

# FORESTRY

## CAREER DEVELOPMENT EVENT

### 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.



## **Event Format and Scoring**

### Part I: General Knowledge (100 points)

This phase of the contest will test the contestant's knowledge and understanding of basic forestry and agroforestry principles. Contestants will see fifty (50) objective type, multiple choice or true/false questions. The questions will reflect the contest objectives and come from the reference list on the following pages.

Time: Each contestant will be allowed 30 minutes to complete this phase of the contest.

Scoring: Each answer has a value of two points for a total maximum score of 100 points.

### Part II: Tree Identification (100 points)

Twenty (20) unduplicated specimens from the following list will be displayed for contestants to identify by common names. Each specimen will be designated by a number.

Time: Each contestant will be allowed 30 minutes to complete this phase (approximately one and one-half minutes for each specimen station).  
Specimens may be actual specimens or mounted specimens.

Scoring: Five points will be given for each specimen that is correctly identified for a total maximum score of 100 points.

Specimen

<u>No.</u>	<u>Specimen Name</u>	<u>Latin Name</u>
1.	American Basswood.....	<u>Tilia Americana</u>
2.	American Elm.....	<u>Ulmus Americana</u>
3.	American Plum.....	<u>Prunus Americana</u>
4.	American Sycamore.....	<u>Platanus occidentalis</u>
5.	Ash, Green.....	<u>Fraxinus pennsylvanica</u>
6.	Ash, White.....	<u>Fraxinus americana</u>
7.	Baldcypress.....	<u>Taxodium distichum</u>
8.	Black Cherry.....	<u>Prunus serotina</u>
9.	Black Locust.....	<u>Robinia pseudoacacia</u>
10.	Blackgum.....	<u>Nyssa sylvatica</u>
11.	Black Walnut.....	<u>Juglans nigra</u>
12.	Boxelder.....	<u>Acer negundo</u>
13.	Downy Serviceberry.....	<u>Amelanchier arborea</u>
14.	Eastern Cottonwood.....	<u>Populus deltoids</u>
15.	Eastern Redbud.....	<u>Cercis Canadensis</u>
16.	Eastern Redcedar.....	<u>Juniperus virginiana</u>
17.	Flowering Dogwood.....	<u>Cornus florida</u>
18.	Hackberry.....	<u>Celtis occidentalis</u>
19.	Hawthorn.....	<u>Crataegus spp.</u>
20.	Hickory, Bitternut.....	<u>Carya cordiformis</u>
21.	Hickory, Mockernut.....	<u>Carya tomentosa</u>
22.	Hickory, Shagbark.....	<u>Carya ovata</u>
23.	Honey Locust.....	<u>Gleditsia triacanthos</u>
24.	Kentucky Coffeetree.....	<u>Gymnocladus dioicus</u>
25.	Maple, Red.....	<u>Acer rubrum</u>
26.	Maple, Silver.....	<u>Acer saccharinum</u>
27.	Maple, Sugar.....	<u>Acer saccharum</u>
28.	Oak, Black.....	<u>Quercus velutina</u>
29.	Oak, Blackjack.....	<u>Quercus marilandica</u>
30.	Oak, Bur.....	<u>Quercus macrocarpa</u>
31.	Oak, Chinkapin.....	<u>Quercus muehlenbergii</u>
32.	Oak, Northern Red.....	<u>Quercus rubra</u>
33.	Oak, Pin.....	<u>Quercus palustris</u>
34.	Oak, Post.....	<u>Quercus stellata</u>
35.	Oak, Scarlet.....	<u>Quercus coccinea</u>
36.	Oak, Shingle.....	<u>Quercus imbricaria</u>
37.	Oak, White.....	<u>Quercus alba</u>
38.	Ohio Buckeye.....	<u>Aesculus glabra</u>
39.	Osage-orange.....	<u>Maclura pomifera</u>
40.	Pawpaw.....	<u>Asimina triloba</u>
41.	Pecan.....	<u>Carya illinoensis</u>
42.	Persimmon.....	<u>Diospyros virginiana</u>
43.	Red Mulberry.....	<u>Morus rubra</u>
44.	River Birch.....	<u>Betula nigra</u>
45.	Sassafras.....	<u>Sassafras albidum</u>
46.	Shortleaf Pine.....	<u>Pinus echinata</u>
47.	Slippery Elm.....	<u>Ulmus rubra</u>
48.	Sweetgum.....	<u>Liquidambar styraciflua</u>
49.	Willow.....	<u>Salix spp.</u>
50.	Yellowpoplar.....	<u>Liriodendron tulipifera</u>

### Part III: Equipment Identification (40 points)

Twenty (20) pieces of equipment from the following list will be displayed for contestants to identify by proper technical name. Each piece of equipment will be designated by a number.

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

Time: Each contestant will be allowed 10 minutes to complete this phase of the contest.

Scoring: Two points will be given for each piece of equipment correctly identified for a total of 40 points.

