of Bastar, Chhattisgarh; avoid swapping it with Maharashtra's Lavani.

Nagaland festival pairs. Tokhu Emong: Lotha; Tuluni: Sumi; Moatsu: Ao. Tribe and festival must be matched together.

Bihu, Garba and Ghoomar. Bihu: Assam; Garba: Gujarat; Ghoomar: Rajasthan.

Harvest celebrations. Onam: Kerala; Pongal: Tamil Nadu; Baisakhi: Punjab. Shared seasonal themes do not make the regional names interchangeable.

1 Scripts, music, painting and cultural figures

Ol Chiki. Script for Santali/Santhali, created by Pandit Raghunath Murmu in 1925; a script is not itself a separate spoken language.

Eighth Schedule additions. Bodo, Dogri, Maithili and Santali were added by the Ninety-second Amendment Act, 2003.

Music traditions. Hindustani and Carnatic are major Indian classical-music traditions; Kathak and Kathakali are dance forms, not these musical systems.

Musician-instrument pairs. Ravi Shankar: sitar; Bismillah Khan: shehnai; Hariprasad Chaurasia: flute; Zakir Hussain: tabla.

2 Painting, literature and cultural figures

Painting pairs. Madhubani: Bihar; Warli: Maharashtra; Pattachitra: Odisha; Kalamkari: painted/printed textile traditions associated with Andhra Pradesh.

Literature and Nobel. Rabindranath Tagore received the 1913 Nobel Prize in Literature; Gitanjali is the work associated with this landmark.

Savitri and Sarojini. Savitribai Phule is associated with pioneering girls' education; Sarojini Naidu with poetry and the national movement. Similar first names are not a matching rule.

1 Memorials, monuments and world heritage

Monument-city pairs. Sanchi: Madhya Pradesh; Hampi: Karnataka; Konark: Odisha; Khajuraho: Madhya Pradesh.

Ajanta versus Ellora. Ajanta is chiefly Buddhist; Ellora includes Buddhist, Hindu and Jain monuments. Both are in Maharashtra.

Mughal monument distinction. Humayun's Tomb: Delhi; Taj Mahal: Agra; Buland Darwaza: Fatehpur Sikri.

UNESCO designation caution. A World Heritage inscription, an intangible-heritage element and a Ramsar designation are different kinds of recognition.

Sports and Sporting Honours

BADMINTON: THREE TEAM CUPS, THREE CATEGORIES

THOMAS	UBER	SUDIRMAN
Men	**Women**	**Mixed**
Team championship	Team championship	Team championship

A trophy name alone is incomplete: recall sport + category + team or individual.

Remember. Separate trophy, sport and category: men, women, mixed; amateur or professional.

1 Olympic symbols and National Sports Day

Indian science and sports days. National Science Day: 28 February, linked to Raman effect; National Sports Day: 29 August, Dhyan Chand's birth anniversary.

Olympic rings. Five interlaced rings represent the union of five continents and athletes worldwide; individual ring colours are not officially assigned to particular continents.

1 Cups, trophies and competition categories

Badminton team cups	Thomas Cup: men; Uber Cup: women; Sudirman Cup: mixed teams. These are team competitions, not individual singles titles.
Tennis team cups	Davis Cup: men's international team tennis; Billie Jean King Cup: women's international team tennis, formerly Fed Cup.
Golf team cups	Ryder Cup: men's professional golf; Walker Cup: men's amateur golf; Solheim Cup: women's professional golf.

2 Domestic trophies and competition formats

Indian domestic trophies	Ranji Trophy: first-class cricket; Santosh Trophy: football; Durand Cup: football.
Cricket format distinction	The Ashes is the England-Australia Test series; Ranji Trophy is an Indian domestic first-class competition.
Grand Slam surfaces	Australian Open and US Open: hard courts; French Open: clay; Wimbledon: grass.

1 Players, terms and scoring clues

Players on court or field. Basketball: 5; volleyball: 6; water polo: 7; football: 11; rugby union: 15 per team at a time in the standard format.

Hockey and kabaddi. Outdoor field hockey: 11 on the field per side; standard kabaddi: 7 on court per side. Squad sizes include substitutes.

Basketball terms. Layup, dribble, free throw and three-point shot belong to basketball; a free throw is worth one point.

Badminton and tennis terms. Shuttlecock and rally: badminton; ace, deuce and advantage: tennis. A shared word such as rally needs context.

2 Scoring and sporting terms

Golf scoring. Par is the expected stroke score; birdie is one under par; eagle two under; bogey one over.

Athletics distinctions. Marathon distance: 42.195 km; decathlon has ten events; heptathlon seven. A relay is a team race.

Chess terms. Checkmate: the king is in check with no legal escape; stalemate: the player has no legal move but the king is not in check, producing a draw.

1 Olympic milestones and award distinctions

First Indian woman medallist	Karnam Malleswari won weightlifting bronze at Sydney 2000, becoming the first Indian woman Olympic medallist.
First individual Olympic gold	Abhinav Bindra won India's first individual Olympic gold, in shooting at Beijing 2008.
PV Sindhu milestone	Rio 2016 silver and Tokyo 2020 bronze in badminton made her the first Indian woman with two individual Olympic medals.
Tokyo naming trap	The Tokyo 2020 Olympics were held in 2021; the edition's name and actual competition year differ.

2 Indian achievements and sports awards

Neeraj Chopra milestone	Tokyo 2020 men's javelin gold was India's first Olympic athletics gold; the event is javelin, not discus.
Dronacharya versus Arjuna	Dronacharya honours coaches; Arjuna recognises sportspersons. Neither is restricted simply to Olympic gold medallists.
MAKA Trophy	The Maulana Abul Kalam Azad Trophy recognises university sporting performance; it is not an individual athlete's medal.
Khel Ratna	Major Dhyan Chand Khel Ratna is India's highest sporting honour; prize money and annual awardees belong in dated updates.

1 Sporting personalities and landmark associations

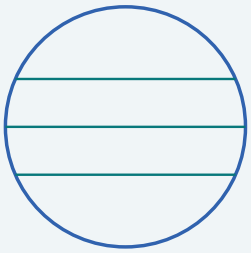
Dhyan Chand	Legendary Indian hockey player; National Sports Day on 29 August marks his birth anniversary.
Track-event pairs	Milkha Singh: 400 m; P. T. Usha: sprint and hurdles events. Their nicknames do not identify the same athlete.
Boxing and weightlifting	Mary Kom: boxing; Mirabai Chanu: weightlifting. A sportsperson's discipline is more durable than a changing world ranking.
Chess personality	Viswanathan Anand: chess; India's first Grandmaster and a multiple-time world champion.

2 Sporting personalities and events

Saina Nehwal	London 2012 bronze made her India's first Olympic badminton medallist; distinguish her milestone from Sindhu's two-medal landmark.
Women's cricket	Mithali Raj and Jhulan Goswami: cricket; Sania Mirza: tennis; Saina Nehwal: badminton.
Long jump and javelin	Anju Bobby George: long jump; Neeraj Chopra: javelin. Both are athletics, but one is a jump and the other a throw.

Geography and World Locations

LATITUDE LOCATES; LONGITUDE SETS LOCAL SOLAR TIME



Schematic globe

15° = 1 hour; 1° = 4 minutes

East: later clock time. West: earlier.

82½° E ÷ 15 = 5½ hours

IST = UTC + 05:30

Remember. Use shape and process to distinguish features; inward drainage is not radial.

1 Earth, coordinates and time

Latitude versus longitude. Latitude measures north/south angular distance from the equator; longitude measures east/west distance from the prime meridian.

Important parallels. Equator: 0°; tropics: about 23½° N/S; polar circles: about 66½° N/S. These are approximate school values.

Longitude-time shortcut. Earth turns 360° in about 24 hours: 15° per hour, 1° per 4 minutes; east is ahead in local solar time.

Indian Standard Time. Based on 82°30′ E; IST = UTC + 5 hours 30 minutes. India uses one official standard time.

Date Line. Approximately follows 180° with political deviations; westward crossing normally adds a day, eastward crossing subtracts one.

2 Seasons and the rotating Earth

Seasons. Caused mainly by Earth's axial tilt and revolution, not simply by Earth-Sun distance.

Solstice versus equinox. Solstices mark extreme solar declination; equinoxes bring nearly equal day/night lengths, not exactly equal everywhere.

Rotation effects. Day/night and apparent daily sky motion; Coriolis deflection is right in the Northern Hemisphere and left in the Southern.

Great circles. Divide a sphere into equal hemispheres; the equator is a great circle, while other latitude circles are smaller circles.

1 Solar system and Earth's interior

Planet order. Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune; terrestrial planets are the inner four.

Planet contrasts. Venus is hotter on average than Mercury because of its strong greenhouse effect; Jupiter is the largest planet.

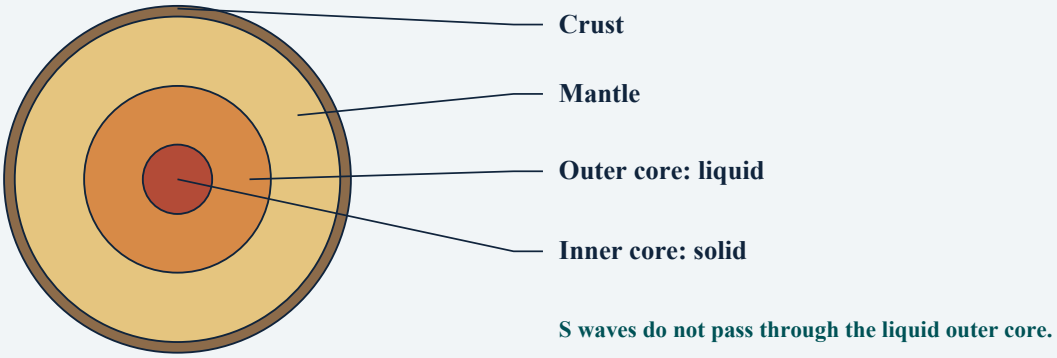
Small bodies. Asteroid: rocky/metallic body; comet: volatile-rich body; meteor: atmospheric light streak; meteorite: surviving material reaching the ground.

Eclipse geometry. Solar: Moon between Sun and Earth; lunar: Earth between Sun and Moon. Alignment and orbital tilt determine whether an eclipse occurs.

Moon phase trap. New moon permits a solar eclipse and full moon permits a lunar eclipse; neither phase guarantees an eclipse every month.

