

2015 Manitoba Envirothon  
Regional Trail Test

Team #

**STOP #**

**(Aquatic Ecology)**

**(This question requires materials provided at the stop)**

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1) The image labeled A-A is of a common invasive species in Manitoba. State the common or scientific name of the species. (0.5 pt)

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2) State one (1) negative impact that invasive plant species can have on an ecosystem. (0.5 pt)

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3) Refer to the image labeled A-B for the following questions.

a) State the common or scientific name of the plant in the pictures to genus (species is not necessary). (0.5 pt)

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b) This plant is considered a(n) \_\_\_\_\_ plant. Circle the best response. (0.5 pt)

i) emergent

ii) free-floating

iii) floating leaf

iv) submerged

v) all of the above

4) Aquatic and shoreline plants provide a variety of ecosystem benefits. Name three (3) benefits that they provide. (3 pts - 1 pt each)

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Aquatic Ecology

Table required?	(No)
Supervisor required?	(No)
Local feature required?	
Description of local feature	
Hands on question?	This question requires materials provided at the stop
List of equipment, props, and/or samples	images labeled A-A and A-B (File containing both images: A5_aquatic plants_A and B.pdf)
Answer to question	<p>1) Purple Loosestrife (also accept <i>Lythrum salicaria</i>) (0.5 pt)</p> <p>2) Any 1 of the following: out-compete native species, create a monoculture, reduce structural and habitat diversity of ecosystem, destroy wildlife habitat, reduce ecosystem's ability to perform ecological functions, replace the vegetation that native wildlife utilize for shelter or food, compete for nutrients/water/sunlight, alter soil chemistry, increase runoff and erosion. (0.5 pt)</p> <p>3a) Cattail (also accept broad-leaved cattail, narrow-leaved cattail, <i>Typha angustifolia</i>, <i>Typha latifolia</i> or <i>Typha</i>) (0.5 pt)</p> <p>3b) i - emergent (0.5 pt)</p> <p>4) Any 3 of the following: food source, spawning site, nesting site, life-cycle development site, hiding place from predators, shelter, buffer wave action, improve water quality, absorb nutrients, filter pollutants, hold sediment, bank stabilization, natural beauty. (3 pts - 1 pt each)</p>
Reference to student material	<p>1) Aquatic Invasive Species in Manitoba: AIS Factsheet, p 1-2</p> <p>2) Riparian Areas: Managing the Water's Edge (p 86)</p> <p>3a) Identifying Aquatic Plants: Through the Looking Glass, p 64-67</p> <p>3b) Identifying Aquatic Plants: Through the Looking Glass, p 4, 12, 64-67</p> <p>4) Identifying Aquatic Plants: Through the Looking Glass, p 8-11</p>
Additional information	
Directions for attendant	(n/a)

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**STOP #**

**(Aquatic Ecology)**

**(This question requires materials provided at the stop)**

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1) List three (3) characteristics typical of eutrophic lakes/ponds. (1.5 pt - 0.5 pt each)

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2) Algae are primary producers in aquatic ecosystems, producing oxygen and carbohydrates through photosynthesis. List the two (2) ingredients that the algae use (in the presence of sunlight) to create these products. (1 pt)

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3) Name one type of organism that a researcher would collect with the piece of equipment labeled A-A. (0.5 pt)

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4) Congratulations! You caught a lake trout (see photo A-B). Using the Key to Manitoba's Sport Fish, list two (2) physical characteristics you can see in the photo that would help you to identify this fish as a lake trout. (1 pt - 0.5 pt each)

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5) Photo A-C shows an invertebrate in its aquatic larval stage. Work through the steps of the Identification Guide to Freshwater Macroinvertebrates to identify the group the organism belongs to (Hint: group names are in capital letters). (1 pt)

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Aquatic Ecology

Table required?	(Yes)
Supervisor required?	(No)
Local feature required?	
Description of local feature	
Hands on question?	This question requires materials provided at the stop
List of equipment, props, and/or samples	<p>phytoplankton net labeled A-A  laminated photo of lake trout labeled A-B (File: A_food web_B.jpg)  laminated Key to Manitoba's Sport Fish  laminated photo of invertebrate labeled A-C (File: A_food web_C.jpg)  laminated Identification guide to freshwater macroinvertebrates (File: A_food web_Stroud Centre Macroinvertebrate Guide.pdf)</p>
Answer to question	<p>1.) Any 3 of the following: high nutrient levels OR high nitrogen/phosphorus levels, warm, shallow, high TDS, high productivity, algal blooms, warm water organisms, fish kills (1.5 pt - 0.5 pt each)  2) Carbon dioxide and water (1 pt - 0.5 pt each)  3) Any 1 of the following: plankton, zooplankton (0.5 pt)  4) Any 2 of the following: tail deeply forked, white edge on lower fins, no barbels, adipose fin, tail fin even or symmetrical (1 pt - 0.5 pt each)  5) Ephemeroptera (1 pt)  Partial marks: Plecoptera or Odonata (0.5 pt)</p>
Reference to student material	<p>1) Aquatic Ecology, p 9, 43; Lake Ecology, p 28, 34-35  2) Lake Ecology, p 24  3) Aquatic sampling techniques, p 4-5  4) Key to Manitoba's Sport Fish  5) Invertebrate Keys</p>
Additional information	<p>3) Lay out phytoplankton net on table and make sure label A-A is visible. Attach sample collection vial to bottom of net if possible. If not, just put net out alone.  4) Tape down photo of lake trout and key to MB fish side by side on table  5) Tape down photo of invertebrate and invertebrate ID key side by side on table</p>
Directions for attendant	(n/a)

