RIGHT OF WAY PEST CONTROL

Practice Questions - Answered

INSTRUCTIONS: Have a highlighter and a colored pen handy. As you study through the text, look for the answers to the following questions and mark them in the book or write them on the sheet provided. Also, as you study through the text, ask yourself, "If I know this information will I be a better applicator?" Before beginning take a few minutes to read through the Terms and Definitions (pages 54-57) to review some of the vocabulary. In addition, practice the Review Questions (pages 58-60). In order to allow for quick grading, most questions on the test are in the form of Multiple Choice or True and False; but this is not necessarily so.

1. Name types of areas that involve common transport which are included in the general term Rights-of way. (Page 1)

Rights-of ways are areas involved in common transport including:
highways and county roads,
public airports,
railroads,
electric utilities,
pipelines,
public surface drain ways,
public paths and trails.

2. List values associated with maintenance of rights-of-way. (page 1)

These values may include the rights-of-way as:
habitat for livestock, wildlife, wild flowers, herbs and rare plants and the aesthetics of the landscape

3. List the 10 vegetational areas in Texas. (Page 4)

VEGETATIONAL AREAS OF TEXAS

1. Pineywoods
2. Gulf Prairies and Marshes
3. Post Oak Savannah
4. Blackland Prairies
5. Cross Timbers and Prairies
6. South Texas Plains
7. Edwards Plateau
8. Rolling Plains
9. High Plains
10. Trans-Pecos, Mountains and Basins.

4. Texas is divided into ten vegetational areas. List the four environmental factors(s) that can be used to map and predict the combination of plants growing in the area. (Page 4)

Climatic, edaphic, topographic, and biotic.

5. List examples of climatic factors that affect the environment. (Page 4)

   (rainfall, temperatures, etc.)

6. List items that are considered edaphic environmental factors. (Page 4)

   Texture, structure, depth, and permeability are important soil (edaphic) factors

7. List examples of topographic factors that affect the environment. (Page 4)

   Slope, exposure (north, south, etc.), general roughness and elevation

8. Define biotic factors that affect the environment. (Page 4-5)

   wildlife, insects, disease, other plants and the direct effects of man's activities, all influence plant distribution and growth.

9. List examples of biotic factors that affect the environment. (page 4-5)

   Types of plants (distributions of vegetation) within rights-of-way are dominated by man's disturbance of the natural condition (a biotic factor)

Be familiar with the description of the various weeds listed in the booklet. (pages 5-7)
Examples weed problems:

johnsongrass	bromegrasses	rescuegrass	Japanese bromegrass
downy bromegrass	ryegrass	rosette dichanthelium	(Scribner panicums)
common sandbur	grassbur	barnyardgrass	bermudagrass
blood ragweed	common broomweed	western ragweed	sunflower
asters	King Ranch bluestern	hairy crabgrass	buffledgrass
cattails	mesquite	huisache	retama
macartney rose	baccharis	Yaupoh	elm
willow	oaks	hardwood species	common or eastern persimmon
salt cedar			

10. List two weed control methods used along rights-of-ways. (Page 7)

    mechanical
    chemical

11. Explain why herbicide control would be used rather than mechanical control. (page 8)

    They are considered cheaper, easier and better than most mechanical methods - this may not always be true.

12. What factors must be considered before selecting a herbicide to treat a right-of-way. (page10/8)

Physical, biological, and environmental factors that would favor selectivity
Product labels
Applicable herbicides- where to use each; which ones are selective, contact and soil sterilants; and the characteristics of each.
Reaction of each herbicide in the environment and the mode-of-action within the plans to be controlled
Correct time to apply
Kind of equipment, nozzle size, and pressure for proper application
Mixing and application procedures necessary for success

13. Define warm season annual. Give examples. (page 8)

Annuals- complete their life cycle in less than one year. Annuals are classified as warm- and cool- season plants - ryegrass - crabgrass - rescuegrass - grassbur - and many others

14. Define warm season annuals. Give examples. (page 8)

Warm-season annuals germinate in the spring and complete their life cycle by fall. Large crabgrass, giant ragweed, common ragweed, and wooly croton,

15. Define cool season annual. Give examples. (page 8)

Cool-season annuals germinate in the fall and early winter and complete their life cycle in the spring or early summer. wild oat, cheat, and little barley.

