

Date: July, 1961

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Title of Study: TESTS CORRELATED WITH THE COURSE OF STUDY FOR  
WOODWORK IN THE JUNIOR HIGH SCHOOLS, WICHITA,  
KANSAS

Number of Pages in Study: 114

Under Direction of What Department: Industrial Arts Education

Scope of Study: This report deals with the tests correlated with the course of study for woodwork in the junior high schools in Wichita, Kansas, giving the kinds, and types of objective tests used. The report of the study is given in the written tests for each unit in the course of study as presented in the report by James E. Ashley. Included is a brief history of testing and objectivity of tests. A list of material used and the tests are included for convenience of the reader.

Findings and Conclusions: The industrial arts teacher must have a good set of objectives in mind. Objective tests are used, giving the completion type question first place, followed by multiple-choice and true-false questions. The testing program properly executed fulfills an important place in the total industrial arts program. Performance tests are used by some teachers to develop skill. The reason for giving tests, regardless of the type, is for student and teacher evaluation, motivation, achievement, administrative requirements, and grading purposes. Industrial arts students preparing to be teachers should have a course in measuring educational achievement.

ADVISER'S APPROVAL

C. L. Hill

TESTING PROGRAM CORRELATED WITH THE  
COURSE OF STUDY FOR WOODWORK,  
IN THE JUNIOR HIGH SCHOOLS,  
WICHITA, KANSAS

BY

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1948

Submitted to the Faculty of the Graduate School of  
Oklahoma State University  
In Partial Fulfillment of the Requirements  
For the Degree of  
Master of Science

1961

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MASTER OF SCIENCE

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## CHAPTER I

### TESTING PROBLEMS FOR WOODWORK IN THE WICHITA KANSAS JUNIOR HIGH SCHOOLS

There has been a need in the mind of the writer for more accurate information of the testing programs of different woodwork teachers. Through the years of teaching, opportunities have arisen to visit different school shops. One of the foremost questions arising in the writer's mind was concerning the kind of testing program in effect, how it was administered and why the various tests were being given. It is hoped that this information will be given and these questions answered in this report.

Need for the Study. The need of collecting and presenting this information on the testing program is to answer any questions which may arise in the minds of those contemplating such a study. The information contained herein will be helpful to anyone interested in tests, measurements and, particularly, woodwork teachers starting out in the industrial arts field. The main purpose or need for this study is to fulfill the desire of the author and three committeemen to gain such information and present it in such a way that it will be beneficial to the industrial arts teaching profession.

Methods of Research Used. The study of books, reading research problems, collection of ready made test material was the principal source of information contained in this paper. Books written by recognized educators were used to gather the objectives and the history of tests.

Definition of Terms. The definitions given here are quoted from the writings of recognized authors in the field of tests and measurements and industrial arts.

Industrial Arts. The changes made by man in forms of materials to increase their values, and the problems of life related to these changes. (1, page 5)

Test. A test is a measuring instrument used for the evaluation of knowledge, quality, or ability. (9, page 12)

Achievement tests are those tests which measure pupils' mastery of subject matter taught in school. (2, page 14)

Prognastic Tests. These tests are intended to be used as pre-tests to determine beforehand the probable interest in, aptitude for, and likely success of an individual in the field, such as any occupational field which he contemplates entering. (3, page 175)

Diagnostic Tests. The diagnostic and analytical tests are designed to reveal specific elements of strength or weakness in learning or in teaching. (13, page 429)



Standardized Test. A test is standardized (1) if it is composed of exercises that have been selected in the light of usual teaching practice and evaluated as to innate difficulty, and (2) if it is accompanied by norms or standards permitting the interpretation of results in levels of accomplishment. (9, page 13)

Norms are representations of the typical or average performance of subjects of different age or grade groups.

Usually based on a large number of cases. (9, page 246)

Subjective. The score a student made depended very largely upon the personal opinion of the scorer and the factors which he considered essential to scoring. This method is not very accurate. (6, page 2)

Objectivity. By objectivity in a measuring instrument is meant the degree to which equally competent users get the same results. (6, page 88)

Review of Similar Studies. The author, after a study of past master's reports, books and other library sources, found that similar studies on testing and measuring educational achievement in the field of woodworking has been made by writers of woodwork books. J. H. Douglass and R. H. Roberts have worked out a testing program on their Units in Hand Woodworking.

Available Literature on Testing. A large number of books involving testing in general education was found and investigated

A large part of the basic material found in this report was taken from these books. The author found books dealing directly with testing in industrial arts and industrial education could be found only in limited numbers. Emanuel E. Ericson, Louis V. Newkirk, Harry A. Greene, John F. Friese, F. Theodore Struck, William Michaels and Ray Karnes are the leaders in this field at the present time.

Predicted Views of the Results of this Investigation.

The following outcome of this report are predicted by the author. (1) To make for better tests in the woodwork class; (2) that the information will serve as a guide; (3) that this study may inspire woodwork teachers who are not familiar with new testing techniques to examine their program for possible points of improvement.

A preliminary study of the history and development of tests and measurements in industrial arts is necessary before proceeding to the present day testing techniques.

## CHAPTER II

### HISTORY OF TESTING IN INDUSTRIAL ARTS

This chapter traces industrial arts testing through early historical times. During the early days of testing, educational measurements were very crude. The stone age man was concerned with testing in a physical sense more than in a mental one. The testing program in industrial arts made very little progress before World War I. The group tests made their appearance during the second period from 1920 to 1941. The present day testing program is characterized by advances in new techniques in the measurement of achievement and ability. There has been marked improvement concerning the proper use of all types of tests.

#### PART A

Early History of Industrial Arts Testing. There has always been some form of testing. The earliest form centered around such problems of securing food, providing shelter, and making clothing. The test of this period was the test of utility. The period of organized training came along during the ancient civilization of Babylon and the old Greeks. This was the beginning of the apprenticeship type of learning. The test at this time was based on how well the learner had learned his trade.

The first method of testing used in the classroom was oral tests which were simple tests of memory and motor processes. In medieval times, the oral examination was used in Universities. In 1219 A.D. the University of Bologna and the University of Paris required oral examinations for their graduating students.

A system of written examinations was started as early as 2200 B.C. in China for the purpose of selecting their public officials. The candidates for office were confined to isolated cells and compelled to write long papers on assigned topics. Reports or written examinations in Universities were made at Cambridge, England in 1702.

Through each period of advancement for the movement of manual and industrial education, the testing program consisted of copying and imitating models produced by the instructor, performance tests such as squaring a board. In England, the same desire for definite and objective knowledge induced Sir Francis Galton to originate the idea of using the mathematical technique in measuring human traits in his works, Hereditary Genius (1869), and Natural Inheritance (1889). The advances of Galton were followed by the work of Karl Pearson. These two movements, the German and the English, were instrumental in producing the first article published in this new field in America by James McKeen Cattell, entitled "Mental Tests and Measurements" (1890). The Sloyd system of hand training had a very marked influence in the development of manual education in America. The students of this system

worked on a series of models. Each model was detailed, not only as to dimensions, kind of wood, and tool processes involved, but for each model the educational values were clearly stated such as: training in skill, dexterity, neatness, attention, accuracy, aesthetic sense, patience, honesty, and love of labor. The Sloyd method of grading projects was the most objective method found during this period.

The idea of keeping a notebook in manual training was suggested in Ray Southworth's article in the 1910 Manual Training Magazine. The following is quoted from the article:

The notebook work should be made interesting and its value in the present making or future reference should not be underestimated by teacher or pupil. It is recommended that the notebook be used, so that the pupil, going from one school to another during his high school course or entering a higher institution after completing any high school course, may present his notebook, with the instructor's signature to the institution just entered. This evidence with some oral questioning upon the fundamental principles of the subject, should insure the students receiving full credit for work already completed and at the same time protect the institution. (12, page 237)

Standardized aptitude tests were developed by Munsterbery in 1913. These were tests for telephone girls and streetcar motormen. These aptitude tests were later followed by tests for mechanical aptitude, musical aptitude, art aptitude, and clerical aptitude. Standardized tests that could be used for industrial arts did not develop until after World War I. Six users of Standardized tests at this time are:

1. Promotion and classification of pupils.
2. Educational and vocational guidance.

3. Supervision of the instruction including the evaluation of school efficiency.
4. Rating of teachers.
5. School publicity.
6. Scientific experimentation.

In the first two of these activities the teacher has to deal with individual pupils. In the other four activities mentioned the teacher is dealing for the most part with groups of pupils.

The first objective type tests, of which there is a record, were given to a University of Missouri psychology class in 1907. About the same time, and without knowledge of the testing at the University of Missouri, Thorndike started giving objective tests to freshmen college students at Columbia University. (6, page 247)

Test making passed from the amateur to a professional basis around 1919, and there was widespread use of objective tests by 1920. From an almost obscure beginning of a relatively few tests, there are now more than fifty types of objective tests.

## PART B

Industrial Arts Testing Between World War I and World War II. The United States was faced with the urgent necessity of training a large civilian army. The existing individual tests were entirely unsuited for use. These tests were too slow as there was neither time nor examiners to test the thousands of men needed.

In 1917, a group of psychologists, including Robert Yerkee, A. S. Otis, G. M. Whipple and G. A. Yoakam met in the training school, Vineland, New Jersey, to develop the Army Alpha test which was the first group intelligence test to be published. The difficulty of time was solved because a group test could now be administered to a hundred or more individuals in the time it formerly required for measuring one individual. The Army Alpha test was used for testing men who could read and understand English. The test was made up of a series of eight tests with a series of tasks or problems in each test. These tests were planned to measure mental development through the ability to understand, to carry out instructions, to organize disarranged words to make complete meanings, to observe and detect differences and similarities, and to retain and interpret information learned through common experiences. The manual of instructions and the mechanics of the test were very simple so that any skilled examiner or teacher could, with a little study, qualify to give the tests with satisfactory results. Accompanying the Army Alpha test was the Army Beta test. This test was a non-language test used to test men who could not read or write English. This test was a performance type of test. All directions were given in spoken words or pantomime until the men understood what they were to do with the test. This type of test consisted of tracing mazes, indicating whether groups of numbers were alike or unlike, supplying missing elements in pictures and the manipulation of apparatus such as form boards.

The form boards consisted of blocks of various shapes cut out of a board and the test was to fit them in their proper place in the board. The solution of the test depended upon the actual performance with the different parts of the test and not on the linguistic ability of the men.

The army also developed a number of standardized tests for measuring trade ability. The tests were largely tests of skill and trade information. The methods of approach, the type of problems devised, methods of scoring and the ratings gave the field of manual arts an excellent key to similar research problems.

The technical department of Chicago high schools, following the war, attempted to apply some of the methods used by the army mental and trade performance tests. The functional principles and operations required in the courses of woodwork, machine shop, printing, etc., were analyzed and tests were then devised based upon the theory and practice of each of the subjects. The subject of woodwork, because of the great numbers of pupils enrolled in the course, received the greatest attention. Two types of tests were devised. A trade knowledge test and trade skill test. Both tests proved satisfactory with the exception of the trade knowledge test which proved too easy and required revision.

Although this was a great stride in testing in industrial arts, the teachers first regarded this study with suspicion. They thought that this was a procedure to show up a teacher's inefficiency and to increase his work. However, after the



tests were made and the teachers had an opportunity of assisting in scoring the papers, they soon became interested in the problem. They recognized that this type of an inventory would be of assistance to them in determining standards of attainment.

