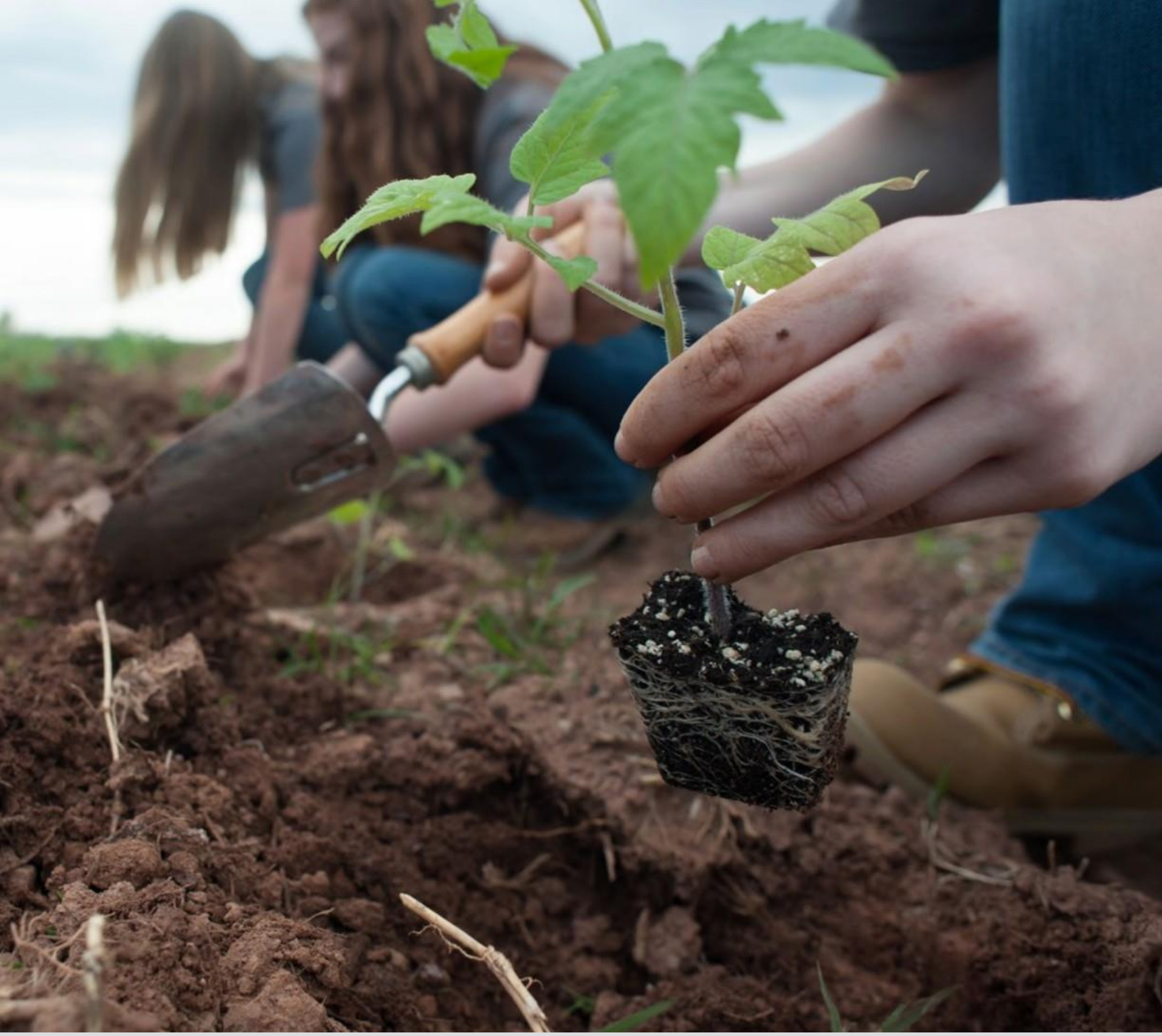


AGRONOMY

2017-2021

NATIONAL FFA

CAREER AND LEADERSHIP DEVELOPMENT EVENTS

IMPORTANT NOTE
Please thoroughly read the introduction section located on FFA.org/cdeintro for complete rules and procedures that are relevant to all National FFA Career/Leadership Development Events.

Purpose

The purpose of the National FFA Agronomy Career Development Event is to create interest and promote understanding in agronomy by providing opportunities for recognition through the demonstration of skills and proficiencies. It also gives students an opportunity to explore career opportunities available in agronomy and encourages students to pursue careers in agronomy.

Objectives

Through participation in the national event, participants will be able to

- Demonstrate knowledge and skills used in agronomic sciences.
- Explore career opportunities, skills and proficiencies in the agronomy industry.
- Determine the ability to identify agronomic:
  - Crops,
  - Weeds,
  - Seeds,
  - Insects,
  - Diseases,
  - Plant nutrient deficiencies,
  - Plant disorders,
  - Crop grading and pricing,
  - Equipment, and
  - Local, state and global issues.
- Evaluate a scenario and develop a crop management plan including crop selection, production and marketing.
- Demonstrate understanding of sustainable agriculture and environmental stewardship through the use of integrated pest management and best management practices.

Event Rules

TEAM MAKE-UP

- Four members will be on each team. All four members will be scored, and all four scores will count toward the team total.
- It is highly recommended that participants wear official FFA dress for each event.
- All participants will be given an identification number by which they will be designated throughout the event.
- Under no circumstances will a participant be allowed to destroy any of the items in the identification portion of the practicums. Any infractions of this rule will be sufficient to eliminate a team from the event.
- Participants will be assigned to group leaders who will escort them to various event-staging sites. Each participant is to stay with his or her assigned group leader throughout the event or until told to change leaders by the event superintendent.

WRITTEN MATERIAL

- All written material will be furnished for the event. No written materials such as tests, problems and worksheets should be removed from the site.
- Any participant in possession of an electronic device in the event area is subject to disqualification.

Event Format

Materials students must provide include the following:

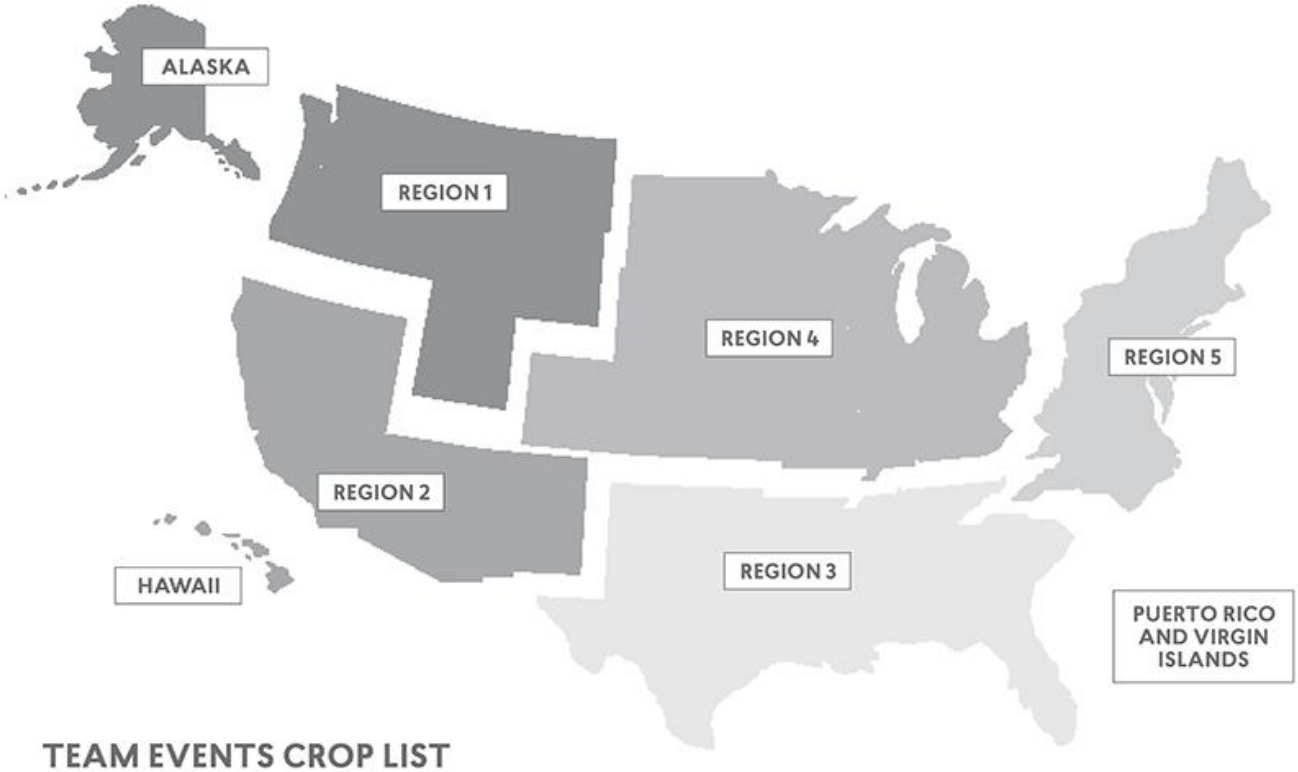
- Clean, free-of-notes clipboard.
- Two sharpened No. 2 pencils.
- Non-programmable electronic calculator.
    - The calculators used during the event are to be battery operated, non-programmable, and silent with large keys and large displays. The calculators should only have these functions: addition, subtraction, multiplication, division, equals, percent, square root, +/- key and one memory register. No other calculators are allowed during the event.
- One laptop computer per team.
    - Laptops must have USB port, be flash-drive compatible and have Microsoft Word and Excel. The laptop will be used for budgets and final reporting for the team activity only. Laptops must be fully-charged and be capable of continuous activity for 90 minutes.

