2022 MIT Science Bowl High School Invitational
Tiebreak Round 10

TOSSUP

1) CHEMISTRY *Short Answer* The standard reduction potential of Cr^{3+} (read: *chromium three plus*) to chromium metal is -0.7 volts, while the standard reduction potential of Cr^{3+} to Cr^{2+} (read: *chromium two plus*) is -0.4 volts. In volts, what is the standard reduction potential of Cr^{2+} to chromium metal?

ANSWER: -0.85

TOSS UP

2) EARTH AND SPACE *Short Answer* By name or number, identify all of the following three minerals which are characteristic of hydrothermal vents that are more distal to the magma source, which tend to be poor in sulfides and lighter in color:

1) Galena
2) Sphalerite
3) Barite

ANSWER: 3 only

TOSS UP

3) PHYSICS *Short Answer* A viscous fluid is subjected to a pressure gradient, causing it to flow through a cylindrical pipe. The total rate of mass flowing through the pipe is proportional to the radius of the pipe to what power?

ANSWER: 4

TOSS UP

4) BIOLOGY *Short Answer* GABA receptors are primarily inhibitory because they increase the permeability of the cell membrane to what ion?

ANSWER: Cl^- (ACCEPT: Chloride)

TOSS UP

5) MATH *Multiple Choice* How many planes of symmetry does a regular tetrahedron have?

W) 3
X) 6
Y) 12
Z) 24

ANSWER: X) 6
