

Minnesota FFA

Forestry Career Development Event

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FORESTRY Career Development Event: Overview

1. There are 600 total possible points for this CDE. The CDE will be divided into five sections with the scoring as follows:

Section 1. Identification of Wood and Tree Samples: (200 points)

- A. Identify 10 wood samples at five points each.
- B. Identify 25 tree and shrub samples at six points each.

Section 2. Forestry Tools and Equipment: (50 points)

- A. Identify 10 tools at five points each.

Section 3. Written Exam: (150 points)

- A. 50 questions at three points each.

Section 4. Timber Cruising (50 points)

- A. Estimate DBH, merchantable height, and volume in 10 trees at five points each.

Section 5. Even- and Odd-Year Practicums: (150 points)

- A. Even-year practicums
 1. Compass/GPS course (10 marked points/questions at five points each)
 2. Forest business management (10 questions at five points each)
 3. Map interpretation (10 questions at five points each)
- B. Odd-year practicums
 1. Chainsaw (10 questions at five points each)
 2. Product scaling (10 questions at five points each)
 3. Tree/forest disorders (10 questions at five points each)

2. A combination of tally sheets and computer scan sheets will be used to record contestant responses for this CDE. Tally sheets, included as a part of this packet, will be used for the Compass/GPS, Timber Cruising, and Product Scaling practicums. All other events will use a provided Scantron bubble sheet similar to the one that can be downloaded from <https://cde.ffa.umn.edu>
3. Contestants should come prepared to work out-of-doors for part of the CDE and **provide their own tape measures, Biltmore sticks (tree sticks), compasses, calculators, hand lenses, pencils, erasers and clip boards**. The compass used in the CDE will have 360 azimuth graduations (0 to 360 degrees). Non-electric compasses (such as those made by Silva, Suunto, and Brunton) may be used for the CDE. The Silva Ranger is an acceptable compass, but there are many others that will work just as well. The GPS used in the CDE will be a Garmin GPSmap 76. A supply of GPS receivers will be available.
4. Official dress or appropriate FFA attire is required. Refer to Rule 1-A-5 on page 1.1.
5. Four members will constitute a team.

CDE Material and Subject Matter:

Section 1: Identification of Wood and Tree Samples

Wood identification

Identify 10 wood samples from multiple choice questions at five points each for a total of 50 points. Samples will be drawn from commonly found native and non-native tree species from the following list. Every sample will include a piece of surfaced lumber and may include a piece of firewood or sample product commonly made from that species. (Hand lens may be used.) Contestants may handle/touch samples. Multiple choice questions will have four answers to choose from. Contestant answers will be entered on the provided Scantron bubble sheet.

Hardwoods

Ash
Aspen
Basswood
Birch
Black walnut
Butternut
Cherry
Cottonwood
Elm
Hackberry
Hickory
Sugar maple
Northern red oak
White oak

Conifers

Douglas-fir
Eastern red cedar
Northern white cedar
Ponderosa pine
Red (Norway) pine
Spruce
Tamarack (eastern larch)
White pine

Tree Identification

Identify 25 tree and shrub samples at six points each for a total of 150 points. (Twigs and/or leaves will be used for identification. This may vary year to year based on contest date and phenology.) Contestants may handle/touch samples. Contestant answers must be entered on the provided Scantron bubble sheet.

Hardwoods		Softwoods
111. American elm	125. Honey locust	139. Balsam fir
112. Balsam poplar	126. Ironwood (<i>Ostrya</i> sp)	140. Black spruce
113. Basswood	127. Northern pin oak	141. Colorado (blue) spruce
114. Bigtooth aspen	128. Northern red oak	142. Eastern hemlock
115. Black ash	129. Paper birch	143. Eastern red cedar
116. Black cherry	130. Quaking aspen	144. Eastern white pine
117. Black walnut	131. Red maple	145. Jack pine
118. Boxelder	132. Russian olive	146. Northern white cedar
119. Bur oak	133. Silver maple	147. Norway spruce
120. Butternut	134. Slippery elm	148. Red (Norway) pine
121. Cottonwood	135. Sugar maple	149. Scotch pine
122. Green ash	136. White ash	150. Tamarack (Eastern larch)
123. Hackberry	137. White oak	151. White spruce
124. Hickory	138. Willow	

Section 2: Forestry Tools and Equipment

Identify 10 forestry tools or pieces of equipment from the following list at five points each for a total of 50 points. Contestant answers must be entered on the provided Scantron bubble sheet.

