Rapid Learning Center

Chemistry :: Biology :: Physics :: Math

Rapid Learning Center Presents …

Teach Yourself
MCAT Physics in 24 Hours

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MCAT Physics

Introduction to Physics in the MCAT

MCAT Rapid Learning Series

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Learning Objectives

By completing this tutorial, you will learn about ...

- The MCAT
- MCAT test format and score
- Rapid Learning for the MCAT
- MCAT Physics test topics
- MCAT Physics question types and example illustrations
- MCAT Test-preparation strategies
- MCAT Test-taking strategies

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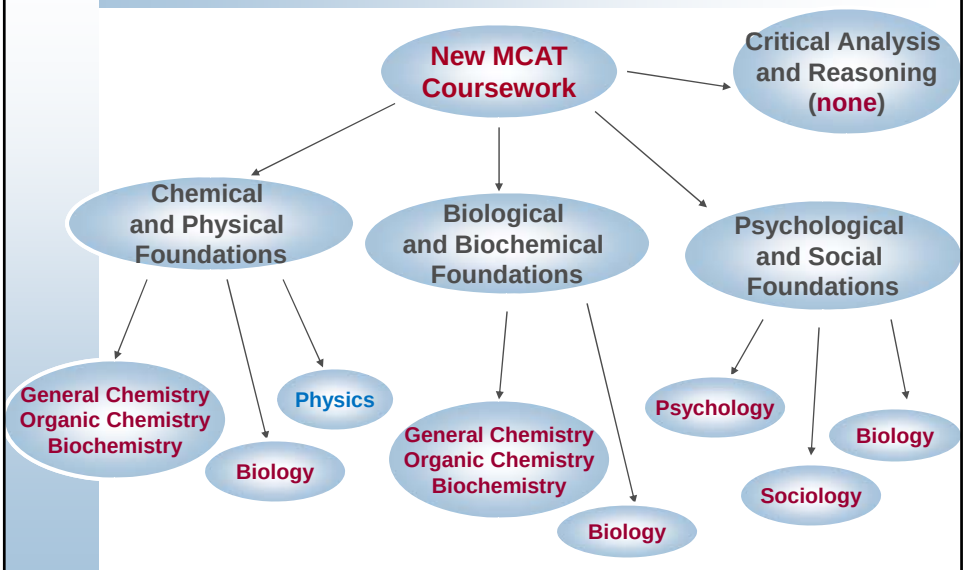
Concept Map - MCAT



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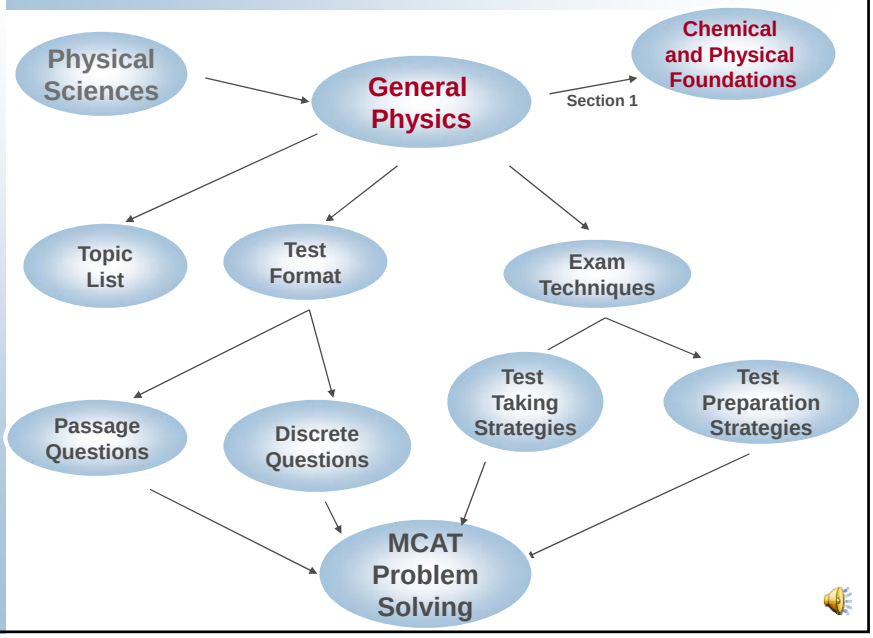
Physics in the MCAT



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Introduction to the "New" MCAT

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What is the MCAT?

