The Ultimate AP® Psychology Unit 1 Cheat Sheet

1.1 Heredity & Environment

Nature + Nurture

Nature vs. nurture: genes vs. experience. Modern view: both interact → behavior. Genes set a range; environment sets where in that range you land (height + nutrition).
Genotype = genes you carry. **Phenotype** = traits actually expressed (genes + environment interact).
Epigenetics: environment (stress, diet, toxins) switches genes on/off via chemical tags, w/o altering DNA sequence. Some of these changes may even pass to offspring.

Evolutionary Perspective

Natural selection: traits that aid survival + reproduction get passed on → more common over generations (Darwin).
Evolutionary psych: explains behavior (fear of snakes, mate preferences) as adaptations that helped ancestors survive. Critique: hard to test, after-the-fact stories.

Research Designs

Study	Compares	Shows
Twin	MZ vs. DZ twins	MZ more alike → genes
Adoption	Bio vs. adopt. kin	Like bio → genes
Family	Close vs. far kin	Risk ↑ w/ relatedness
Twins apart	MZ reared apart	Genes w/o shared env.

MZ (identical): 1 egg splits, ~100% shared genes. **DZ (fraternal)**: 2 eggs, ~50%, like any siblings. Both share a home env. → extra MZ similarity = genetic effect.
Heritability: % of trait *variation in a group* due to genes (0–1). Higher when env. is uniform; changes w/ population.

⚠ Heritability is about groups, never individuals. "Intelligence is 50% heritable" ≠ half of YOUR IQ comes from genes. Also ≠ fixed, unchangeable traits.

Eugenics: discredited 19th–20th c. movement to "improve" humans via selective breeding/forced sterilization. Misused early psych theories + IQ tests to justify it.

✓ FRQ: name the design (twin vs. adoption), then say what similarity pattern would point to genes vs. environment.

1.2 Nervous & Endocrine Systems

Divisions

CNS = brain + spinal cord. **PNS** = all nerves outside CNS; carries messages back and forth between CNS and body.
Somatic NS: voluntary; skeletal muscles + senses.
Autonomic NS: automatic; glands, heart, gut, organs.

Feature	Sympathetic	Parasympathetic
Role	Fight or flight	Rest & digest
Heart rate	↑	↓
Pupils	Dilate	Constrict
Digestion	↓ (stops)	↑ (resumes)
Energy	Spends	Conserves

⚠ Sympathetic = arousal ("S" for stress). Parasympathetic calms you after ("P" for peace). Don't flip them.

Reflexes & Neuron Types

Sensory (afferent): body → CNS. **Motor (efferent)**: CNS → muscles/glands. **Interneurons**: in CNS, link the two.
Reflex arc: sensory → spinal interneuron → motor. Brain not needed → fast (hand off hot stove before pain felt).

Endocrine System

Endocrine system: glands release **hormones** into blood. Slower than NTs, but effects last longer.

Gland/Hormone	Effect
Pituitary (master)	Controls other glands
Adrenaline (adrenal)	Fight-or-flight boost
Cortisol (adrenal)	Long stress → ↓ immunity
Melatonin (pineal)	Sleep onset, ↑ in dark
Leptin / Ghrelin	Full (↓ hunger) / ↑ hunger
Oxytocin	Bonding, trust, labor

Hypothalamus → pituitary: brain's link to endocrine system.

✓ Racing heart + sweaty palms → sympathetic NS + adrenaline. Calming after → parasympathetic.

1.3 The Neuron & Neural Firing

Neuron Parts (signal path)

Dendrites (receive) → **soma**/cell body (nucleus, sums input) → **axon** (carries signal) → **terminal buttons** (release NTs into **synapse**) → synapse (gap to next neuron).
Myelin sheath: fatty insulation from glia → faster signal. Lost in **multiple sclerosis** → slowed control.
Glial cells: support neurons (nourish, insulate, clean up).

Action Potential

Step	What happens
Resting (~−70mV)	Inside neg.; neuron polarized
Threshold	Enough input → fires
Depolarization	Na^+ in → inside turns +
Repolarization	K^+ out → back to neg.
Refractory	Brief pause; can't refire

Saltatory conduction: signal jumps between myelin gaps (**nodes of Ranvier**) → much faster than unmyelinated axons.
All-or-none: neuron fires fully or not at all. Strong stimulus → *more frequent* firing + more neurons, NOT bigger signal.
Excitatory input → ↑ firing chance. **Inhibitory** → ↓ chance. Soma sums both: fires only past threshold.

