



2017 Manitoba Envirothon  
(name of Region) Regional Field Test

Team #

**STOP #**

**WATER AND AQUATIC ECOSYSTEMS**

*This question requires materials provided at the stop.*

A -

5

1) There are many types of aquatic ecosystems. When a waterbody has flowing water (e.g., a river), it is called a "lotic" system; when a waterbody has still water (e.g., a lake), it is called a "lentic" system. Read the descriptions below and indicate whether the waterbody is lotic or lentic. (1 pt - 0.5 pt each)

a) Well-oxygenated, turbid water, lots of erosion at shoreline. \_\_\_\_\_

b) Stratified water temperatures, clear water. \_\_\_\_\_

2) Some aquatic organisms require light (e.g. for photosynthesis or to capture prey), while others are tolerant of low-light conditions. Use the graph labelled A-A to answer the following questions. Round your answers to the nearest meter (1 m). (4 pts - 1 pt each)

a) Organism A needs 20% of surface light to survive.

What is the deepest depth Organism A could live at in a turbid lake? \_\_\_\_\_

What is the deepest depth Organism A could live at in a clear lake? \_\_\_\_\_

b) Organism B needs 60% of surface light to survive.

What is the deepest depth Organism B could live at in a turbid lake? \_\_\_\_\_

What is the deepest depth Organism B could live at in a clear lake? \_\_\_\_\_



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Table required?	No
Supervisor required?	No
Local feature required?	No
Description of local feature	
Hands on question?	This question requires materials provided at the stop.
List of equipment, props, and/or samples	graph of light vs depth labelled A-A (A_aquatic habitat_A)
Difficulty of question	Medium
Answer to question	1a) lotic (0.5 pt) 1b) lentic (0.5 pt) 2) students are asked to round to nearest 1 m, so no marks given if answers are not rounded. a) 3 m (1 pt), 9 m (1 pt) Partial marks: 2 m or 4 m (0.5 pt), 8 or 10 m (0.5 pt) b) 1 m (1 pt), 2 m (1 pt) Partial marks: 0 m or 2 m (0.5 pt), 1 or 3 m (0.5 pt)
Reference to student material	1) Aquatic Ecology Document, p 8-9, 44 2) ability to read and interpret a graph; Lake Ecology, p 6
Directions for printing and laminating	Print and laminate 2 or 3 copies of A_aquatic habitat_A for each Regional.
Direction for stop set-up	Make document A-A available in binder at stop.
Directions for attendant	n/a



**STOP #**

**WATER AND AQUATIC ECOSYSTEMS**

*This question requires materials provided at the stop.*

A -

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1) Carbon is the fourth most abundant element in the universe. Every organism on Earth needs carbon for structure and/or energy. Diagram A-A shows how atoms of carbon move around the environment. Use this diagram to answer the questions below.

a) Carbon can move from the atmosphere into different parts of the environment on Earth. Name one of the places carbon from the atmosphere can end up on Earth. (0.5 Pt)

\_\_\_\_\_

b) What is the biggest storage area for carbon? (Hint: Look at the legend for the diagram.) (0.5 Pt)

\_\_\_\_\_

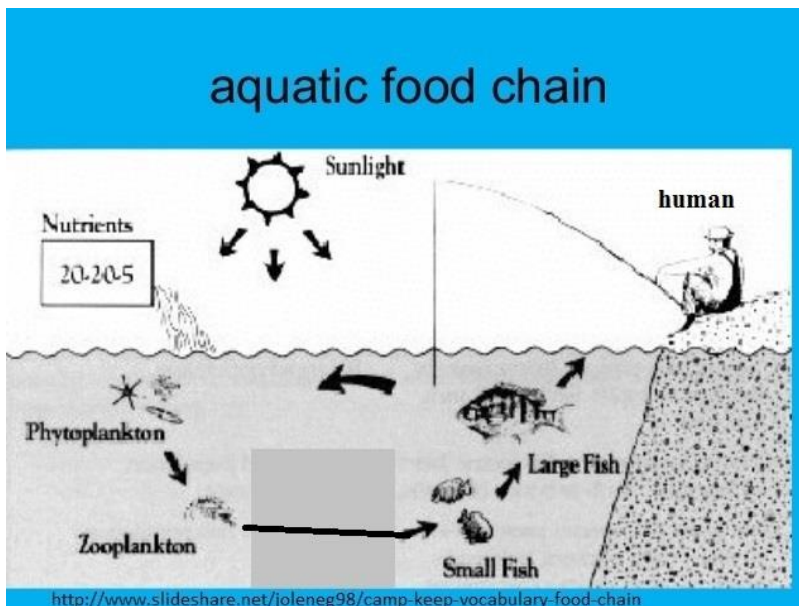
c) What is the main gas that contains carbon in the atmosphere? Write out the full name of the gas (no chemical symbols). (0.5 Pt)

\_\_\_\_\_

d) What is the name of the process in which carbon is taken in by algae? (1 Pt)

\_\_\_\_\_

2. Below is a diagram of a simple aquatic food web.





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Biomass, or organic matter, contains large amounts of carbon and is used as a source of energy that moves through the food web. An ecological pyramid shows the relative amount of biomass at each trophic level.

Write the names of the organisms shown in the food web in the correct levels of the ecological pyramid below. (2.5 Pts - 0.5 ea).

