

Geography 12

January 2003 Provincial Examination

ANSWER KEY / SCORING GUIDE

- Topics:**
1. The Nature of Geography
 2. Systems of the Earth
 3. Resources of the Earth

Part A: Multiple Choice

Q	K	C	S	T	PLO	Q	K	C	S	T	PLO
1.	A	K	1	3	3A4b	21.	C	U	1	2	2C1a
2.	C	K	1	3	3A1, 3A4a	22.	B	U	1	2	2C1d
3.	D	U	1	3	3A2	23.	C	K	1	1	1B1
4.	A	K	1	1	1A1	24.	C	K	1	3	3A1
5.	B	U	1	2	2A1	25.	A	U	1	2	2C1e
6.	A	U	1	2	2B4, 3B2	26.	B	K	1	2	2C1b
7.	D	K	1	2	2A2	27.	D	U	1	2	2C1b
8.	B	U	1	2	2A3	28.	C	U	1	2	2D1
9.	C	U	1	2	2A2	29.	A	U	1	2	2D1
10.	B	U	1	2	2A2	30.	D	U	1	2	2D3c, 2D3d
11.	B	U	1	1	1C2, 2A2, 2A3	31.	A	K	1	2	2D3d
12.	A	U	1	1	1C2, 2A2, 2A3	32.	B	U	1	2	2D3d
13.	D	U	1	1	1C2, 2A2, 2A3	33.	A	U	1	2	2D3d
14.	C	U	1	2	2B1	34.	D	U	1	2	2D3b
15.	B	U	1	2	2B1	35.	B	U	1	1	1C1
16.	D	U	1	2	2B2, 2B3	36.	C	U	1	1	1C1
17.	A	U	1	2	2B2	37.	B	U	1	1	1C1
18.	B	U	1	2	2B3	38.	D	U	1	1	1B3
19.	D	U	1	3	3B2	39.	D	U	1	2	2D3b
20.	C	U	1	2	2C1a	40.	D	U	1	2	2B3

Multiple Choice = 40 marks

Part B: Written Response

Q	B	C	S	T	PLO
1.	1	U	4	2	2D3d
2.	2	H	6	3	3C1
3.	3	U	3	2	2C3
4.	4	U	3	2	2B3
5.	5	H	5	1	1B3, 1B4
6.	6	U	5	3	3B2
7.	7	H	4	2	2B5
8.	8	H	6	3	3A3, 3C1
9.	9	H	4	1	1B4
10.	10	H	10	3	3A4a

Written Response = 50 marks

Multiple Choice = 40 (40 questions)

Written Response = 50 (10 questions)

EXAMINATION TOTAL = 90 marks

LEGEND:

Q = Question Number

C = Cognitive Level

T = Topic

K = Keyed Response

S = Score

PLO = Prescribed Learning Outcome

B = Score Box Number

PART B: WRITTEN RESPONSE

Value: 50 marks

Suggested Time: 80 minutes

INSTRUCTIONS: Answer each question in the space provided. You may not need all of the space provided. Answers should be written in **ink**. **Comprehensive answers are required for full marks.**

