



# **Top Strategies for the MCAT**

# Today's Info Session

- ▶ Welcome to this Info Session!
- ▶ Introduction
- ▶ General info about MCAT
- ▶ High vs Low yield
- ▶ Section specific advice
- ▶ How Can Next Step Help?
- ▶ Questions?

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TEST PREP

**MCAT**  
Medical College  
Admission Test

WHAT IS YOUR NEXT STEP?

# Introduction

**Hi, I'm Phil!**

- ▶ **MCAT Content writer**
  - ▶ **Tutored and taught for 9+ years**
  - ▶ **Attended University of Nebraska Medical Center as an MD/PhD student.**
- ✓ **In order to communicate, use the Question box.**



# Who Is Next Step?

Next  
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TEST PREP

- Began in 2009 as a tutoring company
- Focus on graduate admissions tests only
- Team of educational experts
- First company to have materials built from ground up for 2015 MCAT format
- Now the first company to have new 2018 MCAT Interface

✓ We never stop improving our materials!



# Exam Overview

- ▶ **Four sections – three science, one verbal (CARS)**
- ▶ **Science sections all have same format/time constraints**
- ▶ **Passages and discrete questions alternate**
- ▶ **Some math required, but no calculator is provided**

Section	Time Allowed	Number of Questions	Question Format
Chemical and Physical Foundations	95 min	59	10 passages, 15 discretives
Critical Analysis and Reasoning Skills	90 min	53	9 passages
Biological and Biochemical Foundations	95 min	59	10 passages, 15 discretives
Psychological and Sociological Foundations	95 min	59	10 passages, 15 discretives

# Subjects Tested

## Chemical and Physical Foundations

30% general chemistry

25% physics

25% biochemistry

15% organic chemistry

5% biology

## Bio and Biochemical Foundations

65% biology

25% biochemistry

5% organic chemistry

5% general chemistry

## Psychological and Sociological Foundations

65% psychology

30% sociology

5% biology

# “High-Yield”

**Warning: anything on the AAMC MCAT outline is fair game!**

**However, some topics are more likely to appear than others...**

Topic	Number of questions
Biology	45
Biochem	30
Physics	15
Gen Chem	20
Organic Chem	11
Psychology	38
Sociology	18
CARS	53
<b>Total</b>	<b>230</b>

Takeaways:

Biology and biochemistry are about 1/3 of the test!

You have more psychology questions than physics and chemistry combined.

Organic chemistry is about 5% of your questions.

# Things to think about

- **Content**

**LOTS of stuff you need to know**

- **Strategy**

**Strategy is important in every area, but ESPECIALLY in CARS.**

**- Cars is not a test of your knowledge. It's a test of skill.**

- **Timing / endurance**

**Many students are exhausted by the time they get to the Psych section.**



# Chem/Phys

## Chemistry and Physics features

- ▶ Tons of equations
- ▶ More about how do you apply this, than straight “plug and chug.”

## Other sources of equations

Biology:

Hardy Weinberg

Recombination frequencies

Enzyme rates

DATA!

Psych:

Weber's law

DATA!