<u>Specimen No.</u>	<u>Specimen Name</u>	<u>Specimen No.</u>	<u>Specimen Name</u>
51	Backpack Water Pump	66	Hearing Protection
52	Bark Gauge	67	Increment Borer
53	Biltmore Stick	68	Loppers
54	Broom Rake	69	Peavy-Canthook
55	Chainsaw	70	Pruning Saw
56	Chaps	71	Pulaski-Forester Axe
57	Clinometer	72	Safety Glasses
58	Compass	73	Scale Stick
59	Crusing Vest	74	Sling Pshchrometer
60	Diameter Tape	75	Stereoscope
61	Digital Data Recorder	76	Tally Meter
62	Drip Torch	77	Tree Caliper
63	GPS Unit	78	Tree Marking Gun
64	Hand Pruners	79	Tree Planting Bar
65	Hard Hat	80	Wedge Prism

### Part IV: Timber Cruising (measuring standing timber on a 1/10 acre plot) (100 points)

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.

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.

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:

Given a general Form Class of 75, one can expect to lose one inch diameter (outside bark) for every eight-foot log.

Minimum merchantable tree diameter will be ten inches (outside bark).

Merchantable volume will stop at the first major fork or obvious defect in the trunk.

No volume is to be determined for logs above the fork (or defect) as well as any side limbs.

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.

**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.

**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.

**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.

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

Time: Contestants will be allowed 60 minutes to record DBH and heights of trees, and to make volume recordings and conversions.

Scoring: There are a total of 100 points possible in this section. 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 identifying the tree species, four points for measuring DBH, and four points for measuring proper tree height to the nearest 1/2 log.

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

#### Part V: Timber Stand Improvement (TSI) (100 points)

The site will be a fixed area, normally 1/10 acre or (merely designated). All trees will be identified by number. On the scorecard, the student will be given the following information:

- (1) existing number of trees per acre
- (2) number of trees to thin (or leave) per plot
- (3) objective or management plan for the stand

Using the information furnished on the scorecard, the student will determine whether each tree will be:

- (1) left for growing stock or
- (2) deadened/remove for a cull or undesirable species/harvest

The management plan will be explicit in scope giving all information needed by the student to decide whether to cut, leave, or deaden. 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. 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. Additional information, as appropriate, may be included. NOTE: Cutting of firewood is not to be considered a harvest operation. Only those trees 4" DBH and larger will be tagged or numbered.

Time: Contestants will be allowed 30 minutes to make their decisions in this segment of the contest.

Scoring: One hundred (100) points will be allotted to this portion of the contest. The number of points awarded to the contestant will depend upon the percent of right answers given by the student.

## Part VI: Map Reading - Legal Descriptions (60 points)

Contestants will be furnished a U.S. geological survey map with specific points marked for the student to identify. The student will need to know legal descriptions, size or location of no less than one 10 acre land parcel. 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?  
southwest one quarter of the northwest one quarter of the northwest one quarter of section
- (2) Find Letter B--What is the item located at this point?  
Church
- (3) Find Letter C--What is the acreage of this point boxed in?  
10 acres
- (4) Find Letter D--What is the line shown here called?  
contour line

Time: Contestants will be given 20 minutes to complete this section of the contest.

Scoring: There will be 12 questions -- 5 points per question -- for a total of 60 points.

### Event Rules

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. No contest team, team member, or team coach shall visit the contest facilities to observe plant materials and facilities prior to the contest.
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. 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 when the CDE specifies calculators may be used. (See specific CDE rules.) In all events, calculators must be **nonprogrammable** and **non-graphing** models and limited to the following function keys or their equivalent: Plus (+); Minus (-); Multiplication (x); Division (/); Equals (=); Memory Clear (MRC); Memory Minus (M-); Memory Plus(M+); Plus &/or Minus (+/-); Percentage (%); Square Root or Square Keys. Additional Function Keys may be accepted if approved in advance by the CDE Superintendent. The main criteria is that the calculator be **nonprogrammable & non-graphing** and that equations &/or text may not be stored within the calculators memory.
11. Written Materials: All written materials will be furnished for the contest. Contestants should provide clipboards and pencils. Electronic calculators and magnifying glasses will be allowed.

## **References**

Conservation Education Series, Forest Management for Missouri Landowners, Instructors Guide, MDC 2005 (or latest revision), Rebecca Elliott

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 Univeristy, by Sally Weeks and George Parker  
Phone 888-398-4636 to order or visit [www.Purdue.edu/fnr/Extension/extension.html](http://www.Purdue.edu/fnr/Extension/extension.html)

University of Missouri Forestry Website, [www.snr.missouri.edu/forestry/extension/ffa.php](http://www.snr.missouri.edu/forestry/extension/ffa.php)

## Tree Identification Scorecard

FORM 40

Name: \_\_\_\_\_ Contestant Number: \_\_\_\_\_  
School \_\_\_\_\_ School Number: \_\_\_\_\_

