Forestry

Purpose

The Forestry Contest is designed to stimulate students' interest in forestry and the principles and benefits of forest resource management.

Objectives

I. Ability to understand and have a basic knowledge of forestry and agroforestry principles.

II. Ability to identify trees common to Missouri.

III. Ability to recognize tools and equipment and their uses in forest management.

IV. Ability to inventory standing timber.

V. Ability to understand timber stand improvement principles.

VI. Ability to interpret topographic maps and understand legal descriptions.

Crosswalk with Show Me Standards

Objectives – Students participating in the Career Development Event should be able to:		Show-Me Standards	
		Knowledge Standards (Content Areas)	Performance Standards (Goals)
1.	Ability to understand and have a basic knowledge of forestry and agroforestry principles.	CA.3	1.3, 1.4, 1.5, 1.8
2.	Ability to identify trees common to Missouri.	MA.1, MA.2, MA.3	3.2, 3.4, 3.8
3.	Ability to recognize tools and equipment and their uses in forest management.	SC.3, SC.4, SC.8	4.4, 4.8
4.	Ability to inventory standing timber.	SS.4	
5.	Ability to understand timber stand improvement principles.		
6.	Ability to interpret topographic maps and understand legal descriptions.		

Corresponding Secondary Agriculture Curriculum			
Course and/or Curriculum:	Agricultural Science II	Unit(s):	Forestry
	Forest Management		All Units

Event Format

The Forestry CDE shall consist of the following six (6) components:

A. **General Knowledge** - 30 minutes
   1. This phase of the contest will test the contestant's knowledge and understanding of basic forestry and agroforestry principles.
   2. Contestants will see fifty (50) objective type, multiple choice or true/false questions reflecting the contest objectives and coming from the reference list.

B. **Tree Identification** - 30 minutes
   1. Twenty (20) <u>unduplicated</u> specimens from the list on Form 40 will be displayed for contestants to identify by <u>common names</u>. **Duplicate samples may not be used in any identification portion of the event.**
   2. Each specimen will be designated by a number
   3. Contestants will have approximately one and one-half minutes for each specimen station.
   4. Specimens may be actual specimens or mounted specimens.

C. **Equipment Identification** - 10 minutes
   1. Twenty (20) pieces of equipment from the list on Form 41 will be displayed for contestants to identify by proper technical name. **Duplicate samples may not be used in any identification portion of the event.**
   2. Each piece of equipment will be designated by a number.

D. **Timber Cruising** (measuring standing timber on a 1/10 acre plot) - 60 minutes

1. Using a Biltmore tree scale stick, in the correct manner, each contestant will measure pre-numbered trees on a 1/10 acre plot for DBH, 4.5 ft. from the high side of the tree, tree height to the nearest 1/2 log (8') and board foot volume.
2. All marked trees on the plot must be measured in order to make the desirable cruise computations, but only the first five trees (saw timber) will be scored for each individual measurement.
3. WHILE TREE FORM AND MINIMUM MERCHANTABLE TREE DIAMETERS VARY ACROSS THE STATE, TO LEVEL THE PLAYING FIELD FOR THIS PART OF THE CONTEST, TREE VOLUMES SHOULD BE DETERMINED USING THE FOLLOWING GUIDELINES:

a. Given a general Form Class of 75, one can expect to lose one inch diameter (outside bark) for every eight-foot log.
b. Minimum merchantable tree diameter will be ten inches (outside bark).
c. Merchantable volume will stop at the first major fork or obvious defect in the trunk.
d. <u>No volume is to be determined</u> for logs above the fork (or defect) as well as any side limbs.
e. After measuring all trees, the contestant will find total volume per acre, total value per acre, the average DBH per acre, the total number of trees per acre, and the desired minimum number of trees per acre. The student will then decide if the stand was understocked, adequately stocked, or overstocked. The student will then recommend that the stand be thinned, harvested, or left to grow.

   1. Harvest: The removal of all or portions of the trees on an area. If the average diameter on the 1/10 acre plot is 12 inches or greater and is definitely overstocked, a harvest cut is possible.
   2. Thinning: A cut in an immature forest stand to reduce the tree density and to concentrate productivity on fewer, higher quality trees. Usually the average diameter is less than 12 inches and the stand is overstocked.

3. Left to grow: The stand is not overstocked and the trees can be left to grow to maturity, a larger average diameter, or until further management is necessary.

f. A chart showing the desirable stocking level will be provided and a chart with the International 1/4" Tree Scale will also be provided.