### Electricity and Magnetism

$$F = kQ_1Q_2 / r^2$$

$$F = qVB\sin\theta$$

$$F = iLB\sin\theta$$

$$V = IR$$

$$P = IV$$

$$R = \rho L / A$$

$$V_{rms} = V_{max} / \sqrt{2}$$

$$I_{rms} = I_{max} / \sqrt{2}$$

**Resistors in series:**

$$R_{tot} = R_1 + R_2 \dots$$

**Resistors in parallel:**

$$1/R_{tot} = 1/R_1 + 1/R_2 \dots$$

**Capacitors in series:**

$$1/C_{tot} = 1/C_1 + 1/C_2 \dots$$

**Capacitors in parallel:**

$$C_{tot} = C_1 + C_2 \dots$$

$$C = Q/V$$

$$\text{Energy} = (1/2)QV$$

$$F = qE$$

$$V = Ed$$

$$\text{Energy} = qEd$$

$$E = kQ/r^2$$

$$\text{Energy} = kQq/r$$

$$V = kQ/r$$

$$\Delta G = -nFE$$

$$E_{cell} = E_{cath} - E_{an}$$

### Waves

$$v = f\lambda$$

$$T = 1/f$$

### Light

$$n_1\sin\theta_1 = n_2\sin\theta_2$$

$$\sin\theta_c = n_2/n_1$$

$$E = hf$$

$$m = -d_i / d_o$$

$$P = 1/f$$

$$f = (1/2)r$$

$$n = c/v$$

$$1/f = 1/d_i + 1/d_o$$

### Sound

$$d\beta = 10 \log(I/I_0)$$

$$L = n\lambda/2 \quad (n=1, 2, \dots)$$

$$L = n\lambda/4 \quad (n=1, 3, \dots)$$

$$f_{beat} = |f_1 - f_2|$$

$$f = f_e[v \pm v_d] / [v \pm v_s]$$

### Fluids

$$\rho = m/V$$

$$P = F/A$$

$$P = P_{atm} + \rho g d$$

$$F_b = \rho g V$$

$$Q = Av$$

$$P + \rho g y + (1/2)\rho v^2 =$$

constant

### Gases

$$PV = nRT$$

$$\text{Boyle: } PV = k$$

$$\text{Guy-Lussac: } P/T = k$$

$$\text{Charles: } V/T = k$$

$$\text{Avogadro: } n/V = k$$

$$R_1/R_2 = \sqrt{m_2/m_1}$$

$$P_A = X_A \times P_{tot}$$

### Solutions

$$pH = pK_a + \log(A^-/HA)$$

$$M = \text{mol} / L$$

$$m = \text{mol} / \text{kg}$$

$$N = M \times \# \text{ of } H^+$$

$$pH = -\log[H^+]$$

$$M_i V_i = M_f V_f$$

$$\Pi = MRT$$

$$\Delta T_f = i k_f m$$

$$\Delta T_b = i k_b m$$

$$X_A = \text{mol}_A / \text{mol}_{tot}$$

### Thermo

$$\Delta U = Q - W$$

$$\Delta U = (3/2)nRT$$

$$W = P\Delta V$$

$$Q = mc\Delta T$$

$$Q = mH_L$$

$$\Delta G = \Delta H - T\Delta S$$

$$\Delta H_{rxn} = \Delta H_{prod} - \Delta H_{react}$$

### Kinematics

$$v_f = v_o + at$$

$$d = v_o t + (1/2)at^2$$

$$v_f^2 = v_o^2 + 2ad$$

$$a_c = v^2 / r$$

$$F_c = mv^2 / r$$

$$v_x = v_o \cos\theta$$

$$v_y = v_o \sin\theta$$

### Mechanics

$$F = ma$$

$$F_{a \text{ on } b} = -F_{b \text{ on } a}$$

$$F_{fric} = \mu F_N$$

$$F_g = GM_1 m_2 / r^2$$

$$F_g = mg$$

$$F = kx$$

$$\tau = rF\sin\theta$$

$$P = W/t$$

$$W = Fd\cos\theta$$

$$E_K = (1/2)mv^2$$

$$U = mgh$$

$$U = -GM_1 m_2 / r$$

### Inclined Plane

$$F_{incline} = mg\sin\theta$$

$$F_N = mg\cos\theta$$

$$F_{fric} = \mu mg\cos\theta$$

# C/P

Let the answer choices help you.

Help you figure out how to solve an equation

Guide your rounding

Bill pushes a 2 kg box with a force of 8N. If the box moves 3 meters over the course of 2 seconds, what is Bill's power?

- A. *1.5 Watts*
- B. *8 Watts*
- C. *12 Watts*
- D. *24 Watts*

A 6kg, +3C charge is placed 4 m from another point charge. The spot that is placed in has a potential of 8 volts. What is the magnitude of the force experienced by the charges?

# C/P

Let the answer choices help you.

Help you figure out how to solve an equation

Guide your rounding

What is the rate of flow for water traveling through a pipe that has a diameter of 4 cm and a length of 310 meters if the pressure change from one end of the pipe to the other is 90 kPa and the viscosity of water is 0.009 Pa s?

- A.  $2.0 \times 10^{-3} \text{ m}^3/\text{s}$
- B.  $4.0 \times 10^{-3} \text{ m}^3/\text{s}$
- C.  $6.3 \times 10^{-3} \text{ m}^3/\text{s}$
- D.  $9.0 \times 10^{-3} \text{ m}^3/\text{s}$

$$Q = \frac{\Delta P \pi r^4}{8 \eta L}$$

$$Q = (9 \times 10^4 \text{ Pa})(3.14)(0.02 \text{ m})^4 / 8(9 \times 10^{-3} \text{ Pa s})(3.1 \times 10^2 \text{ m})$$

$$Q = (9)(3.14)(2)^4 / 8(9)(3.1)$$

$$Q = 16/8 = 2$$

## The SINGLE MOST IMPORTANT THING TO KNOW ABOUT CARS:

It's the only section where they are not testing your knowledge.

