S5 Geography Practice Paper

S5 | Geography | Time: 75 minutes | Total: 100 marks | 24 questions

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Section 1 Plate Tectonics and Earthquakes (16 marks)

Each part carries 4 marks. Show all working.

1. A seismograph records a 12 s difference between the arrival of P waves and S waves. P waves travel at 6.0 km/s and S waves at 3.5 km/s in the crust. Find the distance of the epicentre from the station in km, to 1 decimal place.

2. The energy released by an earthquake follows log E = 4.8 + 1.5M with E in joules. Calculate the energy of a magnitude 6.0 quake and the ratio of its energy to that of a magnitude 5.0 quake.

3. A transform fault slips at an average of 5 cm per year. Assuming a constant rate, how far have the two blocks offset after 100 years, and why is the offset not released as earthquakes every year?

4. Plate boundaries are divergent, convergent or conservative. State two landforms found at a convergent boundary where an oceanic plate meets a continental plate, and explain why earthquakes there range from shallow to very deep.

Section 2 Volcanoes and Igneous Rocks (16 marks)

Each part carries 4 marks.

5. An eruption ejects 0.5 km3 of magma with a density of 2 600 kg/m3. Calculate the total mass of the erupted magma in kg in scientific notation.

6. That magma contains 800 ppm of sulphur dioxide. Calculate the mass of SO2 released in million tonnes (Mt) and explain how volcanic SO2 can affect global temperature.

7. Magma rises from 5 km depth to the surface in 2 hours. Find the average ascent rate in km/h and in m/s. What happens to dissolved volatiles if the ascent suddenly speeds up?

8. Compare basaltic and rhyolitic magma in silica content, viscosity and landform, and explain why their eruption styles differ.

Section 3 Weathering and Mass Movement (16 marks)

Each part carries 4 marks.

9. A slope has a resisting force of 480 kN per metre width and a driving force of 320 kN. Calculate the factor of safety and state whether the slope is stable (1.2 is the critical value).

10. After heavy rain the pore water pressure rises and the driving force becomes 420 kN. Recalculate the factor of safety and explain the link between rainstorms and mass movement.

11. A shale cliff retreats 12 mm per year through weathering. How far does the cliff line retreat in 100 years, and state two processes that weather shale quickly.

12. A 25 m granite block undergoes a 40 degrees C temperature change; its linear expansion coefficient is 8 x 10^-6 per degree C. Find the change in length in mm and explain how repeated cycling causes disintegration.

Section 4 Soil Erosion and Agriculture (16 marks)

Each part carries 4 marks.

13. A field loses 18 t/ha of topsoil each year; bulk density is 1.2 t/m3. Calculate the annual soil loss in mm of depth.

14. The field has 250 mm of effective topsoil. At the same erosion rate, how many years until it is lost, and state two human factors that accelerate erosion.

15. Soil organic matter falls from 2.8 per cent to 2.1 per cent. Find the relative decrease in per cent and explain how this affects water retention and yield.

16. Adopting no-till farming cuts erosion by 60 per cent. Calculate the new annual loss in t/ha and state two other benefits of no-till.

Section 5 Wind and Coal Power Generation (18 marks)

Each part carries 4 or 5 marks.

17. A wind farm has 30 turbines rated at 2.5 MW each with a capacity factor of 35 per cent. Find the installed capacity in MW and the annual output in GWh to the nearest whole number.

18. If a household uses 4 500 kWh a year, how many households can the farm supply, and why is the real number lower?

19. A coal plant is 38 per cent efficient; coal has a calorific value of 24 MJ/kg and an emission factor of 2.4 kg CO2 per kg of coal. Find the coal used per kWh and the emissions in kg CO2 per kWh.

20. Gas-fired generation emits about 0.45 kg CO2 per kWh. Using the coal figure from part 3, find the percentage reduction from switching to gas and state two environmental costs of wind power compared with coal.

Section 6 Waste Management and Sustainability (18 marks)

Each part carries 4 or 5 marks.

21. A landfill has 12 million m3 of capacity left and receives 3.6 million m3 of waste a year. Find its remaining life in years to 1 decimal place.

22. The city generates 11 000 t of municipal solid waste a day and recycles 30 per cent. Find the daily tonnage sent to landfill.

23. If the recycling rate rises to 45 per cent, find the new daily landfill tonnage and the daily reduction, then estimate how many years the landfill life is extended.

24. Each tonne diverted from landfill avoids 0.6 t CO2e. Using the daily reduction in part 3, calculate the annual saving over 365 days in t CO2e.
