These questions, which were used as replacements throughout the SMH Invitational Cup, are sorted by category but not by difficulty.

TOSSUP

1) Biology – *Multiple Choice* How many nuclei are there in one fully developed angiosperm pollen grain?
W) 1
X) 2
Y) 3
Z) 4

ANSWER: Y) 3 [SO]

BONUS

1) Biology – *Short Answer* Identify all of the following three mutations that can create a stop codon:
1) Insertion of 1 nucleotide;
2) Insertion of 3 nucleotides;
3) Deletion of 3 nucleotides.

ANSWER: All of them [EH]

TOSSUP

1) Biology – *Multiple Choice* Also known as club fungi, what phylum of fungi includes mushrooms, puffballs, and rusts?
W) Ascomycota
X) Basidiomycota
Y) Microsporidia
Z) Chytridiomycota

ANSWER: X) BASIDIOMYCOTA [SO]

BONUS

1) Biology – *Short Answer* Identify all of the following three results which may occur after conjugation between a Hfr cell and a F minus cell.
I. Two Hfr cells
II. One Hfr cell, one F plus cell
III. One Hfr cell, one F minus cell

ANSWER: I and III [SO]

TOSSUP

1) Biology – *Multiple Choice* Also known as club fungi, what phylum of fungi includes mushrooms, puffballs, and rusts?
W) Ascomycota
X) Basidiomycota
Y) Microsporidia
Z) Chytridiomycota

ANSWER: X) BASIDIOMYCOTA [SO]

BONUS

1) Biology – *Short Answer* Identify all of the following three results which may occur after conjugation between a Hfr cell and a F minus cell.
I. Two Hfr cells
II. One Hfr cell, one F plus cell
III. One Hfr cell, one F minus cell

ANSWER: I and III [SO]

TOSSUP

1) Biology – *Multiple Choice* Increased comparative growth rates of bat fingers, leading to wing development, is an example of which of the following phenomena?
W) paedomorphosis
X) allochrony
Y) heterochrony
Z) neoteny

ANSWER: Y) HETEROCHRONY [SO]

TOSSUP

1) Math – *Short Answer* The numbers 1 through 6 are placed on the vertices of a hexagon. The sum of the numbers on the 3 pairs of opposite vertices is the same. What is this common sum?

ANSWER: 7 [RG]

TOSSUP

1) Math – *Short Answer* A 3x3 matrix has determinant 4. If every element is then doubled, what is the new determinant of the matrix?

ANSWER: 32 [RG]

BONUS

1) Math – *Short Answer* What is the ratio of the additive inverse of 3/5 to the multiplicative inverse of 3/5?

ANSWER: -9/25 [SO]

TOSSUP

1) Chemistry – *Multiple Choice* Which of the following best describes the shape of the curve when pressure and volume in an ideal gas are plotted against each other at constant temperature?
W) linear
X) quadratic
Y) elliptical
Z) hyperbolic

ANSWER: Z) Hyperbolic [CZ]

BONUS

1) Physics – *Short Answer* Peter is pulling rocks up a 8-meter long inclined plane set at 30 degrees above the horizontal. In watts and to one significant figure, how much average power must Peter exert to move a 2 kilogram rock from the bottom to the top of the slope in 10 seconds?

ANSWER: 8 [SO]

TOSSUP

1) Earth and Space – *Multiple Choice* In which layer of the atmosphere is most gamma and x-ray radiation absorbed?
W) Troposphere
X) Stratosphere
Y) Mesosphere
Z) Thermosphere

ANSWER: Z) Thermosphere [PB]