E. **Timber Stand Improvement (TSI)** - 30 Minutes

1. The site will be a fixed area, normally 1/10 acre or (merely designated).
2. All trees will be identified by number.
3. On the scorecard, the student will be given the following information:
   a. existing number of trees per acre
   b. number of trees to thin (or leave) per plot
   c. objective or management plan for the stand
4. Using the information furnished on the scorecard, the student will determine whether each tree will be:
   a. left for growing stock or
   b. deadened/remove for a cull or undesirable species/harvest
5. The management plan will be explicit in scope giving all information needed by the student to decide whether to cut, leave, or deaden.
   a. If the plan is for timber production, it will state the species which are desirable and those that are undesirable and size and quality limits of merchantable trees.
   b. If the plan is for wildlife habitat management, the plan is to include the species desirable and undesirable, number of den trees needed per acre, and the number of foresting trees to be left per acre.
6. Additional information, as appropriate, may be included.
7. NOTE: Cutting of firewood is not to be considered a harvest operation.
8. Only those trees 4" DBH and larger will be tagged or numbered.

F. **Map Reading** - Legal Descriptions - 20 minutes

a. Contestants will be furnished a U.S. geological survey map with specific points marked for the student to identify.
b. The student will need to know legal descriptions, size or location of no less than one 10 acre land parcel.
c. When the student is asked to identify points on a geological survey map, the points will be clearly marked with a letter and an arrow pointing to the section or symbol or area on the map to be identified or sized.
   Examples are:

(1) Find Letter A--What is the legal description of the area boxed in? <u>southwest one quarter of the northwest one quarter of the northwest one quarter of section</u>
(2) Find Letter B--What is the item located at this point? <u>Church</u>
(3) Find Letter C--What is the acreage of this point boxed in? <u>10 acres</u>
(4) Find Letter D--What is the line shown here called? <u>contour line</u>

Event Scoring

Event	Points
General Knowledge (50 questions @ 2 pts each)	100
Identification (20 plants at 5 pts each)	100
Equipment ID (20 @ 2 pts each)	40
Timber Cruising	100
Timber Stand Improvement	100
Map Reading (12 questions @ 5 pts each)	60
TOTAL	**500**

1. Scoring Timber Crusing
   a. There are a total of 100 points possible in this section.
   b. Fifty (50) points will come from proper measurement of the first five saw timber trees. This would be ten points for each tree:
      •Two points for correctly identifying the tree species
      •Four points for correctly measuring DBH
      •Four points for correctly measuring proper tree height to the nearest 1/2 log.

   c. The remaining 50 points will come from answering questions about measurements:
      •10 points for total volume per acre (allowing for a variance of plus or minus 10 percent)
      •10 points for value per acre (allowing for a variance of plus or minus 10 percent)
      •10 points for minimum number of trees per acre
      •10 points for assessing stand (understocked, adequately stocked, or overstocked)
      •10 points for determining if the stand should be thinned, harvested, or left to grow

2. Tie scores among teams in all events should be broken using the high individual team member's score. In case the scores are tied, the scores of the second high individual on each team should be used.

Event Rules and Regulations

1. Under no circumstances will any contestant be allowed to touch or handle plant material during the contest, with the exception of the tree measuring activity. Any infraction of this will be sufficient cause to eliminate the team from the contest.
2. Observers will not be permitted in the contest area while the contest is in progress.
3. <u>No contest team, team member, or team coach shall visit the contest facilities to observe plant materials and facilities prior to the contest.</u>
4. Any contestant caught cheating during the contest will, along with his/her team members, be expelled from the contest.
5. All contestants are expected to be prompt at their stations throughout the contest. No provisions will be made for tardiness and will most certainly cause late contestants to lose contest points.
6. Contestants will be assigned to group leaders who will escort them to various contest staging lines. Each contestant is to stay with his or her group leader throughout the contest or until told to change leaders by the contest superintendent.
7. All contestants will be given a contestant number by which they will be designated throughout the contest.
8. Contestants must come to the contest prepared to work in adverse weather conditions. The contest will be conducted regardless of weather conditions, except those outlined in

the FFA Severe Weather Guidelines in the General Guidelines section. Contestants should have heavy coats and other warm clothes and footwear. **NO open-toed shoes will be allowed.**