TEAM ACTIVITY (1,000 POINTS)

- The team will be provided with a scenario of an agronomic situation and will be asked to develop a management plan in 70 minutes. Teamwork will be assessed during the management plan development time. The team will be required to develop both an oral presentation and a written plan that addresses the question in the scenario. The team will submit their written plan at the end of their oral presentation.
- After preparation, the team will be required to give an oral presentation justifying decisions made by the team (eight minutes maximum in length). All team members are expected to participate in the presentation. The team will then be required to answer questions from judges regarding the decisions reached by the team (five minutes maximum).
- Each year the team event scenario will be chosen from a cropping region of the country. The rotation and crops lists follow. Cost information may be utilized for various practices such as irrigation, machinery, harvesting, seedbed preparation, storage and loan interest rates, as well as fertilizers and chemicals. (This list is not inclusive.) The students may be asked to figure profit or loss based on this information.

- Resources provided for the team activity may include cost sheets, seed tag information, tillage practices, pesticide labels, extension bulletins, fertility reports, tissue analysis, contract information, water management, seeding rates, variety information, trial data and application information including nozzle selection, chemigation, fertigation and aerial application.
- Please review the Team Activity Preparation Rubric, especially the section on Written Proposal Analysis of Information and Written Plan Quality, to identify what teams should include in their written proposal and how the written portion is evaluated. For example, the Written Plan Quality score is based on having an introductory sentence or two to explain the situation, a statement of the actual problem, identification of possible solutions (alternatives), a recommendation with measurable goals, a sound economic decision, a list of expenses, a complete list of income, a statement of the amount of profit or loss expected, a break-even analysis such as bushels per acre needed or dollars per bushel needed, and finally a short summary of the teams results.

National FFA Agronomy CDE Regional Areas



TEAM EVENTS CROP LIST

REGION 1	REGION 2	REGION 3	REGION 4	REGION 5
2021	2017	2018	2019	2020
Alfalfa	Alfalfa	Bermudagrass	Alfalfa	Alfalfa
Barley	Bermudagrass	Brassica	Barley	Clover
Canola	Brassica	Corn	Canola	Corn
Chickpea/Garbanzo	Corn	Cotton	Corn	Cranberry
Corn	Cotton	Cucumber	Dry edible beans	Fescue
Dry edible beans	Lettuce	Fescue	Flax	Lima bean
Fescue	Melons	Melon	Peas	Melon
Hops	Onion	Peanuts	Rye	Orchardgrass
Lentil	Pepper	Rice	Sorghum	Peas
Peas	Rice	Sod	Soybean	Potatoes
Potatoes	Safflower	Sorghum	Sugarbeet	Sorghum
Ryegrass	Sorghum	Soybean	Sunflower	Soybean
Safflower	Spinach	Sucarcane	Tomato	Squash
Sugarbeet	Strawberry	Tomato	Wheat	Strawberry
Wheat	Sundangrass	Wheat	Safflower	Tobacco
	Tomato			Tomato
	Wheat			Wheat

Individual Practicums

GENERAL KNOWLEDGE EXAMINATION (100 POINTS)

Fifty objective multiple-choice questions will be given to each participant. Questions may include, but are not limited to, the following areas: general agronomy questions, plant and soil science, cost sheets, seed tag information, tillage practices, pesticide labels, extension bulletins, fertility reports, tissue analysis, contract information, water management, seeding rates, variety information, trial data and application/calibration information for nozzle selection, chemigation, fertigation and aerial application.

IDENTIFICATION (150 POINTS)

Students will identify 50 weed and/or crop plants and/or seeds. Plants may be presented in any stage of growth following emergence. The list of possible specimens is in the reference section of the handbook.

SOILS (100 POINTS)

Each participant will be responsible for the following activities related to soils:

- Identify various soil structures: web soil survey, custom soil resource report, soil maps.
- Analyze web soil survey data and answer questions related to
  - Relative drainage (e.g., poor, moderate, well).
  - Relative topographic position (e.g., summit, slope, depression).
  - Depth to water table.
  - Frost free period.
  - Identify the USDA land capability classes and answer problem-solving questions related to various classes.
  - Use soil survey to locate specific sites, use of suggested soil spots and questions related to the soil survey map.
  - Interpret graphs and tables of data based on soil parameters.

COMMODITY EVALUATION (250 POINTS)

Participants will evaluate the quality of four different crops. These evaluations will be broken down into three different categories representing different aspects of quality: variety selection, marketability and usability.

Variety selection (50 points)

Participant will be given multiple variety evaluation trial results, seed descriptions and data and/or seed tags. They must select the most appropriate and economical choice for the given scenario. A written reason must be given for the selection. Necessary information will be provided, such as soil type, maturity information, germination rate, weed seed content and/or cost of seed.

Marketability (Grain grading) (100 points)

Participants will determine factors and conditions that will determine the grade of various crops. Grain grading will be done in accordance with the Official U.S. Standards for Grain. Information on grain grading can be found in the laws and regulations section of www.gipsa.usda.gov.

Two samples will be graded in 30 minutes. Each sample is worth 50 points.

Participants will be given two base samples to determine the class and/or subclass of grain. The rotation for the given seed samples are as follows:

- 2017 Region 2: Rice and corn.
- 2018 Region 3: Grain sorghum and white wheat.
- 2019 Region 4: Canola and durum wheat.
- 2020 Region 5: Red wheat and soybean.
- 2021 Region 1: Barley and dry beans.

Participants will be provided information about grain samples (i.e., test weight, moisture and special conditions).

Participants will be given representative samples in a sealed package of defected seed. Raw weights of each defect will be given, and participants calculate the percentage of each based on the flow chart provided.

Participants will complete the Grain Grading Answer Sheet.

Participants will determine market price based on provided discount schedule.

Usability (Crop Quality) (100 points)

Two classes of crop samples, one of a forage, fiber or grain crop and one from another crop (see plant list) will be evaluated in 30 minutes (15 minutes per sample). Each class will consist of four samples of the same crop. Participants will rank each class with a Hormel card (25 points per sample) and provide written justification (25 points per sample).

AGRONOMY ISSUES (100 POINTS)

Each student will discuss an issue that is important to crop production. The student will be provided with articles, social media posts, videos or a combination of these items. Each student will be given 10 minutes to prepare their discussion. The student will then be given five minutes to present their views and will be asked questions for an additional five minutes. A narrowed list of topics will be provided in the coaches' letter prior to the event. A topic will be assigned at the event.

Suggested topics are provided below. This list not all-inclusive.

- Water cost and availability
- Use of robots or drones in agriculture
- Decrease in acreage of favorable land (taxes, escalating land values)
- Food safety (good agriculture practices — GAP)
- Minimum wage laws
- GMO/Biotechnology use in agriculture
- Endangered Species Act
- Urban/Agriculture interface (drift, dust, crop dusting, noise, smells, smoke)
- Immigration (H2A, E-verify) foreign labor
- Pollinators/honeybees
- Trade agreements
- Farm Bill
- Research – Food safety and microbiology, plant breeding
- Extension funding – applied research/education
- Conventional crops vs. organic crops
- Invasive species (plants, insects or crop diseases)
- Nutritional/Fertility management
- Logistics, transportation and infrastructure
- Food Security — growing populations, reduced resources, increased cost of land and inputs, agro-terrorism

PEST MANAGEMENT (200 POINTS)

Disorders (100 points)

- Ten samples will be identified according to category, causal agent and damage location. Refer to the Agronomic Disorders Practicum Scorecard for the category, agent and damage location lists.

Insect Identification (100 points)

- Ten samples will be identified according to insect name, life cycle, economic impact and mouth part. Refer to the Insect Identification Practicum Scorecard for additional details.

EQUIPMENT AND MACHINERY IDENTIFICATION (100 POINTS)

- Participants will be required to identify 20 specimens from the list in the reference section of the handbook. Samples may appear as actual equipment, scale models, toys or pictures.
- Identification samples will be of the complete item. There will be no identification of individual parts/pieces.
- The goal is to use names that are used by the manufacturers of the products. These names appear in literature, on websites, and are reflective of the terms used in industry market share classification. While not a public standard, there is a standard name set used in the industry.
- Internet searches do not always produce the correct image so use internet image searches carefully.

Event Scoring

Participant scores are the sum of the individual phases of the event, and team scores are the sum of the four participant scores plus the team activity.

Activities	Individual Points	Team Points
Written exam	100	400
Identification	150	600
Soils	100	400
Commodity	250	1,000
Agronomy issues	100	400
Pest management	200	800
Equipment and machinery identification	100	400
Team Activity points		1,000
TOTAL POINTS POSSIBLE	1,000	5,000

TIEBREAKERS

If ties occur for team awards, the following events will be used to determine the placings:

1. Team activity.
2. Total written exam.

If ties occur for individual awards, the following events will be used to determine the placings:

1. Written exam.
2. Plant and seed identification.
3. Soils.

Awards

Awards will be presented at the awards ceremony to individuals and/or teams based upon their rankings.

Awards are sponsored by cooperating industry sponsors as a special project and/or by the general fund of the National FFA Foundation.

References

This list of references is not intended to be all-inclusive.

Other sources may be utilized, and teachers are encouraged to make use of the very best instructional materials available. Make sure to use discretion when selecting website references by only using reputable, proven sites. The following list contains references that may prove helpful during event preparation. The most current edition of resources will be used. Please note that universities frequently update or change their web servers which can invalidate the listed website.

Past CDE materials and other resources FFA.org/participate/cdes/agronomy.