Medical
College
Admission
Test

The MCAT is a standardized exam that most prospective students must take in order to gain admission to medical schools in the US and Canada.

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When Can I Take The MCAT?

The MCAT is offered throughout the year in: January, April, May, June, July, August and September.

To register visit the MCAT official site: http://www.aamc.org/mcat/

The ideal time to take the MCAT is when you have completed the basic science courses and between 12-18 months before entry into medical school.

A good approach, is to plan ahead about six months before taking the exam.

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MCAT Exam Structure

MCAT
(4 Test Sections and 10-minute break in between)

Section 1	Section 2	Section 3	Section 4
Chemical and Physical Foundations of Biological Systems	Critical Analysis and Reasoning Skills	Biological and Biochemical Foundations of Living Systems	Psychological, Social and Biological Foundations of Behavior

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MCAT Scores

The MCAT scores consist of four individual section scores and one total score.

Section	Range (Midpoint)
1. Chemical/Physical 2. Critical/Reasoning 3. Biological/Biochemical 4. Psychological/Social	118-132 (125)
Total Score (sum of 4)	472-528 (500)

The scores are released approximately 1-2 months after the test. The MCAT Scores are equated. The equating is designed to correct small difference in difficulty among exams on different dates.

The MCAT is completely computer based.

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Test Specifics and Subjects Covered

Chemical /Physical	Biological /Biochem	Psychological /Social	Critical /Reasoning
59 questions 95 minutes	59 questions 95 minutes	59 questions 95 minutes	53 questions 90 minutes
General Chem, 30% Organic Chem, 15% Biochemistry, 25% Physics, 25% Biology, 5%	Biochemisry, 25% Biology, 65% General Chem, 5% Organic Chem, 5%	Psychology, 65% Sociology, 30% Biology, 5%	No specific courses Humanities, 50% Social Sciences,50%
44 passage questions & 15 multiple choice	44 passage questions & 15 multiple choice	44 passage questions & 15 multiple choice	All 53 passage questions

It's a longer test! The entire test will be 6 hours 15 minutes long, with an optional 10-minute break between each section. The total seat time is 7 hours 30 minutes.

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Mental Math and Calculations

Currently, the MCAT does not permit the use of calculator on the test. Scratch paper is provided.

Arithmetic and basic algebra calculations are common in the MCAT's general chemistry and physics questions.

Most numerical answers on the MCAT are sufficiently far-apart to allow imprecision.

Learn to do mental math and simple calculations on scratch paper. For more complex numerical problems, estimate by hand.

Note: Some Rapid Learning chapter problem drills here will require you to work through calculations that potentially require a calculator. In that case, focus on the steps of problem solving and use a calculator if you must for numerical parts, but make an attempt to estimate first.

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No Equation Sheet

A periodic table is provided during the exam to answer questions in the physical and chemical foundations section.

No equation sheet is provided for the current test. It is not permitted to bring your own either.

All formulas and equations should be memorized.

Simple and common physical constants should also be memorized, although it might be stated in the question statements.

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Rapid Learning for MCAT

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What is Rapid Learning?

Rapid learning is a set of break-through methods to **increase the speed of learning and deepen the understanding of the subjects**. This is done by breaking down each complex subject into 24 manageable units and facilitating rich-media teaching, providing an effective multi-modal learning opportunity.

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The Science of Rapid Learning

V: Visual
A: Aural
R: Read/Write
K: Kinesthetic

Rapid Learning courses are designed to optimize the learning experience for all four types of learners by presenting materials visually, providing narrations for aural learners, involving students with interaction drills and encouraging note-taking and re-writing of review cheat sheet to engage both read/write and kinesthetic learners.

