

The Science of Agriculture

Plant Science

1 Identify plants & plant diseases. 0102.1

- 1 Identify plants including herbaceous plants, annual, biennial, and perennial types. 0102.1.1
 - 2 Identify weed species. 0102.1.2
 - 3 Demonstrate knowledge of the systematic classification of plants. 0102.1.3
 - 4 Assess and identify symptoms of crop diseases. 0102.1.4
 - 5 Explain the processes and benefits of crop rotation. 0102.1.5
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2 Describe entomology. 0102.2

- 1 Identify insect pests. 0102.2.1
 - 2 Explain the steps of metamorphosis. 0102.2.2
 - 3 Define Integrated Pest Management. 0102.2.3
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3 Demonstrate understanding of soil preparation, propagation techniques, and regulating environmental conditions in plant production systems. 0102.3

- 1 Prepare soil for planting, and plant or transplant seeds, bulbs, and cuttings. 0102.3.1
 - 2 Plant seeds in specified areas and count the resulting plants to determine the percentage of seeds that germinated. 0102.3.2
 - 3 Perform duties including propagating varieties of plant materials, collecting and germinating seeds, maintaining cuttings of plants, and controlling environmental conditions, and regulating irrigation systems. 0102.3.3
 - 4 Prepare data summaries, reports, or analyses that include results, charts, or graphs to document research findings and results. 0102.3.4
 - 5 Research the requirement of becoming a USDA Certified Organic crop producer. 0102.3.5
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Soil Science

4 Identify components of soil (e.g., soil texture, soil horizon). 0102.4

- 1 Study soil characteristics to classify soils on the basis of factors such as geographic location, landscape position, or soil properties. 0102.4.1

5 Demonstrate knowledge of soil nutrients (e.g., soil pH, calculate amounts of fertilizer, eutrophication). 0102.5

- 1 Analyze soil to determine types or quantities of fertilizer required for maximum crop production. 0102.5.1
 - 2 Conduct studies of nitrogen or alternative fertilizer application methods, quantities, or timing to ensure satisfaction of crop needs and minimization of leaching, runoff, or denitrification. 0102.5.2
 - 3 Explore components of urban and suburban market gardening. 0102.5.3
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6 Describe land capability use (e.g., land capability class, soil management practices). 0102.6

- 1 Provide information or recommendations to farmers or other landowners regarding ways in which they can best use land, promote plant growth, or avoid or correct problems such as erosion. 0102.6.1
 - 2 Investigate responses of soils to specific management practices to determine the use capabilities of soils and the effects of alternative practices on soil productivity. 0102.6.2
 - 3 Investigate soil problems and poor water quality to determine sources and effects. 0102.6.3
 - 4 Assess comparative soil erosion from various planting or tillage systems, such as conservation tillage with mulch or ridge till systems, no-till systems, or conventional tillage systems with or without moldboard plows. 0102.6.4
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Animal Nutrition

7 Determine nutritional needs of livestock (e.g., essential nutrients, protein, calculate feed, Pearson Square). 0102.7

- 1 Study effects of feed on quality and quantity of animal products, such as eggs and milk. 0102.7.1
 - 2 Study nutritional requirements of animals and nutritive values of animal feed materials. 0102.7.2
 - 3 Select appropriate feedstuffs for animals based on factors such as economics, digestive system and nutritional needs. 0102.7.3
 - 4 Formulate animal feeds based on nutritional requirements, using feed ingredients for maximum nutrition and optimal economic production. 0102.7.4
 - 5 Appraise the adequacy of feed rations using data from the analysis of feedstuffs, animal requirements, and performance. 0102.7.5
 - 6 Research the components of becoming a USDA Certified Organic livestock producer. 0102.7.6
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8 Differentiate forage production (e.g., carrying capacity). 0102.8

- 1 Monitor pasture or grazing land use to ensure that livestock are properly fed or that conservation methods, such as rotational grazing, are used. 0102.8.1
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Small Gas Engine Maintenance and Repair

9 Cycles of a small engine. 0102.9

- 1 Discuss the cycle of a 2-cycle engine. 0102.9.1
 - 2 Discuss the cycle of a 4-stroke engine. 0102.9.2
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10 Identify parts. 0102.10

- 1 Identify the parts of small engine components 0102.10.1
 - 2 Demonstrate knowledge of the usage of a small engine parts manual. 0102.10.2
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11 Demonstrate knowledge of small engine maintenance (e.g., service manuals, fluid levels). 0102.11