**Select one of the following features to answer question 1.
Indicate your selection with a ✓.**

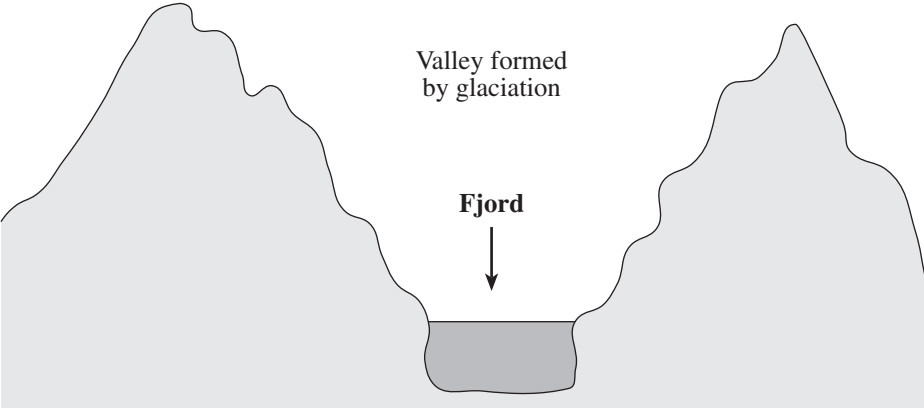
Fjord

Sand spit

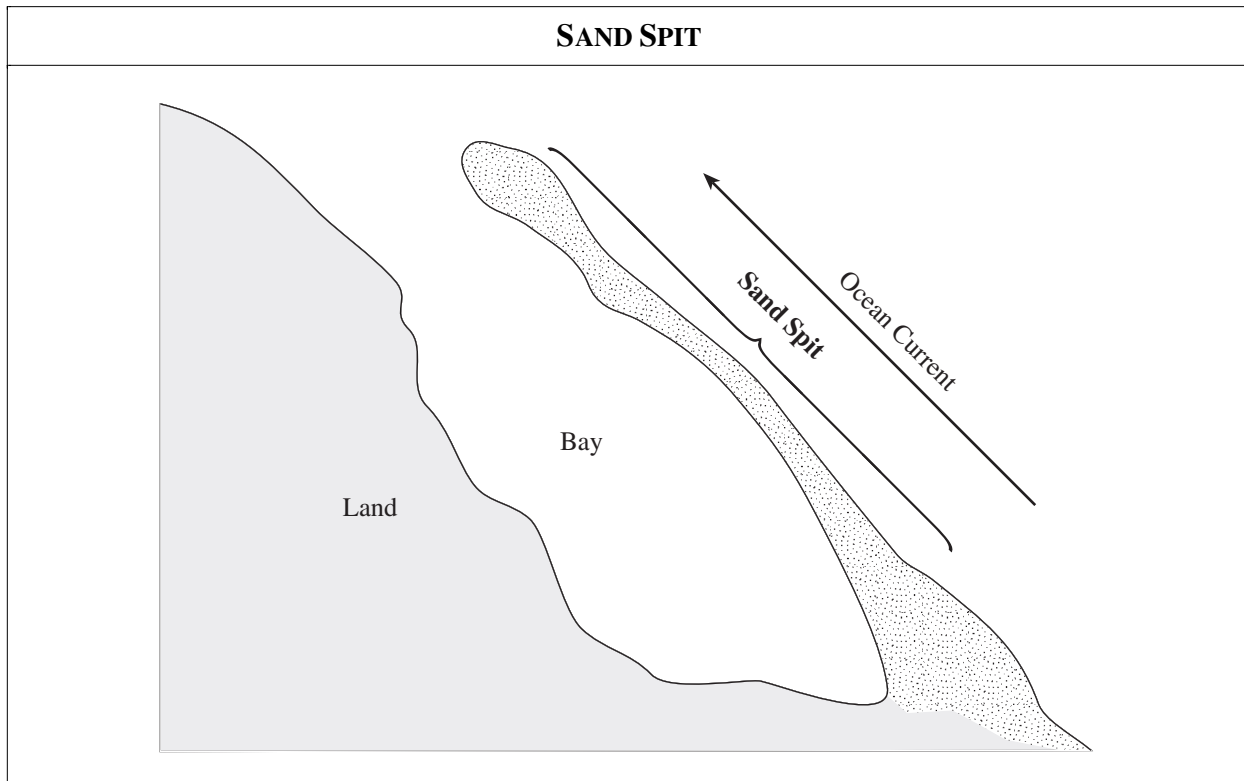
1. With the aid of a clearly labelled diagram(s), **explain** either the formation of a fjord **OR** a sand spit.

(4 marks)

Response:

FJORD	
	
<ul style="list-style-type: none">• A fjord is an erosional feature that is formed when a mountainous coastline undergoes glaciation. River valleys become widened and deepened by the action of plucking and abrasion and are subsequently flooded as the sea level rises with the melting of the ice (submerged coastline). Fjords are usually perpendicular to the coastline.	
<p>Note to Markers:</p> <p>This question is to be marked holistically. The explanation may be shown in the diagram. An annotated diagram can achieve full marks. No half marks given.</p>	

Response:



- The processes of wave action and longshore drift may move material along a beach.
- The irregularities of a coastline will result in many areas of calm water, which will cause currents and waves to deposit eroded material they are carrying. If the tidal flow or wave action runs parallel to the coast, a slight change in the outline of the coast will lead to the formation of a spit, a long, narrow bar of sand that points in the direction of the current.
- Form at river mouths, estuaries (confluence of currents).
- Made up of transported, eroded material.
- A product of longshore drift (**do not accept refraction**).
- Is shaped in the direction of the current.

Note to Markers:

This question is to be marked holistically. The explanation may be shown in the diagram. An annotated diagram can achieve full marks. No half marks given.