- | | | |
|-----------------------------------|--------------------------|---------------------------------|
| 211. Aerial photo | 231. Fire swatter (flap) | 252. Plastic flagging |
| 212. Angle gauge (Cruz-all style) | 232. Forwarder | 253. Pruning shears |
| 213. Backpack fire pump | 233. Fire weather kit | 254. Pulaski-Forester Axe |
| 214. Biltmore stick (tree stick) | 234. GIS map | 255. Relaskop |
| 215. Bow saw | 235. GPS receiver | 256. Safety glasses |
| 216. Bulldozer | 236. Hand compass | 257. Safety hardhat |
| 217. Canthook | 237. Hand lens | 258. Shearing knife |
| 218. Chainsaw | 238. Harvester/processor | 259. Skidder |
| 219. Chainsaw chaps | 239. Hip chain | 260. Slasher |
| 220. Chipper/Grinder | 240. Hookeroon | 261. Soils map |
| 221. Clinometer | 241. Increment borer | 262. Steel tape |
| 222. Containerized seedling block | 242. Laser rangefinder | 263. Stereoscope |
| 223. Cruising vest | 243. Log truck | 264. Tally book |
| 224. Data recorder | 244. Logger's tape | 265. Topographic map |
| 225. Diameter tape | 245. Lopping shears | 266. Tree caliper |
| 226. Dot grid | 246. Mattock | 267. Tree injector/hypo hatchet |
| 227. Drip torch | 247. Peavy | 268. Tree marking gun |
| 228. Ear protectors | 248. Planimeter | 269. Wedge prism |
| 229. Feller-buncher | 249. Plant press | |
| 230. Fire rake | 250. Planting hoe or bar | |
| | 251. Pruning saw | |

Section 3: Written Exam

Students will take a written exam consisting of 50 multiple choice and/or true-false questions (true-false questions not to exceed 25% of the total questions) at three points each for a total of 150 points. The exam will test the contestant's knowledge and understanding of basic principles of forestry. Multiple choice questions will have four answers to choose from. Answers will be entered on a Scantron bubble sheet. Sample exams are at <https://cde.ffa.umn.edu/exams>.

Questions from the following areas will be emphasized:

1. Measurement relating to Forestry and Forest Products
 - a. Land, individual tree, and stand measurements
 - b. Scaling of cut products (board foot, cubic foot, cord, etc.)
2. Forest Health and Protection
 - a. Causes and prevention of damage from animals, insects, and diseases
 - b. Invasive species
 - c. Fire prevention and control
3. Silviculture and harvesting
 - a. Regeneration harvests (clear cutting, seed tree, shelterwood, etc)
 - b. Intermediate harvests (selection, timber stand improvement, row thinnings, etc.)
 - c. Harvesting process (equipment, methods, and planning the harvest)
4. Forest Regeneration
 - a. Planting stock
 - b. Site preparation
 - c. Management
5. Windbreak and Shelterbelt Design
 - a. Planning
 - b. Establishment
 - c. Management
6. Christmas Tree Production
 - a. Species
 - b. Site selection
 - c. Spacing
 - d. Shaping and harvesting
 - e. Grading
 - f. Marketing
7. Selection and Use of Wood around the Home and Farm
 - a. Wood properties and use requirements (choosing suitable species for common home and farm use)
 - b. Wood drying practices
 - c. Wood preservation (common preservatives and preservation processes)
8. Ecosystem Concepts
 - a. Watersheds
 - b. Wildlife habitat
 - c. Water quality
 - d. Disturbance
9. Career Opportunities

