

MCAT Formula and Strategy Guide

The MCAT's four scored sections: Chemical and Physical Foundations, Critical Analysis and Reasoning Skills, Biological and Biochemical Foundations, and Psychological, Social, and Biological Foundations of Behavior — with the core facts and passage strategy each section rewards.

SECTIONS	4	WORKED EXAMPLES	1	FORMAT	Print friendly
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How to use this guide

A formula you cannot place is not knowledge yet. Work the recall drill below before the questions.

- The MCAT tests content application inside a passage far more than isolated recall — practice connecting a passage's data or experiment to the underlying concept.
- CARS is a separate weekly skill, not a content review: build a standalone rhythm of timed passages and error-pattern review.
- Review every full-length exam by error category (content gap, reasoning error, timing, careless read) rather than only by raw score.

1. Chemical and Physical Foundations

NAME	FORMULA	WHEN TO USE
Ideal gas law	$PV = nRT$	Relating pressure, volume, moles, and temperature of a gas.
Henderson-Hasselbalch equation	$pH = pK_a + \log([A^-]/[HA])$	Finding the pH of a buffer solution.
First law of thermodynamics	$\Delta U = Q - W$	Relating heat, work, and internal energy of a system.
Newton's second law	$F = ma$	Relating force, mass, and acceleration.
Ohm's law and power	$V = IR, P = IV$	A circuit with current, resistance, or voltage.

2. Critical Analysis and Reasoning Skills (CARS)

NAME	FORMULA	WHEN TO USE
Main idea vs. detail	the author's overall argument, not a single supporting fact	Asked for a passage's central claim.
Author's tone	identify word choice that signals attitude (critical, sympathetic, neutral)	Asked how the author regards the subject.

NAME	FORMULA	WHEN TO USE
Inference within scope	the conclusion the passage supports, without outside knowledge	Asked what the passage 'implies' or 'suggests'.
Strengthen/weaken	identify the passage's core assumption before evaluating new information	New evidence is introduced and its effect is asked.

3. Biological and Biochemical Foundations

NAME	FORMULA	WHEN TO USE
Central dogma	DNA is transcribed to mRNA, mRNA is translated to protein	Describing gene expression.
Enzyme kinetics (Michaelis-Menten)	Vmax and Km describe maximum rate and substrate affinity	Analyzing an enzyme's rate versus substrate concentration.
Cell respiration overview	glycolysis (cytoplasm) -> Krebs cycle -> electron transport chain (mitochondria)	Tracing where ATP is produced in a cell.
Mendelian inheritance	a dominant allele masks a recessive allele in a heterozygote	Predicting offspring genotype/phenotype ratios.
Amino acid structure	an amino acid has an amino group, carboxyl group, and a variable R-group	Identifying the building block of a protein.

4. Psychological, Social, and Biological Foundations of Behavior

NAME	FORMULA	WHEN TO USE
Classical vs. operant conditioning	classical pairs two stimuli; operant pairs a behavior with a consequence	Distinguishing how a learned behavior was acquired.
Nervous system divisions	central (brain, spinal cord) vs. peripheral (somatic, autonomic)	Locating a described neural structure or function.
Social stratification	the ranking of individuals or groups by access to resources and status	Describing unequal access to power or wealth in a society.
Sensation vs. perception	sensation is raw sensory input; perception is the brain's interpretation of it	Distinguishing detecting a stimulus from interpreting it.

WORKED EXAMPLE

A patient's blood pH is 7.30 (normal range 7.35-7.45) with low bicarbonate. Identify the acid-base disturbance.

1. pH below 7.35 = acidosis
2. Low bicarbonate (a base) rather than elevated CO₂ points to a metabolic cause
3. Conclusion: metabolic acidosis

Check: A respiratory cause would instead show abnormal CO₂, not primarily low bicarbonate.

Notes and tutor hand-off

Bring this page to your next session so the tutor can start from what actually blocked you.

Which section (Chem/Phys, CARS, Bio/Biochem, Psych/Social) needs more passage practice?

One full-length error that was a reasoning error, not a content gap:

Worksheet question numbers to review with a tutor:
