

**EVALUATING
ACADEMIC READINESS
FOR APPRENTICESHIP TRAINING**
Revised for
ACCESS TO APPRENTICESHIP

**COMMUNICATIONS SKILLS
CLASSIFICATION OF INFORMATION**

**AN ACADEMIC SKILLS MANUAL
for
The Horticulture Trades**

This trade group includes the following trades:
Arborist, and
Horticulturist

*Workplace Support Services Branch
Ontario Ministry of Training, Colleges and Universities*

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In preparing these Academic Skills Manuals we have used passages, diagrams and questions similar to those an apprentice might find in a text, guide or trade manual.

**This trade related material
is not intended to instruct you in your trade.
It is used only to demonstrate how understanding an academic skill
will help you find and use the information you need.**

COMMUNICATIONS SKILLS CLASSIFICATION

*An academic skill required for the study of the
Horticulture Trades*

INTRODUCTION

Classification of information is a system that groups items together based on shared qualities or features, or uses. When information is divided into topics, when tools are stored by how they are to be used or when plants are sorted by species, each collection is classified into a group according to characteristics they have in common.

Classification indicates an underlying similarity in grouped items. If you recognize features in a new material or tool that are similar to features you are familiar with, you will find it easier to figure out how it works and where to use it. By classifying information you learn to see common patterns in the different techniques you are learning. Being able to classify new information assists you in organizing things, finding material, and making good choices.

In this skill sheet, we look at the following aspects of classification:

- ◆ Classifying into Categories
- ◆ Using Categories to Get Organized
- ◆ Using Classification

PART I

CLASSIFYING INTO CATEGORIES

Belonging to a group

The word “tool” is a grouping or category. It is a broad, general category. If someone asked you to hand them a tool, you could give them a screwdriver, a hammer or a hacksaw. You couldn’t make a wrong choice because *any* tool fits the category.

Example:

If someone asked for a shovel (a type or class of tool), you’d choose a shovel. *Shovels* is a smaller, more specific category, so you would choose a shovel and exclude every other tool.

If someone asked for a shovel and there were several to choose from, you would have to ask, “Which one do you want?”

Which one?

When you ask the question, *which one*, you are asking for more information. Because you need to select the right tool, you need a *list of features* or *criteria* that describes that tool. The answer to your question will provide a list. It will be something like this: "I need the short handled round-nosed one." With these words to guide you, you can match shovel to criteria and hand it over.

You can make the right choice. There is probably only one shovel that matches the list (the given criteria), round nosed, short handled and all.

Note: We use the terms "given criteria" and "list of features" to mean the same thing.

From general to one

To make the right choice, we moved in three steps:

1. from a very broad category which included all types of tools;
2. to a narrower category which included shovels only; and
3. to a list of features that described one item: short handled round nosed shovel.

Classification involves a process, moving from a broad category of information that gradually narrows to descriptions that apply only to one type or one item only.

Example: Classification may apply to a lesson about on *insects* in this way:

- **First**, you learn about insects which belong to a broad category: in this case, *harmful* insects.
- **Next**, you learn about insect families which are grouped according to different feeding habits and how they cause damage the damage they cause.
- **Finally**, you look for information about the *specific characteristics* of the insects in each feeding category.

There's a good reason for these steps. Whether you are learning about insects or soil types, you need to understand what to expect from a group of items so you can predict results. You need to understand what type of product is best suited to the job and what type is not appropriate. You need to know what is considered odd or unusual behavior in any category. This knowledge prepares you to react when something unexpected happens so you can look for the causes. It lets you work from broad patterns in a logical way.

The right information

To make the right choice, we need to work from information. When you ask questions about a job or a tool, the answers will describe the conditions.

Example: You are going to prune an old tree. Before you do anything, you need information. Your starting point is a list of questions: Why am I pruning it? What parts need pruning? How much pruning is needed? Are there any special problems or considerations with the health of the tree?

The answers to these questions outline the conditions. The answers will guide you in your choices for each step of the project. You can select the right information, tables, safety guides and tools. You can choose the right products and procedures for this situation. You can make appropriate choices by matching information to the requirements for the task. You can see that the job requirements set the conditions for all the choices.