16. Define biennials. Give examples . (page 9/13)

Biennials - grow vegetatively one year, produce seed the second year, then die.
Examples: wild carrot, mullein, and some thistles.

17. Define simple perennials. Give examples. (page 9)

Perennials - persist more than two years reproducing vegetatively or by seed.
Simple perennials reproduce only by seed. Examples of cool-season species are curly dock, and common dandelion.

18. Define creeping perennials. Give examples. (page 9)

Creeping perennials reproduce by seed and by stolons, rhizomes, or tubers. Examples of warm-season species: bermudagrass, johnsongrass, and purple nutsedge.

19. Compare the differences between 'strong' and 'weak' perennials. (page 7/15)

Strong perennials (reproduce by seed and roots) TRUE FOR CREEPING AS WELL. A better term for 'strong' perennials might be 'woody' perennial since that is what is being included in the group. Examples of warm-season species are: mesquite, huisache, and Macartney rose.

20. Explain why mesquite is particularly difficult to control. (page 7/15)

The extensive root system and underground buds near the root crown that sprout rapidly following top disturbances make mesquite difficult to control.

21. Are weed seed ever able to germinate after passing through the digestive tract of the animals that eat them? (page - see Table on 10)

Many seed pass through digestive tracts of animals and remain viable. Forages or grain feeds may contain weed seeds.

22. Define dormacy. Give examples of seed dormacy. (page 10)

Dormacy is a type of resting stage for the seed. It may control the time of year that certain species germinate or even delay germination for years.

23. List as many factors as possible that affect seed dormacy. (page 10)

Factors affecting dormacy include 1) temperature, 2) moisture, 3) oxygen, 4) light, 5) resistant seed coats and 6) immature embryos. After ripening, prechilling breaks dormacy of some grass seeds.

24. Define a selective herbicide. (page 10/55)

Selective herbicides. Not all plants react the same way to any one herbicide. Response differences of various plant species to herbicides are exploited to obtain selectivity which is the control of certain plants without evident or appreciable harm to others making-up the plant community in a given site (field, meadow, right-of-way). ***Physical, biological, and environmental factors*** alone or in combination account for, or may be exploited to result in, selectivity.

25. Do all herbicides affect all weeds in the same way? (page 10/13)

Understand selective - Degree of control a any stage varies according to the weed species and the herbicide used.

26. List the kinds of differences between plants that would allow selective control. (page 11)

Biological factors permitting selective control include 1) morphological (structural) and physiological (functional) difference among plant species

27. List morphological features of the leaf surface that may affect deposition, absorption, and retention of a herbicide. (page 11)

Leaf structure characteristics such as pubescence (hairiness) or waxiness and leaf angle - all morphological features of a plant- affect the ease with which a leaf surface may be wetted and thus deposition and retention of a herbicide.

28. List physiological features of the leaf surface that may determine the susceptibility of a plant species. (page 11)

Plant species may differ in their ability to inactivate a herbicide- a physiological difference that determines the susceptibility of plant species.

29. Define a non-selective herbicide. (page 11)

Non-selective herbicides. Non-selective herbicides kill almost all plants in the application area. They may leave the soil nonproductive for a year or more. Depending on the chemical and the rate at which it is used.

30. Define a plant growth regulator. (page 11/56)

A substance used for controlling or modifying plant growth processes (generally slows/shortens growth) without appreciable phytotoxic effect at the dosage applied.

31. Define a contact herbicide. (page 11/54)

A herbicide that causes localized injury to plant tissue where contact occurs. These herbicides commonly disrupt cellular membranes and increase permeability of these membranes resulting in loss of fluid from cells by leakage thus desiccating the plant tissue disrupt cell membranes. (page 11)
Contact/membrane disrupters

32. What is a cell membrane? (page 11)

Not clear in manual but this is the outer covering of the cell

33. Define translocation (translocated herbicide). (page 11/57)

These herbicides may be absorbed by leaves or roots or both and move readily either in the phloem or the xylem within the plant. Translocated herbicides kill inhibiting or disrupting some vital physiological process such as cell division or tissue development or a metabolic process such as photosynthesis or respiration.

34. Define a system herbicide. (page 11/57)

Synonymous with translocated herbicide. The term "systemic" more often is used to describe action of insecticides or fungicides.

35. Define phloem. (page 56)

The living tissue in plants which function primarily to transport metabolic compounds from the site of synthesis or storage to the site of utilization.