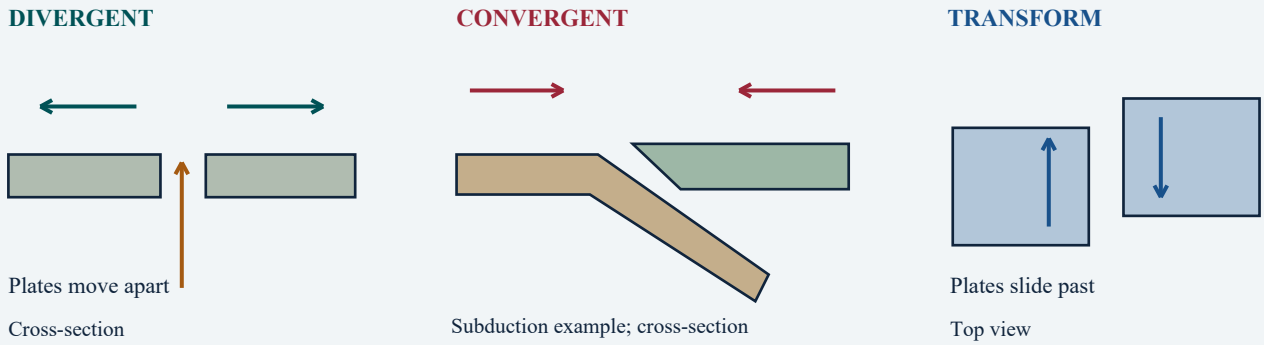
Distance units. Astronomical unit: Earth-Sun orbital-distance reference; light-year: distance travelled by light in one year, not a time unit.

INSIDE EARTH: THE OUTER CORE IS LIQUID



Schematic cross-section; crust thickness exaggerated. Layer thicknesses are not to scale.

THREE PLATE BOUNDARIES: CHECK THE MOTION



Schematic; continental collision is another kind of convergence. Not all convergent boundaries look identical.

2 Read the evidence inside Earth

Earth layers. Crust → mantle → core; outer core is liquid and inner core is solid in the standard model.

Seismic waves. P waves travel through solids and fluids; S waves do not propagate through liquids. Their paths reveal Earth's interior.

Plate tectonics. Divergent boundaries separate plates; convergent boundaries bring them together; transform boundaries involve mainly sideways motion.

Earthquake terms. Focus/hypocentre: origin within Earth; epicentre: surface point above it. Magnitude and observed intensity are different measures.

1 Landforms, rocks and drainage

Rock cycle. Igneous: cooled molten material; sedimentary: consolidated sediments or chemical/biological deposits; metamorphic: transformed by heat/pressure without complete melting.

Rock examples. Granite/basalt: igneous; sandstone/limestone: sedimentary; marble/slate: metamorphic.

Weathering versus erosion. Weathering breaks material down in place; erosion removes and transports it. Deposition lays transported material down.

River work. Upper-course vertical erosion favours valleys; deposition helps build floodplains, levees and deltas where conditions permit.

Delta versus estuary. A delta is a depositional river-mouth landform; an estuary is a tidal river-mouth system, not necessarily a delta.

2 Landforms and Indian relief

Glacial landforms. U-shaped valleys, cirques and moraines are classic glacial features; V-shaped valleys are commonly associated with river erosion.

Wind landforms. Dunes result from deposition; mushroom rocks and deflation hollows illustrate wind-related erosion processes.

Groundwater and karst. Limestone dissolution can form caves and sinkholes; stalactites hang from roofs, stalagmites grow upward from floors.

India's relief divisions. Himalayas, Northern Plains, Peninsular Plateau, Indian Desert, coastal plains and islands form a useful broad classification.

Mountain contrasts. Himalayas are geologically young fold mountains; the Peninsular Plateau contains much older rocks and land surfaces.

1 Atmosphere, oceans and monsoons

Atmospheric layers. Troposphere: most weather; stratosphere: ozone-rich zone; mesosphere: many meteors burn; thermosphere includes much ionospheric activity.

Pressure belts. Equatorial low, subtropical highs, subpolar lows and polar highs are idealised global belts that shift seasonally.

Planetary winds. Trades blow toward equatorial lows; westerlies dominate many mid-latitudes; polar easterlies originate near polar highs.

Cyclone versus anticyclone. Northern Hemisphere: cyclonic flow is generally anticlockwise around low pressure; anticyclonic flow is clockwise around high pressure.

Humidity and dew point. Relative humidity compares actual water vapour with saturation at that temperature; dew point is the cooling temperature for saturation.

Rainfall types. Convectional: rising heated air; orographic: air forced over relief; frontal/cyclonic: air-mass interaction and uplift.

Land and sea breezes. Day: sea-to-land surface breeze is common; night: land-to-sea, driven by differential heating and pressure differences.

Weather versus climate. Weather is short-term atmospheric state; climate describes longer-term patterns and statistics, not one unusual season.

2 Oceans and the monsoon mechanism

Ocean salinity. About 35 parts per thousand is a useful mean open-ocean reference; local salinity varies with evaporation, rainfall, rivers and ice.

Tides. Mainly driven by Moon/Sun gravity; spring tides near new/full moon have greater range, neap tides near quarter phases smaller range.

Currents. Warm/cold describe relative thermal influence: Gulf Stream is warm; Labrador and Humboldt/Peru currents are cold.

Monsoon mechanism. Seasonal circulation changes involve land-sea heating contrasts, migrating rain belts, topography and ocean-atmosphere interactions.

3 Indian climate and global influences

Southwest monsoon. Arabian Sea and Bay of Bengal branches deliver most of India's annual rainfall; local timing and totals vary.

Northeast monsoon. Important for autumn/early-winter rain on the Tamil Nadu coast; it is not India's main summer southwest-monsoon season.

Western disturbances. Extratropical systems bring winter rain/snow to northwestern India and the Himalayas; useful for many rabi crops.

Rain shadow. Leeward regions often receive less orographic rain; the Deccan east of the Western Ghats illustrates this effect.

El Niño and La Niña. Warm and cool phases of tropical Pacific variability, respectively; they influence weather but do not alone determine every Indian monsoon outcome.

Tropical cyclones. Need suitable warm-ocean and atmospheric conditions; Coriolis influence is weak near the equator, limiting formation there.

1 Indian rivers, passes and islands

Ganga origin names. Bhagirathi and Alaknanda meet at Devprayag; downstream the combined river is called Ganga.

Ganga tributaries. Yamuna joins at Prayagraj; Ghaghara, Gandak and Kosi are major Himalayan tributaries. Son joins from the peninsular side.

Brahmaputra names. Yarlung Tsangpo in Tibet; Siang/Dihang in Arunachal Pradesh; Brahmaputra in Assam; Jamuna in Bangladesh.

Indus system. Jhelum, Chenab, Ravi, Beas and Sutlej are major tributaries; the Indus system drains mainly toward the Arabian Sea.

Peninsular rivers. Godavari, Krishna, Kaveri and Mahanadi generally flow east; Narmada and Tapi flow west through rift-related valleys.

2 River dams, passes and islands

River-dam pairs. Bhakra: Sutlej; Hirakud: Mahanadi; Tehri: Bhagirathi; Sardar Sarovar: Narmada.

Pass pairs. Zoji La: Kashmir-Ladakh route; Nathu La: Sikkim; Shipki La: Himachal Pradesh. Pass locations matter more than name recognition alone.

Ghats. Western Ghats are generally more continuous; Eastern Ghats are interrupted by major rivers. The Nilgiri region links their southern systems.

Island groups. Andaman and Nicobar lie in the Bay of Bengal; Lakshadweep lies in the Arabian Sea and is mainly coral atolls/reefs.

Channels and straits. Ten Degree Channel separates Andaman/Nicobar groups; Palk Strait lies between India and Sri Lanka; Malacca links Indian/Pacific sea routes.

3 Channels, coasts and geographic pairs

Lakshadweep channels. Nine Degree Channel separates Minicoy from the main Lakshadweep group; Eight Degree Channel lies between Minicoy and the Maldives.

Tropic of Cancer in India. Gujarat, Rajasthan, Madhya Pradesh, Chhattisgarh, Jharkhand, West Bengal, Tripura and Mizoram, broadly west to east.

Coastal-region pairs. Konkan: broadly Maharashtra-Goa coast; Malabar: broadly Kerala coast; Coromandel: southeastern peninsular coast.

Coast and river-mouth trap. A west-flowing Indian river need not form a delta; Narmada and Tapi are standard estuary examples.

1 Soils, crops and resource regions

Alluvial soils. Widespread in northern plains and river valleys; khadar is newer alluvium, bhangar older alluvium.

Black soils. Often clay-rich with high moisture retention; strongly associated with Deccan basalt regions and cotton cultivation.

Red and laterite soils. Red colour often reflects iron compounds; laterite develops under intense leaching in warm, wet conditions.

Crop seasons. Kharif: generally monsoon-sown; rabi: generally winter-sown; zaid: shorter summer season between major crops.

2 Crops, minerals and ports

Crop-climate pairs. Rice: generally warm/wet; wheat: cooler growth period and dry ripening; tea: humid conditions with well-drained soils.

Plantation and fibre pairs. Rubber: warm/humid; coffee: often shaded uplands; jute: warm humid deltaic areas; cotton: warm frost-free growing season.

Mineral-region pairs. Coal: Damodar valley belts; iron ore: Odisha-Jharkhand-Chhattisgarh and other belts; bauxite: several plateau regions including Odisha.

Port pairs. Deendayal/Kandla: Gujarat; Paradip: Odisha; Visakhapatnam: Andhra Pradesh; Kochi: Kerala; Chennai: Tamil Nadu.

1 Capitals, passages and boundary distinctions

East African capitals. Ethiopia: Addis Ababa; Kenya: Nairobi; Tanzania: Dodoma; Sudan: Khartoum. Do not swap a major port with the constitutional capital.

Indian Ocean neighbours. Sri Lanka: Sri Jayewardenepura Kotte is the legislative capital; Maldives: Malé; Mauritius: Port Louis; Seychelles: Victoria.

Landlocked versus coastal. Nepal and Bhutan are landlocked; Bangladesh, Myanmar and Pakistan have sea coasts.

2 Passages, canals and boundaries

Passage pairs. Hormuz links Persian Gulf and Gulf of Oman; Bab-el-Mandeb links Red Sea and Gulf of Aden.

Canal pairs. Suez links Mediterranean and Red seas; Panama links Atlantic and Pacific oceans.

Boundary names. Durand Line: Afghanistan-Pakistan; Radcliffe Line: 1947 partition demarcation; McMahon Line: eastern India-China boundary context.

