



GEOGRAPHY EDUCATION ASSOCIATION TURKEY

**THE 2018 INTERNATIONAL
EARTH SCIENCE OLYMPIAD
TURKEY NATIONAL EXAMINATION**

NAME – SURNAME: _____

17 February 2018

INSTRUCTIONS:

The exam consists of 60 multi-choice questions.

Each correct answer is 1 point. 1/3 point will be subtracted for each wrong answers. Blank answers are 0 point

Each of the questions or incomplete statements is followed by four suggested answers or completions. Select the one that is best in each case and then fill in the corresponding oval on the answer sheet.

The response time of the exam is 120 minutes.

You may **not** leave the exam room in the **first 30 minutes** or in the **last 15 minutes**.



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SECTION I

The Geosphere and Earth Systems

1. When Mount Vesuvius erupted in 79 A.D., most people were killed by

- (A) lava
- (B) pyroclastic flow
- (C) volcanic rock
- (D) poisonous volcanic gases

2. Where two crustal plates collide and one plate is forced under the other into the mantle, it is called a

- (A) hot spot
- (B) pressure zone
- (C) sedimentary layer
- (D) subduction zone

3. An ocean trench is formed along the

- (A) transform fault boundary of two colliding plates
- (B) convergent boundary of two colliding plates
- (C) distant edge boundary of two colliding plates
- (D) divergent boundary of two colliding plates

4. Which soil horizon consists of a zone of accumulation, where ions transported by rainwater are reconnected to create new minerals?

- (A) Horizon A
- (B) Horizon B
- (C) Horizon C
- (D) Mineralization occurs only in the topsoil.

5. Scientists believe that the youngest rocks are found?

- (A) In the highest reaches of the mountains
- (B) Just offshore in the deep trenches
- (C) On the slopes of shield volcanoes
- (D) On the sea floor near spreading centers

6. Which of the following statements about earthquakes is correct?

- (A) Earthquakes occur only at plate boundaries.
- (B) During an earthquake, movement along the fault occurs only at the Earth's surface.
- (C) Stored-up energy is released in the form of seismic waves.
- (D) An earthquake with a magnitude of 4 on the Richter Scale releases approximately twice as much energy as a magnitude 2 earthquake.

7. The Mohorovicic discontinuity is the boundary between Earth's

- (A) outer core and mantle
- (B) inner and outer core
- (C) crust and mantle
- (D) oceanic crust and continental crust

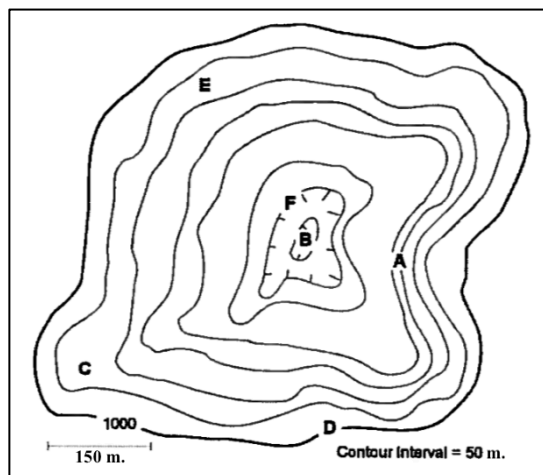
8. In terms of hardness, place the following substances in proper order from softest to hardest: (I) quartz, (II) calcite, (III) talc, (IV) diamond.

- (A) I, III, IV, II
- (B) III, II, I, IV
- (C) IV, II, I, III
- (D) III, I, II, IV

9. The main difference between conglomerate and breccia sedimentary rocks is that

- (A) conglomerate particles have rounded edges, breccia particles have angular edges
- (B) conglomerate particles have angular edges, breccia particles have rounded edges
- (C) conglomerate particles are formed by compaction/dessification, breccia particles are formed by cementation
- (D) conglomerate particles are typically larger than sand sized, breccia particles are typically sand sized

For question 10 & 11, refer to the diagram below.