If you ever miss a question, it must be for one of the following reasons:

1. Timing
2. You missed an idea in the passage
3. You tackled a question incorrectly
4. You got pulled in by a certain type of wrong answer

### Wrong answer types

- Out of scope
- Opposite
- Distortion (extreme)
- Faulty use of detail (true but wrong)

own transcriptional units or derived from the introns or genes. Both undergo different avenues of processing to produce a miRNA/miRNA\* duplex. Only one strand is incorporated into the RNA-induced silencing complex (RISC), which interacts with the mRNA, while the other strand is degraded. For partially complementary miRNAs to recognize their targets, only nucleotides 2 through 8 in the 'seed region,' which is located in the 3' untranslated region (UTR), have to be perfectly complementary. As a result of binding, the mRNA is silenced by translational repression or deadenylation. When there is perfect complementarity, the mRNA is silenced by endonucleolytic cleavage and degradation.

The role of miRNA in other cancers has been elucidated, but due to the high tissue heterogeneity of pancreatic ductal adenocarcinoma (PDAC), studies have not revealed any particular pattern of miRNA dysregulation.

The epithelial-mesenchymal transition (EMT), in which cells lose their polarity and adhesion, is the initial step in tumor metastasis. Epithelial cells are highly ordered and display polarity by adhering to one another via tight junctions, while mesenchymal cells differ in shape and display the capacity for migration. Studies have demonstrated that the miR-200 family, a group of functionally related miRNAs, inhibits EMT by negatively regulating the transcription factors ZEB1 and ZEB2. Studies have also shown that the tumor suppressor protein E-cadherin regulates EMT through its role in cell adhesion and maintenance of cell polarity. Experiments were conducted to assess whether miR-200 family expression correlates with the epithelial phenotype in PDAC cell lines. Figure 1 shows the findings of these experiments.

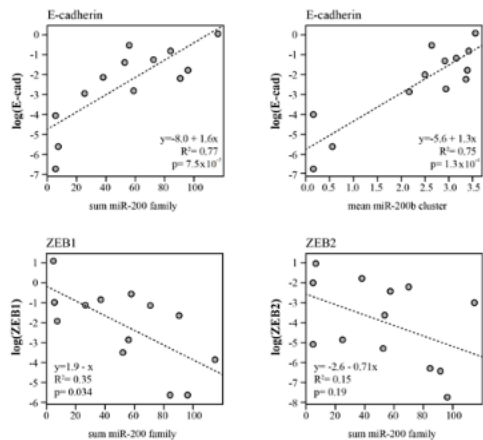


Figure 1 miR expression in PDAC cell lines

In prostate cancer cell lines, miR-34a was found to be downregulated and suspected to have a role similar to E-cadherin. Figure 2 shows measurements of cell culture size when a vector was used to reintroduce expression of miR-34a into PDAC lines.

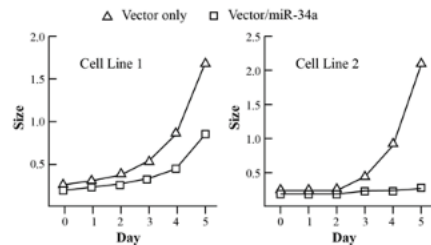


Figure 2 Growth rates of retrovirus-infected PDAC lines

Question 7

According to the passage, what is necessary for the maintenance of the epithelial phenotype?