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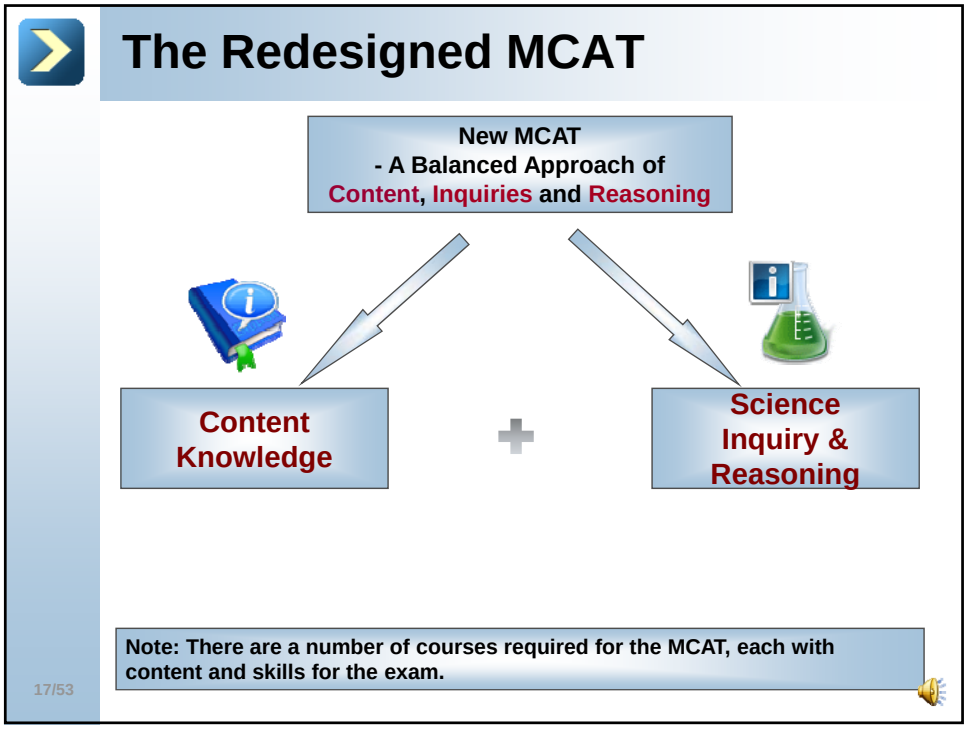

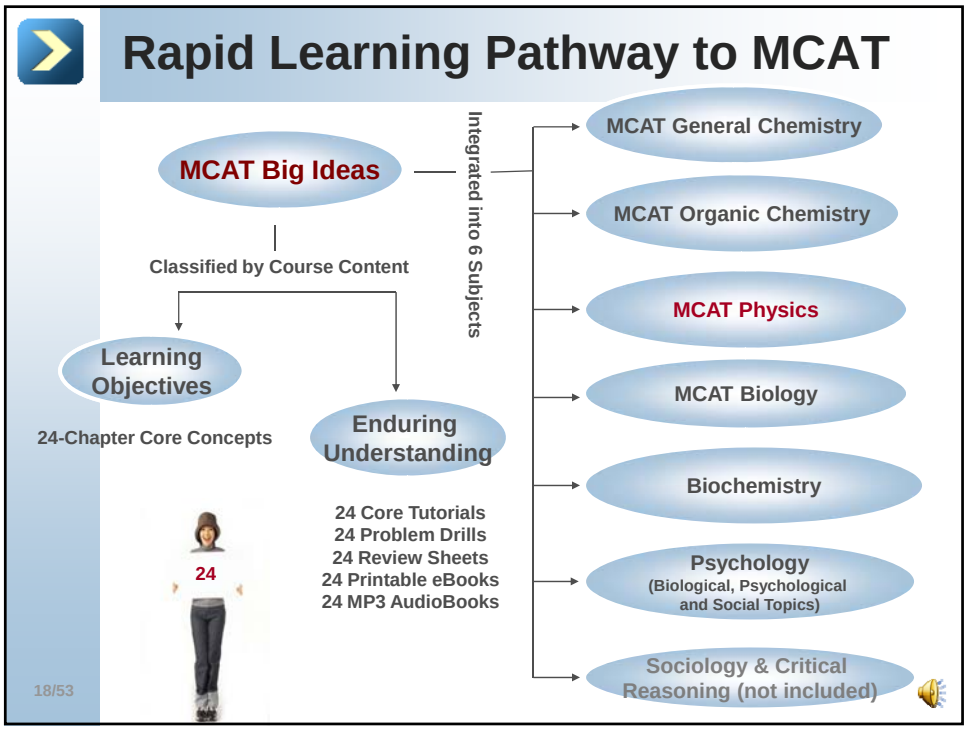

Rapid Learning vs Other Test-Prep

Rapid Learning is not a "review" course, rather a "re-learn" of the subjects from the start, visually.

Other Test-Prep	Rapid Learning
Printed books or test-prep classes by college **students**	Rich-Media Courses by **professors**
High-Level **Review**	Comprehensive **Re-Learn**

If you are looking for a simple review, go for Amazon's test-prep books. If you are looking to re-study the subject courses from the beginning to end, use Rapid Learning.

