KEY

2015 MANITOBA ENVIROTHON TRAIL TEST
Town of Tuxedo Trail

STOP 1

AQUATIC ECOLOGY (2 pts) – STOP 1

_____
2 pts

A wetland is a reflection of its watershed. Even urban wetlands have watersheds.

1) Which landscape will have the highest inflow of phosphorus into their affiliated wetland? Circle the correct choice. (0.5 pt)

agricultural urban forest

2) One contributor of nutrients to aquatic ecosystems is surface runoff. What is SURFACE RUNOFF? (1 pt)

3) Other than surface runoff, name one factor that could contribute phosphorus to aquatic ecosystems in urban areas. (0.5 pt)

Answer:
1) urban (0.5 pt)
2) some variation of: water that falls on the landscape as precipitation and runs overland into nearby streams and lakes (1 pt)
3) Any 1 of the following: high proportion of impervious surfaces, runoff from agriculture, human effluent, nutrients and pesticides from turf management and gardening, lack of water treatment facilities (0.5 pt)

Reference:
1) Lake Ecology, p 14
2) Aquatic Ecology, p 6
3) Non-Point Source Pollution, p 5

FORESTRY (2 pts) – STOP 1

This question requires materials found at the stop.

_____
2 pts

The Canadian penny has been removed from Canadian currency. Agree with it or not, one forestry argument to support this action might be because a maple characteristic is incorrectly shown on the penny. Look at the penny below, and the Field Guide to the Native Trees of Manitoba.

KEY

1) What is the scientific term for the arrangement of leaves and buds found on maples? (1 pt)

2) Name one (1) species of tree found in Manitoba that has this characteristic but is not a maple. (1 pt)

Answer:
1) opposite branching (1 pt)
2) Green Ash or Black Ash (1 pt)
Partial marks: only "Ash" (0.5 pt)

Reference:
1) Field Guide to the Native Trees of Manitoba, p 13
2) Field Guide to the Native Trees of Manitoba, p 34 -35, 38-39

SOILS AND LAND USE (2 pts) – STOP 1

This question requires features found at the stop.

1) There are five soil forming factors. List two (2) of them. (1 pt)

2) Pick one (1) soil forming factor that YOU DID NOT list above. Give an example of how it is different at this stop than it would be in a place where a soil is naturally formed. (1 pt)

_____
2 pts

KEY

Answer:
1) Any 2 of the following: parent material, topography/relief, climate, organisms and time (1 pt – 0.5 pt each)
2) Any OTHER 1 of the above (Selection MUST BE unique from part 1) (0.5 pt)
Any 1 of the following corresponding with the choice for 2), or any other reasonable answer as judged by a soil expert (0.5 pt)
PARENT MATERIAL – as a city park development this parent material may have been taken from the place of its original deposition; OR original parent material is mixed with whatever developed soil was overlying it
TOPOGRAPHY/RELIEF – may be modified from original topography (a built up hill instead of flat); OR topography is man-made
CLIMATE – one example of difference in climate in city versus in rural location: temperature, water regime, snow cover and residence time, freeze-thaw, etc.
ORGANISMS – one example of difference in organic interaction: plants, soil micro-organisms, surface bacteria/algae/lichens, biomass production and incorporation into organic matter, presence of exotic species, different small and large animals (dogs, ground squirrels, mice, insects, ants, earthworms, etc) trees in a location where it might be grass naturally
TIME – soils may be much younger than what you would find in most places in Manitoba

Reference:
Soils and Land Use Document, p 12-14

THEME (10 pts) – STOP 1

This question requires features found at the stop.

1) *Indicate whether the statement is true (T) or false (F) by circling the correct answer*. (0.5 pt)

_____
10 pts

T F As the urban forestry is largely managed at the municipal level, it is the municipalities who enact and enforce legislation regarding trees on both municipal and private land.

2) *Which of the following is correct? Circle the best response*. (0.5 pt)

Tree cutting bylaws often include provisions for :

a) Protection of trees during construction activities, hydro utility practices, and damaging practices by residents
b) Protection of heritage trees
c) Building envelope placement, tree preservation plans, permits, replacement trees
d) All of the above

3) *Fill in the blank with the most appropriate words.* (2 pts)

Conservation of trees in the urban environment can only be achieved effectively through the development and implementation of a _____ _____ that standardizes policies and practices surrounding activities related to trees.

4) List two (2) water issues that healthy urban forests can improve. (2 pts)

5) *Indicate whether the statement is true (T) or false (F) by circling the correct answer*. (1 pt - 0.5 pt each)

T F Trees reduce temperatures and mitigate the heat-island effect through evapotranspiration.
T F Trees remove air pollutants by trapping particulate matter in their leaves, needles and bark.

6) Urban forest managers want to ensure that urban woodlots and parks are aesthetically appealing and provide human recreation opportunities while also protecting wildlife habitat and soil and water quality. Briefly describe two (2) strategies they use to achieve these goals. (2 pt)

7) List two (2) elements often found in a municipality's forest plan. (2 pts)

Answer:
1) T (0.5 pt)
2) d) (0.5 pt)
3) Any 2 of the following: Planning, maintenance and protection of trees and how these are linked to the municipalities' Official Plan; Detailing of responsibilities in Parks, Public Works; Bylaw Control and Advisory Committees of the municipality; Details of tree inventory, standards for planting, and pruning, pest control, protection during construction, and what operations the municipality is responsible for; Private tree issues, education and regulation; A plan that encompasses a long-term vision with short-term goals is necessary for the conservation and management of urban trees (2 pts - 1 pt each)
4) Any 2 of the following: the quantity of storm water flows; soil erosion; stream sedimentation; helps improve the quality of storm water runoff through absorption (2 pts - 1 pt each)
5) T, T (1 pt - 0.5 pt each)
6) Any 2 of the following: restricting traffic to specific roads and trails to reduce compaction; establishing buffer strips to reduce compaction; controlling invasive species to protect native species; monitoring; removing hazardous trees to protect recreational users; pruning to improve sight lines; others as appropriate. (2 pts - 1 pt each)
7) strategic urban forest management plan (2 pts)
Partial marks: management plan (1 pt)

Reference:
1)-2) Compendium of Best Urban Forest Management Practices: Enabling Legislation...

KEY

3) Compendium of Best Urban Forest Management Practices: Strategic and Operational...
4) Compendium of Best Urban Forest Management Practices: Stormwater...
5) Compendium of Best Urban Forest Management Practices: Air Quality...
6) Compendium of Best Urban Forest Management Practices: Mngt of Urban Woodlots...
7) Compendium of Best Urban Forest Management Practices: Strategic and Operational...

WILDLIFE (2 pts) – STOP 1

_____
2 pts

1) Based on the following descriptions of fictional species, classify each wildlife population with an International Union for Conservation of Nature (IUCN) Red List category. (1.5 pts – 0.5 pt each)

a) The population of Horned Newts in northern Manitoba has declined by 30% in the last 20 years, possibly due to climate change. The total population size for northern Manitoba is now estimated at 22,000 individuals. Populations of Horned Newts in neighboring areas are stable to increasing as are global population estimates of this circum-boreal species.

b) A hunter claims to have seen an Ebony-billed Woodpecker in a freshwater swamp in eastern Louisiana (outside of their former range). The known worldwide population of Ebony-billed Woodpeckers live in three zoos in California. A detailed bird survey was done on saltwater marshes along the California coast (inside their former range) last year and no Ebony-billed Woodpeckers were observed.

c) The population of Asian Moose is restricted to a single mountain range in western China. Due to habitat destruction the population has declined from 5,400 individuals in 2001 to less than 500 individuals in 2010. This species faces an extremely high risk of becoming extinct.

2) Name a mammal species in Manitoba that is classified on the IUCN Red List in a category above Least Concern (0.5 pt)

Answer:
1a) Near Threatened or Least Concern (0.5 pt)
1b) Extinct in the Wild (0.5 pt)
1c) Critically Endangered or Endangered (0.5 pt)
2) Any 1 of the following: Polar Bear, Ursus maritimus, Beluga Whale, Delphinapterus leucas, Bison, American Bison, Bison bison, Plains Bison, Bison bison bison, Wood Bison or Bison bison athabascae (0.5 pt)

Reference:
1) Wildlife Document, p 41-42
2) Mammals of Manitoba, p 25-27, p 48-51

KEY

STOP 2

AQUATIC ECOLOGY (2 pts) – STOP 2

_____
2 pts

1) *Which of the following is correct? Circle the best response*. (1 pt)

These three aquatic species are ALL considered invasive species in Manitoba:

a) Flowering Rush, Chestnut Lamprey, Northern Caddisfly
b) Chestnut Lamprey, Zebra Mussel, Purple Loosestrife
c) Zebra Mussel, Rainbow Smelt, Purple Loosestrife
d) Narrow-leaved Cattail, Northern Caddisfly, Common Carp

2) List two (2) things that you can do to prevent the introduction and spread of aquatic invasive species. (1 pt)

Answer:
1) c) (1 pt)
2) Any 2 of the following: never transport aquatic plants or animals from one water body to another; never release live fish (such as goldfish) into a natural water body; wash and dry your boat and fishing equipment before transporting them to another water body; learn to recognize invasive species and report sightings to the appropriate authorities (1 pt - 0.5 pt each).
Partial Marks: wash and dry boat/equipment as two separate answers (0.5 pt)

Reference:
1)-2) Aquatic Invasive Species in Manitoba, p 1-2

FORESTRY (2 pts) – STOP 2

This question requires both materials and features found at the stop.

_____
2 pts

1) What species is the tree labelled F-A? Give the full common or scientific name. (1 pt)

2) Look at the samples labelled F-B. List two (2) signs of infestation with emerald ash borer that are visible in the samples. (1 pt)

Answer:
1) green ash or Fraxinus pennsylvanica (1 pt)
Partial marks: ash or Fraxinus (0.5 pt)
2) Any 2 of the following: D-shaped exit holes, serpentine galleries, galleries (1 pt - 0.5 pt each)

KEY

Reference:
1) Field Guide to the Native Trees of Manitoba, p 38, 40
2) Don't Move Firewood – Federal: Emerald Ash Borer: How to identify: Signs and symptoms

SOILS AND LAND USE (10 pts) – STOP 2

This question requires materials found at the stop.

_____
10 pts

1) What is a soil survey? (1 pt)

2) You are provided a soil map, Survey of Winnipeg Area in Manitoba, showing the larger Winnipeg region.

a) What type of soil survey map is it? (1 pt)

b) Provide a reason for your answer. (i.e., How do you know?) (1 pt)

3) There is a polygon delineated in red on the map.

a) Which soil order covers the majority of the polygon? Give the full name. (1 pt)

i) What is the most likely parent material for this soil? (1 pt)

ii) Provide a reason for your answer. (1 pt)

b) What is the other soil order in the polygon? Give the full name. (1 pt)

i) What is the mode of deposition for this soil? (1 pt)

ii) Describe that mode of deposition. (1 pt)

c) *Which of the following is correct? Circle the best response*. (1 pt)

Which of the following is/are not found in the polygon?

i) Stony areas
ii) Marsh
iii) Spruce Swamp
iv) All of the above
v) None of the above

Answer:
1) inventory of the properties of the soil (0.5 pt) and their spatial distribution over a landscape (0.5 pt)

KEY

2a) reconnaissance (1 pt)
2b) the scale: 1:126,720 (1 pt)
3a) Fort Garry Clay (1 pt)
3ai) limestone (1 pt)
3aii) calcium carbonates are derived from fragments of limestone (1 pt)
3b) St Norbert Clay (1 pt)
3bi) lacustrine (1 pt)
3bii) lake deposited material (1 pt)
3c) iv) - all of the above (1 pt)

Reference:
1) Soil Management Guide, p 25
2) Soil Management Guide, p 28
3a) map provided; Soil Management Guide, p 16
b) map provided; Soil Management Guide p, 8
c) map provided

THEME (2 pts) – STOP 2

1) List two (2) ways construction activities can damage trees. (1 pt)

2) List two (2) tree protection techniques to minimize damage to trees during construction. (1 pt)

_____
2 pts

Answer:
1) Any 2 of the following: trunk and crown damage, direct and indirect root damage, changes in exposure, root cutting, branch abrasions, trunk fractures (1 pt - 0.5 pt each)
2) Any 2 of the following: prevention, organize beforehand/site plan, minimize land disturbance, trench before clearing and grading along limits of disturbance, account for underground utilities, adapt to pavement, install protective tree fencing around critical root zone, mulch in the critical root zone, insure quality of fill material, prune branches for vehicle clearance, maintain trees/health, restore site (1 pt - 0.5 pt each)

Reference:
1) Urban Forestry Manual: Trees and Construction: How Construction Activities Impact Trees; Compendium of Best Urban Forest Management Practices: Tree Protection During Construction/Trees and Building Foundations
2) Urban Forestry Manual: Trees and Construction: Protecting Trees Before, During, and After Construction: Tree Protection Techniques

KEY

WILDLIFE (2 pts) – STOP 2

This question requires materials found at the stop.

Listen to the wildlife calls on the iPod. Identify the species whose calls were played. (2 pts – 0.5 pt each)

_____
2 pts

W-A _____

W-B _____

W-C _____

W-D _____

Answer:
W-A: Barred Owl or Strix varia (0.5 pt)
W-B: Leopard Frog or Rana pipiens (0.5 pt)
W-C: Blue Jay or Cyanocitta cristata (0.5 pt)
W-D: Red Squirrel or Tamiasciurus (0.5 pt)

Reference:
Wildlife Calls

STOP 3

AQUATIC ECOLOGY (10 pts) – STOP 3

This question requires both materials and features found at the stop.

1) *Fill in the blanks with the most appropriate terms. Blanks may contain more than one word*. (3.5 pts - 0.5 pt each)

_____
10 pts

The Prairie Pothole Region expands over a large area of the United States and Canada. This region has thousands of depressions, called potholes or sloughs which are classified as a _____ type of wetland. The wetland ecosystem has many beneficial functions such as _____, _____ and _____. Although the benefits are vast, these ecosystems have been vanishing from our Manitoba landscape. An international program called _____ is in place in Manitoba, and aims to protect remaining wetlands in Canada, the United States and Mexico. Programs such as this aim to alleviate some of the stresses commonly placed on wetlands such as_____ and _____.

KEY

2) Look at diagram labelled A-A (a simplified food and energy web). Give one (1) example of an organism for each of the following levels in a wetland. (4 pts - 1 pt each)

a) Primary producer

b) Primary consumer

c) Secondary consumer

d) Tertiary consumer

3) Look at the aquatic ecosystem in front/around you.

a) List one (1) primary producer you see present. (0.5 pt)

b) List two (2) defining characteristics of a wetland. (2 pts)

Answer:
1) shallow open water; any 3 of the following: water filtration, habitat, spawning area, erosion control, flood control, source of oxygen and water, nutrient sink, recreational activities, aesthetics; the North American Waterfowl Management Plan; any 2 of the following: dredging, filling, draining, invasive species, runoff from upstream agricultural practices, sewage treatment plants and industrial sources which can cause loading of nutrients, sediments and toxic chemicals in downstream wetlands. (3.5 pts - 0.5 pt each)
2a) Any 1 of the following: algae, duck weed, cattails, reeds, rushes (1 pt)
2b) Any 1 of the following: invertebrates, zooplankton (1 pt)
2c) Any 1 of the following: frog, salamander, fish, goose, plant-eating duck (1 pt)
2d) Any 1 of the following: pelican, waterfowl, fish-eating duck, fish, heron (1 pt)
3a) Any 1 of the following: cattails, bulrushes, sedges, duck weed etc. (0.5 pt)
3b) Any 2 of: seasonally or permanently covered by shallow water, hydric soils from the presence of abundant water, hydrophytic or water-tolerant plants (2 pts - 1 pt each)

Reference:
1) Aquatic Ecology Document, p 20-26
2) Lake Ecology, p 21, 24
3a) Lake Ecology, p 26
3b) Aquatic Ecology Document, p 20

FORESTRY (2 pts) – STOP 3

List two (2) reasons why elm wood should not be improperly stored or transported in Manitoba? (2 pts)

_____
2 pts

KEY

Answer:
Any 2 of the following: Stored wood is a breeding ground for elm bark beetles; Dutch elm disease is a fungus/disease carried by elm bark beetles; Stored elm wood spreads Dutch elm disease by breeding elm bark beetles; It is illegal to store or transport elm wood (2 pts - 1 pt each)

Reference:
Don't Move Firewood - Provincial: Dutch Elm Disease and Urban Foresty: Dutch Elm Disease Management in Manitoba

SOILS AND LAND USE (2 pts) – STOP 3

_____
2 pts

The Provincial Land Use Regulations, under the Provincial Planning Act, designate how agricultural lands can be divided or developed for use within a municipality. Both Prime and Viable agricultural lands are protected from non-agricultural uses in areas of the province that are designated for agricultural use.

1) Which three (3) soil classes in the Canada Land Inventory Soil Capability Classification for Agriculture are included in the Prime definition for land use purposes? (1pt)

2) Which three (3) classes in the Canada Land Inventory Soil Capability Classification for Agriculture are included in the Viable definition for land use purposes? (1 pt)

Answer:
1) Classes 1, 2, & 3 (1 pt)
Partial marks: 0.5 pt - any 1 or 2 of the above
2) Classes 4, 5, & 6 (1 pt)
Partial marks: 0.5 pt - any 1 or 2 of the above

Reference:
1) Soil Management Guide, p 112
2) Soil Management Guide, p 112

THEME (2 pts) – STOP 3

List two (2) ways that trees improve air quality? (2 pts)

_____
2 pts

KEY

Answer:
Any 2 of the following: filter the air by removing dust and other particulates; absorb carbon dioxide during photosynthesis; absorb air pollutants (such as ozone, carbon monoxide and sulfur dioxide); release oxygen (2 pts - 1 pt each)

Reference:
NCF Envirothon Theme Documents: Benefits of Trees – International Society of Arboriculture

WILDLIFE (2 pts) – STOP 3

An urban park department in the city of Winnipeg decides to expand their parking lot by draining and paving over a small section of wetland as well as surrounding upland habitat. For each of the four basic habitat needs, briefly describe one (1) direct negative impact of this habitat destruction on a nesting pair of Canada geese. (2 pts - 0.5 pt each)

_____
2 pts

FOOD

WATER

SPACE

COVER

Answer:
FOOD: removal of food sources (seeds and grasses) for parents (0.5 pt)
WATER: draining of water removes source of drinking water (0.5 pt)
SPACE: Either of the following: overcrowding for nesting sites, increased competition (0.5 pt)
COVER: removal of vegetation for nesting and/or raising of young (0.5 pt)

Reference:
Wildlife, p 6-7; Birds of Manitoba, p 12

STOP 4

AQUATIC ECOLOGY (2 pts) – STOP 4

1) What is WATER CONSERVATION? (0.5 pt)

2) Why is water conservation important? (0.5 pt)

_____
2 pts

KEY

3) *Which of the following statements is correct? Circle the best response.* (0.5 pt)

Conserving water will NOT:

a) Reduce pollution
b) Increase health risks
c) Lower water costs
d) Extend the life of waste treatment facilities

4) State one (1) way to conserve water in your home. (0.5 pt)

Answer:
1) Water Conservation is using water more efficiently or reducing where appropriate (0.5 pt)
2) To protect the resource now, and for the future (0.5 pt)
3) b) (0.5 pt)
4) Any 1 of the following: repair leaks, flush less, replace old toilets with water efficient models, install toilet dams (or equivalent), reduce shower time, rinse veggies in basins instead of running water, wash only full loads of dishes and/or laundry, collect rainwater for watering lawn, install greywater reuse system (0.5 pt)

Reference:
1)-3) Water Conservation, p 1
4) Water Conservation, p 9-14

FORESTRY (2 pts) – STOP 4

This question requires features found at the stop.

_____
2 pts

Which of the following is correct? Circle the best response. (2 pts - 1 pt each)

1) Which native tree species is fire adapted to send out sprouts from stumps and roots of dead trees after a forest fire?

a) Aspen
b) White spruce
c) Bur oak
d) European buckthorn

2) Stand-replacing fires are beneficial to the boreal forest. Once a fire starts, it will continue to burn only if the 3 elements of the fire triangle are met. What are the 3 elements that make up the fire triangle?

a) Heat, jack pine and resin
b) Heat, carbon dioxide, vegetation

KEY

c) Carbon monoxide, trees and fungi
d) Heat, oxygen and fuel

Answer:
1) a (1 pt)
2) d (1 pt)

Reference:
1) Forest Fire Ecology
2) Forest Fire Behavior

SOILS AND LAND USE (10 pts) – STOP 4

This question requires materials found at the stop.

_____
10 pts

Manure is an important source of fertilizer for agricultural fields. However, there are some limitations to its use. Farmers calculate an appropriate application rate based on the nutrient content of the manure and soil and the type of crop being fertilized. They may need to adjust the rate given the exact situation.

1) Fill out the Liquid Manure Application Rate Worksheet, labelled S-A, using the Manure Test Data Report and Table 2: Volatilization Losses. A copy of the worksheet will be provided at the stop. Include it when you hand in your test at the end of the trail. (8 pts)

2) One of the limitations of using manure is achieving the correct balance between amounts of P and N applied.

a) If the manure is applied at the rate based on N requirements, what is the consequence to P application? (0.5 pt)

b) What is an environmental consequence of this situation? (0.5 pt)

c) If the manure is applied at the rate based on P removal, what is the consequence to N application? (0.5 pt)

d) Provide a solution to this situation. (0.5 pt)

Answer:
1) B2: 27.0 (0.5 pt); E: 10.0 (0.5 pt); G: 19.3 (0.5 pt); H: 25% (0.5 pt); I: 11.9 (0.5 pt); J: 2.5 (0.5 pt); K: 14.4 (0.5 pt); L: 14.4 (0.5 pt); M: 12.0 (0.5 pt); N: 6666.7 (0.5 pt); O: 128.7 (0.5 pt); P: 101.7 (0.5 pt); Q: 1399.0 (0.5 pt); R: 16.8 (0.5 pt); S: -63.2 (0.5 pt)
2a) P is over applied (0.5 pt)
2b) eutrophication (0.5 pt)

KEY

2c) N is under applied (0.5 pt)
2d) Apply N inorganic fertilizer to make up the shortfall (0.5 pt)

Reference:
1) provided worksheet
2a) answer from calculation
2b) Soil Management Guide, p 53
2c) answer from calculation
2d) Soils and Land Use document, p 32

THEME (2 pts) – STOP 4

This question requires features found at the stop.

_____
2 pts

Note the tree labelled T-A.

Indicate whether each statement is true (T) or false (F) by circling the correct answer. (2 pts – 1 pt each)

T F The invasive shrub/tree, European buckthorn, utilizes a longer growing season than its native counterparts and alters nutrient cycling dynamics within a forest giving it a competitive advantage over many native species.

T F European buckthorn can be identified by its horizontal, light colored pores on its bark, thorns, oval shaped leaves with veins curving towards the tip and purplish berries observed in late-summer.