1 Ocean floors, drainage and geographic zones

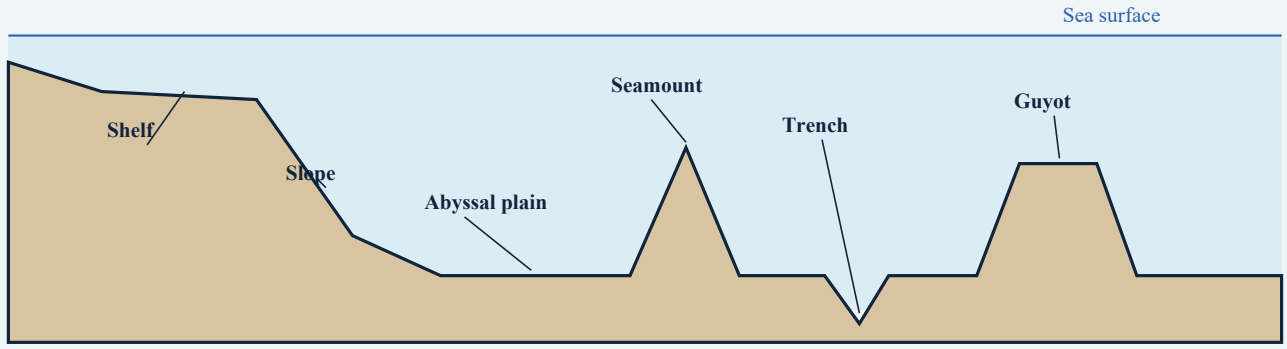
Shelf and slope. Continental shelf: submerged continuation of the continent; continental slope: steeper descent toward the deep ocean basin.

Abyssal plain and trench. Abyssal plains are broad, very flat deep-ocean areas; trenches are long, narrow and exceptionally deep depressions.

Seamount versus guyot. A seamount is an underwater volcanic mountain; a guyot is a flat-topped submerged seamount. Neither need reach the sea surface.

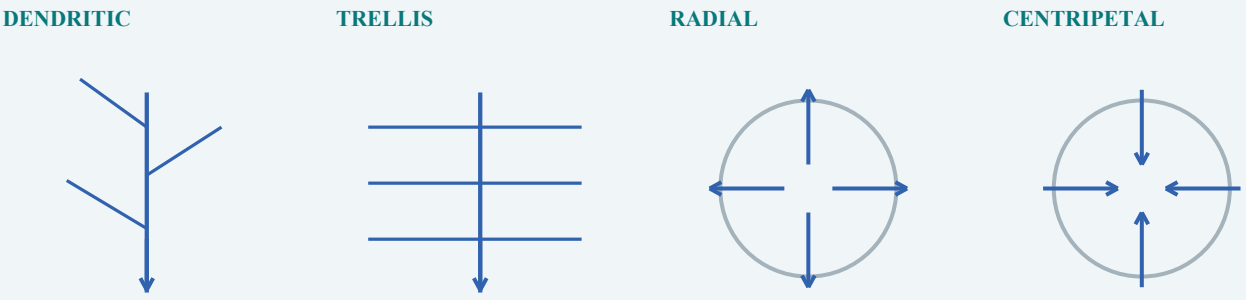
Mid-ocean ridge. An underwater mountain chain associated with divergent plate boundaries and creation of new oceanic crust.

OCEAN FLOOR: READ THE SHAPE, NOT THE NAME ALONE



Schematic only: relative placement is illustrative; no horizontal or vertical scale.

DRAINAGE PATTERNS: FLOW DIRECTION IS THE KEY



Tree-like branches | Near-parallel tributaries | Outward from highland | Inward toward basin

Schematic top views. Trellis commonly follows alternating resistant and weaker rock strata.

2 Drainage, climate zones and tsunamis

Dendritic and trellis. Dendritic drainage resembles tree branches, often on fairly uniform rock; trellis commonly reflects alternating resistant and weaker strata.

Radial versus centripetal. Radial streams flow outward from a central highland; centripetal streams flow inward toward a basin.

Rectangular drainage. Right-angle bends commonly reflect joints or faults; this is different from the near-parallel tributaries of trellis drainage.

Thermal zones. Torrid zone lies between the tropics; temperate zones between tropics and polar circles; frigid zones beyond the polar circles.

Tsunami mechanism. Sudden large-scale displacement of seawater, often from vertical seabed movement, can generate a tsunami; ordinary surface winds are not the earthquake mechanism.

Environment and Sustainable Development

SDGs: KEEP THE NUMBER WITH THE GOAL

13	14	15
Climate action	**Life below water**	**Life on land**
Emissions and resilience	Marine ecosystems	Terrestrial ecosystems

The 2030 Agenda has 17 goals. These three numbers are labels, not ranks.

Remember. Ozone protection, climate action and biodiversity conservation have different instruments.

1 Ecology, conservation and environmental agreements

Ecosystem roles. Producers fix energy; consumers obtain it by feeding; decomposers recycle nutrients. Energy is not recycled in the same way as matter.

Biodiversity levels. Genetic, species and ecosystem diversity; a hotspot combines exceptional endemism with severe habitat loss under defined criteria.

India-linked hotspots. Himalaya, Indo-Burma, Western Ghats-Sri Lanka and Sundaland include parts of India; the Indian Sundaland component includes Nicobar Islands.

In-situ versus ex-situ. In-situ protects organisms in natural habitats; ex-situ includes suitable zoos, botanical gardens and seed/gene banks.

Protected-area distinctions. National parks, wildlife sanctuaries and biosphere reserves have different legal/management frameworks; their names are not interchangeable.

2 Agreements and environmental distinctions

Ramsar Convention. Concerns conservation and wise use of wetlands; Ramsar designation is not the same as national-park status.

Montreal versus Paris. Montreal Protocol addresses ozone-depleting substances; Paris Agreement addresses climate change under the UNFCCC framework.

CITES. Regulates international trade in listed wild animals/plants and their products; it does not simply ban all wildlife trade.

Pollution contrasts. Bioaccumulation: buildup within an organism; biomagnification: increasing concentrations along food chains; eutrophication: nutrient enrichment of water.

Sustainable development. Meeting present needs without compromising future generations is the standard guiding idea; conservation includes resource use as well as protection.

1 Air, water and pollution

Dry-air composition. Approximately 78% nitrogen, 21% oxygen and 0.93% argon by volume; water vapour and CO_2 vary.

Hard water. Dissolved calcium/magnesium salts cause hardness; boiling removes temporary hardness but not all permanent hardness.

Water treatment. Filtration removes suspended matter; disinfection controls microbes. Boiling does not remove every dissolved chemical pollutant.

Acid rain. Mainly associated with sulphur and nitrogen oxides; CO_2 alone explains ordinary rain's mild acidity, not the usual acid-rain problem.

2 Atmosphere, nutrients and disinfection

Greenhouse versus ozone. Greenhouse gases affect heat balance; stratospheric ozone absorbs much harmful UV. These are different environmental issues.

Fertilisers. N, P and K denote nitrogen, phosphorus and potassium nutrients; excessive nutrient runoff can drive eutrophication.

Bleaching and disinfection. Chlorine-containing compounds can oxidise and disinfect; bleaching powder is commonly represented in school chemistry as $CaOCl_2$, with actual composition more complex.

1 Climate, conservation and sustainability targets

SDG framework. The UN 2030 Agenda has 17 Sustainable Development Goals; their numbers identify goals, not ranking positions.

SDG recall I. 3: good health and well-being; 4: quality education; 5: gender equality; 6: clean water and sanitation.

SDG recall II. 7: affordable and clean energy; 12: responsible consumption and production; 13: climate action.

SDG recall III. 14: life below water; 15: life on land. Marine conservation and terrestrial biodiversity have separate goal labels.

2 Conservation, energy and ecological traps

Wetland trap. Ramsar status recognises a wetland's international importance; it does not automatically turn it into a national park.

Green India Mission. Focuses on forest/tree cover, ecosystem restoration and ecosystem services; it is not primarily an industrial-output scheme.

Renewable versus low-carbon. Solar and wind are renewable; nuclear fission is low-carbon in operation but is not conventionally classified as renewable energy.

Food chains and concentration. Energy availability usually declines along trophic levels; persistent pollutants can become more concentrated through biomagnification.

Indian Polity and Governance

THREE PARTS, THREE DIFFERENT FUNCTIONS

PART III	PART IV	PART IVA
Fundamental Rights	**Directive Principles**	**Fundamental Duties**
Enforceable rights	Guides to governance	Duties of citizens

Directive Principles are not directly court-enforceable like Fundamental Rights.

Remember. Rights = Part III; principles = Part IV; duties = Part IVA.

1 Constitutional foundations

Constitution-making dates. Constituent Assembly first met on 9 December 1946; Constitution adopted on 26 November 1949; major provisions commenced on 26 January 1950.

Assembly leadership. Rajendra Prasad chaired the Constituent Assembly; B.R. Ambedkar chaired its Drafting Committee. These were different offices.

Preamble keywords. Sovereign, socialist, secular, democratic republic; socialist, secular and integrity were added by the Forty-second Amendment, 1976.

Federal structure. Article 1 calls India a Union of States; the Constitution combines federal division with significant Union powers.

Constitutional supremacy. Ordinary law must conform to the Constitution; Parliament can amend it subject to constitutional procedure and the basic-structure doctrine.

2 Institutions, schedules and amendments

Parliamentary government. The executive is accountable to the legislature; at Union level, the Council of Ministers is collectively responsible to Lok Sabha.

Borrowed-feature pairs. Parliamentary conventions: British influence; Fundamental Rights: US influence; Directive Principles: Irish influence; Concurrent List: Australian influence.

Schedules recall. Eighth: scheduled languages; Tenth: anti-defection; Eleventh: Panchayat subjects; Twelfth: municipal subjects.

Seventh Schedule. Union, State and Concurrent Lists divide legislative subjects; residuary legislative power belongs to Parliament under the constitutional scheme.

Amendment route. Article 368 governs major constitutional amendments; some changes also require ratification by at least half the State legislatures.

1 Rights, duties and guiding principles

Part III versus Part IV. Fundamental Rights are enforceable through constitutional remedies; Directive Principles guide governance but are not directly enforceable by courts.

Equality cluster. Article 14: equality before law/equal protection; 15: prohibited discrimination; 16: equality of opportunity in public employment, subject to constitutional provisions.

Articles 17 and 18. 17 abolishes untouchability; 18 deals with abolition of titles, with stated exceptions such as military/academic distinctions.

Freedom and personal liberty. Article 19 protects specified citizen freedoms; Article 21 protects life/personal liberty of persons, not citizens alone.

Education. Article 21A provides free and compulsory education for children aged 6-14, in the manner determined by law.

