S3 Geography Practice Paper: Map Reading and Scale, Contours and Landforms, Weather and Climate, Population Distribution and Migration, Land Use and Agriculture, Natural Hazards and Management

S3 | Geography | Time: 60 minutes | Total: 100 marks | 24 questions

---

Part 1 Map Reading and Scale

Study the data, show all working and give the answer.

1. The scale of a map is 1:50,000. Two points are 8.4 cm apart on the map. Find the actual distance between them in kilometres. [4]

Answer: Actual distance = 8.4 x 50,000 cm = 420,000 cm; dividing by 100 000 gives 4.2 km. A larger-scale map shows a smaller ground area in the same space.

2. On another map with scale 1:20,000, points A and B are 6.0 cm apart. Walking at 4 km per hour, how many minutes does the journey take? [4]

Answer: Actual distance = 6.0 x 20,000 cm = 120,000 cm = 1.2 km; time = 1.2 / 4 = 0.3 hour = 18 minutes.

3. The bearing of B from A is 045 degrees. Find (a) the bearing of A from B and (b) the new bearing after turning 90 degrees clockwise at A. [4]

Answer: (a) Back bearing = 45 + 180 = 225 degrees. (b) Add 90 degrees clockwise: 45 + 90 = 135 degrees. Bearings are measured clockwise from north, so subtract 360 if the result exceeds 360.

4. On a 1:25,000 map a rectangular plot measures 5.0 cm by 4.0 cm. Find its actual area in square kilometres and state how many 1 km by 1 km grid squares this equals. [4]

Answer: Length = 5.0 x 25,000 cm = 1.25 km, width = 4.0 x 25,000 cm = 1.0 km; area = 1.25 x 1.0 = 1.25 km2, which is 1.25 grid squares. Area scales with the square of the linear scale.

Part 2 Contours and Landforms

Study the contour information and show all working.

5. The contour interval of a map is 20 m. Point A lies below point B, which is 5 contours higher; the horizontal distance is 2 km. Find the vertical interval and the gradient as a percentage. [4]

Answer: Vertical interval = 20 x 5 = 100 m; gradient = 100 / 2,000 x 100 per cent = 5 per cent, i.e. 1 in 20. Closer contours mean a steeper slope.

6. A summit is 320 m high and a valley floor 200 m; the horizontal distance between them is 1.5 km. Find the average gradient of the slope. [4]

Answer: Vertical interval = 320 - 200 = 120 m; horizontal distance = 1,500 m; gradient = 120 / 1,500 x 100 per cent = 8 per cent.

7. Describe the contour pattern of a concave slope and a convex slope, and state which one is steeper near the top. [4]

Answer: On a concave slope contours are closely spaced low down and widely spaced higher up; on a convex slope they are widely spaced low down and closely spaced near the top, so a convex slope is steeper near the summit. Overall gradient can be the same; only its variation along the slope differs.

8. A hill foot is at 200 m with a temperature of 28.0 °C; the summit is at 1,600 m. If temperature falls by 6.5 °C per 1 000 m of ascent, find the summit temperature. [4]

Answer: Height difference = 1,400 m = 1.4 thousand metres; cooling = 1.4 x 6.5 = 9.1 °C; summit temperature = 28.0 - 9.1 = 18.9 °C.

Part 3 Weather and Climate

Study the weather data and show all working.

9. On a day at 25 °C the air contains 14.4 g/m3 of water vapour; the saturation value at that temperature is 18.0 g/m3. Find the relative humidity. [4]

Answer: Relative humidity = 14.4 / 18.0 x 100 per cent = 80 per cent. If the air cools while its vapour content stays the same, relative humidity rises and condensation begins at 100 per cent.

10. Daily rainfall for one week was 25, 8, 62, 14 mm. Find the weekly total, the number of rain days (at least 1 mm) and the wettest day. [4]

Answer: Total = 25 + 8 + 62 + 14 = 109 mm; all four recorded days exceed 1 mm, so there are 4 rain days; the wettest day is 62 mm, which is 57 per cent of the weekly total.

11. On a weather map two places read 1008 hPa and 1004 hPa and are 200 km apart. Find the pressure gradient and state where the wind is stronger. [4]

Answer: Pressure difference = 1008 - 1004 = 4 hPa; gradient = 4 / 200 = 0.02 hPa per km. Wind is stronger where isobars are closer, so the 1004 hPa side is windier.