Application

In your trade you will choose products to protect plants from insect damage. Although product information materials will tell you which insects a product has been developed to control. There are some questions about the insect which you need to be able to answer. Once you know about the different categories of insect pests, how they are essentially different from each other, and how to tell them apart difference? You can decide which class of insect you are dealing with and what product types will best control them.

Read Passage 1 that gives (in part) information about types of insects and the types of damage they cause. Answer the questions that follow. Answers are at the end of this skill manual.

Passage 1

Insects and Damage

Insects which are beneficial to garden plants should be identified and protected. Those which damage garden plants are termed pests. Pests are divided into five broad categories according to their feeding habits and the damage which results.

Defoliating Insects: These remove leaves and stems by eating them. Some of these insects can be seen while others are hidden in the leaf. They feed singly or in dense colonies. Defoliators have feeding habits which vary: Some eat the entire leaf; some eat interveinal tissue; some eat everything and leave a skeleton; some eat between the leaf's surfaces. Each feeding type deprives the plant of food because photosynthesis is affected. The following are defoliators:

- *Caterpillars*, the larvae of moths and butterflies, feed individually or in colonies.
- *Leaf Eating Beetles* feed as adults and larvae. They can consume, skeletonize or mine (eat between surfaces) the leaf.
- *Leafminer* larvae are often concealed because they develop within the leaf tissues. Their tunnels, however, are visible and easy to identify.
- *Sawflies* feed in colonies stripping leaves very quickly.

Sucking Insects: This category of insects weakens plants by sucking the sap, or by injecting secretions that injure or kill plant cells. Severe damage may occur before symptoms are visible. Symptoms include mottling and fading leaf colour, curling and twisting leaves, wilting of foliage and shoots, malformed flowers. The following are sucking insects:

- *Aphids* cluster on new growth secreting a sweet sticky substance on which black sooty mould may grow.
- *Leafhoppers* feed on the undersides of leaves causing stippling or bleaching. Small white dots appear on the upper surface.
- *Mites* (not true insects) attack evergreens and herbaceous ornamentals. Damage appears as speckling, bleaching or bronzing of foliage.

Questions:

1. All insects cause damage to plants, but the type of damage is different for each category of insect.

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2. Defoliators do **not** attack evergreens.

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3. Which types of defoliators feed in colonies?

- a) caterpillars and sawflies
- b) leaf eating beetles and leafminers
- c) both a) and b)

4. How would you identify damage which is characteristic of sucking insects?

- a) mottling and fading leaf colour
- b) black sooty mould
- c) malformed flowers and bronzing foliage
- d) all of the above

The questions above ask you to look at something based on its features, its ability to do something, or because it doesn't do something.

- Each insect type may have one or two characteristics similar to the others.
- Each will have its own unique characteristics.

Your ability to choose the appropriate treatment depends on your being able to match the product to the need. It depends on your familiarity with different materials, their ability to do something and where they will be used.

You will match the pesticides you choose to the insect types they control. Ask questions:

- Where is it to be used?
- What is the *desired* result?
- Would a more different product offer any advantage? Why or why not?

The specific requirements and instructions will direct you to the right techniques, materials, and tools to get the right result.

Equipment

Sometimes you will work from the other direction.

Example: You have a tool, or a piece of equipment and you need to know more about it – how and where it works. You use classification to understand what it is, how it works and what you should do with it. When you ask questions, you may get this kind of answer:

- It is used for measuring plant water availability.
- It must be inserted in the soil.
- It is a probe.

Look from all angles

You often have to look at the right choice from two directions.

- You need to understand what a tool or product is designed to do to know the class of job it's correct for.
- You need to know the requirements of a job to know the class of tool or product that's correct.

This may sound like going in circles, but whichever way you look at it, making the right choice is essential to the quality of the completed project.

Sometimes you go through the process of finding information, only to discover you must compromise.

Example: You may start with the best plan for cultural (non-chemical) control of pests, but find the client is not willing to wait for new plants to emerge. After discussions with your supervisor and the client you decide to make another choice.

Nevertheless, you need to understand your reasons for this choice – how “the next best thing” will perform and what it will cost. You must be sure it suits all the conditions and the purpose.

