

**State FFA Forestry 2015 Contest
Written Examination (150 points)**

This exam consists of 38 multiple choice and 12 true or false questions, each worth 3 points. Mark your answers on your scantron bubble sheet. DO NOT mark on this exam.

Multiple choice questions

1. The interior structural columns for hog barns are often made from treated wood. Why would treated wood be preferred to cedar (naturally durable species) for this application?
 - a) When pigs eat the arsenic in the wood, there is less need for nitrates to preserve the ham for future generations.
 - b) Treated wood is better able to withstand the high decay hazards such as ground contact for columns in the hog barn.
 - c) Cedar would be too expensive and it would be stronger than the treated lumber.
 - d) Odors developed in the hog barn are considered incompatible with the favorable smells of many cedar species.

2. Lumber used for buildings will have a grade stamp on it. Building codes now require grade stamps. What is the purpose of grade stamps?
 - a) Grade stamps provide some assurance of quality control so that you know how good the lumber is when you buy it.
 - b) Lumber that is not grade stamped will be more prone to fungal decay because the ink in the grade stamp provides some fungicidal impact.
 - c) Grade stamps will tell you what states are included for a particular category.
 - d) Grade stamps will designate the original moisture content of the log.

3. Lumber can be air-dried before it is put into a kiln for final drying. Outside conditions can change from hot to cold and from rainy to dry and from windy to calm. What type of species would be least suited for air-drying?
 - a) An expensive wood that was particularly prone to degrade.
 - b) Recently sawed lumber that is still dripping wet.
 - c) Low value boards that will be used to make pallets.
 - d) Lumber that is discolored due to stain fungi.

4. Some preservatives have been prohibited because of safety concerns. Why?
 - a) Wood exposed to preservatives will get weaker over time and fall apart.
 - b) Preservatives in wood absorb oxygen from the air and may suffocate nearby plants and animals.
 - c) Some preservatives are radioactive and cause household pets to glow in the dark if they get too close to them.
 - d) Preservatives can be toxic to people in some of the same ways that they are poisonous to fungi.

5. When buying firewood, which of the following would you prefer?
 - a) Low density species that has not been seasoned.
 - b) High density species that has not been seasoned.
 - c) High density species that has been seasoned.
 - d) Low density species that is partially decayed.

6. When wood is used inside, it does not require preservative treatment. Why?
 - a) Constant indoor temperatures are not good for decay fungi because they need cold and hot temperature fluctuations.
 - b) Moisture in wood will be much less and this is too low for fungi.
 - c) Oxygen levels for interior wood are too low to support fungal metabolic activity.
 - d) Both b and c

7. The purpose of the log rule scale is to:
 - a) Estimate the weight of the log.
 - b) Determine usable firewood available.
 - c) Estimate the board feet of lumber in a log.
 - d) Calculate the green volume of the log.

8. If birch logs are left as round wood they may decay considerably within a few years. If the logs are cut, split, and dried for firewood, the wood can last many years. Why?
 - a) Tannic acids from the birch bark will dissolve the wood inside.
 - b) Once wood has dried out during seasoning there is not enough water to support decay fungi.
 - c) Over time, the wood cell wall naturally dissolves into mush for all types of round wood.
 - d) Oxygen locked inside the round wood will attack cell wall components leading to decay.

9. When lumber is cut to be used for building a house:
 - a) Knots add to the overall strength of the lumber.
 - b) Splits and checks are preferred because they show that the lumber has been dried.
 - c) The preferred lumber is straight with no knots or checks.
 - d) If the lumber is soft and mushy from wood decay, it can still be use for building beams and trusses.

10. When logs are processed to make paper:
 - a) Sometimes the wood is dissolved with chemicals to make pulp and sometimes it is ground up to make 'mechanical pulp.'
 - b) The bark is left on the log as it improves the quality of the pulp.
 - c) Low density logs produce more pulp than heavy logs.
 - d) Only wood on the outer surface can be used to make high-grade paper.