2 Remedies, duties and guiding principles

Exploitation and religion. Articles 23-24 address trafficking/forced labour and child labour; Articles 25-28 concern religious freedom, with qualifications.

Constitutional remedies. Article 32: Supreme Court enforcement of Fundamental Rights; Article 226: High Court writ powers, including other legal rights.

Property right. Article 300A protects against deprivation of property except by authority of law; property is no longer a Fundamental Right.

Fundamental Duties. Article 51A, Part IVA; originally ten duties added in 1976, with an eleventh added by the Eighty-sixth Amendment, 2002.

DPSP associations. Equal justice/legal aid: Article 39A; village Panchayats: 40; environment: 48A. Duties and Directive Principles are different categories.

1 Parliament and Union executive

Parliament's components. President + Rajya Sabha + Lok Sabha; the President is a constitutional component without being a member of either House.

House characteristics. Rajya Sabha is not dissolved; approximately one-third retire every two years. Lok Sabha's normal term is five years unless dissolved earlier.

Age thresholds. Lok Sabha candidate: at least 25; Rajya Sabha candidate: at least 30; voting age: 18, subject to legal eligibility.

Money Bill. Article 110 defines it; introduced only in Lok Sabha with the required recommendation; Rajya Sabha has 14 days to return recommendations.

Joint sitting. Article 108 can resolve specified ordinary-bill deadlocks; not available for Money Bills or Constitution Amendment Bills.

No-confidence motion. Tests support in Lok Sabha; collective ministerial responsibility is not owed to Rajya Sabha in the same way.

Anti-defection. Tenth Schedule; the presiding officer decides disqualification subject to judicial review. A party whip is not itself a constitutional amendment.

2 President, Prime Minister and ordinances

President. Constitutional head of the Union; ordinarily acts on ministerial advice, with constitutional provisions governing reconsideration and other functions.

Presidential election. Indirect election by elected MPs and elected MLAs of States plus the constitutionally specified UTs of Delhi and Puducherry.

Vice-President. Elected by members of both Houses of Parliament, including nominated members; not by the presidential electoral college.

President qualifications and term. Minimum age 35; normal term five years; impeachment for constitutional violation is governed by Article 61.

Prime Minister. Appointed by the President; other Union ministers are appointed on the Prime Minister's advice.

Ordinances. Article 123 gives the President ordinance power under constitutional conditions; ordinances must be laid before Parliament and face time limits.

1 Courts, institutions and federalism

Supreme Court versus High Courts. Supreme Court is the apex court; High Courts head State/territorial judicial systems. Judicial review examines constitutionality and legality.

Judicial retirement ages. Supreme Court judge: 65; High Court judge: 62. Do not exchange these figures.

Writ recall. Habeas corpus: detention; mandamus: public duty; prohibition: restrain jurisdictional excess; certiorari: quash; quo warranto: authority to hold public office.

Basic structure. Kesavananda Bharati, 1973: Parliament's amendment power cannot destroy the Constitution's basic structure.

Election Commission. Article 324: superintendence/control of elections to Parliament, State legislatures and President/Vice-President; local-body elections have State Election Commissions.

CAG. Article 148 establishes the Comptroller and Auditor General; audits public accounts within the constitutional/statutory framework.

Finance Commission. Article 280; recommends fiscal distributions and related matters. It is not the same as the GST Council or NITI Aayog.

UPSC. A constitutional public-service commission under the Articles 315 onward framework; not the recruiting body for every government post.

Constitutional versus other bodies. ECI, CAG and UPSC are constitutional; NHRC is statutory; NITI Aayog was created by an executive resolution.

2 Local government and emergency provisions

Local-government amendments. Seventy-third: Panchayats; Seventy-fourth: municipalities; both passed in 1992 and took effect in 1993.

Local schedules. Eleventh Schedule lists 29 matters; Twelfth lists 18. Actual devolution also depends on the constitutional scheme and State law.

National Emergency. Article 352: war, external aggression or armed rebellion; the old phrase internal disturbance is not the present ground.

President's Rule. Article 356 addresses failure of constitutional machinery in a State; it differs from a nationwide Article 352 emergency.

Rights during emergency. Articles 20 and 21 are protected from suspension of court enforcement under Article 359; avoid the slogan that every right automatically disappears.

1 Electoral and executive statement traps

Party recognition. National/state party recognition is administered by the Election Commission under the applicable Election Symbols Order and electoral-performance criteria; it is not a list written in the Constitution.

Union-State executive powers. Article 256 concerns compliance with parliamentary laws; Article 257 concerns Union control in certain cases and State executive action that must not prejudice Union executive power.

Amendment-number trap. Fundamental Duties were introduced by the Forty-second Amendment, 1976; not the Forty-third.

Constitutional lists. Defence and census: Union; police and agriculture: State; education and forests: Concurrent, subject to constitutional qualifications.

Economy and Development

THE DEFICIT THAT EXCLUDES INTEREST

Fiscal deficit		Minus interest		Primary deficit
₹100 crore	-	₹30 crore	=	₹70 crore

Illustrative annual flows. A deficit is not the accumulated stock of public debt.

Remember. Distinguish institution and mandate, stock and flow, policy route and sectoral conditions.

1 Income, prices and development

GDP. Value of final goods/services produced within domestic territory over a period; nationality of the producer is not the defining boundary.

GNI. GDP plus net primary income from abroad; this is the modern national-income counterpart of the older GNP terminology.

Gross versus net. Net measures subtract consumption of fixed capital/depreciation; gross measures do not.

Nominal versus real. Nominal uses current prices; real uses a price-adjusted measure. Nominal growth is not identical to growth in output volume.

Economic sectors. Primary: direct natural-resource activities; secondary: manufacturing/construction; tertiary: services. Agriculture's share and employment share can differ.

2 Prices and development measures

Inflation and purchasing power. A sustained rise in general prices reduces money's purchasing power; an increase in one item's price is not necessarily general inflation.

CPI versus WPI. CPI tracks consumer-price baskets; WPI tracks wholesale goods prices. Their coverage and weights differ; WPI is not a full consumer cost-of-living index.

Human development. UNDP's HDI combines health, education and income dimensions; GDP alone is not the index.

Poverty and unemployment. Poverty concerns deprivation; unemployment concerns lack of work under specified labour-force definitions. Their measurement methods matter.

Disguised unemployment. Some workers can be removed without materially reducing output in the usual textbook example; different from seasonal unemployment.

1 Money, banking and financial institutions

RBI milestones. Began operations on 1 April 1935; nationalised in 1949. It is India's central bank, not a normal retail commercial bank.

Currency issuers. RBI issues banknotes except the Government-issued ₹1 note; coins are minted by Government and distributed through RBI arrangements.

Signatures. RBI banknotes normally bear the Governor's signature; the ₹1 note bears the Finance Secretary's signature.

Repo mechanism. RBI provides liquidity against eligible securities with a repurchase arrangement; a policy-rate change does not instantly alter every loan contract.

CRR versus SLR. CRR: prescribed cash balance with RBI; SLR: prescribed liquid assets held by banks, including eligible cash/gold/securities.

2 Banking and financial institutions

Monetary Policy Committee. Six members: three from RBI and three appointed by the Union Government; the RBI Governor chairs it and has a casting vote in a tie.

Commercial banking. Accepts deposits and extends credit; banks create deposit money through lending within regulatory, funding and risk constraints.

Demand versus time deposits. Demand deposits are withdrawable on demand; time deposits have agreed maturity conditions. Money is broader than currency notes alone.

Institutions. NABARD: agriculture/rural development finance; SIDBI: MSME development finance; SEBI: securities-market regulator.

Banking trap. A bank's liquidity, profitability and solvency are different ideas; a digital payment method is not automatically a separate legal currency.

1 Budget, taxes and the external sector

Revenue versus capital receipts. Borrowings create liabilities and are capital receipts; taxes are revenue receipts. Classification depends on the nature of the transaction.

Revenue deficit. Revenue expenditure minus revenue receipts; a different measure from the fiscal deficit.

Fiscal deficit. Total expenditure minus revenue receipts and non-debt capital receipts; broadly measures the government's net borrowing requirement.

Primary deficit. Fiscal deficit minus interest payments; do not subtract total debt repayment instead.

Direct versus indirect taxes. Income tax is direct; GST is an indirect consumption tax. The person remitting tax and bearing its economic burden can differ.

GST milestone. Constitutional framework: One Hundred and First Amendment, 2016; GST rolled out on 1 July 2017.

GST structure. Intra-State supplies ordinarily involve CGST + SGST/UTGST; inter-State supplies ordinarily involve IGST, subject to legal classifications.

2 Trade, currency and external accounts

Exports versus imports. Exports sell domestic output abroad; imports purchase foreign output. A trade deficit concerns goods trade in the usual merchandise measure.

Current account. Covers goods, services, primary income and secondary income/transfers; it is broader than merchandise trade alone.

Exchange-rate terms. Depreciation/appreciation generally describe market movements; devaluation/revaluation describe official changes under a fixed/managed parity framework.

Currency depreciation. Can make imports costlier in domestic currency; export gains depend on demand, costs, invoicing and other conditions.

Balance of payments. Records transactions between residents and nonresidents; residence is an economic concept, not merely citizenship.

Foreign investment. FDI implies a lasting interest/influence in an enterprise; portfolio investment concerns securities without the same direct-investment relationship.

1 Planning, farming and social development

Planning Commission. Established in 1950 by executive resolution; NITI Aayog replaced it in 2015, also through executive action.

First and Second Plans. First: 1951-56, strong agriculture/irrigation emphasis; Second: 1956-61, associated with Mahalanobis and heavy industry.

Green Revolution. High-yield varieties, irrigation, fertilisers and supporting institutions raised foodgrain output, especially wheat/rice in early beneficiary regions.

White Revolution. Operation Flood is associated with dairy cooperatives and Verghese Kurien; it is distinct from foodgrain-focused Green Revolution.

MSP. Government announces minimum support prices for specified crops; announcement does not mean universal procurement of every farmer's crop.

2 Agriculture and social development

Public distribution. PDS distributes specified food commodities through an organised public system; food availability and access are different food-security dimensions.

Cooperative principle. Member-owned, democratically controlled enterprise; one-member-one-vote is a common cooperative principle, subject to the applicable legal structure.

Demographic dividend. Potential gain from a favourable working-age population share; education, health and jobs determine whether the potential is realised.

Inclusive development. Financial inclusion concerns useful access and use of financial services; opening an account alone does not settle every access or welfare problem.

1 Institutions, investment and policy routes

SIDBI. Small Industries Development Bank of India was established on 2 April 1990 under a parliamentary Act; its central mandate concerns promotion, financing and development of MSMEs.

