

2024 Earth and Space Scrimmage

Round Robin 5

August 13th - 15th

TOSS-UP

1) Space science – *Short Answer* Order the following three types of galaxies in terms of increasing strength of emissions from their nucleus: 1) Type 1 Seyfert [**see-furt**]; 2) Type 2 Seyfert; 3) Quasars.

ANSWER: 2, 1, 3

TOSS-UP

2) Earth science – *Multiple Choice* In which of the following geologic environments would aragonite occur more frequently than calcite?

- W) Within volcanic rocks associated with cinder cones
- X) Within metamorphic aureoles of intruded dikes
- Y) Within blueschists at convergent boundaries
- Z) Within speleothems associated with karst topography

ANSWER: Y) Within blueschists at convergent boundaries

TOSS-UP

3) Space science – *Multiple Choice* Which of the following best explains why Population III stars have never been observed?

- W) They are too small to detect
- X) They do not emit visible light
- Y) They generally form outside of galaxies
- Z) Their lifetimes were too short to survive until today

ANSWER: Z) Their lifetimes were too short to survive until today

TOSS-UP

4) Earth science – *Short Answer* What is the term for the sequence of sedimentary structures deposited by low-density turbidity currents?

ANSWER: Bouma [**boo-mah**] sequence

TOSS-UP

5) Space science – *Multiple Choice* Which of the following statements is INCORRECT regarding comets?

- W) Short-period comets originate from the Kuiper Belt
- X) The dust tail of a comet always points directly away from the Sun
- Y) Comets usually have very low albedos
- Z) Comets usually have highly eccentric elliptical orbits

ANSWER: X) The dust tail of a comet always points directly away from the sun

TOSS-UP

6) Space science – *Short Answer* Two stars have a difference in apparent magnitude of 10. If they have the same absolute magnitude, what is the ratio between the distance from the larger star to the distance from the smaller star?

ANSWER: 100:1

TOSS-UP

7) Space science – *Short Answer* In white dwarfs, gravitational collapse does not occur due to the presence of what balancing force?

ANSWER: Electron degeneracy

TOSS-UP

8) Earth science – *Short Answer* What type of stream is defined as having a water table that lies above the height of the stream?

ANSWER: Gaining stream

TOSS-UP

9) Earth science – *Multiple Choice* Which of the following statements is INCORRECT regarding glaciers?

- W) Drumlins are often found in groups known as drumlin fields
- X) The snowline is typically found in the zone of ablation
- Y) Tarns form inside the cirques [*sir-ks*] of alpine glaciers
- Z) Eskers are formed by glacial meltwater

ANSWER: X) The snowline is typically found in the zone of ablation

TOSS-UP

10) Earth science – *Short Answer* What metamorphic facies [**fay-shees**] is best characterized by a mineral assemblage composed of albite, epidote [**eh-pih-dote**], and chlorite?

ANSWER: Greenschist

TOSS-UP

11) Space science – *Multiple Choice* Which of the following best explains why stars with masses greater than 2.5 solar masses rarely undergo a helium flash?

W) Larger stars fuse via the CNO cycle instead of the triple-alpha process

X) Larger stars evolve too slowly to reach the helium flash stage

Y) Larger stars lack helium in the core due to strong convection cycles

Z) Larger stars burn helium before developing a degenerate core

ANSWER: Z) Larger stars burn helium before developing a degenerate core

TOSS-UP

12) Earth science – *Short Answer* On the moment magnitude scale, a 1000-fold difference in earthquake energy is approximately associated with what difference in magnitude?

ANSWER: 2

TOSS-UP

13) Earth science – *Multiple Choice* Which of the following currents is NOT part of the North Atlantic Gyre?

W) Gulf Stream

X) Canary Current

Y) North Atlantic Drift

Z) Benguela [**ben-guay-la**] Current

ANSWER: Z) Benguela Current

TOSS-UP

14) Earth science – *Multiple Choice* Which of the following INCORRECTLY matches the mineral ore with the element it is mined to obtain?

- W) Sphalerite, zinc
- X) Wolframite, tungsten
- Y) Galena, mercury
- Z) Ilmenite, titanium

ANSWER: Y) Galena, mercury

TOSS-UP

15) Earth science – *Short Answer* The mantle discontinuity at a depth of 660 kilometers is attributed to a mineral transition from ringwoodite to bridgmanite. Bridgmanite is a member of what group of high-pressure minerals commonly found in Earth's lower mantle?

ANSWER: Perovskites

TOSS-UP

16) Earth science – *Multiple Choice* In which of the following locations would pillow lavas most likely form?

- W) Mid-ocean ridge
- X) Volcanic arc
- Y) Rift valley
- Z) Accretionary wedge

ANSWER: W) Mid-ocean ridge

TOSS-UP

17) Earth science – *Short Answer* What term is given to precipitation that evaporates before reaching the ground?

ANSWER: Virga

TOSS-UP

18) Space science – *Short Answer* Visible from space, what moving line divides the daylit side and the night side of a planet?

ANSWER: Terminator (ACCEPT: Terminator line)

TOSS-UP

19) Space science – *Short Answer* Given that Earth is much larger than the Moon, by what factor would the tidal force exerted on Earth by the Moon be multiplied if Earth's mass was tripled and the distance between Earth and the Moon was quadrupled?

ANSWER: 3/64

TOSS-UP

20) Earth science – *Multiple Choice* At which of the following times is the urban heat island effect typically the most noticeable?

W) During a summer morning

X) During a summer evening

Y) During a winter morning

Z) During a winter evening

ANSWER: Z) During a winter evening