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**STOP #**

**(Aquatic Ecology)**

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As in many parts of the world, most rural Manitobans rely on aquifers as their primary source of water for general use.

1) What is the general name for the water that is obtained from aquifers? (1 pt)

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2) When water is being supplied by an artesian well, which of the following aquifer types would be the water source for this well? Circle the correct answer? (1 pt)

fractured      permeable      impermeable

3) List four (4) point sources of human-caused contamination of the water in aquifers. (2 pts - 0.5 pt each)

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4) Clay soils have many spaces between their grains, but do not make good aquifers. Why? (1 pt)

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Aquatic Ecology

Table required?	(No)
Supervisor required?	(No)
Local feature required?	
Description of local feature	
Hands on question?	
List of equipment, props, and/or samples	
Answer to question	<p>1) groundwater (1 pt) Partial marks: well water (0.5 pt)</p> <p>2) impermeable (1 pt)</p> <p>3) Any four (4) of the following: On-site septic systems; Leaky tanks or pipelines containing petroleum products; Leaks or spills of industrial chemicals at manufacturing facilities; Underground injection wells (industrial waste); Municipal landfills ;Livestock wastes; Leaky sewer lines; Chemicals used at wood preservation facilities; Mill tailings in mining areas; Fly ash from coal-fired power plants; Sludge disposal areas at petroleum refineries; Land spreading of sewage or sewage sludge; Graveyards; Road salt storage areas; Wells for disposal of liquid wastes; Runoff of salt and other chemicals from roads and highways; Spills related to highway or railway accidents; Coal tar at old coal gasification sites; Asphalt production and equipment cleaning sites; Other valid answers or variations of these as appropriate (2 pts - 0.5 pt each)</p> <p>4) The spaces between clay particles are too small for significant water storage or movement (1 pt)</p>
Reference to student material	<p>1) Aquatic Ecology: Groundwater, What is an Aquifer?</p> <p>2) Aquatic Ecology: Groundwater, Groundwater - Always on the Move</p> <p>3) Aquatic Ecology: Groundwater Contamination, Point Sources</p> <p>4) Aquatic Ecology: Groundwater, Groundwater - Always on the Move</p>
Additional information	(n/a)
Directions for attendant	(n/a)

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**STOP #**

**(Aquatic Ecology)**

**(This question requires materials provided at the stop)**

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1) Dihydrogen monoxide is a colourless, odorless chemical compound that can dissolve almost any other substance given enough time. It is a major component of acid rain, contributes to the global greenhouse effect, and causes soil erosion. Based on what you know about dihydrogen monoxide, should this compound be banned from use? (0.5 pt)

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2) Fill in the blank (0.5 pt)

Water molecules are attracted to each other and connect together with \_\_\_\_\_ bonds.

3) Use the eye dropper to place as many drips of water as you can on the penny, refilling the dropper as necessary. Name one physical property that allows the water to form a large blob on the penny. (0.5 pt)

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4) Identify the missing steps in the simplified diagram of the water cycle labelled A-A. (2 pts - 0.5 pt each)

A: \_\_\_\_\_

B: \_\_\_\_\_

C: \_\_\_\_\_

D: \_\_\_\_\_

5) List the following terms in order of lowest to highest density: water ice, liquid water, water vapour (1.5 pt - 0.5 pt each)

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Aquatic Ecology

Table required?	(Yes)
Supervisor required?	(Yes)
Local feature required?	
Description of local feature	
Hands on question?	This question requires materials provided at the stop
List of equipment, props, and/or samples	disposable eyedroppers (2 for on the table, 8 spares) jar/plastic cup to hold water jug of water to refill glass penny mounted on board cloth/dish towel to dry off pennies laminated diagram of water cycle labeled A-A (File: A_properties of water_A.pdf)
Answer to question	1) no (dihydrogen monoxide is water) (0.5 pt) 2) hydrogen (0.5 pt) 3) Any 1 of the following: surface tension, cohesion, adhesion (0.5 pt) 4) A: condensation, B: evaporation, C; transpiration or evapotranspiration, D: Any 1 of the following: run-off, percolation, infiltration (2 pts - 0.5 pt each) 5) water vapour, water ice, liquid water (1.5 pts - 0.5 pt each)
Reference to student material	1) Aquatic Ecology, p 2 2) Aquatic Ecology, p 3 3) Aquatic Ecology, p 3 4) Aquatic Ecology, p 5; Nutrient Cycles: Water Cycle 5) Aquatic Ecology, p 2
Additional information	3) Fill cup or jar with water from jug; put 2 pipettes in jar; put boards with pennies mounted on them on table (as level as possible) 4) Put diagram A-A on table (tape down if windy)
Directions for attendant	3) To use pipettes, students just need to squeeze the bulb end with the tip in the water and gently release the bulb to suck up water. Dry off the pennies with the cloth between groups (as best as possible - don't have to be perfectly dry). Refill the water in the jar as necessary.)