36. Define xylem. (page 57)

The non-living tissue in plants which function primarily to conduct water and mineral nutrients from roots to the shoot.

37. Are selective herbicides always selective? What might cause a selective herbicide to become non-selective? (page 12)

Soil residual herbicides that are selective in some situations may be used non-selectively by increasing the amount applied.

38. Define pre-emergence. (page 56)

(1) Applied to the soil before emergence of the specified weed or crop. (2) Ability to control weeds before or soon after they emerge.

39. Define post-emergence. (page 56)

(1) Applied after emergence of the specified weed or crop. (2) Abitily to control established weeds.

40. Name and describe the four growth stages that grasses and broadleaf weeds go through during their life cycle. (page 12-13) See discussions in manual

41. Define the vegetative stage of plant growth. (page 12)

Plant is producing stems, leaves, and roots

42. When are control methods for annual weeds most effective? (page 13)

Controlling annual weeds is most readily accomplished during the seedling stage - See chart

43. When are control methods of most weeds most difficult? (page 13)

See chart

44. When are perennial broadleaf weeds best controlled? (page 14)

Controlling perennial weeds is most readily accomplished during the bud stage - See chart

45. Why would you need to know what weed species was being controlled. (page 14)

Degree of control varies according to the weed species and the herbicide used

46. Are stem applications of herbicides effective at controlling woody plants? Name two types of stem applications. (page 15)

Yes - 1) as a basal spray or 2) cut surface treatment at any time of the year

47. Compare stem applications of herbicides as a basal spray or a cut surface treatment. (page 15)

Soak area around base where buds may be 4-8 inches below ground or apply directly into cuts that expose the phloem thus increasing movement in the plant.

48. Explain why grasses may be more difficult to control than broadleaf weeds by mowing. (page 15)

The growing point of a seedling grass is protected below the soil surface. The plant will grow back if the herbicide or mechanical method does not reach the growing point.

49. Explain why established perennial broad-leaved plants are hard to control. (page 16)

Established perennial broad leaved plants are hard to control because of the many buds on the creeping roots and stems. Also, many woody plants, either cut or uncut, sprout from the base or root.

50. How would leaf shape, hairs, and a waxy cuticle affect herbicide penetration? (page 17)

All can prevent uptake by the plant - if the herbicide stays on the outside of the plant it is not effective.

52. Explain the effect of low or high humidity on herbicide penetration. (page 17)

A foliar-applied herbicide enters the leaf more easily and rapidly at high humidity than at low humidity. The leaf stoma are more open at high humidity.

53. Explain the affect growing under low or high humidity has on the wax and cuticle of a plant. (page 17)

Plants grown under high humidity are more tender and have a thinner layer of wax and cuticle therefore herbicide penetrate more easily.

54. Explain the effect frequent hot, dry winds will have on stomata function and wax accumulation at the plant leaf surface. (page 17)

Frequent, hot dry winds cause stomata on the plant surface to close, the leaf surface to thicken and the way layer to harden. These factors make it harder for herbicides to penetrate leaves.

55. Name the most abundant charge on soil particles. (page 17)

Soil particles have negative charge sites

56. Name the charge that a herbicide that will not leach would have. (page 17)

Herbicides with positive charges, tie-up on the negative charge sites of soil particles in both clay and organic matter (herbicides containing As = arsenic and P = phosphorus are also tightly adsorbed to the Fe = iron and Al = aluminum silicates in clay particles in the soil but less tightly adsorbed by organic matter)

57. Explain the difference between texture and structure. (page 18)

Soil texture is the amount of sand, silt and clay in the soil. Soil structure is the way the individual soil particles are arranged and cemented together - good soil structure is necessary for good root growth.

58. Compare the ability of sand, silt and clay to tie-up herbicides in the soil. (page 18)

Sand - least and clay - most

59. Name the soil type that would allow the highest amount of leaching. (Page 18)

Sand

60. Name the soil type that would allow the least amount of leaching. (Page 18)

Clay

61. Name the soil component that has the most negatively charged sites. (Page 18)

Organic matter

62. Name the soil component that is most adsorptive. (Page 18)

Organic matter has many more negative charge than even the finest soil particles and is the most adsorptive type of soil particle.

63. Explain how rapid plant growth is related to the herbicide susceptibility of a plant. (Page 19)

Temperatures favoring more rapid plant growth generally cause greater susceptibility of a plant to a herbicide.

