



New Mexico FFA

# Forestry

Career Development Event

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## Career Development Event Handbook

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### PURPOSE

The New Mexico FFA Forestry Career Development Event is designed to stimulate student interest and to promote the forestry industry as a career choice. It also provides recognition for those who have demonstrated skills and competencies as a result of forestry instruction in the agriculture education classrooms.

### OBJECTIVES

This event will provide the participant the ability to:

- ❖ Understand and use forestry terms.
- ❖ Promote an understanding of the economic impact of the forest environment and the forest industry to the American economy.
- ❖ Recognize sustainability (multiple-use) opportunities in the forests.
- ❖ Recognize environmental and social factors affecting the management of forests.
- ❖ Identify major species of trees of economic importance to New Mexico, the United States and internationally.
- ❖ Recognize and understand approved silvicultural practices in New Mexico and the United States.
- ❖ Identify forest disorders
- ❖ Understand how to take a forest inventory
- ❖ Understand marketing management strategies.
- ❖ Recognize safety practices in forest management.
- ❖ Identify hand tools, equipment, and their use in forestry management.

### COMMON CORE REFERENCES

#### **7th Grade:**

**CCSS.Math.Content.7.G.B.4** Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.

#### **8th Grade:**

**MS-LS2-5.** Evaluate competing design solutions for maintaining biodiversity and ecosystem services.\*

#### **9-10th Grade:**

**CCSS.Math.Content.HSG-MG.A.1** Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).★

#### **11-12th Grade:**

**CCSS.ELA-Literacy.RST.11-12.9** Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible

## **EVENT FORMAT**

### **INDIVIDUAL ACTIVITIES**

#### **GENERAL KNOWLEDGE EXAM**

- ❖ Fifty (50) multiple-choice questions will be selected from areas of the forestry industry reflected in the event objectives. This phase of the event will test the participant's knowledge and understanding of the basic principles of forestry.
- ❖ Each participant will be allowed 45 minutes to complete this phase of the event.
- ❖ Each question will be worth 2 points, for a total maximum score of 100 points.

#### **TREE IDENTIFICATION**

- ❖ Twenty (20) live specimens, pressed samples, fresh leaf samples, cones or seeds, or branches from the tree identification specimen list will be displayed for participants to identify by common names.
- ❖ An identification list will be provided to participants.
- ❖ Each participant will be allowed a maximum of 2 minutes at each specimen with a total of forty minutes allowed for the practicum.
- ❖ There is no restriction on the number of duplicate specimens included in the practicum.
- ❖ Specimens may not be touched.
- ❖ Each specimen identified correctly is worth 2 points for a total maximum score of forty (40) points.

#### **EQUIPMENT/CHAINSAW PART IDENTIFICATION**

- ❖ Twenty (20) actual samples, pictures or slides or written description of items from the equipment/chainsaw parts list will be displayed for participants to identify.
- ❖ An identification list will be provided to participants.
- ❖ Each participant will be allowed a maximum of two (2) minutes at each specimen with a total of forty (40) minutes allowed for the practicum.
- ❖ Specimens may not be touched.
- ❖ Each specimen identified correctly is worth 2 points for a total maximum score of forty (40) points.

#### **TREE/FOREST DISORDERS IDENTIFICATION**

- ❖ Twenty (20) actual samples or pictures or slides or written description of items from the tree/forest disorders list will be displayed for participants to identify.
- ❖ An identification list will be provided to participants.
- ❖ Each participant will be allowed a maximum of two (2) minutes at each specimen with a total of forty (40) minutes allowed for the practicum.
- ❖ Specimens may not be touched.
- ❖ Each specimen identified correctly is worth two (2) points for a total maximum score of forty (40) points.