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**(Forestry)**

**(This question requires materials provided at the stop)**

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1) Define the term ALIEN SPECIES (0.5 pt). When are they considered ALIEN FOREST PESTS (0.5 PT)

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2) List two (2) ways in which invasive alien forest pests cause changes in ecosystems. (1 pt - 0.5 pt each)

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3) List two (2) characteristics of invasive species. (1 pts - 0.5 pt each)

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4) Match the pictures on the laminated sheet labeled F-A with the alien pests listed below. Write the number of the picture in the blank beside the pest. (2 pts - 0.5 pt each)

\_\_\_\_ Asian long-horned beetle

\_\_\_\_ Pine shoot beetle

\_\_\_\_ White pine blister rust

\_\_\_\_ Gypsy moth

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Forestry

Table required?	(Yes)
Supervisor required?	(No)
Local feature required?	
Description of local feature	
Hands on question?	This question requires materials provided at the stop
List of equipment, props, and/or samples	Photos of 4 alien pests, labeled F-A (File: F_AlienPests_A)
Answer to question	<p>1) Any species, subspecies, variety, or race occurring in an area or ecosystem to which it is not native (0.5 pt) and causes environmental damage and economic and social losses (0.5 pt)</p> <p>2) Any 2 of the following: removal of native organisms by predation or by parasitism; displacement of native organisms by competition for space or nutrients or food, or by alteration of habitat (1 pt - 0.5 pt each)</p> <p>3) Any 2 of the following: No natural checks; reproduce quickly; disperse widely; tolerate a broad range of habitat conditions; resist eradication when established (1 pt - 0.5 pt each)</p> <p>4) 2, 3, 4, 1 (2 pts - 0.5 pt each)</p>
Reference to student material	1) - 4) Forestry Document, p 15-17; Alien Forest Pests, p 4-8
Additional information	Place picture F-A on the table. Tape down if windy.
Directions for attendant	

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**(Forestry)**

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1) All activities in forestry, including road building, land site location, harvesting and slash disposal, can potentially affect water quality. Best management practices for water quality in the forestry industry are a set of practices determined to effectively prevent or reduce pollution from these activities. What is the general term for water pollution from these sources? (1 pt)

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2) Indicate whether each statement is true (T) or false (F) by circling the correct answer. (2 pts - 0.5 pt each)

- |   |   |  |
|---|---|--|
| T | F | Canada harvests less than 1% of its managed forests annually.  |
| T | F | Canada has the smallest percentage of original forest cover than any other country.  |
| T | F | Canada has the largest area of protected forests in the world.   |
| T | F | Canada was the first developed nation at the 1992 Earth Summit to sign the Convention on Biological Diversity, which is intended to conserve ecosystem, species and genetic diversity. |

3) In 2002, the Forest Products Association of Canada (FPAC) made a landmark commitment to the long-term health and protection of Canada's forests and the forest industry by requiring all of its members to submit \_\_\_\_\_ to one of three internationally recognized forestry standards. (0.5 pt)

4) Circle the three (3) acronyms for forestry certification standards required for FPAC membership. (1.5 pts - 0.5 pt each)

- |     |     |     |
|-----|-----|-----|
| CFA | CPA | SFF |
| FSP | CSA | FSC |
| SFI | SFI | MFA |

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Forestry

Table required?	(No)
Supervisor required?	(No)
Local feature required?	
Description of local feature	
Hands on question?	
List of equipment, props, and/or samples	
Answer to question	1) non-point source (1 pt) 2) T, F, T, T (2 pts - 0.5 pt each) 3) forest management practices (0.5 pt) 4) CSA, FSC, SFI (1.5 pts - 0.5 pt each)
Reference to student material	1) Water Quality Best Management Practices on Forested Lands, p 1 2) Certification and Canadas Forests, p 4, 3 3) Certification and Canadas Forests, p 6
Additional information	
Directions for attendant	

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**STOP #**

**(Forestry)**

**(This question requires materials provided at the stop)**

**(This question requires a feature found at this stop)**

5

1) Using the Field Guide to the Native Trees of Manitoba or your own general knowledge, identify the tree samples labelled F-A, F-B, F-C and F-D to species. (2 pts - 0.5 pt each)

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

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

F-C \_\_\_\_\_

F-D \_\_\_\_\_

2) Using the Suunto clinometer and diameter tape, measure the trees labelled F-E and F-F. Record your measurements in the spaces provided. (2 pts - 0.5 pt each)