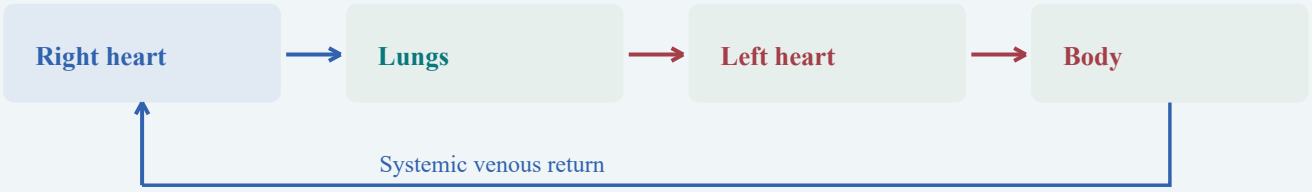
NABARD versus SIDBI. NABARD focuses on agriculture and rural development; SIDBI on the MSME sector. RBI is the central bank, not either specialised institution.

IDBI history. Established in 1964 as a wholly owned RBI subsidiary; ownership transferred to the Government in 1976. Its historical development-finance role is distinct from its later banking-company status.

FDI entry routes. Automatic route does not require prior Government approval; Government route requires approval by the competent authority. Sectoral caps and conditions still apply.

Basic Science and Everyday Applications

BLOOD FLOW: ARTERY DOES NOT ALWAYS MEAN OXYGENATED



Right heart → lungs: pulmonary artery. Lungs → left heart: pulmonary veins.

Remember. Remember the mechanism, not only the label: use it to test assertion-reason pairs.

1 Motion, forces and energy

SI force, work and power. Newton (N), joule (J) and watt (W), respectively; pressure is measured in pascal (Pa).

Speed conversion. km/h × 5/18 = m/s; m/s × 18/5 = km/h.

Distance versus displacement. Distance follows the whole path; displacement joins start to finish and includes direction.

2 Laws of motion and gravitation

Newton's first law. Zero resultant force means constant velocity, not necessarily rest; mass measures inertia.

Momentum and impulse. p = mv; impulse = change in momentum; for constant mass, resultant F = ma.

Third-law pair. Equal and opposite forces act on different bodies; they do not cancel on one body's force diagram.

Friction. Opposes relative slipping or its tendency at contact; static friction can act even when surfaces do not slide.

Gravity versus g. G is universal; local g varies. Weight = mg, while mass does not change simply because g changes.

Weightlessness. In free fall, apparent weight can be zero even when gravitational force is present; orbiting astronauts remain under gravity.

3 Work, energy and circular motion

Work. W = Fs cos θ for constant force; a force perpendicular to displacement does zero work.

Kinetic energy. K = ½mv^2; doubling speed doubles momentum but quadruples kinetic energy for fixed mass.

Energy and power. Near Earth, ΔU = mgΔh; power = work/time; efficiency = useful output/input.

Uniform circular motion. Speed may remain constant while velocity changes; centripetal acceleration points toward the centre and has magnitude v^2/r.

1 Pressure, heat and everyday devices

Density. ρ = mass/volume; 1 g/cm^3 = 1000 kg/m^3. Relative density is a ratio with no unit.

Pressure. P = normal force/area; smaller contact area means greater pressure for the same force.

Liquid pressure. Gauge pressure = ρgh; absolute pressure also includes the pressure at the liquid surface.

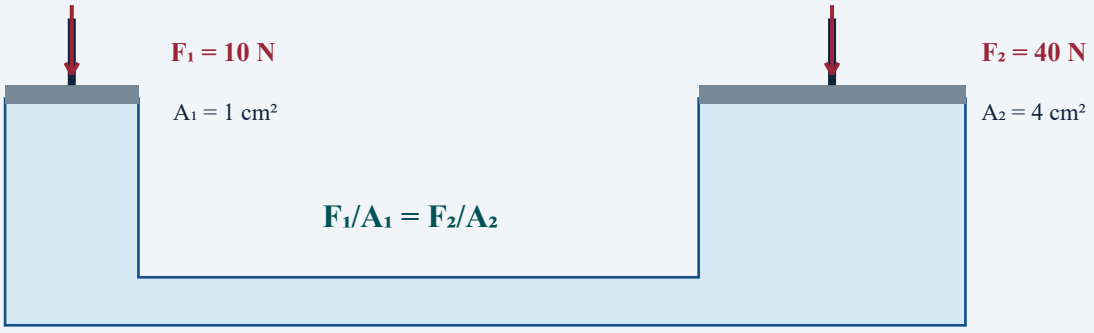
Hydraulic machines. Pascal's principle transmits an imposed pressure change through a confined fluid; force gain trades against movement distance.

Archimedes' principle. Buoyant force equals the weight of displaced fluid; use the fluid's density and the displaced volume.

Hydrometer. Floats higher in a denser liquid; a ship floats because its overall average density includes enclosed air.

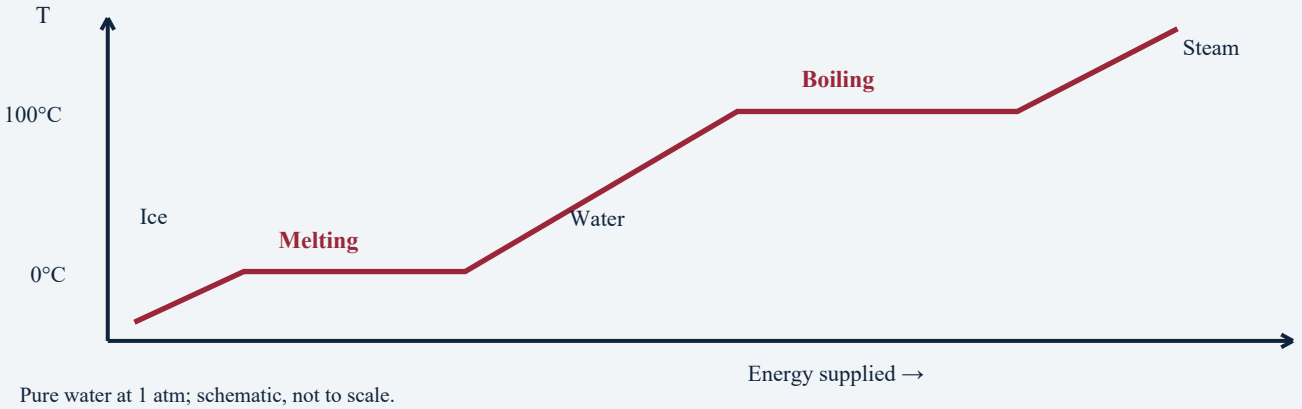
Barometer. Measures atmospheric pressure; standard atmosphere = 101325 Pa ≈ 760 mmHg. Pressure generally falls with altitude.

HYDRAULIC PRESS: SAME PRESSURE, DIFFERENT FORCE



Idealised, equal-height pistons. Force gain trades against displacement; energy is not multiplied.

HEATING WATER: THE FLAT PARTS ARE PHASE CHANGES



Pure water at 1 atm; schematic, not to scale.

2 Temperature, phase changes and water

Temperature conversion. K = °C + 273.15; °F = 9°C/5 + 32; a change of 1°C equals a change of 1 K.

Kelvin notation. Use K, not °K. Celsius and Fahrenheit readings coincide at -40°.

Latent heat. Q = mL; a pure substance can change state at fixed pressure without changing temperature while energy is transferred.

Evaporation. Surface cooling process; promoted by heat, airflow and larger surface area, and slowed by greater humidity.

Water anomaly. Pure water at ordinary pressure is densest near 4°C; cooling from 4°C to 0°C expands it. Ice floats.

3 Heat transfer and pressure cooking

Conduction and convection. Conduction needs no bulk material movement; convection transports energy through moving fluid, not through rigid solids.

Thermal radiation. Needs no medium. At corresponding conditions, good absorbers are good emitters; a vacuum does not stop radiation.

Pressure cooker. Higher internal pressure raises water's boiling temperature; lower atmospheric pressure lowers boiling point at altitude.

1 Sound, light and vision

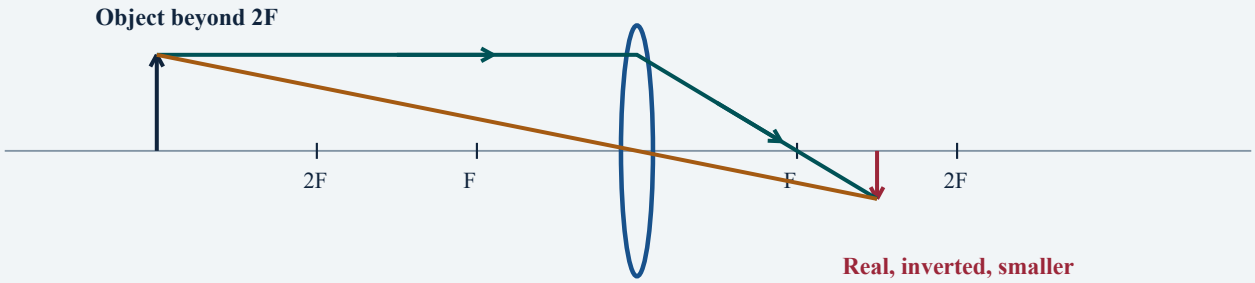
Wave relation. v = fλ; f = 1/T. Sound in air is longitudinal; a stretched-string wave is transverse.

Pitch, loudness, timbre. Pitch mainly follows frequency; intensity generally rises with amplitude squared; timbre depends on waveform/harmonics.

Sound and vacuum. Sound needs a material medium; electromagnetic waves do not. Use the question's sound speed, not a universal 340 m/s.

Hearing and echo. Typical young-human range: about 20 Hz-20 kHz. Echo/SONAR distance = wave speed × round-trip time/2.

CONVEX LENS: TRACE THE PRINCIPAL RAYS



Object beyond 2F → image between F and 2F on the far side. Thin lens in air; schematic.

VISION DEFECTS: WHERE DOES THE IMAGE FOCUS?



Uncorrected-eye schematics: distant object (left), near object (right). Not to scale.

2 Reflection, mirrors and refraction

Reflection. Incidence angle = reflection angle, measured from the normal. A ray 30° to the surface is 60° to the normal.

Plane mirror. Virtual, upright, same-size image; image distance behind equals object distance in front.

Concave versus convex mirror. Concave can form real or virtual images; convex gives a virtual, upright diminished image of a real object.

Refraction. $n = c/v$; $n_1 \sin i = n_2 \sin r$. Toward higher refractive index, an oblique ray bends toward the normal.