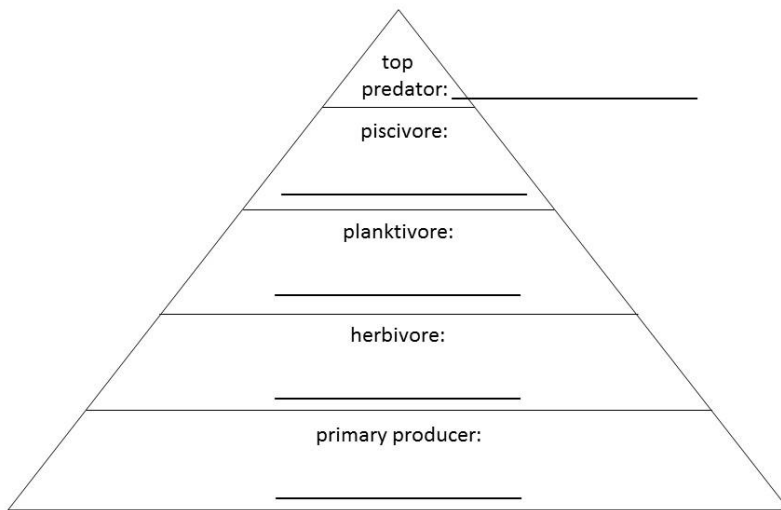


Table required?	No
Supervisor required?	No
Local feature required?	No
Description of local feature	
Hands on question?	This question requires materials provided at the stop.
List of equipment, props, and/or samples	diagram of carbon cycle labelled A-A (A_C-cycle_A)
Difficulty of question	Medium
Answer to question	1a) Any 1 of the following: forest, vegetation, surface ocean (0.5 pt ) 1b) deep ocean (0.5 pt) 1c) carbon dioxide (0.5 pt) (no points if they just write CO2) 1d) Photosynthesis (1 pt) 2) Triangle labeled from the bottom up: Phytoplankton, Zooplankton, Small fish, Large fish, Human (2.5 pt - 0.5 pt each)
Reference to student material	1a-b) Nutrient Cycles – Carbon cycle; ability to interpret diagram 1c-d) Lake Ecology, p 24, Fig 16 2) Lake Ecology, p 21-23, Fig 14



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Directions for printing and laminating	Print and laminate 2 or 3 copies of A_C-cycle_A for each Regional.
Direction for stop set-up	Make laminated document A-A available in binder at stop.
Directions for attendant	n/a



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**STOP #**

**SOILS AND LAND USE**

*This question requires materials provided at the stop.*

S -

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1) The parent material of a soil depends on the type of bedrock and the mode of deposition.

a) Sample S-A is a specimen of one of the types of bedrock found in Manitoba.  
Identify this type of bedrock. (1 Pt)

\_\_\_\_\_

b) When this bedrock breaks down over time, which type of soil particle does it form? (1 Pt)

\_\_\_\_\_

c) Spruce Woods Park is an example of a large area of sand dunes. What is the term for the mode of deposition of these dunes? (0.5 Pt)

\_\_\_\_\_

2) Parent material is also known as the C horizon. While the C horizon is relatively unaffected by soil forming processes, a few processes can alter it.

a) List three (3) lowercase suffixes that are commonly used to describe the C horizon. (1.5 Pts – 0.5 ea.)

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b) Define one (1) of those lowercase suffixes identified in part a). (1 Pt)

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\_\_\_\_\_

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Table required?	Yes
Supervisor required?	No
Local feature required?	No
Description of local feature	
Hands on question?	This question requires materials provided at the stop.
List of equipment, props, and/or samples	sample of granite, labelled S-A
Difficulty of question	Medium
Answer to question	1a) granite (1 pt) 1b) sand (1 pt) 1c) Eolian (0.5 pt) 2a) Any 3 of the following: ca, j, k, s, g, z (1.5 pts - 0.5 pt each) 2b) Any 1 of the following (1 pt): ca: layer of carbonate accumulation that exceeds the amount present in the parent material j: weak (juvenile) expression of soil processes k: presence of carbonates, visible by effervescence when dilute HCl is added s: soluble salts present g: grey colours or mottles, indicative of permanent or periodic intense reduction (wet condition), gleying z: permafrost, frozen horizon
Reference to student material	1) Soil Management Guide, p 8 2) Soil Management Guide, p 6-7
Directions for printing and laminating	
Direction for stop set-up	
Directions for attendant	



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**SOILS AND LAND USE**

S -

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1) Soil is made up of four components in two main parts - the solid part and the pore space.

a) The solid part of the soil is composed of which two (2) types of particles? (1 Pt – 0.5 ea)

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b) The pore space of soil is made up of which two (2) components? (1 Pt – 0.5 ea)

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2) Which of the following soils is the most compacted? Circle the best response. (0.5 Pt)

a) Soil #1, which has 50% solid and 50% pore space

b) Soil #2, which has 65% solid and 35% pore space

3) Which of the following is NOT correct? Circle the best response. (0.5 Pt)

a) Sandy soils have a greater amount of pore space than clay soils.

b) Soil with large pore spaces experience more water loss from gravity than soil containing mostly small pore spaces.

c) Water flows more quickly through soil with larger pore spaces than soil with smaller pore spaces.

d) Sandy soils have better air exchange with the atmosphere than clay soils.

4) When thinking about pore space, what does it mean to have a soil that is saturated with liquid water (or "water-logged")? (0.5 Pt)

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5) Agricultural capability subclasses identify the limitations of a soil.

a) State one (1) agricultural capability limitation (for example, P - stoniness, or R - bedrock) that is related to water interacting with pore space. (0.5 Pt)

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b) Explain how water interacts with pore space to create this limitation. (1 Pt)

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Table required?	No
Supervisor required?	No
Local feature required?	No
Description of local feature	
Hands on question?	No
List of equipment, props, and/or samples	
Difficulty of question	Difficult
Answer to question	<p>1a) mineral and organic (humus may not substitute for organic because it is a derivative of organic) (1 pt - 0.5 pt each)</p> <p>1b) air (or gas) and water (1 pt - 0.5 pt each)</p> <p>2) b) (0.5 pt)</p> <p>3) a) (0.5 pt)</p> <p>4) the pore space is completely filled with liquid water (or no air) (0.5 pt)</p> <p>5a) any 1 of the following (0.5 pt)</p> <p>D - dense soils (undesirable soil structure/low permeability)</p> <p>E - erosion damage</p> <p>M - moisture (droughtiness) or low water holding capacity</p> <p>N - salinity</p> <p>W - excess water other than flooding (inadequate soil drainage or high water table)</p> <p>(probably not I - inundation unless they make an accurate case for it - requires inundated water to have entered the soil profile)</p> <p>5b) any reasonable explanation using "water" and "pore", such as one of the following, but must be linked to a) (1 pt - no part marks)</p> <p>D - pore spaces too small to easily absorb water or allow it to flow within soil</p> <p>E - flowing water enters surface pores to soften aggregates and dislodge soil particles</p> <p>M - pore spaces are too large to hold water so it is lost to evaporation or gravity</p> <p>N - continuity of small pore spaces has allowed ground water containing salts to move into the soil profile</p> <p>W - ground water occupies pores in the soil profile; OR large continuous pores have allowed a ground water aquifer to form in the soil profile, making it excessively wet; OR a layer of material limited by small discontinuous pores has not allowed water to flow out of upper parts of the soil profile</p>
Reference to student material	<p>1) Soils and Land Use Document, p 11 -14</p> <p>2) Soils and Land Use Document, p 11 - 14</p> <p>3) Soils and Land Use Document, p 11 - 14, 19</p> <p>4) Soils and Land Use Document, p 14</p> <p>5) Soils and Land Use Document, p 45-47</p>
Directions for printing and laminating	none
Direction for stop set-up	none
Directions for attendant	none



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**STOP #**

**THEME**

*This question requires materials provided at the stop*

The Stop Attendant will give you a Map T-A at the stop.