9. Tools and Equipment: All tools and equipment will be furnished for the contest. Contestants must use the tools and equipment furnished at the contest site for all instructional areas, with the exception that contestants may provide their own Biltmore stick.
10. Calculators may be used. In all events, only six-function, (nonprogrammable and non-graphing) models may be used. Therefore, the calcualtors are limited to the following keys: Plus (+); Minus (-); Multiplication (x); Division (/); Equals (=); Memory Clear/Recall (MRC); Memory Minus (M-); Memory Plus (M+); Plus / Minus (+/-); Percentage (%); Square Root (√). See page 3, rule #8 of the General CDE Guidelines for an example.
11. **Written Materials: All written materials will be furnished for the contest. At the state contest, each contestant will receive:**
    a. **Scansheet to mark all answers**
    b. **Form 42 – Cruising Tally Sheet 1/10 Acre Plot**
    c. **Form 43 – Cruising Tally Sheet and Scorecard Computations**
    d. **Contestant Reference Sheet for use with the Forestry CDE Scansheet**
12. Contestants should provide clipboards and pencils. Electronic calculators and magnifying glasses will be allowed.

References

Forest Management for Missouri Landowners, MDC 2003, Bruce Palmer

Designing a Windbreak Agroforestry Practice, MU Center for Agroforestry

Designing a Riparian Forest Buffer Agroforestry Practice, MU Center for Agroforestry

50 Common Trees of Missouri, MDC 2005, David Knotts

Trees of Missouri, 1983, Carl Settegren & R.E. McDermott, University of Missouri, Agricultural Experiment Station, B767.

Missouri's Oaks and Hickories, Missouri Department of Conservation Field Guide, Reprinted from the August and December 1993, and January 1994 *Missouri Conservationist* by the Conservation Commission of the State of Missouri.

Trees of Indiana (CD), Purdue University, by Sally Weeks and George Parker Phone 888-398-4636 to order or visit http://www.ces.purdue.edu/extmedia/menu.htm

University of Missouri Forestry Website, www.snr.missouri.edu/forestry/extension/ffa.php

Equipment ID References
Official Reference: MDC Forestry Tools (CD), Missouri Department of Conservation, Outreach and Education Division, P.O. Box 180, Jefferson City, MO 65102

Other References: Forestry Supplies, Inc., 205 West Ranken Street, Jackson, MS 39204-0397

The Ben Meadows Company, 3589 Broad Street, Atlanta, GA 30366

"Missouri FFA Forestry CDE Training Guide", Dr. Hank Stelzer, 2010. Available at: http://snr.missouri.edu/forestry/extension/ffa.php

Forms

See following pages for Form 40, Form 41, Form 42, Form 43, Form 44 and the "Contestant Reference Sheet for use with the Forestry CDE Scansheet".

Tree Identification Scorecard

FORM 40

Name: _____ Contestant Number: _____
School _____ School Number: _____

Directions: Place number of correct specimen in blank. Five points each for a total of 100 pts.

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____
16. _____
17. _____
18. _____
19. _____
20. _____

OAK

01. Black Oak / Quercus velutina
02. Blackjack Oak / Quercus marilandica
03. Bur Oak / Quercus macrocarpa
04. Chinkapin Oak / Quercus uehlenbergii
05. Northern Red Oak / Quercus rubra
06. Pin Oak / Quercus palustris
07. Post Oak / Quercus stellata
08. Scarlet Oak / Quercus coccinea
09. Shingle Oak / Quercus imbricaria
10. White Oak / Quercus alba

HICKORY

11. Bitternut Hickory / Carya cordiformis
12. Mockernut Hickory / Carya omentosa
13. Shagbark Hickory / Carya ovata
14. Pecan / Carya illinoensis

MAPLE

15. Red Maple / Acer rubrum
16. Silver Maple / Acer saccharinum
17. Sugar Maple / Acer saccharum
18. Boxelder / Acer negundo