3 Optics and the human eye

Lens power. $P = 1/f$ in metres, measured in dioptres; thin lenses in contact have approximately additive powers.

Dispersion and scattering. Ordinary glass generally deviates violet more than red; atmospheric small-particle scattering favours shorter wavelengths. These are different mechanisms.

Vision correction. Myopia: concave lens; hypermetropia: convex lens; presbyopia: age-related loss of accommodation, not simply hypermetropia.

Eye and instruments. Retina receives the real inverted image; iris controls pupil size. Periscope redirects rays; microscope enlarges small objects; telescope views distant ones.

1 Electricity and electromagnetic waves

Current and voltage. $I = Q/t$; V = energy/charge. Conventional current opposes electron drift in a metallic conductor.

Meter connection. Ammeter → series, very low ideal resistance; voltmeter → parallel, very high ideal resistance.

Ohm's law. $V = IR$ for an ohmic conductor at unchanged physical conditions; wire resistance $R = \rho L/A$.

Series and parallel. Series: same current, resistances add. Parallel: same voltage; reciprocal resistances add.

2 Power, safety and magnetism

Electrical power. P = VI; for a resistor, $P = I^2R = V^2/R$. Fixed-current and fixed-voltage comparisons differ.

Commercial electricity unit. 1 unit = 1 kWh = 3.6×10^6 J; kWh is energy, not power.

Safety and cells. Fuse interrupts excess current; earthing provides a fault-current path. Primary cells are not designed for recharge; secondary cells are rechargeable.

Magnetic field recall. Outside a bar magnet, field runs N → S; inside, S → N. Cutting it produces smaller two-pole magnets.

3 Electrical machines and electromagnetic radiation

Motor, generator, transformer. Motor: electrical → mechanical; generator: mechanical → electrical; transformer needs changing magnetic flux, not steady DC.

Electromagnetic order. Radio → microwave → infrared → visible → ultraviolet → X-ray → gamma, broadly increasing frequency; all travel at c in vacuum.

X-rays and total reflection. X-rays are ionising electromagnetic radiation. Total internal reflection needs higher-to-lower index travel and incidence above the critical angle.

1 Atoms, reactions and common materials

Atomic number. Number of protons; equals electron count only in a neutral atom. Mass number = protons + neutrons.

Isotopes and isobars. Isotopes: same atomic number, different mass number. Isobars: same mass number, different atomic number.

Ions. Loss of electrons forms positive ions; gain forms negative ions. Ordinary chemical changes do not change the nucleus.

Modern periodic table. Ordered by atomic number; periods are rows, groups are columns. Same-group elements often share related valence behaviour.

Group families. Group 1 metals (excluding hydrogen): alkali metals; 2: alkaline earth metals; 17: halogens; 18: noble gases. Hydrogen is in Group 1 but is a nonmetal.

Ionic versus covalent. Ionic bonding involves electrostatic attraction between ions; covalent bonding involves shared electron pairs.

2 Reactions, redox and catalysts

Conservation of mass. In a closed chemical reaction, total mass is conserved; balance equations with coefficients, not altered formula subscripts.

Physical versus chemical. Melting changes physical state; rusting forms new substances. Reversibility alone is not a reliable classification test.

Oxidation and reduction. Oxidation loses electrons; reduction gains electrons. Memory aid: OIL RIG; both occur together in a redox process.

Agents. An oxidising agent accepts electrons and is reduced; a reducing agent donates electrons and is oxidised.

Catalyst. Changes reaction rate without being consumed overall; it does not alter the equilibrium constant at fixed temperature.

3 Metals, corrosion and materials

Rusting. Iron corrosion requires oxygen and moisture; rust is hydrated iron oxide, not a single universally fixed hydration formula.

Galvanisation. Coats iron/steel with zinc; zinc provides barrier protection and can act sacrificially.

Alloy pairs. Brass: copper + zinc; bronze: copper + tin; stainless steel typically contains chromium in an iron-based alloy.

Nonmetal exceptions. Graphite conducts electricity; iodine is lustrous. Mercury is a liquid metal at ordinary room temperature.

4 Carbon, fuels and everyday materials

Diamond versus graphite. Diamond: hard three-dimensional network; graphite: layered structure with mobile electrons and electrical conductivity.

Fuel composition. Natural gas is mainly methane; LPG mainly propane/butane; CNG means compressed natural gas, not a different molecule.

Incomplete combustion. Can form poisonous CO and soot; CO reduces oxygen transport by binding strongly to haemoglobin.

Material associations. Ordinary soda-lime glass contains silica with sodium/calcium compounds; cement is not simply powdered limestone; gunpowder traditionally mixes nitrate, charcoal and sulphur.

1 Acids, bases and familiar formulas

Acids and bases in water. Acids increase hydronium-ion concentration; bases increase hydroxide-ion concentration in the usual aqueous school treatment.

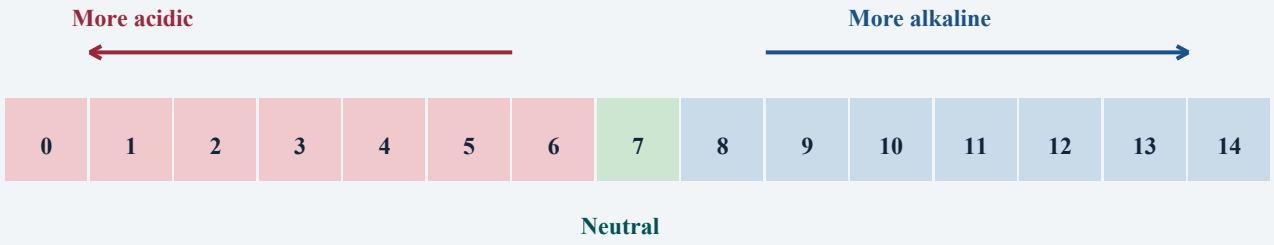
pH. At 25°C, neutral pure water has pH 7; lower pH is more acidic. Neutral pH depends on temperature.

Litmus. Acid turns blue litmus red; base turns red litmus blue. Dry gases may not affect dry litmus without water.

Indicators. Phenolphthalein: colourless in acidic, pink in sufficiently alkaline solution; methyl orange: red in acidic, yellow in alkaline solution.

Neutralisation. Acid + base commonly gives salt + water; equal volumes alone do not guarantee neutrality.

pH: ONE UNIT MEANS A TENFOLD CHANGE



Lower pH → greater hydrogen-ion activity.

Typical aqueous scale at 25°C. Neutral pH depends on temperature; extreme values can lie outside 0-14.

2 Everyday salts and chemical tests

Carbonate test. Acid + carbonate/hydrogencarbonate releases CO_2; it turns limewater milky, with excess CO_2 potentially clearing it.

Baking versus washing soda. Baking: $NaHCO_3$; washing: $Na_2CO_3 \cdot 10H_2O$. Baking powder is a mixture, not pure baking soda.

Quicklime and slaked lime. Quicklime: CaO; slaked lime: $Ca(OH)_2$. Adding water to quicklime releases considerable heat.

Gypsum and plaster of Paris. Gypsum: $CaSO_4 \cdot 2H_2O$; plaster: $CaSO_4 \cdot \frac{1}{2}H_2O$. Plaster sets by rehydrating.

3 Carbon compounds and formula pairs

Functional groups	Alcohol: -OH; aldehyde: -CHO; ketone: >C=O; carboxylic acid: -COOH.
Ethanol versus ethanoic acid	Ethanol: C_2H_5OH; ethanoic acid: CH_3COOH. Vinegar is a dilute aqueous ethanoic-acid solution.
Mineral acids	Hydrochloric: HCl; sulphuric: H_2SO_4; nitric: HNO_3. Strength is not the same as concentration.
Organic-acid pairs	Acetic/ethanoic: vinegar; citric: citrus fruits; lactic: sour milk/fermentation contexts; tartaric: tamarind and grapes.
Common salts	Sodium chloride: NaCl; potassium nitrate: KNO_3; copper sulphate pentahydrate: $CuSO_4 \cdot 5H_2O$.
Glucose and sucrose	Glucose: $C_6H_{12}O_6$; sucrose: $C_{12}H_{22}O_{11}$. Same elements do not imply the same compound.

1 Cells, heredity and plant functions

Cell nucleus. Contains most cellular DNA in typical eukaryotic cells; prokaryotes lack a membrane-bound nucleus.

Mitochondria and ribosomes. Mitochondria support aerobic ATP production; ribosomes synthesise proteins. Mature mammalian red cells lack mitochondria and a nucleus.

Chloroplasts. Site of photosynthesis in green plant cells; chlorophyll absorbs light, while carbohydrate formation also needs carbon fixation reactions.

Cell membrane versus wall. Membrane regulates exchange; plant cell walls provide support. Osmosis concerns water movement across a selectively permeable membrane.

Mitosis versus meiosis. Mitosis generally preserves chromosome number; meiosis halves it in the production of haploid cells and promotes variation.

2 Heredity and transport in plants

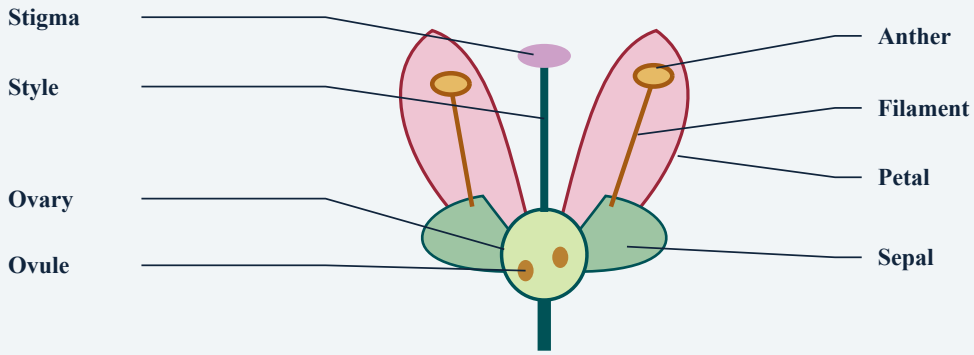
Human chromosome count. Most human somatic cells have 46 chromosomes in 23 pairs; typical gametes have 23, not 23 pairs.

Gene and chromosome. A gene is a DNA sequence associated with a functional product; chromosomes organise DNA with proteins.

DNA versus RNA. DNA usually stores hereditary information; RNA participates in gene expression. Some viruses use RNA as genetic material.

Xylem versus phloem. Xylem mainly transports water/minerals; phloem distributes sugars and other organic solutes between sources and sinks.