F-E: Diameter \_\_\_\_\_ cm, Height \_\_\_\_\_ m

F-F: Diameter \_\_\_\_\_ cm, Height \_\_\_\_\_ m

3) Dendrochronology refers to \_\_\_\_\_. Circle the best answer. (1 pt)

- a) the study of plant evolution
- b) the analysis of tree growth ring patterns in science
- c) the time of year that leaves form on trees
- d) the difference in plant growth from one area to another

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Forestry

Table required?	(Yes)
Supervisor required?	(Yes)
Local feature required?	(This question requires a feature found at this stop)
Description of local feature	(Tree)
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 on-site trees and/or branch and twig samples to identify labelled F-A, F-B, F-C, and F-D on-site trees to measure labelled F-E and F-F
Answer to question	Regional host responsible to provide TBD answers to Steering Committee for test marking purposes. 1) TBD on site - full common or Latin name required (2 pts - 0.5 pt each) 2) TBD on site (2 pts - 0.5 pt each measurement) Partial marks: a marking range will be developed once measurements are determined 3) b (1 pt)
Reference to student material	1), 2) Training 3) Forestry, p 3; Principles in Dendrochronology: Definitions
Additional information	Ensure extra clinometers and d-tapes on hand in case they "walk away". Set up the exact spot where to measure the tree height from and mark the distance to target tree on flagging tape tape tied to pigtail pin inserted in ground (so that students can utilize the correct equipment scale). Suggest two conifers and winter twigs for two hardwoods (collected in spring before leaf out) and stored in fridge until event. Utilize live tree at stop if possible. As theme is Urban Forestry, use an elm if handy or Glenn can send twig samples from a DED crew. Have extra labelled samples of all material available in case of damage or overuse.
Directions for attendant	Monitor samples and replace with extra samples as needed, making sure labelling is correct.)

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**(Forestry)**

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First Nations Traditional Land Use and Occupancy mapping is a way of showing how a community, and individuals within it, use the land. This is an important part of forestry planning.

1) List three (3) examples of the types of features that could appear on that map that demonstrates traditional land use. (3 pts - 1 pt each)

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2) Which of the following is the best example of a traditional activity that you would show in land use occupancy mapping. Circle the best response. (1 pt)

- a) an area infrequently traveled for fishing purposes
- b) an area often traveled for hunting purposes
- c) a route taken for irregular trips to collect medicine
- d) all of the above

3) Land use occupancy mapping allows for \_\_\_\_\_. Circle the best response. (1 pt)

- a) creation of parks and wildlife management areas
- b) designation of permanent sample plots
- c) community capacity to use GIS to participate in resource management
- d) forest certification

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Forestry

Table required?	(No)
Supervisor required?	(No)
Local feature required?	
Description of local feature	
Hands on question?	
List of equipment, props, and/or samples	
Answer to question	<p>1) Any 3 of the following: Places where animals are harvested for food, clothing, medicines, tools, and other purposes; Places where plant materials are harvested for food, clothing, medicines, tools, shelter and fuel; Places where rocks, minerals, and soils are collected for making tools, conducting ceremonies, and other purposes; Ecological knowledge of habitats and sites critical to the survival of important animal populations - for instance, caribou migration corridors, islands where moose calve, waterfowl breeding grounds and staging areas, and spawning beds; Habitation sites, such as settlements, trading posts, cabins, camps, and burial grounds; Spiritual or sacred places such as ceremony sites, rock paintings, areas inhabited by non-human or supernatural beings, and birth and death sites; Legends and other accounts about specific places; Travel and trade routes; Aboriginal place names (3 pts - 1 pt each)</p> <p>2) b (1 pt)</p> <p>3) c (1 pt)</p>
Reference to student material	1) - 3) Training; Chief Kerry's Moose
Additional information	
Directions for attendant	

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**STOP #**

**(Soils and Land Use)**

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Salts are found in the soil water solution. In Manitoba, calcium and magnesium salts are the most common. Groundwater used for domestic water supplies may be very high in calcium and magnesium, and these high levels may make soaps less effective. Domestic water softeners usually use sodium chloride to treat this "hard" water for household purposes, as the sodium increases the effectiveness of the cleaning power of the detergents and soaps. The resulting water contains a higher concentration of sodium which creates problems for soils and plants when the treated water is discharged or applied to lawns or gardens.

- 1) List two (2) possible effects on soil or plants from applying softened water to gardens or lawns. (2 pts - 1 pt each)

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- 2) List three (3) remediation strategies to minimize the effect of soil salinity from softened domestic water. (3 pts - 1 pt each)

