S5 Geography Practice Paper: Plate Tectonics and Seismic Waves, River Discharge and Runoff, Coastal Erosion and Wave Energy, Lapse Rate and Rainfall, Urban Population Density and Land Use, Map Scale and Gradient

S5 | Geography | Time: 60 minutes | Total: 100 marks | 24 questions

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Plate Tectonics and Seismic Waves

Part A: Plate tectonics and seismic waves (16 marks)

1. An earthquake produces P waves travelling at 7 km/s and S waves at 4 km/s. A station records a 24 s gap between the arrivals of the two wave types. (a) Calculate the distance from the epicentre to the station. (b) Explain why the P waves arrive first. [5]

2. Rocks on two sides of a plate boundary move apart at an average of 6 cm per year. Two matching points are now 1,800 km apart. (a) Calculate the time needed for them to separate, in millions of years. (b) State one assumption of this calculation. [4]

3. A region recorded 5 earthquakes of magnitude 6 or above in the past 20 years. (a) Calculate the average return period. (b) State one use of the return period in urban earthquake planning. [3]

4. Most of the world earthquakes are concentrated in the Circum-Pacific belt and the Mediterranean-Himalayan belt. (a) State the main type of plate boundary at each belt. (b) Explain why convergent boundaries produce frequent and strong earthquakes. [4]

River Discharge and Runoff

Part B: River discharge and runoff (17 marks)

5. A river channel is 25 m wide with a mean depth of 3.2 m and a mean velocity of 1.5 m/s. (a) Calculate the discharge. (b) If the width is unchanged but the depth rises to 4.5 m while the velocity falls to 1.2 m/s, find the new discharge and the percentage change. [5]

6. A catchment of 480 km2 receives 2,400 mm of rain a year and has a runoff coefficient of 0.45. (a) Calculate the annual runoff volume in m3. (b) Find the equivalent depth of runoff in mm per year. [4]

7. The peak discharge of a river before and after urbanisation is 120 m3/s and 480 m3/s. (a) Find the multiple and the percentage increase. (b) Explain why urbanisation raises the peak discharge. [4]

8. (a) State the dominant processes in the upper, middle and lower courses of a river. (b) Explain why broad floodplains form in the lower course. [4]

Coastal Erosion and Wave Energy

Part C: Coastal erosion and wave energy (16 marks)

9. Longshore drift along a coast averages 0.8 m per year. (a) Calculate the distance sediment travels along the shore in 50 years. (b) Explain how longshore drift contributes to spit formation. [4]

10. A sea cliff retreats at an average of 2.5 m per year and the cliff foot is now 60 m from a coastal road. (a) In how many years will erosion reach the road if nothing is done? (b) Name one soft coastal management method. [4]

11. Waves at a site have a period of 8 s and a wavelength of 100 m. (a) Calculate the wave speed. (b) Explain how wind speed, fetch and wind duration affect wave height, and state the link between wave height and erosive power. [4]

12. (a) Put sea cave, sea arch, sea stack and wave-cut platform in order of formation. (b) Explain how a sea arch finally becomes a sea stack. [4]

Lapse Rate and Rainfall

Part D: Lapse rate and rainfall (17 marks)

13. The foot of a mountain is at 28.0°C and the environmental lapse rate is 6.5°C per km; the summit is 1.5 km above the foot. (a) Calculate the expected summit temperature. (b) If the measured summit temperature is 16.5°C, find the actual lapse rate. [5]

14. On a day when the air is 30 degrees C the actual vapour pressure is 24 hPa and the saturation vapour pressure at that temperature is 42 hPa. (a) Calculate the relative humidity. (b) If the air cools while the vapour content stays the same, describe the change in relative humidity and condensation. [4]

15. A weather station recorded a daily maximum of 30.4 degrees C, a minimum of 22.6 degrees C, and 2,160 mm of rain over twelve months. (a) Find the daily temperature range. (b) Find the mean monthly rainfall. [4]

16. (a) State the prevailing monsoon wind direction over Hong Kong in summer and in winter, with the cause. (b) List three conditions required for tropical cyclone formation. [4]

Urban Population Density and Land Use

Part E: Urban density and land use (17 marks)

17. A city has a population of 5,400,000, a total area of 1,100 km2 and a built-up area of 220 km2. (a) Calculate the population density of the built-up area. (b) Calculate the density for the whole city. [4]

18. A city population grows from 3,200,000 to 4,480,000. (a) Calculate the growth rate. (b) Using the rule of 70, estimate how long a doubling would take at that rate. [4]

19. About 12 km2 of farmland is converted to built-up land each year in a city of 1,100 km2. (a) Calculate the farmland lost in 20 years. (b) Express this as a percentage of the city area. [4]

20. (a) Explain three causes of the urban heat island effect. (b) Suggest two ways to ease the land use conflict between old district redevelopment and new town expansion. [5]

Map Scale and Gradient

Part F: Map scale, area and gradient (17 marks)

21. A map has a scale of 1:20,000 and two points are 6.5 cm apart on the map. (a) Find the real distance in km. (b) State how many metres 1 cm on the map represents. [4]

22. Using the same 1:20,000 scale, a farmland plot measures 4.0 cm2 on the map. (a) Find its real area in m2 and km2. (b) Express the area in hectares. [4]

23. Two points on a map are 500 m apart horizontally and differ in height by 75 m. (a) Express the gradient as a percentage. (b) Express it in the form 1:n. [4]

24. (a) State three locational factors, giving one that favours heavy industry and one that favours light industry. (b) Use an inputs-outputs system to explain how farming intensity affects yield per unit area. [5]