Section 4: Timber Cruising

- A. Contestants perform the following for each tree:
 1. Estimate and record diameter at breast height (DBH) to the nearest inch using a Biltmore or tree stick.
 2. Estimate and record the merchantable height in 8-foot lengths in sawlogs (sawtimber) above a 1-foot stump. Minimum diameters and product lengths are as follows:
 - a. Sawtimber: Number of sawlogs, to the nearest $\frac{1}{2}$ sawlog based on a minimum 10-inch DBH, 8-inch top diameter inside bark and 8-foot (half-sawlog) length. For example, if the tree includes three 8-foot half-sawlogs, merchantable height would be properly recorded as 1.5 sawlogs.
 3. Determine and record the volume in board-feet. Appropriate volume tables will be provided by the contest chairperson.
- B. Contestant answers may be entered on a tally sheet (below).
- C. A total of 50 points will be available for DBH, merchantable height, and volume measures on up to ten trees.
- D. A Biltmore stick (tree stick) or the Scribner Decimal C scale stick will be used to estimate DBH.
- E. In the event of inclement weather, the timber cruising contest will take place inside and consist of a written test including ten multiple choice and/or true/false questions.

A good video demonstrating proper use of a Biltmore stick (tree stick) to cruise timber is at <http://z.umn.edu/FFAcruising>

Contestant Name _____

Team Number _____

School _____

Code Number _____

Timber Cruising Tally Sheet (50 points)

Record the DBH to the nearest inch, merchantable height in sawlogs, and sawlog volume in board feet for each of the marked trees.

To estimate merchantable height, use a minimum top diameter inside bark of 8 inches and a minimum log length of 8 feet ($\frac{1}{2}$ sawlog). If the tree includes three 8-foot half sawlogs, merchantable height would be properly recorded on the tally sheet as 1.5 sawlogs.

Tree No.	DBH	Merchantable Height (num. of 16-foot sawlogs)	Sawlog Volume
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Timber Cruising: Volume Table

On your tally sheet, record individual tree DBH to the nearest inch and merchantable height to the nearest ½ sawlog. To calculate volume in board feet, convert sawlogs to feet (e.g., 1 ½ sawlogs equals 24 feet). Then utilizing that diameter and height information, determine individual tree volume from the table below and record that information on your tally sheet.

Tree Volume (Scribner Rule by Number of 16 foot logs)

Diameter at breast height (inches)	Volume (board feet) when number of 16-foot logs is:					
	½	1	1 ½	2	2 ½	3
10	17	28	36	44	48	52
11	22	38	49	60	67	74
12	28	47	61	75	85	95
13	34	58	76	94	107	120
14	40	69	92	114	130	146
15	47	82	109	136	157	178
16	54	95	127	159	185	211
17	63	109	146	184	215	246
18	72	123	166	209	244	280
19	81	140	190	240	281	322
20	90	157	214	270	317	364
21	100	176	240	304	358	411
22	111	194	266	338	398	458
23	123	214	294	374	441	508
24	137	234	322	409	484	558
25	149	258	355	452	534	617
26	165	281	388	494	585	676
27	179	304	420	536	636	736
28	195	327	452	578	686	795
29	210	354	491	628	746	864
30	277	382	530	678	806	933

Section 5: Practicums

Contestants will annually complete three (3) practicums, each with 10 questions worth five points for each question. The practicums will be divided between the even and odd years.

Even Number Years

Compass/GPS

Forest Business Management

Map Interpretation

Odd Number Years

Chainsaw

Product Scaling

Tree/Forest Disorders

Simulations of a practical situation will be allowed if materials are not available.

A. Compass/GPS

The compass course will have five marked and numbered positions. Contestants may start at any position and record the compass bearing/azimuth (to the nearest degree) and use pacing to estimate the distance (to the nearest foot) to the next position in numeric order. Twenty five points are possible, 5 points for each numbered position: three for bearing and two for distance. One point will be deducted for every two degrees off on the bearing and for every five feet off on the distance.