For many, the combination of both might work the best.

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Physics On the MCAT

Topic List

Overview of MCAT Physics

Preview Question Formats

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Physics Topics in the MCAT

- Translational Motion
- Force and Motion, Gravitation
- Equilibrium and Momentum
- Work and Energy
- Waves and Periodic Motion
- Sound
- Fluids and Solids
- Electrostatics and Electromagnetism
- Electronic Circuit Elements
- Light and Geometrical Optics
- Atomic and Nuclear Structure

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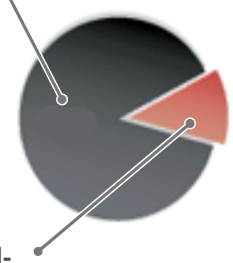
Passage and Discrete Question Types

There will be passage-based questions and standalone multiple choice (discrete) questions.

The majority (roughly 75%) of the questions will be passage-based questions. Passages can be an informational presentation, problem-solving techniques, research studies, or persuasive arguments in the context of biological systems.

	Type I # Passage Questions	Type II # Discrete Questions
Chem/Phys	44	15
Bio/Biochem	44	15



The remainder 25% will be stand-alone multiple-choice questions.

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Type I: Passage-Based Questions

Passage-based questions require information found in the passage and outside knowledge.

Example:

If a stone is thrown upwards, it falls back to the surface of the earth after attaining a height which depends upon the velocity of projection. The stone needs a large velocity to escape the gravitational pull of the earth. The escape velocity from earth is 11.2 km/sec.

The minimum speed with which a body must be projected from the earth's surface so that it completely overcomes the gravitational pull and never returns to the earth, even in an orbit, is known as escape velocity. The value of escape velocity for a planet remains the same.

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Type I: Example

Each passage will be accompanied by a set of 4-8 questions.

Example:

1. **For a given planet, the value of escape velocity?**
   - A. Keeps changing randomly
   - B. Increases
   - C. Remains Constant
   - D. None of the above

2. **What is the escape velocity of earth?**
   - A. 11.2 km/s
   - B. 9 km/s
   - C. 14 km/s
   - D. 13 km/s

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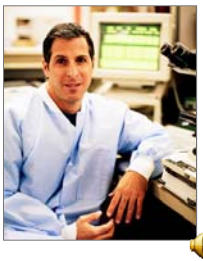
Type II: Discrete Questions

Discrete questions are multiple choice type questions with four answer options. You will pick ONE best answer. They are standalone without any passage (Correct answer in red).

There are three types of radiations, alpha, beta and gamma. Gamma rays are the most useful type of radiation because they can kill off living cells easily, without leaving any harmful residue. They are therefore often used to fight cancer and to sterilise food. What is being released during this process?

(A) Electrons
(B) Neutrons
(C) Protons
(D) Photons



Tips: The alpha and beta radiation consist of actual matter that shoots off the atom, while gamma rays are electromagnetic waves. Hence A, B, & C are eliminated.

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MCAT Test Preparation Strategies

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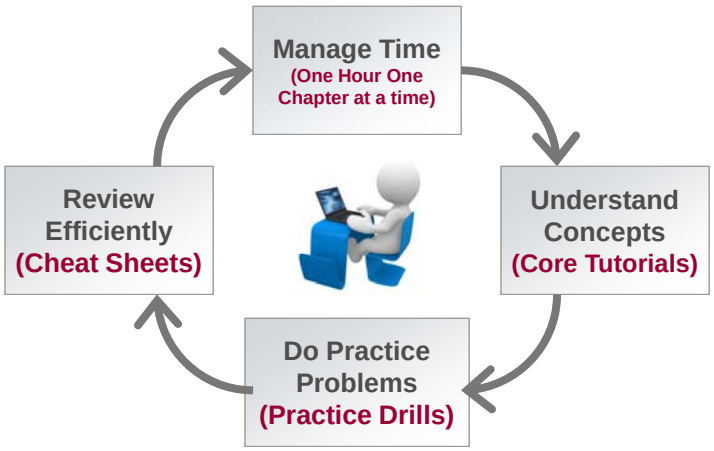
Test Preparation Overview

Follow this four-step process to successfully prepare for Physics in the MCAT.



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Time Management - 1

Use yout time wisely. Study only the topics that will be on the MCAT.

The MCAT does not contain every single physics concept.

There are some topics in your textbook that are not on the MCAT.

Don’t waste time on concepts not tested.

Use this tutorial series to focus on the tested material.

