2022 MIT Science Bowl High School Invitational Tiebreak Round 6

TOSSUP

1) CHEMISTRY *Multiple Choice* By name or number, identify all of the following three homonuclear diatomic species that have a higher ionization energy than their neutral parent atom:

1) He_2^+
2) N_2^+
3) F_2^+

ANSWER: 2 only

TOSS UP

2) EARTH AND SPACE *Short Answer* What form of chemical limestone is formed by precipitation from groundwater and is commonly found near hot springs or on cave walls?

ANSWER: Travertine

TOSS UP

3) PHYSICS *Short Answer* Tyler's spaceship leaves Earth and travels at a constant speed of $3c/5$, except for a negligible time period at the middle of its journey when it turns around to return to Earth as well as negligible acceleration time periods at the start and end of its journey. When Tyler returns to Earth, he finds that 10 years have elapsed according to clocks on Earth. In years to one significant figure, how much time has elapsed according to the clocks on Tyler's spaceship?

ANSWER: 8

TOSS UP

4) BIOLOGY *Short Answer* Amine (*uh-MEEN*) hormones are synthesized from what two possible amino acids?

ANSWER: Tyrosine and tryptophan

TOSS UP

5) MATH *Short Answer* What is the eccentricity of the conic with equation $y = x^2 - 25$?

ANSWER: 1
