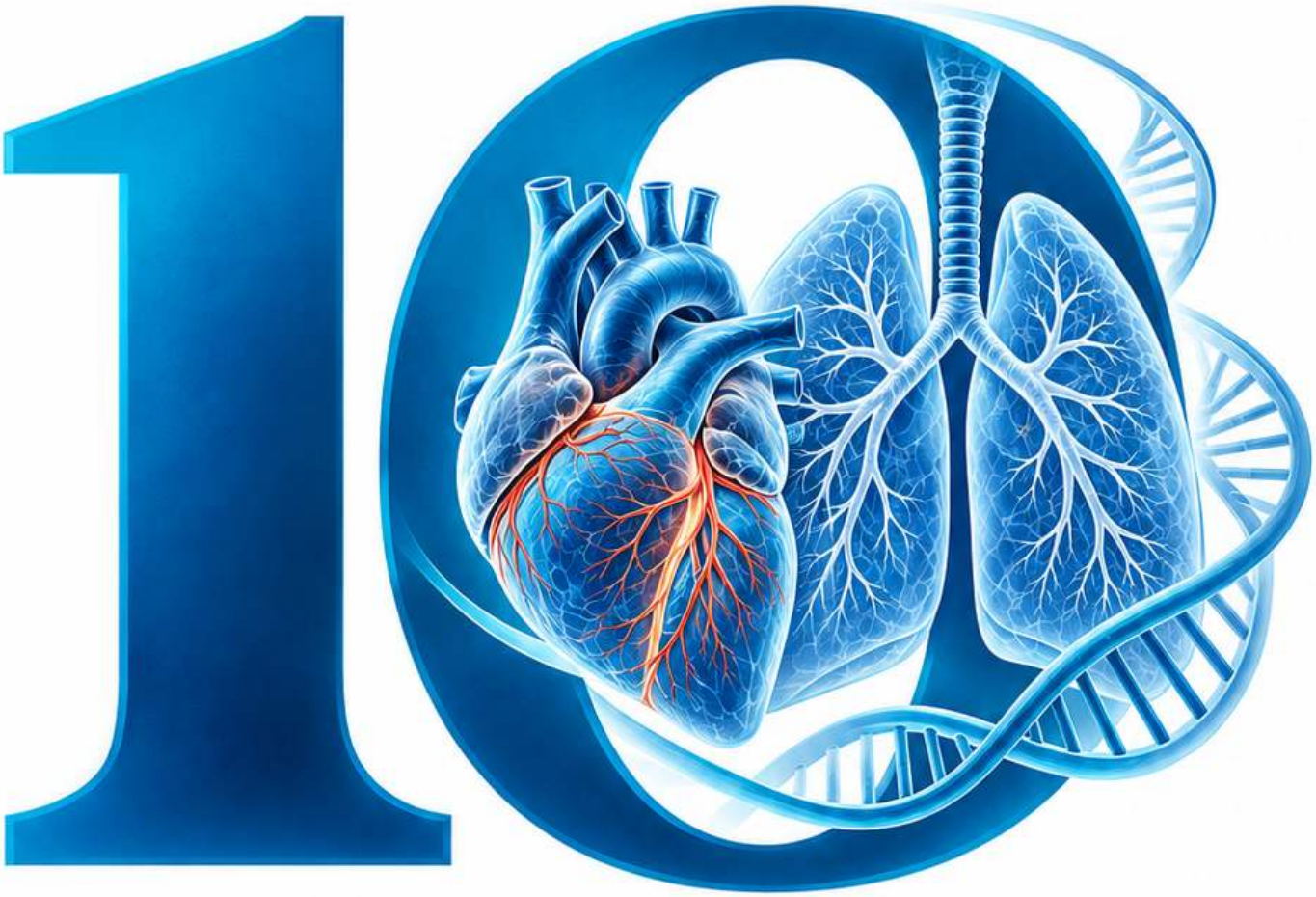
ATI TEAS 7

SCIENCE



10 FULL-LENGTH PRACTICE TESTS

500 ORIGINAL QUESTIONS

COMPLETE SCIENCE REVIEW

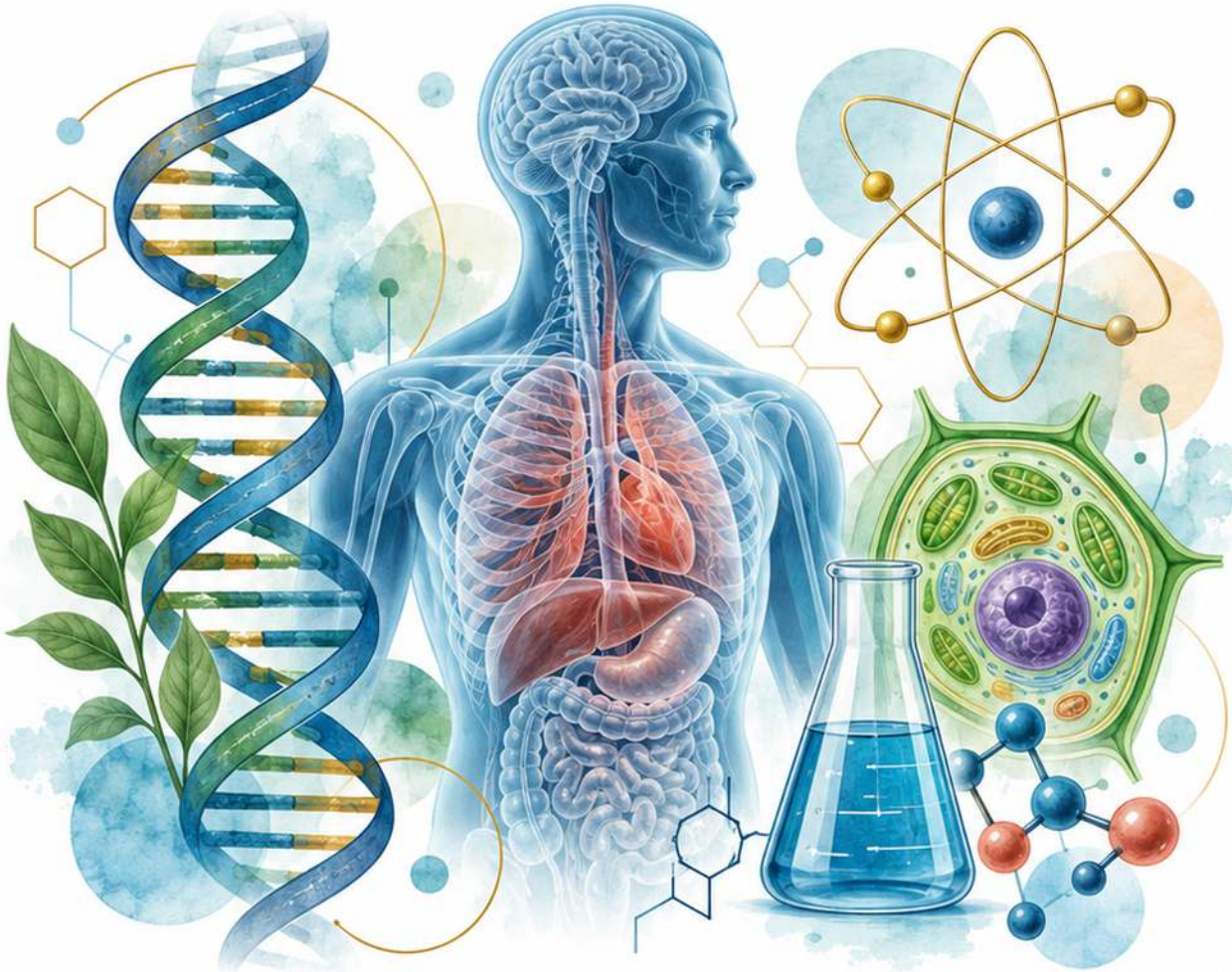
STEP-BY-STEP EXPLANATIONS

ATI TEAS 7 · SCIENCE

10 FULL-LENGTH PRACTICE TESTS

500 Original Questions

Complete Science Review & Step-by-Step Explanations



Reza Nazari

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1.3 Organization and homeostasis