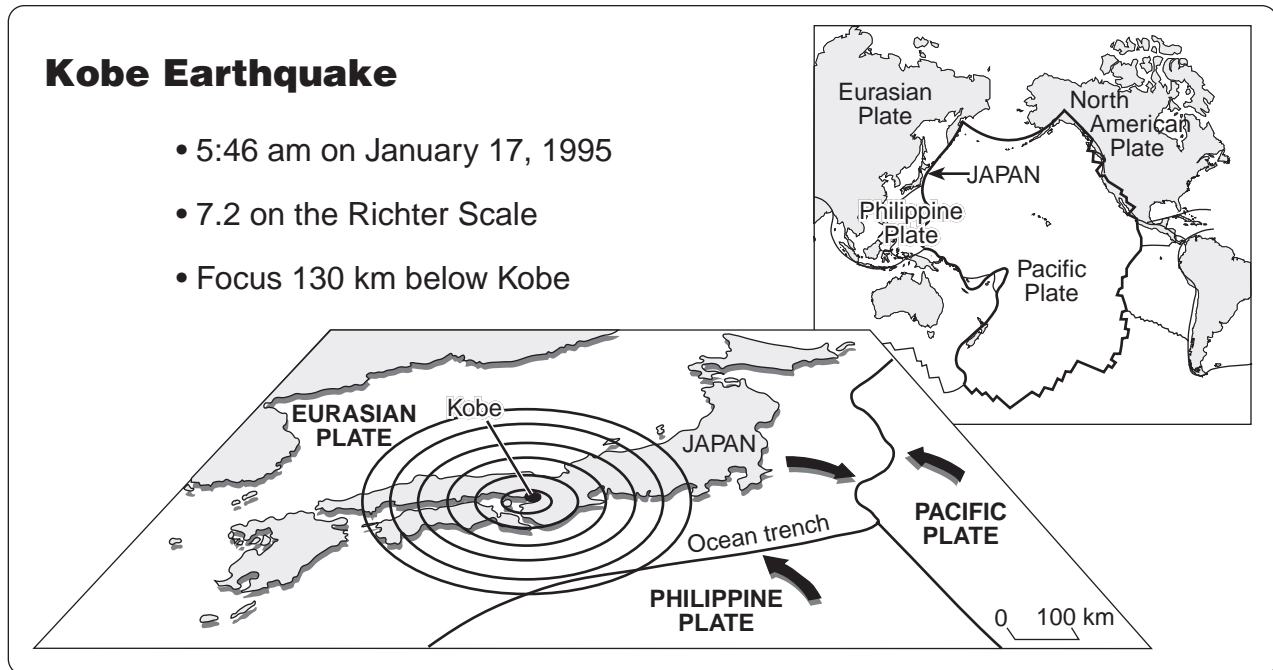
2. **Explain** how interactions between the atmosphere, hydrosphere and lithosphere influence British Columbia's forests. Answer in **paragraph** form. **(6 marks)**

Response:

<p>General</p>	<ul style="list-style-type: none"> • The inter-relationship between the atmosphere, hydrosphere and lithosphere is crucial for the survival of BC's forests.
<p>Atmosphere</p>	<ul style="list-style-type: none"> • BC's cool temperate, western margin climate is ideal for the growth of coniferous trees (cedar on the coast...fir and pine in the interior). • Coastal trees grow much taller as a result of the mild, wet winters. Further into the interior of the province trees are considerably smaller due to the more extreme temperature ranges (continental vs. maritime effect). • Reforestation increases photosynthesis and transpiration. • Deforestation reduces photosynthesis and transpiration. • Loss of carbon sink would add to global warming. • Weather leads to adaptations in vegetation such as thick bark due to cold, varied forest types from coastal temperate rainforest to lodgepole pines of the interior. • Lightning increases the risk of forest fires. • Milder climate, maritime influences coastal forest. • Warmer climate compounds the problems of pest infestation in forests (pine beetles).
<p>Hydrosphere</p>	<ul style="list-style-type: none"> • The heavy precipitation rates along the coastal regions have forced trees to adapt: waxy needles limit evapotranspiration during dry, warm summers; the development of shallow root structures. • Coastal water routes provide for the efficient transportation of large numbers of logs to a variety of processing plants and mills. • Deforestation increases soil erosion and run-off siltation while it reduces infiltration and transpiration. • Reforestation decreases soil erosion and run-off siltation while it increases infiltration and transpiration. • Abundant rainfall leads to more trees.

Lithosphere	<ul style="list-style-type: none">• The rugged, mountainous terrain of the coastal regions limits the large-scale use of large machinery. This factor alone is the single greatest determinant of the type of harvesting practice that will be used (clear-cut, selective, patch, helicopter, horse logging).• Although trees along the coast are more difficult to harvest, they garnish the highest dollar value.• Coniferous forests are well-suited for growing in podzolic soils.• Shallow soils foster shallow spreading root systems.• Mountains cause altitudinal differences in forest zones.• Mountains lead to orographic rainfall and differences in forests on windward compared to leeward slopes.
Note to Markers: This question is to be marked holistically.	

Use the following map to answer question 3.



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3. a) **State** the cause of the 1995 Kobe earthquake.

(1 mark)

Response:

Cause	<ul style="list-style-type: none">• Japan is located in a region where the Pacific, Eurasian and Philippine plates collide.• One plate may have moved, converged or subducted.• There may have been movement along a fault.• The plate movement along the subduction zone caused a shock wave.• The earthquake was caused by interactions or movements between two plates.
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b) Besides loss of life, **describe** two impacts high-magnitude earthquakes may have on a region.

(2 marks)

Response:

Impacts High-Magnitude Earthquakes May Have on a Region	<ul style="list-style-type: none">• flooding<ul style="list-style-type: none">– landslides– tsunamis– spread of disease• liquefaction<ul style="list-style-type: none">– recent deposition (alluvial soils) turn to “jelly” during seismic activity• destruction of infrastructure<ul style="list-style-type: none">– buildings– roads– emergency response is slow– communication and power lines down– water, gas and sewer lines may rupture– spread of disease• economic loss<ul style="list-style-type: none">– businesses are lost or need to close– cost to rebuild– looting and rioting• threat of aftershocks• psychological impacts (fear of aftershocks and further events)• mass wasting (avalanches)• could trigger volcanic activity• river rejuvenation• provides scientists with data (which can be used for educational programs)• need for rebuilding provides jobs
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4. a) **Identify** the natural vegetation associated with the biome represented in the photograph.

(1 mark)

Response:

Vegetation	<ul style="list-style-type: none"> • acacia • baobab • savanna • savanna grassland • savanna woodland • tropical grassland • tropical parkland • tall grasses • xerophytes • elephant grass • deciduous trees
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- b) **Explain** two ways that vegetation has adapted to the seasonal drought conditions in this biome.

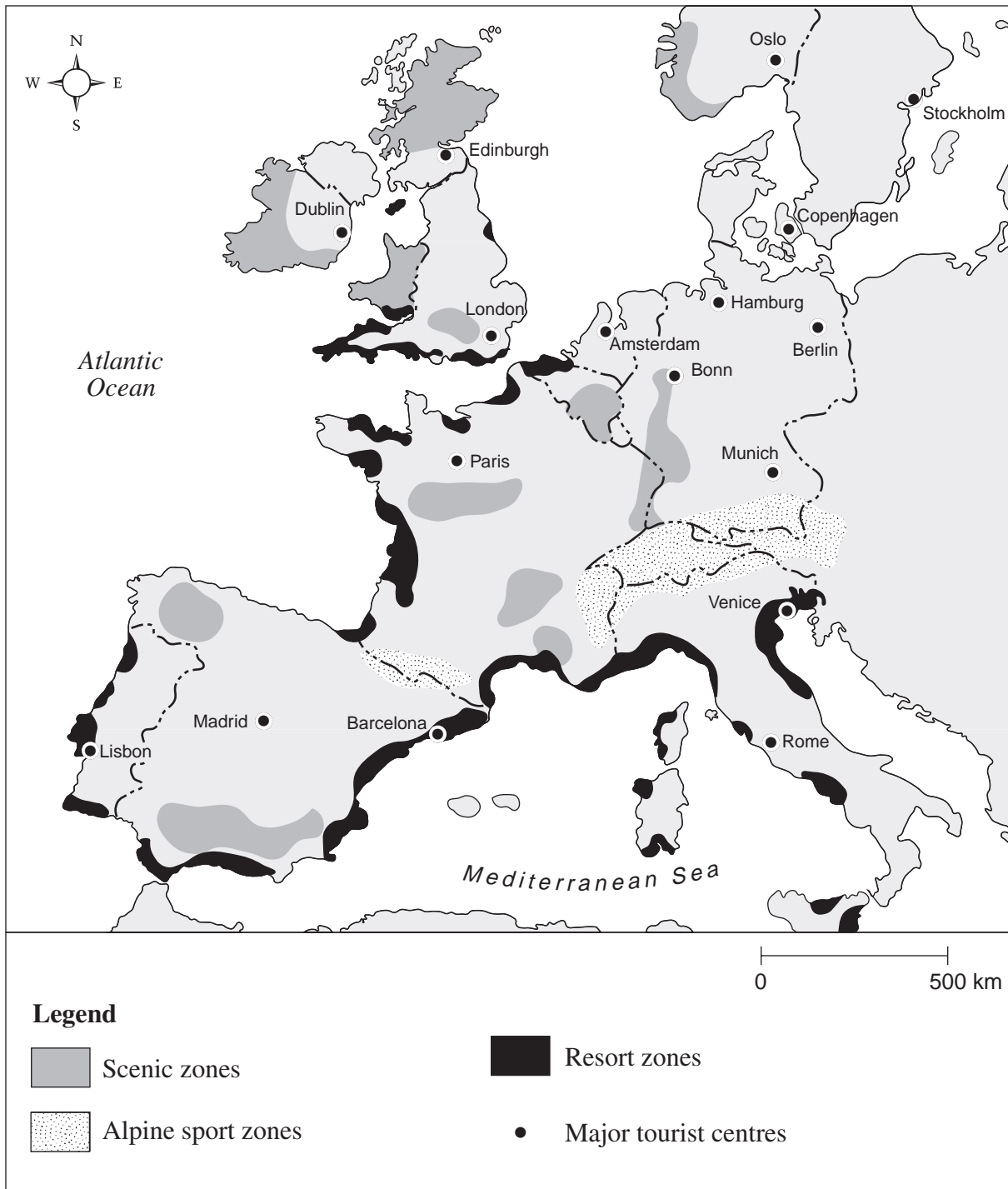
(2 marks)