T -

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Map T-A shows a small watershed in rural Manitoba with a number of areas of concern to the local residents. These areas of concern are marked according to the particular soil or water management issue at each location.

Choose five (5) of the marked locations. Decide on and design a beneficial management practice that will help solve the soil or water management issue at that location. Using the coloured markers provided at the stop, draw each of your chosen 5 BMPs on your copy of the map. Include the map with your test when you hand it in. (5 Pts - 1 ea)



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Table required?	Yes
Supervisor required?	No
Local feature required?	No
Description of local feature	
Hands on question?	This question requires materials provided at the stop.
List of equipment, props, and/or samples	copies of the map for teams (T_BMP_Implementation_A) fine point coloured markers
Difficulty of question	Easy
Answer to question	<p>Student must correctly design and draw 5 of the following 10 issues and their corresponding BMPs (5 pts - 1 pt each)</p> <p>2 High Flow - Damage To Municipal Culverts = In-stream Water Retention            1 Highway Runoff - Water Quality Issues = Vegetated Buffer strip along road edges            1 Lack of Supply for Irrigation = Pipeline to a newly created In-stream Water Retention            2 Runoff Causing Soil Erosion = Grassed Runway            3 Steep Slopes - Soil Erosion = Erosion Control Project            1 Wind Erosion = Shelterbelts on W and N sides of quarter</p>
Reference to student material	GAEGS BMP Catalogue (2013), p 1-13
Directions for printing and laminating	Print enough copies of T_BMP Implementation_A for each team, plus a few extras.
Direction for stop set-up	N/A
Directions for attendant	N/A



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**THEME**

*This question requires features found at the stop.*

T -

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1) In addition to being beneficial farm management practices, riparian areas serve as a secondary line of defense in keeping farmland nutrients, sediments, and other potential contaminants out of our water bodies. Describe where you would find a riparian area on an agricultural landscape. (1 Pt)

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2) You are trying to determine if the place you are standing is a riparian zone. Which of the following IS NOT one of the three (3) features that distinguish a riparian zone? Circle the best response. (0.5 Pt)

- a) abundant birds, mammals, and amphibians
  
- b) soils that are different because of abundant water, erosion/deposition, and lush vegetation
  
- c) plants that like water
  
- d) abundant water at or near the soil surface

3) A healthy riparian area performs many ecological functions, which result in many services, products, and benefits. List four (4) of the eight (8) key ecological functions. (2 Pts – 0.5 ea.)

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4) Riparian Health Indicators are characteristics we can easily see that allow us to determine how well riparian areas are functioning. "Caring for the Green Zone" and "Managing the Water's Edge" describe 11 indicators (in the form of questions) that Manitoba and Alberta have chosen for assessing riparian health. List three (3) of these riparian health indicators. (1.5 Pts - 0.5 ea.)

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Table required?	No
Supervisor required?	
Local feature required?	This question requires features found at the stop.
Description of local feature	site adjacent to stream or river that is obviously a riparian area
Hands on question?	No
List of equipment, props, and/or samples	
Difficulty of question	Medium
Answer to question	<p>1) adjacent to water OR transition from upland to water (1 pt)</p> <p>2) a) (0.5 pt)</p> <p>3) Any 4 of the following (2 pts - 0.5 pt each)</p> <p>Because this is a tough memorization question, leniency is allowed within reason: partial or poorly worded answers are acceptable as long as their intentions appear to be correct and they belong to separate functions:</p> <ul style="list-style-type: none"> <li>trap and store sediment</li> <li>build banks and shores</li> <li>store water and energy</li> <li>recharge aquifers</li> <li>filter and buffer water</li> <li>reduce energy</li> <li>maintain biodiversity</li> <li>create primary productivity</li> </ul> <p>4) Any 3 of the following (1.5 pts - 0.5 pt each)</p> <p>Because this is a tough memorization question, leniency is allowed within reason: partial or poorly worded answers are acceptable as long as their intentions appear to be correct and they belong to separate indicators.</p> <ul style="list-style-type: none"> <li>Vegetative Cover of Floodplain and Streambanks</li> <li>Invasive Plant Species (or weeds)</li> <li>Disturbance-Increaser Undesirable Herbaceous Species (or weeds)</li> <li>Preferred Tree and Shrub Establishment and Regeneration (or seedlings or stand replacement)</li> <li>Utilization of Preferred Trees and Shrubs (or browsing/grazing of woody plants)</li> <li>Standing Decadent and Dead Woody Material</li> <li>Streambank Root Mass Protection (or deep roots)</li> </ul>



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	<p>Human-Caused Bare Ground          Streambank Structurally Altered by Human Activity          Pugging, Hummocking and/or Rutting (or compaction)          Stream Channel Incisement (vertical stability, downcutting)          Is there any manipulation of water levels or removal of water by humans (this 12th one is in the Alberta guide but not the Manitoba guide)</p>
Reference to student material	<p>1) Soil Management Guide, p 61          2) Managing the Water's Edge - Riparian Health Assessment for Streams and Small Rivers, p 7, 33-72          3) Caring for the Green Zone - A User's Guide to Health, p 2-9, 16-24          4) Managing the Water's Edge - Riparian Health Assessment for Streams and Small Rivers, p 33-72; Caring for the Green Zone - A User's Guide to Health, p 16-24</p>
Directions for printing and laminating	
Direction for stop set-up	
Directions for attendant	



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**THEME**

T -  

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You have acquired a piece of property near Morden, Manitoba and plan to start a farming operation. The previous owner removed all of the trees from the property and used them for firewood. You would like to plant new trees along your field and near your home as you have heard about the benefits of restoring shelterbelts.

1) What is the primary purpose of a field shelterbelt? (0.5 Pt)

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2) List two (2) additional benefits that may result from planting the shelterbelt. (1 Pt – 0.5 ea.)