## COMPASS PRACTICUM

- ❖ Participant will use a hand compass and pacing to the nearest full foot to simulate the determination of the property lines on a tract of timber.
- ❖ The compass practicum will have five (5) marked points.
- ❖ Participants will start at any point and record the azimuth and distance to the next point.
- ❖ Participants are responsible for bringing compasses to the event.
- ❖ Calculators are permitted during the event and participants are responsible for bringing them to events other than state contest. They will be supplied at state contest.
- ❖ No other electronic devices are allowed during the event.
- ❖ Each participant is allowed forty (40) minutes for the event.
- ❖ Each correct azimuth and each correct distance is worth five (5) points each for a maximum score of fifty (50) points.
- ❖ Partial credit will be given with a deduction of one (1) point for each two (2) degrees or two (2) feet the participant is off the correct answer.

## TEAM ACTIVITY

### TREE MEASUREMENT PRACTICUM

- ❖ Teams will measure five (5) pre-numbered trees
- ❖ They will record the DBH (diameter breast height) computed to the nearest whole number.
- ❖ They will record the height of each tree from the base (at the ground) to the top (top of branches) computed to the nearest foot.
- ❖ **Students are not allowed to use any type of measuring tape or tool to measure out 100' from the tree to 54" from the ground to determine DBH.**
- ❖ The volume of the tree will be determined using the height and the diameter of the tree. **If the tree volume is off the chart the student will enter 000 for volume. Add all 5 volumes and enter them in volume section.**
- ❖ Volume table will be provided
- ❖ The team is allowed 40 minutes for the event
- ❖ Each chapter is responsible for bringing either a clinometer or tree stick and a D-tape to the event.
- ❖ Pacing must be utilized to determine distance from the tree when using a clinometer or tree stick. )
- ❖ Each correct tree height and DBH is worth four (4) points each. Each correct volume is worth two (2) points.
- ❖ Partial credit will be given with a deduction of one point for each inch off the correct DBH and each foot off the correct height.
- ❖ No partial credit is given for an incorrect volume.

## SCORING

| Activities:                          | Individual Points | Team Points |
|--------------------------------------|-------------------|-------------|
| General Knowledge Exam               | 100               | 300         |
| Tree Identification                  | 40                | 120         |
| Equipment/Chainsaw Identification    | 40                | 120         |
| Tree/Forest Disorders Identification | 40                | 120         |
| Compass Practicum                    | 50                | 150         |
| Tree Measurement Practicum           | 50                | 150         |
| Total Points Possible                | 320               | 960         |

## REFERENCES

### GENERAL KNOWLEDGE EXAM

- ❖ Introduction to Forestry Science, Burton, Delmar Publications (newest edition)
- ❖ Science of Forestry Management, Kris Irwin, University of Georgia, AAVIM (first edition)
- ❖ Husqvarna publication, How to Work with a Chainsaw (.pdf file)
- ❖ Forests and Forestry. Rolfe et al., Interstate Publishers. 0-8134-3240-5

### TREE IDENTIFICATION

- ❖ Tree Identification Study Guide (2 .pdf files)
- ❖ Trees & Shrubs of New Mexico, Jack L. Carter
- ❖ Dendrology at Virginia Tech, <http://dendro.cnre.vt.edu/dendrology/main.htm>
- ❖ W. H. Harlow, E. S. Harrar, and F. M. White. Textbook of Dendrology, current edition. New York, NY:McGraw-Hill Book Company
- ❖ Silvics of North America, Handbook #654, volume one and two, U.S. Forest Service, [https://www.srs.fs.usda.gov/pubs/misc/ag\\_654/table\\_of\\_contents.htm](https://www.srs.fs.usda.gov/pubs/misc/ag_654/table_of_contents.htm)

### EQUIPMENT/CHAINSAW PART IDENTIFICATION

- ❖ Science of Forestry Management, Kris Irwin, University of Georgia, AAVIM (first edition)
- ❖ Stihl Chainsaw Safety Manual (.pdf file pages 28-31)
- ❖ <https://www.forestry-suppliers.com/>
- ❖ <https://www.forestryequipmentguide.com/>