The development of standardized tests was very rapid in the period from around 1920-1941. However, as late as 1927 the scientific measurement movement had as yet scarcely made itself felt in the field of industrial arts. The difficulties of placement in the school curriculum and content of material have undoubtedly operated in the field of industrial arts. Added to these obstacles are such others as the relative emphasis that should be given in a particular subject to skills and related materials, the amount of time that should be devoted to industrial arts work, and the lack of agreement as to what standards of attainment the pupils should possess upon completion of a given unit of work.

A research in mechanical ability, carried on at the University of Minnesota in 1923-1927 was one of the several supported by the National Research Council in its studies on immigration problems. The purpose was to devise methods of prognosticating mechanical ability, and to suggest ways and means of adapting these methods to practical use in schools.

In 1927, John Stenquist developed the "Stenquist Mechanical Aptitude Tests," which were tests on mechanical things common in the experiences of most people.

G. M. Ruch published his book in 1924 entitled "The Improvement of the Written Examination" on informal tests constructed by the teachers. The informal objective tests between 1920-1936 came into such wide use that J. M. Lee and David Segel, in 1936 made a survey entitled "Testing Practices of High School Teachers." Of 1600 high school teachers, widely distributed throughout the country, 74 per cent used informal objective tests and an additional 10 per cent used a combination of the informal objectives and essay examination. This type of test was, and still is, especially useful in industrial arts in the evaluation of the classroom achievement because the content of the test parallels the subject matter taught to the class.

In 1941, the United States found itself at war, industry and the armed forces found the tests which had been developed in the past twenty years invaluable. By using the scientific measurements developed over the years, both groups were able to choose and make the best use of the individual talents of the available men and women.

#### PART C

Present Day Status of Industrial Arts Testing. The present day development of valid and reliable tests is not only the development of new tests to be used in industrial arts, but is also a better understanding of the proper use and improvement of the available tests which can be used to measure subject matter and tool skill. Whether the teacher uses standardized tests or teacher constructed tests, it is their

## CHAPTER III

### TESTS AND OBJECTIVES OF TESTING

The woodworking teacher, if he is to do a good job of teaching must have in mind at all times the objectives of industrial arts. With these definite objectives established and the course of study developed, there is a need for a testing program. This program will serve as an instrument for the purpose of determining whether the students are, in actual practice, realizing those objectives.

This section of the paper is intended to emphasize the teacher-made objective type tests which are most commonly used by the instructors of woodworking.

#### Part A

##### Test Objectives

The writer found several sets of test objectives listed in different books. Due to the scope of this paper, only those pertinent to this field were chosen.

Michaels and Karnes give their interpretations of test objectives under eleven different statements as follows:

1. The development of effective methods of thinking.
2. The cultivation of useful work habits and study skills.
3. The inculcation of social habits.
4. The acquisition of a wide range of significant interests.
5. The development of increased appreciation of music, art, literature and other aesthetic experiences.

6. The development of social sensitivity.
7. The development of better personal social adjustment.
8. The acquisition of important information.
9. The development of physical health.
10. The development of a consistent philosophy of life.
11. The development of useful manipulative skills.  
(7, page 93)

Newkirk and Greene present their objectives in the following statement:

Industrial arts teachers need reliable measuring instruments in order to give more adequate educational guidance, to evaluate personality traits, to motivate learning, to study the effectiveness of teaching material and methods, and to measure pupil progress more accurately through the establishment of more definite standards of performance and through the diagnosis of pupil difficulties. (8, page 1)

Test objectives as suggested by Hjerstedt are stated as follows:

1. To give an accurate measure of that trait which it is designed to measure.
2. To make possible a diagnosis of individual weakness and strength of pupils of the adaptability of the subject matter and of the appropriateness of the method used.
3. To stimulate proper study and habits of study.
4. To stimulate and guide proper methods of teaching.
5. To grade the schools fairly and accurately.
6. To measure the progress of pupils in their studies.
7. To measure the ability of the teacher.
8. To find a practical method of supervising study and teaching how to study.
9. Different schools can be rated more accurately by using the new method of testing.
10. To eliminate irresponsible rating, which may work serious injustice to the children.
11. To measure progress of class and individual pupils.
12. To compare classes with each other and with the standard or norm.
13. To classify pupils on the basis of ability.
14. To determine the relative merits of two methods of teaching the same subject.
15. To set up different and better grades of attainment for teachers and pupils alike.
16. To discover individual abilities and interests.  
(4, page 422)

Classification of Objective Tests. An objective test is an examination in which all the responses are either correct or incorrect with no opportunity of any subjective opinion in the scoring. Struck defines the objective test as:

An objective test is one which is free from personal judgment in scoring. It is a test so devised that the same score will be given by any competent examiner or by the same examiner at any time. (13, page 426)

Objectivity in the test may be secured by giving brief, simple, explicit directions and by furnishing a sample test question with the answer given. The phrasing should be clear and the questions should not be debatable in any way.

Since the objective form of testing permits rapid response covering a wide sampling of test material, it is advisable to limit the amount of writing that the student must do. The responses may consist of underscoring, checking, or encircling words or phrases. The response should be kept to a minimum in the completion exercises.

Types of Objective Examinations. The examinations which have been used fall into the following classifications:

- I. Recall questions:
  1. Simple recall
  2. Sentence completion
  3. Enumeration type question
- II. Recognition questions:
  1. True - false
  2. Matching

3. Multiple choice
4. Rearrangement

### III. Performance

1. Identification of tools and materials
2. Quality of work
3. Technique applied
4. Rate of progress

The type of question to be used depends on the information and manipulative ability that is to be tested. The types which best measure the different phases of information and manipulative ability should be selected.

Recall Items. The recall item is considered as that type where the student supplied the answer. The student may be required to answer by writing in a single word, figure, date, a list to enumerate, a sketch to fill in, or a paragraph to write. In the construction of the recall question the test maker should construct definite sentence statements with the central fact or word omitted. Recall exercises have great value in industrial arts to test for information.

Simple Recall. The simple recall item usually requires the student to supply a word, figure, or date. The word may come at the end of a statement, it may be an answer to a direct question, or it may be associated with another word or phrase.

## Simple Recall Sample

Your Name \_\_\_\_\_ Date \_\_\_\_\_ Score \_\_\_\_\_

Directions: Each of the statements below contains a blank at or near the end of the statement. You are to supply the missing word. Write your word in the large blank space at the left of the item. The first item is correctly answered as an example.

- o. Wood screws will enter the wood easier if they are given a coating of wax.
1. The natural color of shellac is \_\_\_\_\_.
  2. Bronze is composed of copper and \_\_\_\_\_.
  3. The operation that changes the shape or size of a hole by means of a tool pressed or drawn through it is known as \_\_\_\_\_.

Sentence Completion. The sentence completion type test is made up of incomplete statements in which important words have been omitted. The statements may be isolated and unrelated, or they may be combined to form short paragraphs that carry a continuous line of thought.

## Completion Sample

Your Name \_\_\_\_\_ Date \_\_\_\_\_ Score \_\_\_\_\_

Directions: Each of the blank spaces in the following statements indicates the place of an omitted word. Complete the meaning of each statement by writing the correct word in the corresponding numbered blank at the left. The first item is answered as an example.

(0) The best plane for planing end grain is the block plane.

1. Spirit stains are made by mixing \_\_\_\_\_ with \_\_\_\_\_.
2. To prepare weldwood glue mix it with \_\_\_\_\_.
3. The best plane for the school shop is the \_\_\_\_\_ plane.

Enumeration Question. The enumeration type of question requires the student to supply a list of terms, rules, factors, and steps, that have been taught and emphasized in a given course. It is used frequently and is often abused.

#### Enumeration Sample

List the steps of squaring a board in the order in which you have been taught.

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_
6. \_\_\_\_\_

Advantages of Recall-Type Items. The two most important advantages are: ease of construction and is applicable to any field in which achievement is being measured.

There are points that should be observed in the construction of the recall questions. According to Micheels and Karnes these points are:



situation that is either true or false. The student decides which of the two possible choices is the correct one and places his answer. The statements in the true-false test must be either true or false.

### True-False Sample

Your Name \_\_\_\_\_ Date \_\_\_\_\_ Score \_\_\_\_\_

Directions: Some of the following statements are true and some are false. If the statement is true place a (T) in the blank space at the left. If the statement is false place a (F) in the space. The first item is answered as an example.

- \_\_\_\_\_ (0) A jack plane is longer than a block plane.
- \_\_\_\_\_ 1. There are two board feet in a piece of lumber 1" x 6" x 24".
- \_\_\_\_\_ 2. To bore a  $\frac{1}{2}$ " hole in a piece of stock, use a No. 6 auger bit.
- \_\_\_\_\_ 3. A piece of lumber 2" x 6" x 24" contains four board feet.

Micheels and Karnes suggests these points to consider in constructing True-False Items:

1. Make Approximately Half of the Items True and Half False.
2. Make the Method of Indicating Responses as Simple as Possible.
3. Wherever Possible, Construct the Items to Make Application of Things Learned.
4. Do Not "Lift" Statements Directly from Books.
5. Use Direct Statements. Avoid Words with General Meanings.
6. Do Not Make the True Statements Consistently Longer than the False Statements.
7. Avoid Negative Statements.

8. Be Careful with Specific Determiners.
9. Make the Point of the Item Obvious.
10. Avoid Catch Questions.
11. If You Plan to Correct for Guessing, Be Sure to Emphasize This in the Directions.
12. Wherever Possible, Use Modified True-False Items Rather Than the Plain Type. (7, page 218)

Matching. The matching item consists of two columns of words or phrases. The student is required to match each item in one list with the item in the other list to which it is most closely related.

#### Matching Sample

Your Name \_\_\_\_\_ Date \_\_\_\_\_ Score \_\_\_\_\_

Directions: In column one is a list of machine operations that may be performed best with one of the machines or other equipment listed in column two. Place the number in the parenthesis that indicates the machine or tool to use for the operation.

Example: (4) Sawing curved edges.	4. Band saw
1. ( ) Ripping stock to width.	1. Surfacer
2. ( ) Reducing stock to uniform thickness.	2. Jointer
	3. Jig saw
3. ( ) Trueing edges of stock before gluing.	4. Variety saw

Micheels and Karnes suggests the following points to be observed in constructing matching items:

1. Have at Least Five and Not More than Twelve Responses in Each Matching Exercises.
2. Include at Least Three Extra Choices from Which Responses Must Be Chosen.

- ( ) 2. Which of the following woods is "open grained" and therefore requires past filler?
- (1) Birch, (2) Red Gu, (3) Sugar Maple,  
(4) Walnut.

The points to be observed in constructing multiple - choice items are:

1. The Stem of the Item Should Contain a Central Problem.
2. The Item Should Be Practical and Realistic.
3. The Stated Problem Should Be Specific, Clear, and as Brief as Possible.
4. Illustrations Are Sometimes Useful in Presenting the Central Problem.
5. Have at Least Four and Preferable Five Possible Answers (Choices).
6. Include No Responses That are Obviously Wrong.
7. Avoid the Inclusion of Irrelevant Clues.
8. Place the Choices at the End of the Incomplete Statement.
9. List Each Choice on a Separate Line.
10. When the Choices Include a Series of Figures, Put Them in Order.
11. Scatter the Correct Responses.
12. When a Negative Response Is Desired, Be Sure to Make This Clear.
13. Do Not Use a Multiple - Choice Item if a Simpler Type Will Be Sufficient. (7, page 193)

Rearrangement Exercises. The rearrangement test is adapted to industrial arts in testing for classification of materials according to grades or quality, order of operations. It lends itself to measuring information involving the employment of skills in sequence. (8, page 114)

Your Name \_\_\_\_\_ Date \_\_\_\_\_ Score \_\_\_\_\_

Directions: The proper steps for carrying out each job are listed below, but these steps are not in their proper order. Examine each statement carefully and determine which comes first, second, third,

Unit I

## Lumber and Lumbering

Name \_\_\_\_\_ Date \_\_\_\_\_ Score \_\_\_\_\_

Directions: Read each statement below and decide whether it is true or false. If true, circle the letter "T", if false, circle the letter "F".

- T F 1. The heartwood is found near the outside of the tree.
- T F 2. The sapwood is generally darker in color than the heartwood.
- T F 3. Softwoods are cut into standard dimensions as to thickness, width and length.
- T F 4. Air drying is the most efficient method of drying lumber.
- T F 5. Logs are thoroughly dried before they are sawed into lumber.
- T F 6. Soft woods usually grow more rapidly than hardwoods.
- T F 7. Quarter-sawed wood warps less than plain-sawed wood.
- T F 8. Trees usually make the most rapid growth in the spring.
- T F 9. Trees that shed their leaves annually are usually hardwood trees.
- T F 10. Ash is classified as a hardwood.
- T F 11. When cutting a tree, the tree will fall in the direction opposite from the notch.
- T F 12. A millpond is developed when moisture is drawn from the logs before cutting them into planks and boards.
- T F 13. Kiln dried lumber is the best for furniture construction.
- T F 14. Veneer is several sheets of plywood glued together.

- T F 15. Lumbering practices have changed very little in the last 100 years.
- T F 16. Cedar is used for lining clothes closets and chests because of its beauty.
- T F 17. The word "bird's-eye" is used to describe certain types of oak.
- T F 18. White pine is used for constructing door and window frames.
- T F 19. Cypress wood grows best in the swamplands of the United States.
- T F 20. Oak is a soft wood used for cabinet construction.
- T F 21. Maple is a hard, tough, strong wood used for furniture construction.
- T F 22. The three most common types of ash are white, green and black.
- T F 23. Birch is a hardwood of fine texture and close grain, coming primarily from the north central states and Canada.
- T F 24. Black cherry wood is found in most parts of the United States.
- T F 25. Mahogany wood is a medium hard wood used for fine furniture construction.

## Completion

Directions: In each blank space at the left, write in the word or words that will make the sentence correct and complete.

- \_\_\_\_\_ 26. The two methods of drying lumber are -----  
\_\_\_\_\_ drying and ----- drying.
- \_\_\_\_\_ 27. ----- is a wood from which a large amount  
\_\_\_\_\_ of sports equipment is made especially base-  
\_\_\_\_\_ ball bats.
- \_\_\_\_\_ 28. Large ----- saws are used to cut logs into  
\_\_\_\_\_ lumber.
- \_\_\_\_\_ 29. The part of the tree which is found between  
\_\_\_\_\_ the bark and the sapwood is called the -----.
- \_\_\_\_\_ 30. The approximate age of a tree may be  
\_\_\_\_\_ determined by counting its -----.

## Matching

Directions: Place in the parenthesis at the left the number of the word or phrases in the right hand column which is associated or related to the word in the left hand column.

- |                         |   |
|-------------------------|---|
| 31. ( ) Evergreen trees | 1. A wood having a very distinctive odor.         |
| 32. ( ) Red Cedar       | 2. A superior wood for paint and enamel finishes. |
| 33. ( ) Cypress         | 3. Softwood trees.                                |
| 34. ( ) Maple           | 4. Found largely in colonial furniture.           |
| 35. ( ) Walnut          | 5. A wood which grows in swamp lands.             |
| 36. ( ) Pine            | 6. Open-grain wood.                               |
|                         | 7. Red Wood.                                      |
|                         | 8. Wood used for boat construction.               |

## Multiple - Choice

Directions: In the parenthesis at the left, place the number of the word or phrase that gives the correct answer.

- ( ) 37. The following wood is hard from the point of use:  
(1) Cedar, (2) Poplar, (3) Redwood, (4) Maple.
- ( ) 38. From the point of use the following wood is soft:  
(1) Yellow Pine, (2) Elm, (3) Birch, (4) Poplar.
- ( ) 39. By which method are veneers produced most economically?  
(1) by slicing, (2) by rotary-cutting, (3) by sawing.
- ( ) 40. Cell formation takes place in the following part of the tree: (1) Pith, (2) Cambium, (3) Bark, (4) Wood ray.

- ( ) 41. The approximate number of uses for wood products is:  
(1) 1,000, (2) 2,500, (3) 4,500, (4) 6,000.
- ( ) 42. Kiln-dried lumber should have a moisture content of about: (1) 2 to 5 per cent, (2) 6 to 8 per cent, (3) 10 to 12 per cent, (4) 15 to 18 per cent.
- ( ) 43. How is walnut wood classified in regard to weight?  
(1) light, (2) heavy, (3) medium.
- ( ) 44. Which of the following woods is most noted for the large number of knots found in it? (1) Redwood, (2) Red Cedar, (3) Mahogany, (4) Cypress.
- ( ) 45. Which of the following woods is yellowish green in color? (1) Cypress, (2) Chestnut, (3) Birch, (4) Poplar.
- ( ) 46. Which wood would be best to use for making an archer's bow? (1) Birch, (2) Hickory, (3) Oak, (4) Maple.
- ( ) 47. Which wood is most commonly used for core stock of plywood? (1) Poplar, (2) Oak, (3) Maple, (4) Mahogany.
- ( ) 48. The following wood would be best to use when making a porch box? (1) Red Gum, (2) Oak, (3) Cypress, (4) Maple.
- ( ) 49. White pine is used extensively for: (1) Dimension material, (2) Door and window frames, (3) Shingles, (4) Furniture.
- ( ) 50. The pattern or grain of most woods is formed by:  
(1) Medullary rays, (2) Annual growth rings, (3) Knots in the trees.



Name \_\_\_\_\_ Date \_\_\_\_\_ Score \_\_\_\_\_

Directions: Read each statement below and decide whether it is true or false. If True, circle the letter "T", if false, circle the letter "F".

- T F 1. The smooth plane is larger than a jack plane.
- T F 2. The jack plane is the most commonly used plane in the school shop.
- T F 3. If the lever cap of the plane will not press down, loosen the cap-iron screw slightly.
- T F 4. Adjust the plane-iron cap closer to the cutting edge for rough work than for fine work.
- T F 5. When cutting end grain, set the plane-iron cap closer to the cutting edge than for other kinds of planing.
- T F 6. The lateral adjustment of the plane blade is controlled by the adjusting nut.
- T F 7. The first surface that is planed true and smooth is called the rough surface.
- T F 8. The block plane is most suitable for planing edge grain as well as end grain.
- T F 9. The plane iron of the circular plane resembles that of a jack plane.
- T F 10. The bevel of the plane iron should be turned up when clamping it in the plane.

## Multiple - Choice

Directions: In the parenthesis at the left, place the number of the word or phrase that gives the correct answer.

- ( ) 11. The size of a hand plane is determined by: (1) Width of blade, (2) Length of sole, (3) Length of the plane iron.
- ( ) 12. Which plane should be used for straightening the edges of long boards? (1) Smoothing, (2) Fore, (3) Jack, (4) Jointer.
- ( ) 13. Which of the following planes is the best to use in cutting dadoes? (1) Bullnose, (2) Router, (3) Block.
- ( ) 14. The plane iron should be tested for cutting levelness first by: (1) A trial stroke on the stock, (2) Sighting over sole of plane, (3) Neither of these two methods.
- ( ) 15. In which of the following planes is the bevel of the plane iron turned up? (1) Circular, (2) Block, (3) Smoothing.
- ( ) 16. To change the thickness of the shaving of a plane one would adjust the: (1) Cap-screw, (2) Adjusting nut, (3) Lateral adjusting-lever, (4) Lever cap.
- ( ) 17. When a plane is laid on the bench it should be placed: (1) On its bottom, (2) Right side up, (3) Toward the workman, (4) On its side.
- ( ) 18. The most commonly used plane in the shop is the: (1) Smooth, (2) Jack, (3) Block, (4) Jointer.

### Matching

Directions: Match the items in column B with the items in column A:

A	B
( ) 19. Body	1. Provides sidewise adjustment of the cutter.
( ) 20. Knob	2. Main mental part of the plane.
( ) 21. Frog	3. Holds the front end of the plane.
( ) 22. Lateral adjusting lever	4. For adjusting depth of cut.
( ) 23. Adjusting nut	5. Holds the back end of the plane.
( ) 24. Handle	6. Provides support for the plane iron.
	7. A rectangular slot.

### Completion

Directions: In each blank space at the left, write in the word or words that will make the sentence correct and complete.

- \_\_\_\_\_ 25. The slot through which the cutting edge of the plane iron projects is called the -----.
- \_\_\_\_\_ 26. If the jack plane cuts deeper on one side than the other, it should be adjusted with the -----.
- \_\_\_\_\_ 27. The part of the plane that clamps the plane iron in place is called the -----.

\_\_\_\_\_ 28. How many common methods are used to prevent  
splitting when planing end grain -----.

\_\_\_\_\_ 29. Three ways of testing the sharpness of the  
plane iron are:

1.

2.

3.

## Unit III

## Squaring Stock

Name \_\_\_\_\_ Date \_\_\_\_\_ Score \_\_\_\_\_

Directions: Read each statement below and decide whether it is true or false. If true, circle the letter "T", if false, circle the letter "F".

- T F 1. The first step in squaring stock is plane the working edge.
- T F 2. Warp is found by placing the piece of stock on a bench and rocking it on the high corners.
- T F 3. It is necessary to "square up" all parts of a project.
- T F 4. The marking gauge is the best tool to use when marking stock to length.
- T F 5. There are six steps in squaring stock to three dimensions.
- T F 6. Planing to thickness is the last step in squaring up a board.
- T F 7. A knife line is better than a pencil line for marking stock to length.
- T F 8. The last edge of stock should be squared before the ends are squared.
- T F 9. Stock should be removed from the vise before testing the working face.

## Multiple - Choice

Directions: In the parenthesis at the left, place the number of the word or phrase that gives the correct answer.

- ( ) 10. When sawing stock to rough length, how much waste should be left for planing to the line? (1)  $\frac{1}{8}$ ", (2)  $\frac{1}{4}$ ", (3)  $1/8$ ", (4)  $3/8$ "
- ( ) 11. The test for "wind" in stock is made by testing: (1) Diagonally, (2) Across grain, (3) With the grain.
- ( ) 12. When stock is too wide to mark to width with a marking gauge, which of these tools should be used as a guide? (1) Folding rule, (2) Framing square, (3) Straightedge, (4) Tape measure.
- ( ) 13. The third step in squaring stock is to: (1) Plane the first surface, (2) Plane the first edge, (3) Plane the first end, (4) Measure the correct length.
- ( ) 14. Which of the following is not a method for planing end grain? (1) Planing halfway from each end, (2) Bevel one corner, (3) Take very light cuts, (4) Clamp a scrap piece against one end.
- ( ) 15. When choosing the working face of a board to be planed, which of the following would indicate the working face: (1) Best flat surface, (2) Most interesting grain and free of imperfections, (3) Best working edge, (4) Best flat surface, best grain, free of imperfections.

## Rearrangement

Directions: The proper steps for carrying out each job are listed below, but these steps are not in their proper order. Examine each statement carefully and determine which comes first, second, third, etc. Place the number of the step in the parenthesis to the left of the correct statement. To square a board, the following steps are required: remember, the steps are not in proper order.

- ( ) 16. Plane a working edge.
- ( ) 17. Plane the face surface.
- ( ) 18. Plane stock to thickness.
- ( ) 19. Plane one end square with the face surface and working edge.
- ( ) 20. Plane stock to width.
- ( ) 21. Measure stock to length and plane other end.

## Unit IV

## Layout Tools

Name \_\_\_\_\_ Date \_\_\_\_\_ Score \_\_\_\_\_

Directions: Read each statement below and decide whether it is true or false. If true, circle the letter "T", if false, circle the letter "F".

- T F 1. To measure accurately, the rule should be placed on edge.
- T F 2. The sliding T bevel is used to check 90 degree angles.
- T F 3. The bench rule is the most common tool for general measuring in the wood shop.
- T F 4. The two parts of a try square are called the tongue and the handle.
- T F 5. The zigzag rule can be used for measuring long lengths when a slight variation in measurement is not too important.
- T F 6. A try square is used for checking right angles.
- T F 7. The spur of the marking gauge should be used for marking chamfers and bevels.
- T F 8. The thumbscrew adjustment of a marking gauge is found in the head of the marking gauge.
- T F 9. The framing square was designed chiefly for the use of the cabinet maker.
- T F 10. The tongue of the framing square is larger than the blade.
- T F 11. The framing square is sometimes used as a straight edge for testing surfaces.



T F 12. In marking a board before cutting to length, a line should be drawn across the face surface and another across the face edge.

T F 13. Dividers are used for laying out curves, arcs, and for transferring measurements.

### Completion

Directions: In each blank space at the left, write in the word or words that have been omitted.

- \_\_\_\_\_ 14. The tool that can be adjusted to any angle is called a \_\_\_\_\_.
- \_\_\_\_\_ 15. A common tool used almost constantly when checking stock for squareness, especially edges is a \_\_\_\_\_.
- \_\_\_\_\_ 16. The two parts of a try square are the \_\_\_\_\_ and the \_\_\_\_\_.
- \_\_\_\_\_ 17. A marking gauge should be set and then checked with a \_\_\_\_\_ before using.
- \_\_\_\_\_ 18. To use a rule for measuring accurately, place the rule on \_\_\_\_\_.
- \_\_\_\_\_ 19. For measuring longer lengths, it is better practice to measure with a \_\_\_\_\_.

## Multiple Choice

Directions: Select and place in the parenthesis at the left the number that makes each of the following statements correct.

- ( ) 20. A rule used for general measurement of small pieces is the: (1) Zigzag, (2) Bench, (3) Steel Tape, (4) Yardstick.
- ( ) 21. The framing square was designed chiefly for the use of the: (1) Cabinetmaker, (2) Carpenter, (3) Patternmaker, (4) Upholsterer.
- ( ) 22. To test and mark angular surfaces use a:  
(1) Combination square, (2) Carpenter's square,  
(3) Sliding T bevel, (4) Try square.
- ( ) 23. The smallest divisions on the blade of the try square are: (1) Sixteenths, (2) Eighths, (3) Quarters, (4) Halves.
- ( ) 24. A rule is to inches as a protractor is to: (1) Feet, (2) Degrees, (3) Yards, (4) Decimals.
- ( ) 25. For measuring long boards use the following: (1) Bench rule, (2) Try square, (3) Steel tape, (4) Marking gauge.
- ( ) 26. In scribing a circle the dividers should be set to what part of the diameter? (1) One quarter, (2) One eighth, (3) One half, (4) Three quarters.
- ( ) 27. Circles and arcs which have large radius are drawn with: (1) Bow compass, (2) Pencil compass, (3) Trammel points, (4) Dividers.

( ) 28. This symbol ( " ) is used to show: (1) Inches,  
(2) Feet, (3) Yards, (4) Parts of an inch.

29. Give the number of sixteenths of an inch in each of  
the following:

\_\_\_\_\_ a.  $1/4$ "

\_\_\_\_\_ b.  $1/8$ "

\_\_\_\_\_ c.  $1/2$ "

\_\_\_\_\_ d.  $3/8$ "

\_\_\_\_\_ e.  $5/8$ "

\_\_\_\_\_ f.  $3/4$ "

\_\_\_\_\_ g.  $7/8$ "

## Unit V

## Hand Saws

Name \_\_\_\_\_ Date \_\_\_\_\_ Score \_\_\_\_\_

Directions: Read each statement below and decide whether it is true or false. If true circle the letter "T", if false, circle the letter "F".

- T F 1. The crosscut saw usually ranges from 20 to 26 inches in length.
- T F 2. The points of the teeth of a crosscut saw are chisel shaped.
- T F 3. A 12-point saw will cut smoother than a 6-point saw.
- T F 4. Filing a saw, prevents it from binding.
- T F 5. To saw with the grain of the wood use a cross cut saw.
- T F 6. The final strokes when sawing either across or with the grain should be taken very slowly.
- T F 7. The teeth of a rip saw and those of a cross-cut saw are filed at the same angle.
- T F 8. The back saw resembles the crosscut saw in appearance.
- T F 9. The width of the saw kerf is determined by the length of the saw.
- T F 10. Long strokes should be used when starting a cut with the saw.
- T F 11. Setting a saw will prevent the saw from binding.
- T F 12. The points on the teeth of a rip saw are chisel shaped.
- T F 13. It is good practice to cut stock to length without first squaring a line across it.

- T F 14. The saw kerf should be started with the back stroke of the saw.
- T F 15. The cut should be made directly on the line when sawing stock.
- T F 16. A rip saw can be used to saw through small nails and screws.
- T F 17. There is always one more point than teeth per inch on a saw.
- T F 18. A coping saw is used to cut out curves in  $\frac{3}{4}$ " stock or thicker.
- T F 19. A keyhole saw is very similar to the compass saw.
- T F 20. Coping saw blades have ripsaw-like teeth.

#### Completion

Directions: In each blank space at the left, write in the word or words that will make the sentence correct and complete.

- \_\_\_\_\_ 21. Number 8 stamped on the heel of the saw indicates the number of ----- per inch.
- \_\_\_\_\_ 22. When the saw binds or "pinches" in the kerf, it is an indication that it needs to be-----.
- \_\_\_\_\_ 23. The crosscut saw should be kept at approximately a -----degree angle when sawing.
- \_\_\_\_\_ 24. The ----- may be used to determine whether or not the side of the saw blade and the surface of the stock are at right angles.
- \_\_\_\_\_ 25. The ripsaw should be kept at approximately a ----- degree angle when sawing.

## Unit VI

## Project Planning

Name \_\_\_\_\_ Date \_\_\_\_\_ Score \_\_\_\_\_

Directions: Read each statement below and decide whether it is true or false. If true, circle the letter "T", if false, circle the letter "F".

- T F 1. A working drawing always has three views.
- T F 2. Invisible parts on a working drawing are shown by a series of dots and dashes.
- T F 3. If the working drawing is full size, you can trace it to make the layout.
- T F 4. The front view of an object shows the height of a project.
- T F 5. It is possible to show all parts of an object in the front view.
- T F 6. When a scale of  $\frac{1}{4}$ " equals 1" is used to make a drawing, the full sized dimensions are placed on the drawing.
- T F 7. A detail drawing is used to show points and other complicated parts of a project.
- T F 8. The end view of an object is located in the lower left hand corner of the drawing.
- T F 9. The longest measurement of a piece of stock is always the length.
- T F 10. A bill of material is essential before starting a project.
- T F 11. In constructing a project it is essential that a systematic procedure be followed.

- T F 12. There are eight board feet in a piece of oak 1" x 8" x 12'.
- T F 13. The smallest division on a bench rule is 1/8".
- T F 14. You don't need to know how to read a working drawing in order to make a bill of material.
- T F 15. Dimension lines are usually placed on a drawing so that they may be read from the bottom and the right side of the drawing.
- T F 16. A board foot is a board 1 inch in thickness, 12 inches wide, and 12 inches long.
- T F 17. There are six board feet in a piece of walnut 1" x 10" x 12'.
- T F 18. The thickness of lumber is always given last when listing the dimensions of stock.
- T F 19. Plywood is sold by the board foot.
- T F 20. The formula to use when figuring board feet when the length is in inches is  $T \times W \times L$  divided by 144.
- T F 21. Design is the application of ideas and skills on materials, with tools and machines.
- T F 22. Before a student attempts to design a project, he must study and learn to recognize good design qualities.
- T F 23. Red cedar is an appropriate type of wood to use for dining room furniture.
- T F 24. It is necessary to consider the machines available for making a project before designing it.
- T F 25. A stock bill of the project is usually made before the drawing.

- T F 26. A good picture of a piece of furniture is an adequate guide to follow when making the furniture in the shop.
- T F 27. The usual height of a writing desk is 30".
- T F 28. Design is the outline, shape, or plan of something.
- T F 29. When figuring board feet, stock less than 1" is figured as 1".
- T F 30. The thickness of lumber is always given last when listing the dimensions of stock.

#### Completion

Directions: In each blank space at the left, write in the word or words that will make the sentence correct and complete.

- \_\_\_\_\_ 31. What is the formula used for finding board feet?
- \_\_\_\_\_ 32. How many board feet is a board 1" x 12" x 7'?
- \_\_\_\_\_ 33. How many board feet is a board 1" x 6" x 12"?
- \_\_\_\_\_ 34. How many board feet in a board 2" x 8" x 24"?
- \_\_\_\_\_ 35. How many board feet in 3 boards 1" x 10" x 24"?
- \_\_\_\_\_ 36. How many board feet in a board 1/2" x 6" x 8'?
- \_\_\_\_\_ 37. How many board feet in 8 boards 3/4" x 4" x 16"?
- \_\_\_\_\_ 38. How many board feet in 10 boards 3/8" x 12" x 48"?
- \_\_\_\_\_ 39. How many board feet in 7 boards 5/8" x 6" x 36"?
- \_\_\_\_\_ 40. If lumber costs \$250.00 per M, four board feet will cost.



## Matching

Directions: Place in the parenthesis at the left the number of the word or phrases in the right hand column which is associated or related to the lines in the left hand column.

- |                        |                      |
|------------------------|----------------------|
| 41. ( ) _____          | 1. Dimension         |
| 42. ( ) -----          | 2. Extension         |
| 43. ( ) _____          | 3. Invisible Outline |
| 44. ( ) _____          | 4. Center            |
| 45. ( ) _____ 3" _____ | 5. Outline           |
|                        | 6. Projection        |

## Matching

- |                              |               |
|------------------------------|---------------|
| 46. ( ) Golden rectangle     | 1. Harmony    |
| 47. ( ) Formal               | 2. Rhythm     |
| 48. ( ) Repetition of shape  | 3. Emphasis   |
| 49. ( ) Parts get along well | 4. Proportion |
| 50. ( ) Center of interest   | 5. Balance    |

## Multiple - Choice

Directions: In the parenthesis at the left, place the number of the word or phrase that gives the correct answer.

- ( ) 51. If the project does its job well, it has:  
 (1) Proportion, (2) Function, (3) Rhythm, (4) Balance.
- ( ) 52. The drawing most commonly used in the wood shop as a guide in construction is a: (1) Perspective,  
 (2) Working, (3) Oblique, (4) Machine.

- ( ) 53. In listing the size of stock on a bill of material, use the following order: (1) Thickness, length and width; (2) Width, length and thickness; (3) Thickness, width and length; (4) Length, thickness and width.
- ( ) 54. This symbol ( " ) is used to show: (1) Yards; (2) Parts of an inch; (3) Feet; (4) Inches.
- ( ) 55. A three view working drawing shows these views: (1) Front, top and right sides; (2) Front, top, and left side; (3) Front, top and bottom; (4) Front, bottom and right side.
- ( ) 56. When dimensioning circles on a drawing, which is given? (1) Radius; (2) Diameter; (3) Circumference.

#### Enumeration

57. Woodworking projects, as far as design goes, can be divided into three groups. They are:
- 1.
  - 2.
  - 3.
58. List the four principles that should be followed in good furniture design:
- 1.
  - 2.
  - 3.
  - 4.

59. List four good ways to get ideas for projects.

1.

2.

3.

4.

## Unit VII

## Wood Chisels

Name \_\_\_\_\_ Date \_\_\_\_\_ Score \_\_\_\_\_

Directions: Read each statement and decide whether it is true or false. If true, circle the letter "T", if false, circle the letter "F".

- T F 1. The size of a chisel is determined by the width of the blade.
- T F 2. When using a chisel always cut against the grain.
- T F 3. The best tool to use for pounding on a chisel is a hammer.
- T F 4. When cutting a concave curve, hold the chisel with the bevel side up.
- T F 5. Some gouges are made with the bevel on the outside.
- T F 6. The mortise chisel is made wider than the framing chisel.
- T F 7. When making vertical cuts, the bevel of the chisel should be on the waste side of the stock.
- T F 8. Chisels are sharpened in the same manner as plane irons.
- T F 9. When paring end grain a cut the full width of the chisel should be taken each time.
- T F 10. A wood chisel is sometimes used to smooth the curved edges of stock.
- T F 11. When making the cuts with a chisel for a cross lap joint, it is best to pare from both edges toward the center.

## Matching

Directions: Match the items in column B with the items in column A.

A	B
( ) 21. Chamfer	1. For bending wood
( ) 22. Bevel	2. For pounding a chisel
( ) 23. Taper	3. Paring cuts
( ) 24. Chisel	4. Shallow tray
( ) 25. Gouge	5. Legs of modern table
( ) 26. Mallet	6. Book trough
( ) 27. Form	7. Pencil gauging
	8. Carving

## Unit VIII

## Wood Bits

Name \_\_\_\_\_ Date \_\_\_\_\_ Score \_\_\_\_\_

Directions: Read each statement below and decide whether it is true or false. If true, circle the letter "T", if false, circle the letter "F".

- T F 1. Round shank bits are made to use in a hand drill.
- T F 2. A special file is used for sharpening auger bits.
- T F 3. It is best to bore a hole entirely through from one side with an auger bit.
- T F 4. The brace should be turned in a clockwise direction for boring holes.
- T F 5. When boring a vertical hole, the bit should be checked with a try square for squareness.
- T F 6. The adjustable bit used for boring holes of various diameters is called an extension bit.
- T F 7. The auger bit should be clamped in a vise when it is filed.
- T F 8. A hole that is being bored can be "straightened up" easily after the bit has entered the wood to a considerable depth.
- T F 9. There is more than one size of countersink bits.
- T F 10. Stock that cannot be reversed when using an auger bit should be backed up with a piece of scrap wood.

## Completion

Directions: In each blank space at the left, write in the word or words that will make the sentence correct and complete.

- \_\_\_\_\_ 11. The ----- bits varies in sizes by  $1/32$ ".
- \_\_\_\_\_ 12. The ----- determines the diameter of a hole bored with an auger bit.
- \_\_\_\_\_ 13. To drill the anchor hole for screws use a ----- bit.
- \_\_\_\_\_ 14. The size of an auger bit is usually found on the -----.
- \_\_\_\_\_ 15. The bit used to taper the hole for the head of a flat head screw is called a ----- bit.
- \_\_\_\_\_ 16. The number of an auger bit for boring a  $3/4$ " hole should be a number -----.
- \_\_\_\_\_ 17. "Stop boring" several holes to the same depth may be accomplished by using a -----.
- \_\_\_\_\_ 18. The part of the brace into which the tang of the bit fits, is called the -----.
- \_\_\_\_\_ 19. When a hole is completed by boring from both sides of the stock, the process is called ----- boring.
- \_\_\_\_\_ 20. A No. 5 stamped on the tang of an auger bit shows that the bit is ----- inches in diameter.
- \_\_\_\_\_ 21. A bit that is used for boring a larger hole where a smaller hole has been bored is called a ----- bit.

## Matching

Directions: Match the items in column B with the items in column A.

- | A                             | B                               |
|-------------------------------|---------------------------------|
| ( ) 22. Hand drill            | 1. Flat Head Screw              |
| ( ) 23. $\frac{1}{4}$ " size  | 2. Bore to $\frac{3}{16}$ depth |
| ( ) 24. Forstner              | 3. Auger bit                    |
| ( ) 25. Ratchet               | 4. Enlarging an existing hole.  |
| ( ) 26. No. 7                 | 5. Twist drill                  |
| ( ) 27. Depth gauge           | 6. Three-jaw chuck              |
| ( ) 28. Straight shank        | 7. Expansion bit                |
| ( ) 29. $2\frac{1}{2}$ " hole | 8. Electric drill               |
| ( ) 30. Countersink           | 9. Brace                        |
|                               | 10. No. 2                       |



## Unit IX

## Screws

Name \_\_\_\_\_ Date \_\_\_\_\_ Score \_\_\_\_\_

Directions: Read each statement below and decide whether it is true or false. If true, circle the letter "T", if false, circle the letter "F".

- T F 1. The round head screw should be countersunk.
- T F 2. The No. 7 wood screw is larger than the No. 10.
- T F 3. Screws hold better than nails.
- T F 4. Roundhead screws are usually finished a dull blue.
- T F 5. The anchor hole for flat head screws is countersunk.
- T F 6. The depth of the pilot and anchor holes combined should be less than the length of the screw.
- T F 7. The pilot hole should be bored the same size as the shank of the screw.
- T F 8. The head of the round head screw is included in its length.
- T F 9. The number of the screw indicates the diameter of the head.
- T F 10. The head of the flat head screw is included in its length.

## Multiple - Choice

Directions: In the parenthesis at the left, place the number of the word or phrase that gives the correct answer.

- ( ) 11. What length screws should be used when fastening two pieces of  $1\frac{1}{2}$ " stock together? (1) 2", (2)  $2\frac{1}{4}$ ", (3)  $2\frac{3}{4}$ ", (4)  $2\frac{7}{8}$ ".
- ( ) 12. When fastening two pieces of 1" stock together, which size screw would be best to use? (1) No. 4, (2) No. 6, (3) No. 9, (4) No. 14.
- ( ) 13. Which of the following abbreviations pertain to screws? (1) S 4 S, (2) F.H.B., (3) F & S, (4) S 2 S.
- ( ) 14. Which of these screws should be used on a finished wood surface? (1) Flat head, (2) Round head, (3) Oval head, (4) Drive screw.
- ( ) 15. When fastening a butt hinge in place, which screw should be used? (1) Flat head, (2) Oval head, (3) Round head, (4) Drive screw.
- ( ) 16. In which kind of grain does the screw have the most holding power? (1) Face, (2) Edge, (3) End.
- ( ) 17. Lag screws are driven in place with a: (1) Hammer, (2) Screw driver, (3) Wrench, (4) Mallet.
- ( ) 18. Screws are packed in pasteboard boxes containing: (1) A pound, (2) a dozen, (3) six dozen, (4) a gross.
- ( ) 19. The tool that is sometimes used to make small holes to start the bit in when drilling screw holes is: (1) Scratch awl, (2) Nail, (3) Center punch, (4) Punch.

## Completion

Directions: In each blank space at the left, write in the word or words that will make the sentence correct and complete.

- \_\_\_\_\_ 20. When two pieces of wood are to be fastened together with screws, the hole through the first piece is called the ----- hole.
- \_\_\_\_\_ 21. What is sometimes applied to threads of screws to make them drive easier? -----
- \_\_\_\_\_ 22. A screw driver bit is turned with a -----.
- \_\_\_\_\_ 23. The part of a screw on which the threads are cut is called the -----.

## Unit X

## Nails

Name \_\_\_\_\_ Date \_\_\_\_\_ Score \_\_\_\_\_

Directions: Read each statement below and decide whether it is true or false. If true, circle the letter "T", if false, circle the letter "F".

- T F 1. The box nail has a thinner head than the common nail.
- T F 2. It is best to drive nails straight into the wood rather than at a slight angle.
- T F 3. Sometimes it is necessary to bore a hole for a nail before driving it.
- T F 4. An 8-D nail is larger than a 10-D nail.
- T F 5. A casing nail has more holding power than a finishing nail.
- T F 6. It is best to drive the nails in a straight row, when nailing cleats.
- T F 7. An 8-D nail is three inches long.
- T F 8. The hammer handle should be gripped at the end, when driving brads with a hammer.
- T F 9. It is necessary to use a wood block under the head of the hammer when pulling nails.
- T F 10. It is good practice to clinch a nail with the grain.
- T F 11. Common nails are set with a nail set.
- T F 12. An 8-penny nail is  $2\frac{1}{2}$  inches long.

## Multiple - Choice

Directions: In the parenthesis at the left, place the number of the word or phrase that gives the correct answer.

- ( ) 13. The head of which of the following nails is set below the surface of the wood? (1) Casing, (2) Common, (3) Box.
- ( ) 14. Nails are usually purchased by the: (1) Thousand, (2) Pound, (3) Gross.
- ( ) 15. The face of the nail hammer should be: (1) Concave, (2) Convex, (3) Flat.
- ( ) 16. What size nails would be best to nail two 2 by 4's together when the nails are to be clinched? (1) 8-D, (2) 10-D, (3) 12-D, (4) 16-D.
- ( ) 17. Brads are small fasteners similar to: (1) Escutcheon nails, (2) Corrugated fasteners, (3) Finishing nails, (4) Common nails.

## Completion

Directions: In each space at the left, write in the word or words that will make the sentence correct and complete.

- \_\_\_\_\_ 18. The size of nails and spikes is usually indicated by the term -----.
- \_\_\_\_\_ 19. The hammer used for driving and pulling nails is called a ----- hammer.
- \_\_\_\_\_ 20. The best wood to use for hammer handles is -----.

\_\_\_\_\_ 21. The size of a nail hammer is designated by  
the weight of the -----.

\_\_\_\_\_ 22. The larger sizes of common nails are called  
-----.

### Matching

Directions: Match the items in column B with the items in  
column A.

A	B
<input type="checkbox"/> 23. Common nails	1. Rough carpentry
<input type="checkbox"/> 24. Finishing nails	2. Fine cabinet work
<input type="checkbox"/> 25. Brads	3. Packing cases
<input type="checkbox"/> 26. Escutcheon nails	4. Repair of screws
<input type="checkbox"/> 27. Corrugated fasteners	5. Small toys
<input type="checkbox"/> 28. Casing nails	6. Early American spice rack.

## Unit XI

## Scraping Tools

Name \_\_\_\_\_ Date \_\_\_\_\_ Score \_\_\_\_\_

Directions: Read each statement below and decide whether it is true or false. If true, circle the letter "T", if false, circle the letter "F".