64. Define persistent. (Page 18-19)

The fate of a herbicide in the soil depends on herbicide characteristics, application rate, soil texture, organic matter, precipitation, temperature, and surface flow. Herbicides can remain concentrated at he soil surface, partially leach (diluting effect) or move through the soil in a band, allowing new weeds to grow above. The time that the soil-applied herbicide remains active in a soil is very important in relation to control. If a herbicide is subject to breakdown by microorganisms, it usually remains for shorter periods in soil in organic matter content.

65. It is possible for a herbicide, applied at the recommended rate, to harm susceptible crops planted in normal rotation after harvesting the treated crop? (Page 18/19/56)

Yes

66. Is it possible for a herbicide, applied at the recommended rate to interfere with regrowth of native vegetation in non-crop sites for a extended period of time? (Page 18/19/56)

Yes

67. What is a 6-1 horizontal to vertical drop. (Page 20)

A drop of one foot vertically over a horizontal distance of six feet (a 6:1 horizontal to vertical slope)

68. What effect does slope have on herbicide movement from the target area. (Page 20)

The greatest potential for movement from the target area exists on slopes when runoff producing rains occur before the herbicide has leached into the soil. Rapidly moving herbicides may cause an unsightly appearance to the right-of-way and may damage plants outside of the area. For example, grass turf killed by herbicides moving down-slope may result in a bare soil surface subject to erosion.

69. Herbicides that are most susceptible to movement have: A. Water solubility (low) or (high) and B. Soil adsorption (low) or (high) - (page 21)

A - high B - low

70. List three characteristics of herbicides that may be a potential hazard to ground water. (Page 21)

1) highly soluble in water 2) nor readily degraded either chemically or by microorganisms and 3) not strongly adsorbed to soils.

71. If a herbicide is soluble in water, if it is not readily degraded either chemically or by microorganisms, and if it is not strongly adsorbed to soils, explain how it could effect ground water? (Page 21)

It could persist long enough to move into the ground water as a contaminant that may harm other plants (or possibly people, ect) using the water. See whole paragraph

72. How are these agencies, Texas Department of Health, Texas Natural Resource Conservation Commission, formerly the Texas Water Commission, Texas parks and Wildlife Department, involved in the using of herbicides near public waters. (Page 21)

They can advise you on safe use of pesticides near water and the precautions that should be taken.

73. Define drift. (Page 21-22)

Herbicide drift is defined as "the airborne movement of applied herbicide spray droplets, granules or dust particles to places other than the target areas"

74. Define particle drift.(page 21-22)

(1) spray drift is that part of the spray that moves out of the target areas and deposits on adjoining property, (2) drift is the complex movement of pesticide out of the target area, and (3) drift is the movement of spray droplets away from the spray site before they deposit.

75. Define vaporization. (Page 57)

Vaporize - Evaporate, become a gas.

76. Define vapor drift. (Page 22/24/57)

Vapor drift- the movement of chemical vapors from the application area. Some herbicides, when applied at normal rates and normal temperatures, have a sufficiently high vapor pressure to change them into vapor from which may cause injury to susceptible plants away from the application site. Note: Vapor injury and injury from spray drift are often difficult to distinguish.

(Page 22)

77. A___30_____ micrometer droplet is the size of cloud particles.

78. A___200____ micrometer droplet id the size of drizzle or a fine agricultural spray.

79. A___500____micrometer droplet is the size of light rain or medium agricultural spray.

80. A___1000___ micrometer droplet is the size of moderate rain or coarse agricultural spray.

81. Explain how droplets with a larger or smaller diameter are related to mass median diameter. (Page 22)

Volume median diameter is the diameter at which half the spray volume is in droplets of large diameter half is in droplets of lesser diameter.

82. List three groups of variables that are associated with spray drift. (Page 23)

1) product-related, 2) equipment related, 3) weather -related

83. List four product related variables associated with herbicide drift. (Page 23)

1) viscosity, 2) vapor pressure, 3) surface tension and 4) density

84. List four equipment related variables associated with herbicide drift. (Page 23)

Equipment-related variable include 1) nozzle size, 2) nozzle type, 3) spray pressures, and 4) spraying height. 5) other metering and dispersal equipment

85. List six weather-related variables associated with herbicide drift. (Page 23)

Weather-related variables include 1) air temperature, 2) relative humidity, 3) air stability, 4) horizontal and vertical air movement, 5) sunlight (radiation) and 6) rain.