FLOWER: OVULE BECOMES SEED; OVARY BECOMES FRUIT



Simplified longitudinal section. The pistil includes stigma, style and ovary; the stamen includes anther and filament.

3 Plant processes and reproduction

Photosynthesis recall. Uses light energy to build organic compounds from CO_2 and water; released oxygen originates from water.

Respiration versus breathing. Cellular respiration releases usable energy from substrates; breathing ventilates respiratory surfaces. Plants also respire.

Stomata and transpiration. Stomata regulate gas exchange and water loss; guard cells control opening. Transpiration helps water transport and cooling.

Pollination versus fertilisation. Pollination transfers pollen to a receptive stigma; fertilisation fuses gametes. Neither word means seed dispersal.

Flower-to-fruit pair. After fertilisation, the ovule generally develops into a seed and the ovary into a fruit; accessory tissues may also contribute.

1 Human organs and circulation

Heart circulation. Right side pumps blood toward lungs; left side pumps toward the body. Humans normally have double circulation.

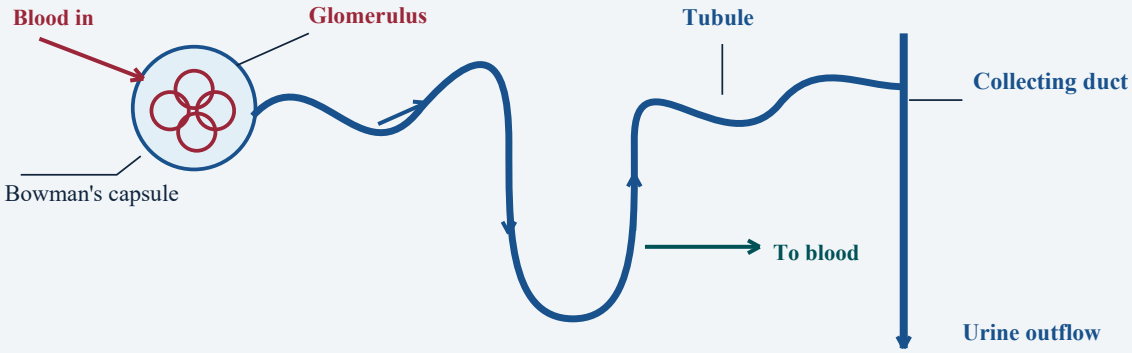
Artery versus vein. Arteries carry blood away from the heart; veins carry it toward the heart. Oxygenation is not the defining distinction.

Pulmonary exception. Pulmonary artery carries relatively deoxygenated blood; pulmonary veins carry oxygenated blood in normal adult circulation.

Blood components. Red cells transport respiratory gases; white cells defend; platelets support clotting; plasma carries dissolved substances.

Haemoglobin. Iron-containing respiratory pigment of red cells; iron deficiency can cause anaemia, but not all anaemia is iron deficiency.

NEPHRON: FILTRATION FIRST, THEN SELECTIVE REABSORPTION



Simplified functional layout; surrounding blood vessels are omitted. Not to scale.

2 Blood groups and organ functions

ABO and Rh. Blood-group compatibility depends on antigens, antibodies and the component transfused; simple universal-donor labels have clinical limitations.

Kidney and nephron. Nephrons filter and modify fluid to form urine; kidneys help regulate water, ions, acid-base balance and waste removal.

Liver roles. Produces bile, processes nutrients and detoxifies many substances; bile is stored/concentrated in the gall bladder, not produced there.

Lungs. Gas exchange occurs mainly across alveolar surfaces; inhalation involves diaphragm contraction and increased chest volume.

Skin and sense organs. Skin contributes to protection and temperature regulation; the ear's cochlea supports hearing and semicircular canals help balance.

1 Digestion, hormones and coordination

Digestive sequence. Mouth → oesophagus → stomach → small intestine → large intestine; most nutrient absorption occurs in the small intestine.

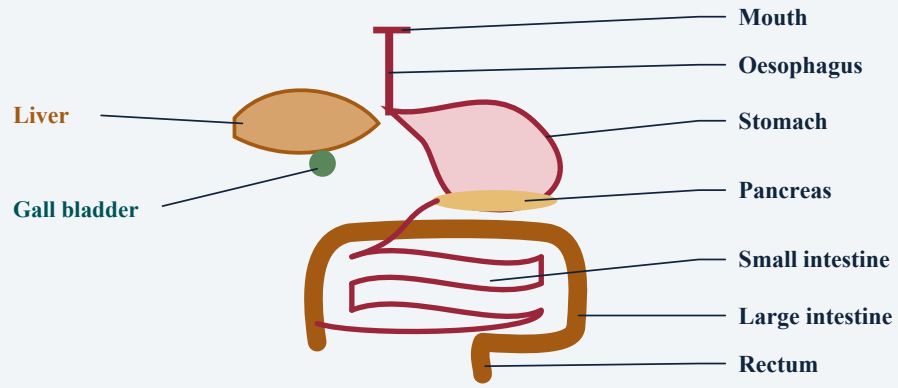
Digestive enzymes. Amylase acts on starch; proteases on proteins; lipases on fats. Bile aids fat digestion but is not a digestive enzyme.

Stomach and intestine. Stomach acid supports pepsin action; alkaline secretions help provide suitable conditions for many intestinal enzymes.

Pancreas. Has exocrine digestive secretion and endocrine hormone production; insulin lowers blood glucose through several coordinated effects.

Insulin and glucagon. Insulin generally lowers blood glucose; glucagon generally raises it. Both come from pancreatic islet cells of different types.

DIGESTIVE SYSTEM: TRACE THE FOOD PATHWAY



Schematic anatomy. Most nutrient absorption takes place in the small intestine.

2 Hormones and nervous coordination

Thyroid and iodine. Iodine is required for thyroid-hormone production; deficiency can cause goitre, but goitre has other possible causes too.

Adrenaline. Adrenal medulla hormone associated with fight-or-flight responses, including increased heart activity and energy availability.

Pituitary and hypothalamus. Pituitary regulates several endocrine glands, while the hypothalamus links nervous and endocrine control; 'master gland' is a simplification.

Reflex action. A rapid involuntary response follows a reflex pathway; some reflexes are mediated through the spinal cord, others through the brain.

Nervous-system divisions. Central: brain and spinal cord; peripheral: associated nerves. Cerebellum supports coordination and balance; medulla regulates vital functions.

1 Nutrition, diseases and immunity

Energy nutrients	Carbohydrates and proteins yield about 4 kcal/g; fats about 9 kcal/g in standard food-energy calculations.
Vitamin A	Deficiency can cause night blindness and other eye changes; carrots supply beta-carotene, a vitamin-A precursor.
Vitamin B_1	Thiamine deficiency causes beriberi; do not confuse it with niacin deficiency, associated with pellagra.
Vitamin C	Deficiency causes scurvy; vitamin C supports collagen formation and can aid absorption of non-haem iron.
Vitamin D	Deficiency can cause rickets in children and osteomalacia in adults; it supports calcium/phosphate regulation.
Vitamin K	Required for normal production of several clotting proteins; not the same substance as the mineral potassium, whose symbol is K.
Mineral pairs	Iron → haemoglobin; iodine → thyroid hormones; calcium/phosphorus → bones and teeth, alongside other essential roles.

2 Skeleton and bone pairs

Skeleton	A typical adult has 206 bones; counts vary with age and individual variation. Tendons join muscle to bone; ligaments join bone to bone.
Bone superlatives	Femur is the longest bone; stapes in the middle ear is the smallest. Superlatives refer to the typical adult human skeleton.

3 Diseases and transmission

Malaria. Caused by Plasmodium parasites; transmitted mainly by infected female Anopheles mosquitoes, not by all mosquitoes.

Dengue and chikungunya. Viral infections commonly spread by infected Aedes mosquitoes; the vector is not the disease-causing pathogen.

Tuberculosis. Bacterial disease caused mainly by Mycobacterium tuberculosis; commonly spreads through airborne infectious particles.

Cholera and typhoid. Bacterial diseases associated with contaminated food/water; the organisms are Vibrio cholerae and Salmonella Typhi, respectively.

Rabies and AIDS. Rabies is viral and commonly transmitted through infected-animal saliva; AIDS results from HIV infection, not ordinary social contact.

Ringworm. Fungal infection despite the name; it is not caused by an actual worm.

4 Prevention, treatment and spread

Antibiotics. Target susceptible bacteria; they do not directly treat viral infections. Inappropriate use promotes antimicrobial resistance.

Vaccination. Trains adaptive immune responses and memory; passive immunity supplies ready-made antibodies and is usually temporary.

Smallpox milestone. WHO declared smallpox eradicated in 1980; its causative agent was variola virus.

Endemic, epidemic, pandemic. Endemic: usual regional presence; epidemic: excess occurrence in a population; pandemic: widespread epidemic across countries/continents.

1 Sound production, carbohydrates and statement checks

Larynx. The cartilaginous voice box houses vocal folds and helps produce sound; pharynx is the throat region, not the voice box.

Fructose. A monosaccharide with formula $C_6H_{12}O_6$, classified as a ketohexose; it is not an amino acid.

Glucose versus fructose. Both have formula $C_6H_{12}O_6$; their structures differ. Same molecular formula does not imply identical chemical behaviour.

2 Motion and assertion-reason checks

Centripetal force. The inward net force changes velocity direction in circular motion; it is supplied by forces such as tension or gravity, not an additional universal force.

Force removed in a circle. Without the inward resultant, an object continues along the instantaneous tangent under ideal force-free conditions, not around the original circle.

Assertion-reason check. First test each statement; then test whether the reason actually explains the assertion. A true supporting fact is not automatically a causal explanation.

Science, Technology and Space

SPACE SYSTEM: THREE DIFFERENT ROLES

LAUNCH VEHICLE	SPACECRAFT	APPLICATION
Reaches the orbit	**Works in space**	**Serves a need**
Example: PSLV / LVM3	Example: satellite / probe	Imaging / navigation

A launch vehicle is not the satellite it carries; one system can serve many applications.

Remember. Separate launch vehicle from spacecraft, navigation from imaging and fission from fusion.

1 Indian space and scientific associations

ISRO foundation. Indian Space Research Organisation was established in 1969; its headquarters are in Bengaluru.

Aryabhata satellite. India's first satellite, launched on 19 April 1975 by a Soviet rocket; not launched by an Indian launch vehicle.

Rohini RS-1. Placed in orbit by India's SLV-3 in July 1980, marking an important indigenous launch-vehicle milestone.

Chandrayaan milestones. Chandrayaan-1 launched in 2008; Chandrayaan-3 soft-landed on 23 August 2023. Landing region and exact lunar pole are not identical.