- 1 Repair and maintain gasoline engines used to power equipment such as portable saws, rototillers, lawn mowers, generators, and compressors. 0102.11.1
 - 2 Adjust points, valves, carburetors, distributors, and spark plug gaps, using feeler gauges. 0102.11.2
 - 3 Reassemble engines after repair or maintenance work is complete and ensure that the reassembled engine is operational. 0102.11.3
 - 4 Record repairs made, time spent, and parts used. 0102.11.4
 - 5 Perform routine maintenance such as cleaning and oiling parts, honing cylinders, and tuning ignition systems. 0102.11.5
 - 6 Obtain problem descriptions from customers and prepare cost estimates for repairs. 0102.11.6
 - 7 Operate, test and inspect engines to determine malfunctions, to locate missing and broken parts, and to verify repairs, using diagnostic instruments. 0102.11.7
 - 8 Repair or replace defective parts such as magnetos, water pumps, gears, pistons, and carburetors, using hand tools. 0102.11.8
 - 9 Dismantle engines, safely use hand tools, and examine parts for defects. 0102.11.9
 - 10 Remove engines from equipment, and position and bolt engines to repair stands. 0102.11.10
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Welding

12 Understand welding-related safety. 0102.12

- 1 Identify common safety hazards of welding. 0102.12.1
 - 2 Identify specific PPE needs of welding. 0102.12.2
 - 3 Demonstrate knowledge of a safe, properly ventilated welding area. 0102.12.3
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13 Types of welding joints. 0102.13

- 1 Identify types of weld joints including butt, fillet, lap, etc. 0102.13.1

14 Discuss welder set-up and process. 0102.14

- 1 Ignite torches or start power supplies and strike arcs by touching electrodes to metals being welded, completing electrical circuits. 0102.14.1
- 2 Explain the difference between Gas Metal Arc Welding (GMAW) and Flux Core Arc Welding (FCAW). 0102.14.2
- 3 Explain electrode coding and selection. 0102.14.3
- 4 Clamp, hold, tack-weld, heat-bend, grind or bolt component parts to obtain required configurations and positions for welding. 0102.14.4
- 5 Recognize, set up, and operate hand and power tools common to the welding trade, such as shielded metal arc and gas metal arc welding equipment. 0102.14.5
- 6 Lay out, position, align, and secure parts and assemblies prior to assembly, using straightedges, combination squares, calipers, and rulers. 0102.14.6
- 7 Chip or grind off excess weld, slag, or spatter, using hand scrapers or power chippers, portable grinders, or arc-cutting equipment. 0102.14.7
- 8 Connect and turn regulator valves to activate and adjust gas flow and pressure so that desired flames are obtained. 0102.14.8
- 9 Select and install torches, torch tips, filler rods, and flux, according to welding chart specifications or types and thicknesses of metals. 0102.14.9
- 10 Remove rough spots from work pieces using portable grinders, hand files, or scrapers. 0102.14.10
- 11 Position and secure work pieces, using hoists, cranes, wire, and banding machines or hand tools. 0102.14.11
- 12 Clean or degrease parts, using wire brushes, portable grinders, or chemical baths. 0102.14.12

Natural Resources**15 Define natural resources and ecosystems.** 0102.15

- 1 Identify the natural resources derived from West Virginia. 0102.15.1
- 2 Describe the components of a West Virginia biome. 0102.15.2
- 3 Define ecology. 0102.15.3
- 4 Identify and describe areas of forest wetlands in West Virginia. 0102.15.4

16 Recognize methods of identifying trees, wildlife, and aquatic species. 0102.16

- 1 Identify common tree species and other woody plants in West Virginia. 0102.16.1
- 2 Identify common WV wildlife species. 0102.16.2
- 3 Identify aquatic species including macroinvertebrates, fish, plants, invertebrates, and predator species. 0102.16.3

17 Demonstrate knowledge of forest and wildlife management. 0102.17

- 1 Identify ways in which forest stands may be improved and determine forest harvest timelines. 0102.17.1
 - 2 Identify methods of wildlife habitat improvement. 0102.17.2
 - 3 Identify forest products. 0102.17.3
 - 4 Describe techniques used in the harvesting of wildlife. 0102.17.4
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**Agricultural Innovation
and Technology**

18 Technology in Agriculture. 0102.18

- 1 Identify emerging technology in agriculture. 0102.18.1
 - 2 Identify career opportunities in technology, innovation, and entrepreneurship in agriculture. 0102.18.2
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19 Agricultural Innovation & Current Issues. 0102.19

- 1 Identify a current question in agriculture and then develop a hypothesis, conduct research, and present findings. 0102.19.1
 - 2 Identify a current issue or problem in agriculture and work as a group to find a solution to the problem. 0102.19.2
 - 3 Research the components and requirements of producing, processing, and selling agricultural products from the home/farm. 0102.19.3
 - 4 Design an agrotourism business. 0102.19.4
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**Foundations of
Agriculture, Food, and
Natural Resources**

20 Demonstrate knowledge of leadership development through FFA. 0102.20

- 1 Participate in FFA leadership opportunities offered at the local, state, and national level. 0102.20.1
- 2 Participate in FFA intracurricular competitive opportunities at the local, state, and national level. 0102.20.2
- 3 Participate in community service and career awareness activities at the local, state, and national level. 0102.20.3