

**2024 Earth and Space Scrimmage**

**Round Robin 1**

**August 1st - 3rd**

**TOSS-UP**

- 1) Earth science – *Short Answer* Order the following three circulation cells in terms of increasing average vertical thickness: 1) Polar cell; 2) Hadley cell; 3) Ferrel cell.

ANSWER: 1, 3, 2

**TOSS-UP**

- 2) Space science – *Short Answer* The eruption of compounds such as water and ammonia from Enceladus' subsurface oceans is an example of what phenomenon present on many outer solar system bodies?

ANSWER: Cryovolcanism

**TOSS-UP**

- 3) Earth science – *Short Answer* Identify all of the following three coastline features that are considered depositional in origin: 1) Sea stacks; 2) Baymouth bars; 3) Tombolos.

ANSWER: 2 and 3

**TOSS-UP**

- 4) Space science – *Short Answer* The collapse of protostars under the force of gravity is slowed by the fusion of what isotope?

ANSWER: Deuterium (ACCEPT: Hydrogen-2, DO NOT ACCEPT: Hydrogen)

**TOSS-UP**

- 5) Earth science – *Short Answer* Identify all of the following three statements that are true regarding intrusive igneous bodies: 1) Dikes are concordant bodies; 2) Preexisting crust is known as country rock; 3) Dikes are almost never found in groups.

ANSWER: 2 only

**TOSS-UP**

6) Earth science – *Multiple Choice* Which of the following correctly compares typical glacial and fluvial deposits?

- W) Glacial deposits are more rounded and less sorted
- X) Glacial deposits are more rounded and more sorted
- Y) Glacial deposits are less rounded and less sorted
- Z) Glacial deposits are less rounded and more sorted

ANSWER: Y) Glacial deposits are less rounded and less sorted

**TOSS-UP**

7) Earth science – *Multiple Choice* In which of the following Köppen climate classifications would soils with low cation exchange capacities and lateritic compositions most likely be found?

- W) A
- X) B
- Y) C
- Z) D

ANSWER: W) A

**TOSS-UP**

8) Space science – *Multiple Choice* Which of the following elements is most often found in the absorption spectrum of brown dwarfs?

- W) Helium
- X) Lithium
- Y) Oxygen
- Z) Calcium

ANSWER: X) Lithium

**TOSS-UP**

9) Space science – *Multiple Choice* The Maunder Minimum was a period known for its vast decrease in which of the following solar phenomena?

- W) Solar flares
- X) Coronal mass ejections
- Y) Sunspots
- Z) Spicules

ANSWER: Y) Sunspots

**TOSS-UP**

10) Earth science – *Multiple Choice* Which of the following minerals is NOT a polymorph of quartz?

- W) Coesite
- X) Tridymite
- Y) Cristobalite
- Z) Staurolite

ANSWER: Z) Staurolite

**TOSS-UP**

11) Earth science – *Multiple Choice* Rainshadow deserts form when a mountain range causes precipitation on one side of the mountain and creates a desert on the other. Which of the following terms correctly describes the side of the mountain associated with the desert?

- W) Stoss
- X) Slip
- Y) Windward
- Z) Leeward

ANSWER: Z) Leeward

**TOSS-UP**

12) Space science – *Multiple Choice* Which of the following best describes what would happen if a large moon crossed within a planet’s Roche limit?

- W) It would be flung outwards
- X) It would spiral inwards
- Y) It would be torn apart
- Z) It would tear apart the planet

ANSWER: Y) It would be torn apart

**TOSS-UP**

13) Earth science – *Short Answer* The Morenci mine in Arizona contains breccias cemented by azurite and malachite. This formation is possible because azurite and malachite are typically classified as what kind of minerals, which are formed by the alteration of rock already present in an area?

ANSWER: Secondary minerals

**TOSS-UP**

14) Earth science – *Short Answer* What mechanism of tectonic plate movement occurs as the subduction of dense plates applies a downward force on the rest of the plate?

ANSWER: Slab pull

**TOSS-UP**

15) Earth science – *Short Answer* What soil horizon is characterized by the deposition of clay minerals and iron oxides via illuviation?

ANSWER: B

**TOSS-UP**

16) Space science – *Short Answer* A group of stars has the unique property that each star’s radius is directly proportional to its temperature. If Star A has a temperature of 10,000 Kelvin and Star B has a temperature of 5,000 Kelvin, what is the ratio of the luminosity of Star A to that of Star B?

ANSWER: 64

**TOSS-UP**

17) Earth science – *Multiple Choice* Which of the following generally describes how surface salinity changes from the equator to the poles in the Atlantic Ocean?

- W) Uniformly increases
- X) Uniformly decreases
- Y) Increases, then decreases
- Z) Decreases, then increases

ANSWER: Y) Increases, then decreases

**TOSS-UP**

18) Space science – *Multiple Choice* A star with a core mass between the Chandrasekhar limit and the Tolman-Oppenheimer-Volkoff limit will typically evolve to form which of the following celestial bodies?

- W) Black hole
- X) Wolf-Rayet star
- Y) White dwarf
- Z) Neutron star

ANSWER: Z) Neutron star

**TOSS-UP**

19) Space science – *Short Answer* What relationship is used to calculate the distance to galaxies by comparing their rotational velocity and absolute magnitude?

ANSWER: Tully-Fisher relation

**TOSS-UP**

20) Earth science – *Multiple Choice* A geologist finds a bed of Carboniferous shale at the center of a syncline. In which of the following periods could the rock surrounding this bed have formed?

- W) Cretaceous
- X) Devonian
- Y) Permian
- Z) Triassic

ANSWER: X) Devonian