All compass readings will come from 0 degrees magnetic north with no correction for magnetic declination. Compasses preset for declination will not correspond with official results.

In the event of inclement weather, the compass contest will take place inside and consist of a written test including ten multiple choice and/or true/false questions.

The GPS course will include a large number of waypoints, all pre-loaded on to the Garmin GPSmap 76 receivers provided to contestants. Each waypoint will be marked on the ground with a three-digit numeric code (e.g., 259). The ground markings may be hard to find; contestants will need to be close to the waypoint locations to see them. Each contestant will be given a unique list of five waypoints. Contestants will navigate to each assigned waypoint and enter the corresponding three-digit numeric code on the tally sheet. Twenty-five points are possible, five points for each waypoint numeric code.

In the event of inclement weather, the GPS contest will take place inside and consist of a written test including ten multiple choice and/or true/false questions.

The GPS receiver used in the CDE will be a Garmin GPSmap 76. A supply of GPS receivers will be available, but contestants must know how to use it in advance. Step-by-step instructions are available at the following links:

Familiarizing yourself with the receiver: <http://z.umn.edu/FFAgps1>

Navigating to a waypoint: <http://z.umn.edu/FFAgps2>

Contestant answers will be entered on a tally sheet (below).

Contestant Name _____

Team Number _____

School _____

Code Number _____

Compass Course Tally Sheet (25 points)

Write your answers CLEARLY in the spaces below, then hand in your completed sheet for scoring. Do not write your answers on the Scantron sheet.

The compass course will have five marked and numbered positions. Contestants may start at any position and record the compass bearing/azimuth (to the nearest degree) and use pacing to estimate the distance (to the nearest foot) to the next position in numeric order.

Twenty five points are possible, 5 points for each numbered position: three for azimuth and two for distance. One point will be deducted for every two degrees off on the azimuth and for every five feet off on the distance.

All compass readings will come from 0 degrees magnetic north with no correction for magnetic declination. Compasses preset for declination will not correspond with official results.

Points	Bearing	Score	Distance	Score
Point 1 to Point 2				
Point 2 to Point 3				
Point 3 to Point 4				
Point 4 to Point 5				
Point 5 to Point 1				
Subtotal				

Contestant Name _____

Team Number _____

School _____

Code Number _____

GPS Waypoints Tally Sheet (25 points)

Note: During the contest, the GPS tally sheet will have 3-digit point numbers in the left column.

INSTRUCTIONS: The Garmin map76 GPS receivers provided for this contest have 20+ GPS waypoints saved. Contestants need to navigate to the five waypoints numbered below. At each waypoint, contestants will find a small tag with a three-digit code. Write that waypoint code into the blank cells below. Contestants may navigate to their five waypoints in any order. Different contestants will navigate to different waypoints. Twenty-five points are possible, five points for each correct waypoint numeric code.

Write your answers CLEARLY in the spaces below, then hand in your completed sheet for scoring. Do not write your answers on the Scantron sheet.

Point	3-digit waypoint code	Score (contestants leave blank)
Subtotal		

Total score: _____

B. Forest Business Management

This practicum is designed to assess the contestant's ability to apply economic principles and concepts to solving a business management problem. This will involve reviewing information about a hypothetical logging business or forest landowner's property and solving at least 10 problems related to that business. The types of questions might include the cost of payroll, stumpage cost, income received, and net profit. Questions will be multiple choice with four answers to choose from. Contestant answers will be entered on a Scantron bubble sheet. A sample Forest Business Management worksheet from the 2012 contest is at <http://z.umn.edu/FFAfbm>.

C. Map Interpretation

Contestants will be furnished with a portion of a U.S.G.S. topographic map from a location outside Minnesota, but with similar geographic features. Ten (10) points on the map will be clearly marked and questions corresponding to each point will be provided. Questions will be multiple choice with four answers to choose from. Contestant answers will be entered on a Scantron bubble sheet.