### FOREST/TREE DISORDERS IDENTIFICATION

- ❖ Field Guide to Insects and Diseases of Arizona and New Mexico <https://www.fs.fed.us/r3/resources/health/field-guide/index.shtml>
- ❖ Bugwood, <http://www.bugwood.org>
- ❖ Carpenterworm [https://www.fs.usda.gov/Internet/FSE\\_DOCUMENTS/stelprdb5349700.pdf](https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5349700.pdf)
- ❖ Emerald ash borer <https://www.forestpests.org/acrobat/eabfg.pdf>
- ❖ Boxelder [https://wiki.bugwood.org/NPIP:Boisea\\_trivittata](https://wiki.bugwood.org/NPIP:Boisea_trivittata)
- ❖ Wood wasp [https://wiki.bugwood.org/Sirex\\_noctilio](https://wiki.bugwood.org/Sirex_noctilio)
- ❖ Bagworm [https://www.fs.usda.gov/Internet/FSE\\_DOCUMENTS/stelprdb5347210.pdf](https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5347210.pdf)
- ❖ Gypsy Moth [https://wiki.bugwood.org/Lymantria\\_dispar](https://wiki.bugwood.org/Lymantria_dispar) and page 121 in Science of Forestry Management

- ❖ Cicadas <https://www.desertusa.com/insects/cicada.html> and page 125 in Science of Forestry Management

#### COMPASS PRACTICUM

- ❖ <https://www.idl.idaho.gov/forestry/contest/5.0-FC-Manual-CompassPacing2014.pdf>
- ❖ [https://courses.washington.edu/esrm304a/lectures/LAB%201/RangerCompass\\_UserGuide.2000\\_2-up.pdf](https://courses.washington.edu/esrm304a/lectures/LAB%201/RangerCompass_UserGuide.2000_2-up.pdf)
- ❖ <https://training.nwcg.gov/pre-courses/s290/S-290%20Student%20CD/Map%20and%20Compass.pdf>

#### TREE MEASUREMENT PRACTICUM

- ❖ [https://www.fs.usda.gov/Internet/FSE\\_DOCUMENTS/stelprdb5202838.pdf](https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5202838.pdf)
- ❖ [https://www.americanforests.org/wp-content/uploads/2014/12/AF-Tree-Measuring-Guidelines\\_LR.pdf](https://www.americanforests.org/wp-content/uploads/2014/12/AF-Tree-Measuring-Guidelines_LR.pdf)
- ❖ [Measuring Woodland Timber](#)
- ❖ <https://www.extension.purdue.edu/extmedia/FNR/FNR-4.pdf>

#### FOREST MANAGEMENT

- ❖ Forests and Forestry. Rolfe et al., Interstate Publishers. 0-8134-3240-5
- ❖ Introduction to Forestry Science. Burton, Delmar Publications. 0-8273-8010-0
- ❖ Science of Forestry Management. Irwin. AAVIM. 0-8960-6383-6
- ❖ One Less Thing—Lessons, <https://www.onelessting.net/collections/lesson-plans>

#### MAP INTERPRETATION

- ❖ The U.S. Department of Interior Geological Survey Topographic Map Information and Symbols Key, Map Distribution, U. S. Geological Survey.  
<https://pubs.usgs.gov/gip/TopographicMapSymbols/topomapsymbols.pdf>
- ❖ <https://www.honolulu.hawaii.edu/instruct/natsci/geology/brill2/TopoMaps.pdf>
- ❖ <https://paleoind.sitehost.iu.edu/Resources/Guide%20to%20Topographic%20Maps.pdf>
- ❖ <https://training.nwcg.gov/pre-courses/s290/S-290%20Student%20CD/Map%20and%20Compass.pdf>