chemical → cell → tissue → organ → organ system → organism

Four tissue types: epithelial (covers, lines, secretes), connective (supports, binds; includes bone, cartilage, tendons, blood, fat), muscle (contracts), nervous (signals).

Homeostasis keeps internal conditions near a set point.

- **Negative feedback** reverses a change: body temperature, blood glucose, blood pressure, thyroid hormone levels. Most body controls work this way.
- **Positive feedback** amplifies a change until an endpoint: oxytocin in labor, blood clotting.

Watch out: blood is a connective tissue; it is not its own tissue type.

1.4 Cardiovascular system

Blood path (memorize it as a loop):

body → venae cavae → right atrium → tricuspid valve → right ventricle → pulmonary valve → pulmonary arteries → lungs → pulmonary veins → left atrium → mitral (bicuspid) valve → left ventricle → aortic valve → aorta → body

- **Arteries** carry blood *away* from the heart; **veins** carry it *toward* the heart—regardless of oxygen. Pulmonary arteries carry oxygen-poor blood; pulmonary veins carry oxygen-rich blood.
- The **left ventricle** has the thickest wall: it pumps blood to the whole body.
- **Conduction:** SA node (pacemaker) → atria → AV node (brief delay) → bundle of His → bundle branches → Purkinje fibers → ventricles contract.
- **Systole** = contraction; **diastole** = relaxation and filling. BP is written systolic/diastolic; a normal resting adult BP is generally below 120 mm Hg systolic and below 80 mm Hg diastolic.
- **Capillaries** are one cell thick; exchange with tissues happens here. The **hepatic portal vein** carries nutrient-rich blood from the intestines to the liver before it returns to the heart.
- **Baroreceptors** (aorta, carotid arteries) sense stretch: when BP rises, a reflex slows the heart and widens vessels; when BP falls, heart rate rises.
- **Cardiac output** = heart rate × stroke volume (70 beats/min × 70 mL = 4,900 mL/min).

Watch out: "Pulmonary artery = oxygen-rich" is the most common error. Name vessels by direction, not by oxygen.

1.5 Blood

Plasma (≈55% of blood; about 92% water) carries nutrients, hormones, CO_2, and proteins such as **albumin** (holds water in the vessels) and clotting factors. **Formed elements:**

Red blood cells	hemoglobin carries O_2; no nucleus; live about 120 days
Neutrophils	most common WBC; first phagocytes at infection
Lymphocytes	B cells (antibodies) and T cells
Monocytes	become macrophages
Eosinophils / basophils	parasites, allergy / release histamine
Platelets	cell fragments that start clotting

ABO: type A cells carry A antigen and plasma has anti-B; type O has no A or B antigen (universal red-cell donor); type AB has both antigens and no anti-A or anti-B (universal red-cell recipient). Rh^+ cells carry the D antigen.

Watch out: low albumin lets fluid leave the vessels (edema); it does not lower red-cell count.

