



# OAT<sup>Q&As</sup>

Optometry Admission

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### QUESTION 1

Which of the following is true of enzymes?

- A. Enzymes effect the  $\Delta G'$  of a reaction.
- B. Enzymes effect the equilibrium of a reaction.
- C. Enzymes effect the activation energy of a reaction.
- D. A and C are true.
- E. All of the above are true.

Correct Answer: C

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### QUESTION 2

Which of the following molecules is thought to have acted as the first enzyme in early life on earth?

- A. Protein
- B. RNA
- C. Triglycerides
- D. Phospholipids
- E. DNA

Correct Answer: B

Some RNA molecules in extant organisms have enzymatic activity; for example, the formation of peptide bonds on ribosomes is catalyzed by an RNA molecule. This and other information have led scientists to believe that the most likely molecules to first demonstrate enzymatic activity were RNA molecules.

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### QUESTION 3

Which of the following proteins are incorrectly matched to their functions?

- A. DNA Topoisomerase: relaxes supercoiling.
- B. Helicase: Unwinds the double helix of the DNA by breaking the hydrogen bonds.
- C. DNA Polymerase I: Removes and replaces the RNA primer with DNA.
- D. DNA Ligase: Joins DNA segments together, as seen with Okazaki fragments.
- E. None of the above.

Correct Answer: E

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All of the answer choices are correct. These proteins are components of DNA replication and should be known.

#### QUESTION 4

Three consecutive prime numbers add up to 223. What is the smallest of these numbers?

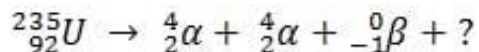
- A. 61
- B. 67
- C. 68
- D. 71
- E. 79

Correct Answer: D

Begin tackling these problems by first looking at the answer choices. One can eliminate 68 immediately because it is not a prime number. From there, pick an answer choice and work from there. Because the question asks for the first number in the set of 3 prime numbers, it means you pick an answer choice, and then figure out the next two prime numbers that follow it. Add them up and see if they add up to 223. With 71, the next two prime numbers will be 73 and 79.  $71 + 73 + 79 = 223$ .

#### QUESTION 5

For the following nuclear reaction, fill in the correct daughter product.



- A.  ${}_{89}^{227}\text{Ac}$
- B.  ${}_{95}^{243}\text{Am}$
- C.  ${}_{95}^{227}\text{Am}$
- D.  ${}_{89}^{227}\text{Am}$
- E.  ${}_{95}^{235}\text{Am}$

- A. Option A
- B. Option B
- C. Option C
- D. Option D
- E. Option E

Correct Answer: A



Begin by looking at the reactant side and noting down the number of mass number and protons (235 and 92 respectively). These numbers have to match the total numbers on the product side. The 2 alpha-decay and 1 beta-decay give you a mass of 8, which means it is 227 short of the mass number in the reactants. They also produce a  $(2 + 2 - 1 = 3)$  number of protons, 89 short of balancing the reactant number of protons. Thus, your missing daughter nuclei will have a mass of 227 and 89 protons. Looking at a periodic table, the atom Ac has 89 protons.

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