86. Define viscosity. (Page 57)

Viscosity- the internal resistance to flow exerted by a liquid.

87. Explain how the viscosity of the spray mix relates to droplet size. (Page 23)

Increases viscosity usually produces larger droplets therefore decreased viscosity produces smaller droplets

88. Using the same nozzle and spraying pressure, does water or oil produce smaller droplets? (Page 23)

Carriers having lower surface tension may give an increase in the proportion of small droplets in the spray spectrum.

89. Compare the changes in viscosity of water and oil with temperature change. (Page 23)

Viscosity of a liquid generally decreases with an increase in temperature.

90. Which of these liquid carriers (water, diesel fuel, and cottonseed oil) is most viscous at room temperature? (Page 24)

Viscosity is (water- 1.0, diesel fuel- 10, and cottonseed oil- 70)

91. What weather condition is most likely to cause herbicide to volatilize (vaporize)? (page 24)

High temperature

92. Define adjuvant? (Page 24/49/54)

Adjuvant - Any substance in a herbicide formulation or added to the spray tank to improve herbicidal activity or application characteristics.

93. Define surfactant. (Page 49/57)

Surfactant - A material which improves the emulsifying, dispersing, spreading, wetting or other surface- modifying properties of liquids.

94. Describe the effect of adding polyvinyl polymer to a spray mix. (Page 24)

Polyvinyl polymer 1) produces a wider spectrum of droplet sizes and 2) reduces the number of small droplets 3) increases the spreading of the spray on the leaf surface and 4) reduces the evaporation rate of droplets

95. What effect does a Polyvinyl polymer adjuvant have on the spectrum of droplets sizes? (Page 24)

Increases

96. If adding a drift additive or making an invert emulsion makes a spray solution thicker, will the sprayer require adjustment? (Page 25)

NO - Invert emulsion and other drift additives make the solution thicker usually require no sprayer adjustment. YES - Changes in flow rate affect herbicide application rate; thus, check calibration with the adjuvant added to the spray mixture.

97. Define a conventional (standard) emulsion. (Page 25)

A standard water emulsion has the soil particle surrounded by a water film - water is continuous phase and oil is dispersed phase.

98. Define an invert emulsion. (Page 25/55)

In the invert emulsion, water is dispersed as microscopic droplets surrounded by oil - oil is the continuous phase and water is the dispersed phase

99. Does adding an adjuvant to the herbicide/carrier mixture have any effect on resistance to flow? (Page 25)

Adding an adjuvant to the herbicide/carrier mixture may alter resistance to flow.

100. Describe the effect operating pressure has on droplet size for a given nozzle. (Page 25/26/35)

Droplet size decreases for a given nozzle as operating pressure increases. Increasing shearing forces as the fluid is forced through the nozzle at greater velocities reduces droplet size. See Tables 3 (8002 flat fan nozzle tip) and 4 (8004 flat fan nozzle tip)

101. Describe the effect changing nozzle orifice size has on droplet size for a given operating pressure. (Page 26)

Droplet size (increases) as orifice size (increases)

102. Given the following combinations which would be **most likely** to cause drift? Page 26)

(a) 8001 tip at 20 psi
(b) 8004 tip at 40psi
(c) 8001 tip at 40 psi
(d) 8004 tip at 20 psi

C

103. How does horizontal wind speed change with height? (Page 27)

Horizontal wind speed increases with height (release sprays as low as possible over the target to allow uniform application)

104. Does vertical air movement from ground heating or air moving over a rough surface affect the path of small droplets? (Page 27)

Vertical air movement affects the trajectory of small droplets.

105. When atmospheric conditions has air that is cooler at ground level and gets warmer with an increase in height this is called a _____ condition. (Page 28)

In a temperature inversion, air is cooler at groung level, warmer up to a certain height and then cooler above this height. (See Figure 2). There is no upward air movement and the air is very stable so small spray particles will have a minimum upward movement and may form a mass or cloud of particles that can drift for great distances with the slightest lateral wind movement and settle as a concentrated mass, causing a hazard.

106. When atmospheric conditions has air that is warmer at ground level and gets cooler with an increase in height this is called a _____ condition. (Page 28)

Under normal atmospheric conditions (called *a lapse condition*), air is warmer at ground level and gets cooler with an increase in height. With lapse there is upward air movement resulting in unstable atmospheric conditions. With upward air movement, small airborne droplets and particles may spread over a larger area downwind in a concentration that is less likely to constitute a hazard, also some of the chemical may be degraded by sunlight.