Once you know the set of conditions, you can consult the right information or table for that category and for that specific project.

Classifying will give you a base of information to help you understand more about your topic and your purpose for reading. Classification groups similar things together so that you understand something in general terms first. Then you are ready to learn about the qualities and functions of individual items.

We have looked at the right choice from two directions.

1. When you understand what something is designed to do, you know where it can be correctly used.
2. When you know the specific requirements of a job, you can find the class of material that is best.

Whichever way you look at it, making the right choice is essential to the quality of the completed project.

Ask questions

The success of your efforts depends on information. Start with information about the job you are doing: like the type and the conditions of the operation. Then choose the products and tools based on information about their characteristics. Understand which situation will call for which products or methods. When you ask questions, you address all of the requirements.

PART II

USING CATEGORIES TO GET ORGANIZED

We all use classification to separate people, things and information into groups and categories. Sorting by categories tells us:

1. where to find things – things that are alike are found together: socks are in the sock drawer, tools are in your toolbox, and instructions are in your blue manual;
2. how to use things;
3. how to make good choices; and
4. how to set priorities.

When you classify things, you organize them in your mind and you get a sense of the big picture. You can start with a general idea – class or type – before dealing with each individual detail.

Example: When a work area is organized, tools, supplies and information are sorted and stored by category. Hand tools are grouped together; hazardous products are labelled and stored where they won't get knocked over; manufacturer's instructions and safety standards are placed on a shelf. The working area is organized so everyone can get down to business.

If you need to use hazardous products (a class of products), you know immediately that a special type of safety is involved. When you know which type of hazard is involved and the name of the product, you can determine specific safety procedures. You can then adjust handling and equipment to the conditions.

As you read Passage 2, take note of the pattern of categorizing, grouping or classifying. Answer the questions that follow. Answers are at the end of this skills manual.

Passage 2

Abiotic Injury

Abiotic means *not having to do with living things*. Abiotic diseases are caused by something non-living. These include soil, weather, and man-made physical and chemical disturbances. Usually both root and leaf systems are affected though root injury is more serious and can result in death of the plant unless corrected. Two main factors affect the plant's response: severity of damage and plant species.

Some control of abiotic disease is possible by selecting plants resistant to types of damaging conditions. For example, white pine and crab apple are sensitive to salt runoff and spray while blue spruce and sumac are tolerant. Growing conditions can also be improved.

Several abiotic conditions are described below:

Air pollution varies throughout Ontario. Damage varies with the severity of pollution and susceptibility of plant. Damage from pollutants (ozone, nitrogen oxides, sulphur dioxide) may cause leaf stippling (chlorosis) and premature ageing of leaves.

Compaction of soil prevents air and water from penetrating the soil. Causes include moving or storing heavy equipment, heavy foot traffic or installing paving stone, brick or pavement. Young and old trees alike may slowly decline. Compaction is more damaging where soil is clay.

Dieback may be sudden or very gradual in shade trees throughout Ontario. Symptoms include dying back of branches, early fall colours, short internodes and small discoloured leaves. Several factors may be causes: root stress from soil compaction, poor drainage, site alteration, high soil temperatures, viral disease, girdling wires or ropes. New trees require proper watering and fertilizing. Older trees can be damaged by changes to drainage and heavy equipment operating over root systems.

Fertilizer injury results from improper or over-application, either of which can cause burning. Under-application may result in yellowing leaves and weak, spindly growth.

Herbicide injury is more serious than fertilizer injury and should be avoided. The extent and type of injury depends on the amount and type of herbicide. Herbicides that are soil-borne may be active for years causing stress to the plant. You can relieve this a little by watering and fertilizing. Symptoms include yellowing, browning or scorching of leaves (dropping or purpling of conifer needles), deformities of new growth and dieback. Avoid spray-drift by applying under wind-free conditions. Identify type of herbicide and read application labels carefully.

Questions:

1. For which type of abiotic damage can the horticulturist/arborist offer improvement?
 - a) air pollution
 - b) fertilizer injury
 - c) herbicide injury
 - d) all of the above
2. Injury to either the root system or the leaf system is equally serious to plant health.