10. What does Point A represent?

- (A) A cliff.
- (B) A valley.
- (C) A depression.
- (D) A hilltop

11. What contouring feature is represented by Point D?

- (A) A hachure.
- (B) An index contour.
- (C) A benchmark.
- (D) The sea level line.

12. Humans may have migrated to North America by way of then

- (A) Columbia Plateau
- (B) East Pacific rise
- (C) Basin & Range province
- (D) Beringia isthmus

13. During which of the following processes within the rock cycle would gneiss form?

- (A) Metamorphism
- (B) Sedimentation
- (C) Basaltic flow
- (D) Weathering

14. The black (and dark gray) coloration common in many sedimentary rocks is the result of

- (A) the oxidation of ferrous iron to ferric iron
- (B) compounds of organic carbon and iron deposited in low oxygen environments
- (C) the presence of dark colored materials like silt and clay
- (D) deposition in a warm, humid environment such as in the tropics.

15. Which of the following best describes soils in many tropical rain forests?

- (A) They lack soil horizons.
- (B) They are well suited for growing a wide variety of crops.
- (C) They are similar to soils in grassland.
- (D) They are quickly depleted of nutrients when the forest is removed.

16. Which of the following elements constitutes the highest percentage of mass in Earth's crust?

- (A) Oxygen
- (B) Aluminum
- (C) Carbon
- (D) Potassium

17. There are various stages in the formation of coal as heat and pressure are increased and moisture content is decreased. These stages, in order, are

- (A) bituminous, peat, lignite, anthracite
- (B) peat, lignite, bituminous, anthracite
- (C) peat, lignite, anthracite, bituminous
- (D) anthracite, bituminous, peat, lignite

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SECTION II

Atmosphere and Earth Systems

18. The relationship between air temperature and the amount of water vapor it contains is known as

- (A) relative humidity
- (B) indistinct humidity
- (C) point source humidity
- (D) aridity

19. The Aurora Borealis and Aurora Australis are found in which atmospheric layer?

- (A) Mesosphere
- (B) Stratosphere
- (C) Tropopause
- (D) Thermosphere

20. Circulating air and water patterns affected by the Earth's rotation are known as the

- (A) geomorphic cycle
- (B) El Niño–Southern Oscillation
- (C) geosynclinal cycle
- (D) Coriolis effect

21. Which of the following property pairs best characterizes a sinking air mass?

- (A) Warm, high humidity
- (B) Cool, low humidity
- (C) Warm, low humidity
- (D) Cool, high humidity

22. Which of the following statements is TRUE in regard to a land breeze?

- (A) It only develops during daylight hours.
- (B) It reflects an atmospheric disturbance in the stratosphere.
- (C) It is usually weaker than a sea breeze.
- (D) It blows from the sea to the land.

23. When layer of cool air at the surface of Earth is found under a layer of warmer air above it, the result is known as

- (A) the Coriolis effect.
- (B) the greenhouse effect.
- (C) a temperature inversion.
- (D) an upwelling.

24. Earth's atmosphere is divided into layers that are based upon their

- (A) water content.
- (B) relative humidity.
- (C) gas content.
- (D) temperature gradient.

25. The primitive atmosphere of Earth was deficient in free oxygen. What process was primarily responsible for the development of the present percentage of free oxygen in the Earth's atmosphere?

- (A) outgassing
- (B) photosynthesis
- (C) volcanic eruptions
- (D) oxidation of iron-based minerals

26. Which of the following human activities reduces the level of ozone in the atmosphere?

- (A) using artificial lighting in scientific polar stations
- (B) using large banks of solar cells for energy production
- (C) releasing chlorofluorocarbons from aerosol cans
- (D) destroying large areas of the equatorial rain forests

27. Which of the following are the two most important factors in determining a habitat's climate?

- (A) Temperature and precipitation
- (B) Wind direction and precipitation
- (C) Wind speed and rate of evaporation
- (D) Rate of evaporation and temperature