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Soils and Land Use

Table required?	(No)
Supervisor required?	(No)
Local feature required?	
Description of local feature	
Hands on question?	
List of equipment, props, and/or samples	
Answer to question	<p>1) Any 2 of the following: stunted plant growth; death of trees and shrubs; change in species composition to salt tolerant plants; soil structure deterioration resulting in poor infiltration; hard soil structure; white deposits of salt on surface or within soil profile; water less available to plants due to osmotic pressure, creating droughtiness (2 pts - 1 pt each)</p> <p>2) Any 3 of the following: use a water treatment system not based on sodium chloride (could be a filter, or potassium based); discharge water away from lawn or garden; collect and use rainwater for domestic purposes; amend the soil with organic material, such as manure or compost to increase aeration and improve structure; plant salt tolerant species; use bedding plants that are not as sensitive as emerging seedlings; improve soil drainage to lower water table to enhance water infiltration; provide adequate soil fertility based on soil sampling (3 pts - 1 pt each)</p>
Reference to student material	<p>1) Soil Management Guide: Chapter 5: Soil Salinity</p> <p>2) Soil Management Guide: Chapter 5: Soil Salinity</p>
Additional information	
Directions for attendant	

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**STOP #**

**(Soils and Land Use)**

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1) Soil consists of four main physical components.

a) Which two (2) physical components make up the solid part of the soil? (1 pt - 0.5 pt each)

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b) What is the origin of each of the 2 solid components? (1 pt - 0.5 pt each)

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c) Which two (2) physical components occupy the pore space of a soil? (1 pt - 0.5 pt each)

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2) What does a soil have in abundance if it is very dark in colour? (0.5 pt)

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3) Which of the following two 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 75% solid and 25% pore space

4) Which of the following is NOT correct? Circle the best response. (0.5 pt)

a) Sandy soils have higher porosity than clay soils.

b) Soil with large pore spaces cannot hold as much water as soils with small pore spaces.

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

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

5) What does it mean to have a soil that is saturated with liquid water? (0.5 pt)

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Soils and Land Use

Table required?	(No)
Supervisor required?	(No)
Local feature required?	
Description of local feature	
Hands on question?	
List of equipment, props, and/or samples	
Answer to question	<p>1a) mineral and organic (humus may not substitute for organic because it is a further derivative of organic) (1 pt - 0.5 pt each)</p> <p>b) mineral originates from weathering of rocks and minerals; organic originates from residues of living things (1 pt - 0.5 pt each)</p> <p>c) air (or gas) and water (1 pt - 0.5 pt each)</p> <p>2) either humus or organic matter (0.5 pt)</p> <p>3) b) Soil #2 (0.5 pt)</p> <p>4) a) (0.5 pt)</p> <p>5) the pore space is completely filled with liquid water (or no room for air) (0.5 pt)</p>
Reference to student material	<p>1) Soils and Land Use, p 15-16</p> <p>2) Soils and Land Use, p 16-17</p> <p>3) Soils and Land Use, p 15</p> <p>4) Soils and Land Use, p 17</p> <p>5) Soils and Land Use, p 18</p>
Additional information	
Directions for attendant	

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**STOP #**

**(Soils and Land Use)**

**(This question requires materials provided at the stop)**

5

Using the soil sample and equipment provided, answer the following questions.

1) Define soil texture. (1 pt)

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2) Define soil structure. (1 pt)

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3) What is the texture of the soil provided? (1 pt)

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4) What is the colour of the soil on the Munsell colour chart. (1 pt)

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5) Are carbonates present in the soil? (1 pt)

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Soils and Land Use

Table required?	(Yes)
Supervisor required?	(Yes)
Local feature required?	
Description of local feature	
Hands on question?	This question requires materials provided at the stop
List of equipment, props, and/or samples	sample of soil hand texturing chart HCl paper towels rubber gloves and safety glasses water (in a squirt bottle and also for clean up) Munsell 10YR colour chart
Answer to question	1) The proportion of silt, sand and clay sized particles or the proportion of silt, sand and clay (1 pt) 2) The way in which soil particles cling together to form aggregates (1 pt) 3) TBD (1 pt) 4) 10YR TBD/TBD (0.5 pt for correct hue (10YR), 0.5 pt for correct value/chroma) 5) TBD, but I'm guessing no (1 pt)
Reference to student material	1) Soils and Land Use, p15 2) Soil Management Guide, p13 3) Soils and Land Use, p27; Training 4) Training 5) Training
Additional information	
Directions for attendant	Please ensure students use rubber gloves and safety glasses when handling HCl.)

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**STOP #**

**(Soils and Land Use)**

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You are an agronomist visiting a client's field to determine its suitability for a high-value annual crop, such as canola or soybean, that the farmer is planning to grow this year. The field has variable topography with several depressions. Using some dilute HCl that you astutely packed for the site visit, you observe obvious fizzing near the surface in these low lying areas.