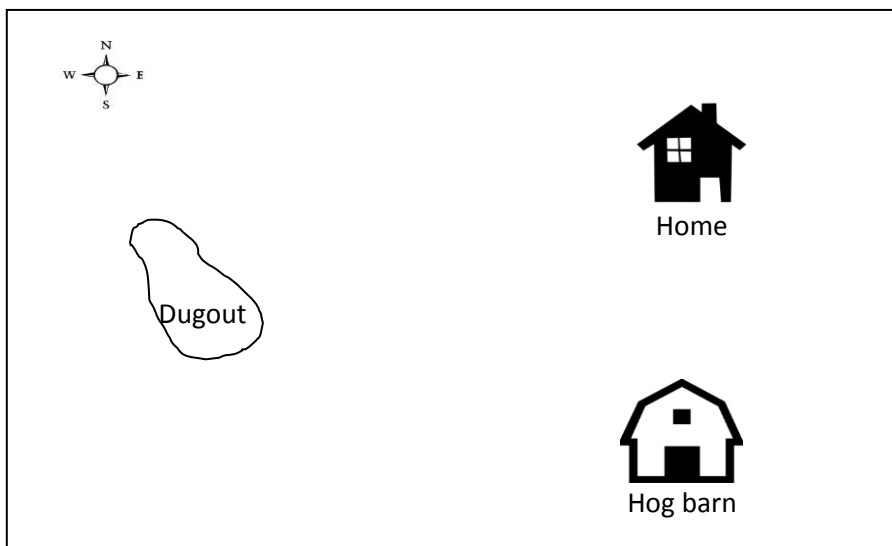
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3) A diagram of the property is shown below. Based on the information from Table 1, draw the shelterbelt you would construct to provide shelter for your home and hog barn on the diagram. Show the number of rows of trees you would plant. Include arrows to show the direction of annual prevailing winds. (3 Pts)

**Table 1: Monthly prevailing wind conditions for Morden, MB**

	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Annual
<b>Wind Speed (km/hr)</b>	18.5	16.7	18.5	19.9	18.9	16.9	14.5	16.5	17.5	18.4	18.5	18.1	17.7
<b>Prevailing Wind Direction</b>	W/ NW	SW	S	S & N	SW	SW	W/ NW	SW	SW	W	SW	SW	SW







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4) What is one (1) thing that you might take into consideration when planting a shelterbelt near a dugout being used for irrigation purposes? (0.5 Pt)

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Table required?	No
Supervisor required?	
Local feature required?	No
Description of local feature	
Hands on question?	No
List of equipment, props, and/or samples	
Difficulty of question	Medium
Answer to question	<p>1) Reduced soil erosion by wind (0.5 pt)</p> <p>2) Any 2 of the following: Can provide wildlife habitat, can provide more water for crops by decreasing evaporation due to wind, can protect crops from wind damage, wildlife habitat and shelter, improved safety in winter travel due to reduced snow drifting, lower costs of snow removal from roads, beautification of the prairie landscape, reduce the environmental impacts from agriculture, potential source of biomass income for the farmer, etc. (1 pt - 0.5 pt each)</p> <p>3) Shelterbelt along the south and west side of the diagram (1 pt); no less than 3 rows of trees (1 pt); prevailing winds from the south-west (1 pt)</p> <p>4) Any 1 of the following: Competition for moisture (increased moisture uptake from the trees may threaten the water supply purposes), leaf litter from the trees may impact irrigation systems. (0.5 pt)</p>
Reference to student material	<p>1)-2) Agri-Environment Bulletin, p 2</p> <p>3) Shelterbelts in Alberta, p 1-4</p> <p>4) PFRA Planning Farm Shelterbelts, p 5</p>
Directions for printing and laminating	
Direction for stop set-up	N/A
Directions for attendant	N/A



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**STOP #**

**THEME**

<i>T -</i>
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1) Effective soil management practices vary depending on soil texture. Soil texture can influence the flow of agricultural contaminants into surface and groundwater.

a) Briefly explain the effect of sandy soils on the flow of agricultural contaminants into groundwater. (1 Pt)

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b) The fine particles in clay soils are susceptible to wind erosion under dry conditions. Name a practice that can be used to reduce wind erosion of soils. (1 Pt)

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Multiple choice: Which of the choices is correct? Circle the best response.

2) Which of the following is NOT a basic soil property? (0.5 Pt)

- a) texture
- b) solubility
- c) calcium carbonate content
- d) bulk density
- e) colour



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3) Which of these beneficial management practices is most likely to improve soil electrical conductivity? (0.5 Pt)

- a) crop rotation
- b) cover cropping
- c) irrigation management
- d) conservation tillage
- e) none of the above

4) Name two (2) organizations who are responsible for helping to implement beneficial management practices on an agricultural landscape. (2 Pts – 1 ea.)

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Table required?	No
Supervisor required?	No
Local feature required?	No
Description of local feature	
Hands on question?	No
List of equipment, props, and/or samples	
Difficulty of question	Easy
Answer to question	<p>1a) large pore spaces allow rapid infiltration of water carrying contaminants (1 pt)</p> <p>1b) Any 1 of the following: crop rotation, cover cropping, conservation tillage, shelterbelts, annual barriers (1 pt)</p> <p>2) b (0.5 pt)</p> <p>3) c (0.5 pt)</p> <p>4) Any 2 of the following: Producer, Conservation District, Provincial Government, Ducks Unlimited, any agricultural/environmental based NGO, Federal Government, etc. (2 pts - 1 pt each)</p>
Reference to student material	<p>1a) Soil Texture and Water Quality, Best Management Practices for Different Soil Textures, p 3</p> <p>1b) Soil Texture and Water Quality, Best Management Practices for Different Soil Textures, p 5</p> <p>2) MB Soil Management Guide, p 11</p> <p>3) Soil Quality Indicator Sheets - Soil Electrical Conductivity, p 2</p> <p>4) Regional Training</p>
Directions for printing and laminating	
Direction for stop set-up	
Directions for attendant	



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**STOP #**

**WILDLIFE AND WILDLIFE MANAGEMENT**

W -
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1) Define adaptive behavior. (1 Pt)

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2) Briefly describe one (1) example of adaptive behavior for each of the following animals, including the purpose of the behavior.

a) Muskox (2 Pts)

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b) Orca whale (2 Pts)

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Table required?	No
Supervisor required?	No
Local feature required?	No
Description of local feature	
Hands on question?	No
List of equipment, props, and/or samples	
Difficulty of question	Easy
Answer to question	1) A unique behavior a species has developed to allow it to survive in a given habitat (1pt) 2a) Adults form a tight circle around young (1 pt) to protect from predators (1 pt); other answers accepted as appropriate 2b) Whales form a circle of bubbles around prey to trap them (1 pt) to the prey can be caught more easily (1 pt); other answers accepted as appropriate
Reference to student material	1) - 2) Wildlife Document, p 29-30
Directions for printing and laminating	N/A
Direction for stop set-up	N/A
Directions for attendant	N/A



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**STOP #**

**WILDLIFE AND WILDLIFE MANAGEMENT**

*This question requires materials provided at the stop.*

W -
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1) Look at the jaw labelled W-A.