1.6 Respiratory system

nose → pharynx → larynx → trachea → bronchi → bronchioles → alveoli

- **Alveoli:** gas exchange by diffusion—O_2 and CO_2 each move down their own partial-pressure gradient; **surfactant** keeps alveoli from collapsing.
- **Inhalation:** diaphragm contracts and flattens, chest volume rises, pressure falls, air flows in. Quiet exhalation is passive.
- **Epiglottis** covers the larynx when you swallow. The trachea is held open by C-shaped cartilage rings; **cilia** on its lining sweep mucus and trapped particles up toward the throat.
- **Control:** the medulla oblongata sets the rhythm; rising CO_2 (and H^+) is the main trigger to breathe more.
- O_2 travels mostly bound to hemoglobin; CO_2 travels mostly as bicarbonate.
- Slow, shallow breathing → CO_2 rises → pH falls (respiratory acidosis). Hyperventilation → CO_2 falls → pH rises.
- **Volumes:** tidal volume ≈ 500 mL; vital capacity = tidal + inspiratory reserve + expiratory reserve; residual volume always stays in the lungs. Minute ventilation = breaths/min × tidal volume.

Watch out: the diaphragm *contracts* to inhale; it does not "push air in."

1.7 Digestive system

mouth → pharynx → esophagus → stomach → small intestine (duodenum, jejunum, ileum) → large intestine → rectum

Accessory organs: salivary glands, liver, gallbladder, pancreas. **Mechanical** digestion breaks food into pieces (chewing, churning, bile emulsifying fat); **chemical** digestion breaks bonds with enzymes.

Enzyme	Where	Digests
Salivary amylase	mouth	starch
Pepsin	stomach (acid)	protein
Pancreatic amylase	small intestine	starch
Trypsin	small intestine	protein
Lipase	small intestine	fats (triglycerides)
Lactase, maltase, sucrase	intestinal lining	disaccharides

- **Bile** is made by the liver, stored in the gallbladder, and *emulsifies* fat; it is not an enzyme.
- **Small intestine:** most digestion and absorption; villi and microvilli multiply surface area.
- **Large intestine:** absorbs water and electrolytes; gut bacteria make vitamin K.
- **Liver:** makes bile, stores glycogen, converts ammonia to urea, detoxifies, makes albumin and clotting factors.
- **Peristalsis:** waves of smooth-muscle contraction move food.

Watch out: most nutrients are absorbed in the small intestine, not the stomach or large intestine.

1.8 Nervous system

CNS = brain + spinal cord; **PNS** = everything else. PNS divides into **somatic** (voluntary, skeletal muscle) and **autonomic** (involuntary): sympathetic "fight or flight" and parasympathetic "rest and digest."

Neuron: dendrites receive → cell body → axon conducts (myelin speeds it) → axon terminal → synapse (neurotransmitter, e.g., acetylcholine). Na^+ rushing in depolarizes; K^+ leaving repolarizes.

Frontal lobe	planning, personality, voluntary movement, speech production
Parietal lobe	touch, pain, body position
Temporal lobe	hearing, memory
Occipital lobe	vision
Cerebellum	balance, coordination, smooth movement
Medulla oblongata	breathing, heart rate, blood pressure
Hypothalamus	temperature, hunger, thirst; controls the pituitary
Thalamus	relays sensory signals to the cortex
Corpus callosum	band of nerve fibers connecting the left and right hemispheres

Reflex arc: receptor → sensory neuron → interneuron (spinal cord) → motor neuron → effector.

Sympathetic: heart rate up, bronchioles and pupils dilate, digestion slows, glucose released. **Parasympathetic:** the reverse (mainly via the vagus nerve).

Hearing path: external auditory canal → tympanic membrane (eardrum) → ossicles (malleus, incus, stapes) → cochlea (vibrations become nerve impulses). Semicircular canals = balance. **Eye:** rods = dim light, cones = color.

Watch out: the cerebellum coordinates movement but does not start it; a cerebellar injury causes clumsiness, not paralysis.