1) Based on the results of this test, what limitation to crop production does the soil in the low parts of the field have? (1 pt)

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2) Do you recommend applying the same rate of fertilizer application to both the lower and higher parts of this field? (1 pt)

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3) Explain your answer to 2). (2 pts)

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4) Propose one (1) solution to address the limitation affecting the depressions in the field. (1 pt)

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Soils and Land Use

Table required?	(No)
Supervisor required?	(No)
Local feature required?	
Description of local feature	
Hands on question?	
List of equipment, props, and/or samples	
Answer to question	<p>1) excess moisture (1 pt)                  2) no (1 pt)                  3) All of the following key points:                  The low-lying areas of the field should receive lower rates of fertilizer application OR be excluded from annual crop production and receive no fertilizer. (1 pt)                  Lower areas not as good for farming (0.5 pt)                  More nutrients likely to be lost from lower areas (0.5 pt)                  4) The grower could consider improving the internal drainage of the depressions by installing tile drainage if conditions are favourable. (1 pt)</p>
Reference to student material	<p>1) Soil Management Guide, p 16-17                  2) - 4) Soil Management Guide, p 52-54, 59, 126-127</p>
Additional information	
Directions for attendant	

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Regional Trail Test

Team #
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**STOP #**

**(Theme)**

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1) List two (2) benefits of urban trees. (2 pts - 1 pt each)

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2) Briefly describe three (3) examples of how urban trees benefit human health. (3 pts - 1 pt each)

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2015 Manitoba Envirothon  
Regional Trail Test

Team #
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Theme

Table required?	(No)
Supervisor required?	(No)
Local feature required?	
Description of local feature	
Hands on question?	
List of equipment, props, and/or samples	
Answer to question	<p>1) Any 2 of the following: Enhance aesthetic beauty of the city, provide shade, help conserve fuel, provide business opportunities, prolong the life of infrastructure, draw tourists, provide diverse foods, reduce energy costs, foster healing and health, enhance community safety, enhance recreation opportunities, capture and store carbon, clean the air, cool city environment, improve water quality, slow storm water flow, conserve biodiversity, promote learning opportunities, provide employment opportunities, impart sense of place, increase property values, contribute to sense of well-being, wildlife habitat, reduce noise levels (2 pts - 1 pt each)</p> <p>2) Any 3 of the following: Trees purify the air; trees play a role in enhancing healing; the more people experience nature the better they feel emotionally, mentally and physically; urban trees provide shade which blocks harmful ultraviolet radiation (major cause of skin cancer) - shade can help mitigate the risk of skin cancer (3 pts - 1 pt each)</p>
Reference to student material	<p>1) Benefits/In Support of Trees in the City, p 1-4; Local Resident Values/Understanding Local Values Related to the Urban Forest, p 15-18</p> <p>2) Benefits/In Support of Trees in the City, page 1-4</p>
Additional information	
Directions for attendant	

2015 Manitoba Envirothon  
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**STOP #**

**(Theme)**

5

An infestation of emerald ash borer has been found in a campground in a stand of young ash trees that were planted only a couple of years ago. The infestation is thought to be from firewood coming into the campground from 100 km away.

1) Give two examples of what we can do to minimize infestations of invasive pests from firewood in our forests, parks and campgrounds in Manitoba.

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2) List three (3) invasive pests other than emerald ash borer that could be spread by transporting firewood? (3 pts - 1 pt each)

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2015 Manitoba Envirothon  
Regional Trail Test

Team #
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Theme

Table required?	(No)
Supervisor required?	(No)
Local feature required?	
Description of local feature	
Hands on question?	
List of equipment, props, and/or samples	
Answer to question	<p>1) buy firewood from local dealers, buy firewood at the campsite, don't bring in firewood from other provinces or from the USA, use firewood disposal sites in Manitoba so firewood does not travel long distances. (2 pts - 1 pt each)</p> <p>2) Any 3 of the following: banded elm bark beetle, native elm bark beetle, Asian long horned beetle, mountain pine beetle, Dutch elm disease, brown spruce long horned beetle (3 pts - 1 pt each).</p>
Reference to student material	1) and 2) Don't Move Firewood - Provincial/Protecting Manitoba's Forests; Don't Move Firewood - Federal/Don't Move Firewood
Additional information	
Directions for attendant	

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**STOP #**

**(Theme)**

5

- 1) List four (4) pieces of information that are collected about an individual tree as part of a tree inventory. (2 pts - 0.5 pt each)

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- 2) Why is a tree inventory important for an urban forest management program? Circle the best response(s). (1 pt)

- a) to identify species diversity and distribution
- b) to determine root volume in a city
- c) to predict migratory bird patterns
- d) to determine percentage of canopy cover
- e) all of the above

- 3) What is the name of the computer-based system commonly used for municipal tree inventories to organize data and enhance urban forest management? (1 pt)

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- 4) List two (2) other kinds of information useful to urban forestry management that may be collected and/or analysed using state of the art technologies. (1 pt - 0.5 pt each)

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Team #
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Theme

Table required?	(No)
Supervisor required?	(No)
Local feature required?	
Description of local feature	
Hands on question?	
List of equipment, props, and/or samples	
Answer to question	<p>1) tree health, species, size, location, and others as appropriate (2 pts - 0.5 pt each)</p> <p>2) a) and d) (1 pt - 0.5 pt each)</p> <p>3) geographic information systems (1 pt)</p> <p>4) Any 2 of the following: dendrology, soil sampling, tree core sampling, leaf area, crown density, geographic positioning and others as appropriate (1 pt - 0.5 pt each)</p>
Reference to student material	<p>1) Compendium of Best Urban Forest Management Practices: Tree Inventory and the Tree Inspection</p> <p>2) Compendium of Best Urban Forest Management Practices: Tree Inventory and the Tree Inspection</p> <p>3) Compendium of Best Urban Forest Management Practices: GIS and Other Technologies</p> <p>4) Compendium of Best Urban Forest Management Practices: GIS and Other Technologies</p>
Additional information	
Directions for attendant	

2015 Manitoba Envirothon  
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Team #

**STOP #**

**(Theme)**

5

1) List two (2) reasons why is it important to have trained, licensed, tree care professionals in Manitoba? (1 pt - 0.5 pt each)

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2) List two (2) requirements for tree care professionals who want to become licensed arborists in Manitoba. (2 pts - 1 pt each)

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3) How long do arborist licenses in Manitoba last before they need to be renewed? (0.5 pt)

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4) What two (2) training programs are approved for arborist training in Manitoba? (1 pt - 0.5 pt each)

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5) What school in Manitoba offers the Manitoba Arborist Training and Examination Program? (0.5 pt)

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Regional Trail Test

Team #

Theme

Table required?	(No)
Supervisor required?	(No)
Local feature required?	
Description of local feature	
Hands on question?	
List of equipment, props, and/or samples	
Answer to question	<p>1) Any 2 of the following: legal requirement; knowledge of safety issues related to providing tree care; knowledge about issues that affect urban tree health including environmental stresses and forest pests and diseases; an understanding of trees growing in urban environments; and techniques used for proper tree maintenance. (1 pt - 0.5 pt each)</p> <p>2) Any 2 of the following: complete approved training course, have sufficient liability insurance coverage, submit an Arborist Licence Application to the to Province, pay application fee (2 pts - 0.5 pt each)</p> <p>3) 3 years (0.5 pt)</p> <p>4) Manitoba Arborist Training and Examination Program, International Society of Arboriculture (I.S.A) Certificate (1 pt - 0.5 pt each)</p> <p>5) University of Manitoba (0.5 pt)</p>
Reference to student material	1) - 5) Urban Forestry/DED: Licensing of Arborists
Additional information	
Directions for attendant	

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Team #

**STOP #**

**(Wildlife)**

5

Match each species of bird to its corresponding group by writing its letter in the blank by the group. (5 pts -1 pt each)

GROUP

\_\_\_\_ Diving Birds

\_\_\_\_ Birds of Prey

\_\_\_\_ Waterfowl

\_\_\_\_ Songbirds

\_\_\_\_ Shorebirds

SPECIES

a) Northern Harrier

b) Black-capped Chickadee

c) Snow Goose

d) Piping Plover

e) Pied-billed Grebe

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Team #
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Wildlife

Table required?	(No)
Supervisor required?	(No)
Local feature required?	
Description of local feature	
Hands on question?	
List of equipment, props, and/or samples	
Answer to question	e, a, c, b, d (5 pts - 1 pt each)
Reference to student material	Birds of Manitoba, p 7, 17, 11, 33, 24
Additional information	
Directions for attendant	

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Team #

**STOP #**

**(Wildlife)**

**(This question requires materials provided at the stop)**

5

1) Look at the fur labelled W-A.

a) Identify this fur. (1 pt)

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b) List two (2) characteristics or behaviours this animal possesses that make it well-suited to living in urban habitats. (1 pt)

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c) State one (1) thing humans can do to reduce problems with this animal in urban settings. (0.5 pt)

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2) Look at the fur labelled W-B.

a) Identify this fur. (1 pt)

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b) List two (2) features of urban habitats that are well-suited to this animal. (1 pt)

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c) State (1) thing humans can do to reduce problems with this animal in urban settings. (0.5 pt)

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2015 Manitoba Envirothon  
Regional Trail Test

Team #

Wildlife

Table required?	(Yes)
Supervisor required?	(Yes)
Local feature required?	
Description of local feature	
Hands on question?	This question requires materials provided at the stop
List of equipment, props, and/or samples	Fur labelled W-A Fur labelled W-B
Answer to question	1a) Raccoon (1 pt) 1b) Any 2 of the following: Camouflage colouring; extremely adaptable; comfortable around humans; others as appropriate. (1 pt - 0.5 pt each) 1c) Any 1 of the following: Block access to chimneys or attics, cover fish ponds with metal mesh, do not feed, or others as appropriate. (0.5 pts) 2a) White-tailed Deer (1 pt) 2b) Any 2 of the following: Abundant food; shelter; protection from natural predators; others as appropriate (1 pt - 0.5 pt each) 2c) Any 1 of the following: do not feed deer, using fencing and repellents or others as appropriate (0.5 pt)
Reference to student material	1a) Fur Identification; Training 1b) Wildlife, p 39 1c) Wildlife, p 39 2a) Training 2b) Wildlife, p 38 2c) Wildlife, p 38
Additional information	Site requires table to set furs on and cover for furs in case of wet weather. Provide a tent if possible, or large sheet of plastic.
Directions for attendant	(Make sure to keep furs clean and dry. Keep furs on the table and cover if wet weather.)