Contestants should be familiar with legal descriptions and standard topographic map symbols and their meanings. They should also be able to determine the acreage of a marked polygon and identify the location of 40 acres or more in a section based on a given legal description. The U.S.G.S. Topographic Map Information and Symbols will be provided.

Legal descriptions will be written or described according to the following:

NW- Northwest R – Range S – Section (640 acres) T - Township
SE- Southeast ¼ - Quarter section (160 acres) or a quarter of a quarter (40 acres of the 160)

Sample Map Interpretation materials from past CDEs are at <https://cde.ffa.umn.edu/exams>

D. Chainsaw

The practicum will consist of 10 multiple choice and/or true-false questions which address operating a chainsaw, felling techniques, safety, fuel/oil mixture ratios, sharpening, adjustment, maintenance, etc. which are found in an operator's manual and/or a parts identification exercise. A chainsaw will be selected that has an online manual. The chainsaw will be selected by September 1 each year and FFA Advisors will be notified of the selection. Contestant answers will be entered on a standard bubble sheet. Until further notice, the chain saw manual to be used is the one for the Stihl MS 271, 291. Download the manual at <http://z.umn.edu/FFAchainsawmanual>. Multiple choice questions will have four answers to choose from. Answers will be entered on a Scantron bubble sheet. Copies of the manual will be available within the contest area.

The manual is 137 pages and in two languages. We will be using pages 1 -57. It is on the [Stihl](http://www.stihl.com) web site.

Here are links for smaller sections of the chainsaw manual:

Pages 1-30: <http://z.umn.edu/FFAsawmanual1>

Pages 31-60: <http://z.umn.edu/FFAsawmanual2>

E. Product Scaling

This practicum will address a combination of log scaling, pulpwood scaling and lumber scaling. A total of 10 items will be scaled, with a minimum of two in each category and a maximum of four items in any category. For example, the contest could include three log scaling items, three pulpwood scaling items, and four lumber scaling items (3 + 3 + 4 = 10). Questions will be multiple choice with four answers to choose from. Contestant answers will be entered on a Scantron bubble sheet. Each of the scaling components is defined below.

1. Log scaling -- The Scribner Decimal C log rule will be used. Contestants will scale and record the board foot content of sawlogs of various lengths. Do not deduct for defects. For log scaling, determine the average diameter inside the bark at the smaller end of the log. When the average diameter is a half-inch, round even numbers down and odd numbers up. For example: if the average small end diameter averaged 10 inches, it would be recorded as 10 inches; 10 1/4 inches would be recorded as 10 inches; 10 1/2 inches would be recorded as 10 inches; 10 3/4 inches would be recorded as 11 inches; 11 inches would be recorded as 11 inches; 11 1/4 inches would be recorded as 11 inches; 11 1/2 inches would be recorded as 12 inches; and 11 3/4 inches would be recorded as 12 inches. For this contest, log length is measured in two-foot increments (8, 10, 12, 14) with a 4-inch trim allowance for both hardwood and softwood logs. For example, a log which is 8'4" in length would be scaled as an 8-foot log. A log which is 9'10" in length would be scaled as an 8-foot log.
2. Pulpwood scaling -- Contestants will scale volume to the nearest 1/10 cord on a loaded pulpwood truck, a scale model (1 inch = 1 foot model), or an image of a truck carrying a load of pulpwood. Assume that the length of a pulpwood stick is always 8 feet. Determine the width and average height of the load. A standard cord equals 128 cubic feet (ft³) of air, solid wood, and bark. The formula for determining volume in cords is:

$$\frac{(\text{Length in feet} = 8) \times (\text{Average height in feet}) \times (\text{Width in feet})}{128 \text{ cubic feet}}$$

Example 1: On a loaded truck, if the width of the pile is 50 feet; intermediate heights are 3.5 feet, 4.5 feet, 4 feet, 3.5 feet, and 4.5 feet (average height of the pile is 4 feet); and the length of each pulpwood piece is 8 feet (the length you should always assume), the volume in the pile is:

$$(8 \text{ feet} \times 4 \text{ feet} \times 50 \text{ feet}) / 128 \text{ cubic feet per cord} = 12.5 \text{ cords (already rounded to nearest 1/10 cord)}$$