- a) Using the Deer Jaw Aging Guide, determine the age of the animal the skull belonged to. (2 Pts)

\_\_\_\_\_ yrs

- b) Based on the teeth, is this species an omnivore, herbivore or carnivore? (1 Pt)

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2) Briefly describe two (2) examples of tooth adaptations that are related to what an animal eats. (2 Pts – 1 ea.)

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Table required?	Yes
Supervisor required?	Yes
Local feature required?	No
Description of local feature	
Hands on question?	This question requires materials provided at the stop.
List of equipment, props, and/or samples	Lower Jaw of White Tailed Deer labelled W-A (x2 if possible - can split lower jaw in half if need be) Texas-Parks-and-Wildlife-A-Guide-to-Age-Determination-of-White-tailed-Deer (Deer Age Determination on Wildlife Resources web page)
Difficulty of question	Difficult
Answer to question	1a) TBD - exact year (2 pts) Partial marks: plus or minus one year (1 pt) 1b) Herbivore (1 pt) 2) Any 2 of the following: Molars for grinding leafy material, balene in whales for filtering krill, rodent incisors for chewing wood, sharp canines for tearing meat, walrus tusks for digging molluscs (2 pts)
Reference to student material	1a) Deer Age Determination, p 2-7 1b) Wildlife Document, p 29 2) Wildlife Document, p 28
Directions for printing and laminating	Print and laminate 2 or 3 copies of Deer Age Determination (on Wildlife Resources web page) for each Regional.
Direction for stop set-up	Set jaw and aging photograph on the table.
Directions for attendant	





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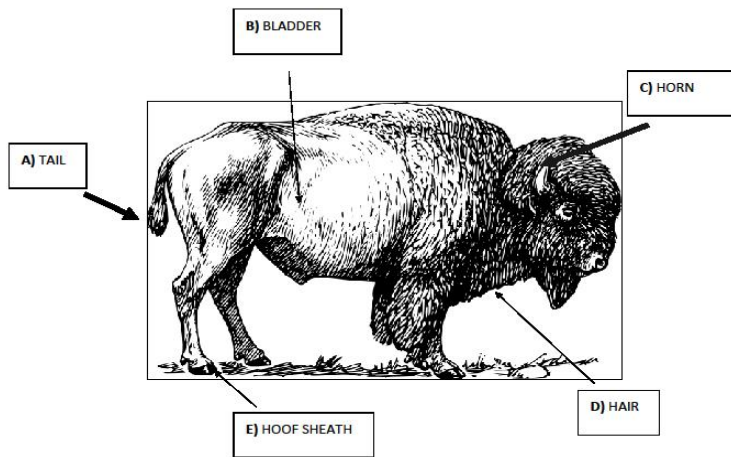
**WILDLIFE AND WILDLIFE MANAGEMENT**

W -  

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Identify two (2) of the traditional uses of each of the body parts indicated on the bison below. (5 Pts - 0.5 each)



A: \_\_\_\_\_  
\_\_\_\_\_  
B: \_\_\_\_\_  
\_\_\_\_\_  
C: \_\_\_\_\_  
\_\_\_\_\_  
D: \_\_\_\_\_  
\_\_\_\_\_  
E: \_\_\_\_\_  
\_\_\_\_\_



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Table required?	No
Supervisor required?	No
Local feature required?	No
Description of local feature	
Hands on question?	No
List of equipment, props, and/or samples	
Difficulty of question	Easy
Answer to question	<p>Any 2 of the following for each</p> <p>A: Decorations, Fly Swatter, Knife Sheath, Medicine, Switch, Whips (1 pt - 0.5 pt each)</p> <p>B: Food pouches, Medicine Bags, Water Container (1 pt - 0.5 pt each)</p> <p>C: Arrow Points, Cups, Fire Carrier, Headdresses, Ladles, Medication, Ornaments, Powderhorn, Signals, Spoons, Toys (1 pt - 0.5 pt each)</p> <p>D: Bracelets, Braided Ropes, Doll Stuffing, Hair Pieces, Headdresses, Horse Halters, Medicine Balls, Moccasin Linings, Ornaments, Pad Fillers, Pillow Fillers (1 pt - 0.5 pt each)</p> <p>E: Container, Glue, Rattles, Spoons, Wind Chimes. (1 pt - 0.5 pt each)</p>
Reference to student material	Traditional Uses of Bison; Traditional Uses of Buffalo
Directions for printing and laminating	
Direction for stop set-up	
Directions for attendant	





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Table required?	No
Supervisor required?	Yes
Local feature required?	No
Description of local feature	
Hands on question?	This question requires materials provided at the stop.
List of equipment, props, and/or samples	Photos of mammals labeled W-A (W_WildlifeCalls_A), W-B (W_WildlifeCalls_B), W-C (W_WildlifeCalls_C) Recorded wildlife calls: Moose, Elk and Bison System for playing the calls to teams (CD player, etc.)
Difficulty of question	Medium
Answer to question	1) Call 1: W-B, Call 2: W-C, Call 3: W-A (3 pts - 1 pt each) 2) Artiodactyla (1 pt) 3) F, T (1 pt - 0.5 pt each)
Reference to student material	1) Wildlife Calls, p 1 2) Mammals of Manitoba, Artiodactyla, p 25-27 3) Mammals of Manitoba, Artiodactyla, p 25, 49
Directions for printing and laminating	Print and laminate 2 or 3 copies of W_WildlifeCalls_A, W_WildlifeCalls_B and W_WildlifeCalls_C for each Regional.
Direction for stop set-up	Set up sound system to play calls. Check that calls can be played.
Directions for attendant	Play the animal calls when the group arrives at the stop, twice if they request it.



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**STOP #**

**WATER AND AQUATIC ECOSYSTEMS**

A -

5

You are part of an environmental emergency response team and you are the expert in oil and petroleum products. You receive word of a crude oil spill that has occurred near a waterway. You've been informed that crude oil has also been found in some local groundwater monitoring wells. Your team needs to answer the following questions in order to formulate the correct emergency response plan.

1) The spill was a result of an accident during the transportation of crude oil.

a) Name the three (3) methods of crude oil transportation used in Canada that could have been the source of this spill. (1.5 Pts – 0.5 ea.)

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b) Do these three methods represent point sources or non-point sources of pollution? (0.5 Pt)

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Multiple choice: Which of the answers is correct? Circle the best response.

2) Which of the following represents a non-point source that could contribute crude oil to a waterway? (0.5 Pt)

- a) gas station
- b) car crash
- c) sunken boat
- d) urban runoff



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3) When crude oil spills onto the ground, through what action does it come in contact with groundwater? (0.5 Pt)

- a) flotation
- b) percolation
- c) dissolution
- d) evaporation

4) True/False: Indicate whether the statement is true (T) or false (F) by circling the correct answer. (2 Pts - 0.5 ea.)

- T**    **F**    The speed of cleanup response does not affect the impact of a crude oil spill
- T**    **F**    Polycyclic Aromatic Hydrocarbons (PAHs), sometimes found in crude oil, can cause chronic toxic effects to aquatic species
- T**    **F**    A small crude oil spill in a lake can cause more environmental damage than a large spill in the ocean.
- T**    **F**    Burning oil on the surface of the water is one way to clean up spills in marine aquatic environments.



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Table required?	No
Supervisor required?	No
Local feature required?	No
Description of local feature	
Hands on question?	No
List of equipment, props, and/or samples	
Difficulty of question	Medium
Answer to question	1a) Marine transportation, rail transportation and pipeline transportation (1.5 pts. - 0.5 pt. each) 1b) point source (0.5 pt.) 2) d (0.5 pt) 3) b (0.5 pt) 4) F, T, T, T (2 pt - 0.5 pt each)
Reference to student material	1a) Oil Spill Document, p 1 1b) Oil Spill Document, p 1; Aquatic Ecology Document, p 74 2) Aquatic Ecology Document, p 39 3) Aquatic Ecology Document, p 76 4) Oil Spill Document, p 1, 3
Directions for printing and laminating	n/a
Direction for stop set-up	n/a
Directions for attendant	n/a



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**STOP #**

**WATER AND AQUATIC ECOSYSTEMS**

*This question requires materials provided at the stop.*

A -

5

1) What kind of chemical bonds hold water molecules together and determine almost every physical property of water as well as many of its chemical properties? (1 Pt)

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2) Document A-A provides a description of some of the most interesting physical properties of water. Below is a list of six common events or activities involving water, each of which can be attributed to at least one of the properties listed in A-A. In the space provided beside each of these events, print the letter (as noted on A-A) of the property of water most important in making the event possible. (3 Pts - 0.5 ea.)

- \_\_\_\_\_ A water strider travels about on the surface of a small pond searching for food.
- \_\_\_\_\_ A hiker cooks breakfast by a mountain stream and discovers that the boiled eggs are still soft after five minutes of boiling.
- \_\_\_\_\_ Many terrestrial plants obtain life supporting nutrients by taking in water via their roots.
- \_\_\_\_\_ Rainfall in eastern Canada lowers the pH in lakes and alters their food webs.
- \_\_\_\_\_ Salt is spread on city streets at air temperatures below 0 degrees Celsius to inhibit the formation of ice on the pavement.
- \_\_\_\_\_ Ice on a small lake forms first along the shore in late fall and melts first along the shore in spring.

3) What unusual property of water not listed on A-A causes ice to form on the surface of lakes and remain at the surface? (1 Pt)

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Table required?	No
Supervisor required?	No
Local feature required?	No
Description of local feature	
Hands on question?	This question requires materials provided at the stop.
List of equipment, props, and/or samples	Description of water properties labelled A-A (A_water properties_A)
Difficulty of question	Difficult
Answer to question	1) Hydrogen bond (1 pt) 2) C, A, E or D, E, A, B (3 pts - 0.5 pt each) 3) Some variation of: the maximum density of water occurs above the freezing point (at 4 degrees C); frozen water is less dense than liquid water. (1 pt)
Reference to student material	1) Aquatic Ecology Document, p 3 2) Aquatic Ecology Document. p 3-4 3) Aquatic Ecology Document, p 2
Directions for printing and laminating	Print and laminate 2 or 3 copies of A_water properties_A for each Regional.
Direction for stop set-up	Make document A-A available in binder at stop.
Directions for attendant	n/a



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**STOP #**

**NATIVE PLANTS AND FORESTRY**

*F -*

Match each definition with the correct forestry term by printing the letter of correct term beside the definition. (5 Pts - 0.5 ea.)

5

- A. forest certification
- B. chain of custody
- C. sustainable forest management
- D. deforestation
- E. annual allowable cut (AAC)
- F. Canadian Standards Association (CSA)
- G. regeneration
- H. Sustainable Forestry Initiative (SFI)
- I. afforestation
- J. permanent sample plot
- K. planting
- L. free-to-grow survey

- \_\_\_ The clearing of forests to make way for new, non-forest land uses.
- \_\_\_ Harvest allowed each year on a particular area of Crown land for a specific number of years to ensure sustainability over the long term.
- \_\_\_ From a forestry perspective, clearcutting has two functions. As a harvesting method, clearcutting is a cost and energy efficient way to secure a high volume of wood, usually from an even-aged stand of trees. As a silviculture method, clearcutting is a step in the \_\_\_\_\_ process.
- \_\_\_ A stamp of approval showing customers they are buying products that come from forests managed to comprehensive environmental, social, and economic standards.
- \_\_\_ Because of concerns over illegal logging and deforestation, businesses and government, are scrutinizing non-certified wood. This demand for proof that forest products have been sustainably and legally harvested has boosted demand for \_\_\_\_\_ certification, which verifies the link between the certified forest and the product produced.
- \_\_\_ Three major forest certification programs are used in Canada. What is Canada's oldest and largest standards organization?



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- \_\_\_ A way of using and caring for forests so as to maintain their environmental, social and economic values and benefits over time.
  