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Regional Trail Test

Team #
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**STOP #**

**(Wildlife)**

**(This question requires materials provided at the stop)**

5

You are a scientist who is studying a closed population of mice in an urban park. Your goal is to estimate the size of this entire population. To do this, your team has caught individuals using Sherman live-traps, marked these individuals and released them. In the first night of trapping (Survey 1), 20 individuals were trapped and marked. You reset the traps and wait for the second night results (Survey 2).

The jar of beans in front of you represents this closed population of mice. Each bean represents an 'individual' mouse; beans with a dot represent 'marked individuals.' Shake container and remove 12 'individuals' (i.e. beans). Record your results below and put the beans back into the container and repeat this process a second time.

1) Record the number of 'marked individuals' (beans with dot) below: (1 pt - 0.5 pt each)

Trial #1: \_\_\_\_\_

Trial #2: \_\_\_\_\_

2) Using the Petersen method (i.e.  $N = MC / R$ ), calculate the estimated population size (N) for each trial. Record the results below.

Show your work. (2 pts - 1 pt each)

Trial #1:

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Trial #2:

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3) Calculate the average estimated population size (N) of voles present in the park based on the results of the previous question. (1 pt)

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4) In this case, a mark-recapture process was utilized to estimate population size. In the view of a scientist, what is one advantage of this process as compared to a complete census of the same population? (1 pt)

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2015 Manitoba Envirothon  
Regional Trail Test

Team #

Wildlife

Table required?	(Yes)
Supervisor required?	(Yes)
Local feature required?	
Description of local feature	
Hands on question?	This question requires materials provided at the stop
List of equipment, props, and/or samples	40 beans in container, with 20 marked with a dot Calculator
Answer to question	1) Results of both trials recorded (max number = 12) (1 pt - 0.5 pt each) 2) M = marked individuals = 20, C = number of individuals sampled in survey = 12, R = number of recaptured individuals (will vary sample to sample) (2 pts - 1 pt for each trial - 0.5 pt formula work shown, 0.5 pt correct answer) If R = 1, $N = (20)(12)/(1) = 240$ ; R = 2 then N = 120; R = 3 then N = 80; R = 4 then N = 60; if R = 5 then N = 48; R = 6 then N = 40; R = 7 then N = 34; R = 8 then N = 30; R = 9 then N = 27; R = 10 then N = 24; R = 11 then N = 22; R = 12 then N = 20 3) $(N \text{ from Trial \#1} + N \text{ from Trial \#2}) / 2$ (1 pt) 4) Any 1 of the following: Complete census is difficult to complete due to the amount of work involved; Difficult to identify if all organisms have been counted in a complete census; Complete census takes too long; Mark-recapture estimates population size, counting every individual not necessary (1 pt)
Reference to student material	1) Wildlife, p 49-51 2) Wildlife, p 49-51 3) Wildlife, p 49-51 4) Wildlife, p 48
Additional information	
Directions for attendant	(All beans must be in container once teams leaves.)



2015 Manitoba Envirothon  
Regional Trail Test

Team #
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**STOP #**

**(Wildlife)**

5
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1) List two (2) possible hosts of the rabies virus. (1 pt - 0.5 pts each)

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2) How is the rabies virus transmitted between hosts? (1 pt)

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3) Define ZOONOSIS. (1 pt)

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4) You are a wildlife manager working for a large city with a rabies outbreak. Using your knowledge about how the rabies virus is spread between hosts, make a recommendation to city council about possible treatment or control options that will prevent the spread of rabies. Explain why you chose that option. Your recommendation must be practical and cost effective in order to be considered by city council. (2 pts)

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## 2015 Manitoba Envirothon Regional Trail Test

Team #
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### Wildlife

Table required?	(No)
Supervisor required?	(No)
Local feature required?	
Description of local feature	
Hands on question?	
List of equipment, props, and/or samples	
Answer to question	<p>1) Any 2 of the following: humans , Domestic animals, raccoons, skunk, bats, foxes (1 pt - 0.5 pts each)</p> <p>2) Rabies is transmitted through the saliva or nervous tissue of an infected animal coming into contact with an open wound or mucosal membrane of a suitable host. Usually this is accomplished with a bite. (1 pt)</p> <p>3) A pathogen that can be transmitted to humans from other animals and vice versa. (1 pt)</p> <p>4) Any 1 of the following : reduce the population of suitable hosts (wild and domestic ie. keep pests inside, cull susceptible wildlife), cull infected wildlife, vaccinate domestic hosts, vaccinate wild hosts (food bait with vaccine, live trap and vaccinate). (1 pt)</p> <p>Explanation of their reasoning (1 pt)</p>
Reference to student material	<p>1) Pathogens, Parasites and Disease, p 4</p> <p>2) Pathogens, Parasites and Disease, p 4</p> <p>3) Pathogens, Parasites and Disease, p 1</p> <p>4) Pathogens, Parasites and Disease, p 4</p>
Additional information	
Directions for attendant	