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3. Which characteristics describe the type of injury caused by soil compaction?
 - a) leaf stippling, slow decline of the plant
 - b) small discoloured leaves, premature fall colours
 - c) premature ageing of leaves, chlorosis
4. Species planting (selecting plants for the set of conditions) will improve a plant's resistance to abiotic injury.

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We'll look at classification in paragraph one of Passage 2.

Paragraph one tells us this about all abiotic injuries:

- It defines abiotic injury:
 - abiotic injury is caused by non-living things.
- It identifies the four causes of abiotic injury
 - soil, weather, man-made physical and chemical disturbances. and can result in death of the plant unless corrected.
- It identifies how plants are affected,
 - Usually both root and leaf systems are affected though root injury is more serious ...

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- It identifies the factors which affect the plant's survival.
 - severity of damage and plant species.

Paragraph two identifies two possible ways to control abiotic injury.

The rest of the passage describes the category of causes of abiotic injury.

This passage is an example of how we use classification to learn about something. You are classifying types of abiotic injury and learning about how they differ from each other in both affect to the plant and how they are treated.

Which one to choose?

If you have asked and answered all the questions, you will have you a complete list of conditions and factors for choosing a treatment for an abiotic injury. Your question and answer list will guide your task.

A decision may involve comparing two (or more) lists. One list may describe the situation you are facing, the other list may describe the features of a material. The choice of a process will depend on your understanding of both the situation and that material. Each result you get depends on the kind of information you select to answer the “which one” question you encountered on page one of this unit.

Passage 2 is an example of how we use classification to learn about something. You are classifying types of plant damage. You can begin to see how they are the similar to each other, and how they are different.

You are learning to compare the situation you are facing to the features of products and service available. The choices you make will depend on your understanding of both the plants and the conditions.

Classification in Tables and Charts

Tables and charts also classify information. For example, you might see tables used in the following ways:

- to classify harmful insects, their life cycles and host plants,
- to group categories of plant damage and causes, or
- to classify turfgrass sod for use in Ontario.

Tables are a quick way to lay out classification so that information is easily found.

Example: Table one below allows you to find out about plant pests through three simple groupings:

Table 1: Category of Plant Damage and Possible Causes

Category	Symptom	Cause
Discoloured leaves	Bleached Bronzed Silvered Stippled	lace bugs plant bugs spider mites leafhoppers
	Streaked	aphids, psyllids or thrips
Distorted plant parts	mined leaves, skeletonized leaves,	beetle larvae caterpillars, sawflies
	curled/cupped leaves,	aphids
	galls on leaves, stems, flowers, twigs	thrips, gall wasps
	twisted growing parts	gall flies, psyllids, eriophyid mites
Parts of plant die	dying leaves, twigs

Note: Table 1 is a guide to the first step in identifying common garden “pests”. Use products as recommended for each category of pest. Apply only when control is possible, in the recommended way.

The Language of Classification

The language of classification provides valuable information. It indicates which category a material, design, or technique belongs. This will make some job decisions easier.

Classification is used to limit your choice to one type or category only. You may not know why you should only choose from a certain category or follow a particular procedure, but the directions tell you how to act.

Examples:

Apply *only* when control is possible ...

Apply pesticides only when needed. Apply only to crops listed on the label. Apply only as directed with proper equipment.

Classification can point you to what you should avoid. Restrictions like these direct you to choose materials or techniques that are allowed and to comply with all relevant codes. You classify materials and operations so you can match codes and standards to appropriate actions.

Examples:

Never apply insecticides to fruits and vegetables when in bloom. The **Bees Act** prohibits this.

Caution!

Do not clean, oil, adjust or repair any machine while it is running. Stop the machine and lock the power switch in the “off” position.

Classification can instruct you how to proceed. To follow directions, you need to know which things are included in the general classification term (solvents, industry standards, safety codes) and which details you need to classify. Then, you can apply the instructions properly.

Examples:

Many pesticides are toxic to fish. **Do not use near streams or ornamental ponds.**

It is safe to apply a chemical on a fruit or vegetable **only** if directions for that crop appear on the label of the product.

Classification can define a category of items, and what you must know about its use, safety, and handling etc.