Response:

Adaptations	<ul style="list-style-type: none"> • tap roots to reach groundwater • small, waxy leaves and thorns to prevent transpiration and ward off predators • extensive, shallow roots to absorb water before evaporation • barrel trunk to store water • widely spaced to reduce competition for water • deciduous, shed leaves in the dry season to conserve water • thick bark, reduces transpiration, protection from heat and wild fire • stunted growth due to lack of water • grasses lie dormant during drought • rapid growth during the wet season • thorns and prickles to protect leaves • small leaves to reduce transpiration
<p>Note to Markers: Did not accept albedo.</p>	

Use the following map to answer question 5.

European Tourist Destinations



5. a) **Explain** how the location of European tourist destinations is directly related to the physical environment. **(2 marks)**

Response:

Description	<ul style="list-style-type: none">• high mountains with heavy snowfall to encourage alpine skiing (Alps)• glaciated areas create scenic regions (Alps)• southerly latitudes (Mediterranean Sea) attract tourists to the beaches of the region (Costa Del Sol)• scenic rift valleys (Rhine)• rugged coastline and inlets create bays for marinas• proximity of countries to one another• islands
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b) **Outline** three impacts of tourism.

(3 marks)

Response:

Impacts of Tourism (Positive)	<ul style="list-style-type: none">• creation of direct jobs (hotels) and indirect jobs (tour operators)• a major source of income in many parts of the world (foreign currency)• introduces a large number of people to the environment; an effective education tool• encourages people to contribute financially to the alleviation of environmental problems• demonstrates that regions have enormous aesthetic value• demonstrates the importance of regions remaining intact for the enjoyment of future generations• regions have historical and heritage value• demonstrates that ecosystems have spiritual significance for aboriginal and non-aboriginal people• demonstrates that regions are an integral part of the food chain and/or ecosystem• emphasizes the critical role of ecosystems and the need to preserve habitat for the many animal and bird species (the habitat must be protected to ensure the survival of rare animals and birds)• increased investment for infrastructure (upgrade hotels, airlines, roads, etc.)• surrounding landowners benefit from increased property value
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**Impacts of Tourism
(Negative)**

- resort development and transportation routes alter natural forests
 - floods and landslides will be triggered
 - topsoil is carried to the rivers and lakes where contamination occurs
 - watersheds disappear and rainfall decreases creating a shortage of water
 - loss of genetic resources which support human welfare (foods, drugs)
- noise and litter by visitors
- overharvesting and illegal fishing
- increase in domestic prices due to high demand of wealthy tourists
- increased real estate prices
- business siting and construction practices have led to
 - destruction of vegetation
 - pollution of aquatic habitat
 - dumping of construction waste destroying coral reefs
 - landfill covering in wetlands
- too many visitors on the trails of national parks lead to habitat destruction
- divers destroy coral reefs and fish habitat
- inadequate infrastructure to meet the growing demand
- increased water consumption
- seasonal employment
- trophy collection (taking of artifacts)
- introduction of non-indigenous flora and fauna
- relocation of indigenous peoples
- increased globalization
- spread of disease (Asian Flu)
- increased fear of terrorism, retribution

6. a) **Explain** two causes of soil erosion.