11. The ability of a soil to supply water and nutrients is related to its _____?
 - a) Texture
 - b) Depth
 - c) Structure
 - d) All of the above

12. You tally 7 trees using a 10 factor wedge prism within a plot. What is the basal area in square feet per acre of the trees around that point?
- a) 0.7
 - b) 7
 - c) 10
 - d) 70
13. Which of the following carries food made in leaves down to the branches, trunk and roots?
- a) Cambium
 - b) Phloem
 - c) Heartwood
 - d) Xylem
14. If a cord of firewood costs \$200, how much would a stack of wood measuring 4' x 6' x 8' cost?
- a) \$100
 - b) \$200
 - c) \$300
 - d) \$400
15. If you are traveling at an azimuth reading of 315, in what direction are you heading?
- a) Northwest
 - b) Northeast
 - c) Southwest
 - d) Southeast
16. You are doing a regeneration survey in a plot with a radius of 5.3 feet and counted 2 seedlings. How many seedlings would that represent per acre?
- a) 50
 - b) 100
 - c) 500
 - d) 1,000
17. Which of the following tree species has compound leaves?
- a) Black walnut
 - b) Jack pine
 - c) Sugar maple
 - d) Quaking aspen
18. A plot of land measures 800 feet x 1000 feet. How many acres are in the plot?
- a) 15.36
 - b) 18.36
 - c) 21,36
 - d) None of the above

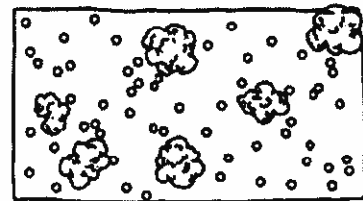
19. You are using a clinometer to determine tree height on level ground from a distance of 100'. Your reading to the top of the tree is +85%; the bottom reading is +5%. What is the height of the tree?
- a) 5 feet
 - b) 80 feet
 - c) 105 feet
 - d) 185 feet
20. In which part of the state are most of the paper mills found in Minnesota?
- a) Southeast
 - b) Southwest
 - c) Northeast
 - d) Northwest
21. Which of the following is a common spacing for planting Christmas trees?
- a) 6 feet x 6 feet
 - b) 8 feet x 8 feet
 - c) 10 feet x 10 feet
 - d) 12 feet x 12 feet
22. Which of the following is a common tree species grown as a Christmas tree in the Midwest?
- a) Tamarack
 - b) Eastern hemlock
 - c) Jack pine
 - d) Balsam fir
23. When shearing Christmas trees, what is the ideal taper?
- a) 40%
 - b) 67%
 - c) 75%
 - d) 90%
24. How many sections are there in a township?
- a) 1
 - b) 36
 - c) 640
 - d) 43,560
25. How long is a chain, in feet?
- a) 66 feet
 - b) 100 feet
 - c) 1,000 feet
 - d) 5,280 feet

26. Which of the following is an example of a wood boring insect?

- a) Forest tent caterpillar
- b) Hypoxylon canker
- c) Saratoga spittle bug
- d) Asian longhorned beetle

27. Which of the following regeneration systems is depicted by the image on the right?

- a) Clearcutting
- b) Selection method
- c) Shelterwood method
- d) Seed tree method



28. Which of the following criteria would you not consider when selecting crop trees for a thinning in a hardwood stand?

- a) Tree value
- b) Tree straightness
- c) Branch size within the upper 16 feet of the tree
- d) Tree height

29. When collecting cones for their seeds, which of the following is an appropriate method for determining whether the cones are mature enough to collect?

- a) Squirrels have begun cutting and hoarding the cones
- b) The seeds are milky
- c) The cones are green
- d) It is spring

30. When designing a farmstead windbreak, what is the recommended minimum distance between the trees and any buildings?

- a) 10 feet
- b) 50 feet
- c) 66 feet
- d) 100 feet

31. You are designing an eight-row farmstead windbreak that will include both conifers and hardwood trees. Where is the most appropriate place to plant conifers in your design?