ELM

19. American Elm / Ulmus americana
20. Slippery Elm / Ulmus rubra

PINE

21. Shortleaf Pine / Pinus echinata

OTHER

22. American basswood / Tilia americana
23. American Sycamore / Platanus occidentalis
24. Ash, Green / Fraxinus pennsylvanica
25. Ash, White / Fraxinus americana
26. Baldcypress / Taxodium distichum
27. Black Cherry / Prunus serotina
28. Black Locust / Robinia pseudoacacia
29. Black Walnut / Juglans nigra
30. Blackgum / Nyssa sylvatica
31. Downy Serviceberry / Amelanchier arborea
32. Eastern Cottonwood / Populus deltoides
33. Eastern Hophornbean / Ostrya virginiana
34. Eastern Redbud / Cercis canadensis
35. Eastern Redcedar / Juniperus virginiana
36. Flowering Dogwood / Cornus florida
37. Hackberry / Celtis occidentalis
38. Hawthorn / Crataegus spp.
39. Honeylocust / Gleditsia triacanthos
40. Kentucky Coffeetree / Gymnocladus dioicus
41. Ohio buckeye / Aesculus glabra
42. Osage-orange / Maclura pomifera
43. Pawpaw / Asimina triloba
44. Persimmon / Diospyros virginiana
45. Red Mulberry / Morus rubra
46. River Birch / Betula nigra
47. Sassafras / Sassafras albidum
48. Sweetgum / Liquidambar styraciflua
49. Yellow Poplar / Liriodendron tulipifera
50. Willow / Salix spp.

FORM 41

Forestry Equipment Identification Specimen Scorecard

Name: _____ Contestant Number: _____

School: _____ School Number: _____

Directions: Place the number of the correct specimen in the blank. Two points each for a total of 40 points.

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____
16. _____
17. _____
18. _____
19. _____
20. _____

01. Backpack Water Pump
02. Bark Guage
03. Biltmore Stick
04. Broom Rake
05. Chainsaw
06. Chaps
07. Clinometer
08. Compass
09. Cruising Vest
10. Diameter Tape
11. Digital Data Recorder
12. Drip Torch
13. Hand Pruners
14. Hearing Protection
15. GPS Unit
16. Hard Hat
17. Increment Borer
18. Loppers
19. Peavy-Canthook
20. Pruning Saw
21. Pulaski-Forester Axe
22. Safety Glasses
23. Scale Stick
24. Sling Psychrometer
25. Stereoscope
26. Tally Meter
27. Tree Caliper
28. Tree Marking Gun
29. Tree Planting Bar
30. Wedge Prism

FORM 42

Cruising Tally Sheet 1/10 Acre Plot

Name: _____ Contestant Number: _____
School: _____ School Number: _____

Tree No.	Tree Species	DBH Diameter Breast Height	Tree Height 16 ft. Logs	Board Foot Volume
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				
12.				
13.				
14.				
15.				
16.				
17.				
18.				
19.				
20.				
21.				
22.				
23.				
24.				
25.				
26.				
27.				
28.				
29.				
30.				

All trees marked on the plot are to be tallied. Total data is necessary in order to complete the computations. Any tree less than 12 inches will have 0 height and 0 board feet volume; however, they should be considered when calculating the stocking level.

The first five trees will be scored in the following manner:
Two points for each species, **four points** for each DBH, **four points** for each height, for a total of **ten points** per tree.

Total Number of Trees: _____ Not Scored

Total DBH: _____ Not Scored

Total Volume: _____ Not Scored

TREE SCALE - (International 1/4 Inch)

DBH (in)	Number of 16-Foot Logs							
	1/2	1	1 1/2	2	2 1/2	3	3 1/2	4
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	1020
30	220	410	550	690	810	930	1060	1180
32	260	470	640	790	940	1080	1220	1360
34	290	530	730	900	1060	1220	1380	1540
36	330	600	820	1010	1200	1380	1560	1740
38	370	670	910	1130	1340	1540	1740	1940
40	420	740	1010	1250	1480	1700	1920	2160
42	460	820	1100	1360	1610	1870	2120	2360

FORM 43

Cruising Tally Sheet and Scorecard Computations

Numbered questions are worth 10 points each.

Name: _____ Contestant Number: _____

School: _____ School Number: _____

Total Volume of Plot:

1. Total volume/acre _____ (± 10% will be correct)

2. Total value/acre _____

   (based upon _____ cents/board foot) to be given for area (± 10% will be correct)

   Average DBH _____

   Total number of trees/acre _____

3. Desired minimum number of trees/acre _____

4. Is this stand: (check one)	Overstocked	
	Understocked	
	Adequately Stocked	

5. Should this stand be: (check one)	Thinned	
	Harvested	
	Left to Grow	

Use the table below to determine appropriate stocking rate:

Desirable stocking Level/Number of Trees Per Acre		
Average DBH	Minimum Number	Maximum Number
5	324	430
6	243	328
7	194	259
8	151	206
9	125	170
10	105	143
11	89	121
12	77	106
13	66	93
14	59	81
15	52	73
16	43	61
17	38	54
18	34	48
19	30	43
20	27	39
21	25	35
22	23	32

UNDERSTOCKED

ADEQUATELY STOCKED

OVERSTOCKED

FORM 44

Timber Stand Improvement Scorecard

Name: _____ Contestant Number: _____

School: _____ School Number: _____

Directions: Evaluate each tree. Place an A by the number of the trees to leave and a B by the number of the trees to remove, harvest, or deaden. Possible score of 100, depending on the percentage of correct answers.