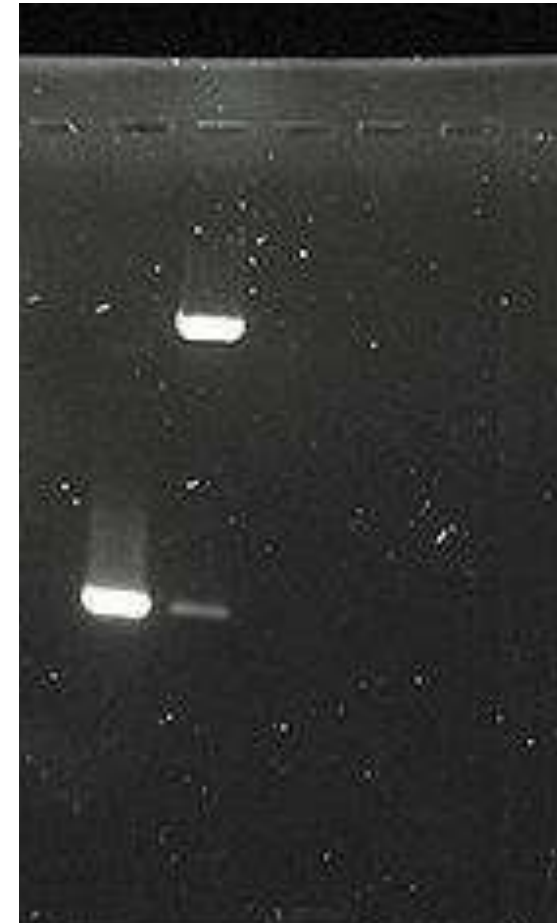
- A. Low levels of miR-34a
- B. High levels of ZEB-1 and ZEB-2
- C. High levels of E-cadherin
- D. Low levels of miR-200

View Solution

# Biology

I ran a gel with two sets of the same DNA and ended up with the gel shown. I also may have done some other things before I ran the gel. Which of the following is most likely?

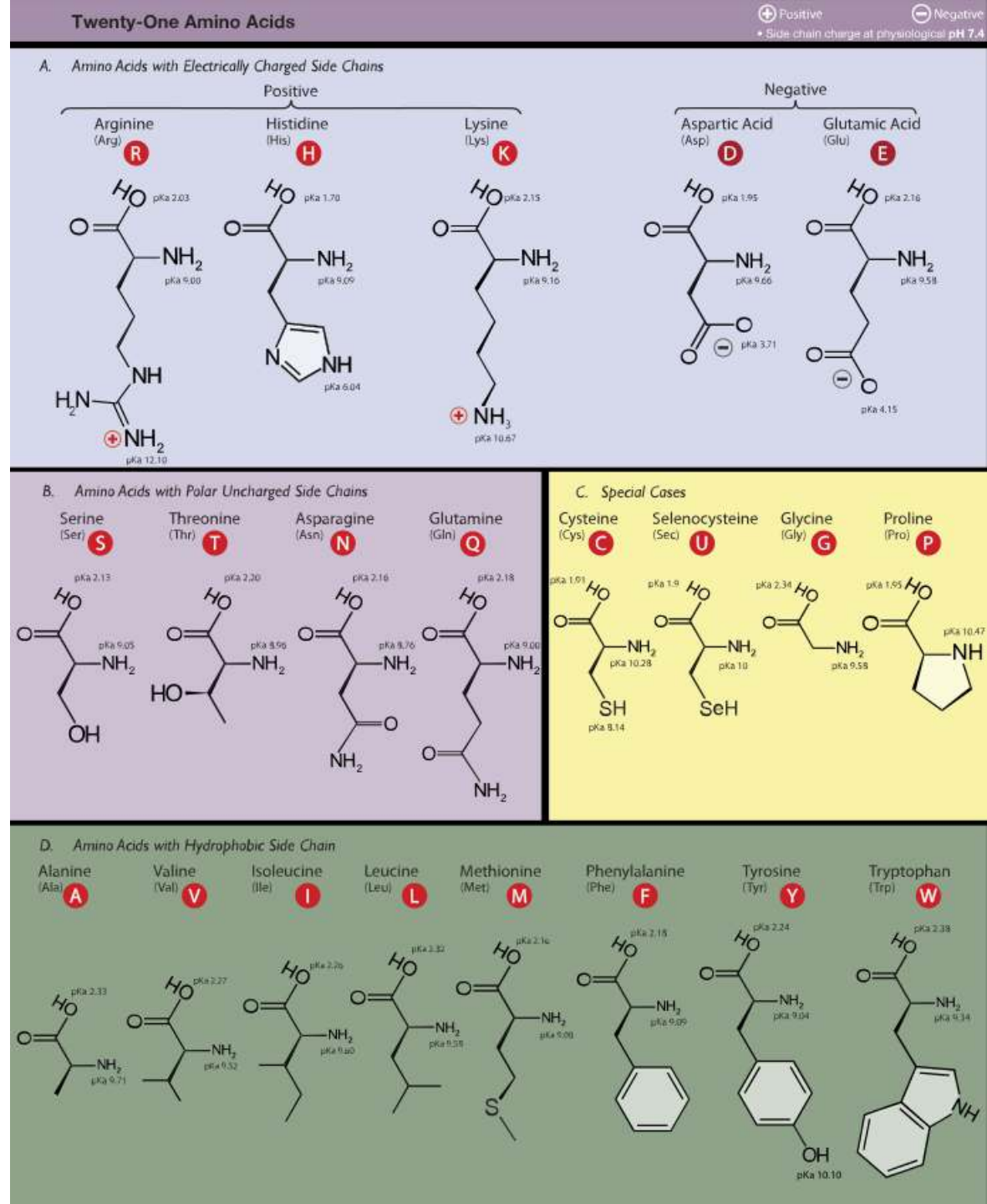
- A. I added mononucleotides to one sample.
- B. I added an exonuclease to one sample.
- C. I added an endonuclease to one sample.
- D. I heated one sample.