- a) On the outside row(s) only – farthest away from any buildings
- b) On the inside row(s) only – closest to any buildings
- c) Both the outside and inside row(s)
- d) In the middle

32. Which of the following will not help improve deer habitat?
- a) Preserve and maintain herbaceous openings
 - b) Focus on providing a single tree species
 - c) Maintain about 10 percent of the area in permanent brush cover
 - d) Maintain a source of good quality water
33. Which of the following best describes typical damage to trees from rabbits?
- a) Damage to the tops and side branches of small trees
 - b) Tree has been girdled
 - c) Bark has been gnawed or stripped away
 - d) Tree roots have been eaten
34. Assume that your normal pace is 5 feet long. How many paces would you need to walk 5 chains?
- a) 25
 - b) 36
 - c) 66
 - d) 100
35. The E 1/2 of Section 27 contains how many acres?
- a) 40
 - b) 80
 - c) 160
 - d) 320
36. Within a township map, what is the number of the section which is due north of section 21?
- a) 16
 - b) 20
 - c) 22
 - d) 28
37. What is the state tree of Minnesota?
- a) Norway spruce
 - b) Norway pine
 - c) Aspen
 - d) White pine
38. What landowner group owns and manages the largest percentage of timberland in Minnesota?
- a) Private individuals
 - b) Forest industry
 - c) US Forest Service
 - d) State of Minnesota

True-False questions

For the following twelve true or false questions, mark A on the scantron bubble sheet if the statement is true and B if the statement is false.

True False

39. A B Climax species are generally the first species to successfully invade bare ground following a widespread disturbance such as clearing an area for a housing development.
40. A B A contour interval on a topographic map indicates the elevation of a specific point.
41. A B Site index is an expression of site quality based on the expected height of dominant trees at a specified age.
42. A B The degree of acidity or alkalinity of a soil is expressed in pH values. A soil with a pH of 6.0 is considered an alkaline soil.
43. A B There are separate (different) recommendations for shearing short- vs. long-needles species of Christmas trees.
44. A B In Minnesota, township and range lines are measured from the 4th and 5th Principal Meridians.
45. A B You are cruising timber in a stand located in Minnesota and your calculations show that the basal area is 850 square feet/acre. That is a reasonable basal area value for Minnesota forest stands.
46. A B A single complete defoliation of hardwood trees results in their death.
47. A B You should avoid building a summer road in a bottomland.
48. A B After trees have been thinned, you are hoping to see an increase in the growth rate of the remaining trees.
49. A B The number associated with the map of plant hardiness zones is highest in southern Minnesota and lowest in northern Minnesota.
50. A B A watershed is the land area from which water flows toward a lake or stream.

FORESTRY CONTEST



Contestant Name _____ Team Number _____

School _____ Code Number _____

Tally Sheet for Timber Cruising (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 logs)	Sawlog Volume
1			
2			
3			
4			
5			
6			
7			
8			
9			

Note: Final answers for DBH and merchantable height are to be entered on the scantron bubble sheet. Turn in this form so that sawlog volume can be hand-scored.

2015
State FFA Forestry Contest – Chainsaw Practicum
ANSWER KEY

1. D
2. B
3. C
4. B
5. A
6. C
7. B
8. A
9. B
10. A

2015
State FFA Forestry Contest – Wood ID
ANSWER KEY

1. D
2. C
3. C
4. A
5. C
6. D
7. D
8. B
9. B
10. C



2015
State FFA Forestry Contest – Forest and Tree Disorders
ANSWER KEY

1. 304 – Bronze birch borer
2. 308 – Forest tent caterpillar
3. 321 – Witches broom
4. 317 – Rhizosphaera spruce needlecast
5. 312 – Insect (cynipid wasp) gall on bur oak
6. 307 – Emerald ash borer
7. 313 – Black knot of cherry
8. 316 – Pine bark beetle
9. 313 – Japanese beetle
10. 306 – Eastern Pine gall rust

2015
State FFA Forestry Contest – Product Scaling
ANSWER KEY

1. B
2. A
3. D
4. A
5. B
6. C
7. D
8. C
9. A
10. C

2015
State FFA Forestry Contest – Timber Cruising
ANSWER KEY

Tree No.	DBH	Merchantable Height (num. of 16-foot logs)	Sawlog Volume
1	14	025	130
2	12	020	75
3	12	015	61
4	12	005	17
5	18	015	166
6	17	010	109
7	21	030	411
8	15	020	136
9	17		

NOTE: Enter DBH and merchantable height on the scantron. Sawlog volume will be hand scored.

