S5 Geography Practice Paper (Set 1): Map Reading and Scale, Population Density and Natural Increase, River Discharge and Runoff Coefficient, Urban Land Use and Density, Farming Systems and Profit, Industrial Location and Environmental Impact

Senior Secondary Geography

S5 Geography paper, Set 1: 24 parts, 100 marks on map scale, population, river discharge, urban land use, farm profit and industry, with worked answers.

Map Reading and Scale

On a map with a scale of 1:25,000, points A and B are 8.4 cm apart and the mapped area covers 15.0 cm². The contour interval is 20 m.

#	Question
1	Calculate the actual ground distance between A and B in km.
2	Calculate the ground area covered by the map in km² (4 decimal places).
3	A slope crosses 6 contours and its horizontal distance on the map is 3.0 cm. Find the gradient as a percentage and as 1 in n.
4	A footpath measures 12.5 cm on the map. How many minutes does it take to walk it at 4.5 km/h (1 decimal place)?

Population Density and Natural Increase

A district has 486,000 people over 42 km². In a year there are 4,860 births, 3,240 deaths and a net migration gain of 1,500. Age structure: 72,900 aged 0-14, 330,480 aged 15-64 and 82,620 aged 65 or above.

#	Question
5	Calculate the population density in persons per km² (1 decimal place).
6	Calculate the rate of natural increase per 1,000 people (2 decimal places).
7	Calculate the dependency ratio (dependent ÷ working population x 100%, 1 decimal place) and state what it indicates.
8	If the population then grows by 0.8% a year, what will it be after 10 years (nearest integer)?

River Discharge and Runoff Coefficient

At a gauging station the channel is 8.0 m wide with a mean depth of 0.6 m and a mean velocity of 0.9 m/s. The same day the 0.32 km² catchment receives 210 mm of rain and the mean discharge is 0.42 m³/s.

#	Question
9	Calculate the cross-sectional area in m² and the discharge in m³/s (2 decimal places).
10	Calculate the total volume of rain falling on the catchment that day in m³.

#	Question
11	Calculate the runoff coefficient for the day as a percentage (nearest integer) and explain where the rest of the water went.
12	During a flood the discharge rises to 8.64 m^3/s and velocity to 1.2 m/s. Assuming the width is unchanged, find the water depth in m.

Urban Land Use and Density

A new town covers 240 hectares with a population of 84,000. Land use: residential 96 ha, commercial 24 ha, industrial 36 ha, transport 36 ha and open space 48 ha.

#	Question
13	Calculate the percentage of the town area taken by each land use and check that the total is 100%.
14	Calculate the population density of the residential area in persons per hectare.
15	A residential site of 0.6 ha has a plot ratio of 8. If the average flat is 45 m^2, how many flats can be built (1 decimal place)?
16	Of 12,000 commuters, 65% travel by rail over a 2-hour peak; rail capacity is 9,000 passengers per hour. Find the rail load factor (%, 1 decimal place) and suggest one improvement.

Farming Systems and Profit

A 4.5 ha rice farm yields 5.2 tonnes per hectare and sells rice at $9,200 per tonne. Costs are labour $68,000, seed $9,600, fertiliser $21,400 and machinery $18,000.

#	Question
17	Calculate the total annual production in tonnes.
18	Calculate the total annual revenue in dollars.
19	Calculate total cost, profit and profit per hectare in dollars.
20	If a flood cuts the yield by 15% while costs stay the same, calculate the new profit and explain how the farmer could reduce risk.

Industrial Location and Environmental Impact

A factory uses 1,450 MWh of electricity a year and the grid emits 0.55 kg CO_2 per kWh. The plant is 42 km from its raw material source with 850 lorry trips a year; moving to an industrial estate cuts the distance to 12 km at $9.5 per km. It discharges 320 m^3 of wastewater a day with BOD 180 mg/L, and treatment removes 85%. The site is 3.6 ha and 60% is built up.

#	Question
21	Calculate the annual carbon emissions in tonnes of CO_2 (1 decimal place).
22	Calculate the annual transport cost saved after moving to the industrial estate.
23	Calculate the BOD after treatment in mg/L and the daily BOD load in kg (2 decimal places).

#	Question
24	Calculate the built-up area in ha and the green area if 30%% of the remaining land becomes a green buffer (ha, 3 decimal places).