- \_\_\_ The planting of forests on lands that were previously non-forest lands.
  
- \_\_\_ Taking repeated measurement on the same trees over time to allow growth calculations.
  
- \_\_\_ An independent, non-profit charitable organization with a forest management standard developed specifically for North American forests.

Table required?	No
Supervisor required?	No
Local feature required?	No
Description of local feature	
Hands on question?	No
List of equipment, props, and/or samples	
Difficulty of question	Medium
Answer to question	D, E, G, A, B, F, C, I, J, H (5 pts - 0.5 pt each)
Reference to student material	State of Canada's Forests (2015), p 17, 20; Clearcutting in Manitoba, p 7; Forest Certification in Canada, p 3-5; Sustainable Forest Management in Canada, p 1; State of Canada's Forests (2015), p 17; Forestry Equipment Techniques, p 1; Forest Certification in Canada, p 5
Directions for printing and laminating	
Direction for stop set-up	
Directions for attendant	



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**STOP #**

**NATIVE PLANTS AND FORESTRY**

*This question requires materials provided at the stop.*

F -

5

1) In Manitoba, forest pests and invasive forest pests are regulated under what piece of legislation? (1 Pt)

\_\_\_\_\_

2) How does emerald ash borer spread into new areas? (1 Pt)

\_\_\_\_\_

\_\_\_\_\_

3) Emerald ash borer is difficult to control and manage. Briefly explain why. (1 Pt)

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

4) Look at the picture labelled F-A. This tree is infested with emerald ash borer. Briefly describe two (2) signs/symptoms of the infestation visible in the photo, including what activity causes each sign/symptom. (2 Pts – 0.5 ea)

Sign\symptom: \_\_\_\_\_

Activity: \_\_\_\_\_

Sign\symptom: \_\_\_\_\_

Activity: \_\_\_\_\_



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Table required?	Yes
Supervisor required?	No
Local feature required?	No
Description of local feature	
Hands on question?	This question requires materials provided at the stop.
List of equipment, props, and/or samples	Laminated picture of emerald ash borer signs/symptoms, labeled F-A (F_invasives_A)
Difficulty of question	Medium
Answer to question	<p>1) The Forest Health Protection Act (1 pt)</p> <p>2) Any 1 of the following: movement of infested wood, movement of infested ash material (nursery stock, packing material - wood pallets, barked ash wood or logs). (1 pt)</p> <p>3) It is hard to detect at low levels or early stages, so it goes unnoticed until it is too late. (1 pt)</p> <p>4) Any 2 of the following: Squirrel/wood pecker damage also called "blonding", d-shaped exit holes caused by the emergence of the adult emerald ash borers, bark cracks caused by larval activity under the bark, s-shaped gallery created by feeding larvae. (2 pts - 1 pt each)</p>
Reference to student material	<p>1) Manitoba's Forest Health Protection Act and Regs/The Forest Health Protection Act - Dutch Elm Disease Legislation, p 1</p> <p>2) -3) Emerald Ash Borer, p 1</p> <p>4) Emerald Ash Borer, p 5-7</p>
Directions for printing and laminating	Print and laminate 2 or 3 copies of F_invasives_A for each Regional.
Direction for stop set-up	
Directions for attendant	



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**STOP #**

**NATIVE PLANTS AND FORESTRY**

*This question requires materials provided at the stop. This question requires features found at the stop.*

F -

5

1) Using the Field Guide to the Native Trees of Manitoba or your own general knowledge, identify the tree samples labelled F-A and F-B to species. (2 pts - 1 ea.)

F-A \_\_\_\_\_

F-B \_\_\_\_\_

2) Using the Suunto clinometer and diameter tape, measure the tree labelled F-C. (2 Pts - 1ea.)

Diameter \_\_\_\_\_ cm

Height \_\_\_\_\_ m

3) Determine the age of the tree sample labelled F-D. (1 Pt)

\_\_\_\_\_ years



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Table required?	Yes
Supervisor required?	Yes
Local feature required?	This question requires features found at the stop.
Description of local feature	2 different tree species for ID, if possible Tree for diameter and height measurement
Hands on question?	This question requires materials provided at the stop.
List of equipment, props, and/or samples	Suunto clinometer diameter tape Field Guide to Native Trees of Manitoba flagging tape; perm marker; pig-tail pin; 50m measuring tape trees and/or branch and twig samples to identify labelled F-A, F-B tree to measure labelled F- C tree cookie labelled F-D
Difficulty of question	Difficult
Answer to question	Regional host responsible to provide TBD answers for 1) and 2) to Envirothon Coordinator for test marking purposes.  1) TBD (full common or Latin name required) (2 pts - 1 pt each) 2) TBD (2 pts - 1 pt each measurement) Partial marks: a marking range will be developed once measurements are determined 3) TBD (1 pt) Partial marks: a marking range will be developed once age is determined
Reference to student material	1), 2), 3) Regional Training
Directions for printing and laminating	Glenn to provide 10 identical tree cookies, two for each Region
Direction for stop set-up	Collect 2-3 samples of one conifer and one winter hardwood in spring before leaf out and stored in fridge until event for ID. Use live trees at stop if possible for ID and measurements. Set up the exact spot at which teams to measure tree height: mark t
Directions for attendant	Monitor samples and replace with extra samples as needed, making sure labelling is correct. Make sure clinometer and diameter tape don't leave stop.



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**STOP #**

**NATIVE PLANTS AND FORESTRY**

<i>F -</i>
<hr/>
5

1) Name three types of natural disturbances that can occur on a forest landscape. (1.5 Pts - 0.5 ea.)

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2) True /False: Indicate whether each statement is true (T) or false (F) by circling the correct answer. (2.5 Pts - 0.5 pt each)

- T**    **F**    Forest fires burn more than 25% of Canada's forests every year.
- T**    **F**    All boreal coniferous tree species are adapted to fire.
- T**    **F**    Forest fires require four things: fuel, oxygen, heat, and lightning.
- T**    **F**    Serotinous refers to cones that open only in high winds.
- T**    **F**    Best practices for clearcutting in boreal forests attempt to mimic natural disturbances.

3) Climate change is expected to result in more frequent fires in many boreal forests. List two (2) reasons why. (1 Pt – 0.5 ea.)