Examples:

Controlled products fall into six classes of hazards. Each class is identified by a symbol. For each class, identify uses, ingredients, hazards, clean up, etc...

Labels with the word *Domestic* are for home gardens. Home gardeners must not use products labelled with any of the following: *Agriculture, Commercial, Industrial or Restricted*.

Under no circumstances, eat, drink or smoke while applying pesticides.

Classification identifies problems and causes. Once you know where to look for the causes of a problem you can begin to classify specific details of the cause of a particular problem.

Examples:

Using incorrect lubricant fluids could result in tool failure.

PART III

USING CLASSIFICATION

Use classification to achieve the right result. What are the results of a wrong or poor choice?

Example: What results can you expect from garden equipment if you use a lubricant only when you happen to think about it? What if you've stored the lubricant in a rusty container? To maintain the life and performance of equipment, you need information about the right type of lubricant, how often to use it, and how to store it.

Getting the wrong information

If you are not using the right information, the result of your choice could be very different from the desired one. Equipment may be well designed and manufactured, but choosing the wrong lubricant could result in corrosion of metals and excessive wear to parts. In fact, it could result in equipment failure.

Getting the right information

Understanding information often involves sorting out one set of details from another. When you read, pay attention to special instructions, manufacturer's directions or textbook directions that use classification to point out or tell you how to proceed.

Examine it all to ensure you meet the criteria.

Example: Your job is to perform a garden service.

1. *Understand the conditions:* The garden service must do the following:

- reduce or eliminate unwanted plants,
- be performed expertly with safe equipment and appropriate products,
- result in the desired appearance, and
- come in at the estimated cost.

2. *Understand the factors* or group of factors to get you these results. Therefore, you list the factors that relate to the list above. It will include, but not be limited to, the following:

- your efficiency and skill level,
- type and amount of plant problem,
- type and condition of soil, and
- service provided to meet the conditions.

3. *Assemble information* for a detailed, complete list of conditions and product methods and implements factors. You can then relate this list to the next task:

- find the right products, and
- ensure they match the conditions for the job.

As you read to understand characteristics of products and equipment, you will learn how to avoid problems. When you have collected and assessed information, you can find the right fit. You can investigate the range of choices and select the best one.

At some point, you will put two (or several) lists of information together to make a choice. You may also have to decide which feature on your list is the most or least important. Often, you will need one, two or more sources to complete your task.

What is the situation?

To make the right choices, assess the situation:

- ◆ look at a requirement or group of requirements;
- ◆ understand them; and
- ◆ choose a product or process to suit the requirements.

You need to be sure you create solutions, not problems. Let's look at the type of situations you will want to avoid:

- redoing the job
- damaging any plant or tool
- creating safety risks, and
- finding yourself with the wrong tools or short of material

Passage 3, below, provides a brief description of plant nutrients. Look at the categories of plant nutrients, then the features (or group of features) of each group so you can select appropriate products for given situations. **Read Passage 3 and answer the questions that follow. Answers are at the end of this skills unit.**

Passage 3 Plant Nutrients

Nutrients are essential to the plant's health and development. They are drawn from soil at different rates depending on the plant's stage of growth. Nutrients fall into two categories – *major* and *micro* – according to the amounts used by the plant. All fertilizers containing these nutrients can be toxic to the plant if too much is applied or if it is too concentrated. Fertilizers also dissolve in moisture at different rates which affects absorption.

Major nutrients include nitrogen, phosphorus, potassium, calcium, magnesium and sulphur. Deficiencies in lawn and garden soils are most likely to be nitrogen, phosphorus, and potassium. It is unlikely that calcium and magnesium will be deficient except in sandy soils or those with low pH levels. Fertilizer will be beneficial to plants if it is suited to the soil fertility levels. If soils have low infertility levels, plants will respond to applications of nitrogen, phosphorus and potassium. Be cautioned that excessive fertilizer can result in poor flowering as the plant becomes too tall and leafy. This spindly growth may cause the plant to bend or be flattened by heavy rains or wind.