107. The condition described in 105 usually develops at what time of day? (Page 28)

An inversion condition tends to develop in the early morning or late afternoon. The early morning inversion is normally replaced by a lapse condition; whereas, the late afternoon inversion normally replaces a lapse condition.

108. Describe the lifetime os a water droplet as it relates to air temperatures and relative humidity. (Page 29)

The lifetime of a water droplet is reduced at higher temperatures and as water vapor or humidity is reduced in the surrounding air.

109. How does droplet size relate to drift potential of herbicide sprays? (Page 31)

Spray droplets produced at the nozzle that are less than *100 micrometers* in diameter and larger droplets which may become smaller than *100 micrometers* in diameter before reaching the intended target, are considered to represent the primary drift potential of herbicide sprays.

110. Give the size droplet (equal or less than) that represents a primary potential. (Page 31)

100 micrometers

111. Who controls most variables that affect droplet size and thus drift potential? (Page 31)

Under control of the applicator

112. List four reasons why special are should be exercised when using herbicides along right-of-ways that cross areas where livestock are confined. (Page 32)

Limit herbicide use in right-of-way areas extending across pastures and crop land to those products labeled for use in such areas. 1) Livestock have been poisoned by use of toxic materials on or near grazing areas. 2) Some poisonous plants may become more palatable after spraying. 3) Some treated plants (such as wild cherry) may produce prussic acid or other toxicant that can poison animals. 4) Even if a herbicide does not poison livestock, the chemical may show up as a illegal residue in meat, milk or crops making these products unsalable.

113. If complete spray coverage is required for optimum kill on target vegetation, what is the possibility of serious damage by drift to desirable plants near those being sprayed? (Page 32)

When working with ornamental trees and shrubs, use herbicides that require thorough spray coverage to injure or kill vegetation. This minimizes the possibility of damage to desirable plants near those being sprayed.

114. When are bees most active? (Page 32)

It is best to apply herbicides in the early morning or in the evening when bees are *not active*. Bees are most active in the middle of the day.

115. The best time to apply herbicides in when the bees are most active. (TRUE) or (FALSE) (Page 32)

False

116. What effect does inaccurate equipment calibration have on performance of a herbicide product. (Page 33)

Performance of any herbicide depends on proper application over an area. Calibration is adjusting equipment to apply the desired herbicide-carrier rate.

117. The pressure gauge on a hand sprayer should be re-pressurized when the pressure drops about _____ pounds per square inch from the initial reading. (Page 33)

10

118. The hand held sprayer that is operated by a constant-pressure positive displacement pump and that does not have to be pressurized is called a _____ sprayer. (Page 33)

Knapsack

119. Describe various types of equipment that may be referred to as a knapsack sprayer.(page 33)

Any sprayer that is carried on the back like a backpack may be referred as a knapsack sprayer.

120. How does the nozzle flow rate relate to the nozzle tip size and nozzle pressure? (Page 35)

Nozzle flow rate varies directly with the size of the tip and the nozzle pressure. Increase flow rate by installing a larger nozzle tip or raising pressure. Decrease flow rate by installing a smaller nozzle tip or lowering pressure. For major adjustments in flow rate, change the size of nozzle tip. Use pressure increases or decreases to make only minor changes in flow rate because nozzle flow rate varies in proportion to the square root of the pressure.

121. What can be modified most easily to make minor changes in flow rate from the nozzle? (Page 35)

Pressure can be changed for minor changes only

122. How can a new pressure be calculated when the current nozzle flow rate and pressure the desired flow rate is known? (Page 35)

$$\frac{GPM1^2}{GPM2^2} = \frac{PSI1}{PSI2}$$ SEE EXAMPLE BELOW:

If the output is 0.3 GPM at 20 psi, what should the pressure be set at to deliver 0.6 GPM?

$$\frac{0.3^2}{0.6^2} = \frac{20}{PSI2} \quad (0.36)(20) = (0.09)(PSI2) \quad PSI2 = \frac{7.2}{0.09} \quad PSI2 = 80$$