# Biology

Which of the following mutations is least likely to influence protein activity?

- A. S112N
- B. C212A
- C. L114P
- D. D72E



# Psychology

**When it comes to this section, vocab is king.**

- Schizoid personality disorder
- Schizotypal personality disorder
- Schizophreniform disorder
- Schizophrenia

**Think about how they are going to test you on this!**



# Psychology

Which of the following personality disorders is most likely seen in someone who avoids contact with others because they feel no urge for socialization?

## Personality disorders

### CLASS A- oddity

Paranoid -Paranoia ( NOT DELUSIONAL!)

Schizoid - People who see no benefit in social interactions.

Schizotypal- Odd thinking and speaking.

### CLASS B-Emotion

Antisocial - Lack of empathy.

Borderline - Sees people as extremes, Tend to be extrovert and not Politically correct

Histrionic - Attention seeking.

Narcistic - Think they are more important than others.

### CLASS C -Anxiety

Avoidant -Afraid of being judged, so stay home.

Dependent - Needs people to approve.

Obsessive compulsive - people with obsessions that become compulsions.

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**Q&A**

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# Additional Free Resources

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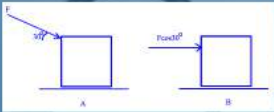
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- Question of the Day Quick Prep
- YouTube, Facebook and Instagram Content
- Ongoing Public Webinars and Q&A Sessions
- MCAT Blog: Content and Admissions
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### Question of the Day

Two people push a box along a frictional surface. One pushes the box at an angle of  $30^\circ$  to horizontal with force  $F$  while the other pushes the box horizontally with force  $F\cos 30^\circ$ . Which person does the most work?

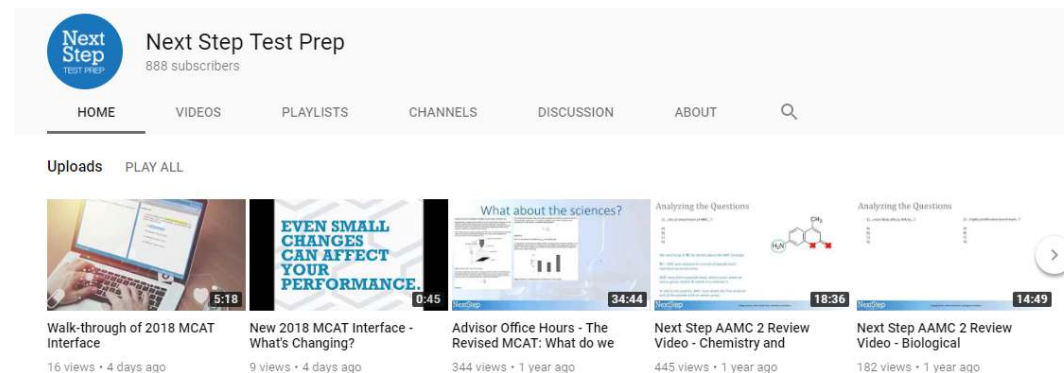


A) Person A  
B) Person B  
C) Person A and B do equal amounts of work  
D) cannot be determined

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# New 2018 MCAT Interface

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- New highlighting features
- New strikethrough features
- New keyboard shortcuts
- New Navigation/Review Screens

Next Step is ready. Are you?

Medical College Admission Test - Clara Gillan Time Remaining: 01:21:34 18 of 59

Highlight Strikethrough

Remove Highlight

Pause

**Figure 1** Eosinophil activation as measured by percent of CD69-positive cells after 3 and 12 hours of co-culture (\* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ )

Next, researchers aimed to assess the effect of NK co-culture on eosinophil degranulation. After 3 and 12 hours of co-culture, samples were centrifuged at 1500 rpm, and ECP levels were measured in the supernatants (Figure 2). No ECP was detected in supernatant culture of NK cells alone.