Micronutrients are required by plants in small quantities. They include zinc, manganese, iron, copper and boron. Most lawn and garden soils contain these nutrients in sufficient quantities. Deficiencies may occur in sandy soils, in back-filled areas or in soils that are too alkaline. The most common micronutrient deficiency is iron chlorosis caused by lime in soil. It will affect azaleas, rhododendrons, blueberries, *Hydrangea macrophylla* and pin oak. Symptoms include yellowing leaves with green veins which may worsen to yellow or whitened leaf tissue with burning around the edges.

Questions:

1. For which soils would a hort/arb technician add nitrogen, phosphorus and potassium?
 - a) lawn and garden soils, and soils with low fertility levels
 - b) soils that are too alkaline, too moist
 - c) back-filled areas, lime soils

2. Which are **not** suitable situations for treatment with fertilizers?
 - a) soils with low infertility levels
 - b) plants with tall, leafy, spindly growth
 - c) azaleas affected by iron chlorosis

3. Which treatment would you choose for plants with yellowing leaves and green veins?
 - a) applications of major nutrients
 - b) applications of micronutrients
 - c) no applications of nutrients

4. Plants which respond to fertilizer applications should be treated regularly.

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In Passage 3, you had information in front of you from which to work. As you looked for answers, you may have underlined words or made notes in the margins that help you eliminate details that don't apply or to highlight something important. Regardless of how you approached this passage, your object is to match the given process to the situation.

To make the right choice, you need to do the following:

- ◆ look at a requirement or group of requirements;
- ◆ understand them; and
- ◆ choose a product or process to suit the requirements.

To make the good decisions, you need to know about each situation in detail. It is just as important to understand why you would **not** choose a product or procedure as it is to understand why you would choose it.

Organize the information

The process of pulling information together will help you make your decisions. Take the time to consider each factor and to understand it. Keep asking questions. Consider the details you would pull together to answer your supervisor's questions. Make sure you cover all possibilities to fit the requirements of a job.

Headings

Apply classification of information to your own notes to organize information. Underline or highlight what is relevant to your project or studies. Eliminate or set aside details that are not.

Enter details under headings in a notebook. This is classification of information applied to your own notes.

Example: You can group information on classes of plants or soil problems you run into in your area. As you proceed through a course or job, you can add to this information in a logical, ordered way. You can then add the solutions that work and note what hasn't worked. It will help you keep the big picture more clearly in sight. As you develop information categories, it's easier to sort out and understand details about individual items.

Organize your thoughts

You need to organize information methodically. By classifying information, you can learn why a principle or technique applies to a group of situations or why it applies to one situation only. You can identify types of problems, determine their causes and find solutions. You understand and why a recommended welding technique failed to make a good weld. You can record what changed and whether or not you need to change a product or procedure.

CONCLUSION

Your job is to assemble information as thoroughly as possible to help answer the question: "Which is the best choice for this situation?" By starting from broad categories and working toward the specifics of single products, you can investigate the range of choices and select the best one.

Always work from reliable sources found in text and trade books, tables, manufacturers, suppliers and the experts in your field. If the desired result is a sturdy bin with smooth joints and yours will not stand straight and has a seam you'd like to hide, you haven't achieved your goal. In addition, it probably cost you just as much money, time and energy as the right result would have.

Summary

1. **Classification is a process.** A general, broad group or category contains a large number of items. A narrower category will hold fewer items.
2. **Match a list of features against a list of requirements.** Match products, information, and methods to a list of features. The question, "*which one*", narrowly defines the items that will fit.
3. **Use questions in your research to find relevant factors and conditions.** Look for the items that fit the grouping or classification.
4. **Know your purpose for classifying information.** Some of the details fit what you want; others can be eliminated because they do not fit the criteria.
5. **Classify features and conditions to determine errors, inappropriate or unsuitable choices.** Your own experience, knowledge and access to experts will help direct your search.

6. **You may have to decide which feature is the most important.** A choice may mean a compromise or a balance of factors.

7. **Understand characteristics of products;** understand the advantages and disadvantages of features. This will help you understand why something is a good choice, the best choice or *the only choice* for a particular situation.

ANSWER PAGE

PART I **Passage 1, Insects and Damage**

1. All insects cause damage to plants, but the type of damage is different for each category of insect.

F This question makes two statements: the first is about the characteristics (behaviour or features) of an entire category (insects); the second is about characteristics of groups within the category. Because the first part is false, choose False as the answer: All insects **do not** cause damage. The second part of the question may be true though Passage 1 covers only two of the five categories of insects categorized as *pests*.