⚠ Trap: a stronger stimulus never makes an action potential "bigger" — intensity = firing rate + # of neurons.

At the Synapse

Neurotransmitters (NTs): chemicals released into synapse; bind to **receptor sites** on next neuron (lock + key).
Reuptake: sending neuron reabsorbs extra NT → signal ends. Blocking it → NT lingers → stronger effect.
Neural transmission: *electrical* inside a neuron (action potential), *chemical* between neurons (NTs).

⚠ NTs don't travel down the axon — the action potential does. NTs only cross the synaptic gap between cells.

✓ Order MCQs ask about: dendrite → soma → axon → terminal → synapse → next dendrite.

1.3 Neurotransmitters & Drugs

Key Neurotransmitters

NT	Role	Imbalance
Dopamine	Reward, movement	↓ Parkinson's
Serotonin	Mood, sleep, appetite	↓ depression
Norepinephrine	Alertness, arousal	↓ low mood
Glutamate	Main excitatory	↑ migraine, seizure
GABA	Main inhibitory	↓ anxiety, seizure
Acetylcholine	Muscles, memory	↓ Alzheimer's
Endorphins	Pain relief, pleasure	Mimicked by opioids
Substance P	Pain signals	↑ pain perception

Excess dopamine → linked to schizophrenia symptoms.

How Drugs Act

Agonist: mimics/boosts NT → ↑ effect (morphine mimics endorphins). **Antagonist**: occupies + blocks receptor w/o activating it → ↓ effect (curare blocks ACh → paralysis).
Reuptake inhibitor: blocks reuptake → NT stays in synapse (SSRIs for depression ↑ serotonin; cocaine ↑ dopamine).

Class	Effect	Examples
Stimulants	↑ neural activity	Caffeine, cocaine
Depressants	↓ activity (↑ GABA)	Alcohol, sedatives
Opioids	Pain relief, euphoria	Heroin, morphine
Hallucinogens	Distort perception	LSD, marijuana

Tolerance: need more for same effect (brain adapts).
Withdrawal: discomfort + distress on quitting. **Addiction**: compulsive craving + use despite harm.
Physical dependence: body needs drug (withdrawal).
Psychological: cravings, use to cope.

⚠ Alcohol is a depressant, not a stimulant — it slows CNS (↑ GABA). Lowered inhibition ≠ stimulation.

1.4 The Brain: Structures

Brainstem & Hindbrain (basic survival)

Medulla: heartbeat, breathing (damage = fatal). **Pons**: links brain parts; sleep, dreams, movement. **Reticular activating system**: arousal, alertness, filters incoming sensory input.
Cerebellum: balance, coordination, timing, procedural memory. Alcohol impairs it → sobriety tests.

Limbic System & Forebrain Core

Structure	Function
Thalamus	Sensory relay (not smell)
Hypothalamus	Hunger, thirst, temp, sex
Pituitary	Master gland (w/ hypothal.)
Hippocampus	Forms new explicit memories
Amygdala	Fear, aggression, emotion
Corpus callosum	Links 2 hemispheres

Limbic system: emotion, drives + memory. Core parts: hippocampus, amygdala, hypothalamus.
Hypothalamus "4 F's": feeding, fighting, fleeing, mating. Also body temp, reward + controls pituitary.

⚠ Thalamus = relay (routes senses). Hypothalamus = regulator (drives + hormones). Don't swap them.

Cerebral Cortex (lobes)

Lobe	Main job
Frontal	Plans, judgment, movement
Parietal	Touch, body position, space
Occipital	Vision
Temporal	Hearing, language input

Prefrontal cortex: executive function, planning, impulse control; matures last (~mid-20s). **Phineas Gage**: frontal damage → personality change (impulsive).

✓ MCQ symptom → structure: lost balance = cerebellum; no new memories = hippocampus; no fear = amygdala.

1.4 Cortex, Plasticity & Brain Tools

Specialized Areas

Motor cortex (rear frontal): voluntary movement.
Somatosensory cortex (front parietal): touch. More cortex = more sensitive/precise part (hands, lips).
Broca's area (L frontal): speech production. Damage → slow, halting, effortful speech. **Wernicke's** (L temporal): comprehension. Damage → fluent but meaningless speech.
Association areas: integrate info; thinking, planning.