## STANDING TREE BOARD FOOT VOLUME TABLE

| <b>Table 2. Standing Tree Board Foot Volumes—International 1/4-Inch Rule</b>                |                               |          |              |          |              |          |              |          |
|---|-------------------------------|----------|--------------|----------|--------------|----------|--------------|----------|
| <b>Dbh<br/>(inches)</b>   | <b>Number of 16-Foot Logs</b> |          |              |          |              |          |              |          |
|   | <b>1/2</b>                    | <b>1</b> | <b>1-1/2</b> | <b>2</b> | <b>2-1/2</b> | <b>3</b> | <b>3-1/2</b> | <b>4</b> |
| <b>Board Feet</b>   |                               |          |              |          |              |          |              |          |
| 12  | 30                            | 60       | 80           | 100      | 120          |          |              |          |
| 14  | 40                            | 80       | 110          | 140      | 160          | 180      |              |          |
| 16  | 60                            | 100      | 150          | 180      | 210          | 250      | 280          | 310      |
| 18  | 70                            | 140      | 190          | 240      | 280          | 320      | 360          | 400      |
| 20  | 90                            | 170      | 240          | 300      | 350          | 400      | 450          | 500      |
| 22  | 110                           | 210      | 290          | 360      | 430          | 490      | 560          | 610      |
| 24  | 130                           | 250      | 350          | 430      | 510          | 590      | 660          | 740      |
| 26  | 160                           | 300      | 410          | 510      | 600          | 700      | 790          | 880      |
| 28  | 190                           | 350      | 480          | 600      | 700          | 810      | 920          | 1,020    |
| 30  | 220                           | 410      | 550          | 690      | 810          | 930      | 1,060        | 1,180    |
| 32  | 260                           | 470      | 640          | 790      | 940          | 1,080    | 1,220        | 1,360    |
| 34  | 290                           | 530      | 730          | 900      | 1,060        | 1,220    | 1,380        | 1,540    |
| 36  | 330                           | 600      | 820          | 1,010    | 1,200        | 1,380    | 1,560        | 1,740    |
| 38  | 370                           | 670      | 910          | 1,130    | 1,340        | 1,540    | 1,740        | 1,940    |
| 40  | 420                           | 740      | 1,010        | 1,250    | 1,480        | 1,700    | 1,920        | 2,160    |
| 42  | 460                           | 820      | 1,100        | 1,360    | 1,610        | 1,870    | 2,120        | 2,360    |
| From: Ashley, Burl S. 1980. <i>Reference handbook for foresters</i> . USDA NA-FR-15. 35 pp. |                               |          |              |          |              |          |              |          |

## EQUIPMENT and CHAINSAW IDENTIFICATION LIST

|    |                                    |    |                                |
|----|------------------------------------|----|--------------------------------|
| 1  | Adjusting wheel of quick tensioner | 41 | Hand lens                      |
| 2  | Adze hoe                           | 42 | Handle of wingnut              |
| 3  | Altimeter                          | 43 | Hard hat                       |
| 4  | Backpack sprayer                   | 44 | Hip chain                      |
| 5  | Bark Gauge                         | 45 | Hypo-hatchet                   |
| 6  | Bumper spike                       | 46 | Increment borer                |
| 7  | Cant hook                          | 47 | Log rule                       |
| 8  | Carburetor adjusting screws        | 48 | Log scale stick/Biltmore stick |
| 9  | Chain brake                        | 49 | Master Control lever           |
| 10 | Chain catcher                      | 50 | Muffler                        |
| 11 | Chain sprocket                     | 51 | Oil filler cap                 |
| 12 | Chain sprocket cover               | 52 | Oilomatic saw chain            |
| 13 | Chain tensioner (front)            | 53 | pH meter                       |
| 14 | Chain tensioner (side)             | 54 | Planimeter                     |
| 15 | Chainsaw                           | 55 | Plant press                    |
| 16 | Chainsaw chaps                     | 56 | Planting shovel                |
| 17 | Clinometer                         | 57 | Pulaski                        |
| 18 | Data recorder                      | 58 | Rear hand guard                |
| 19 | Decompression valve                | 59 | Rear handle                    |
| 20 | Densimeter                         | 60 | Relaskop                       |
| 21 | Diameter tape                      | 61 | Safety goggles                 |
| 22 | Dibble bar                         | 62 | Soil sampler                   |
| 23 | Dot grid                           | 63 | Soil test kits                 |
| 24 | Drip torch                         | 64 | Spark plug boot                |
| 25 | Fiberglass measuring tape          | 65 | Spark plug                     |
| 26 | Field microscope                   | 66 | Staff compass                  |
| 27 | Fire plow                          | 67 | Starter grip                   |
| 28 | Fire rake                          | 68 | Stereoscope                    |
| 29 | Fire shelter                       | 69 | Surveying Instruments          |
| 30 | Fire swatter                       | 70 | Tally book                     |
| 31 | Fire weather kit                   | 71 | Tally meter                    |
| 32 | Flagging                           | 72 | Throttle trigger               |
| 33 | Flow/current meter                 | 73 | Throttle trigger interlock     |
| 34 | Front hand guard                   | 74 | Tree caliper                   |
| 35 | Front handle (handlebar)           | 75 | Tree marking gun               |
| 36 | Fuel filler cap                    | 76 | Tree planting bar              |
| 37 | Fuel pump                          | 77 | Twist Lock                     |
| 38 | Global Positioning System (GPS)    | 78 | Water sampler                  |
| 39 | Guide bar                          | 79 | Water test kit                 |
| 40 | Hand compass                       | 80 | Wedge prism                    |
|    |                                    | 81 | Wheeler caliper                |