Example 2: For a scale model, recall that 1 inch = 1 foot. Thus, if the width of the pile in the scaled model is 18 inches the true width is 18 feet; if the average height in the scale model is 3 inches the true height is 3 feet; and the length of each piece is known to be 8 feet. The volume in the pile is:

$$(8 \text{ feet} \times 3 \text{ feet} \times 18 \text{ feet}) / 128 \text{ cubic feet per cord} = 3.375 \text{ cords (round to 3.4)}$$

3. Lumber scaling -- Contestants will use a standard measuring tape to calculate the board foot content of dimension lumber and/or boards of various sizes. Lumber is the raw wood material that goes into building houses, fences, and some furniture. Among the more common pieces in construction is the 2 X 4, but lumber is available in many

dimensions. Nominal and actual, as defined below, are two important terms to understand when scaling lumber.

Nominal size – refers to the dimension the lumber was sawn and by which it is known and sold in the market. For example, when a 2 x 4 is cut out of a log, it is 2” thick x 4” wide.

Actual size – refers to the true thickness and width dimensions of the lumber after additional processing has occurred. When lumber is sawed from a log, it is a larger (nominal) dimension because it is green (it has lots of water in it) and because its surface is rough. As lumber dries, it shrinks. Also, before lumber is sold, it will be planed to make the surfaces smooth. These factors account for the size reduction from nominal to actual dimension.

Examples of nominal vs. actual dimensions of lumber are noted below.

Nominal (dimensions when sawn)	Actual (true dimensions)
1” x 2”	3/4” x 1-1/2”
1” x 4”	3/4” x 3-1/2”
2” x 4”	1-1/2” x 3-1/2”
2” x 8”	1-1/2” x 7-1/4”
4” x 6”	3-1/2” x 5-1/2”

While you will be measuring actual dimensions, when recording board foot measure of lumber, it is based on nominal dimension. Therefore, you need to convert from actual (true) dimensions to nominal dimensions before determining board foot values. To do so, round the actual width and thickness dimensions you measure to the next largest integer. Thus, if the actual dimensions of the board you are measuring are 3/4” x 3-1/2”, the nominal dimension would be 1” x 4”. Lengths are rounded down to the next smaller whole number. For example, a board that is 12’ – 3” long (12 feet and 3 inches) would be recorded as being 12 feet.

Board feet is the basic unit of measure for lumber. One board foot is 1 foot long by 1 foot wide by 1 inch thick. It is calculated by nominal, not actual dimensions of lumber. The formula for figuring nominal board feet is:

$$\frac{(\text{Length in feet}) \times (\text{Nominal width in inches}) \times (\text{Nominal thickness in inches})}{12 \text{ inches}}$$

Example: The actual dimensions of the board you are measuring are 1-1/2” x 3-1/2” and it is 12’ 4” long. The 1-1/2” actual thickness would need to be converted to 2” nominal thickness. Similarly the 3-1/2” actual width would need to be converted to 4” nominal width. The length would be 12’. Therefore, the nominal dimensions of the board are 2” x 4” x 12’. The number of board feet would be calculated as:

$$\frac{12 \text{ feet} \times (2 \times 4)}{12} = \frac{12 \text{ feet} \times 8}{12} = 8 \text{ board feet}$$

Section V: Scaling Practicum Note Sheet:

This page is for your notes only. Final answers must be entered on the Scantron sheet.

Log Scaling

Record the scaling diameter, scaling length, and board foot volume for each log (give the board footage of each log). Do not deduct for defects.

Log Number	Scaling Diameter	Scaling Length	Board Foot Content
1	_____	_____	_____
2	_____	_____	_____
3	_____	_____	_____
4	_____	_____	_____

Pulpwood Scaling

Calculate and record the volume in cords to the nearest 1/10 cord of the simulated truck loads and/or piles of pulpwood. Assume a length of 8 feet.