Hemispheres & Split Brain

Contralateral control: L hemisphere runs R body + R visual field; R runs L. **Lateralization**: L = language, logic, math; R = spatial, faces, emotion. Specialized, not separate.
Split brain: corpus callosum cut (to treat severe epilepsy). Object in L visual field → R hemisphere only → can't name it, but L hand can pick it out by touch (Sperry, Gazzaniga).

⚠ Lateralization ≠ "left-brained" people. Both hemispheres work together in nearly every task you do.

Plasticity

Neuroplasticity: brain rewires after damage or w/ experience. Greatest in childhood (kids recover from hemispherectomy). **Neurogenesis**: new neurons.

Tools to Study the Brain

Tool	Shows	Note
Case study	Damage effects	Rare, not general.
Lesion	Removed part role	Animals mostly
EEG	Electrical waves	Good timing
fMRI	Blood flow	Structure + func.
PET	Glucose use	Radioactive tracer
MRI / CT	Structure only	No activity

✓ Asked "which tool shows activity during a task?" → fMRI or PET. "Sleep stages?" → EEG. "Structure?" → MRI.

1.5 Sleep

Consciousness & Rhythms

Consciousness: awareness of self + surroundings.
Circadian rhythm: ~24-hr cycle; set by light via **SCN** (hypothalamus) → pineal gland releases melatonin in dark. Jet lag, shift work, screens at night disrupt it.

Sleep Stages (EEG)

Stage	Waves	Features
Awake	Beta (alert)	Alpha when relaxed
NREM 1	Theta	Light; hypnagogic jerk
NREM 2	Spindles, K-cx	Most of night
NREM 3	Delta (slow)	Deep; hard to wake
REM	Beta-like	Dreams; muscle atonia

Cycle ≈ 90 min, 4–6/night; N**REM** 3 mostly early, REM grows toward morning. REM = "paradoxical": active brain, paralyzed body. **REM rebound**: extra REM after deprivation.

Why Sleep & Dream

Functions: restoration, memory consolidation, growth hormone (NREM 3). **Activation-synthesis**: dreams = brain making sense of random brainstem firing. **Consolidation** (info-processing): dreams sort + store memories. **Freud**: wish fulfillment (manifest vs. latent content).

Sleep Disorders

Disorder	Key sign
Insomnia	Trouble falling/staying asleep
Narcolepsy	Sudden REM attacks by day
Sleep apnea	Breathing stops; snoring
Sleepwalking	NREM 3; kids most often
REM behavior dis.	No atonia → acts out dreams

⚠ Sleepwalking + night terrors happen in NREM 3, not REM. Nightmares are REM (body paralyzed, can't move).

1.6 Sensation

Core Principles

Sensation: receptors detect stimuli. **Transduction**: energy → neural impulses. (Perception = interpreting; Unit 2.)
Absolute threshold: min. stimulus detected 50% of time. **JND**/difference threshold: min. change noticed 50% of time.
Weber's law: JND = constant % of original (1 lb on 10 lb noticed; on 100 lb need ~10 lb). **Sensory adaptation**: ↓ response to constant stimulus (stop feeling your watch).
Signal detection: detecting depends on stimulus + expectation, fatigue (hits, misses, false alarms, correct rejections). **Sensory interaction**: senses combine (smell → taste). **Synesthesia**: one sense triggers another.

Vision & Hearing

Light path: cornea → pupil → lens (accommodation) → **retina**. **Rods**: dim light, periphery. **Cones**: color, detail, fovea.
Blind spot: where optic nerve exits, no receptors.
Trichromatic (cones: R, G, B) explains color at retina.
Opponent-process (R-G, B-Y pairs) explains afterimages. Nearsighted = far blurry; farsighted = near blurry.
Color vision deficiency: missing/weak cone type (most often red-green); supports trichromatic theory.
Sound: pinna → eardrum → ossicles (hammer, anvil, stirrup) → **cochlea** (hair cells transduce). **Place theory** → high pitch; **frequency/volley** → low pitch (firing rate).

Hearing loss	Damage to	Fix
Conduction	Eardrum/ossicles	Hearing aid
Sensorineural	Hair cells/nerve	Cochlear implant

Chemical & Body Senses

Taste: sweet, sour, salty, bitter, umami. **Smell**: only sense that skips thalamus → strong memory/emotion link. Gate-control: spinal cord "gate" blocks/lets pain through. **Vestibular** (balance, inner ear). **Kinesthesis** (body position).

⚠ Sensory adaptation (receptors ↓ firing) ≠ habituation (learned, brain ignores). Know which one a scenario shows.