123. If the output is 0.5 GPM at 40 psi, what should the pressure be set at to deliver 0.35 GPM?

$$\frac{GPM1^2}{GPM2^2} = \frac{PSI1}{PSI2} \qquad \frac{0.5^2}{0.35^2} = \frac{40}{PSI2}$$

$$\frac{0.25}{0.1225} = \frac{40}{PSI2} \quad (0.1225)(40) = (0.25)(PSI2) \quad PSI2 = \frac{4.9}{0.25} \quad PSI2 = 19.6$$

124. If the output is 0.6 GPM at 60 psi, what should the pressure be set at to deliver 0.4 GPM?

$$\frac{GPM1^2}{GPM^2} = \frac{PSI1}{PSI2} \qquad \frac{0.6^2}{0.4^2} = \frac{60}{PSI2}$$

$$\frac{0.36}{0.16} = \frac{60}{PSI2} \quad (0.16)(60) = (0.36)(PSI2) \quad PSI2 = \frac{9.6}{0.36} \quad PSI2 = 26.7$$

125. How is the nozzle flow rate and the sprayer groung speed related if you change one but want to keep the same number of gallons per acre?(page 35)

In order to keep the same gallons per acre, when you speed up the nozzle flow rate must be increases and when you slow down the nozzle flow rate must be decreased.

126. How is the pressure at the nozzle affected by check valves used to prevent nozzle drip compared to the square inch lower than the boom pressure indicated on the pressure gauge. (Page 35)

If check valves are used to prevent nozzle drip, the pressure at the nozzle may be 5 to 7 pounds per square inch lower than the boom pressure indicated on the pressure gauge.

127. How are the gallons per acre affected if spray width is changed and all other settings remain constant? (Page 35)

(GPA1)(width 1) = (GPA2)(width2) Example (20)(20) = (X)(10) X = 40
As width increases volume per acre decreases and as width decreases volume per acre increases.

128. How is the nozzle flow rate and the spray width per nozzle related if you change one but want to keep the same number of gallons per acre? (Page 35)

In order to keep the same gallons per acre, when you increase the spray width the nozzle flow rate must be increased and when you decrease the width the nozzle rate must be decreased.

130. How are the gallons per acre affected if sprayer ground speed is changed but all other variables remain constant? (Page 35)

(GPA1)(speed1) = (GPA2)(speed2) Example (20)(5) = (X)(2.5) X = 40
As speed increases volume per acre decreases and as speed decreases volume per acre increases.

131. Rank the spray gun, the swivel nozzle, the boomles nozzle, and boom nozzles from **Best**, most uniform spray distribution to **LEAST** uniform. (Page 36 must read and interpret page)

Most uniform-boom nozzles> swivel nozzle> boomless nozzles> spray gun-Least uniform

132. If the standard flat fan boom nozzles are 20 inches apart, the patterns should overlap at least _____ inches on each side (HINT- 40% overlap). (page 36)

8

134. Describe the process of filling a spray tank with water, adjuvant and herbicides (include all steps). (page 49-50)

1) Partially fill the tank with water, 2) begin agitating, 3) add the required herbicide and the adjuvant, 4) finishing filling the tank - Throughly mix the herbicide-water adjuvant mixture before spraying. Keep the agitator working if you have to stop spraying for a while before finishing.

135. Define absorption. (Page 54)

Absorption - The process by which a herbicide passes from one system into another, e.g., from the soil solution into a plant root cell or from the leaf surface into the leaf cells.

136. Define adsorption. (Page 54)

Adsorption - The process by which a herbicide associates with a surface, e.g., a soil colloidal surface.

137. Define diluent. (Page 54)

Diluent - Any gas, liquid or soil material used to reduce the concentration of an active ingredient in a formulation.

138. Define emulsion and emulsifier. (Page 55)

Emulsifier - A substance which promotes the suspension of one liquid in another.
Emulsion - One liquid suspended as minute globules in another liquid (for example, oil dispersed in water).

139. Define rate. (Page 56)

Rate - The amount of product, active ingredient, or acid equivalent applied per unit area or other treatment unit.

140. Define residue. (Page 56)

Residue - The quantity of a herbicide remaining in or on the soil, plant parts, animal tissues, whole organisms and surfaces.

141. Define solution. (Page 56)

Solution - A homogeneous or single phase mixture of two or more substances.

142. Define tolerance. (Page 57)

Tolerance - (1) Ability to withstand herbicide without marked deviation from normal growth or function. (See susceptibility.) (2) Concentration of herbicide residue allowed in or on raw agricultural commodities.