- T F 1. A cabinet scraper is suitable for smoothing the edges of stock.
- T F 2. The scraper should be used instead of a plane.
- T F 3. When a scraper is sharp, it should take off thin shavings similar to those of a plane.
- T F 4. The file should cut only on the forward stroke.
- T F 5. The hand scraper can be either pulled or pushed when using it.
- T F 6. The cabinet scraper cuts faster than the hand scraper.
- T F 7. A bench brush should be used to clean the wood particles from the teeth of a wood file.
- T F 8. Wood files are made triangular shape the same as files used for metal.
- T F 9. The wood file is used for smoothing edges and small curves that are difficult to smooth.
- T F 10. The rasp is like the wood file except that its surface is covered with triangular shaped teeth.
- T F 11. All scraper flades are given a beveled edge when they are filed.
- T F 12. Drawfiling is accomplished by holding the file at a 45 degree angle.

## Completion

Directions: In each blank space at the left, write in the word or words that will make the sentence correct and complete.

- \_\_\_\_\_ 13. The ----- is used to remove the wood particles from the teeth of the wood files.
- \_\_\_\_\_ 14. The wood file that has a double series of teeth crossing each other at an oblique angle is called a ----- file.
- \_\_\_\_\_ 15. The ----- scraper is a thin, flexible piece of steel usually rectangular in shape.
- \_\_\_\_\_ 16. What is the name of the scraper that has a handled frame for the blade to fit into.
- \_\_\_\_\_ 17. When the teeth of the file run in parallel lines diagonally across the surface, it is known as a ----- file.
- \_\_\_\_\_ 18. The tool used for turning edges on a scraper blade is called a -----.
- \_\_\_\_\_ 19. A special file made for sharpening auger bits is called an -----.
- \_\_\_\_\_ 20. The beveled edge on the scraper blade should be filed at an angle of about ----- degrees.



## Unit XII

## Abrasives

Name \_\_\_\_\_ Date \_\_\_\_\_ Score \_\_\_\_\_

## True - False

Directions: Read each statement below and decide whether it is true or false. If true, circle the letter "T", if false, circle the letter "F".

- T F 1. Sandpaper is a good substitute for a plane.
- T F 2. Sandpaper is a paper that is covered with a thin coat of sand.
- T F 3. Flint paper is harder and sharper than granet paper.
- T F 4. End grain is sanded in one direction only.
- T F 5. To sand a concave surface, wrap the sandpaper around a stick or the handle of a tool.
- T F 6. When sanding a flat surface use a sanding block.
- T F 7. Excess glue should be removed with sandpaper.
- T F 8. Sanding is done for the purpose of forming or shaping wood.
- T F 9. It is incorrect to sand across grain of wood.
- T F 10. Sandpaper is usually sold in sheets or reams.

## Rearrangement

Directions: Place the numbers in the parenthesis to the left, or the correct answer.

11. Number these sandpapers in order from the finest to the coarsest.

- ( ) 1. No. 1/2
- ( ) 2. No. 3
- ( ) 3. No. 0
- ( ) 4. No. 6/10
- ( ) 5. No. 4/0
- ( ) 6. No. 2/0

## Completion

Directions: In each blank space at the left, write in the word or words that will make the sentence correct and complete.

- \_\_\_\_\_ 12. Steel ----- is made of thin metal shavings.
- \_\_\_\_\_ 13. ----- is a white colored powder made from lava.
- \_\_\_\_\_ 14. ----- is a reddish brown or grayish black substance that is obtained from the decomposition of shale.
- \_\_\_\_\_ 15. Another name for flint is -----.

## Unit XIII

## Holding Tools

Name \_\_\_\_\_ Date \_\_\_\_\_ Score \_\_\_\_\_

## True - False

Directions: Read each statement below and decide whether it is true or false. If true, circle the letter "T", if false, circle the letter "F".

- T F 1. The jaws of a woodworker's vise should be lined with wood.
- T F 2. The cabinet clamp and the bar clamp are the same type of clamp.
- T F 3. Corner bit braces are best for general usage.
- T F 4. The hand drill is made for heavy duty drilling.
- T F 5. When boring large holes, it is best to use a brace with a large sweep.
- T F 6. The miter box should be used for squaring ends of stock.
- T F 7. The bench hook is a device used to hang hand tools.
- T F 8. The hand drill will accommodate round shank bits.
- T F 9. The jaws of the hand screw clamps are made of steel.
- T F 10. Sawhorses are classified as holding tools.

## Completion

Directions: In each blank space at the left, write in the word or words that will make the sentence correct and complete.

- \_\_\_\_\_ 11. The metal clamp shaped like the letter "c" is called a \_\_\_\_\_.
- \_\_\_\_\_ 12. The clamp that requires both hands to adjust it is called the \_\_\_\_\_.
- \_\_\_\_\_ 13. Vises, braces and clamps are classified as \_\_\_\_\_ tools.
- \_\_\_\_\_ 14. The angle most commonly cut in the miter box is an angle of \_\_\_\_\_.
- \_\_\_\_\_ 15. The miter saw most nearly resembles the \_\_\_\_\_ saw.
- \_\_\_\_\_ 16. When gluing stock edge to edge which type clamp should be used? \_\_\_\_\_
- \_\_\_\_\_ 17. A clamp used for holding mitered frames is called a \_\_\_\_\_ clamp.
- \_\_\_\_\_ 18. A device used by carpenters and woodworkers to place stock on, to cut it roughly to size, is called a \_\_\_\_\_.
- \_\_\_\_\_ 19. Which clamp can be adjusted to the greatest length? \_\_\_\_\_
- \_\_\_\_\_ 20. When gluing stock edge to edge, which type of clamp should be used? \_\_\_\_\_

## Unit XIV

## Glues and Gluing

Name \_\_\_\_\_ Date \_\_\_\_\_ Score \_\_\_\_\_

## True - False

Directions: Read each statement below and decide whether it is true or false. If true circle the letter "T", if false, circle the letter "F".

- T F 1. When gluing boards face to face the clamps should all be installed from one edge.
- T F 2. It is best to place waste stock under the jaws of cabinet clamps.
- T F 3. Three hand screws would be sufficient to clamp two pieces of stock 2" by 6" by 4' face to face.
- T F 4. Animal glue is made from the fatty parts of the animal.
- T F 5. It is best to have the clamps adjusted before applying the glue.
- T F 6. When clamping stock edge to edge the clamps should all be placed on one side.
- T F 7. When gluing boards face to face, it is not necessary to apply glue to both surfaces of the wood.
- T F 8. A glue joint can never be as strong as the wood itself.
- T F 9. Synthetic resin glues are widely used in school shops.
- T F 10. Clamps are made chiefly to hold stock together while glue is drying.
- T F 11. Two hours is sufficient time to allow animal glue to dry.

- T F 12. For proper consistency, glue should fall from the brush in a thin stream.
- T F 13. It is advisable to rub the pieces being glued together before applying the clamps.
- T F 14. Synthetic resin glue is waterproof.
- T F 15. The same amount of pressure can be applied with the carriage clamp as with the cabinet clamp.
- T F 16. The jaws of the hand screw clamp should be in a parallel position when clamping stock face to face.
- T F 17. Most resin base glues undergo a chemical reaction while drying.
- T F 18. There is danger of applying too much pressure on the stock being glued with the cabinet clamp.
- T F 19. Glue obtains its maximum holding power by adhering to the surface of the wood.
- T F 20. A trial assembly is always made before gluing.

#### Multiple - Choice

Directions: In the parenthesis, place the number of the word or phrase that gives the correct answer.

- ( ) 21. Which of these glues should be applied while hot?  
(1) Casein, (2) Animal, (3) Fish, (4) Synthetic resin.
- ( ) 22. When gluing stock for a table top 20" by 40", how many cabinet clamps are needed? (1) Two, (2) Three, (3) Five, (4) Seven.
- ( ) 23. Which of the following glues is waterproof?  
(1) Casein, (2) Fish, (3) Animal (4) Synthetic resin.

- ( ) 24. Which of the following glues, is most often used for waterproof veneer? (1) Synthetic resin, (2) Animal, (3) Fish, (4) Casein.
- ( ) 25. The clamp used for gluing boards together for a desk top is: (1) C-clamp, (2) Cabinet, (3) Hand Screw, (4) Picture Frame.

## Unit XV

## Wood Joints

Name \_\_\_\_\_ Date \_\_\_\_\_ Score \_\_\_\_\_

## True - False

Directions: Read each statement below and decide whether it is true or false. If true, circle the letter "T", if false, circle the letter "F".

- T F 1. Joints are used in furniture construction for ornamental purposes.
- T F 2. The butt joint is more difficult to make than the rabbet joint.
- T F 3. Dowels are used in edge joints to strengthen the joint.
- T F 4. It is possible to fasten the ends of stock together with a dado joint.
- T F 5. Screws are sometimes used for holding the cross lap joint together.
- T F 6. The tenon should be made first when making a mortise and tenon joint.
- T F 7. Only two saw kerfs should be made when cutting a dado joint.
- T F 8. The difference between a rabbet joint and a dado joint is determined by their position on the stock.
- T F 9. A rabbet joint can be cut entirely with a backsaw.
- T F 10. If a dado is to be cut in  $3/4$ " stock, the dado should be made  $1/2$ " deep?
- T F 11. Several saw kerfs should be made when cutting a dado joint.



- T F 12. The ends of tenons are sometimes mitered.
- T F 13. If a joint fits too loose when it is made, it can be made strong by adding an extra amount of glue.
- T F 14. The butt joint is often used in construction of good furniture.
- T F 15. A router plane can be used when making a cross lap joint.
- T F 16. After a dado joint has been laid out, it is best to place the pieces in the position they are to fit before cutting the dado.
- T F 17. It is best to mark the width of the cross lap joint on each piece of stock separately.
- T F 18. A joint fits properly if excessive pressure on the clamps is necessary to pull it together.
- T F 19. It is best to keep the head of the marking gauge against the working face of the stock when marking for dowels.
- T F 20. Dowels for edge joints should be made slightly shorter than the total depth of both holes.
- T F 21. A dowel jig is used to reduce the diameter of a dowel.
- T F 22. It is necessary to trial-assemble doweled joints before gluing them.
- T F 23. When marking across the edges of stock to be joined with dowels, the pieces should be marked separately.
- T F 24. When joining the edges of two long boards, the ends should fit closer than the center.

- T F 25. A center line is sometimes used when laying out a mortise.
- T F 26. The bit used for boring holes for a mortise should be slightly smaller than the width of the mortise.
- T F 27. When paring the sides of a mortise 3" long, a 1/2" chisel should be used.
- T F 28. The shoulder lines for tenons should be marked entirely around the stock.
- T F 29. The thickness of a tenon should be marked before marking the shoulder lines.
- T F 30. The chisel is the first tool used for cutting the cheeks of a tenon.
- T F 31. The rabbet joint is used in simple drawer construction.
- T F 32. If a dado joint does not fit, always remove the excess stock from the other piece.
- T F 33. The miter joint is usually made at an angle of 80 degrees.
- T F 34. A spline is a thin piece of wood used to strengthen a miter joint.
- T F 35. A dado joint that is cut only partway across a board is called a bind dado.

## Multiple - Choice

Directions: In the parenthesis at the left, place the number of the word or phrase that gives the correct answer.