Load/Pile Number	Cords (to the nearest 1/10 cord)
1.	_____
2.	_____
3.	_____
4.	_____

Lumber Scaling

Record the nominal (not actual) thickness, width, and length for each sample. Odd foot lengths are permitted. Calculate and record the number of board feet contained in each sample. Round board foot values to the nearest 1/10 board foot.

Sample No.	Thickness (inches)	Width (inches)	Length (feet)	Board Feet
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

Log Scaling Volume Table

On your note sheet, record individual tree scaling diameter (diameter inside bark) to the nearest inch and log length to the nearest even foot rounding down. Then utilizing that diameter and log length information, determine individual section board foot content from the table below.

Log Volume (Scribner Decimal C Rule)

Small-end diameter inside bark (inches)	Log Length (feet)						
	8	10	12	14	16	18	20
6	5	10	10	10	20	20	20
7	10	10	20	20	30	30	30
8	10	20	20	20	30	30	30
9	20	30	30	30	40	40	40
10	30	30	30	40	60	60	70
11	30	40	40	50	70	80	80
12	40	50	60	70	80	90	100
13	50	60	70	80	100	110	120
14	60	70	90	100	110	130	140
15	70	90	110	120	140	160	180
16	80	100	120	140	160	180	200
17	90	120	140	160	180	210	230
18	110	130	160	190	210	240	270
19	120	150	180	210	240	270	300
20	140	170	210	240	280	310	350
21	150	190	230	270	300	340	380
22	170	210	250	290	330	380	420
23	190	230	280	330	380	420	470
24	210	260	300	350	400	450	500
25	230	290	340	400	460	520	570
26	250	310	370	440	500	560	620
27	270	340	410	480	550	620	680
28	290	360	440	510	580	650	730
29	310	380	460	530	610	680	760
30	330	410	490	570	660	740	820
31	360	440	530	620	710	800	890
32	370	460	550	640	740	830	920
33	390	490	590	690	780	880	980
34	400	500	600	700	800	900	1000

F. Tree and Forest Disorders

1. Contestants will identify 10 tree or forest disorders for five points each. Contestant answers will be entered on a standard bubble sheet.
2. Samples may include excised sections, photographs, or text descriptions of symptoms characteristic of each disorder. Samples may also include insects or fungal fruiting bodies themselves.
3. Disorders will be chosen from the following list:

311. Ash anthracnose	322. Insect (cynipid wasp) gall on bur oak
312. Bark damage from deer scrape	323. Japanese beetle
313. Black knot of cherry	324. Maple leaf galls
314. Bronze birch borer	325. Oak wilt
315. Deer browse damage	326. Pine bark beetle
316. Eastern pine gall rust	327. Rhizosphaera spruce needlecast
317. Emerald ash borer	328. Thousand cankers of walnut
318. Forest tent caterpillar	329. White pine blister rust
319. Frost crack	330. White pine weevil
320. Heart rot	331. Witches broom
321. Hypoxylon canker on aspen	

4. Contestant answers will be entered on the provided Scantron bubble sheet.

CDE General References:

Woodland Stewardship: A Practical Guide for Midwestern Landowners. 2nd Edition. 2009. University of Minnesota Extension. Book can be downloaded at http://woodlandstewardship.org/?page_id=12 or purchased at <http://z.umn.edu/WoodStew>

The Forest Management Digest. Allen Wickman-Editor, Ninth Edition. Hobar Publications. May 2004. 458 p. ISBN-13: 978-0913163368

Minnesota Trees. Rathke, D. 1999 University of Minnesota Extension Service Bulletin BU-0486-S

Beginner's Guide to Minnesota Trees. Rathke, D. 1999. University of Minnesota Extension Bulletin BU-06593-S: <http://z.umn.edu/MNtreesGuide>

Other useful links not appearing elsewhere in the CDE:

Measuring tree volume: <http://www.youtube.com/watch?v=R8kzuq6ecKI>

Tree identification: www.treezydoesit.com