Answer:
T, T (2 pts - 1 pt each)

Reference:
Invasive Pest BMP Study Case, p 1, 3

WILDLIFE (2 pts) – STOP 4

_____
2 pts

1) What defines PROBLEM WILDLIFE? (1 pt)

2) Name one (1) species of wildlife that is a problem in urban or community forests. State one (1) reason that species can be a problem in these forests. (1 pt)

KEY

Answer:
1) Wildlife species that can be potentially dangerous or can cause problems when they share areas with human populations (1 pt)
2) Any 1 of the following species (0.5 pt), any 1 of the corresponding reasons (0.5 pt):
WHITE TAILED DEER: property damage, accidents on surrounding roadways, transmission of pathogens to people / other animals
utilizing these spaces
RACCOON: creating dens in surrounding areas, property damage, getting into garbage, transmission of pathogens through fluids or
contact with feces
COYOTE: property damage, potential physical injury to people or pets, transmission of pathogens

Reference:
1)-2) Wildlife Document, p 36-38

STOP 5

AQUATIC ECOLOGY (2 pts) – STOP 5

This question requires materials found at the stop.

_____
2 pts

Aquatic researchers have developed many sampling devices for acquiring samples from various habitats within aquatic ecosystems. On display at this stop are three different devices designed to sample in various lake habitats. Each device is identified with a coded tag. Examine these devices and answer the following:

For each of the lake ecosystem sampling requirements listed below, write the identification code (A-A, A-B, or A-C) for the sampler that could best be used to obtain the required sample in the space provided. (2 pts - 0.5 pt each)

1) microscopic algae in the pelagic zone _____

2) invertebrates in the profundal sediments _____

3) nutrient concentrations in the hypolimnetic zone _____

4) microscopic invertebrates in the pelagic zone _____

Answer:
1) A-A Van Dorn bottle (0.5 pt)
2) A-B Ekman dredge (0.5 pt)
3) A-A Van Dorn bottle (0.5 pt)

KEY

4) A-C plankton tow net (0.5 pt)

Reference:
1)-4) Aquatic Sampling, p 2-5

FORESTRY (10 pts) – STOP 5

This question requires both materials and features found at the stop.

_____
10 pts

1) Using the equipment provided, measure the trees marked F-A and F-B at this stop. Record the information below. (8 pts - 2 pts each)

Tree F-A: Diameter _____ cm

Height _____ m

Tree F-B: Diameter _____ cm

Height _____ m

2) The sample labelled F-C is found growing on trees. You may see other examples in the forest around you.

a) What term is commonly used for the Sample F-C? (1 pt)

b) What kind of organism and structure is it? (0.5 pt)

c) What does it tell you about a tree that it is found on? (0.5 pt)

Answer:
1) F-A: diameter TBD, height TBD
Partial marks:
F-B: diameter TBD, height TBD
Partial marks:
2a) Conk (1 Pt)
2b) fungal fruiting body (0.5 pt)
2c) diseased or unhealthy (0.5 pt)

Reference:
1) Forestry Equipment Techniques, p 2-3; Provincial Training
2) Provincial Training

KEY

SOILS AND LAND USE (2 pts) – STOP 5

_____
2 pts

1) Nutrients that are required by plants in large amounts, such as phosphorus, are called _____ (0.5 pt)

2) Which type of soils is superior in terms of nutrient retention and delivery? Circle the correct choice. (0.5 pt)

silt soils clay soils

3) Certain nutrients are introduced into a soil through organic matter rather than the weathering of minerals. If an organic farmer wishes to increase nitrogen content in his soil through crop rotation, what feature must he or she look for in the crop that is intended to increase soil nitrogen? (1 pt)

Answer:
1) Macronutrients (0.5 pt)
2) Clay (0.5 pt)
3) Nitrogen-fixing bacteria in root nodules (1 pt)
Partial marks: 0.5 pt - nitrogen-fixing only

Reference:
1) Soils & Land Use Document, p 32
2) Soils & Land Use Document, p 32
3) Soils & Land Use Document, p 32

THEME (2 pts) – STOP 5

_____
2 pts

1) Name two (2) animals that live in Assiniboine Forest. (1 pt)

2) Why are trees important to urban wildlife? (0.5 pt)

3) Briefly describe one (1) reason why an area like Assiniboine Forest is important to wildlife. (0.5 pt)

Answer:
1) Deer, ground squirrel, wood pecker, squirrel, beaver, waterfowl, shorebirds, song birds
2) Provide habitat, shelter and food (.05 pts)
3) Any 1 of the following: all components of habitat are located within the forest; will minimize animals on roadways and in yards therefore increasing safety for animals and the public; increase species diversity (0.5 pts)

KEY

Reference:
1) Provincial Training; Observation
2)-3) NFC Envirothon Theme Documents: The Benefit of Urban Trees

WILDLIFE (2 pts) – STOP 5

This question requires materials found at the stop.

Using the field guides and binoculars provided, identify the four wildlife species labelled W-A, W-B, W-C, and W-D. (2 pts - 0.5 pts each)

_____
2 pts

W-A _____

W-B _____

W-C _____

W-D _____

Answer:
W-A: TBD (0.5 pt)
W-B: TBD (0.5 pt)
W-C: TBD (0.5 pt)
W-D: TBD (0.5 pt)

Reference:
Mammals of Manitoba, p TBD; Birds of Manitoba, p TBD

STOP 6

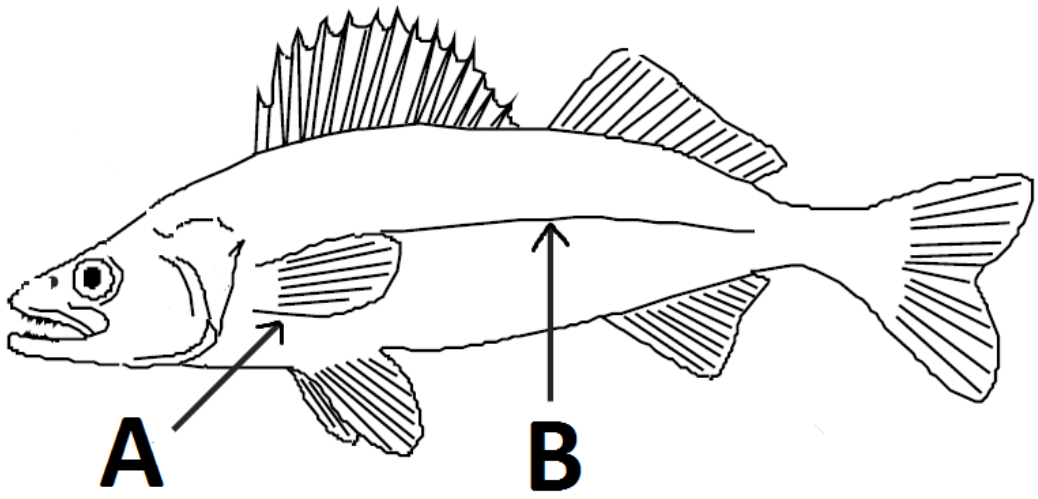
AQUATIC ECOLOGY (2 pts) – STOP 6

This question requires materials found at the stop.

1) Name the anatomical structures labeled A and B in the diagram below. (1 pt – 0.5 pt each).

_____
2 pts

KEY



A _____

B _____

2) Look at the mouths of the fish in the photos labelled A-A. Based on the physical characteristics you see in the photos, do you think these fish are piscivorous or planktivorous? (1 pt).

Answer:
1) A: pectoral fin; B: lateral line (1 pt – 0.5 pt each)
2) piscivorous (1 pt)

Reference:
1) Key to MB Sport Fish
2) Lake Ecology, p 21

FORESTRY (2 pts) – STOP 6

1) List two (2) ways to slow the spread of Dutch elm disease. (1 pt)

2) List two (2) symptoms of Dutch elm disease. (1 pt)

_____
2 pts

Answer:
1) Any 2 of the following: sanitation (remove and destroy infected trees/firewood), basal spraying for bark beetles, root injections of fungicide, surveillance, keep elm trees healthy, prune dead branches out of healthy trees (1 pt - 0.5 pt each)

2) Any 2 of the following: small leaves in spring that fall off, wilting of leaves, wilting leaves that turn yellow (flagging), leaves turn brown, premature leaf drop, brown leaves stay on tree into winter, coffee coloured stain under bark (1 pt - 0.5 pt each)

Reference:
1) Urban Forestry\DED: Forestry Branch: Dutch Elm Disease FAQs, Prevention and Control of Dutch elm disease
2) Urban Forestry\DED: Forestry Branch: Dutch Elm Disease FAQs: Dutch Elm Disease

SOILS AND LAND USE (2 pts) – STOP 6

This question requires materials found at the stop.

_____
2 pts

You submitted a 460 gram soil sample to a laboratory for particle size analysis and received the following report:

Organic matter	60 grams
Clay	120 grams
Sand	20 grams

What is the texture of the soil? (2 pt)

Answer:
Silty Clay Loam (2 pt)

Reference:
Soils and Land Use Document, p 25-26; Provincial training

THEME (2 pts) – STOP 6

_____
2 pts

1) Urban forests line the banks of each river in Winnipeg. What is this forested zone along the river called? (1 pt)

2) List two (2) benefits of maintaining healthy forests along urban rivers. (1 pt)

KEY

Answer:
1) Riparian zone (1 pt)
Partial marks: buffer zone (0.5 pt)
2) Any 2 of the following: trap sediment, build and maintain stream banks/reduce erosion, store flood water and energy, recharge groundwater, filter water, reduce and dissipate stream energy, maintain biodiversity, create primary productivity (1 pt – 0.5 pt each)

Reference:
1)-2) Assiniboine Park/Assiniboine Park Riparian Forest Best Management Plan, p 1-2

WILDLIFE (10 pts) – STOP 6

This question requires materials found at the stop.

_____
10 pts

Researchers are undertaking a comprehensive life study of local gastropods found within the 2.8 km^2 Assiniboine Park Forest. One genus of slug is known to consume a diet of slime molds and mushrooms. You have been asked to collect data for a population study of this slug and one of its primary food sources using the Quadrat Sampling Method. The sampling site has been set up in the field in front of you.

1) Look at the photos of the slug, labelled W-A, and the mushroom, labelled W-B. Identify the slug and mushroom using the Key to Slug Genera, labelled W-C, and the Guidebook to Mushrooms. (2 pts - 1 pt each)

W-A _____

W-B _____

2) Estimate the size of the population of each species in the Assiniboine Park Forest based on the quadrats in the sampling site. Note that the study is using 1m x 1m sample plots and the total area of the Forest is 2.8 km^2. (4 pts)

W-A

W-B

3) *Indicate whether the following statement is true (T) or false (F) by circling the correct answer*. (1 pt)

T F The larger the quadrant area the more variability is present.

4) What group of birds is a Bal-chatri used to trap? (1 pt)

5) What two (2) groups of vertebrates would a mist net be used to capture? (2 pts)

KEY

Answer:
1) W-A: Oyster Mushroom (1 pt), W-B: Philomycus (1 pt)
2) Average number of organism per quadrat (2 pts - 1 pt each): 3 mushrooms, 6.7 slugs
Estimated population (2 pts - 1 pt): 3 mushrooms/m^2 x 2.8 km2 = 3 mushrooms/m^2 x 2800000 m^2 = 8400000 mushrooms; 6.7 slugs/m^2 x 2.8 km^2 = 6.7 slugs/m^2 x 2800000 m^2 = 18,760,000 slugs
3) F (1 pt)
4) Raptors (1 pt)
5) Bats and Birds (2 pts - 1 pt each)

Reference:
1) Common use of guides and keys
2) Wildlife Document, p 48
3) Wildlife Document, p 49
4) Wildlife Document, p 51
5) Wildlife Document, p 51

STOP 7

AQUATIC ECOLOGY (10 pts) – STOP 7

This question requires materials found at the stop.

_____
10 pts

1) Define the term WATERSHED (also known as a DRAINAGE BASIN). (1 pt)

2) The graph labelled A-A shows the relationship between nutrient concentrations in lakes and the size of the area drained by the lakes. If a lake drains a large area of land, will it likely have low or high nutrient concentrations? (1 pt)

3) Topographic maps are useful tools for studying the landscape around water bodies. Use topographic map A-B to answer the following questions:

a) What are CONTOUR LINES? (1 pt)

b) What is the contour interval of this map? (0.5 pt)

c) What is the approximate elevation of point A? (0.5 pt)

d) When water flows across and landscape, will it typically flow parallel or perpendicular to contour lines? (0.5 pt)

e) If rain falls on point A, will the water flow on top of the ground toward point B, C, or D? (0.5 pt)

KEY

4) Bathymetric maps are like inverse topographic maps: instead of elevation, bathymetric maps show the depth of a water body. The maps labelled A-C show the bathymetry of three lakes. Use these maps to answer the following questions:

a) If we were to cut each lake in half along the dashed lines, the resulting cross-sections of the basins would look like the ones pictured in the diagram labelled A-D (based on the depths of the contour lines for each lake). Match each cross-section with the lake that you think best represents it. (3 pts)

Lake i) _____
Lake ii) _____
Lake iii) _____

b) What is the approximate depth of Lake (ii) at point *? (0.5 pt)

5) *Fill in the blanks with the most appropriate terms*. (1 pt)

Lakes that are primarily fed by groundwater are called _____ lakes, while lakes that are fed by inflowing streams and surface runoff are called _____ lakes.

6) *Which of the following is correct? Circle the best response*. (0.5 pt)

Small streams that flow into larger rivers are called:

a) aquifers
b) tributaries
c) ephemeral streams
d) waterfalls

Answer:
1) some variation of: the area of land that drains into a river or lake (1 pt)
2) high (1 pt)
3a) some variation of: Each contour line on a topographic map represents a ground elevation or vertical distance above a reference point such as sea level, such that all points along any one contour line are at the same elevation. (1 pt)
Partial marks: incomplete definition (0.5 pt)
3b) 10 m (0.5 pt)
3c) ~635 m (accept 631-639 m) (0.5 pt)
3d) perpendicular (0.5 pt)
3e) C (0.5 pt)
4a) lake i) 2; lake ii) 1; lake iii) 3 (3 pts - 1 pt each)
4b) 9.5 m (accept 9.1 to 9.9 m) (0.5 pt)
5) seepage, drainage (1 pt - 0.5 pt each)
6) b) (0.5 pt)

KEY

Reference:
1) Aquatic Ecology Document p 15; Lake Ecology, p 13
2) Lake Ecology, p 13
3a)-3b) How to Read a Topographic Map and Delineate a Watershed, p 1
3c) How to Read a Topographic Map and Delineate a Watershed, p 1-2
3d) How to Read a Topographic Map and Delineate a Watershed, p 2
3e) How to Read a Topographic Map and Delineate a Watershed, p 1-2
4) How to Read a Topographic Map and Delineate a Watershed, p 1 -2
5) Lake Ecology, p 13
6) How to Read a Topographic Map and Delineate a Watershed, p 2

FORESTRY (2 pts) – STOP 7

_____
2 pts

1) *Which of the following is correct? Circle the best response.* (1 pt)

Which of the following are features of a forest certification standard?

a) scientifically supported
b) is based on an open process
c) produces repeatable and consistent independent audits
d) includes continual improvement
e) all of the above

2) Which two (2) forest certification systems are currently being used in Manitoba? (1 pt)

Answer:
1) e (1 pt)
2) CSA or Canadian Standards Association (0.5 pt); SFI or Sustainable Forestry Initiative (0.5)

Reference:
1) Certification and Canada's Forests, p 5
2) Certification and Canada's Forests, p 7; Provincial Training

SOILS AND LAND USE (2 pts) – STOP 7

_____
2 pts

An Integrated Watershed Management Plan (IWMP) is a document that outlines actions to address and and water resource issues on a watershed basis. Soil information is required to determine erosion risks, drainage characteristics, and suitability for agricultural and other types of land uses for the watershed.

KEY

An Environmental farm Plan is a plan for an individual farm to recognize and address the risks of farming practices, with the purpose of increasing environmental sustainability. Planning is very site specific.

1) Which scale for mapping soil information would be suited to an IWMP? Circle the correct choice. (1 pt)

1:125000 1:20000

2) Which scale for mapping soil information would be best suited for an EFP? Circle the correct choice. (1 pt)

1:125000 1:20000

Answer:
1) 1:125000 (1 pt)
2) 1:20000 (1 pt)

Reference:
1) Soil Management Guide, p 28
2) Soil Management Guide, p 28

THEME (2 pts) – STOP 7

This question requires features found at the stop.

Look at the tree labelled T-A, and at the area around it.

_____
2 pts

1) What type of animal made the damage on Tree T-A? (1 pt)

2) What was it most likely looking for? (1 pt)

Answer:
1) Woodpecker (sap sucker and pileated damage visible around forest) (1 pt)
2) Food, either ants or sap (1 pt)

Reference:
1)-2) Provincial Training

KEY

WILDLIFE (2 pts) – STOP 7

_____
2 pts

1) Some insect species are used as a form of biological control.

a) Define BIOLOGICAL CONTROL in terms of invasive species. (0.5 pt)

b) Give one (1) example of an invasive species for which insect biological control is used. (0.5 pt)

2) Colonies of insect pollinators are often moved to economically important agricultural crops through "artificial migrations." What human agricultural practice has made this practice fairly common? (0.5 pt)

3) Give one (1) example of a human use of insects that is NOT related to insect pollination or biological control. (0.5 pt)

Answer:
1a) Biological control involves "introducing the natural enemies of a particular invasive species in a controlled and monitored manner." (0.5 pt)
1b) Any 1 of European corn borer, leafy spurge, purple loosestrife, etc. (0.5 pt)
2) Monoculture, or growing only one type of crop over a large area and for multiple consecutive years (0.5 pt)
3) An example of any 1 of the following: as a food source, for a derived product, in forensic science (0.5 pt)

Reference:
1) Human Use Of Insects, p. 2 - 4
2) Human Use Of Insects, p 4 - 5
3) Human Use Of Insects, p 5 – 7

STOP 8

AQUATIC ECOLOGY (2 pts) – STOP 8

This question requires features found at the stop.

_____
2 pts

1) Identify, by common name, the aquatic plant labelled A-A with flagging tape. (1 pt)

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

T F The plant marked with flagging tape is a submerged plant.

3) The plant that you have identified can tolerate varying water levels. Name one (1) other aquatic plant in Manitoba that is also able to tolerate varying water levels. (0.5 pt)

Answer:
1) Cattail (accept common, narrow or broad leaved), Typha (1 pt)
2) F (0.5 pt)
3) Any 1 of the following emergent plants: Sweetflag, sedges, rushes, Reed Canary Grass, Burreed, Wild Rice, Arrowhead/Duck Potato (0.5 pt)

Reference:
1) Identifying Aquatic Plants, p 64-67
2) Identifying Aquatic Plants, p 12-13
3) Identifying Aquatic Plants, p 20-93

FORESTRY (2 pts) – STOP 8

This question requires materials found at the stop.

Traditional Land Use mapping can be used by Aboriginal people to create a "map biography" that shows the story of peoples' life on that land. Look at the aerial map labelled F-A showing Traditional Land Use information as well as general information. List four (4) features shown on the map that are most likely examples of Traditional Land Use. (2 pts)

_____
2 pts

Answer:
Any 4 of the following: traplines, spawning grounds ,medicinal plants, migration corridor, spiritual significant site, fishing camp (2 pts - 0.5 pt each)

Reference:
Chief Kerry's Moose, Chapter 1, p 2

SOILS AND LAND USE (2 pts) – STOP 8

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

_____
2 pts

T F Soil salinity may be caused by a high water table.
T F Summerfallowing promotes soil salinity.
T F Plants may appear to be moisture deficient when growing in saline conditions.
T F Signs of salinity include lush growth and higher than normal crop yields.

KEY

Answer:
T, T, T, F (2 pt - 0.5 pt each)

Reference:
Salinization, p 1

THEME (10 pts) – STOP 8

_____
10 pts

Which of the following is correct? Circle the best response. (1.5 pts - 0.5 pt each)

1) Urban forests provide ecosystem services including:

a) moderating climate
b) purifying water
c) improving air quality
d) providing wildlife habitat
e) all of the above

2) Urban forests benefit human health in all of the following ways EXCEPT:

a) providing access to nature for disabled individuals
b) reducing populations of disease-carrying mosquitoes
c) improving air quality
d) lowering incidence of cardiovascular disease
e) reducing cases of skin cancer

3) The economic value of Winnipeg's elm trees has been estimated to be:

a) less than $100 million
b) $100-300 million
c) $300-500 million
d) greater than $500 million

4) The extent and location of urban forest ecosystems are constantly changing due to human activity.

a) What is the primary reason for decreases in the extent of urban forest ecosystems? (1 pt)

b) What human activity results in increases in the extent of urban forest ecosystems? (1 pt)

5) Urban residents may value their urban forests for environmental, economic and social reasons. Give one (1) example of each type of value. (1.5 pts - 0.5 ea)

Environmental _____

Economic _____

Social _____

6) *Indicate whether each statement is true (T) or false (F) by circling the correct answer*. (1 pt - 0.5 pt each)

T F Winnipeg is home to the second largest remaining mature elm forest in North America.
T F 50 % of Canadians now live in urban and suburban areas.

7) American elm is an ideal tree for Winnipeg. List two (2) reasons it is well adapted to life in this city. (2 pts)

8) Urban forests include a variety of components. Circle all that apply. (2 pts)

boulevard trees	greenbelt vegetation
school lawns	park trees
trees on private land	soccer fields

Answer:
1) e (0.5 pt)
2) b (0.5 pt)
3) d - $594 million (0.5 pt)
4a) development (1 pt)
4b) restoration (1 pt)
5) Any reasonable example for each category (1.5 pts - 0.5 pt each)
ENVIRONMENTAL:
ECONOMIC:
SOCIAL:
6) F - largest; F - 80% (1 pt - 0.5 pt each)
7) Any 2 of the following: resist road salt, survive extreme winter cold, tolerates heavy soils, tolerates spring flooding (2 pts - 1 pt each)
8) boulevard trees, trees on private land, greenbelt vegetation, park trees (2 pts - 0.5 pt each)

Reference:
1) Local Resident Values: Understanding Local Values Related to the Urban Forest, p 1
2) Local Resident Values: Understanding Local Values Related to the Urban Forest, p 17-20
3) Local Resident Values: Understanding Local Values Related to the Urban Forest, p 10
4) Local Resident Values: Understanding Local Values Related to the Urban Forest, p 1
5) Local Resident Values: Understanding Local Values Related to the Urban Forest, p 15-20
6) Local Resident Values: Understanding Local Values Related to the Urban Forest, p 9, 13
7) Local Resident Values: Understanding Local Values Related to the Urban Forest, p 10
8) Local Resident Values: Understanding Local Values Related to the Urban Forest, p 4

KEY

WILDLIFE (2 pts) – STOP 8

_____
2 pts

Match the species with the most appropriate descriptor. (2 pts - 0.5 pt each)

A We are the largest species of deer and we can be found feeding in swamps and lakes.
B We are highly territorial and we can be active year round. Our diet ranges from plants to hares and eggs. We are also arboreal.
C We live in colonies and become inactive in winter. Our diet consists mainly of insects.
D We have the largest land range of any animal and can come in three distinct colour variations. We acclimate well to human populations.

1) Brown Bat _____
2) Red Squirrel _____
3) Red Fox _____
4) Moose _____

Answer:
1) C (0.5 pt)
2) D (0.5 pt)
3) B (0.5 pt)
4) A (0.5 pt)

Reference:
Mammals of Manitoba, p 4, 10, 16, 24; Wildlife Document, p 59

STOP 9

AQUATIC ECOLOGY (10 pts) – STOP 9

This question requires both materials and features found at the stop.

_____
10 pts

1) Follow the directions for the water quality test below to determine the amount of phosphate present in the Assiniboine Forest wetland.

Directions:
Remove your sunglasses and put on the safety gloves and goggles.
As discussed at on-site training, either obtain a dip sample of water directly from the wetland or from the bucket of water already collected for you.
Follow the instructions on the laminated card labeled Phosphate (reverse side of colour chart).
Wait 5 minutes. CONTINUE WITH QUESTIONS 2) to 6) WHILE WAITING.
Compare the colour of the sample in the test tube to the Phosphate Colour Chart on the reverse side of the laminated instruction card.

Record the result below, in ppm. If the colour of your treated sample is in between colours on the chart, report your result halfway between the numbers on the colour chart.

The amount of phosphate in the water of this wetland is _____ ppm. (2.5 pts)

2) What is the chemical formula for phosphate? (0.5 pt)

3) *Indicate whether the following statement is true (T) or false (F) by circling the correct answer.* (0.5 pt)

T F Phosphate is an organic form of phosphorus

4) Explain why phosphate is/is not organic. (1 pt)

5) Refer to the diagram labeled A-A that shows the Phosphorus Cycle.

a) What makes the phosphorus cycle unique from the nitrogen and carbon cycles? (1 pt)

b) This is an urban wetland with no significant inflowing stream. List two (2) probable sources for much of the phosphorus measured in the water here? (1 pt)

c) *Fill in the blanks with the most appropriate terms.* (1.5 pts)

Look around you and refer to diagram A-A.

The greatest amount of short-term stored phosphorus in this wetland is likely in _____. Long-term storage occurs in _____. Phosphorus moves from short-term to long-term storage by _____.

6) Scientists at the International Institute for Sustainable Development have been conducting nutrient-bioenergy research in the Netley-Libau Marsh, where the Red River enters Lake Winnipeg. Part of this research has investigated the feasibility of regularly harvesting cattails from this large marsh.

a) What term do scientists use for the algal problem currently plaguing Lake Winnipeg during mid to late summer? (0.5 pt)

b) Which nutrient is primarily responsible for causing this condition? (0.5 pt)

c) Briefly explain how harvesting cattails from the Netley - Libau Marsh might help to reduce the amount of this nutrient reaching Lake Winnipeg. (1 pt)

Answer:
1) TBD (2.5 pts)

KEY

Partial marks: TBD
2) P04 (0.5 pt)
3) F (0.5 pt)
4) It is inorganic because it does not contain Carbon (C) (1 pt)
5a) There is no atmospheric/gaseous phase. Can also include –once it enters the aquatic phase it stays there unless physically removed. (1 pt)
5b) Any 2 of: overland flow or runoff, storm drains, parking lot, lawn or garden fertilizer, soil erosion, bird or animal waste. (1 pt - 0.5 pt each)
5c) Cattails, sediment or soils, decomposition. (1.5 pts - 0.5 pt each)
6a) Eutrophication (algal bloom is also acceptable) (0.5 pt)
6b) Phosphorus or phosphate (0.5 pt)
6c) Cattails take up phosphorus, which is released back to the water and mud as they decompose. Removal of the cattails before they decompose would also remove phosphorus and prevent it from moving on into the lake. (1 pt)

Reference:
1) Aquatics training at Provincials – how to use a Water Monitoring Kit module.
2) Nutrient Cycles, p 10
3) Nutrient Cycles, p 10; and Chemical Monitoring, p 49
4) Nutrient Cycles, p 10
5a) Nutrient Cycles p 4, 8, 10; Chemical Monitoring p 49
5b) Aquatic Ecology p 43; Chemical Monitoring, p 49
5c) Observation, extrapolation from image A-A; Nutrient Cycles, p 10,11
6a)-6b) Lake Ecology: Biological, Trophic Status and Eutrophication; Lake Ecology: Chemical, Nutrients; Freshwater Productivity: The Algae
6c) Nutrient Cycles, p 10-11

FORESTRY (2 pts) – STOP 9

1) What is the meaning of the acronym TEK? (1 pt)

2) How have Aboriginal people historically passed TEK from generation to generation? (1 pt)

_____
2 pts

Answer:
1) Traditional Ecological Knowledge (1 pt)
2) TEK passed on through: storytelling, experience, or spiritual practice (1 pt)

Reference:
1)-2) Provincial Training

KEY

SOILS AND LAND USE (2 pts) – STOP 9

_____
2 pts

1) Climate change has the potential to reduce soil moisture. Create a strategy with three (3) actions for a local agricultural producer to use in adapting to reduced soil moisture. (1 pt)

2) Climate change also has the potential to increase the rate of soil erosion. Describe two ways that climate change can affect the rate of soil erosion. (1 pt)

Answer:
1) Any 3 of the following: upgrades to irrigation canals; water storage capacity increased (e.g., snow management); improved irrigation management; crop insurance investment; summerfallow; chemical fallow; zero tillage; minimum tillage; technological improvements to equipment/machinery to reduce water waste (1 pt)
Partial marks: Any 1 or 2 of the above (0.5 pt)
2) Any two of the following: Increased frequency/severity of extreme climatic events can create greater wind/precipitation stresses on soil; Warmer winters can decrease protective snow cover; Increased freeze-thaw cycles can breakdown soil particles; Soil erosion risk is increased if farmer's address drought concerns through increased tillage and summerfallow (1 pt - 0.5 pt)

Reference:
1) Climate Change Impacts and Adaptation: A Canadian Perspective, p 10
2) Climate Change Impacts and Adaptation: A Canadian Perspective, p 7-8

THEME (2 pts) – STOP 9

This question requires features found at the stop.

_____
2 pts

Which of the following is correct? Circle the best response. (2 pts - 1 pt each)

1) High use natural areas such as Assiniboine Forest receive a great deal of pedestrian traffic. Corduroy bridges are sometimes constructed to connect existing pathways bisected by small streams/runoff channels. What is a corduroy bridge?

a) A bridge composed of recycled corduroy pants
b) The use of egg crates stacked neatly to create a bridge topped with woodchips
c) Logs piled snugly lengthwise in the direction of water flow often topped with woodchips
d) A bridge formed by a great deal of downed woody debris in the style of a tipi

KEY

2) Well defined nature trails increase accessibility throughout an urban forest but also benefit forest health by:

a) Reducing dug-outs created by animals by making the area less desirable
b) Allowing increased tree respiration at night
c) Helping get rid of wood waste
d) Reducing soil compaction and trampling of vegetation

Answer:
1) c (1 pt)
2) d (1 pt)

Reference:
1) Assiniboine Park/Assiniboine Park Riparian Forest Best Management Plan, p 38
2) Assiniboine Park/Assiniboine Park Riparian Forest Best Management Plan, p 34

WILDLIFE (2 pts) – STOP 9

This question requires materials found at the stop.

1) Calculate the dental formula for the skull provided. (1 pt)

2) Identify what species the skull belongs to using the dental formula. (1 pt)

_____
2 pts

Answer:
1) I 2/1, C 0/0, P 3/2, M 3/3 (0.5 pt); = 28 (0.5 pt)
2) Lagomorph (Rabbit or Hare)

Reference:
1) Wildlife Document, p 18-20
2) General use of guides and keys

STOP 10

AQUATIC ECOLOGY (2 pts) – STOP 10

This question requires materials found at the stop.

A Manitoba cottage owner is very interested in understanding how the lake ecosystem functions, and has started taking measurements and keeping records. In particular, the cottager has measured the water temperature at different water depths in the different seasons. Examine the four profiles (A, B, C and D) of temperature versus depth plotted on

_____
2 pts

KEY

the laminated graph, labeled A-A, and answer the following questions:

1) Which profile (A, B, C or D) was taken during the Spring? _____ (0.5 pt)

2) Which profile was taken during the Autumn? _____ (0.5 pt)

3) What scientific term is used for the regions of rapid temperature change in the C and D profiles? (0.5 pt)

4) Based on these seasonal temperature profiles, circle the scientific term in the following list that would best describe the annual water mixing regime in this lake. (0.5 pt)

monomictic dimictic amictic quadramictic

Answer:
1) C (0.5 pt)
2) B (0.5 pt)
3) Thermocline or metalimnion (0.5 pt)
4) Dimictic (0.5 pt)

Reference:
1) Lake Ecology, p 8
2) Lake Ecology, p 10
3) Lake Ecology, p 9
4) Lake Ecology, p 12

FORESTRY (10 pts) – STOP 10

This question requires features found at the stop.

_____
10 pts

At this stop, there are a number of clues about the health of a forest ecosystem. Four features that indicate something about forest health are labeled F-A, F-B, F-C and F-D (F-D actually consists of 3 plants labeled F-D1, F-D2 and F-D3).

1) For each feature, indicate if it is a positive or negative indicator of forest health by circling P (positive) or N (negative) beside the feature's label below. (4 pts - 1 pt each)

P N Feature F-A
P N Feature F-B
P N Feature F-C
P N Feature F-D

2) Compaction can put stress on a tree and make it more vulnerable to insect attack.

a) Identify the tree species at this site that will be most impacted by the compaction of the soil near the trail. (1 pt)

b) What insect attacks that tree species when it is stressed? (1 pt)

3) What is the name of the feature labeled F-A? (1 pt)

4) Some indicators of forest health are themselves sensitive to conditions in an urban environment.

a) Which of the labeled features (F-A through F-D) is highly sensitive to an urban environment? (1 pt)

b) What feature of an urban environment affects this organism? (1 pt)

c) What is the closest source of this feature of an urban environment? (1 pt)

Answer:
1) F-A: P F-B: N F-C: NF-D: P (4 pts, 1 pt each)
2a) Oak (1 pt)
2b) Two-Lined Chestnut Borer (1 pt)
3) Lichen (1 pt)
4a) F-A (Lichen) (1 pt)
4b) It is affected by human pollution and unable to withstand atmospheric pollutants. If there is an increase in pollutants, lichens will die (1pt)
4c) Traffic

Reference:
1) From Rock to Tree, p 1; Winnipeg: Urban Forestry, Black Knot; Diplodia Canker of Poplar; Provincial Training
2) Native Trees of Manitoba Field Guide, p 42; and Winnipeg: Urban Forestry, Oak Decline; Provincial Training
3) From Rock to Tree, p 1-3; Provincial Training
4) From Rock to Tree, p 1-3; Provincial Training

SOILS AND LAND USE (2 pts) – STOP 10

List four (4) benefits of soil organisms for soil health. (2 pts)

_____
2 pts

Answer:
Any 4 of the following: residue decomposition, including decomposition of plant and animal material, and manure; mixing of soil organic and minerals together; recycling of nutrients;

formation of stable soil aggregates through binding of organic substances to mineral fractions; increased porosity; increased infiltration, due to stable pores; reduced erosion due to increase of stable aggregates; increased water retention, though stable soil aggregate formation, and increased stable soil organic matter (2 pts - 0.5 pt each)

Reference:
Soil Biodiversity, p1

THEME (2 pts) – STOP 10

This question requires features found at the stop.

The plant labelled T-A is European Buckthorn, an invasive species that has spread into Assiniboine Forest. A control program is currently underway to reduce its population. Control of invasive plants such as Buckthorn can be accomplished using a variety of techniques. Name one example of each of the following categories. (2 pts - 0.5 pt each)

_____
2 pts

Cultural _____

Mechanical _____

Chemical _____

Biological or Natural _____

Answer:
Any 1 of the following for each category (2 pts - 0.5 pt each)
CULTURAL: mulching, weed torching, controlled burn, animal browse, revegetating cut site
MECHANICAL: hand pulling, mechanical pulling, collecting berries
CHEMICAL: herbicide/basal spray, herbicide/cut stump
BIOLOGICAL or NATURAL: fungal plant pathogen, vinegar

Reference:
Invasive Pest BMP Case Study, p 6-14

WILDLIFE (2 pts) – STOP 10

1) Generally, the smaller species of wildlife have higher birth rates than the larger species. Identify two (2) factors that affect the birth rate of wildlife. (1 pt)

_____
2 pts

2) The smaller species of wildlife also generally have higher death rates than the larger species. Identify two (2) factors that affect the death rate of wildlife. (1 pt)

KEY

Answer:
1) Any 2 of the following: Age at which breeding begins; Number of births per year for each breeding female (how many times each year young are born); Number of young born per litter (1 pt - 0.5 pts each)
2) Any 2 of the following: Availability of food; Predation and cover; Weather; Parasites and disease; Human activities (1 pt - 0.5 pts each)

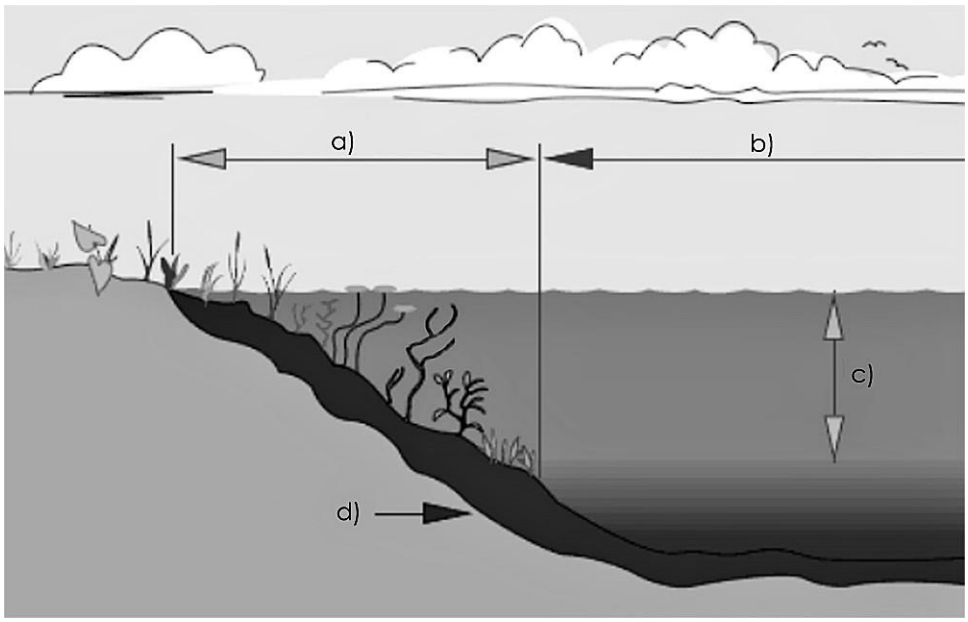
Reference:
1)-2) Wildlife Document, p 9

STOP 11

AQUATIC ECOLOGY (2 pts) – STOP 11

Label the diagram below using words from the word bank provided. (2 pts - 0.5 pt each)

_____
2 pts



Word Bank: *Open Zone, Limnetic Zone, Euphotic Zone, Solum Zone, Lateral Zone, Benthic Zone, Terra Zone, Littoral Zone*.

a) _____
b) _____
c) _____
d) _____

Answer:
a) Littoral Zone
b) Limnetic Zone
c) Euphotic Zone
d) Benthic Zone

Reference:
Lake Ecology, p 19

FORESTRY (2 pts) – STOP 11

This question requires both materials and features found at the stop.

Using the Field Guide to the Native Trees of Manitoba, identify the specimens labeled F-A, F-B, F-C and F-D. (2 pts - 0.5 pt each)

_____
2 pts

F-A _____

F-B _____

F-C _____

F-D _____

Answer:
F-A: TBD (0.5 pt)
F-B: TBD (0.5 pt)
F-C: TBD (0.5 pt)
F-D: TBD (0.5 pt)

Reference:
Field Guide to Native Trees of Manitoba, p 11-13; Provincial Training

KEY

SOILS AND LAND USE (2 pts) – STOP 11

This question requires both materials and features found at the stop.

The original upland soil from this region is from the Chernozemic Order, a soil formed under grassland. The proof is in the soil cores labelled S-A taken from the oak forest around you!

_____
2 pts

1) What soil Order would you expect to find under a natural, mature deciduous forest in central or eastern Manitoba? (0.5 pt)

2) Describe the A horizon of the forest soil that you named in Question 1. (0.5 pt)

3) Describe how the A horizon from the grassland soil is different from the A horizon of the forest soil. (0.5 pt)

4) Of the four soil forming processes (not factors), name the one (1) that best represents how the A horizon of the forest soil evolved. (0.5 pt)

Answer:
1) Luvisol (0.5 pt)
2) light in colour OR leached of organic matter (0.5 pt)
3) the grassland A horizon (or surface layer or topsoil) is darker (OR has a lot of organic matter). (0.5 pt)
4) translocation (0.5 pt)

Reference:
Soil and Land Use Document, p 10–12, 43-46

THEME (2 pts) – STOP 11

This question requires features found at the stop.

Look at the shrub labelled T-A.

_____
2 pts

1) What is the name of the black growth found on the shrub? (1 pt)

2) What genus of plant does the growth affect? Give the common or scientific name. (1 pt)

Answer:
1) Black Knot (1 pt)
2) Prunus (Cherry) (1 pt)

Reference:
Winnipeg: Urban Forestry, Black Knot

KEY

WILDLIFE (10 pts) – STOP 11

This question requires both materials and features found at the stop.

_____
10 pts

You are a Wildlife Technician and are working on a project site out in the field. All of the data you collect and observations you make regarding this site must be recorded in your field notes. The data you have already collected is displayed on the table. There are two remaining sites of interest flagged in the field that need their GPS Coordinates recorded using the UTM system.

Using the GPS unit and other equipment provided, complete your field notes for the. A blank copy of the field notes will be provided at the stop. Include it when you hand in your test at the end of the trail. (10 pts)

*Points will be given for full details and legibility.

Answer:
Legibility (1.0 pt)
Name, Habitat type, Location (0.5 pt)
Weather data (1.0 pt)
Date, Time (0.5 pt)
GPS data (in UTM) (2.0 pts)
Data and Site Observations - at least 3 items present at site (3.0 pts)
Other Observations - at least 1 observation of site (1.0 pt)
Invasive Species Present (0.5 pt)
Water Samples/Site Surveyed - boxes checked (0.5 pt)

Reference:
Wildlife Document, p 47

STOP 12

AQUATIC ECOLOGY (2 pts) – STOP 12

This question requires materials found at the stop.

_____
2 pts

Photo A-A shows the images of a mayfly nymph at the top and a dragonfly nymph below (adult stages are inset). Both are common wetland invertebrates. Use the Identification Guide to Freshwater Macroinvertebrates to answer the following questions.

1) What is the last step on the Guide that differentiates nymphs of mayflies (EPHEMEROPTERA) from dragonflies (ODONATA)? (0.5 pt)

KEY

2) Do a mayfly and a dragonfly both have 6 jointed legs? Circle the correct answer. (0.5 pt)

Yes No

3) What characteristic separates mayflies and dragonflies from fishflies (MEGALOPTERA)? (0.5 pt)

4) Find what the Guide says about the mouth of a dragonfly nymph. Given this information what is the most likely role for dragonflies in the aquatic food web? Circle the correct answer. (0.5 pt)

herbivore carnivore

Answer:
1) some variation of: mayfly has tail filaments, dragonfly doesn't (0.5 pt)
2) Yes (0.5 pt)
3) Any 1 of the following: fishflies do not have wings or wingpads; mayflies and dragonflies have wings or wing pads; presence or absence of wings or wingpads (0.5 pt)
4) Carnivore (0.5 pt)

Reference:
1)-4) Invertebrate Keys; Provincial Training with Stroud Identification Guide to Freshwater Macroinvertebrates

FORESTRY (10 pts) – STOP 12

This question requires materials found at the stop.

_____
10 pts

1) The tree cookies provided at the stop are from a tree that was harvested on the grounds of Canadian Mennonite University in Winnipeg in the winter of 2014.

a) Using the samples and equipment provided, determine the age of this tree when it was harvested. (2 pts)

b) *Which of the following is correct? Circle the best response.* (1 pt)

Look at the annual rings in the tree cookie. How would you describe the tree's growth rate during the period 2000-2005?

i) slower than average
ii) average
iii) fast than average
iv) cannot tell

c) Referring to the graph labelled F-A, describe one (1) factor which could explain your answer in b). (2 pts)

2) Trees can be aged using the piece of forestry equipment labelled F-B. What is this piece of equipment called? (2 pts)

Which of the following is correct? Circle the best response. (2 pts - 1 pt each)

3) Dendrochronology refers to:

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

4) Dendrochronological timelines can be used by researchers to:

a) calculate the age of buildings or structures
b) calculate the age of archeological sites
c) study the effects of climatic factors on tree growth
d) all of the above

5) *Indicate whether the statement is true (T) or false (F) by circling the correct answer*. (1 pt)

T F Tree ring width can be affected by both biotic and abiotic factors.

Answer:
1a) 50 years +/- 3 years (2 pts)
Partial marks: +/- 5 years (1 pt)
1b) i) (1 pt)
1c) Winnipeg Airport precip chart shows significant drought during that time period. (2 pts)
2) increment borer (2 pts)
3) c) (1 pt)
4) d) (1 pt)
5) T (1 pt)

Reference:
1)-2): Regional Training
3)-5): Principles of Dendrochronology

KEY

SOILS AND LAND USE (2 pts) – STOP 12

_____
2 pts

Pesticides are used to control unwanted pests in agricultural fields.

1) What is the term used to describe the accumulation of a pesticide on the surface of soil particles? (0.5 pt)

2) What is the most important soil property controlling pesticide retention? (0.5 pt)

3) Define **Kd** with regard to pesticides in soils. (1 pt)

Answer:
1) Adsorption (0.5 pt)
2) Organic matter (0.5 pt)
3) The adsorption distribution coefficient is the amount of pesticide in soil solution divided by the amount adsorbed to the soil. (1 pt)

Reference:
1)-3) Pesticides/Soil Quality Concerns: Pesticides, p 2

THEME (2 pts) – STOP 12

_____
2 pts

Many urban boulevards are lined with trees to help create an urban canopy.

1) Name two (2) factors urban foresters should take into consideration when deciding which trees to plant. (1 pt)

2) Why would a white spruce be a poor choice for planting on a street corner? (1 pt)

Answer:
1) Any 2 of any of the following: aesthetic appeal, hardiness zone, size, form, site conditions of growing location, soil conditions, light availability, pedestrian traffic, drainage, space and micro climate. (1 pt - 0.5 pt each)
2) Too large, at full size they would be difficult to see past for pedestrians and traffic and would create a safety hazard. (1 pt)

Reference:
1) Compendium of Best Urban Forest Management Practices: Species Selection and Planting
2) Provincial Training

KEY

WILDLIFE (2 pts) – STOP 12

This question requires materials found at the stop.

_____
2 pts

Name the organs labeled W-A, W-B, W-C and W-D. (2 pts - 0.5 pt each)

W-A _____

W-B _____

W-C _____

W-D _____

Answer:
W-A TBD (0.5 pt)
W-B TBD (0.5 pt)
W-C TBD (0.5 pt)
W-D TBD (0.5 pt)
(likely lungs and liver)

Reference:
Wildlife Document, p 12-17

STOP 13

AQUATIC ECOLOGY (2 pts) – STOP 13

This question requires materials found at the stop.

_____
2 pts

Water is essential for life as we know it. Humans also use water for a myriad of other purposes in our modern societies. Many of these human uses of water can be classified as "withdrawal uses", because we withdraw the water from its natural ("instream") locations in order to use it. This can have particularly serious consequences for other inhabitants of these natural systems, particularly during periods of drought.

Examine the diagram labelled A-A. It shows the relative amount of water withdrawn in Canada for five major categories of human uses requiring withdrawal of the water. Note that some uses recirculate significant amounts of the water they use, but most of this withdrawn water is not returned to the original source. Agriculture is shown as the fourth greatest user. However, it is difficult to account for all of the water used by agriculture, so the data may not be accurate. The other four major uses are not named on the diagram, but are identified by large, red numbers (1, 2, 3, 5).

KEY

Beside each of these other four major uses listed below, write the number (1, 2, 3, or 5) from the A-A diagram that represents the amount of water it uses. (2 pts - 0.5 pt each)

1) Mining _____

2) Manufacturing _____

3) Municipal _____

4) Thermal Power _____

Answer:
1) 5 (0.5 pt)
2) 2 (0.5 pt)
3) 3 (0.5 pt)
4) 1 (0.5 pt)

Reference:
1)-4) Aquatic Ecology Document: Water Use, Withdrawal Use, p 55-57

FORESTRY (2 pts) – STOP 13

_____
2 pts

Greenhouse gas emissions are a widely known source of atmospheric pollution, which ultimately leads to the heating of the atmosphere. This heating of the atmosphere creates growing environmental problems including pollution and habitat loss. Trees have an important role in reducing the harmful effects of greenhouse gas emissions.

1) *Which of the following is correct? Circle the best response*. (1 pt)

Which forest practice is considered to be a productive carbon sink?

a) Deforestation
b) Reforestation
c) Afforestation

2) If the trees in a carbon sink were harvested and used as firewood, how much carbon would return to the atmosphere and how much would remain sequestered? (1 pt)

Answer:
1) c (1 pt)
2) All the sequestered carbon would be lost; it would all be returned to the atmosphere (1 pt)

KEY

Reference:
1) What Trees can do to Reduce CO2, p 4
2) What Trees can do to Reduce CO2, p 7

SOILS AND LAND USE (2 pts) – STOP 13

_____
2 pts

The table below shows soil moisture characteristics for a Stockton fine sand and a Red River heavy clay. Values are given as a percentage.

SOIL MOISTURE (percentages)

Characteristic	Stockton	Red River
Saturation Moisture	37%	56%
Field Capacity	15%	15%
Permanent Wilting Point	4%	18%

Calculate the percent of moisture which is available for plant growth by definition. (2 pts - 1pt each)

1) Stockton

2) Red River

Answer:
1) Stockton 15-4 = 11% (1 pt)
2) Red River 45-18 = 27% (1 pt)

Reference:
Soil Management Guide, p 42

THEME (2 pts) – STOP 13

This question requires both materials and features found at the stop.

_____
2 pts

The sapling labelled T-A has been affected by something causing unusual growth.

1) The unusual branch growth this shrub is exhibiting is called a _____ _____. (1 pt)

KEY

2) *Which of the following is correct? Circle best response.* (1 pt)

The organism that is causing this infection is a _____.

a) bacteria
b) fungus
c) animal
d) insect

Answer:
1) witches broom (1 pt)
2) a) (1 pt)

Reference:
1)-2) Witches Broom of Willow

WILDLIFE (10 pts) – STOP 13

This question requires materials found at the stop.

_____
10 pts

Urban white-tailed deer populations have become a large concern for citizens in large urban centers. The map labeled W-A shows the movement of 16 collared deer over one year.

1) Answer the following questions using Map W-A.

a) Briefly describe two (2) things we tell about urban white-tailed deer movements. (2 pts)

b) Give two (2) reasons why their movements may cause problems for human populations. (2 pts)

c) What is the farthest distance Deer 2760 traveled in one direction? State you answer in kilometers. (2 pts)

2) Give two (2) reasons why feeding this population would cause further problems. (2 pts)

3) What are two (2) techniques that wildlife managers could use to control this urban population? (2 pts)

Answer:
1a) Any 2 of the following: Cover wide portion of south east corner of the city, move quite a bit within a year, not all the same, considerable overlap, other answers as reasonable (2 pts - 1 pt each)

KEY

1b) Any 2 of the following: Interfere with traffic (cause accidents), spread pathogens causing disease, cause damage to gardens and property (2 pts - 1 pt each)
1c) TBA - within 0.25 km (2 pts)
Partial marks: 1 pt - within 0.5 km
2) Any 2 of the following: Feeding the deer helps maintain artificially high populations, making the deer more susceptible to starvation and disease; Deer also become accustomed to humans and lose their fear of being around human communities; A feeding area attracts larger groups of deer that may result in more damage as well as encouraging them to travel, increasing their chance of being hit by a vehicle. (2 pts - 1 pt each)
3) Any 2 of the following: research, monitoring, habitat management and conservation, public education, compliance, and species re-introductions (2 pts - 1 pt each)
No points for: season and bag limits, hunting and trapping as they are URBAN deer and therefore can not be hunted or trapped

Reference:
1) Wildlife Document, p 36-37
2) Wildlife Document, p 36
3) Wildlife Document, p 40-42

STOP 14

AQUATIC ECOLOGY (2 pts) – STOP 14

This question requires materials found at the stop.

1) Use the Key to Manitoba Sport Fish to identify the species of fish A-A. (1 pt)

2) Based on the characteristics listed in the key, what is the difference between a rock bass and a black crappie? (1 pt)

_____
2 pts

Answer:
1) stonecat (1 pt)
2) some variant of: rock bass have red eyes, black crappie have yellow eyes (1 pt – 0.5 pt each)

Reference:
1)-2) Key to Manitoba's Sport Fish

KEY

FORESTRY (2 pts) – STOP 14

_____
2 pts

Below is a list of forest products that can be found in Manitoba. These can be categorized as "non-timber" or "primary" or "secondary" forest products. Primary forest products are items produced directly from forest trees. Secondary forest products use items produced in primary manufacturing as raw material. Circle four (4) products that are considered primary forest products. (2 pts)

doors	fence posts	carved walking sticks
paper bags	kitchen cabinets	pulp
birch syrup	furniture	tea
windows	willow wreaths	wood chips
lumber	plywood	pallets
	oriented strand board (OSB)	

Answer:
lumber, fence posts, pulp, wood chips (2 pts - 0.5 pt each)

Reference:
Manitoba's Forests, p 3-5

SOILS AND LAND USE (10 pts) – STOP 14

This question requires both materials and features found at the stop.

_____
10 pts

1) These soil cores are taken from close to the wetland where the flag is.

a) Explain how you can tell from any of these cores whether or not there is an organic layer (O or LFH horizon) present in this soil. (0.5 pt)
b) Does this soil have the organic layer (O or LFH horizon)? (0.5 pt)

c) Explain how you can tell from any of the soil cores whether or not this is a soil that experiences permanent or periodic wet conditions. (0.5 pt)

d) Is this a soil that experiences permanent or periodic wet conditions? (0.5 pt)

KEY

2) *Which of the following is correct? Circle the best response*. (0.5 pt)

Which soil horizon you would you expect to find in a soil profile represented by the flag near the wetland?

a) Bm
b) Ck
c) Btj
d) Bg

3) Notice how there are no trees or shrubs around the flagged area. Describe the reason for this phenomenon. (1 pt)

4) Take some loose soil in your hands. It comes from the upper part, but not the very top, of the soil profile (about 25 cm deep). Knead it to the consistency of putty. If it is too dry, add water. Try to form a ball. Use both the soil texturing flow chart and textural triangle to determine how much sand is in the soil.

Which of the following is correct? Circle the best response. (0.5 pt)

The percentage of sand in the soil is:

a) 85 to 90%
b) 70 to 85%
c) 45 to 70%
d) Less than 45%

5) According to the texturing flow chart, what texture is the soil? (1 pt)

6) *Which of the following is correct? Circle the best response*. (0.5 pt)

Which is the most likely bulk density of this soil at the 25 cm depth?

a) 0.85 g/cm3
b) 1.10 g/cm3
c) 1.35 g/cm3
d) 1.75 g/cm3

7) To which Soil Order does this soil belong? (0.5 pt)

8) Soil Agricultural Capability for Manitoba is divided into seven (7) classes. How many of these soil capability classes have important limitations for growing agricultural crops? (0.5 pt)

9) List six (6) specific limitations that a soil may have that would make it unsuitable for growing crops. You do not need to include the Subclass letter. (3 pts)

10) Name the agricultural capability limitation that is most likely to apply to this soil. You do not need to include the Subclass letter. (0.5 pt)

Answer:
1a) Visible organic matter (plant material) in all or part of the O horizon. (0.5 pt)
1b) yes (0.5 pt)
1c) dull grey colours or mottles (0.5 pt)
1d) yes (0.5 pt)
2) d (0.5 pt)
3) Deeper in the soil, where the tree roots would be, soil is saturated (OR most of the pore space is filled with water) (0.5 pt), therefore there isn't enough air for the roots of trees (0.5 pt).
4) d (0.5 pt)
5) TBD (1 pt)
Partial marks: Any answer one step to the left or right or up or down in the flow chart (0.5 pt)
6) b (0.5 pt)
7) Gleysol (0.5 pt)
8) Six (0.5 pt)
9) Any 6 of the following: adverse climate (outside the boundaries of agro-Manitoba); dense soils (undesirable soil structure/low permeability); erosion damage; inundation (flooding) by streams and lakes; moisture (droughtiness) or low water holding capacity; salinity; stoniness; consolidated bedrock; topography (slopes); excess water other than flooding (inadequate soil drainage or high water table) (3 pts – 0.5 pt each)
10) excessive wetness (0.5 pt)

Reference:
1)-2) Soils and Land Use Document, p10-11
3) Soils and Land Use Document, p 17-18
4)-5) Soils and Land Use Document, p 19, 21, 22
6) Soils and Land Use Document, p 22
7) Soils and Land Use Document, p 43
8) Soils and Land Use Document, p 49-50
9)-10) Soils and Land Use Document, p 50-51

THEME (2 pts) – STOP 14

Parts of the riparian areas in the Assiniboine Forest and Park have soil slumping into the river. The City of Winnipeg would like to remediate these areas.

_____
2 pts

1) What is one (1) urban forestry technique that could be undertaken to reduce the amount of soil loss? (1 pt)

2) What is one (1) challenge that could prevent this remediation method from being successfully implemented? (1pt)

KEY

Answer:
1) Live stake water resistant trees (like dogwood, willow) in the riparian area (1 pt)
Partial marks: Plant trees in the riparian area (0.5 pt)
2) Decades of soil disturbance & compaction have created conditions unsuitable for natural plant regeneration.

Reference:
1)-2) Assiniboine Park Riparian Forest Best Management Plan, p 15-17

WILDLIFE (2 pts) – STOP 14

This question requires materials found at the stop.

Look at the specimens labelled W-A, W-B, W-C and W-D. Using Key to Invertebrates, identify each animal to the most specific taxanomic level the key allows. (2 pts - 0.5 pt each)

_____
2 pts

W-A _____

W-B _____

W-C _____

W-D _____

Answer:
W-A: Nematode (0.5 pts)
W-B: Arthropoda (0.5 pts)
W-C: Annelida (0.5 pts)
W-D: Platyhelminthes (0.5 pts)

Reference:
Wildlife Training; Wildlife Document p 12-13

STOP 15

AQUATIC ECOLOGY (2 pts) – STOP 15

1) Riparian health assessments take into consideration the various plants in a riparian area. Native plants tend to have deeper roots than invasive species. What is the primary function of deep binding root mass in maintaining riparian health? (1 pt)

_____
2 pts

KEY

2) Briefly explain the relationship between vegetation and physical features in a riparian area. (1 pt)

Answer:
1) Stabilize bank, prevent erosion, act as glue, or bind stream bank material together (1.0 pt)
Partial Marks: 0.5 pt - create macro pores, uptake of nutrients, habitat, or food
2) Hydrological and soil conditions affect plant community structure and potential (0.5 pt);
Changes in vegetation affect hydrologic and soil conditions (0.5 pt)

Reference:
1) Riparian Areas/Managing the Water's Edge, p 29, 43, 53-55
2) Riparian Areas/Managing the Water's Edge, p 11-12

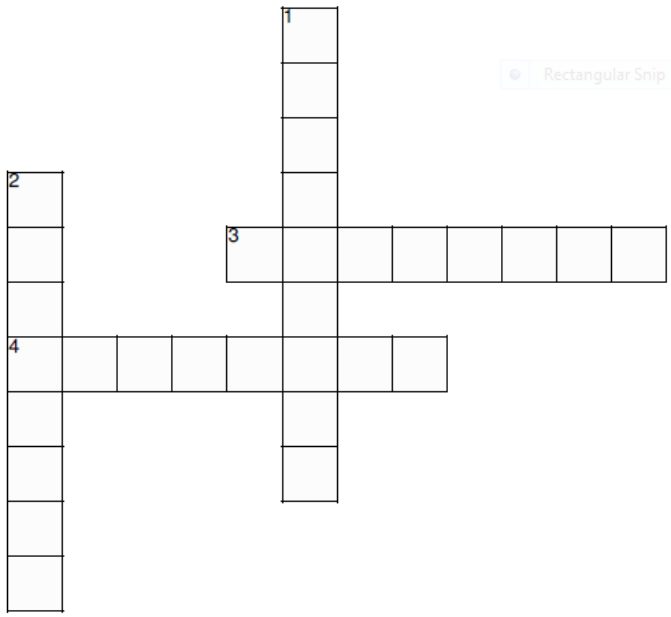
FORESTRY (2 pts) – STOP 15

Complete the crossword puzzle below. (2 pts)

_____
2 pts

Forestry Related Careers

Complete the crossword below



Created on TheTeachersCorner.net Crossword Maker

Across

3. A _____ manages the land and sustains the long-term health of the forest.
4. An ____ is a specialist who focuses on the planting, care and maintenance of trees and shrubs.

Down

1. A person who studies the relationships between organisms and their environment.
2. A person who studies plants.

KEY

Answer:
1) ecologist (0.5 pt)
2) botanist (0.5 pt)
3) forester (0.5 pt)
4) arborist (0.5 pt)

Reference:
Forestry Document: www.forestinfo.com: Discover: Forestry Careers

SOILS AND LAND USE (2 pts) – STOP 15

This question requires both materials and features found at the stop.

1) From this stop, you can observe two different trail types in the Assiniboine Forest: wood chips and asphalt.

_____
2 pts

a) From an infiltration perspective, which is better? (0.5 pt)

b) Explain why. (0.5 pt)

2) The image labelled S-A represents a township map with field observations included. What is the number of the section in the township where initial infiltration rates can be expected to be greatest? (Only sections where observations have been made can be selected.) (1 pt)

Answer:
1a) wood chips (0.5 pt)
1b) Any 1 of the following: wood chips allow water to enter the soil profile; concrete blocks infiltration, allowing water to pond or run off(0.5 pt)
2) Section 8 (1 pt)

Reference:
1) Infiltration/Soil Quality Indicators: Infiltration, p 1-2
2) Soil Management Guide, p 144; Infiltration/Soil Quality Indicators: Infiltration, p 1-2

THEME (10 pts) – STOP 15

This question requires materials found at the stop.

In urban environments, many of the benefits provided by forests are related to human activity. The ability of trees to provide benefits such has shade, beauty and privacy depend on species, age and location as well as management activities that affect growth and health.

_____
10 pts

2015 Manitoba Envirothon
Provincial Trail Test

KEY

1) Use the laminated planning map labelled T-A to answer the following questions. (3 pts - 0.5 pt each)

a) How many deciduous trees are on the planning map? _____

b) How many coniferous trees are on the planning map? _____

c) What is the most common tree species planted? _____

d) Which quadrant has the most elms? _____

e) Which quadrant has the fewest deciduous trees? _____

f) How many ash trees are shown on the map? _____

2) Urban trees live in an inherently difficult environment due to a variety of human activities. In addition to contributing directly to the decline of trees, these factors can predispose them to attack by insects and diseases.

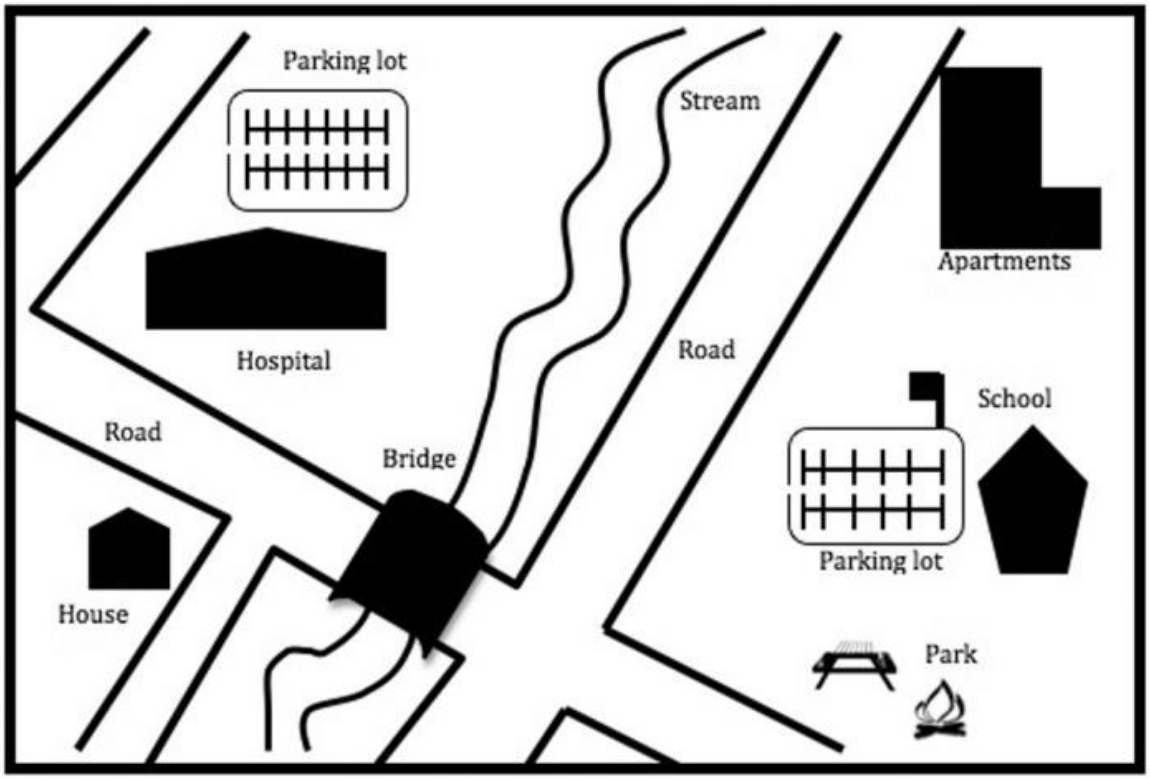
In the line beside each insect or disease, write the letter of the kind of tree it attacks. A type of tree may be used more than once. (3 pts - 0.5 pt each)

_____ Emerald Ash Borer	A Deciduous tree
_____ Spruce Budworm	B Elm
_____ Forest Tent Caterpillar	C Spruce
_____ Black knot	D Ash
_____ Dutch Elm Disease	E Chokecherry/Cherry
_____ Cankerworm	

3) Your job as an urban community forester is to plant four (4) trees in this urban community. Follow the directions below. (4 pts)

Directions:
Chose 4 different species of trees.
Think about the best location for each species.
Draw the trees on the community map on the next page.
Number the trees on the map.
Write name of the species of each tree in the table on the next page.
Explain why you planted each tree in that particular location in the space provided in the table.
Use a rationale only once. For example – do not use the rationale "tree provides fruit to eat" for all four trees that you draw on the map.

KEY



TREE #	SPECIES	RATIONALE
1		
2		
3		
4		

Answer:
1a) 40 (0.5 pt)
1b) 1 (0.5 pt)
1c) Manitoba Maple (0.5 pt)

KEY

1d) 2 (0.5 pt)
1e) 1(0.5 pt)
1f) 7 (0.5 pt)
2) D, C, A, E, B, A (3 pts - 0.5 pt each)
3) Appropriate choice of species for location - must be 4 different species (2 pts - 0.5 pt each)
Appropriate rationale for species and location - single rationale can only be used once (2 pts - 0.5 pt each)
Accepted rationales include: shade, protection from wind or noise, privacy, fruit to eat, beauty or aesthetics, riverbank soil stablization, water quality (filtration) , property values, environmental benefits,diversity, wildlife habitat, pollution control, etc.

Reference:
1) Compendium of Best Urban Forest Management Practices: Tree Inventory and the Tree Inspection Cycle
2) Winnipeg: Urban Forestry; Manitoba Urban Forestry: DED
3. Understanding Local Values Related to the Urban Forest: Connecting Winnipeg Residents to their Trees, p 79

WILDLIFE (2 pts) – STOP 15

This question requires both materials and features found at the stop.

1) Identify the Manitoba wildlife species whose tracks are labeled W-A, W-B and W-C. (1.5 pts - 0.5 pt each)

_____
2 pts

W-A _____

W-B _____

W-C _____

2) The twig marked W-D has been browsed by an animal with well developed incisors, such as a rodent or a rabbit, leaving a distinct 45 degree clean cut. What mammal browsed the twig marked W-E and is responsible for the rough, uneven cut? (0.5 pt)

Answer:
1) W-A: Canada Goose, Goose or Branta canadensis (0.5 pt); W-B: Black Bear, Bear or Ursus americanus (0.5 pt); W-C: Snowshoe Hare, Hare, Lepus americanus, Eastern Cottontail, Cottontail, Sylvilagus floridanus, White-tailed Jackrabbit, Jackrabbit, Lepus townsendii or Rabbit (0.5 pt)
2) Any 1 of the following: any member of the deer family, Deer, White-tailed Deer, White-tail Deer, White Tailed Deer, White Tail Deer, Odocoileus virginianus, Elk, Cervus canadensis, Moose, Alces alces, Mule Deer, Odocoileus hemionus, Pronghorn, or Antilocapra americana (0.5 pt)

KEY

Reference:

1) Provincial Training; Animal Tracks of Manitoba, p 6, 2, 4
2) Animal Tracking, p 3