Product Scaling – Lumber Scaling

1. Sample #1
 - a. 6.5 BF
 - b. 8.0 BF
 - c. 9.0 BF
 - d. 9.3 BF

2. Sample #2
 - a. 2.7 BF
 - b. 3.3 BF
 - c. 1.5 BF
 - d. 4.0 BF

3. Sample #3
 - a. 3.5 BF
 - b. 6.3 BF
 - c. 4.3 BF
 - d. 5.0 BF

4. Sample #4
 - a. 4.7 BF
 - b. 3.3 BF
 - c. 5.5 BF
 - d. 5.7 BF

Product Scaling – Log Scaling

5. Sample #5
 - a. 15 BF
 - b. 20 BF
 - c. 30 BF
 - d. 40 BF

6. Sample #6
 - a. 15 BF
 - b. 20 BF
 - c. 30 BF
 - d. 35 BF

7. Sample #7
 - a. 15 BF
 - b. 20 BF
 - c. 30 BF
 - d. 40 BF

Product Scaling – Pulpwood Scaling

8. Sample #8

- a. 1.5 cords
- b. 3.3 cords
- c. 2.0 cords
- d. 4.3 cords

9. Sample #9

- a. 3.1 cords
- b. 4.3 cords
- c. 2.5 cords
- d. 5.7 cords

10. In the image below of a load of pulpwood, assume that the length of the trailer is 18 feet, the height of the stakes at the front and the back of the load is 5.7 feet, and that the wood is 100 inches in length. What is the volume in cords on the trailer?

- a. 3.9 cords
- b. 5.2 cords
- c. 6.7 cords
- d. 8.1 cords



FFA Forestry CDE Log Scaling Volume Table

On your data 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

FFA Forestry CDE Timber Cruising

On your score sheet, record individual tree DBH to the nearest inch and merchantable height to the nearest ½ sawlog converted 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 score sheet.

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

Diameter breast high (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

Wood ID Practicum

1. Sample 1
 - a. Spruce
 - b. Redwood
 - c. Butternut
 - d. Ponderosa pine
2. Sample 2
 - a. Black walnut
 - b. Ash
 - c. Sugar maple
 - d. Northern red oak
3. Sample 3
 - a. Red (Norway) pine
 - b. Cherry
 - c. Northern red oak
 - d. Spruce
4. Sample 4
 - a. Elm
 - b. Redwood
 - c. Ponderosa pine
 - d. White oak
5. Sample 5
 - a. Birch
 - b. Black walnut
 - c. White pine
 - d. Northern white-cedar
6. Sample 6
 - a. Butternut
 - b. Redwood
 - c. Douglas fir
 - d. Northern white-cedar
7. Sample 7
 - a. Hickory
 - b. Black walnut
 - c. Cottonwood
 - d. Aspen
8. Sample 8
 - a. Cherry
 - b. Redwood
 - c. Birch
 - d. Northern white-cedar
9. Sample 9
 - a. White oak
 - b. Cherry
 - c. Birch
 - d. Cottonwood
10. Sample 10
 - a. Elm
 - b. Cottonwood
 - c. Birch
 - d. Spruce

Tree and Forest Disorders

Identify 10 tree and forest disorders from the following list at five points each. Contestant answers will be entered on the provided Scantron bubble sheet.

2015 FFA Forestry Contest: Tree and Forest Disorders List of codes to enter on Scantron bubble sheet

PLEASE DO NOT MARK ON THIS SHEET

- | | |
|-----------------------------------|--|
| 301. Ash anthracnose | 312. Insect (cynipid wasp) gall on bur oak |
| 302. Bark damage from deer scrape | 313. Japanese beetle |
| 303. Black knot of cherry | 314. Maple leaf galls |
| 304. Bronze birch borer | 315. Oak wilt |
| 305. Deer browse damage | 316. Pine bark beetle |
| 306. Eastern pine gall rust | 317. Rhizosphaera spruce needlecast |
| 307. Emerald ash borer | 318. Thousand cankers of walnut |
| 308. Forest tent caterpillar | 319. White pine blister rust |
| 309. Frost crack | 320. White pine weevil |
| 310. Heart rot | 321. Witches broom |
| 311. Hypoxylon canker on aspen | |

Forestry Tools and Equipment

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

2015 FFA Forestry Contest: Tool and Equipment Identification List of codes to enter on Scantron bubble sheet

501. Aerial photo	520. Fire swatter (flap)	540. Pruning saw
502. Angle gauge (Cruz-all style)	521. Forwarder	541. Plastic flagging
503. Backpack fire pump	522. Fire weather kit	542. Pruning shears
504. Bow saw	523. GIS map	543. Pulaski-Forester Axe
505. Bulldozer	524. GPS receiver	544. Relaskop
506. Canthook	525. Hand compass	545. Safety glasses
507. Chainsaw	526. Hand lens	546. Safety hardhat
508. Chainsaw chaps	527. Harvester/processor	547. Shearing knife
509. Chipper/Grinder	528. Hip chain	548. Skidder
510. Clinometer	529. Hookeroon	549. Slasher
511. Containerized seedling block	530. Increment borer	550. Soils map
512. Cruising vest	531. Laser rangefinder	551. Steel tape
513. Data recorder	532. Log truck	552. Stereoscope
514. Diameter tape	533. Logger's tape	553. Tally book
515. Dot grid	534. Lopping shears	554. Topographic map
516. Drip torch	535. Mattock	555. Tree caliper
517. Ear protectors	536. Peavy	556. Tree injector/hypo hatchet
518. Feller-buncher	537. Planimeter	557. Tree marking gun
519. Fire rake	538. Plant press	558. Tree stick
	539. Planting hoe or bar	559. Wedge prism

Tree Identification (150 points)

List of species codes to enter on Scantron bubble sheet

This portion of the contest consists of 25 plant identification specimens, each worth 6 points. Mark your answers on the Scantron bubble sheet using the two-digit codes noted below.

Hardwoods

01. American elm
02. Balsam poplar
03. Basswood
04. Bigtooth aspen
05. Black ash
06. Black cherry
07. Black walnut
08. Boxelder
09. Bur oak
10. Butternut
11. Cottonwood
12. Green ash
13. Hackberry
14. Hickory
15. Honey locust
16. Ironwood (*Ostrya* sp)
17. Northern pin oak
18. Northern red oak
19. Paper birch
20. Quaking aspen
21. Red maple
22. Russian olive
23. Silver maple
24. Slippery elm
25. Sugar maple
26. White ash
27. White oak
28. Willow

Softwoods

29. Balsam fir
30. Black spruce
31. Colorado (blue) spruce
32. Eastern hemlock
33. Eastern red cedar
34. Eastern white pine
35. Jack pine
36. Northern white cedar
37. Norway spruce
38. Red (Norway) pine
39. Scotch pine
40. Tamarack (Eastern larch)
41. White spruce

State FFA Forestry 2015 Contest Chainsaw Practicum

This practicum consists of 6 multiple choice and 4 true-false questions. Mark your answers on the front side of the scantron answer sheet. DO NOT mark on this exam.

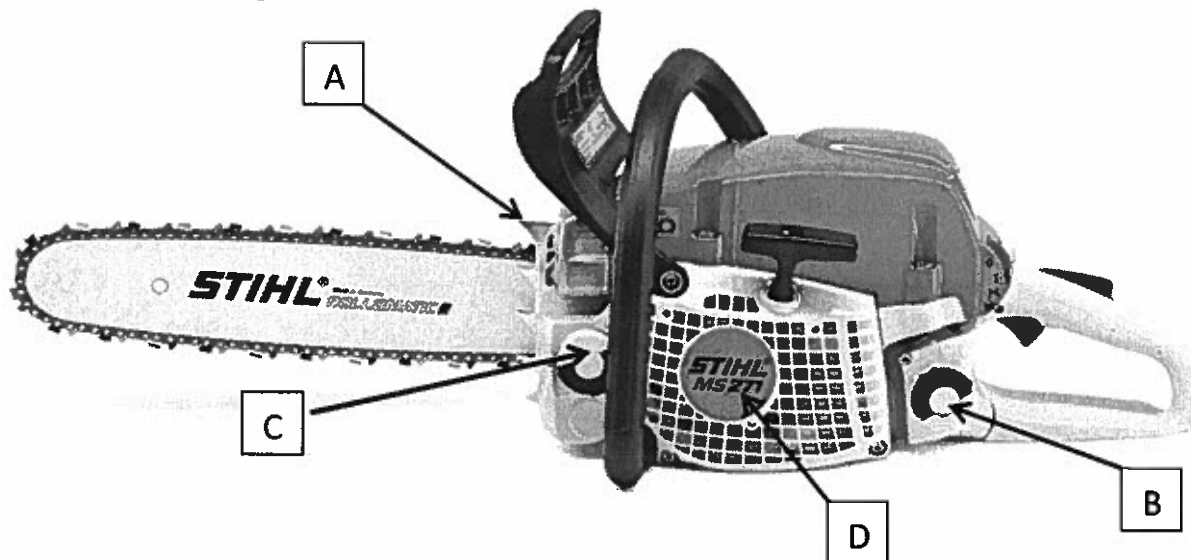
Multiple choice questions



1. You want to adjust the tension on your saw chain. In the image above, which letter best describes the location where you would access the chain tensioner?
 - a) Arrow A – at the end of the guide bar
 - b) Arrow B – where the adjusting screws are located
 - c) Arrow C – next to the throttle trigger
 - d) Arrow D – under the chain sprocket cover
2. Which of the following clothing items is part of proper protective apparel for use when operating a chainsaw?
 - a) Necktie
 - b) Snug fitting long pants
 - c) High top sneakers
 - d) Flared or cuffed pants
3. When making a conventional cut or an open-face cut, what is the maximum depth the felling notch should be cut into the tree?
 - a) 75% of the trunk diameter
 - b) 50% of the trunk diameter
 - c) 25% of the trunk diameter
 - d) 10% of the trunk diameter

4. How often should you turn the guide bar over to avoid one-sided wear, especially at the nose and underside of the bar?
 - a) Every time that you refuel the tank
 - b) Whenever you replace the chain
 - c) After operating the saw for an hour
 - d) It isn't necessary to turn the guide bar over

5. The air filter on your chainsaw may get dirty over time. Which of the following is not a correct part of the procedure for cleaning the air filter?
 - a) Wash the filter in a clean, flammable cleaning fluid
 - b) Dry all filter parts
 - c) Use compressed air, blowing from the inside outwards
 - d) Tap the filter against a hard surface



6. Assume that you need to add oil to your chainsaw. In the image above, which labeled arrow is pointed toward the oil filler cap?
 - a) Arrow A
 - b) Arrow B
 - c) Arrow C
 - d) Arrow D

True-False questions

For the following true or false questions, mark A on the scantron form if the statement is true and B if the statement is false.

True False

7. A B When operating a chainsaw, standing on a ladder to reach points off the ground is recommended.
8. A B The felling cut should be begin higher than the center of the felling notch on an open-face cut.
9. A B Wedges should be made of steel because it lasts longer.
10. A B When holding the chainsaw during starting, one recommended method is to clamp the rear handle between your knees or thighs.

2015
State FFA Forestry Contest – Forestry Written Exam
ANSWER KEY

- | | |
|-------|-------|
| 1. B | 26. D |
| 2. A | 27. D |
| 3. A | 28. C |
| 4. D | 29. A |
| 5. C | 30. D |
| 6. B | 31. B |
| 7. C | 32. B |
| 8. B | 33. B |
| 9. C | 34. C |
| 10. A | 35. D |
| 11. D | 36. A |
| 12. D | 37. B |
| 13. B | 38. A |
| 14. C | 39. B |
| 15. A | 40. B |
| 16. C | 41. A |
| 17. A | 42. B |
| 18. B | 43. A |
| 19. B | 44. A |
| 20. C | 45. B |
| 21. A | 46. B |
| 22. D | 47. A |
| 23. B | 48. A |
| 24. B | 49. A |
| 25. A | 50. A |

Wood Species Identification

1. (d); 2. (c); 3. (c); 4. (a); 5. (c); 6. (d); 7. (d); 8. (b); 9. (b); 10. (c)

Product Scaling

1. (b); 2. (a); 3. (d); 4. (a); 5. (b); 6. (c); 7. (d); 8. (c); 9. (a); 10. (c)