- ( ) 36. Dowels are usually made of: (1) Birch, (2) Ash, (3) Hickory, (4) Oak.
- ( ) 37. Which of the following joints would be best to fasten the back of a drawer to the sides? (1) Rabbet, (2) Dado, (3) Butt, (4) Miter.
- ( ) 38. Which of the following joints is best for fastening the sides of a drawer to the front? (1) Butt, (2) Rabbet, (3) Dado, (4) Dovetail.
- ( ) 39. What joint is most frequently used in making a stepladder? (1) Cross lap, (2) Butt, (3) Dado, (4) Rabbet.
- ( ) 40. What should be the diameter of dowels used in edge joints of 1" stock? (1) 1/4", (2) 3/8", (3) 5/8", (4) 7/8".
- ( ) 41. When fastening the rails to the legs of a table which joint would be the strongest? (1) Butt, (2) Blind mortise and tenon, (3) Dowel, (4) End Lap.
- ( ) 42. A good plane for trimming the bottom of a dado and lap joints is: (1) Block plane, (2) Router plane, (3) Jack plane, (4) Jointer plane.
- ( ) 43. A method used to lay out the width of a rabbet joint is called: (1) Overlay, (2) Superimposing, (3) Coverover, (4) Transposing.

- ( ) 44. The following joint is often used as a substitute for a mortise and tenon joint on a leg and rail construction: (1) Dovetail, (2) Dado, (3) Rabbet, (4) Dowel.
- ( ) 45. Which is a standard size for dowels? (1)  $7/32"$ , (2)  $9/32"$ , (3)  $3/8"$ , (4)  $14/32"$ .

#### Completion

Directions: In each blank space at the left write in the word or words that will make the sentence correct and complete.

- \_\_\_\_\_ 46. The dowel rod should be cut about \_\_\_\_\_ inch shorter than the combined lengths of the holes.
- \_\_\_\_\_ 47. The depth of a rabbet joint should be \_\_\_\_\_ the thickness of the stock.
- \_\_\_\_\_ 48. The thickness of a tenon should be \_\_\_\_\_ the thickness of the stock.
- \_\_\_\_\_ 49. Dowel rod is purchased in \_\_\_\_\_ lengths.
- \_\_\_\_\_ 50. A dado joint that is cut only part way across a board is called a \_\_\_\_\_ dado.

## Unit XVI

## Finishing

Name \_\_\_\_\_ Date \_\_\_\_\_ Score \_\_\_\_\_

## True - False

Directions: Read each statement below and decide whether it is true or false. If true, circle the letter "T", if false, circle the letter "F".

- T F 1. The finish applied to the wood tends to hide mill-marks and other defects.
- T F 3. Stain will not penetrate the glue that has been left on the wood surface.
- T F 3. It is possible to remove dents from wood surfaces ready to be finished.
- T F 4. Plastic wood is used to fill the pores of open grained wood.
- T F 5. Stick shellac can be obtained in more than one color.
- T F 6. It is sometimes best to sand across the grain of the wood when removing defects.
- T F 7. Surfaces are sometimes sponged with water before stain is applied.
- T F 8. Stain tends to bring out the grain of the wood.
- T F 9. Stains are sometimes applied to cheap woods to make them imitate more expensive woods.
- T F 10. Stain penetrates in side grain more quickly than in end grain.
- T F 11. A brush set in glue should be used for applying water stain.

- T F 12. Burnt umber is sometimes used as coloring for oil stain.
- T F 13. It is best to try stain on a piece of waste stock before applying it to the project to be finished.
- T F 14. Stain should be applied in long narrow strips rather than short wide ones.
- T F 15. One hour is sufficient time for oil stain to dry.
- T F 16. Surplus stain should be removed after it has been applied.
- T F 17. The sap streaks of a wood surface should be stained first.
- T F 18. Brush laps are more likely to show when applying water stain than oil stain.
- T F 19. Spirit stain penetrates the wood quickly.
- T F 20. All woods require a paste filler.
- T F 21. Turpentine is sometimes used to thin filler.
- T F 22. It is best to wipe off the surplus filler by rubbing across the grain.
- T F 23. Filler should be allowed to dry at least 24 hours before applying other finishes over it.
- T F 24. Furniture can be finished entirely with a shellac finish.
- T F 25. The United States produces most of the shellac that is used.
- T F 26. Two pounds of lac dissolved in one gallon of alcohol produces a good grade of shellac.

- T F 27. Shellac is a new finish that has been developed in the field of wood finishing.
- T F 28. White shellac gives a clearer finish than orange shellac.
- T F 29. Shellac is sometimes used as a sealer coat for other finishes.
- T F 30. One coat of shellac is usually sufficient for a shellac and wax finish.
- T F 31. Shellac should be applied quickly and evenly.
- T F 32. Enamel is a varnish to which a colored pigment has been added.
- T F 33. All lacquers produce a high gloss finish.
- T F 34. A sealer coat should be used before applying lacquer over paste filler.
- T F 35. Alcohol can be used as a thinner for lacquer.
- T F 36. It is possible to brush varnish longer than shellac when applying it.
- T F 37. Short strokes with the brush are better than long ones when applying varnish.
- T F 38. Lacquer thinner should be used for cleaning lacquered surfaces.
- T F 39. It is advisable to apply varnish over a wax finish.
- T F 40. A lacquered finish is more durable than a shellac finish.
- T F 41. It is necessary to rub down each coat of varnish before the next one is applied.

- T F 42. Brushing is the most satisfactory method of applying lacquer.
- T F 43. Lacquered surfaces are sometimes polished with a coat of wax.
- T F 44. Rubbing oil can be used with finishing paper for smoothing the final coat of lacquer.
- T F 45. The better grades of bristles used for making brushes are imported.
- T F 46. A good brush is important in obtaining a fine finish.
- T F 47. Shellac can be used as a wood filler on closed-grained woods.
- T F 48. The bristles of finishing brushes should touch the bottom of the container when they are suspended in a fluid to preserve them.

#### Multiple - Choice

Directions: In the parenthesis at the left, place the number of the word or phrase that gives the correct answer.

- ( ) 49. A water stain is good to use because: (1) It does not raise the grain, (2) It is expensive, (3) It has a tendency to fade, (4) It has more uniform color.
- ( ) 50. The first coat of shellac should be thinned with alcohol about: (1) one eighth, (2) one fourth, (3) one half, (4) three fourths.



- ( ) 51. Enamel is actually colored: (1) Shellac, (2) Paint, (3) Varnish, (4) Oil.
- ( ) 52. Paste filler is needed on the following wood: (1) Pine, (2) Mahogany, (3) Maple, (4) Willow.
- ( ) 53. What is added to paste filler to make it dry rapidly: (1) Silica, (2) Naptha, (3) Linseed oil, (4) Alcohol.
- ( ) 54. Shellac should be allowed to dry at least: (1) 2 hours, (2) 4 hours, (3) 6 hours, (4) 12 hours.
- ( ) 55. Which of these fillers would be best for filling defects before applying finish? (1) Putty, (2) Paste filler, (3) Colored plastic wood, (4) Glue.
- ( ) 56. When it is necessary to thin shellac, which of these thinners is best to use? (1) Alcohol, (2) Turpentine, (3) Gasoline, (4) Lacquer thinner.
- ( ) 57. Which of the following is best to use for coating knots in wood before applying a coat of paint? (1) Varnish, (2) Shellac, (3) Linseed oil, (4) Lacquer.
- ( ) 58. Which of the following stains is easiest to apply? (1) Spirit, (2) Water, (3) Oil.
- ( ) 59. What is sometimes applied to end grain of wood before applying oil stain? (1) Shellac, (2) Varnish, (3) Linseed oil, (4) Paste filler.

- ( ) 60. When brushing the following finishes to a surface which must be applied the quickest? (1) Enamel, (2) Lacquer, (3) Varnish, (4) Shellac.
- ( ) 61. What is best to use for thinning varnish? (1) Turpentine, (2) Alcohol, (3) Linseed oil.
- ( ) 62. Lacquer should be applied over a surface that has been: (1) Varnished, (2) Waxed, (3) Sealed, (4) Oiled.
- ( ) 63. Which varnish is best resisting and waterproof? (1) Spar, (2) Flat, (3) Spirit.
- ( ) 64. Wax is usually applied with: (1) a brush, (2) a cloth, (3) an airbrush.
- ( ) 65. How long does lacquer require for drying? (1) 2 hours, (2) 6 hours, (3) 12 hours, (4) 24 hours.
- ( ) 66. The nozzle of the airbrush should be kept how many inches from the surface being sprayed? (1) 6 inches, (2) 12 inches, (3) 24 inches, (4) 30 inches.

## Rearrangement

Directions: Number the following operations, used in the process of finishing woods, in their usual order of procedure.

- ( ) 67. Apply coat of shellac or sealer.
- ( ) 68. Apply coat of paste filler.
- ( ) 69. Rub down with No. 280 finishing paper.
- ( ) 70. Apply coat of stain.
- ( ) 71. Work filler into pores of wood.
- ( ) 72. Sand lightly with fine sandpaper.
- ( ) 73. Apply wax.
- ( ) 74. Rub down with No. 400 finishing paper.
- ( ) 75. Apply coat of varnish or lacquer.
- ( ) 76. Rub smooth with pumice or rottenstone and oil.
- ( ) 77. Polish with soft cotton cloth.
- ( ) 78. Remove the surplus material, rubbing across the grain.

## Matching

Directions: Match the items in column B with the items in column A.

- | A                                  | B          |
|------------------------------------|------------|
| ( ) 79. Turpentine                 | 1. Shellac |
| ( ) 80. Turpentine and Linseed oil | 2. Paint   |
| ( ) 81. Alcohol                    | 3. Varnish |
| ( ) 82. Special thinner            | 4. Lacquer |
|                                    | 5. Deft    |

## Matching

- | A                   | B                                   |
|---------------------|-------------------------------------|
| ( ) 83. Steel wool  | 1. Drippings from a pine tree       |
| ( ) 84. Linseed oil | 2. Made from flaxseed               |
| ( ) 85. Turpentine  | 3. From petroleum or paraffin       |
| ( ) 86. Pumice      | 4. Solvent from coal tar            |
| ( ) 87. Alcohol     | 5. From shale                       |
| ( ) 88. Benzine     | 6. Thin steel shavings              |
| ( ) 89. Rubbing oil | 7. From grain or synthetic material |
| ( ) 90. Rottenstone | 8. Lava powder                      |
|                     | 9. Lac bug                          |
|                     | 10. Coloring in an oil base         |

## Unit XVII

## Special Problems

Name \_\_\_\_\_ Date \_\_\_\_\_ Score \_\_\_\_\_

Directions: Read each statement below and decide whether it is true or false. If true, circle the letter "T", if false, circle the letter "F".

- T F 1. A center line is sometimes used when laying out a mortise.
- T F 2. The mortise in a table leg should run entirely to the top of the leg.
- T F 3. The shoulder lines for tenons should be marked entirely around the stock.
- T F 4. When marking the length of the first mortise on four legs of a table, each one should be marked individually.
- T F 5. If the leg of a table is 2 1/2" square, the mortise would be made in the center of the leg.
- T F 6. The bit used for boring holes for a mortise should be slightly smaller than the width of the mortise.
- T F 7. When paring the sides of a mortise 3" long, a 1/2" chisel should be used.
- T F 8. The thickness of a tenon should be marked before marking the shoulder lines.
- T F 9. The cheeks of a tenon should be cut before the shoulders.
- T F 10. The saw is the first tool used for cutting the cheeks of a tenon.

- T F 11. The most common method of cutting a mortise is with the auger bit and brace.
- T F 12. A mortise and tenon fits properly when the two parts go together with a moderate amount of pressure.

#### Multiple - Choice

Directions: In the parenthesis at the left, place the number of the word or words that gives the correct answer.