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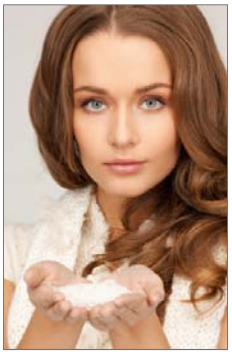
Time Management - 2

Focus core study hours on weak areas.

Study all of the topics listed on the MCAT Big Ideas.

Focus your efforts on your weak areas.

Don't study all of the topics concurrently. Master a topic before moving on to the next.



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Time Management - 3

Plan ahead: set a study schedule and make appointments to yourself.

Set aside a couple of hours every day to study.

Write down on your calendar the specific hours each day for the chapters.

In Rapid Learning, you will need to study 1-2 hours, i.e. 1-2 chapters, each day.

You need to study and practice EVERY DAY in the coming weeks and months.

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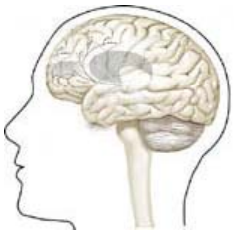
How our Brains Store Information

Space out your study to avoid cramming.

Some students incorrectly believe that if they study more as the test date approaches, they will remember more.



However, as any neurologist will tell you, building long term memory by studying in set doses ahead of time increases memory and the understanding of concepts. Do not cram for the exam.

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Master the Concepts

Learn the general concepts that connect with each other.

Newton's three laws of motion are the most important concepts when it comes to force, energy, mass and momentum.

Once you know these you will be able to make connections between the mass and weight, spring force and tension and other basic forces.

Problems on variable mass can be understood by using Newton's second law.

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Connect Concepts

Generalizing concepts allows you to understand and solve many other concepts without memorizing them

Example:

When a motor car takes a sharp turn to the right, the passenger sitting in it is thrown to the left. This is because the lower part of the body is in contact with the car but the upper part tends to move in the original direction due to inertia.

Reason: "Every body continues to be in its state of rest or uniform motion along a straight line unless it is compelled by an external force to change that state" – What is this ?

The above statement is Newton's First law of motion, inertia.

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Resolve Concepts

Get your questions resolved.

If you have questions about a physics concept or problem, don't leave them hanging—Get an answer!

Whether it is classical or quantum mechanics or electricity or magnetism, make sure you do everything it takes to master the concept.

It may feel tedious, or even a waste of time to google for just one answer, but eventually, these unresolved questions will show up again, and very likely on your MCAT.

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Practice Problems

Practice problems to solidify concept understanding.

Concepts must be applied to fully understand them.

Physics is about the nature and properties of matter and energy. Physics introduces a lot of new concepts, including mechanics, heat, light, sound, waves, electricity, magnetism, atomic and nuclear physics.

Concept understanding goes hand-in-hand with doing practice problems.

As soon as you learn a new concept, try to solve the practice problems that come with this tutorial series! You can also use textbooks and online sources of more practice!

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Try to do a few full length practice tests in stages.

Creative Supplemental Study

Summarize what you learn with cheat sheets.

Cheat Sheets: A cheat sheet is a summary of what you learned in a SIMPLE AND BRIEF outline for a chapter.

Use the ones provided with this series, but making your own is a wonderful way to cement concepts in your head!

Use your smartphone for audio learning.

Audio learning is ideal for learning on-the-go. It also reinforces what you have learned visually and practice the recalling from your long term memory.

Rapid Learning provides 24 audiobooks for 24 chapters in a subject. Plug the mp3 into your smart phone and start learning.

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MCAT Test Taking Strategies

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Test Taking Overview

Follow these steps during the test:

1. **Know The Test** inside and out before you take the MCAT.
2. **Plan Your Attack** the minute the test begins.
3. Use techniques to **Build Focus:** It will improve your score.
4. Apply techniques to **Zoom In On The Answer** & avoid exam traps.
5. If you don't know the answer, **Guess The Right Way**.

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Know the MCAT

Prepare ahead of time and know the test process.

- Bring your alert mind and a valid ID; Leave your personal items in your locker.
- Arrive at least 30 minutes before the start time and be prepared for the check-in process (fingerprint etc.).
- Know the format of the test inside out – no surprise.
- Know the instructions of the sections to save time the day of the test.

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Plan Your Attack

Use game-plan strategies.