12. The warmest month averages 31.2 °C and the coldest 14.8 °C. Find the annual temperature range and the annual mean. [4]

Answer: Annual range = 31.2 - 14.8 = 16.4 °C; annual mean = (31.2 + 14.8) / 2 = 23.0 °C. A small range suggests a maritime climate, a large one a continental climate.

Part 4 Population Distribution and Migration

Study the population data and show all working.

13. A district has a population of 480,000 in an area of 60 km2. Find the population density. [5]

Answer: Density = population / area = 480,000 / 60 = 8,000 people per km2. A density is only an average; people may still crowd into a small strip of flat land.

14. In the same year there were 5,200 births, 3,100 deaths, 1,500 arrivals and 900 departures. Find natural increase, net migration, total growth and the growth rate per 1 000 people. [5]

Answer: Natural increase = 5,200 - 3,100 = 2,100; net migration = 1,500 - 900 = 600; total growth = 2,100 + 600 = 2,700; rate = 2,700 / 480,000 x 1 000 = 5.6 per thousand.

15. The district has 72,000 people aged 0-14, 48,000 aged 65 or above and 360,000 aged 15-64. Find the dependency ratio. [4]

Answer: Dependent population = 72,000 + 48,000 = 120,000; dependency ratio = 120,000 / 360,000 x 100 = 33.3, i.e. about 33 dependants per 100 working people.

16. A population pyramid is narrow at the base and wide at the top. State two population characteristics this shows and one social problem it creates. [4]

Answer: A narrow base means a falling birth rate and a smaller share of children; a wide top means longer life expectancy and a larger elderly share, that is, an ageing population. One social problem is rising demand for medical and long-term care plus a heavier burden on the working population.

Part 5 Land Use and Agriculture

Study the farm data and show all working.

17. A farm of 15 hectares produces 24 tonnes of rice a year, sold at $3,200 per tonne, with total costs of $45,000. Find the yield per hectare, total revenue, profit and profit per hectare. [5]

Answer: Yield = 24 / 15 = 1.6 t per ha; revenue = 24 x $3,200 = $76,800; profit = $76,800 - $45,000 = $31,800; profit per hectare = $31,800 / 15 = $2,120.

18. Describe two common land-use conflicts in the urban fringe and suggest one way to reduce them. [4]

Answer: Typical conflicts are air and noise nuisance between housing and industry or container yards, and competition for flat land between farming and new town development. One remedy is zoning with buffer strips together with concentrating polluting uses and restricting their operating hours.

19. Explain how crop rotation maintains soil fertility and state one limitation of rotation in modern high-yield farming. [4]

Answer: Different crops take up different nutrients, and rotating in legumes fixes nitrogen from the air, so no single nutrient is drained; rotation also breaks pest and disease cycles. The limitation is that rotation needs more land and time and gives lower short-term output than continuous cropping with fertiliser, which is hard where land is scarce.

20. Terracing a hillside reduces soil erosion. Explain why, and state one risk terraces still face in heavy rain. [4]

Answer: Terraces cut a long slope into short near-level steps, shortening slope length and slowing runoff so water can infiltrate instead of washing soil away. The risk is that in very heavy rain one collapsed riser can trigger progressive collapse or debris flows down the slope.

Part 6 Natural Hazards and Management

Study the hazard data and show all working.

21. A place recorded 180 mm of rain in 3 hours; the landslide warning threshold is 30 mm per hour. Find the average rainfall intensity and how many times the threshold. [5]

Answer: Mean intensity = 180 / 3 = 60.0 mm per hour; 60.0 / 30 = 2 times the threshold, so once the slope saturates the landslide risk rises sharply.

22. The return period of a flood is 50 years. Find the probability of such a flood in any one year and the approximate chance of at least one in 25 years. [4]

Answer: Annual probability = 1 / 50 = 0.02 = 2 per cent; chance of at least one in 25 years = 1 - (1 - 0.02)^25, about 39.7 per cent. A return period is a long-run average, not a guarantee of one event every 50 years.

23. A slope has resisting force 120 units and driving force 80 units; the required safety factor is 1.3. Find the safety factor and judge whether the slope is stable. [4]

Answer: Safety factor = 120 / 80 = 1.5; 1.5 exceeds 1.3, so the slope is stable. If rain raises the driving force to 120 units the factor falls to 1.0, which is critical.

24. Compare engineering and non-engineering slope hazard measures, giving one example of each and its limitation. [4]

Answer: Engineering works such as retaining walls, soil nails and drainage pipes raise the resisting force directly but are costly and protect only a local site. Non-engineering measures such as land-use control, evacuation drills and warning systems cover a wide area but depend on public compliance and forecast accuracy.