**Question 18**

Which of the statements below is supported by the experimental results, as shown in Figures 1 and 2?

- A. The duration of Eos co-culture with NK cells directly and linearly correlates to the amount of ECP found in the supernatant after centrifugation.
- B. Cells cultured with a 1:1 NK-to-Eos ratio displayed statistically similar levels of activation to cells cultured with a 5:1 NK-to-Eos ratio, as measured by CD69 expression.
- C. NK co-culture stimulates Eos activation while inhibiting degranulation.
- D. Co-culture with NK cells significantly increased Eos degranulation in all groups, as compared to Eos cells cultured alone.

Periodic Table Review Screen

Previous Next

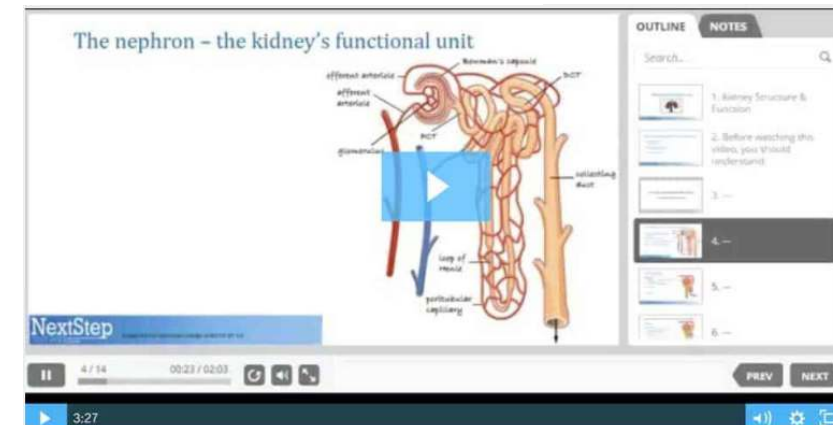
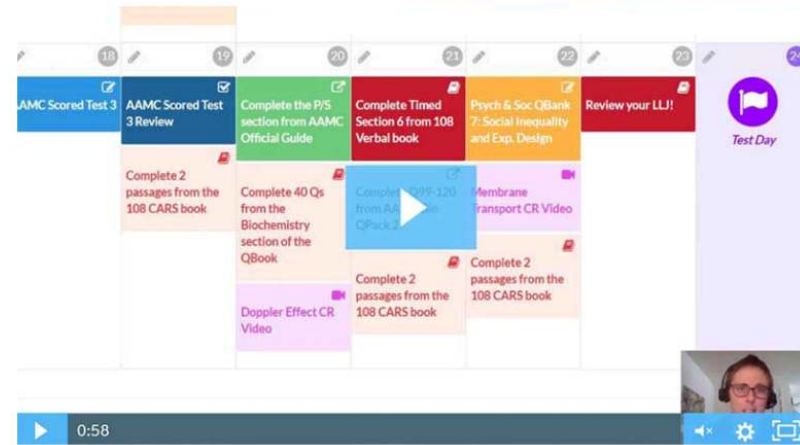
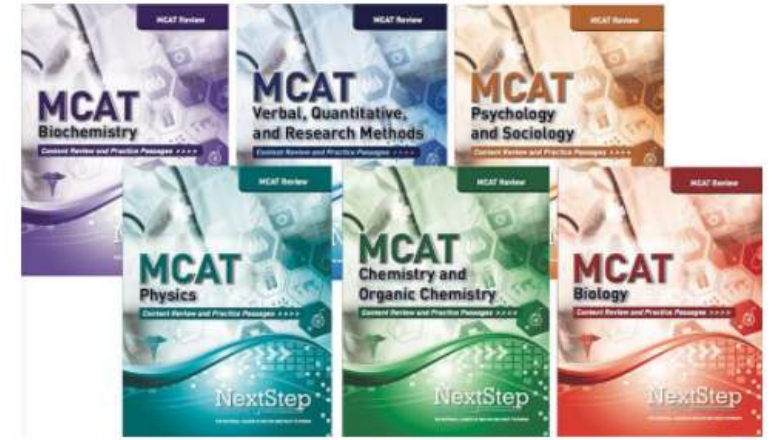
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✓ **All aligned to new 2018 interface**

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