(2 marks)

Response:

Causes of Soil Erosion	<ul style="list-style-type: none">• drought conditions<ul style="list-style-type: none">– climate change leads to desertification• farming practices<ul style="list-style-type: none">– overgrazing– overcropping– monoculture– poor irrigation techniques (overhead sprinklers, flood irrigation)– salinization– downhill ploughing– removal of shelterbelts• removal of natural vegetation for fuelwood leads to desertification• urban development/population growth<ul style="list-style-type: none">– demand for food means farmers are unable to let soil rest– construction– recreational activities (trails, ATVs, hiking)• soil compaction from herds/livestock• overuse of chemicals reduces colloidal cohesion as a result of reduced organic matter content• mismanagement of water flow in dams• acid rain (deteriorates the soil)• deforestation
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b) **Recommend** two solutions that may reduce soil erosion.

(2 marks)

Response:

Solutions to Reduce Soil Erosion	<ul style="list-style-type: none">• limit herd size (abide by calculated carrying capacities)• encourage replanting programs• improved farming techniques<ul style="list-style-type: none">– strip cultivation– contour ploughing– crop rotation– zero tillage– improved irrigation techniques (drip)– plant wind breaks/shelter belts– terracing– intercropping– movement to organic/small-scale farming– restrict removal of vegetation near rivers and streams– laser leveling/ground leveling• government initiatives<ul style="list-style-type: none">– foreign aid– education programs– legislation: fines for not adhering to rules• water diversion programs/schemes<ul style="list-style-type: none">– flood controls
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c) **Suggest** one reason why solutions to reduce soil erosion may be difficult to achieve.

(1 mark)

Response:

Difficulties in Achieving Solutions	<ul style="list-style-type: none">• demand for agricultural products<ul style="list-style-type: none">– population growth (stress on urban land needs)– value or money generated to counter large debt loads• solutions are costly to implement and difficult to reverse• cannot control weather or climate• government policy<ul style="list-style-type: none">– different levels of government involved– requires cooperation between nations• current farming techniques are difficult to change because of long-established traditions• climate change is a natural process• lack of awareness of the problem• it takes a long time to implement change• lack of awareness/knowledge (apathy, lack of concern)
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7. a) **Identify** and **explain** two ways that human activities modify global temperature.

(2 marks)

Response:

Temperature modification due to	<ul style="list-style-type: none">• excessive atmospheric pollutants.• burning of fossil fuels (increased CO₂).• deforestation (increased CO₂).• large-scale cattle ranching (increased methane).• dependence on the automobile.• development of urban centre (heat island).• release of methane gases due to rice paddy cultivation, ranching, melting of permafrost.• refusal to recognize that changes to lifestyle are necessary (ethic).• methane from land fill sites.• CFC as a global warming gas.• proactive efforts to restore natural conditions (car pools, scrubbers, bikes, energy efficient cars, education awareness).• using alternative sources of energy.• international agreements.
Note to Markers: Half marks awarded for activities identified, but not explained.	

b) **Describe** two ways human activities modify the quality and/or quantity of precipitation.

(2 marks)

Response:

Modifications to precipitation	<ul style="list-style-type: none">• burning of fuels (emissions lead to acid rain)• increased particulates for condensation nuclei (more clouds and precipitation)• urban centres which create windward and leeward areas• cloud seeding which increases rainfall• deforestation which reduces transpiration• acid shock• dams, which increase precipitation on the leeward side of the reservoir• water diversion projects• reforestation which increases transpiration• compound effect of global warming alters climatic pattern• legislation/regulation regarding pollutants• quantitative studies for verification• alternative fuels (student must identify technology and justify use)• water diversion (dams, man-made lakes, draining)• deforestation for urban development (leads to desertification)
Note to Markers: Only 1 mark for identifying various sources of acid rain.	

8. a) **Outline** four different ways that vehicles and transportation systems affect the environment. **(4 marks)**

Response:

<p>Ways that Vehicles and Transportation Systems Affect the Environment</p>	<ul style="list-style-type: none"> • reliance on fossil fuels • 50% of land use in cities is devoted to vehicular traffic • construction of roads, bridges and parking lots means habitat loss and pollution • urban sprawl means the loss of agricultural lands • air pollution from vehicle emissions produces smog and ground-level ozone and acid rain • urban run-off (oil and grease drain into waterways) • manufacturing costs to the environment: use of non-renewable resources, high consumption of power, industrial wastes • disposal of automobile wrecks • deforestation for development • increases overland run-off of precipitation • decreases transpiration rates • mass wasting associated with construction of highways • alteration of avalanche paths • wildlife overpasses built • mining of gravel for road construction destroys spawning grounds • draining of wetlands for highway construction • wastes thrown from vehicles not biodegradable; may be consumed by animal species creating health concerns • noise pollution • habitat loss • loss of metals/minerals—heavy metals • siltation of streams • less albedo (micro-climate/heat island) • invader species introduction • health affects • aesthetic problems • road salt • smog • makes soil infertile • lighting of roads (requires power generation)
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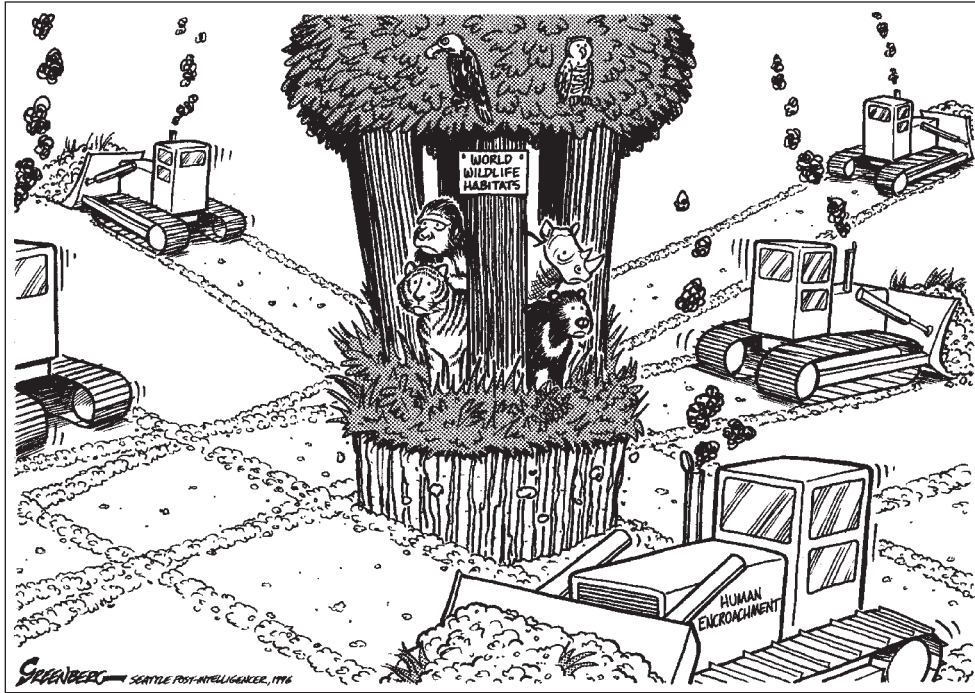
b) **Suggest** two solutions to reduce our dependence on the automobile.

(2 marks)

Response:

Solutions	<ul style="list-style-type: none">• provide bulk transportation such as light rapid transit• empower individuals: car pooling, electric cars• promote alternatives through urban planning: green lanes• locate residential shopping centres within walking distance• provide government incentives: Go Green, transit passes, specified lanes, tax breaks• telecommute with the office• combine housing and work sites into one building• encourage more vertical development in cities• increase fuel costs• build bike lanes• create high occupancy vehicle (HOV) lanes• education• increase the cost of parking in urban areas• implement air care program• increase insurance costs• adhere to the Kyoto Protocol
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Use the following cartoon to answer question 9.



© Steve Greenberg.

9. a) **Outline** two different human activities that threaten animal habitat.

(2 marks)

Response:

Human Activities that Threaten Animal Habitat	<ul style="list-style-type: none">• urban sprawl — the expansion of urban and suburban populations into traditionally rural and wilderness areas• forestry practices — clearcutting eliminates animal habitats and threatens the survival of particular species; slash and burn• mining operations — open-pit and strip mining operations can irreversibly alter animal habitats• emission of CO₂ and other greenhouse gasses — can lead to the alteration of global climatic patterns (global warming)• emission of SO₂ and NO_x — these elements mix with water vapour in the troposphere and fall back to the earth as acid precipitation (this can lead to the elimination of certain animal species and also has significant impact on the food chain)• human conflict — war (civil unrest), land mines• power generation• industrialization• agriculture/intensive farming/monoculture• oil extraction• oil spills/transport leaks• tourism• landfills• hunting and poaching• drainage of wetlands
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b) **Suggest** two management strategies that could help protect animal habitats. (2 marks)

Response:

Strategies to Protect Animal Habitats	<ul style="list-style-type: none">• Provide for the creation of large-scale wildlife refuges (provincial, federal or state parks) to protect species in their natural habitat.• Restrict or eliminate economic activities within wilderness areas that may threaten animal habitat.• Place animals on endangered species lists (globally); protecting the animals implies that animal habitat will also be protected.• Favour vertical urban growth versus horizontal.• Provide education.• Levy heavy fines supported by legislation.• Encourage habitat enhancement.• Provide opportunities for ecotourism.• Restrict urban sprawl.• Forgive Third World debt.• Practice sustainable farming.• Fund and perform research.• Restrict recreation.• Participate in protests.• Ban hunting.• Control poaching.• Promote selective logging.• Zoos.• Create new jobs instead of perpetuating harmful activities.• Reduce/Reuse/Recycle.• Use alternative energy sources.• Introduce population control.• Reduce thermal pollution.
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Use the data provided: Photograph 4, the topographic map of Morris and the two-page case study to answer question 10.