PLANT IDENTIFICATION

- Flash cards for both seeds and plants are available through Wards Natural Science Establishment https://wardsci.com/store/
- Weeds of the Northeast, Comstock Books, by Richard H. Uva (Author), Joseph C. Neal (Author), Joseph M. Ditomaso (Author).
- Weeds of the Great Plains, Nebraska Department of Agriculture by James L Stubbendieck (Author).
- Weeds of the West, University of Wyoming Extension, by Tom D. Whitson (Editor).
- Common Weed Seedlings of the North Central States, Michigan State University Extension.
- Sunset Western Garden Book.
- An Illustrated Guide to Arizona Weeds, University of Arizona, https://www.uapress.arizona.edu/onlinebks/WEEDS/TITLWEED.HTM
- Weeds of California and Other Western States University of California.
- Interactive Encyclopedia of Weeds of North America, North Central Weed Science Society.
- http://plants.usda.gov/java/
- At http://www.efita.org/Agriculture/Pests-and-Diseases/Weeds/Virginia-Tech-Weed-Identification-Guide-details-2207.html click on site listed as http://www.ppws.vt.edu/weedindex.html
- http://www.ipm.ucanr.edu/PMG/weeds_multi.html
- http://wssa.net/weed/weed-identification/

SEED IDENTIFICATION

- Illustrated Taxonomy Manual of Weed Seeds, North Central Weed Science Society.
- Weed Seeds of the Great Plains, University Press of Kansas.
- http://www.oardc.ohio-state.edu/seedid/ At site, enter common name or scientific name to find seed.
- http://plants.usda.gov/java/

MACHINERY IDENTIFICATION

Resources for machinery identification can be obtained online from various equipment manufacturers. A visit to an implement dealer in your area would be recommended. Farm toys can also be used.

GRAIN GRADING

Teaching and CDE samples can be obtained by contacting Northeast Indiana Grain Inspection Service, Mr. Neil Reynolds at 260-341-7497 or neigi@eawifi.com.

- https://www.gipsa.usda.gov/fgis/usstandards.aspx
- https://www.gipsa.usda.gov/fgis/video_library.aspx for videos on grain grading

HAY EVALUATION

- http://pods.dasnr.okstate.edu/ In Search Box, type Hay Evaluation, hit enter and click on PSS-2588 document — "Evaluating Hay Quality Based on Sight, Smell, and Feel — Hay Judging"

VEGETABLE/SEED EVALUATION AND PLACING

- http://www.wyomingextension.org/agpubs/pubs/70501G.pdf

DISEASE/DISORDER

- http://plantdiseasehandbook.tamu.edu

INSECTS

- http://pest.ca.uky.edu/EXT/master_gardener/entbasics/mouthparts/mouthparts.shtml

SOILS

- http://www.nrcs.usda.gov/wps/portal/nrcs/soilsurvey/soils/survey/state/

TEAM EVENT

- www.cdms.net

WRITTEN EXAM

The best resource for the written exam is old exams available from the National FFA Organization. There is no one resource for the exam.

- http://ohioline.osu.edu/factsheet/HYG-1133
- http://www.extension.iastate.edu/Publications/SR48.html
- https://store.extension.iastate.edu In Search Box, type "Soybean."
- https://gaps.cornell.edu

Weeds List

Weeds marked with * are noxious weeds according to the USDA.

ID #	Weed Name	Form	Botanical Name
100	Barnyardgrass	plant and seed	*Echinochloa crus-galli*
101	Black nightshade	plant and seed	*Solanum nigrum or Solanum ptycanthum*
102	Broadleaf plantain	plant and seed	*Plantago major*
103	Buckhorn plantain	plant and seed	*Plantago lanceolata*
104	Bull thistle*	plant and seed	*Cirsium vulgare*
105	Canada thistle*	plant and seed	*Cirsium arvense*
106	Cheat	plant and seed	*Bromus secalinus*
107	Common chickweed	plant and seed	*Stellaria media*
108	Common cocklebur	plant and seed as bur	*Xanthium strumarium*
109	Common lambsquarters	plant and seed	*Chenopodium album*
110	Common mallow	plant and seed	*Malva neglecta*
111	Common milkweed	plant and seed	*Asclepias syriaca*
112	Common purslane	plant and seed	*Portulaca oleracea*
113	Common ragweed*	plant and seed	*Ambrosia artemisiifolia*
114	Common sunflower	plant and seed	*Helianthus annuus*
115	Crabgrass	plant and seed	*Digitaria spp.*
116	Crown vetch	plant and seed	*Coronilla varia*
117	Curly dock*	plant and seed	*Rumex crispus*
118	Dandelion	plant and seed	*Taraxacum officinale*
119	Downy brome	Plant only	*Bromus tectorum L.*
120	Field bindweed*	plant and seed	*Convolvulus arvensis*
121	Field dodder*	plant and seed	*Cuscuta* spp.
122	Field pennycress	plant and seed	*Thlaspi arvense*
123	Field sandbur	plant and seed	*Cenchrus incertus*
124	Foxtail, giant*	plant and seed	*Setaria faberi*
125	Foxtail, green	plant and seed	*Setaria viridis*
126	Foxtail, yellow	plant and seed	*Setaria glauca*
127	Giant ragweed*	plant and seed	*Ambrosia trifidia*
128	Ground cherry	plant and seed	*Physalis spp.*
129	Horsenettle*	plant and seed	*Solanum carolinense*
130	Horseweed* (marestail)	plant only	*Conyza canadensis*
131	Jimsonweed	plant and seed	*Datura stramonium*
132	Johnsongrass*	plant and seed	*Sorghum halpense*
133	Knapweed, Russian*	plant only	*Centaurea repens*
134	Kochia*	plant and seed	*Kochia scoparia*
135	Kudzu*	plant only	*Pueraria montana* var lobata
136	Leafy spurge*	plant and seed	*Euphorbia esula*
137	Morningglory	plant and seed	*Ipomoea* spp.
138	Nightshade, silver	plant and seed	*Solanum elaeagnifolim*
139	Nutsedge*	plant and seed as nutlet	*Cyperus* spp.
140	Prickly lettuce	plant and seed	*Lactuca serriola*
141	Prostrate knotweed	plant and seed	*Polygonum aviculare*
142	Prostrate spurge	plant only	*Euphorbia supina*
143	Puncturevine*	plant and seed	*Tribulus terrestris*
144	Quackgrass*	plant and seed	*Agropyron repens*
145	redroot pigweed	plant and seed	*Amaranthus retroflexus*
146	Russian thistle	plant and seed	*Salsola pestifer*
147	Shepardspurse	plant and seed	*Capsella bursa-pastoris*
148	Sicklepod	plant and seed	*Senna obtusifolia*

149	Smartweed	plant and seed	*Polygonum* spp.
150	Sowthistle*	plant and seed	*Sonchus* spp.
151	Tansy mustard	plant and seed	*Descurainia pinnata*
152	Velvetleaf*	plant and seed	*Abutilon theophrasti*
153	Wild carrot*	plant and seed	*Daucus carota*
154	Wild mustard	plant and seed	*Brassica kaber*
155	Wild oats	plant only	*Avena sativa*
156	Wild onion/garlic*	plant and seed	*Allium* spp.

Crops List

ID #	Crop Name	Form	Botanical Name
200	Alfalfa	plant or seed	*Medicago sativa*
201	Barley	plant or seed	*Hordeum vulgare*
202	Bean (dry)	plant only	*Phaseolus vulgaris*
203	Bermudagrass	plant or seed	*Cynodon dactylon*
204	Black bean	seed only	*Phaseolus vulgaris*
205	Broccoli	plant only	*Brassica oleracea* var. italica
206	Cabbage	plant only	*Brassica oleracea* capitata
207	Canola	plant or seed	*Brassica napus*
208	Cantaloupe	plant or seed	*Cucumis melo* var. cantalupensis
209	Carrot	root provided	*Daucus carota*
210	Cauliflower	plant only	*Brassica oleracea* var. botrytis
211	Chickpea/Garbanzo	seed only	*Cicer arietinum*
212	Chili pepper	plant or seed	*Capsicum annuum*
213	Corn	plant only	*Zea mays*
214	Cotton	plant or seed	*Gossypium hirsutum*
215	Cranberry	plant only	*Vaccinium macrocarpon*
216	Cucumber	plant or seed	*Cucumis sativus* var. sativus
217	Dent corn	seed only	*Zea mays*
218	Durum wheat	seed only	*Triticum turgidum*
219	Flax	plant or seed	*Linum usitatissimum*
220	Hops	plant only	*Humulus lupulus*
221	Kentucky bluegrass	plant or seed	*Poa pratensis*
222	Lentil	plant or seed	*Lens culinaris*
223	Lettuce	plant or seed	*Lactuca sativa*
224	Lima bean	seed only	*Phaseolus lunatus*
225	Oats	plant or seed	*Avena sativa*
226	Onion	plant or seed	*Allium cepa*
227	Orchardgrass	plant or seed	*Dactylis glomerata*
228	Peanut	plant or seed	*Arachis hypogaea*
229	Peas	plant or seed	*Pisum Sativum*
230	Pinto bean	seed only	*Phaseolus vulgaris*
231	Popcorn	seed only	*Zea mays*
232	Potato	plant only	*Solanum tuberosum*
233	Red bean	seed only	*Phaseolus vulgaris*
234	Red clover	plant or seed	*Trifolium pratense*
235	Red wheat	seed only	*Triticum avestivum*
236	Rice	plant or seed	*Oryza sativa*
237	Rye	plant or seed	*Secale cereale*
238	Safflower	plant or seed	*Carthamus tinctorius*
239	Sorghum	plant or seed	*Sorghum bicolor*
240	Soybean	plant or seed	*Glycine max*
241	Spinach	plant or seed	*Spinacia oleracea*
242	Squash	plant or seed	*Curcurbita pepo*
243	Strawberry	plant only	*Fragaria virginiana*
244	Sudangrass	plant or seed	*Sorghum bicolor*
245	Sugar beets	plant or seed	*Beta vulgaris*
246	Sugarcane	plant only	*Saccharum* sp.
247	Sunflower	plant or seed	*Helianthus annuus*
248	Sweet corn	plant only	*Zea mays*
249	Sweet potato	plant only	*Ipomoea batatas*
250	Sweetclover	plant or seed	*Melilotus albus*
251	Tall fescue	plant or seed	*Festuca arundinacea*

252	Timothy	plant or seed	*Phleum pratense*
253	Tobacco	plant or seed	*Nicotiana tabacum*
254	Tomato	plant or seed	*Lycopersicon esculentum*
255	Watermelon	plant or seed	*Citrullus lanatus*
256	Wheat	plant only	*Triticum aestivum*
257	White bean	seed only	*Phaseolus vulgaris*
258	White clover	plant or seed	*Trifolium repens*
259	White wheat	seed only	*Triticum aestivum*

Machinery List

11. Air seeder (tool and air cart together)
12. Anemometer
13. Anhydrous applicator with tank
14. Articulated tractor (wheeled only type tractor)
15. Auger platform head for combine
16. Backpack sprayer
17. Bale wagon (kick or flat)
18. Bed shaper
19. Belt pickup head for combine
20. Broadcast fertilizer spreader
21. Chemigation unit for irrigation
22. Combine (may be displayed with harvesting head attached)
23. Conveyer/Elevator/Auger
24. Corn head for combine
25. Cotton picker
26. Cotton stripper
27. Rolling Harrow
28. Disk
29. Disk chisel
30. Draper head for combine or swather
31. Drawn planter
32. Dry fertilizer density scale
33. Field cultivator
34. Field shovel
35. Forage harvester (may be displayed with harvesting head attached)
36. GPS receiver
37. Grain bin/leg
38. Grain drill (includes no-till)
39. Grain dryer
40. Grain swather (drawn or self-propelled)
41. Gravity wagon
42. Hand hoe
43. Hay merger
44. Hay mower/conditioner (disk or reel/drawn, 3pt, or self-propelled)
45. Hay rake (reel or wheel)
46. Hearing protection
47. Hitch pin
48. Hydraulic cylinder/ hose
49. In-line ripper
50. Integral planter
51. Irrigation — lateral
52. Irrigation — traveling gun
53. Irrigation center-pivot
54. Liquid manure tank/applicator (includes draglines)
55. Manure sampling kit
56. Manure spreader
57. Module builder
58. Moldboard plow
59. Nurse tank trailer
60. Pea harvester
61. Peanut digger
62. Plastic layer
63. Potato harvester
64. PPE (all equipment)
65. Pressure gauge
66. PTO shaft
67. Rotary hoe
68. Round baler
69. Row crop cultivator
70. Row crop tractor (wheeled only tractor)
71. Row independent forage harvester head (kemper head)
72. Skid steer
73. Soil penetrometer

Machinery List

74. Soil probe (for collection of soil sample)	83. Swather
75. Soil sample bag	84. Sweep net
76. Soil thermometer	85. Tensiometer
77. Specialty tractor (orchard, narrow, low profile, high clearance)	86. Tissue sample bag
78. Sprayer	87. Tracked tractor (any configuration of tracks on a tractor)
79. Sprayer nozzle	88. Vegetable transplanter
80. Square baler (large or small)	89. Virtual terminal/monitor/controller
81. Strip tiller	90. V-Ripper
82. Sugar beet harvester	91. Wheel loader

National Insect List 2017 Official Guide

	Insect	Economic Impact	Life Cycle	Mouth Parts
11.	Alfalfa weevil	Vegetative Part Destruction (V)	Complete (C)	Chewing (C)
12.	Aphids	Removal of Plant Fluids (R)	Incomplete (I)	Piercing-Sucking (PS)
13.	Armyworm larva	Vegetative Part Destruction (V)	Complete (C)	Chewing (C)
14.	Assassin bug	None or Predatory (NP)	Incomplete (I)	Piercing-Sucking (PS)
15.	Bean leaf beetle	Must put both (F) & (V)	Complete (C)	Chewing (C)
16.	Blister beetle (larvae)	None or Predatory (NP)	Complete (C)	Chewing (C)
17.	Blister beetle (adult)	Vegetative Part Destruction (V)	Complete (C)	Chewing (C)
18.	Boll weevil	Fruit/Flower Destruction (F)	Complete (C)	Chewing (C)
19.	Chinch bug	Removal of Plant Fluids (R)	Incomplete (I)	Piercing-Sucking (PS)
20.	Colorado potato beetle	Vegetative Part Destruction (V)	Complete (C)	Chewing (C)
21.	Corn earworm larva	Must put both (F) & (V)	Complete (C)	Chewing (C)
22.	Corn rootworm larva	Vegetative Part Destruction (V)	Complete (C)	Chewing (C)
23.	Cricket	Fruit/Flower Destruction (F)	Incomplete (I)	Chewing (C)
24.	Cutworm larva	Vegetative Part Destruction (V)	Complete (C)	Chewing (C)
25.	European corn borer larva	Must put both (F) & (V)	Complete (C)	Chewing (C)
26.	Flea beetle	Vegetative Part Destruction (V)	Complete (C)	Chewing (C)
27.	Grain weevil	Fruit/Flower Destruction (F)	Complete (C)	Chewing (C)
28.	Grasshopper	Vegetative Part Destruction (V)	Incomplete (I)	Chewing (C)
29.	Green lacewing	None or Predatory (NP)	Complete (C)	Chewing (C)
30.	Honeybee	None or Predatory (NP)	Complete (C)	Chewing-Lapping (CL)
31.	Japanese beetle	Must put both (F) & (V)	Complete (C)	Chewing (C)
32.	Lady beetle larva	None or Predatory (NP)	Complete (C)	Chewing (C)
33.	Leaf skeletonizer	Vegetative Part Destruction (V)	Complete (C)	Chewing (C)
34.	Leafhopper	Removal of Plant Fluids (R)	Incomplete (I)	Piercing-Sucking (PS)
35.	Lygus	Removal of Plant Fluids (R)	Incomplete (I)	Piercing-Sucking (PS)
36.	Mexican bean beetle	Must put both (F) & (V)	Complete (C)	Chewing (C)
37.	Pink bollworm larva	Fruit/Flower Destruction (F)	Complete (C)	Chewing (C)
38.	Salt marsh caterpillar/wooly worm	Vegetative Part Destruction (V)	Complete (C)	Chewing (C)
39.	Scale	Removal of Plant Fluids (R)	Incomplete (I)	Piercing-Sucking (PS)
40.	Spider mite	Vegetative Part Destruction (V)	Incomplete (I)	Rasping-Sucking (RS)
41.	Spittlebug	Removal of Plant Fluids (F)	Incomplete (I)	Piercing-Sucking (PS)
42.	Spotted cucumber/Southern corn rootworm beetle	Vegetative Part Destruction (V)	Complete (C)	Chewing (C)
43.	Stinkbug	Removal of Plant Fluids (F)	Incomplete (I)	Piercing-Sucking (PS)
44.	Tobacco/tomato hornworm larva	Must put both (V) & (V)	Complete (C)	Chewing (C)
45.	Western corn rootworm beetle	Must put both (F) & (V)	Complete (C)	Chewing (C)
46.	Western flower thrip	Vegetative Part Destruction (V)	Incomplete (I)	Rasping-Sucking (RS)
47.	White grub	Vegetative Part Destruction (V)	Complete (C)	Chewing (C)
48.	Whitefly	Vegetative Part Destruction (V)	Complete (C)	Rasping-Sucking (RS)
49.	Wireworm	Vegetative Part Destruction (V)	Complete (C)	Chewing (C)

Agronomic Disorders Practicum Scorecard

Name Member Number

Chapter State Team Number

		Member Answer	Possible Points	Member Score
1.	Casual Category:		3	
	Agent:		4	
	Part of Plant Displayed:		3	
2.	Casual Category:		3	
	Agent:		4	
	Part of Plant Displayed:		3	
3.	Casual Category:		3	
	Agent:		4	
	Part of Plant Displayed:		3	
4.	Casual Category:		3	
	Agent:		4	
	Part of Plant Displayed:		3	
5.	Casual Category:		3	
	Agent:		4	
	Part of Plant Displayed:		3	
6.	Casual Category:		3	
	Agent:		4	
	Part of Plant Displayed:		3	
7.	Casual Category:		3	
	Agent:		4	
	Part of Plant Displayed:		3	
8.	Casual Category:		3	
	Agent:		4	
	Part of Plant Displayed:		3	
9.	Casual Category:		3	
	Agent:		4	
	Part of Plant Displayed:		3	
10.	Casual Category:		3	
	Agent:		4	
	Part of Plant Displayed:		3	
			TOTAL POINTS EARNED OUT OF 100 POSSIBLE	

Causal Category
Biological (B)
Cultural (C)
Environmental (E)

Agents
Bacteria (B)
Chemical (Ch)
Compaction (Co)
Drought (D)
Frost damage (Fr)
Fungus (Fn)
Hail (Ha)
Heat (Ht)
Insect (I)
Lightning (L)
Mechanical (Me)
Moisture (Mo)
Nematodes (Ne)
Nutritional (Nu)
Pollution (P)
Sun scald (S)
Virus (V)
Wind damage(W)

Parts of Plant Displayed
Reproductive parts (R)
Vegetative parts (Ve)
Vascular bundles (Va)
More than one (M)

Insect Identification Rubric

Name _____ Member Number _____

Chapter _____ State _____ Team Number _____

		Member Answer	Possible Points	Member Score
1.	Identification:		4	
	Economic Impact:		2	
	Life Cycle:		2	
	Mouth Part:		2	
2.	Identification:		4	
	Economic Impact:		2	
	Life Cycle:		2	
	Mouth Part:		2	
3.	Identification:		4	
	Economic Impact:		2	
	Life Cycle:		2	
	Mouth Part:		2	
4.	Identification:		4	
	Economic Impact:		2	
	Life Cycle:		2	
	Mouth Part:		2	
5.	Identification:		4	
	Economic Impact:		2	
	Life Cycle:		2	
	Mouth Part:		2	
6.	Identification:		4	
	Economic Impact:		2	
	Life Cycle:		2	
	Mouth Part:		2	
7.	Identification:		4	
	Economic Impact:		2	
	Life Cycle:		2	
	Mouth Part:		2	
8.	Identification:		4	
	Economic Impact		2	
	Life Cycle:		2	
	Mouth Part:		2	

Possible Answers

Identification

11. Alfalfa weevil
12. Aphids
13. Armyworm larva
14. Assassin bug
15. Bean leaf beetle
16. Blister beetle (Larva)
17. Blister beetle (adult)
18. Boll weevil
19. Chinch bug
20. Colorado potato beetle
21. Corn ear worm larva
22. Corn rootworm larva
23. Cricket
24. Cutworm larva
25. European corn borer larva
26. Flea beetle
27. Grain weevil
28. Grasshopper
29. Green lacewing
30. Honeybee
31. Japanese beetle
32. Lady beetle larva
33. Leaf skeletonizer
34. Leafhopper
35. Lygus
36. Mexican bean beetle
37. Pink bollworm larva
38. Salt marsh caterpillar/wooly worm
39. Scale
40. Spider mite
41. Spittlebug
42. Spotted cucumber beetle/Southern corn rootworm beetle
43. Stinkbug
44. Tobacco/tomato hornworm larva
45. Western corn rootworm beetle
46. Western flower thrip
47. White grub
48. Whitefly
49. Wireworm

Economic Impact

None or predatory: NP
Fruit/Flower Destruction: F
Vegetative Part Destruction: V
Removal of Plant Fluids: R

		Member Answer	Possible Points	Member Score
9.	Identification:		4	
	Economic Impact:		2	
	Life Cycle:		2	
	Mouth Part:		2	
10.	Identification:		4	
	Economic Impact:		2	
	Life Cycle:		2	
	Mouth Part:		2	
TOTAL POINTS EARNED OUT OF 100 POSSIBLE				

Life Cycle
Complete: C
Incomplete: I
None: N

Mouth Part
Chewing: C
Chewing-Lapping: CL
Rasping-Sucking: RS
Piercing-Sucking: PS
Sponging: Sp
Siphoning: Si

Team Activity Preparation Rubric

100 POINTS

Name Member Number

Chapter State Team Number

Indicator	Very strong evidence of skill 5–4 points	Moderate evidence of skill 3–2 points	Weak evidence of skill 1–0 points	Weight	Total Points
Effective listening	Team member clearly demonstrated active listening throughout the activity.	Team member demonstrated some active listening; however, there was evidence of being distracted throughout the activity.	Team member was not actively listening to teammates and/or talked over others throughout the activity.	X 4	
Oral communication	Team member contributed appropriately in discussing the topic.	Team member somewhat contributed in discussing the topic but engaged in side conversations.	Team member dominated the conversation.	X 4	
Demonstrated cooperation	Team member positively contributed to the team by completing tasks and sharing written and oral solutions.	Team member contributed to the team by sometimes assisting in completing tasks and sharing written and oral solutions.	Team member did not contribute to the team and did not complete tasks or share in the written and/or oral solutions.	X 4	
Team participation	Team member clearly respected the input of other team members.	Team member sometimes respected the input of other team members.	Team member did not clearly respect the input of other team members.	X 4	
Efficiency	Team member demonstrated efficient use of his/her time in comprising the plan.	Team member sometimes demonstrated efficient use of his/her time in comprising the plan.	Team member did not demonstrate efficient use of his/her time in comprising the plan.	X 4	
				TOTAL POINTS EARNED OUT OF 100 POSSIBLE	

Written Proposal Analysis of Information

150 POINTS

Indicator	Very strong evidence of skill 5–4 points	Moderate evidence of skill 3–2 points	Weak evidence of skill 1–0 points	Weight	Total Points
What level of knowledge did the team demonstrate in their written management plan?	Strong to very strong demonstrated knowledge	Moderate demonstrated knowledge	Little or incomplete demonstrated knowledge	X 10	
Did the team accurately analyze and use the information provided to them?	Accurate analysis of provided information	Moderately accurate analysis of provided information.	Inaccurate analysis of provided information	X 10	
How well did the team analyze the scenario?	Accurate scenario analysis	Moderately accurate scenario analysis	Inaccurate scenario analysis	X 10	
				WRITTEN PROPOSAL - TOTAL POINTS EARNED OUT OF 150 POSSIBLE	

Written Plan Quality

350 POINTS

Indicator	Very strong evidence of skill 5–4 points	Moderate evidence of skill 3–2 points	Weak evidence of skill 1–0 points	Weight	Total Points
Introduction	Complete introduction	Partial introduction	Little or no introduction	X 7	
Statement of the problem	Complete and accurate problem statement	Partial and mostly accurate problem statement	Little or no problem statement	X 7	
Did the team identify possible solutions?	Accurate and complete possible solutions	Partial possible solutions	Little or no possible solutions	X 7	
Did the team include a recommendation with measurable goals?	Extensive and accurate recommendations with measurable goals.	Some accurate recommendations with measurable goals	No or little accurate recommendations with measurable goals	X 7	
Were sound economic decisions reached by the team?	Accurate economic decisions	Moderately accurate economic decisions	Inaccurate economic decisions	X 7	
Expenses	Complete expenses included	Some expenses included	Few, if any, expenses included	X 7	
Income	Complete income included	Some income included	Little or no income included	X 7	
Profit or loss amount	Accurate profit or loss amount	Partially accurate profit or loss amount	Inaccurate profit or loss amount	X 7	
Break-even analysis	Accurate break-even analysis	Partially accurate break-even analysis	Inaccurate break-even analysis	X 7	
Did the plan include a summary?	Complete summary	Partial summary	Little or no summary	X 7	
				WRITTEN PLAN - TOTAL POINTS EARNED OUT OF 350 POINTS POSSIBLE	

Oral Presentation

200 POINTS

Indicator	Very strong evidence of skill 5–4 points	Moderate evidence of skill 3–2 points	Weak evidence of skill 1–0 points	Weight	Total Points
Sound agronomic principles	Very sound agronomic principle discussions	Somewhat sound agronomic principle discussions	Unsound agronomic principle discussions	X 20	
Member participation	All members made positive contributions to the presentation	Some members made positive contributions to the presentation	Few members made positive contributions to the presentation	X 20	
				ORAL PRESENTATION - TOTAL POINTS EARNED OUT OF 200 POSSIBLE	

Questions on Presentation

200 POINTS

Indicator	Very strong evidence of skill 5–4 points	Moderate evidence of skill 3–2 points	Weak evidence of skill 1–0 points	Weight	Total Points
Member contribution	All members accurately answered questions.	Some members accurately answered questions	Few members accurately answered questions	X 14	
Confident responses	Members were confident with their responses	Members were somewhat confident with their responses	Members were not confident with their responses	X 12	
Accuracy	Members were accurate with their answers	Members were somewhat accurate with their answers	Members were not accurate with their answers	X 14	
				QUESTIONS - TOTAL POINTSEARNED OUT OF 200 POSSIBLE	

Crop Placing Written Reasons Scorecard

25 POINTS

Name Member Number

Chapter State Team Number

Class Name: Reasons

Placing		Total Points
	TOTAL POINTS EARNDED OUT OF 25 POSSIBLE	

Judge's Name Judge's Signature Date

Agronomy Issues Rubric

100 POINTS

Indicator	Point Value				
	5–4 points	3–2 points	1–0 points	Weight	Total Points
Introduction (5 points)	Introduction is clear, well organized and focused; clearly prepares listener for what is to come The topic indicated clearly; organized; focused	Indication of topic somewhat clear; generally organized and focused Introduction gives some indication of topic	No introduction; extremely brief, non-specific, not related to the topic; disorganized	X1	
Personality/ Confidence (10 points)	Appears friendly and confident; positive attitude; relaxed; Fairly calm and non-confrontational; defends position without being confrontational	Somewhat nervous; confrontational; somewhat defensive; uneasy; shows little confidence in position	Extremely nervous; lacks confidence; confrontational	X2	
Poise/Posture (10 points)	Maintains good eye contact; voice projection and speed excellent; good posture and uses hand gestures as appropriate	Breaks eye contact or looks away occasionally; voice quality uneven; distracting gestures	Does not make eye contact; difficult to understand; mumbles; generally distracted	X2	
Response to Questions (15 points)	Responds quickly with complete statements; uses factual information; opinion based on fact; presents information in a logical manner	Hesitates before answering; speaks in phrases rather than complete statements; repeats information; opinions lack factual basis; random thoughts; provides few facts and basic information; often uses one-word answers; many pauses; long response time; no structure to response	No factual answers; uses one-word answers; long delays in responding; answers indicate no understanding of question	X3	
Knowledge of Issue (20 points)	Extremely well informed; clearly differentiates between fact and opinion; aware of current issues	Somewhat knowledgeable; lines between fact and opinion are blurred; responses sound memorized; limited awareness of current issues	No knowledge of issue; no understanding of current issues	X4	
Conveyance of Thought and Meaning (40 points)	Communicates opinion as clear statement; uses appropriate terminology; backs up statements with suitable examples; clear, coherent expression of ideas	Sounds somewhat rehearsed; difficulty backing up statements; draws blanks; often uses filler words ("ah," "um") Uses incorrect terminology; demonstrates little understanding of terminology	Unable to clearly articulate a clear thought; cannot back up any statements; demonstrates no understanding of terminology	X8	
				TOTAL POINTS EARNED OUT OF 100 POSSIBLE	

Grain Grading Scorecard (Generalized Example)

Name		Member Number
Chapter	State	Team Number

FFA GRAIN INSPECTION SERVICE

IDENTIFICATION AND LOT:

GRADE AND KIND:

Base Price:

	Amounts	Discounts
TEST WEIGHT BY BUSHEL		
MOISTURE %		
DOCKAGE %		
BCFM %		
HEAT DAMAGED KERNELS %		
DAMAGED KERNELS TOTAL %		
TOTAL DEFECTS %		
TOTAL DAMAGE %		
FOREIGN MATERIAL %		
SHRUNKEN OR BROKEN %		
DEFECTS %		
CLASSES THAT BLEND %		
CONTRASTING CLASSES %		
WHEAT OF OTHER CLASSES % SPLITS %		
SAMPLE GRADE FACTORS SPECIAL GRADES		
OTHER		
MYCOTOXINS		
FINAL PRICE		

This tag is an example. Each scorecard will resemble this and be crop specific.

They will be included at FFA.org/participate/cdes/agronomy

Agriculture, Food and Natural Resources Content Standards

Measurements Assessed	Event Activities Addressing Measurements	Related Academic Standards
ABS.01.01. Performance Indicator: Apply micro- and macroeconomic principles to plan and manage inputs and outputs in an AFNR business.		
ABS.01.01.01.c. Create strategies to maximize the efficiency of AFNR business inputs and outputs using microeconomic principles.	Team activity	CCSS.ELA-Literacy.L.9-10.6 CCSS.ELA-LITERACY.L.11-12.6 CCSS.ELA-LITERACY.RST.9-10.4 CCSS.ELA-LITERACY.RST.11-12.4 CCSS.MATH.CONTENT.HSS.ID.C.7 CCSS.MATH.CONTENT.HSS.IC.B.6 Financial Investing: Benchmarks: Grade 12, Statement 9
ABS.01.01.02.c. Analyze the impact of the current macroeconomic environment on decisions related to AFNR businesses.	Team activity	
ABS.01.03. Performance Indicator: Devise and apply management skills to organize and run an AFNR business in an efficient, legal and ethical manner.		
ABS.01.03.01.c. Devise strategies to improve the operation of AFNR businesses using management skills.	Team activity	CCSS.ELA-LITERACY.SL.9-10.6 CCSS.ELA-LITERACY.SL.11-12.6 CCSS.ELA-LITERACY.L.9-10.6 CCSS.ELA-LITERACY.L.11-12.6 CCSS.ELA-LITERACY.RST.9-10.4 CCSS.ELA-LITERACY.RST.11-12.4
ABS.01.03.02.c. Devise management or operational strategies to address and adhere to local, state, federal, international and industry regulations.	Team activity	
ABS.03. Performance Element: Manage cash budgets, credit budgets and credit for an AFNR business using generally accepted accounting principles.		
ABS.03.01.01.c. Develop cash budgets for AFNR businesses.	Team activity	CCSS.ELA-LITERACY.RH.9-10.7 CCSS.ELA-LITERACY.RH.11-12.7 CCSS.ELA- LITERACY.L.9-10.6 CCSS.ELA-LITERACY. L.11-12.6 CCSS.ELA-LITERACY.RST.9-10.4 CCSS.ELA-LITERACY.RST.11-12.4 CCSS.MATH.CONTENT.HSS.IC.B.6

ABS.04.01. Performance Indicator: Analyze characteristics and planning requirements associated with developing business plans for different types of AFNR businesses.		
ABS.04.01.01.c. Demonstrate the application of entrepreneurial skills to conceptualize an AFNR business (e.g., idea generation, opportunity analysis, risk assessment, etc.).	Team activity	CCSS.ELA-LITERACY.L.9-10.6 CCSS.ELA-LITERACY.L.11-12.6 CCSS.ELA-LITERACY.RST.9-10.4 CCSS.ELA-LITERACY.RST.11-12.4 CCSS.ELA-LITERACY.W.9-10.2 CCSS.ELA-LITERACY.W.11-12.2 CCSS.ELA-LITERACY.W.9-10.9 CCSS.ELA-LITERACY.W.11-12.9
ABS.04.01.03.c. Prepare business plans for an AFNR business.	Team activity	
ABS.04.02. Performance Indicator: Develop production and operational plans for an AFNR business.		
ABS.04.02.01.b. Compare and contrast the strengths and weaknesses of operational plans from different AFNR businesses to determine best practices.	Team activity	AFNR Career Cluster – Agribusiness Systems Pathway, Statement 3 CCSS.ELA-LITERACY.ELA-W.9-10.2 CCSS.ELA-LITERACY.W.11-12.2 CCSS.ELA-LITERACY.L.9-10.6 CCSS.ELA-LITERACY.L.11-12.6 CCSS.ELA-LITERACY.RST.9-10.4 CCSS.ELA-LITERACY.RST.11-12.4
ABS.05.01. Performance Indicator: Analyze the role of markets, trade, competition and price in relation to an AFNR business sales and marketing plans.		
ABS.05.01.01.c. Evaluate and predict future trends for a specific AFNR product as related to markets, trade and price (e.g., corn, oil, wheat, etc.).	Grain grading	AFNR Career Cluster, Statement 7 AFNR Career Cluster – Agribusiness Systems Pathway, Statement 1 Financial Investing: Benchmarks: Grade 12, Statement 13
ABS.05.02. Performance Indicator: Assess and apply sales principles and skills to accomplish AFNR business objectives.		
ABS.05.02.01.c. Analyze the sales process of AFNR businesses and create methods to suggest improvements.	Team activity	CCSS.ELA-LITERACY.SL.9-10.6 CCSS.ELA-LITERACY.SL.11-12.6 CCSS.ELA-LITERACY.RH.9-10.7 CCSS.ELA-LITERACY.RH.11-12.7 Buying Goods & Services: Benchmarks: Grade 12, Statements 1 Buying Goods & Services: Benchmarks: Grade 12, Statements 3 Buying Goods & Services: Benchmarks: Grade 12, Statements 4 Buying Goods & Services: Benchmarks: Grade 12, Statements 5

ABS.05.03. Performance Indicator: Assess marketing principles and develop marketing plans to accomplish AFNR business objectives.		
ABS.05.03.01.c. Deconstruct and analyze current AFNR marketing plans to determine the effectiveness of implementation of marketing principles and alternative marketing strategies.	Team activity	AFNR Career Cluster – Agribusiness Systems Pathway, Statement 4 CCSS.ELA-LITERACY.L.9-10.6 CCSS.ELA-LITERACY.L.11-12.6 CCSS.ELA-LITERACY.RST.9-10.4 CCSS.ELA-LITERACY.RST.11-12.4 CCSS.ELA-LITERACY.W.9-10.2 CCSS.ELA-LITERACY.W.11-12.2 CCSS.ELA-LITERACY.RH.9-10.7 CCSS.ELA-LITERACY.RH.11-12.7 CCSS.ELA-LITERACY.SL.9-10.6 CCSS.ELA-LITERACY.SL.11-12.6 Buying Goods & Services: Benchmarks: Grade 12, Statements 1 Buying Goods & Services: Benchmarks: Grade 12, Statements 3 Buying Goods & Services: Benchmarks: Grade 12, Statements 4 Buying Goods & Services: Benchmarks: Grade 12, Statements 7
CS.01.01. Performance Indicator: Examine issues and trends that impact AFNR systems on local, state, national and global levels.		
CS.01.01.01.c. Evaluate and explain AFNR issues and their impacts to audiences with limited AFNR knowledge.	Issues interview	
CS.01.01.02.c. Evaluate emerging trends and the opportunities they may create within the AFNR systems.	Issues interview	
CS.01.02. Performance Indicator: Examine technologies and analyze their impact on AFNR systems.		
CS.01.02.01.c. Solve problems in AFNR workplaces or scenarios using technology	Grain grading	
CS.01.02.02.c. Evaluate the importance of technology use and how it impacts AFNR systems.	Grain grading	
CS.01.03. Performance Indicator: Identify public policies and their impact on AFNR systems.		
CS.7.02.01.c.Evaluate a public policy within AFNR systems and defend or challenge it.	Issues interview	

CS.7.02.02.c. Create a plan for implementing a new public policy that will positively impact AFNR systems.	Issues interview	
CS.02.01. Performance Indicator: Research geographic and economic data related to AFNR systems.		
CS.02.01.01.c. Evaluate geographic data and select necessary data sets to solve problems within AFNR systems.	Soils	
CS.02.02. Performance Indicator: Examine the components of the AFNR systems and their impact on the local, state, national and global society and economy		
CS.02.02.01.c. Devise a strategy for explaining components of AFNR systems to audiences with limited knowledge.	Issues interview	
CS.02.02.02.c. Evaluate how society traditions, customs or policies have resulted from practices with AFNR systems.	Issues interview	
CS.02.02.03.c. Evaluate how positive or negative changes in the local, state, national or global economy impacts AFNR systems.	Issues interview	
CS.03.01. Performance Indicator: Identify required regulations to maintain and improve safety, health and environmental management systems.		
CS.03.01.01.c. Evaluate how AFNR organizations/businesses promote improved health, safety and environmental management.	Exam	
CS.03.01.02.c. Construct and implement methods to evaluate compliance with required safety, health and environmental management regulations.	Exam	
CS.03.04. Performance Indicator: Use appropriate protective equipment and demonstrate safe and proper use of AFNR tools and equipment.		
C3.06.04.01.c. Design plans to ensure the use of appropriate protective equipment when using various AFNR tools and equipment.	Exam	

C3.06.04.02.c. Evaluate and select appropriate tools and equipment to complete AFNR tasks.	Exam Machinery identification	
CS.04.01. Performance Indicator: Identify and implement practices to steward natural resources in different AFNR systems.		
CS.04.01.02.c. Evaluate sustainability policies and plans and prepare summary of potential improvements for AFNR businesses or organizations.	Issues interview	
CS.04.02. Performance Indicator: Assess the natural resource related trends, technologies and policies that impact AFNR systems.		
CS.04.02.01.c. Defend or challenge natural resources trends and technologies based upon an assessment of their impact on AFNR systems.	Issues interview	
CS.06.01. Performance Indicator: Explain foundational cycles and systems of AFNR.		
CS.06.01.02.c. Evaluate AFNR systems and predict how the systems may change or adapt in the future of food, fiber and fuel production based on current trends and data.	Issues interview	
CS.06.02. Performance Indicator: Explain the connection and relationships between different AFNR systems on a national and global level.		
CS.06.02.01.c. Evaluate how AFNR systems impact each other on a national and global level.	Issues interview	
CS.06.02.02.c. Evaluate how changes in one AFNR system can benefit cost components of other systems on a national and global level.	Issues interview	
CRP.01.01. Performance Indicator: Model personal responsibility in the workplace and community.		
CRP.01.01.02.c. Model personal responsibility in workplace and community situations.	Team activity	

CRP.01.02 Performance Indicator: Evaluate and consider the near-term and long-term impacts of personal and professional decisions on employers and community before taking action.		
CRP.01.02.01.c. Make and defend personal decisions after analyzing their near- and long-term impacts on self and others.	Team activity	
CRP.01.02.02.c. Make and defend professional decisions after evaluating their near- and long-term impacts on employers and community.	Team activity	
CRP.01.02.02.c. Make and defend professional decisions after evaluating their near- and long-term impacts on employers and community.	Team activity	
CRP.02.01. Performance Indicator: Use strategic thinking to connect and apply academic learning, knowledge and skills to solve problems in the workplace and community.		
CRP.02.01.02.c. Apply academic knowledge and skills to solve problems in the community and reflect upon results achieved.	Issues interview	
CRP.02.02. Performance Indicator: Use strategic thinking to connect and apply technical concepts to solve problems in the workplace and community.		
CRP.02.02.01.c. Apply technical concepts to solve problems in the workplace and reflect upon the results achieved.	Commodity evaluation Pest management Team activity	
CRP.04.01. Performance Indicator: Speak using strategies that ensure clarity, logic, purpose and professionalism in formal and informal settings.		
CRP.04.01.02.b. Apply strategies for speaking with clarity, logic, purpose and professionalism in a variety of situations in formal and informal settings.	Issues interview Team activity	
CRP.04.02. Performance Indicator: Produce clear, reasoned and coherent written communication in formal and informal settings.		
CRP.04.02.02.c. Compose clear and coherent written documents (e.g., agendas, audio-visuals, drafts, forms, etc.) for formal and informal settings.	Team activity	

CRP.04.03. Performance Indicator: Model active listening strategies when interacting with others in formal and informal settings.		
CRP.04.03.01.b. Apply active listening strategies (e.g., be attentive, observe non-verbal cues, ask clarifying questions, etc.).	Issues interview Team activity	
CRP.07.01. Performance Indicator: Select and implement reliable research processes and methods to generate data for decision-making in the workplace and community.		
CRP.07.01.01.b. Analyze how different research methods are used to generate data in a variety of situations.	Soils Team activity	
CRP.07.02. Performance Indicator: Evaluate the validity of sources and data used when considering the adoption of new technologies, practices and ideas in the workplace and community.		
CRP.07.02.01.c. Propose valid and reliable data sources to use when considering the adoption of new technologies, practices and ideas.	Issues interview	
CRP.07.02.02.c. Create and defend proposals for new technologies, practices and ideas using valid and reliable data sources.	Issues interview	
CRP.08.01. Performance Indicator: Apply reason and logic to evaluate workplace and community situations from multiple perspectives.		
CRP.08.01.01.b. Apply steps for critical thinking to a variety of workplace and community situations.	Team activity	
CRP.08.01.02.b. Assess solutions to workplace and community problems for evidence of reason, logic and consideration of multiple perspectives.	Team activity	
CRP.08.02. Performance Indicator: Investigate, prioritize and select solutions to solve problems in the workplace and community.		
CRP.08.02.02.c. Evaluate and select solutions with greatest potential for success to solve workplace and community problems.	Pest management Team activity	
CRP.11.01. Performance Indicator: Research, select and use new technologies, tools and applications to maximize productivity in the workplace and community.		
CRP.11.01.01.b. Analyze advantages and disadvantages of new technologies, tools and applications to maximize productivity in the workplace and community.	Issues interview Team activity	

CRP.11.01.01.c. Construct effective communications to explain the features, benefits and risks of new technologies, tools and applications in the workplace and community.	Issues interview	
CRP.11.01.02.b. Select, apply and use new technologies, tools and applications in workplace and community situations to maximize productivity.	Exam Pest management Team activity	
FPP.01.02. Performance Indicator: Apply food safety and sanitation procedures in the handling and processing of food products to ensure food quality.		
FPP.01.02.01.c. Identify sources of contamination in food products and/or processing facilities and develop ways to eliminate contamination.	Exam Grain grading	
FPP.01.03. Performance Indicator: Apply food safety procedures when storing food products to ensure food quality.		
FPP.01.03.01.a. Identify and summarize purposes of food storage procedures (e.g., first in/first out, temperature regulation, monitoring, etc.).	Grain grading	
FPP.03.01. Performance Indicator: Implement selection, evaluation and inspection techniques to ensure safe and quality food products.		
FPP.03.01.01.c. Outline procedures to assign quality and yield grades to food products according to industry standards.	Grain grading	AFNR Career Cluster – Food Products and Processing Systems Pathway, Statement 1 AFNR Career Cluster – Food Products and Processing Systems Pathway, Statement 2 Buying Goods and Services, Benchmarks: Grade 12, Statement 7
FPP.03.01.02.b. Assemble procedures to perform quality-control inspections of raw food products for processing.	Grain grading	
FPP.03.02. Performance Indicator: Design and apply techniques of food processing, preservation, packaging and presentation for distribution and consumption of food products.		
FPP.03.02.01.a. Identify and explain English and metric measurements used in the food products and processing industry.	Grain grading	AFNR Career Cluster – Food Products and Processing Systems Pathway, Statement 3

FPP.04.01. Performance Indicator: Examine the scope of the food industry by evaluating local and global policies, trends and customs for food production.		
FPP.04.01.01.c. Articulate and defend a personal point of view on policies and legislation that affect the food products and processing system in the US or around the world.	Issues interview	HS-ETS1-3
NRS.01.01. Performance Indicator: Apply methods of classification to examine natural resource availability and ecosystem function in a particular region.		
NRS.01.01.01.c. Devise strategies for the preservation of natural resources based on their classification.	Soils Team activity	AFNR Career Cluster, Statement 1 AFNR Career Cluster, Statement 2 AFNR Career Cluster - Natural Resources Systems Pathway, Statement 3 STEM Career Cluster, Statement 1 CCSS.ELA-LITERACY.RST.11-12.1 CCSS.ELA-LITERACY.RST.11-12.8 CCSS.ELA-LITERACY.WHST.9-10.2 CCSS.ELA-LITERACY.WHST.11-12.2 CCSS.ELA-LITERACY.WHST.9-10.9 CCSS.ELA-LITERACY.WHST.11-12.9
NRS.01.01.02.c. Conduct analyses of ecosystems and document the interactions of living species and non-living resources.	Exam	AFNR Career Cluster, Statement 1 AFNR Career Cluster, Statement 2 AFNR Career Cluster - Natural Resources Systems Pathway, Statement 3 STEM Career Cluster, Statement 1 CCSS.ELA-LITERACY.RST.11-12.1 CCSS.ELA-LITERACY.RST.11-12.8 CCSS.ELA-LITERACY.WHST.9-10.2 CCSS.ELA-LITERACY.WHST.11-12.2 CCSS.ELA-LITERACY.WHST.9-10.9 CCSS.ELA-LITERACY.WHST.11-12.9
NRS.01.02. Performance Indicator: Classify different types of natural resources in order to enable protection, conservation, enhancement and management in a particular geographical region.		
NRS.01.02.05.c. Evaluate the non-living resources present in an area to determine the best practices for improving, enhancing and protecting an ecosystem.	Soils	AFNR Career Cluster - Natural Resources Systems Pathway, Statement 3 CCSS.ELA-LITERACY.RST.11-12.1 CCSS.ELA-LITERACY.RST.11-12.7 CCSS.ELA-LITERACY.RST.11-12.8 CCSS.ELA-LITERACY.WHST.9-10.2 CCSS.ELA-LITERACY.WHST.11-12.2 CCSS.ELA-LITERACY.WHST.9-10.7 CCSS.ELA-LITERACY.WHST.11-12.7 CCSS.ELA-LITERACY.WHST.9-10.9 CCSS.ELA-LITERACY.WHST.11-12.9 CCSS.MATH.CONTENT.HSN-Q.A.1

		CCSS.MATH.CONTENT.HSN-Q.A.2 HS-ESS3-2
NRS.01.05. Performance Indicator: Apply ecological concepts and principles to terrestrial natural resource systems.		
NRS.01.05.04.c. Devise a soil management plan to minimize erosion and maximize biodiversity, plant productivity, and the formation of topsoil.	Soils	AFNR Career Cluster, Statement 1 AFNR Career Cluster – Animal Systems Pathway, Statement 3 AFNR Career Cluster – Natural Resources Systems Pathway, Statement 3 CCSS.ELA-LITERACY.RST.11-12.1 CCSS.ELA-LITERACY.RST.11-12.7 CCSS.ELA-LITERACY.RST.11-12.8 CCSS.MATH.CONTENT.HSS-ID.A.1 CCSS.MATH.CONTENT.HSS-IC.A.1 CCSS.MATH.CONTENT.HSS-IC.B.6 HS-ESS3-4 HS-ESS3-2
NRS.04.02. Performance Indicator: Diagnose plant and wildlife diseases and follow protocols to prevent their spread.		
NRS.04.02.01.b. Analyze a plant disease based on its symptoms, identify if the disease needs to be reported to authorities and determine which authorities it should be reported to.	Grain grading	CCSS.ELA-LITERACY.RST.11-12.7 CCSS.ELA-LITERACY.RST.11-12.8 CCSS.ELA-LITERACY.WHST.11-12.2 CCSS.ELA-LITERACY.WHST.11-12.7 CCSS.ELA-LITERACY.WHST.11-12.8 CCSS.ELA-LITERACY.WHST.11-12.9 CCSS.MATH.CONTENT.HSN-Q.A.1 CCSS.MATH.CONTENT.HSN-Q.A.2 CCSS.MATH.CONTENT.HSN-Q.A.3 HS-LS2-7
PS.01.01. Performance Indicator: Determine the influence of environmental factors on plant growth.		
PS.01.01.01.c. Analyze plant responses to varied light color, intensity and duration and recommend modifications to light for desired plant growth.	Exam	
PS.01.01.03.c. Analyze plant responses to water conditions and recommend modifications to water for desired plant growth.	Commodity evaluation	

PS.01.02. Performance Indicator: Prepare and manage growing media for use in plant systems.		
PS.01.02.01.c. Formulate and prepare growing media for specific plants or crops.	Exam	
PS.01.02.02.c. Determine the hydraulic conductivity for soil and how the results influence irrigation practices.	Exam Pest management Soils Team activity	
PS.01.03. Performance Indicator: Develop and implement a fertilization plan for specific plants or crops.		
PS.01.03.01.a. Identify the essential nutrients for plant growth and development and their major functions (e.g., nitrogen, phosphorous, potassium, etc.).	Exam Pest management Team activity	CCSS.MATH.CONTENT.HSN.Q.A.2 CCSS.MATH.CONTENT.HSN.Q.A.3
PS.01.03.01.c. Monitor plants for signs of nutrient deficiencies and prepare a scouting report to correct elements negatively affecting plant growth in a field or greenhouse.	Pest management	CCSS.MATH.CONTENT.HSN.Q.A.2 CCSS.MATH.CONTENT.HSN.Q.A.3
PS.01.03.02.c. Adjust the pH of growing media for specific plants or crops.	Exam Team activity	CCSS.MATH.CONTENT.HSN.Q.A.2 CCSS.MATH.CONTENT.HSN.Q.A.3
PS.01.03.03.c. Prescribe fertilizer applications based on the results of a laboratory analysis of soil and plant tissue samples.	Exam Team activity	CCSS.MATH.CONTENT.HSN.Q.A.2 CCSS.MATH.CONTENT.HSN.Q.A.3
PS.01.03.05.c. Devise a plan for soil management for a selected production method.	Exam Soils Team activity	CCSS.MATH.CONTENT.HSN.Q.A.2 CCSS.MATH.CONTENT.HSN.Q.A.3
PS.01.03.06.c. Devise a plan to meet plant nutrient needs based on environmental factors present.	Team activity	CCSS.MATH.CONTENT.HSN.Q.A.2 CCSS.MATH.CONTENT.HSN.Q.A.3
PS.02.02. Performance Indicator: Apply knowledge of plant anatomy and the functions of plant structures to activities associated with plant systems.		
PS.02.02.01.c. Apply the knowledge of cell differentiation and the functions of the major types of cells to plant systems.	Exam	HS-LS1-4
PS.02.02.02.c. Correlate the active and passive transport of minerals into and through the root system to plant nutrition.	Exam	HS-LS1-5

PS.02.02.03.c. Evaluate the function of the xylem, phloem and cambium tissues and the impact on plant systems.	Exam	HS-LS1-5
PS.02.02.04.c. Devise a plan for plant management practices that takes into account leaf structure and functions.	Team activity	HS-LS1-5
PS.02.02.05.c. Evaluate flower structures and analyze the impact of plant structure on plant breeding, production and use.	Exam	HS-LS1-4 HS-LS1-5
PS.02.02.06.c. Evaluate the impact of different seed and fruit structures to plant culture and use.	Exam	HS-LS1-4 HS-LS1-5
PS.01.03. Performance Indicator: Apply knowledge of plant physiology and energy conversion to plant systems.		
PS.02.03.01.c. Evaluate the impact of photosynthesis and the factors that affect it on plant management, culture and production problems.	Exam	HS-LS1-5
PS.02.03.02.c. Evaluate the impact of plant respiration on plant growth, crop management and post-harvest handling decisions.	Exam	HS-LS1-5
PS.02.03.05.c. Devise plans for plant management that applies knowledge of transpiration, translocation and assimilation on plant growth.	Exam	HS-LS1-4 HS-LS1-5
PS.03. Performance Element: Propagate, culture and harvest plants and plant products based on current industry standards.		
PS.03.01.01.c. Select and defend the use of pollination methods and practices used to maximize crop pollination.	Exam	
PS.03.01.02.a. Demonstrate sowing techniques for providing favorable conditions to meet the factors of seed germination.	Machinery identification	

PS.03.01.03.a. Summarize optimal conditions for asexual propagation and demonstrate techniques used to propagate plants by cuttings, division, separation, layering, budding and grafting.	Exam	
PS.03.01.04.a. Define micropropagation, discuss advantages associated with the practice and summarize the main stages of the process.	Exam	
PS.03.01.05.b. Compare and contrast the potential risks and advantages associated with genetically modified plants.	Issues interview	
PS.03.02. Performance Indicator: Develop and implement a management plan for plant production.		
PS.03.02.01.b. Inspect propagation material for evidence of pests or disease.	Pest management	CCSS.ELA-Literacy.RI.9-10.1 CCSS.ELA-Literacy.RI.9-10.8 CCSS.ELA-Literacy.RST.9-10.3 CCSS.ELA-Literacy.WHST.9-10.2 CCSS.ELA-Literacy.WHST.9-10.4 CCSS.ELA-Literacy.WHST.9-10.9
PS.03.02.02.b. Prepare soil and growing media for planting with the addition of amendments.	Soils	
PS.03.02.03.a. Determine seeding rate need for specified plant population or desired quantity of finished plants.	Team activity	
PS.03.02.04.a. Observe and record environmental conditions during the germination, growth and development of a crop.	Exam	
PS.03.02.04.c. Prepare and implement a plant production schedule based on predicted environmental conditions and desired market target (e.g., having plants ready to market on a specific day such as Mother's Day, organic production, low maintenance landscape plants, etc.).	Team activity	
PS.03.02.05.b. Demonstrate proper techniques to control and manage plant growth through mechanical, cultural or chemical means.	Exam	

PS.03.03. Performance Indicator: Develop and implement a plan for integrated pest management for plant production.		
PS.03.03.01.a. Identify and categorize plant pests, diseases and disorders.	Pest management and identification	
PS.03.03.01.b. Identify and analyze major local weeds, insect pests and infectious and noninfectious plant diseases.	Pest management and identification	
PS.03.03.01.c. Devise solutions for plant pests, diseases and disorders.	Team activity and pest management	
PS.03.03.02.b. Predict pest and disease problems based on environmental conditions and life cycles.	Exam Pest management Team activity	
PS.03.03.03.c. Employ pest management strategies to manage pest populations, assess the effectiveness of the plan and adjust the plan as needed.	Exam Pest management Team activity	
PS.03.03.04.b. Examine and apply procedures for the safe handling, use and storage of pesticides including personal protective equipment and re-entry interval.	Exam	
PS.03.04. Performance Indicator: Apply principles and practices of sustainable agriculture to plant production.		
PS.03.04.01.c. Research, prepare and defend plans for a plant systems enterprise that aligns with USDA sustainable practices criteria.	Issues interview	AFNR Career Cluster, Statement 2 STEM Career Cluster, Statement 1 STEM Career Cluster, Statement 4 HS-ESS3-2
PS.03.04.02.c. Select and defend the use of nationally/internationally grown or locally/regionally grown for a production operation system.	Issues interview	AFNR Career Cluster, Statement 2 STEM Career Cluster, Statement 1 STEM Career Cluster, Statement 4 HS-ESS3-2
PS.03.05. Performance Indicator: Harvest, handle and store crops according to current industry standards.		
PS.03.05.01.c. Analyze the process used by mechanical harvesting equipment.	Machinery identification	CCSS.ELA-Literacy.RST.9-10.3 CCSS.ELA-Literacy.RST.9-10.4 CCSS.ELA-Literacy.WHST.9-10.2a
PS.03.05.02.b. Evaluate crop yield and loss data and make recommendations to reduce crop loss.	Team activity	CCSS.ELA-Literacy.RST.9-10.3 CCSS.ELA-Literacy.RST.9-10.4 CCSS.ELA-Literacy.WHST.9-10.2a

PS.03.05.03.c. Research laws and apply regulations to ensure the production of plants and plant products that are safe for distribution and use.	Exam Pest management	CCSS.ELA-Literacy.RST.9-10.3 CCSS.ELA-Literacy.RST.9-10.4 CCSS.ELA-Literacy.WHST.9-10.2a
PS.03.05.05.b. Demonstrate techniques for grading, handling and packaging plants and plant products for distribution.	Grain grading	CCSS.ELA-Literacy.RST.9-10.3 CCSS.ELA-Literacy.RST.9-10.4 CCSS.ELA-Literacy.WHST.9-10.2a
PS.03.05.05.c. Evaluate techniques for grading, handling and packaging plants and plant products.	Commodity evaluation Grain grading	CCSS.ELA-Literacy.RST.9-10.3 CCSS.ELA-Literacy.RST.9-10.4 CCSS.ELA-Literacy.WHST.9-10.2a