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Table required?	No
Supervisor required?	No
Local feature required?	No
Description of local feature	
Hands on question?	No
List of equipment, props, and/or samples	
Difficulty of question	Easy
Answer to question	<p>1) Any 3 of the following: Fire, Wind, Flood (Beavers), Insect, Disease, Snow, Ice Storms, Drought, Meteors!. (1.5 pts - 0.5 pt each)</p> <p>2) F, F, F, F, T (2.5 pts - 0.5 pt each)</p> <p>3) Any two of the following: "Climate change will result in warmer temperatures, making fires more likely", "Climate change will result in less precipitation, making fires more likely", "Climate change will result in more destructive insect outbreaks, creating larger fuel loads, making fires more likely". (1 pt - 0.5 pt each)</p>
Reference to student material	<p>1) Forestry Document, p 7-8</p> <p>2) State of Canada's Forests (2015), p 6; Forest Ecology-1, p 27; Forest Ecology-2, p 7-8; Forest Fires, p 4; Clearcutting in Manitoba, p 8</p> <p>3) Climate Change Connection, p 2-3</p>
Directions for printing and laminating	
Direction for stop set-up	
Directions for attendant	



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**STOP #**

**SOILS AND LAND USE**

*This question requires materials provided at the stop.*

S -

5

You are a soils specialist with the Province of Manitoba. An agronomist has brought you soil samples from two horizons in one of her client's fields. She would like to know whether there could be an internal drainage problem in that field. Based on her observations of several pits that she dug, the soil has three horizons.

1) Using the dilute HCl provided, test Soil 1.

a) Was a positive reaction observed? (0.5 Pt)

\_\_\_\_\_

b) From which of the following three soil horizons was this sample most likely taken: A, B or C? (0.5 Pt)

\_\_\_\_\_

2) Using the dilute HCl provided, test Soil 2.

a) Was a positive reaction observed? (0.5 Pt)

\_\_\_\_\_

b) From which of the following three soil horizons was this sample most likely taken: A, B or C? (0.5 Pt)

\_\_\_\_\_

3) What mineral compound in soil can be detected using this test? (0.5 Pt)

\_\_\_\_\_

4) A gas is released by the chemical reaction in a positive test.

a) What is this gas? (0.5 Pt)

\_\_\_\_\_

b) Name an agricultural source of this gas. (0.5 Pt)

\_\_\_\_\_



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5) What type of parent material contributes this mineral compound to a soil profile? (0.5 Pt)

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6) Based on the description by the agronomist and the test results, is this a well-developed soil or a poorly-developed soil? (0.5 Pt)

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7) Is there any indication of an internal drainage problem at this site? (0.5 Pt)

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Table required?	Yes
Supervisor required?	Yes
Local feature required?	No
Description of local feature	
Hands on question?	This question requires materials provided at the stop.
List of equipment, props, and/or samples	two sets of two samples of soil labelled S-1 and S-2 two bottles of dilute HCl safety goggles MSDS sheets disposable gloves paper towels/water
Difficulty of question	Difficult
Answer to question	1a) no (0.5 pt) 1b) A (0.5 pt) 2a) yes (0.5 pt) 2b) C (0.5 pt) 3) carbonates (0.5 pt) 4a) carbon dioxide (CO <sub>2</sub> ) (0.5 pt) 4b) Any 1 of the following: fossil fuel burning or examples of, decomposition of organic matter, crop residue burning, production of fertilizer (0.5 pt) 5) limestone (0.5 pt) 6) well-developed (0.5 pt) 7) no (0.5 pt)
Reference to student material	1)-2) Soils and Land Use Document, p 19-20; Regional training 3) - 4a) Soils and Land Use Document, p 19-20 4b) Soil Management Guide, p 122 5)-7) Soils and Land Use Document, p 19-20
Directions for printing and laminating	
Direction for stop set-up	
Directions for attendant	Ensure that bottles of dilute hydrochloric acid are sealed between uses. Monitor samples to ensure that they are not mixed or spilled. Tell students to put on safety goggles and gloves before using the HCl.



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**STOP #**

**SOILS AND LAND USE**

*This question requires materials provided at the stop.*

S -

Look at the soil sample or picture labelled S-A. Note the spots in the soil.

1) What is the name given to the spots in soil sample/picture S-A? (1 Pt)

5

\_\_\_\_\_

2) These spots are a distinguishing characteristic of a particular soil order.

a) Name that soil order. (1 Pt)

\_\_\_\_\_

b) What is the most common agricultural capability subclass limitation for this soil order?  
State the symbol and the descriptor (1 Pt - 0.5 ea.)

\_\_\_\_\_

\_\_\_\_\_

Multiple Choice: Which of the choices is correct? Circle the best response.

3) What percentage of agricultural soils in Manitoba does the soil order named  
in 2a) represent? (0.5 Pt)

a) 50

b) 20

c) 10

d) 5

4) Under which of the following drainage classes are these spots most likely to occur? (0.5 Pt)

a) rapid/excessive

b) well to moderately well

c) imperfect

d) poor to very poor

e) non-existent



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5) Where in the soil are these spots most likely to occur? (0.5 Pt)

- a) organic horizon
- b) LFH layer
- c) topsoil (A horizon)
- d) subsoil (B and/or C horizon)
- e) bedrock

6) Which of the following soils is most likely to develop these spots? (0.5 Pt)

- a) Coarse textured on a knoll
- b) Coarse textured in a low-lying area
- c) Fine textured on a knoll
- d) Fine textured in a low-lying area

Table required?	Yes
Supervisor required?	No
Local feature required?	No
Description of local feature	
Hands on question?	This question requires materials provided at the stop.
List of equipment, props, and/or samples	Sample of mottling in soil, labelled S-A (If we can't find enough samples, we will provide a picture.)
Difficulty of question	Medium
Answer to question	1) Mottles (1 pt) 2a) Gleysol (1 pt) 2b) W (0.5 pt), excess moisture or wetness (0.5 pt) 3) b (0.5 pt) 4) c (0.5 pt) 5) d (0.5 pt) 6) d (0.5 pt)
Reference to student material	1) Soil Management Guide, p 15 2a) Soil Management Guide, p 21 2b) Soil Management Guide, p 36 3) Soil Management Guide, p 20 4-6) Soil Management Guide, p 15
Directions for printing	Check with Lindsey whether sample or photo being used. If photo, print and



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and laminating	laminates 2 or 3 copies of file provided for each Regional.
Direction for stop set-up	
Directions for attendant	