10. Using your understanding of geography and the data provided:

- **explain** how the physical and natural characteristics of the Morris region contribute to annual flood conditions;
- **outline** the economic, social and environmental impacts associated with the flooding of the Red River Valley;
- **suggest** measures that could be taken to improve flood control in the Morris region.

Answer in **multi-paragraph** form.

(10 marks)

Response:

<p>Physical and Natural Characteristics that Contribute to Flooding</p>	<ul style="list-style-type: none"> • Cool temperate interior climate — bitter cold winters dominated by a polar high-pressure system (large snow accumulations still possible); relatively short, warm summers; summer convectional rains provide the bulk of the precipitation (large lakes are the source of moisture which bring precipitation to this region year round). • Fairly uniform, flat (low lying) prairie topography — major settlements are located within a large river valley, possessing a large flood plain. • The drainage of the Red River is from south to north — headwaters and many tributary streams are predominantly south of the U.S./Canadian border — the Red River system drains into Lake Winnipeg. • The spring season is very short with temperatures going from well below to well above freezing quite quickly. While surface soils are thawed, sub-surface horizons remain frozen, causing significant problems with surface water drainage. Water is unable to infiltrate and percolate into the groundwater table and so collects at the surface and helps trigger flood conditions. • As spring rains and/or melting snow fills a river, the ice at the surface cracks and breaks into chunks that float downstream. These chunks of ice form a dam as they run into barriers, such as bridges along the rivers. The ice dams cause water to rise rapidly behind them, flooding many upstream locations. If the dam suddenly breaks, water can also flood downstream locations.
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<p>Economic Impacts</p>	<ul style="list-style-type: none"> • The last two major floods (1993 and 1997) resulted in financial damages in excess of \$1.3 billion. • The majority of these costs would have come as the result of the loss of or damage to infrastructures (homes, businesses, public buildings, and transportation systems — roads and highway systems) and clean up. • The damage to crops and the loss of potential revenues from their sales would also be included in these figures. • Hidden costs not covered in these figures would include the increases in insurance premiums that people would have to incur for their homes, businesses, and/or crops. • Loss of tourist revenue. • The loss of domestic animal stocks (hogs, cows, and other livestock). • Jobs for repairs.
<p>Social Impacts</p>	<ul style="list-style-type: none"> • Major health issues are associated with flooding (respiratory diseases, water-borne illnesses due to contaminated water sources, spore buildup due to the growth of molds and other bacterium). • The ongoing psychological effects of the continual potential for flooding (unable to move farm animals; loss of livelihood; stress on families). • Loss of personal mementos cannot be valued and are thus priceless. • Displacement of populations. • Meeting new people during rescue.
<p>Environmental</p>	<ul style="list-style-type: none"> • Contamination of groundwater sources, domestic water systems, and soils due to sewage leaks, the release of industrial toxins (oil, petroleum and other hazardous wastes). • Lost and damaged habitat will pose problems for migratory species of animals and fowl which, in turn, would have implications for the food chain. • The loss of soil fertility at locations upstream as the alluvium is deposited on the flood plains. • The rich agricultural prairie soils (chernozem) could be rendered toxic and may not be able to be used for commercial purposes for many years. • Farming methods causing run-off. • Benefits of flooding. • Increased insects (mosquitoes). • Elevated buildings (change in building code).

**Improvements to
Current Flood
Control Practices**

- Flood control measures: increase diversion channels, expand spillways, raise dikes/levees, improve bypass channels, build check dams, reinforce drainage/irrigation ditches, utilize sand bags.
- Enter into discussions with neighbouring U.S. states, the Manitoba government, and both Federal governments to explore the possibility of instituting a major water diversion scheme to release the pressures on locations downstream on the Red River.
- Address the flooding of the entire river basin but organize for localized responses (examining the minimum required, in terms of an action plan, for each community that will be affected).
- Increase the number of pumping stations.
- Monitor levels/conditions through satellite imagery.

END OF KEY