Global Tectonics Pub Quiz

These questions are to assess what you know already and which you will need to know for this course. With a basic science education, having done first year geology and by giving a bit of thought, you should be able to answer most, if not all of these questions. Many questions require only approximate answers. Enjoy!

Geography and Global Physiography

You are provided with two copies of a Mercator map of the Earth. What do you understand by a Mercator map?

1. Why does the Antarctic continent look so enormous?

2. What is the approximate circumference of the Earth (in km)?

3. What is the approximate distance to the centre of the Earth (work it out if you don‘t know)?

4. How many degrees are swept out in one hour by the Earth's rotation?

5. What is the range of relative plate velocities on the Earth's surface?

6. What is the average depth of water in the world's oceans?

7. What is the average water depth on the continental shelves?

8. What is the depth of the deepest ocean trench?

Mark or point out on one map the following places:

New Zealand
The Iberian Peninsula
Brazil
Iceland
Hawaii
Japan
Nigeria
Hudson Bay
Kamchatka
Mexico
Nova Scotia
The Canary Islands
Tibet
California
A point 150^{o}W, 30^{o} N.

On the other map mark or point out the following physiographic features (some of them are quite small)

The Aleutian Arc
the Indonesion Arc
The Andes mountains
The Applachian mountains
The Rockies
The Zagros mountains
The Gobi Altai mountains
The Caspian Sea
The Western Alps
The Antarctic Peninsula
The Antilles arc
The Red Sea
The Indian Ocean
The Atlantic Ocean
The Pacific Ocean
The Arctic Ocean

Petrology and Mineralogy

9. What are the essential minerals of a basalt?

10. What is the difference between a basalt, a dolerite and a gabbro?

11. What are the essential minerals of a granite?

12. What is the volcanic equivalent of a granite?

13. What is the essential mineralogy of a peridotite?

14. Where on Earth would you expect to find a lot of (a) granite, (b) peridotite?

15. What is the commonest mineral in the Earth‘s crust?

16. Which of the following mineral groups are hydrous:
Pyroxenes, Feldspars, Amphiboles, Micas, Clay minerals, Oxide minerals,
Garnets, Olivines, Spinels, Serpentine minerals.

17. What is the chemical formula of quartz?

18. List the commonest eight elements in the Earth.

19. What are the main differences between albite, anorthite and orthoclase? Which minerals are the end members of the plagioclase solid-solution series?

20. What is the commonest sedimentary rock type in the the Earth‘s crust?

21. At approximately what temperature does (a) granite and (b) basalt start to melt?

22. Why is basalt lava less viscous than rhyolitic lava?

Mathematics

23. How many radians are there in 360^{o}?

24. What is the expression for the volume of a sphere?

25. Given that the radius of the Earth‘s core is about half the radius of the planet, approximately what fraction of the volume of the Earth is the core?

26. An equation of the form $y = A x^{n}$ is called a power law, where A and n are constants (or parameters). Write the result of taking logarithms of this equation. What is the advantage of expressing an equation like this logarithmically?

27. An equation of the form $y = \exp(Bx)$ is called an exponential law. Write down the result of taking logs of this expression.

28. This equation combines power and exponential functions: $y = C\, x^{n} \exp(Bx)$, where C is a constant. Write down the result of taking logs of this expression.

29. The vertical stress ····(force (Newtons) per m^2, also known as Pascals) at a given depth in the Earth's crust is given by

$$\sigma = \rho g z$$

where ρ is the density of the column of rocks (kg/m^3), g is the gravitational acceleration (9.8 ms^{-2}) and z is the depth (m). What is the approximate vertical stress at the base of the continental crust?

Geophysics

30. What is the density of liquid water?

31. What is the approximate density of (a) granite and (b) peridotite?

32. What is the approximate density of the whole Earth?

33. What do you understand by the viscosity of a fluid?

34. What do you understand by the terms "brittle" and "ductile" applied to solids?

35. What is meant by the Moho? How is it defined?

36. What are the main types of seismic wave?

37. What is the (approximately) fastest wave speed in the upper mantle? Hence, if the UK is approximately 10000km from California, after about how long would an earthquake in California be first registered on a seismograph in the UK?

38. What is the relationship between wave speed, wavelength and frequency? If seismic waves are emitted into the upper mantle at a frequency of 20 Hz, what will be the wavelength of the waves?

39. What is the cause of earthquakes?

40. What is elastically stiffer, granite or steel?

41. How is the boiling point of water affected by the application of pressure?

42. Why does the Earth have a magnetic field?

43. What is the average thickness of the continental crust?

44. What is the average thickness of the lithosphere?

45. What do you understand by the asthenosphere?

46. By approximately how much would sea level rise if all the Earth's continental ice sheets were to melt?