28. Samples of atmospheric gases from past eras can most easily be obtained from which of the following sources?

- (A) Mud samples from eutrophic lakes
- (B) Different types of sedimentary rock
- (C) Gases trapped in polar ice caps
- (D) Tree ring measurements

29. All of the following gases contribute to rising global air temperatures EXCEPT

- (A) methane
- (B) water vapor
- (C) ozone
- (D) carbon dioxide

30. Ozone depletion is occurring most rapidly in the earth's polar regions because

- (A) there are more researchers studying the problem at the poles than at the equator
- (B) the solar UV radiation is stronger at the poles, promoting the breakdown of ozone.
- (C) the upper atmosphere winds form a pattern of high and low pressure systems that can cause the destruction of ozone
- (D) large amounts of chlorofluorocarbons (CFCs) can accumulate on ice crystals formed in the cold atmosphere

31. The energy necessary to produce stratospheric ozone comes from which of the following?

- (A) Oxygen
- (B) Sunlight
- (C) Radioactive decay
- (D) Magma

32. Which of the following best describes the mechanism of the greenhouse effect in Earth's atmosphere?

- (A) Ultraviolet radiation from the Sun is absorbed by ozone gas in the stratosphere.
- (B) Gamma radiation from the Sun is absorbed at ground level by dust particles in the atmosphere
- (C) Infrared radiation from Earth's surface is absorbed by gases in the atmosphere.
- (D) Cosmic radiation from deep space is absorbed by gases in the atmosphere.

33. Which of the following will occur if the trend of global temperature increase continues?

- (A) Night temperatures will decrease as day temperatures increase.
- (B) Tropical areas will become cooler than they currently are.
- (C) Sea levels will drop due to increased evaporation.
- (D) The troposphere will contain more water vapor.

34. Which of the following is a process that indirectly removes carbon from Earth's atmosphere?

- (A) Formation of carbonate deposits
- (B) Outgassing by volcanoes
- (C) Respiration by mammals
- (D) Respiration by anaerobic bacteria

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SECTION III

Hydrosphere and Earth Systems

35. Pesticide and fertilizer use on crops affects water purity when

- (A) evaporation is increased by heat
- (B) runoff joins with surface and/or groundwater
- (C) there is too little rainfall
- (D) it is used in proper amounts

36. A core sample shows a “fining upward” sequence in a shallow marine environment. This sequence is typical of?

- (A) A regression
- (B) Metamorphism
- (C) A transgression
- (D) Sea floor spreading

37. The high salinity of seawater increases its density in comparison to freshwater. One of the characteristics of seawater is that it

- (A) is less buoyant than freshwater
- (B) has a lower freezing point than freshwater
- (C) carries higher levels of dissolved oxygen than freshwater
- (D) has a higher heat capacity than freshwater

38. The surface of the sea is not level because of a variety of factors. Which of the following factors does NOT contribute to an irregular surface?

- (A) Wind
- (B) Currents
- (C) Salinity
- (D) Tides

39. Water is resistant to a change in temperature because of its

- (A) High heat capacity
- (B) High specific heat capacity
- (C) High heat of vaporization
- (D) High heat of fusion

40. The Gulf Stream in the Northern Hemisphere and Brazilian Current in the Southern Hemisphere move poleward. Compared to inland areas at the same latitude, the coastal areas bordering these currents will

- (A) be warmer.
- (B) be more arid.
- (C) have more advection fogs.
- (D) have shorter growing seasons.

41. An area where salt and freshwater mix that has a very high level of productivity is correctly called

- (A) the open ocean
- (B) the abyssal zone
- (C) the headwaters
- (D) an estuary

42. In sea water, carbon is mostly found in the form of

- (A) phosphoric acid
- (B) carbon monoxide
- (C) bicarbonate ions
- (D) methane gas

43. The North Atlantic Current provides which of the following for Europe and North America?

- (A) Fish to feed predators such as killer whales
- (B) Warm water that moderates land temperatures
- (C) Large amounts of CO₂ to promote photosynthesis
- (D) Cold saltwater to help form icebergs

44. Which of the following actions would be the most effective in decreasing acid rain and acid deposition?

- (A) Reducing use of fossil fuels
- (B) Using higher smokestacks
- (C) Relocating power plants to areas of lower population density
- (D) Adding lime to acidified lakes

45. Which of the following is most likely to result from destruction of wetlands surrounding a river?

- (A) A decreased sediment load in the river
- (B) A decreased level of pollutants such as nitrates in the river
- (C) An increased frequency of flooding of the river valley
- (D) An increased level of oxygen in the river

46. In models of global warming, the most important factor contributing to an increase in sea level is

- (A) thermal expansion of the oceans
- (B) increased precipitation
- (C) decreased evaporation
- (D) growth of the polar ice caps.

47. Which of the following will result in accelerated eutrophication when introduced into streams, lakes and bays?

- (A) Bacteria and viruses
- (B) Pesticides
- (C) Acid wastes and salts
- (D) Phosphates

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SECTION IV

The Planetary System and Earth Systems

48. The seasonal variations of temperature for a planet are primarily due to

- (A) distance to the Sun
- (B) inclination of Earth's axis in relation to the Sun
- (C) weather
- (D) distance to the Moon

49. The orbital line drawn by the Sun in its path through the sky is termed

- (A) the ecliptic
- (B) the equinox
- (C) the encyclic
- (D) the epilyptic

50. The Moon orbits the Earth once every

- (A) 28 days
- (B) 24 days
- (C) 30 days
- (D) 12 months

51. Which of the following statements best summarizes Newton's Law of Universal Gravitation?

- (A) Objects in an orbit will follow the orbit as long as the circled object is constantly accelerating.
- (B) Objects in orbit are held in orbit by the gravitational force exerted between the objects.
- (C) Objects in orbit must travel at a constant velocity in order to remain in orbit.
- (D) Objects in an orbit must have a smaller mass than the object they are circling, in order to remain in that orbit.

52. In observing a star, cosmologists note that it has a blue shift. What does this mean?

- (A) The star is very cool
- (B) The star is very hot
- (C) The star is moving toward us
- (D) The star is moving away from us

53. Which planet most closely resembles Earth's moon in terms of atmosphere, tectonic activity, size and surface appearance?

- (A) Uranus
- (B) Mars
- (C) Mercury
- (D) Pluto

54. What are Saturn's rings composed of?

- (A) Gas
- (B) Dust
- (C) Gas and dust
- (D) Gas, dust and ice.

55. Scientists believe that planets formed by a process called

- (A) lithification
- (B) accretion
- (C) radioactive heating
- (D) compositism

56. Because the moon has the same period of axial rotation as the Earth, this result in

- (A) Neap and Spring tides
- (B) The phases of the Moon
- (C) One side of the Moon always facing Earth
- (D) Partial and annular eclipses

57. If matter from Jupiter floats in water, but matter from Earth sinks in water, which of the following statements is correct?

- (A) Jupiter has a higher degree of atmospheric saturation of water
- (B) Jupiter has a greater amount of dissolved salts in its crust
- (C) Jupiter has a higher density than Earth
- (D) Jupiter has a lower density than Earth

58. A day on Saturn takes about 10 Earth hours. Which fact would best explain this short day?

- (A) Saturn is less dense than Earth.
- (B) Saturn is much farther from the Sun than Earth.
- (C) Saturn rotates more rapidly than Earth.
- (D) Saturn's orbit has greater eccentricity than Earth's.

59. What is the source of energy for the Sun?

- (A) Hydrogen fusion
- (B) Internal combustion
- (C) Nuclear fission of metals
- (D) Burning of solar gases

60. The Moon is very hot on the side facing the Sun and very cold on the dark side. This extreme temperature difference is primarily due to the Moon's

- (A) mineral composition.
- (B) thin atmosphere.
- (C) reflective rocks.
- (D) lack of volcanic activity.

END OF EXAM



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