## TREE DISORDERS IDENTIFICATION LIST

|    |                             |    |                           |
|----|-----------------------------|----|---------------------------|
| 1  | Animals                     | 19 | Fir Looper                |
| 2  | Aphids                      | 20 | Gypsy Moth                |
| 3  | Bag worm                    | 21 | Mechanical damage         |
| 4  | Bark Beetles – Dendroctonus | 22 | Needleminers              |
| 5  | Bark Beetles – Ips          | 23 | Pine Needle Scale         |
| 6  | Blue Stain Fungi            | 24 | Pine Tip Moths            |
| 7  | Boxelder Bug                | 25 | Pinyon Needle Scale       |
| 8  | Carpenter Ants              | 26 | Pinyon Spindle Gall Midge |
| 9  | Carpenter worm              | 27 | Sawflies                  |
| 10 | Chemical applications       | 28 | Termites                  |
| 11 | Cicadas                     | 29 | Tiger Moth                |
| 12 | Cooley Spruce Gall Adelgid  | 30 | True Mistletoe            |
| 13 | Douglas-fir Tussock Moth    | 31 | Western Spruce Budworm    |
| 14 | Dwarf Mistletoe             | 32 | Western Tent Caterpillar  |
| 15 | Emerald Ash Borer           | 33 | White Pine Blister Rust   |
| 16 | Environmental factors       | 34 | Wood Borers – Longhorn    |
| 17 | Fall Webworm                | 35 | Wood Borers – Metallic    |
| 18 | Fir Engraver                | 36 | Wood Wasp                 |

## TREE IDENTIFICATION LIST

|    |                   |    |                        |
|----|-------------------|----|------------------------|
| 1  | Algerita          | 17 | Pecan                  |
| 2  | Arizona ash       | 18 | Pinyon pine            |
| 3  | Arizona cypress   | 19 | Ponderosa pine         |
| 4  | Arizona sycamore  | 20 | Quaking aspen          |
| 5  | Arizona walnut    | 21 | Rio Grande cottonwood  |
| 6  | Blue Spruce       | 22 | Rocky Mountain juniper |
| 7  | Boxelder          | 23 | Rocky Mountain Maple   |
| 8  | Catclaw acacia    | 24 | Salt cedar             |
| 9  | Desert willow     | 25 | Sandbar willow         |
| 10 | Douglas-fir       | 26 | Scots pine             |
| 11 | Eldarica pine     | 27 | Screwbean mesquite     |
| 12 | Gambel oak        | 28 | Shrub live oak         |
| 13 | Honey mesquite    | 29 | Southwestern pine      |
| 14 | Netleaf hackberry | 30 | Thinleaf alder         |
| 15 | New Mexico locust | 31 | Water birch            |
| 16 | Oneseed juniper   | 32 | White fir              |