2. Defoliators do **not** attack evergreens.

F Choose false. This question looks at the type of plant rather than the eating habits. According to Passage 1, one type of sucking insects (mites) attacks evergreens, but the types of leaf or plant attacked by defoliators are not listed. The types or categories of plants attacked by each insect group is another area of classification of information.

3. Which types of defoliators feed in colonies?

a) caterpillars and sawflies

This question asks you to match behaviour to a category of damaging insects. The point of matching characteristics is to help you understand what to look for on a plant, how damage occurs or how to eliminate a category of insect. Answer a) is given, but check to see if leaf eating beetles or leafminers feed in colonies.

4. How would you identify damage which is characteristic of sucking insects?

d) all of the above

This question asks, "What characteristics would I look for in a particular situation?" The particular situation is an attack of sucking (rather than defoliating or other type) insects. The type of damage is found in the last two paragraphs. The answers list types of damage in a different order than in Passage 1.

PART II **Passage 2, Abiotic Injury**

1. For which type of abiotic damage can the horticulturist/arborist offer improvement?

d) all of the above

Paragraph one states the hort/arb technician can offer *some control* through plant selection and *improved growing conditions*. It offers a few examples of plant selection and how to improve growing conditions. Details will be available to the hort/arb technician once the type of damage is identified. You cannot control the severity of air pollution but you can choose

less sensitive plants (Answer a). Amounts and application of fertilizer can be corrected (Answer b). Incorrect herbicide and application can be avoided (Answer c).

2. Injury to either the root system or the leaf system is equally serious to plant health.
F Both systems are affected, but not *all parts* are affected equally. Paragraph one states that the damage is more serious to the root system. A category of disease or injury may affect species in different ways or it may affect different parts of a single species.
3. Which characteristics describe the type of injury caused by soil compaction?
c) premature ageing of leaves, chlorosis

The cause of injury should be identified. The hort/arb specialist needs to recognize and match the characteristics of damage to choose the correct method for improvement.

4. Species planting (selecting plants for the set of conditions) will improve a plant's resistance to abiotic injury.
F This is true for some types of abiotic injury (such as salt runoff/spray or air pollution) but not all. Some causes of abiotic injury are careless application of herbicides/fertilizers or girdled roots. In these cases, species planting will not improve the chances of success. In these cases, the causes of damage should be removed.

PART III Passage 3, Plant Nutrients

1. For which soils would a hort/arb technician add nitrogen, phosphorus and potassium?
a) lawn and garden soils, soils with low infertility levels

This question asks you to match nutrients from the major category to a type of soil. Answer a) matches soil types to the nutrients listed in the question. Soils with too much alkaline may require micronutrients; too moist soils are not listed as a problem (Answer b). Back-filled areas and lime soils may require treatment with micronutrients (Answer c).

2. Which are **not** suitable situations for treatment with fertilizers?
b) plants with tall, leafy, spindly growth

This asks “which one” or “which type” is **not suited** for a certain type of job. When a type of service or category of products is not suited for a situation, it is essential to avoid its use. Soils with low infertility levels may require major nutrients (Answer a). Plants affected by iron chlorosis may require micronutrients (Answer c). Unless you know a fertilizer is required and the category, do not use. Read the manufacturer's labels for specifics. Wrong applications can be damaging.

3. Which treatment would you choose for plants with yellowing leaves and green veins?
b) applications of micronutrients

The answer is in the third paragraph. All categories of nutrients are not right for all plant problems. Watch for situations which exclude a category or several categories. For example, in some situations, such as for spindly plants found in Question #2, no application is required (Answer c). The condition described above may be symptoms of iron chlorosis which is a deficiency of micronutrients (Answer b).

4. Plants which respond to fertilizer applications should be treated regularly.
F There's not enough here to answer True so answer False until you gather more facts. The passage doesn't tell you how often to apply (that is, *regularly*) a fertilizer even if it is required. Further reading from your trade materials and your own experience might give you a clearer answer.