**Directions:** Place tree number by corresponding common tree names. Five points each for a total of 100 points.

### OAK

- \_\_\_\_\_ Black Oak / Quercus velutina
- \_\_\_\_\_ Blackjack Oak / Quercus marilandica
- \_\_\_\_\_ Bur Oak / Quercus macrocarpa
- \_\_\_\_\_ Chinkapin Oak / Quercus muehlenbergii
- \_\_\_\_\_ Northern Red Oak / Quercus rubra
- \_\_\_\_\_ Pin Oak / Quercus palustris
- \_\_\_\_\_ Post Oak / Quercus stellata
- \_\_\_\_\_ Scarlet Oak / Quercus coccinea
- \_\_\_\_\_ Shingle Oak / Quercus imbricaria
- \_\_\_\_\_ White Oak / Quercus alba

### HICKORY

- \_\_\_\_\_ Bitternut Hickory / Carya cordiformis
- \_\_\_\_\_ Mockernut Hickory / Carya tomentosa
- \_\_\_\_\_ Shagbark Hickory / Carya ovata
- \_\_\_\_\_ Pecan / Carya illinoensis

### MAPLE

- \_\_\_\_\_ Red Maple / Acer rubrum
- \_\_\_\_\_ Silver Maple / Acer saccharinum
- \_\_\_\_\_ Sugar Maple / Acer saccharum
- \_\_\_\_\_ Boxelder / Acer negundo

### ELM

- \_\_\_\_\_ American Elm / Ulmus americana
- \_\_\_\_\_ Slippery Elm / Ulmus rubra

### PINE

- \_\_\_\_\_ Shortleaf Pine / Pinus echinata

### OTHER

- \_\_\_\_\_ American basswood / Tilia americana
- \_\_\_\_\_ American Plum / Prunus americana
- \_\_\_\_\_ American Sycamore / Platanus occidentalis
- \_\_\_\_\_ Ash, Green / Fraxinus pennsylvanica
- \_\_\_\_\_ Ash, White / Fraxinus americana
- \_\_\_\_\_ Baldcypress / Taxodium distichum
- \_\_\_\_\_ Black Cherry / Prunus serotina
- \_\_\_\_\_ Black Locust / Robinia pseudoacacia
- \_\_\_\_\_ Black Walnut / Juglans nigra
- \_\_\_\_\_ Blackgum / Nyssa sylvatica
- \_\_\_\_\_ Downy Serviceberry / Amelanchier arborea
- \_\_\_\_\_ Eastern Cottonwood / Populus deltoides
- \_\_\_\_\_ Eastern Redbud / Cercis canadensis
- \_\_\_\_\_ Eastern Redcedar / Juniperus virginiana
- \_\_\_\_\_ Flowering Dogwood / Cornus florida
- \_\_\_\_\_ Hackberry / Celtis occidentalis
- \_\_\_\_\_ Hawthorn / Crataegus spp.
- \_\_\_\_\_ Honeylocust / Gleditsia triacanthos
- \_\_\_\_\_ Kentucky Coffeetree / Gymnocladus dioicus
- \_\_\_\_\_ Ohio buckeye / Aesculus glabra
- \_\_\_\_\_ Osage-orange / Maclura pomifera
- \_\_\_\_\_ Pawpaw / Asimina triloba
- \_\_\_\_\_ Persimmon / Diospyros virginiana
- \_\_\_\_\_ Red Mulberry / Morus rubra
- \_\_\_\_\_ River Birch / Betula nigra
- \_\_\_\_\_ Sassafras / Sassafras albidum
- \_\_\_\_\_ Sweetgum / Liquidambar styraciflua
- \_\_\_\_\_ Yellow Poplar / Liriodendron tulipifera
- \_\_\_\_\_ Willow / Salix spp.

**Forestry Tool Specimen Identification Scorecard**

Name: \_\_\_\_\_ Contestant Number: \_\_\_\_\_

School: \_\_\_\_\_ School Number: \_\_\_\_\_

**Directions:** Place tool number by corresponding specimen name. Two points each for a total of 40 points.

- |                             |                            |
|-----------------------------|----------------------------|
| _____ Backpack Water Pump   | _____ Loppers              |
| _____ Bark Gauge            | _____ Peavy-Canthook       |
| _____ Biltmore Stick        | _____ Pruning Saw          |
| _____ Broom Rake            | _____ Pulaski-Forester Axe |
| _____ Chainsaw              | _____ Safety Glasses       |
| _____ Chaps                 | _____ Scale Stick          |
| _____ Clinometer            | _____ Sling Psychrometer   |
| _____ Compass               | _____ Stereoscope          |
| _____ Crusing Vest          | _____ Tally Meter          |
| _____ Diameter Tape         | _____ Tree Caliper         |
| _____ Digital Data Recorder | _____ Tree Marking Gun     |
| _____ Drip Torch            | _____ Tree Planting Bar    |
| _____ Hand Pruners          | _____ Wedge Prism          |
| _____ Hearing Protection    |                            |
| _____ GPS Unit              |                            |
| _____ Hard Hat              |                            |
| _____ Increment Borer       |                            |

**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.				
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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

**Cruising Tally Sheet and Scorecard Computations**

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 overstocked , understocked , or adequately stocked  (check one)

5. Should this stand be thinned  harvested, , or left to grow  (check one)

Number questions are worth 10 points each.

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

**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	
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10	
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13	
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16	
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29	
30	

(NOTE: May use Scantron scoresheet)