- Scan the section and make a note of where the midpoint question is - try to be there half-way through the time.
- Use the onscreen clock to keep track of your time.
- Use approximately 1 minute per question for multiple choice - the rest of the time is needed to read and refer to passages.
- Except for the stand-alone questions, answer problems sequentially as information from an earlier problem may help you understand a later problem.

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Build Your Focus

Get into a rhythm by focusing.

- Confidence builds speed, accuracy and score.
- Trust your instincts and don't waste time second-guessing.
- Improve your concentration:
  - Do one problem at a time and do not worry about the problem before or after.
  - Use the scratch paper to organize your thoughts and draw your attention.
  - Breath deeply and refocus on what you know.
- Set the time limit on each problem and move on.

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Zoom in on the Answer

Be efficient in solving problems.

- Try to think of an answer to the question before looking at the answer choices…then look for your answer there (this helps you avoid traps).
- If you can't think of an answer first, scan through all the choices.
  - Don't pick the first one you see that looks good…there might be a better one later.
- Beware of absolutes—rarely are things "**always or never**" in the world!
- If you see two opposite choices, usually one of them is correct.

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Guess The Right Way - 1

To make an educated guess, eliminate wrong answers first.

The MCAT does not penalize you for wrong answers. This means you should answer every question even if you have to guess, because there's a chance you might choose the correct answer.

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Guess the Right Way - 2

To make an educated guess, eliminate the wrong answers first.

Which of the following is an example for the conservation of momentum?

A. Plane reducing its speed to land.

B. The driver of a car stepping on the brakes to stop.

C. ~~Fast moving boat.~~

D. The launching of a rocket

If you knew that the a fast moving boat remains in continuous momentum. You can cross out answer choice C.

Your odds of guessing the correct answer has gone from 1-in-4 to 1-in-3.

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Beware of the Familiar

Beware of the Familiar: Test writers love to include something that seems very obvious as an answer choice. This tempts students to choose the wrong answer because it seems correct at first glance.

What happens to the period of a simple pendulum if the mass of the bob is doubled?

A. ~~The period of the pendulum is doubled.~~
B. The period of the pendulum is inversely proportional to the mass of the bob.
C. The period of the pendulum, increases , but not does not double.
D. The period is independent of the mass.

In this problem, choice A is the trap because most students intuitively assume that as the mass is doubled, so is the period.

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Beware of the Absolute

Beware of the Absolute: Notice words like *always, never, none, all, every, or nothing.*

Such an answer is usually wrong because it only takes one exception to break the absolute.

In most cases, the relative words like *possibly, sometimes, most of the time,* or *often* indicate the correct answer.

We have previously disqualified A, now on observation, we see that B is an absolute statement which makes an assumption.

What happens to the period of a simple pendulum if the mass of the bob is doubled?

A. ~~The period of the pendulum is doubled.~~
B. ~~The period of the pendulum is inversely proportional to the mass of the bob.~~
C. The period of the pendulum, increases , but not does not double
D. The period is independent of the mass.

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Answer Selection

This leaves only choice C and choice D.

The correct answer choice is D, as the period of the simple pendulum is independent of the mass.

What happens to the period of a simple pendulum if the mass of the bob is doubled?

A. ~~The period of the pendulum is doubled.~~
B. ~~The period of the pendulum is inversely proportional to the mass of bob.~~
C. The period of the pendulum, increases , but not does not double.
D. The period is independent of the mass.

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How to Deal with Similar and Opposite

Out of two opposite choices, one is usually correct. Similar choices are often both incorrect.

Deal with Similar or Opposite Answer Choices:

If two answer choices are very similar in wording, the answer is probably neither of them, because there can be only one correct answer.

However, if two answer choices are opposites, one of them is probably correct, because the test wants you to differentiate between the two core ideas.

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Significance of Opposites

Surface tension is the stretching force that exists over the surface of a liquid. What happens to the surface tension when temperature increases?

A. Surface tension increases.

B. Surface tension decreases.

C. Surface tension remains the same.

D. Surface tension increases or decreases randomly.

If you are completely unsure of the answer, choice A and choice B should be the answers you focus on because they are direct opposites. In this case, the correct answer choice is B.

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Wrong Answer Elimination

The First Law of Thermodynamics is the law which deals with …

~~**A. Sound Energy**~~

B. Conserving energy

C. Utilization of energy

~~**D. Potential Energy**~~

You should know choice A and choice D are automatically both incorrect, because they are unrelated answers to the question.

Choice B and choice C are opposite answers, out of which B is correct.

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