Lander and rover. Chandrayaan-3 lander: Vikram; rover: Pragyan. A mission's orbiter, lander and rover are different components.

2 Vehicles, applications and scientific associations

Mars and Sun missions. Mars Orbiter Mission launched in 2013; Aditya-L1 launched in 2023 to study the Sun from a suitable L1-region orbit.

Launch-vehicle distinction. A satellite is a payload; PSLV, GSLV and LVM3 are launch-vehicle families. A mission name is not necessarily a rocket name.

Navigation and sensing. NavIC: India's regional satellite-navigation system; remote sensing observes Earth, while navigation estimates position/time.

Science-name pairs. C.V. Raman: Raman effect; S.N. Bose: quantum statistics; Homi Bhabha: Indian nuclear programme; Vikram Sarabhai: Indian space programme.

Discovery associations. Newton: laws of motion/gravitation; Faraday: electromagnetic induction; Rutherford: nuclear atomic model; Alexander Fleming: penicillin discovery.

1 Orbits, sensing and scientific instruments

Remote sensing versus navigation. Remote sensing measures properties of Earth/objects from a distance; navigation services support position, navigation and timing.

Geostationary conditions. A geostationary orbit is circular and equatorial with an eastward period matching Earth's sidereal rotation, about 23 h 56 min, so it appears fixed over a longitude.

Scientific-instrument pairs. Spectrometer: spectral information; seismometer: ground motion; barometer: pressure; hydrometer: liquid-density comparison. Similar names do not imply the same measurement.

1 Nuclear, digital and emerging-technology basics

Fission versus fusion. Fission splits a heavy nucleus; fusion joins light nuclei. Both can release energy through changes in nuclear binding.

Nuclear reactor roles. Fuel undergoes fission; moderator slows neutrons in reactor designs that use one; control rods absorb neutrons; coolant transfers heat.

BARC and DAE. Bhabha Atomic Research Centre is a major nuclear-research institution under the Department of Atomic Energy; not an ISRO launch centre.

SMR meaning. Small modular reactor: a reactor category defined by smaller modular designs; the term does not itself specify a particular fuel, site or commissioning year.

Hydrogen distinction. Hydrogen is an energy carrier; its production pathway determines associated emissions. Nuclear process heat can support hydrogen production.

2 Digital communication and emerging technologies

Quantum key distribution. QKD uses quantum properties to distribute cryptographic keys with eavesdropping detection; it is not simply a faster internet connection.

AI and robotics. AI concerns computational inference/decision tasks; a robot is a physical system. Software intelligence need not have a robotic body.

Cell broadcast. A one-to-many location-based mobile alert mechanism; distinguish broadcasting to an area from sending individual SMS messages.

C-DOT. Centre for Development of Telematics: an Indian telecom R&D institution; distinct from NIC's government informatics role and ISRO's space role.

Organisations, Awards and Observances

HEADQUARTERS: REMEMBER CITY + MANDATE

GENEVA	PARIS	ROME
WHO: health	**UNESCO**	**FAO**
ILO: labour; WTO: trade	Education, science, culture	Food and agriculture

A selected memory aid, not a complete list of organisations in these cities.

Remember. Connect organisation, headquarters and mandate; agency and principal organ are different categories.

1 United Nations and international frameworks

United Nations milestone. UN Charter entered into force on 24 October 1945; UN Day is observed on 24 October.

Six principal organs. General Assembly, Security Council, ECOSOC, Trusteeship Council, International Court of Justice and Secretariat.

Security Council. 15 seats: five permanent and ten elected; permanent members are China, France, Russia, UK and US.

Veto caution. Permanent-member veto concerns substantive Security Council decisions; it is not a General Assembly voting power.

UN General Assembly. Each member State has one vote; population size does not give additional votes.

2 UN institutions and international principles

UN Secretary-General. Appointed by the General Assembly on Security Council recommendation; this is not a direct global popular election.

ICJ. International Court of Justice sits at The Hague; it is distinct from the International Criminal Court.

UN headquarters. UN headquarters: New York; major UN offices also operate in Geneva, Vienna and Nairobi.

Trusteeship Council. Suspended regular operations in 1994 after Palau's independence; it remains a principal organ under the Charter.

Panchsheel. Five principles include sovereignty/territorial integrity, non-aggression, non-interference, equality/mutual benefit and peaceful coexistence.

1 Organisations and headquarters

Geneva cluster	WHO: health; ILO: labour; WTO: trade; WMO: meteorology. Same city does not mean the same organisation.
Paris and Rome	UNESCO headquarters: Paris; FAO headquarters: Rome. UNESCO is not the UN's food agency.
Bretton Woods	1944 conference shaped IMF and World Bank institutions; IMF and World Bank are not the same lender with two names.
Washington institutions	IMF and World Bank headquarters are in Washington, DC; their mandates and lending frameworks differ.
ASEAN and SAARC	ASEAN Secretariat: Jakarta; SAARC Secretariat: Kathmandu. Membership lists can change and should be checked separately.

2 International groupings and humanitarian bodies

Commonwealth and NATO	Commonwealth Secretariat: London; NATO headquarters: Brussels. Membership in one does not imply membership in the other.
G20	A major international economic-cooperation forum; the African Union was admitted as a permanent member in 2023.
BRICS	Originally Brazil, Russia, India, China, South Africa in the familiar acronym; later expansion means that acronym is not a complete current membership list.
Non-Aligned Movement	First summit: Belgrade, 1961; non-alignment is not simply legal neutrality in every conflict.
International humanitarian distinction	ICRC is associated with humanitarian protection and Geneva Conventions; it is not a UN military force.

1 Institutional distinctions and observances

Important observances. World Health Day: 7 April; World Environment Day: 5 June; International Yoga Day: 21 June.

UN agency versus organ. WHO/UNESCO/ILO are specialised agencies; Security Council/General Assembly/ICJ are principal organs. These are different institutional categories.

Security Council elections. Ten elected members normally serve two-year terms; the five permanent seats follow a different constitutional arrangement under the Charter.

ICJ versus ICC jurisdiction. ICJ deals with disputes between States and advisory opinions; ICC concerns individual criminal responsibility within its legal jurisdiction.

WTO versus IMF. WTO concerns trade rules; IMF concerns monetary/financial stability and balance-of-payments support. Their mandates overlap neither completely nor exclusively with development banking.

1 Important days and award categories

UN and health days. 24 October: UN Day and World Polio Day; 7 April: World Health Day; 1 December: World AIDS Day.

Environment observances. 22 April: Earth Day; 5 June: World Environment Day; 16 September: World Ozone Day.

Water, wildlife and wetlands. 22 March: World Water Day; 3 March: World Wildlife Day; 2 February: World Wetlands Day.

Yoga and science. 21 June: International Day of Yoga; 28 February: India's National Science Day; annual themes require a year label.

2 Peace, honours and award distinctions

Peace and rights. 21 September: International Day of Peace; 10 December: Human Rights Day.

Padma hierarchy. Padma Vibhushan, Padma Bhushan, Padma Shri in descending order; Bharat Ratna is above the Padma awards and is a separate award.

Nightingale distinction. National Florence Nightingale Awards recognise nursing personnel; the award is not a sports-coaching or literary honour.

Static and current links. Learn the award's field and institution here; revise the year's recipient, summit theme, venue and changing membership from the monthly current-affairs editions.

Essential formulas

Use the stated conditions and consistent units. A remembered formula without its conditions can give the wrong answer.

Area	Relation	Condition / cue
Motion	$v = u + at$; $s = ut + \frac{1}{2}at^2$ $v^2 = u^2 + 2as$	Constant acceleration; signed quantities.
Average speed	$2ab/(a + b)$	Only for two equal-distance legs at positive speeds a and b.
Work and energy	$W = Fs \cos\theta$; $K = \frac{1}{2}mv^2$ $\Delta U = mg\Delta h$; power = W/t	Constant force; near-surface potential-energy approximation.
Fluids	$\rho = m/V$; $\Delta P = \rho gh$ $F_B = \rho_{fluid} g V_{displaced}$	Add surface pressure for absolute pressure.
Heat	$Q = mc\Delta T$; $Q = mL$	Temperature change versus phase change.
Temperature	$K = °C + 273.15$ $°F = 9°C/5 + 32$	A rise of 1°C equals a rise of 1 K.
Waves and echo	$v = f\lambda$; $f = 1/T$ Distance = vt/2	Echo uses round-trip time and the relevant medium speed.
Small pendulum	$T = 2\pi\sqrt{(L/g)}$	Small angular amplitude; negligible damping.
Optics	Mirror: $1/f = 1/v + 1/u$ Lens: $1/f = 1/v - 1/u$ Power = 1/f(m)	Cartesian signs; metres for dioptres.
Electricity	$V = IR$; $P = VI$; $E = Pt$ Resistor: $P = I^2R = V^2/R$	Ohmic V-I relation requires unchanged physical conditions.
Economics	Primary deficit = fiscal deficit - interest	Annual flows; not the debt stock.
Time and units	1° longitude = 4 minutes 1 kWh = 3.6×10^6 J	Local solar-time approximation; kWh is energy.

Compare in seconds

These pairs cause avoidable errors. Recall the defining distinction before picking a familiar-looking word.

Often confused	Keep the distinction
Mass / weight	Mass: inertia, kg; weight: gravitational force, N.
Heat / temperature	Heat: transferred energy; temperature determines the direction of spontaneous heat transfer.
Oxidising / reducing agent	Oxidising agent gains electrons and is reduced; reducing agent loses electrons and is oxidised.
Baking / washing soda	$NaHCO_3$ / $Na_2CO_3 \cdot 10H_2O$.
Artery / vein	Away from heart / toward heart; oxygen content has exceptions.
Pollination / fertilisation	Pollen transfer / gamete fusion.
Latitude / longitude	North-south angular position / east-west angular position; longitude links to time.
Weather / climate	Short-term atmospheric state / longer-term patterns and statistics.
Plassey / Buxar	1757 / 1764; Diwani followed in 1765.
Part III / IV / IVA	Fundamental Rights / Directive Principles / Fundamental Duties.
Money / Financial Bill	Money Bills are a specific constitutional category, not every Bill involving finance.
Fiscal / primary deficit	Primary deficit removes interest payments from fiscal deficit.
Army / Navy Captain	Army Captain is junior to Colonel; Navy Captain equals Army Colonel.
Radar / SONAR	Electromagnetic waves / sound.
Thomas / Uber / Sudirman	Badminton team cups: men / women / mixed.
Ryder / Walker / Solheim	Golf: men professionals / men amateurs / women professionals.
Radial / centripetal	Streams flow outward from a highland / inward toward a basin.