1.9 Endocrine system

Gland	Key hormones and effects
Hypothalamus	releasing hormones; makes ADH and oxytocin
Anterior pituitary	GH, TSH, ACTH, FSH, LH, prolactin ("master gland" because its hormones control other glands)
Posterior pituitary	releases ADH (kidneys save water) and oxytocin (labor contractions, milk ejection)
Thyroid	T_3/T_4 raise metabolic rate; calcitonin lowers blood calcium
Parathyroids	PTH raises blood calcium
Adrenal cortex	cortisol (long-term stress, raises glucose, reduces inflammation); aldosterone (keeps Na^+, excretes K^+)
Adrenal medulla	epinephrine, norepinephrine (fast stress response)
Pancreas (islets)	insulin lowers blood glucose; glucagon raises it
Ovaries / testes	estrogen, progesterone / testosterone
Pineal	melatonin (sleep–wake cycle)
Kidneys	erythropoietin (EPO, red-cell production), renin

Feedback example: low thyroid hormone → more TSH → thyroid makes more → TSH falls.

Watch out: cortex = cortisol and aldosterone; medulla = epinephrine. Insulin *lowers* glucose.

1.10 Urinary system

kidney → ureter → bladder → urethra

Nephron path: glomerulus + Bowman's capsule (filtration) → proximal convoluted tubule (most reabsorption, including all normal glucose) → loop of Henle → distal convoluted tubule → collecting duct → renal pelvis.

- Three processes: **filtration** (blood pressure pushes plasma out; cells and large proteins stay), **reabsorption**, **secretion**.
- **ADH** makes collecting ducts save water (urine more concentrated). **Aldosterone** saves Na^+ (water follows).
- Kidneys also regulate blood pressure (renin), pH (excrete H^+, keep bicarbonate), electrolytes, and red-cell production (EPO).
- Glucose appears in urine when blood glucose exceeds what the tubules can reabsorb (uncontrolled diabetes).
- A shorter urethra is why UTIs are more common in women.

Watch out: the glomerulus filters; the tubules reabsorb. Protein in urine suggests glomerular damage.

1.11 Muscular system

Skeletal	voluntary, striated, many nuclei; moves bones
Cardiac	involuntary, striated, branched, intercalated discs; heart only
Smooth	involuntary, not striated; walls of hollow organs and vessels

- **Contraction:** a nerve releases acetylcholine → Ca^{2+} released from the sarcoplasmic reticulum → myosin heads pull actin → sarcomere shortens. ATP is needed for myosin to let go (why muscles stiffen after death).
- Filaments slide; they do not shorten themselves.
- **Origin** = fixed attachment; **insertion** = the attachment that moves. Muscles work in opposing pairs (biceps flexes, triceps extends the elbow).
- More force = more **motor units** recruited.
- Tendons join muscle to bone; ligaments join bone to bone.

Watch out: calcium binds troponin on the thin filament, not myosin.

1.12 Skeletal system

206 bones in an adult. **Axial:** skull, vertebrae, ribs, sternum. **Appendicular:** limbs, shoulder and pelvic girdles.

Functions: support, protection, movement, mineral storage (Ca, P), blood-cell formation (red marrow), fat storage (yellow marrow).

Shapes: long (femur), short (carpals), flat (sternum, skull bones), irregular (vertebrae), sesamoid (patella).

Long bone: diaphysis (shaft), epiphyses (ends), **epiphyseal plate** (growth in length until adulthood), periosteum (outer membrane), articular cartilage (joint surfaces), osteons (units of compact bone: concentric rings around a **central (Haversian) canal** that carries blood vessels and nerves).

Cells: osteoblasts build bone, osteoclasts break it down, osteocytes maintain it.

Joints: fibrous (skull sutures, immovable), cartilaginous (between vertebrae), synovial (freely movable: ball-and-socket = shoulder, hip; hinge = elbow, knee; pivot = neck).

Vitamin D is needed to absorb calcium; lack of it softens bones.

Watch out: bone grows in length at the epiphyseal plate, not at the shaft or the joint cartilage.

Table of Contents

★ Practice Test 1 ____ 18
★ Practice Test 2 ____ 29
★ Practice Test 3 ____ 40
★ Practice Test 4 ____ 50
★ Practice Test 5 ____ 61
★ Practice Test 6 ____ 71
★ Practice Test 7 ____ 82
★ Practice Test 8 ____ 92
★ Practice Test 9 ____ 102
★ Practice Test 10 ____ 112
Practice Test Answer Keys ____ 123
Practice Test Answers and Explanations ____ 126

ATI TEAS 7 Science

Practice Test 1

1

Questions: 50

Duration: 60 minutes

Calculator: basic calculator allowed

Take it online

Timed, with instant scoring

Important Test Information

Question Types:

- **Multiple Choice:** Choose the one best answer from the four options (A, B, C, or D).
- **Select All That Apply:** Mark every correct box. All correct choices, and only those, earn the point.
- **Fill in, Ordered Response, Hot Spot:** Write the number, number the steps 1–4, or choose the lettered region.

Test-Taking Tips:

- Budget your time: about 72 seconds per question (50 questions in 60 minutes).
- There is no penalty for guessing, so answer every question.
- Read graphs, tables, and diagrams before the answer choices.

Remember: Stay calm, read every word, and flag hard questions so you can come back to them at the end!

1) How do many bacteria reproduce under favorable conditions?

(A) By binary fission
(B) By mitosis followed by cytokinesis
(C) By meiosis that produces haploid gametes
(D) By budding, as yeast cells do

Scan Me

2) How does vaccination help protect a person from a viral disease? Mark every correct box.

☐ A. It exposes the immune system to antigens without causing the full disease.

☐ B. It supplies ready-made antibodies that protect for the person's entire life.

☐ C. It leads to memory cells that respond faster to a later exposure.

☐ D. It works mainly by strengthening the skin and mucous membrane barriers.

☐ E. It produces active immunity, because the person's own immune system responds.

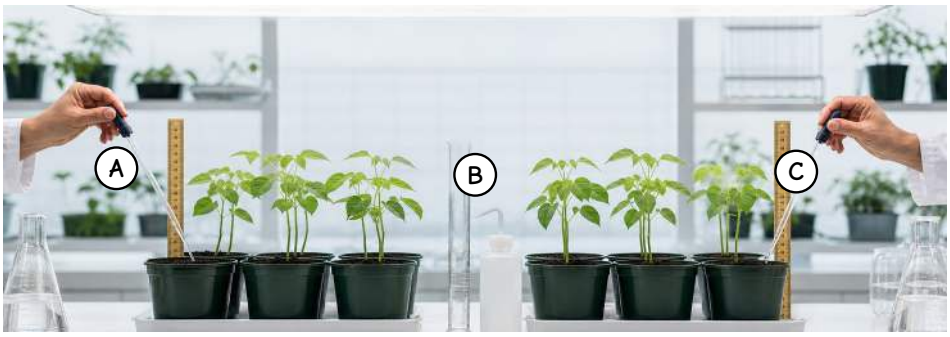
3) Sodium and potassium are in the same group (column) of the periodic table. Which property do their atoms share?

(A) The same number of protons
(B) The same number of electron shells
(C) The same atomic mass
(D) The same number of valence electrons

4) After an opioid overdose, a patient breathes slowly and shallowly. Which change in the patient's arterial blood is most likely?

(A) Carbon dioxide falls and pH rises.
(B) Carbon dioxide rises and pH rises.
(C) Carbon dioxide falls and pH falls.
(D) Carbon dioxide rises and pH falls.

5) The plant investigation compares treatments and records growth. Select the region that shows the tool used to measure the dependent variable, plant height.



Plant-treatment setup with droppers, a graduated cylinder, plants, and rulers.

6) A patient receives an intravenous infusion of 3 percent sodium chloride, which is hypertonic to red blood cells. What will most likely happen to the patient's red blood cells?

(A) Sodium ions move into the cells, causing them to swell.
(B) Water moves out of the cells, causing them to shrink.
(C) Water moves into the cells, causing them to swell and burst.
(D) No net water moves, because both sides contain sodium chloride.