TREE NO.	DECISION
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	

(NOTE: May use Scantron scoresheet)

Contestant Reference Sheet for use with Forestry CDE Scansheet – Side A

Tree Identification List

OAK

01. Black Oak / Quercus velutina
02. Blackjack Oak / Quercus marilandica
03. Bur Oak / Quercus macrocarpa
04. Chinkapin Oak / Quercus uehlenbergii
05. Northern Red Oak / Quercus rubra
06. Pin Oak / Quercus palustris
07. Post Oak / Quercus stellata
08. Scarlet Oak / Quercus coccinea
09. Shingle Oak / Quercus imbricaria
10. White Oak / Quercus alba

HICKORY

11. Bitternut Hickory / Carya cordiformis
12. Mockernut Hickory / Carya tomentosa
13. Shagbark Hickory / Carya ovata
14. Pecan / Carya illinoensis

MAPLE

15. Red Maple / Acer rubrum
16. Silver Maple / Acer saccharinum
17. Sugar Maple / Acer saccharum
18. Boxelder / Acer negundo

ELM

19. American Elm / Ulmus americana
20. Slippery Elm / Ulmus rubra

PINE

21. Shortleaf Pine / Pinus echinata

OTHER

22. American basswood / Tilia americana
23. American Sycamore / Platanus occidentalis
24. Ash, Green / Fraxinus pennsylvanica
25. Ash, White / Fraxinus americana
26. Baldcypress / Taxodium distichum
27. Black Cherry / Prunus serotina
28. Black Locust / Robinia pseudoacacia
29. Black Walnut / Juglans nigra
30. Blackgum / Nyssa sylvatica
31. Downy Serviceberry / Amelanchier arborea
32. Eastern Cottonwood / Populus deltoides
33. Eastern Hophornbean / Ostrya virginiana
34. Eastern Redbud / Cercis canadensis
35. Eastern Redcedar / Juniperus virginiana
36. Flowering Dogwood / Cornus florida
37. Hackberry / Celtis occidentalis
38. Hawthorn / Crataegus spp.
39. Honeylocust / Gleditsia triacanthos
40. Kentucky Coffeetree / Gymnocladus dioicus
41. Ohio buckeye / Aesculus glabra
42. Osage-orange / Maclura pomifera
43. Pawpaw / Asimina triloba
44. Persimmon / Diospyros virginiana
45. Red Mulberry / Morus rubra
46. River Birch / Betula nigra
47. Sassafras / Sassafras albidum
48. Sweetgum / Liquidambar styraciflua
49. Yellow Poplar / Liriodendron tulipifera
50. Willow / Salix spp.

Forestry Equipment Identification Specimen List

Directions: Bubble in the correct number of the specimen.
Two points each for a total of 40 points.

01. Backpack Water Pump		16. Hard Hat
02. Bark Guage		17. Increment Borer
03. Biltmore Stick		18. Loppers
04. Broom Rake		19. Peavy-Canthook
05. Chainsaw		20. Pruning Saw
06. Chaps		21. Pulaski-Forester Axe
07. Clinometer		22. Safety Glasses
08. Compass		23. Scale Stick
09. Cruising Vest		24. Sling Psychrometer
10. Diameter Tape		25. Stereoscope
11. Digital Data Recorder		26. Tally Meter
12. Drip Torch		27. Tree Caliper
13. Hand Pruners		28. Tree Marking Gun
14. Hearing Protection		29. Tree Planting Bar
15. GPS Unit		30. Wedge Prism

Timber Stand Improvement (TSI) Instructions

Directions: Evaluate each tree. Using the information furnished below, determine whether each tree will be:

A. Left for growing stock or

B. Deadend/removed for a cull or undesireable species/harvested

For each tree, mark **A** if the tree should be left to grow. Mark **B** if the tree should be removed, harvested, or deadend. Possible score of 100, depending on the percentage of correct answers.

Scenario: