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COMPREHENSIVE FINAL EXAMINATION FOR WOODWORK

AREA OF THE GENERAL SHOP

(TITLE)

BY

Francis E. Cole

PLAN B PAPER

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR
THE DEGREE MASTER OF SCIENCE IN EDUCATION
AND PREPARED IN COURSE

Achievement Evaluation in Industrial Arts

IN THE GRADUATE SCHOOL, EASTERN ILLINOIS UNIVERSITY,
CHARLESTON, ILLINOIS

1964

YEAR

I HEREBY RECOMMEND THIS PLAN B PAPER BE ACCEPTED AS
FULFILLING THIS PART OF THE DEGREE, M.S. IN ED.

July 29, 1964
DATE

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COMPREHENSIVE FINAL EXAMINATION FOR WOODWORK

AREA OF GENERAL SHOP

I. Introduction. The purpose of this study was to prepare a final examination in the woodworking area of a general shop course to be used in the ninth grade of the Edwardsville, Illinois public schools. The procedure that was followed in preparing this examination was to state the objectives of the Edwardsville public schools, the objectives of the industrial arts department of the high school, and the objectives of the woodwork area of the general shop course. These objectives form the basis for the teaching done in the course and should serve as a guide in the construction of any examination aimed at determining a pupil's accomplishment in an area of study. The objectives of the industrial arts department were compared with the stated objectives of the public school system, and the course objectives were compared with those of the industrial arts department. The course of study was derived from the course objectives, and the examination items were derived from the instructional units which meet the course objectives.

As this examination is to be administered at the end of the course, and pressure is almost always brought to bear against the teacher to compile, compute, record, and turn in grades in a short time, the objective type form was chosen for

the reason that it can be quickly graded. This test will also provide information on these following items:

1. The pupil's over-all retention of material covered outside of the laboratory work,
2. The efficiency with which the instructor covered the material,
3. Guidance data,
4. Comparison of different classes,
5. Finding and defining a student's difficulties in the area.

If the test is valid, the student's score will indicate the amount of the material presented which has been retained by him.

By checking the test items to see if a majority of students gave correct or incorrect responses, it can be seen if the material was properly covered.

Guidance data can easily be obtained. For example, a student who has achieved considerably below the level of other students in weekly tests, project work, and homework, and who did not score high on this examination, could be considered as a poor risk to achieve well in the advanced wood courses. Then the results of this examination, plus the other information the instructor would have, would be passed on to the guidance counselor so that the student could be directed away from a field in which he had only a low level of ability to one in which he has a reasonable chance of success.

By comparing the results of the class that took this examination with the results of previous classes, the instructor will have a basis for comparing the retention of subject matter material.

By checking a student's responses to the various items, it may be revealed that he has had continued difficulty in certain areas of the course.

This examination should cover the contents of the entire course. A test should be valid; it should measure what it is supposed to measure. A test should be reliable; it should measure accurately what it is testing. This examination should meet these checks of a good test.

II. Plan of Procedure. The stated objectives of the public school system were noted and kept in mind while preparing this examination. Those objectives are:

1. That the experiences of the schools assist each individual in developing his potentialities to the maximum;
2. That the experiences of the school equip the individual with the fundamentals of learning;
3. That the experiences of the school provide opportunity for the development of originality, initiative, and independent thinking;
4. That the experiences of the school lay a foundation of sound scholarship, cultural background, and professional or vocational skill;

5. That the experiences of the school provide an opportunity to strengthen the moral and spiritual standards of all individuals.¹

The objectives of the total industrial arts program

are:

1. To develop in each pupil an active interest in industry, and in the methods and problems of production and exchange;
2. To develop in each pupil the appreciation of good design and workmanship, and the ability to select, care for, and use industrial products wisely;
3. To develop in each pupil the habits of self-reliance, self-discipline, and resourcefulness in meeting practical situations;
4. To develop in each pupil a readiness to assist others and to join happily in group undertakings;
5. To develop in each pupil desirable attitudes and practices with respect to health and safety;
6. To develop in each pupil a feeling of pride in his ability to do useful things and to develop worthy leisure-time interests;
7. To develop in each pupil an understanding of drawings and the ability to express ideas by means of drawings;
8. To develop in each pupil the habit of an orderly, complete, and efficient performance of any task;
9. To develop in each pupil a measure of skill in the use of common tools and machines, and an understanding of the problems involved in common types of construction and repair;
10. To educate each pupil to be a wise consumer who will make intelligent choices and uses of the multitudes of products and services available;

1. Teachers Handbook for the Edwardsville Public Schools, 1963-64, Board of Education, Edwardsville, Illinois.

11. To lay a broad and solid foundation of industrial experience for those who may enter training for specific occupations in industry;
12. To render some vocational guidance in aiding you to make wise educational and vocational choices.¹

The stated objectives of the woodworking area of the general shop program are:

1. To help the pupil explore his talents in woodworking to see if there is a vocational future for him in this area;
2. To help the pupil develop a sense of appreciation of the craftsmen in woodworking;
3. To help the pupil become a critical consumer;
4. To help the pupil develop basic skills with the basic woodworking tools;
5. To help the pupil develop leisure-time activities which are beneficial;
6. To help the pupil develop worthwhile work-habits which will carry over into wage-earning activities later in life;
7. To help the pupil develop desirable attitudes and habits towards the practice of safety.²

These stated objectives should determine the content of the woodworking section of the general shop course and the teaching methods used by the instructor should be such as to cause him to meet these objectives and outcomes.

To achieve these objectives, the student is required, according to his ability, to make one or more required projects.

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1. Vocational Arts Curriculum Study, Edwardsville Community Schools, 1958, Industrial Arts Section.
 2. Vocational Arts Curriculum Study, Edwardsville Community Schools, 1958, Industrial Arts Woodworking, page 2.

This gives him practical experience in the practice of safety in the laboratory, and the rest of the subject matter covered in lectures and homework assignments. Two lecture periods are devoted to safety. Four periods are used to emphasize the different kinds of woods, where they come from, their characteristics, and the by-products of the lumbering industry. Three periods are used to instruct the student in the formulas for figuring board feet and in working practice problems. Nine periods are used for formal and demonstrative classroom instruction in the use of the tools found in the Edwardsville high school laboratory. One period is used to cover the use of glues and gluing procedures, one more period is devoted to preparing the project for finishing and finishing procedures. The other twenty-five periods are used for laboratory work, applying what has been covered in the other periods in practical application.

The textbook used for this course is Woodworking, by Willis H. Wagner, published by Goodheart-Wilcox in 1961.

This statement of teaching methods and textbook used is necessary as it establishes the source of content for the individual examination items.

One way to begin the construction of a comprehensive examination is to break the course of study down until the basic instructional units are arrived at. For this course, the following instructional units are used:

1. Safety in the laboratory,
2. The lumbering industry,
3. Design and the planning operation,
4. Figuring board feet,
5. Care and use of hand woodworking tools,
6. Glues and gluing procedures,
7. Fastening devices,
8. Finishes and finishing procedures.

The unit on safety in the laboratory covers the reasons for using an apron, how the apron should be constructed so that it will not be a hazard itself, the proper way to carry and store tools, how to behave around and use properly those machines and tools which the student will use, the reasons for the student work list, and the general laboratory safety rules.

The unit on the lumbering industry covers the various types of wood, where the kinds of lumber grow, what the characteristics are of the lumber in general use in the laboratory, by-products of forestry, how a tree grows and develops, technical names of the various parts of the trees, and general conservation practices.

The design and planning operation unit covers how to make a bill of material, what a stock cutting list is, how to sketch freehand, sources of ideas for projects, the characteristics of early American, colonial, French Provincial, and modern furniture, the importance of matching style, wood, and finish

in a project with that found where the project is to be used, and the detailed planning of a bill of material, stock cutting list, and the plan of procedure for the pupil's first project.

The unit on figuring board feet covers the three different formulas used to figure board feet, when to use each, and practice problems in figuring board feet, and then figuring the board feet and the cost of the projects which will be made in the laboratory during the course.

The unit on the care and use of the hand woodworking tools covers bench planes, rules, straight edges, compasses, trammel points, dividers, pliers, hammers, screwdrivers, spokeshaves, braces, auger bits, hand drills, twist bits, expansive bits, nail sets, carpenter squares, try squares, bench stops, vises and other tools in the laboratory, as well as the terminology used in conjunction with each. Instruction is given in how the cutting edge tools are sharpened and why, how to whet the cutting edges, and how the tools are cared for and why.

The unit on glues and gluing procedures covers the characteristics of polyvinyl glues, urea resin glues, and resorcinal glues, their uses, shelf life, and set up times. Instruction is given in the use and sizes of hand clamps, bar clamps and carriage clamps. The use and construction of jigs is covered. The application of wax around the glue joints for ease of glue removal is taught, and the use of wood chisels

to remove excess glue. Terminology used in connection with gluing is taught.

The unit on fastening devices covers the devices used during the course such as screws, nails, brads, and other special duty fasteners. The terminology as applied to the various parts and the procedure for ordering each is covered. The differences between flat head, oval head, round head, and Phillips head screws are covered. The sizes, finishes, and proper selection and use of these fasteners is taught.

The unit on finishes and finishing procedures covers the measuring systems of abrasive paper, the sizes of abrasive paper, how to distinguish between abrasive papers, how abrasive paper is made and ordered, use of sanding blocks, the sanding procedure used to obtain a good finish, and why millmarks are difficult to sand out. The differences between oil and water stains, and the advantages and disadvantages of each, and how to apply them are taught. The advantages and disadvantages of shellac, varnish, lacquer, and enamel are taught, as well as how to apply them. Especial emphasis is placed on shellac and varnish, as these are the two finishes the pupil will use in the course. The procedure for hand rubbing a finish is taught, as well as the reason and procedure for waxing a finished project.

The examination items were chosen because they covered this material. The material on which the student is being

tested was covered in lectures, assigned reading, and homework assignments.

As the true and best test of the student's knowledge of the material covered under the unit on safety is in the practical application of that knowledge, the author felt that the student's achievement in this area could be better evaluated by observation of the student's use of this material over the entire nine weeks course, to see if those attitudes and habits that are desired actually developed, instead of including questions on this material in the examination.

Items one through nine of the true-false portion of the examination should test the student's knowledge of the design and planning operations. Items ten through twenty cover the material in the unit on the lumbering industry. The unit on care and use of hand woodworking tools, being the most important method used to achieve the objectives and being the unit on which the student has spent most of his class time, has most of the questions covering it. These questions are numbers twenty-one through fifty, inclusive. Glues and gluing procedures are covered by items fifty-one through sixty. Fastening devices are covered by items sixty-one through seventy. The remainder of the true-false items, seventy-one through ninety-one, cover the unit on finishes and finishing procedures.

Items one, two, six, ten, eleven, twelve, and thirteen of the multiple choice section cover finishes and finishing

procedure. Choosing the proper wood joints is covered in items three, four, and five. Items seven, eight, and nine cover material in the unit on the lumbering industry.

The matching section covers terminology used in the general shop woodworking course, and the fourth part of the examination covers the unit on figuring board feet.

The individual items were chosen for the following reasons:

1. They cover the instructional units, based on the course of study;
2. The student is familiar with these types of questions, having answered these types of questions on other quizzes during the course;
3. For ease and objectivity in scoring;
4. For rapid calculation of results;
5. For objective judgement of the examination results;
6. For easy reference in advanced classes when an estimate of specific accomplishment or lack of it is desired for reference to an individual student;
7. For possible use in vocational guidance of individual students.

The unit on safety in the shop relates to the objective for the total industrial arts program of developing desirable attitudes and practices with respect to health and safety. The unit on the lumbering industry meets the objectives of

developing an active interest in industry, to educate the pupil to be a wise consumer, to lay a foundation of industrial experience, and to render some vocational guidance. The unit on design and the planning operation meets the objectives of developing the appreciation of good design, developing the habit of orderly performance, and to developing the ability to express ideas by means of drawings or sketches. The unit on figuring board feet meets the stated objective of developing a certain amount of skill in the area. The unit on the care and use of hand woodworking tools meets the objectives of health and safety in their use, and to the developing of an amount of skill in the use of tools. Glues and gluing procedures meet the objectives to develop a readiness to assist others, as it generally takes two students to get the project glued up right, and in the developing of skills. The unit on fastening devices meets the objectives of selecting and using industrial products wisely, developing the skills of the student, and educating him to be a wise consumer. The unit on finishes and finishing meets the objectives of selecting and using industrial products wisely, the development of orderly and efficient completion of a task, the development of a measure of skill and the making of intelligent choices and uses of industrial products.

III. Final Examination in Ninth Grade Woodworking Area of the General Shop in Edwardsville, Illinois High School, First Revision.

General Shop - Wood
Final Examination*

Name	Grade	Date
Score		

Part A: True or False

Directions: Read each question carefully. If the question is true, block out the T. If the question is false, block out the F. Use a pencil. If an error is made it can be erased.

Sample: T F A mill file should be used to remove bad nicks from the cutting edge of a plane iron.

This is a false statement, so the F should be blocked out.

1. T F Since there are few sources of ideas for projects, a beginning student should follow someone else's plans.
2. T F The planning part of the student's work will include only the plan of procedure.
3. T F Some of the things that must be considered in selecting a design are your ability, the cost, the style, the color, and the size of the article.
4. T F An excellent finish will make up for poor design.
5. T F Pictorial sketches give enough detail to build the project from them.
6. T F A working drawing shows the size and shape of an object.
7. T F A detail view shows just how the object is put together, and is used if the working drawing is not very clear.
8. T F A plan of procedure will include the stock cutting list, bill of materials, list of tools, and step by step procedure.
9. T F A bill of material is a list of all materials used in the project.
10. T F The sizes of the wood given in the bill of material is the size you should cut from rough stock.
11. T F It is possible for a board to be wider than it is long.
12. T F The lumber yards classify lumber as to whether it is hardwood or softwood.
13. T F An example of a deciduous tree is aromatic cedar.

*The original edition of this examination is found in Appendix A.

14. T F An example of a coniferous tree is yellow pine.
15. T F The best grade of hardwood is called "selects".
16. T F Hardwoods and softwoods are stocked in standard sizes.
17. T F The most common size sheet of 3/4" thick plywood is 4' X 10'.
18. T F A piece of lumber 1 1/2" X 7" X 14" has 1 1/4 board feet in it.
19. T F Plywood and moulding are sold by the square feet.
20. T F Before cutting rough stock, it is best to make a rough layout of the pieces you need in chalk on the stock to prevent wasting any lumber.
21. T F The kerf is the groove a saw makes in the board as it cuts its way through the wood.
22. T F The set in a saw blade provides clearance so the saw will not bind.
23. T F A crosscut saw is generally used when cutting a large board to width.
24. T F A rip saw would be used when cutting plywood.
25. T F Some planes that are called bench planes are the smooth, the jack, the block, and the router planes.
26. T F The double plane iron consists of the single plane iron, the plane iron cap, and the cap screw.
27. T F The plane iron should be sharpened carefully so that the edge always remains absolutely square with the sides of the plane iron.
28. T F It is not necessary to hand plane a board if it has been squared on the jointer.
29. T F Millmarks are very difficult to sand out, and may reappear when the finish is applied if they were not planed out.
30. T F The shavings from a plane should be thick and coarse, as this shows that you are taking a lot of stock off in a hurry.
31. T F Joints that tend to be weak are reinforced with nails, screws, dowels, or other fastening devices.
32. T F A dado joint should be 3/4 of the thickness of the stock in depth.
33. T F A rabbet joint should be 3/8 of the thickness of the stock in depth.
34. T F In laying out holes to be drilled, it is only necessary to locate their centers.
35. T F Circles and arcs are generally laid out with the dividers or compass.
36. T F Irregular curves can only be laid out by using the french curve.
37. T F A pattern is generally used once or twice and then discarded.
38. T F A template might be made out of thin aluminum.
39. T F A dovetail saw is used to cut curves.
40. T F The coping saw cuts only on the upward stroke.

41. T F A board is chamfered when one end is made smaller than the other.
42. T F A bevel removes a sharp corner on the edge of a board and is generally at a 45° angle.
43. T F Cutting holes $1/4$ " in diameter or less is called drilling.
44. T F A brace is sized by the diameter of the largest bit it will take.
45. T F Auger bits are available in $1/32$ " diameters from $1/4$ " to 2" in diameter.
46. T F A scratch awl is used to punch the center of the hole so that the bit will start where you want it to.
47. T F The spurs of the bit cut the wood loose from the hole.
48. T F Counterboring is done to make a flat head screw flush with the surface of the wood.
49. T F An expansive bit will only bore holes up to $1\ 1/4$ " in diameter.
50. T F A foerstner bit would be used where an auger bit might split the wood.
51. T F Polyvinyl glue is often called white glue.
52. T F Polyvinyl glue is very water proof.
53. T F Urea resin glue has a working life of several days.
54. T F Resorcinol resin glue has a working life of from 1-3 hours.
55. T F Polyvinyl glue must be mixed with water before using it.
56. T F Industry uses the single spread of glue because of the economy, speed, and machinery that can be used for gluing.
57. T F Glue should be applied very liberally since a large amount of squeeze out indicates a good joint.
58. T F Wax around the glue joint will make it easier to remove the excess glue.
59. T F Bar clamps range in size from 4-8' in length.
60. T F Because of the cost of making special clamping or holding devices, jigs are seldom used in industrial arts classes.
61. T F A nail set is used to start a hole for finish nails.
62. T F A light coat of wax on the nail will make it easier to drive in hard wood.
63. T F When ordering nails, you give the size of the nails in pounds.
64. T F Brads are ordered by giving their length and gauge size.
65. T F Wood screws are available from $1/4$ " to 6" in length and 0 to 24 gauges.
66. T F The order for a number 6 gauge flathead blued screw $1\ 1/4$ " long would be written #6-1 $1/4$ " RHB.
67. T F Oval head screws should be countersunk.

68. T F The pilot hole, sometimes called the anchor hole, is the smallest of the two holes drilled for screws.
69. T F The size of the screwdriver used is not important as long as the tip is small enough to fit the slot.
70. T F Only one size of a Phillips head screwdriver is made as it fits all Phillips head screws.
71. T F The size of a screwdriver is determined by the length of its shank.
72. T F The two systems of grading abrasive paper are the aught system and the mesh system.
73. T F Flint paper is a reddish brown color.
74. T F A sanding board would be used to sand the edges of a book shelf.
75. T F If you have slipped and gouged your work with a plane, water will soak the gouge out.
76. T F A high quality brush bristle will have solid ends that are not split or torn in any way.
77. T F Mahogany is an open grained wood.
78. T F A "tack rag" is used to pick up nails when a large quantity has been spilled.
79. T F A "wash coat" of finish generally is a good sealer for close grained woods.
80. T F Turpentine is used to thin varnish.
81. T F Shellac is thinned with naphtha.
82. T F Lacquer is a product of the lac bug, which is found in Siam.
83. T F Two of the main ingredients in white paint are white lead and benzene.
84. T F Pumice stone is another name for rottenstone.
85. T F When preparing the wood for a finish, it should be sanded with 2/0, 4/0, then 1/2 abrasive paper.
86. T F The best natural brush bristles are found in western Europe, where many hogs are raised.
87. T F Some of the synthetic finishes used today will ruin nylon bristles, so care must be exercised when selecting a brush to apply them.
88. T F Walnut, mahogany, oak, and cherry are some of the hardwoods we use.
89. T F Varnish is an excellent finish for wood and is often used on automobiles entered in show competition.
90. T F Stain is always used on projects.
91. T F Enamel undercoat paint never has to be sanded before applying the finish coat.

Part B: Multiple Choice

Directions: Read each question carefully. Choose the best phrase or word to complete the sentence. Place the letter at the front of the word or phrase on the line before the question number.

Sample: _____ 0. (a) Linseed oil (b) pumice stone
(c) rottenstone (d) turpentine is made
from the drippings of the pine tree.

Turpentine is made from the drippings of the pine tree, so the letter "d" would be the correct answer. Place this on the line in front of the sample question.

- _____ 1. The chief disadvantage of water stain is
(a) it costs too much, (b) fades too badly,
(c) raises the grain, (d) is not uniform in
color.
- _____ 2. Which of these is NOT an advantage of shellac:
(a) waterproof (b) quick drying (c) gives a hard
finish (d) easy to apply.
- _____ 3. The simplest joint to construct is the (a) lap
(b) rabbet (c) dado (d) butt joint.
- _____ 4. To join shelves to the sides of bookshelves,
use (a) butt joints (b) dado joints (c) groove
joints (d) rabbet joints.
- _____ 5. The joint most used in picture frames is the
(a) miter (b) groove (c) butt (d) dado joint.
- _____ 6. Assuming you had the proper equipment, which of
these would give you the quickest finish?
(a) varnish (b) shellac (c) lacquer (d) linseed
oil
- _____ 7. The first consideration in selection of a
project is (a) the kind of wood to use (b) your
needs (c) the size of the project (d) your
ability.
- _____ 8. An example of a close-grained wood is (a) walnut
(b) mahogany (c) oak (d) cherry.
- _____ 9. An example of an open grained wood is (a) birch
(b) pine (c) maple (d) oak.

- _____ 10. A person would apply a stain if he wanted to
(a) hide a poor sanding job (b) keep from
applying a filler (c) imitate a more expensive
wood (d) get a quick finish.
- _____ 11. The biggest advantage of an oil stain is (a) it
dries slowly (b) it is less likely to fade
(c) it is more uniform in color (d) it is
cheaper.
- _____ 12. The chief disadvantage of a varnish finish
is that it (a) dries too slowly (b) does not
give a hard enough surface (c) it is not
transparent (d) it is too costly.
- _____ 13. When using lacquer, the wood first should be
sealed with (a) shellac (b) linseed oil
(c) lacquer sealer (d) it should not be sealed
at all.

Part C: Matching

Directions: This part of the test consists of a column of abbreviations and a column of definitions. You are to choose the best definition and place that letter in front of the number of the abbreviation.

- | | | |
|-------|-------------|--|
| _____ | 1. FAS | a. knock down |
| _____ | 2. S4S | b. surface two sides |
| _____ | 3. G2S | c. lumber that has been machined on all four sides |
| _____ | 4. AD | d. air dried |
| _____ | 5. WHND | e. worm holes would not be detrimental |
| _____ | 6. Selects | f. second best grade of hardwood |
| _____ | 7. Oak | g. best grade of hardwood |
| _____ | 8. Softwood | h. mahogany |
| _____ | 9. RGH | i. open-grained wood |
| _____ | 10. FOK | j. cedar |
| _____ | 11. EXT | k. lumber as it comes from the saw mill |
| _____ | 12. KD | l. grade of plywood meaning one good face and one with knots in it |
| | | m. type of plywood used in house construction |
| | | n. waterproof plywood |
| | | o. plywood that has no surface defects in either face veneer |
| | | p. kiln dried |
| | | q. knots in the wood are not objectionable |

Part D: Board Feet

Directions: The following items are to test your knowledge of figuring costs and materials. Show the formula used and all figuring on this page. Place your final answer in the space provided for it at the left of the page.

1. How much would it cost to lay the subflooring in a room which is 12 X 16 feet, using 1/2" thick plywood? The plywood costs 28¢ per square foot.

2. How many boards 1" X 6" X 10' would it take to fill an order for 200 board feet?

3. If forty 2" X 4" X 8' were required to frame a room, and the cost was 22¢ per foot, how much would the total bill be?

IV. Conclusions:

1. This examination should be evaluated by teachers in this area of work to increase its reliability.
2. Further administration of the examination is necessary to increase its validity.
3. By comparison of the objectives of the course and the course of study, the test appears to meet the requirement of comprehensiveness.
4. The results secured in the initial administration of the examination matched quite well the over-all achievements of the individual students. This may be indicative of the validity of the examination.

V. References

1. Appendix "A" follows this page and is the original version of the examination as it was given to one class of twenty students.
2. Handbook for Teachers of the Edwardsville Public School District #7, 1963
3. Vocational Arts Curriculum Study, Edwardsville Community Schools, 1958
4. Micheels, William J., and Karnes, M. Ray, Measuring Educational Achievement, McGraw-Hill Book Company, New York, 1950

APPENDIX "A"

General Shop
Quarter Exam

1. T F A complete planning operation will include the development of the design.
2. T F Since there are few sources of ideas for projects, a beginning student should follow someone else's plans.
3. T F The planning part of your work will include only the plan of procedure.
4. T F Some of the things that must be considered in selecting a design are your ability, the cost, the style, the color, and the size of the article.
5. T F An excellent finish will make up for poor design.
6. T F Balance, proportion and unity should be considered when designing a project.
7. T F Pictorial sketches give enough detail to build the project from them.
8. T F Pictorial sketches are used to help work out the final details of the plan.
9. T F A working drawing shows the size and shape of an object.
10. T F A detail view should always be included in your plans.
11. T F A detail view shows just how the object is put together, and is used if the working drawing is not very clear.
12. T F A plan of procedure should be very detailed.
13. T F A plan of procedure is a list of each job you must do to complete the project.
14. T F A plan of procedure will include the stock cutting list, bill of materials, list of tools, and step by step procedure.
15. T F A bill of material is a list of all materials used in the project.
16. T F The sizes of the wood given in the bill of material is the size you should cut from the rough stock.
17. T F It is possible for a board to be wider than it is long.
18. T F The cost of the project should be figured from the stock cutting list, since this is the actual size of wood you used in your project.
19. T F There are several methods of classifying lumber.
20. T F The lumber yards classify lumber as to whether it is hardwood or softwood.
21. T F An example of a deciduous tree is aromatic cedar.
22. T F An example of a coniferous tree is yellow pine.
23. T F The best grades of hardwood are called "selects".
24. T F Lumber that is to be used in furniture or cabinet work should be kiln dried.

25. T F Hardwoods and softwoods come in standardized sizes.
26. T F The most common size sheet of plywood is 4' X 10'.
27. T F A piece of lumber 1 1/2" X 14" has 1 1/4 board feet in it.
28. T F Plywood and moulding are sold by the square foot.
29. T F Before cutting rough stock, it is best to make a rough layout of the pieces you need in chalk on the stock to prevent wasting any lumber.
30. T F The kerf is the groove a saw makes in the board as it cuts through the wood.
31. T F The set in a saw blade provides clearance so the saw will not bind.
32. T F A crosscut saw is generally used when cutting a large board to width.
33. T F A rip saw would be used when cutting plywood.
34. T F There are many kinds of planes.
35. T F Some planes that are called bench planes are the smooth, the jack, the block, and the router planes.
36. T F The double plane iron consists of the single plane iron, the plane iron cap, and the cap screw.
37. T F The plane iron should be sharpened carefully so that the edge remains absolutely square with the sides of the plane iron.
38. T F It is not necessary to hand plane a board if it has been squared up on the jointer.
39. T F Millmarks are very difficult to sand out, and may reappear when the finish is applied if they have only been sanded.
40. T F The shavings from a plane should be thick and coarse, as this shows that you are taking off a lot of stock in a hurry.
41. T F Joints that tend to be weak are reinforced with nails, screws, dowels, or other fastening devices.
42. T F The miter joint is often used in the construction of picture frames.
43. T F A dado joint should be cut 3/4 the thickness of the stock.
44. T F A rabbet joint should be cut 3/8 the thickness of the stock.
45. T F In laying out holes to be drilled, it is only necessary to locate their centers.
46. T F Circles and arcs are generally laid out with the dividers or compass.
47. T F Irregular curves can only be laid out by using the french curve.
48. T F A pattern is generally used once or twice and then discarded.

49. T F A template might be made out of thin aluminum.
50. T F A dovetail saw is used to cut curves.
51. T F The coping saw cuts only on the upward stroke.
52. T F A board is chamfered when one end is made smaller than the other.
53. T F A bevel removes a sharp corner on the edge of a board and is generally at a 45° angle.
54. T F Cutting holes 1/4" in diameter or less is called drilling.
55. T F Boring refers to making holes 1/4" or larger in diameter using auger bits.
56. T F A brace is sized by the diameter of the largest drill it will take.
57. T F Auger bits are available in 1/32" diameters from 1/4" to 2" in diameter.
58. T F A scratch awl is used to punch the center of the hole so that the bit will start where you want it to.
59. T F The spurs of the bit cut the wood loose from the hole.
60. T F The twist carries the chips out of the hole.
61. T F The auger bit's size is stamped on the tang.
62. T F Counterboring is done to make a flat head screw flush with the surface of the wood.
63. T F An expansive bit will only bore holes up to 1 1/4" in diameter.
64. T F A foerstner bit would be used where an auger bit might split the stock.
65. T F Polyvinyl glue is often called white glue.
66. T F Polyvinyl glue is very waterproof.
67. T F Polyvinyl glue must be mixed with water before using it.
68. T F Urea resin glue has a working life of several days.
69. T F Resorcinol resin glue has a working life of from 1-3 hours.
70. T F A trial assembly should be made before gluing the pieces together.
71. T F Industry uses the single spread of glue because of the economy, speed, and machinery that can be used for gluing.
72. T F A double spread is used to make sure you have sufficient glue all over the joining surfaces.
73. T F Glue should be applied very liberally since a large amount of squeeze out indicates a good joint.
74. T F Wax around the glue joint will make it easier to remove the excess glue.
75. T F Bar clamps range in size from 4-8'.
76. T F Because of the cost of making special clamping or holding devices, jigs are seldom used in industrial arts classes.

77. T F Brads, finishing nails, and casing nails are used on finished wood.
78. T F A nail set is used to start a hole for finish nails.
79. T F A light coat of wax on the nail will make it easier to drive in hard wood.
80. T F Claw hammers are used by carpenters only, and always weigh over a pound.
81. T F The only kinds of nails used are the common, box, casing, and brad.
82. T F When ordering nails, you give the size of nails in pounds.
83. T F Brads are ordered by giving their length and gauge size.
84. T F Wood screws are available from 1/4"-6" in length and 0-24 gauges.
85. T F The order for a #6 flathead blue screw 1 1/4" long would be #6-1 1/4" RHB.
86. T F Oval head screws should be countersunk.
87. T F The pilot hole, sometimes called the anchor hole, is the smallest of the two holes drilled for screws.
88. T F The size of the screwdriver used is not important as long as the tip is small enough to fit in the slot.
89. T F Only one size of a Phillips head screwdriver is made as it fits all Phillips head screws.
90. T F Counterboring is the term that means setting the heads of bolts or screws below the surface of the wood.
91. T F The size of a screwdriver is determined by the length of its shank.
92. T F The two systems of grading abrasive paper are the aught system and the mesh system.
93. T F Flint paper is a reddish brown color.
94. T F A sanding block is nice to use, but not necessary.
95. T F The stock should be securely held down while sanding if at all possible.
96. T F If you have slipped and gouged your work with a plane, water will soak the gouge out.
97. T F A true brush bristle will have solid ends that are not split in any way.
98. T F Mahogany is an open grained wood.
99. T F A tack rag is used to pick up nails when a large quantity has been spilled.
100. T F A wash coat of finish is generally a good sealer.
101. T F Turpentine is used to thin varnish.
102. T F Shellac is thinned with naphtha.
103. T F Lacquer is a product of the lac bug, which is found in Siam.

104. T F Two of the main ingredients in white paint are white lead and benzene.
105. T F Pumice stone is another name for rottenstone.
106. T F Pumice stone is used to rub down the final coat of finish in a high quality finish.
107. T F Paste wood filler should be applied, allowed to dry completely solid, and then sanded smooth.
108. T F When preparing the wood for a finish, it should be sanded with 2/0, then with 4/0, then finished with 1/2 aught sandpaper.
109. T F The best natural brush bristles are found in western Europe, where a lot of hogs are raised.
110. T F Some of the synthetic finishes used today will ruin nylon bristles, so care must be used when choosing a brush for them.
111. T F Walnut, mahogany, oak, and cherry are some hard woods having open grain that should be filled before trying to apply a finish.
112. T F Varnish is an excellent finish for wood and is often used on automobiles entered in show competition.
113. T F To obtain a good, clear finish, at least three coats should be applied.
114. T F Stain is always used on projects.
115. T F Enamel undercoat paint never has to be sanded before applying the finish coat.

Place the letter of the best definition on the line in front of the number.

- | | | |
|-------|---------------|--|
| _____ | 116. FAS | a. knock down |
| _____ | 117. S4S | b. surface two sides |
| _____ | 118. G2S | c. lumber that has been machined on all sides |
| _____ | 119. AD | d. air dried |
| _____ | 120. KD | e. worm holes would not be detrimental |
| _____ | 121. WHND | f. second best grade of hardwood |
| _____ | 122. Selects | g. best grade of hardwood |
| _____ | 123. Oak | h. mahogany |
| _____ | 124. Softwood | i. open grained wood |
| _____ | 125. kd | j. cedar |
| _____ | 126. Ad | k. lumber as it comes from the saw mill |
| _____ | 127. RGH | l. grade of plywood |
| _____ | 128. FOK | m. plywood used in house construction |
| _____ | 129. EXT | n. waterproof plywood |
| | | o. plywood that has no surface defects in either face veneer |
| | | p. kiln dried |
| | | q. knots in the wood are not objectionable |

Answer in short answers in the space provided the following questions:

- 130-134. Name five hardwood trees, classified as a lumberyard would.
- 135-139. Name five softwood trees, classified as a lumberyard would.
- 140-142. List three reasons for regrinding a plane iron.
- 143-145. List three ways to check a plane iron for sharpness.
- 146-149. Name four bench planes.