- ( ) 13. The best joint for fastening rails to legs is the:  
(1) Rabbet joint, (2) Butt joint, (3) Mortise and Tenon joint, (4) Edge joint.
- ( ) 14. In making a simple table with four legs and rails, the number of mortise and tenon joints needed is:  
(1) 4, (2) 8, (3) 10, (4) 12.
- ( ) 15. The length of a mortise should be marked with:  
(1) Try square and knife, (2) Marking gauge,  
(3) Try square and pencil.
- ( ) 16. How long should the tenon of a rail be, if it is to be fitted into a 2" leg? (1)  $3/4$ ", (2)  $1\ 1/4$ ",  
(3)  $1\ 3/4$ ", (4)  $1\ 7/8$ ".
- ( ) 17. The standard height of a dinning room table is:  
(1) 24", (2) 28", (3) 30", (4) 36".
- ( ) 18. Which of the following joints is often used for joining the front of a drawer to the sides? (1) Dado,  
(2) Dovetail, (3) Half lap, (4) Butt.
- ( ) 19. Which of the following joints is best to use when fastening the back of a drawer to the sides:  
(1) Dado, (2) Butt, (3) Rabbet, (4) End lap.

## Completion

Directions: In each blank space at the left write in the word or words that will make the statement correct and complete.

- \_\_\_\_\_ 20. The best method of permanently fastening a mortise and tenon joint is with -----.
- \_\_\_\_\_ 21. The thickness of the tenon should be ----- the thickness of the stock.
- \_\_\_\_\_ 22. The tool used as a guide for marking the shoulders of a tenon is the -----.
- \_\_\_\_\_ 23. When boring the holes for a mortise, what device may be used on the bit to bore to a uniform depth.
- \_\_\_\_\_ 24. A coat of ----- applied to the bottom edge of the drawer sides every few months will keep it working freely.
- \_\_\_\_\_ 25. A ----- joint is used to fasten the front of the drawer to the sides in fine furniture.
- \_\_\_\_\_ 26. The side members of a door frame are sometimes called -----.

## Unit XVIII

## Cabinet Hardware

Name \_\_\_\_\_ Date \_\_\_\_\_ Score \_\_\_\_\_

True - False

Directions: Read each statement below and decide whether it is true or false. If true, circle the letter "T", if false, circle the letter "F".

- T F 1. The butt hinge is an ornamental type of hinge.
- T F 2. Surface hinges are easier installed than butt hinges.
- T F 3. Strap hinges are installed like surface hinges.
- T F 4. When installing half-surface hinges, the side that is gained should be installed first.
- T F 5. Surface hinges are gained into the surface of the wood when they are installed.
- T F 6. The invisible hinge does have a loose pin, so that it may be taken apart easily.
- T F 7. The loose pin hinge should be installed in a vertical position.
- T F 8. Hasps are usually installed on outside surfaces of cabinets.
- T F 9. All pulls are made of wood.
- T F 10. Pulls are usually fastened in place with ordinary wood screws.
- T F 11. The cupboard catch is generally installed on the outside of the door.
- T F 12. It is necessary to release the friction catch before opening the door.



- T F 13. The lower rails of doors are usually made wider than upper rails.
- T F 14. The combination chest hinge does fit into the back corners of the chest.
- T F 15. The stationary side of the hinge is generally fastened to the door.

Multiple - Choice

Directions: In the parenthesis at the left, place the number of the word or phrase that gives the correct answer.

- ( ) 16. Angle irons are usually made at an angle of:  
(1) 45 degrees, (2) 60 degrees, (3) 90 degrees.
- ( ) 17. Which type of screw should be used to fasten surface hinges in place? (1) Flat head, (2) Round head,  
(3) Oval head.
- ( ) 18. The parts of a hinge are called: (1) Wings,  
(2) Plates, (3) Leaves.
- ( ) 19. Which of the following hardware is used in connection with a padlock? (1) Hasp, (2) Screw eye, (3) Catch.
- ( ) 20. What type of hinge would be best for hanging a door of a house? (1) Surface, (2) Loose pin butt,  
(3) Plain butt hinge.

## Unit XIX Curved and Irregular Designs

Name \_\_\_\_\_ Date \_\_\_\_\_ Score \_\_\_\_\_

## True - False

Directions: Read each statement below and decide whether it is true or false. If true, circle the letter "T", if false, circle the letter "F".

- T F 1. Patterns for curved designs should be drawn full size.
- T F 2. Both sides of a pattern should be laid out for a curved design.
- T F 3. It is best to lay out the squares on the pattern stock with a drawing board and T-square.
- T F 4. The first outline of the curved design should be made with heavy pencil lines.
- T F 5. When sketching an original design on pattern stock, you should use short, light strokes, instead of long, sweeping ones.
- T F 6. A center line should be placed on the stock before transferring the design from the pattern.
- T F 7. It is best to hold stock on a sawhorse when cutting curved designs.
- T F 8. When sawing out curved designs, you should saw on the line.
- T F 9. A try square can be used for testing the curved edges of stock.
- T F 10. The squares on the pattern stock should be laid out with heavy lines.

- T F 11. The coping saw is used so that it cuts on the pull stroke.
- T F 12. It is possible to use a spokeshave for smoothing curved edges of stock.
- T F 13. It is best to wrap the sandpaper around a curved block when sanding curved edges.
- T F 14. The curved sides of the wood file should be used for smoothing concave curves.
- T F 15. When smoothing curved edges, the file should be pushed straight across the grain.
- T F 16. The coping saw is used for cutting both inside and outside curves.
- T F 17. Dividers are used for laying out curves and arcs and for transferring measurements.
- T F 18. It is good practice to use a file or rasp without a handle.
- T F 19. Templates are made of thin wood, sheet metal, or cardboard.
- T F 20. Irregular designs are enlarged using squared paper.
- T F 21. The cutter blade of a spokeshave is sharpened like a plane iron blade.
- T F 22. The pin of the marking gauge is used for marking chamfers and bevels.
- T F 23. A sliding T bevel is used to check a chamfer.
- T F 24. A taper is always cut on all four sides of a tapered leg.
- T F 25. When chamfering entirely around stock, the ends should be chamfered first.

## Multiple - Choice

Directions: In the parenthesis at the left, place the number of the word or phrase that gives the correct answer.

- ( ) 26. Which of these tools is best for testing the angle of chamfers and bevels? (1) Marking gauge, (2) Foot square, (3) Try square, (4) T bevel.
- ( ) 27. The chamfer is usually made at an angle of:  
(1) 30 degrees, (2) 45 degrees, (3) 60 degrees,  
(4) 75 degrees.
- ( ) 28. Which of the following tools would be best for finishing the ends of a stop chamfer? (1) Spokeshave, (2) Smoothing plane, (3) Chisel, (4) Drawknife.
- ( ) 29. Which of the following materials would be best to use for making patterns? (1) Tin, (2) Cardboard, (3) Thin wood, (4) 3/4" White Pine.
- ( ) 30. A hexagon has the following number of sides:  
(1) Four, (2) Six, (3) Eight, (4) Ten.
- ( ) 31. In scribing a circle the dividers should be set to what part of the diameter? (1) One eighth, (2) one quarter, (3) one half, (4) Three quarters.
- ( ) 32. Circles and arcs which have large radius are drawn with: (1) Bow compass, (2) Pencil compass, (3) Trammel points, (4) Dividers.
- ( ) 33. The correct tool for cutting a chamfer is a:  
(1) Spokeshave, (2) Drawknife, (3) Plane, (4) Rasp.

## Completion

Directions: In each blank space at the left write in the word or words that will make the statement correct and complete.

- \_\_\_\_\_ 34. The geometric figure with eight equal sides is called an \_\_\_\_\_.
- \_\_\_\_\_ 35. A major and minor axis are necessary when laying out an \_\_\_\_\_.
- \_\_\_\_\_ 36. A chamfer that is cut only on the center section of an edge or end is called \_\_\_\_\_.
- \_\_\_\_\_ 37. When making the layout for a large number of parts of the same design a \_\_\_\_\_ is used.
- \_\_\_\_\_ 38. Eight sides are to an octagon as six sides are to a \_\_\_\_\_.
- \_\_\_\_\_ 39. The hand tool used for laying out a bevel is the \_\_\_\_\_.
- \_\_\_\_\_ 40. If the diameter of a circle is  $3 \frac{1}{8}$ " what must be the setting on the dividers to draw the circle?

Unit XX

Circular Saw

Name \_\_\_\_\_ Date \_\_\_\_\_ Score \_\_\_\_\_

Directions: Read each statement below and decide whether it is true or false. If true, circle the letter "T", if false, circle the letter "F".

- T F 1. Students are to use the circular saw when properly authorized to do so by the instructor.
- T F 2. All fences and tilting devices are to be securely fastened before the power is turned on.
- T F 3. The edge of the material, which will run against the fence or miter gauge, must be square and true.
- T F 4. All adjustments should be made when the saw is running.
- T F 5. There is no need for inspection by the instructor for special set-ups.
- T F 6. The saw should be operated with a dull blade.
- T F 7. The saw should be running at full speed before starting to saw.
- T F 8. Boards under 12 inches in length may be ripped on the saw.
- T F 9. Cylindrical stock is cut on the circular saw.
- T F 10. A clearance block is securely fastened to the ripping fence when using the fence as a stop for cross-cutting.
- T F 11. The operator should stand to one side when turning on the power.
- T F 12. The operator should stand directly behind the saw blade when cutting stock.
- T F 13. The saw should be overcrowded when it is used.

- T F 14. Stock is ripped without the use of the ripping fence.
- T F 15. Material should never be pulled through the circular saw.
- T F 16. The dado head should be taken off immediately after using.
- T F 17. The saw table should be cleaned off while the saw is still running.
- T F 18. The operator should not reach over the saw blade when the saw is running.

#### Completion

Directions: In each blank space at the left, write in the word or words that will make the sentence correct and complete.

- \_\_\_\_\_ 19. The blade should project how many inches above the stock to be cut.
- \_\_\_\_\_ 20. The true edge of the stock should be held firmly against the ----- when ripping stock.
- \_\_\_\_\_ 21. A circular saw that has a fixed table and an arbor that moves is called a -----.
- \_\_\_\_\_ 22. The best blade for all kinds of cutting on the circular saw is the -----.
- \_\_\_\_\_ 23. The device that holds the kerf open after the cut has been started on a circular saw is called -----.

- \_\_\_\_\_ 24. When ripping narrow stock on the circular saw,  
a ----- should be used to push the stock  
past the blade.
- \_\_\_\_\_ 25. The gauge used for crosscutting on the circular  
saw is called a -----.

#### Enumeration

26. Name nine parts of the circular saw.

- |          |          |
|----------|----------|
| a. _____ | f. _____ |
| b. _____ | g. _____ |
| c. _____ | h. _____ |
| d. _____ | i. _____ |
| e. _____ |          |



## Unit XXI

## Band Saw

Name \_\_\_\_\_ Date \_\_\_\_\_ Score \_\_\_\_\_

Directions: Read each statement below and decide whether it is true or false. If true, circle the letter "T", if false, circle the letter "F".

- T F 1. Bandsaw blades cut on the upward stroke.
- T F 2. Bandsaws are used for cutting wood only.
- T F 3. The cutting table of the bandsaw may be tilted to an angle of 45 degrees.
- T F 4. The tension adjustment on a bandsaw is made so that the various width saw blades will have the same amount of tension.
- T F 5. The band saw is used for resawing.
- T F 6. A bevel can be cut on the band saw by tilting the table.
- T F 7. Ripping can be done on a band saw.
- T F 8. Bandsaws are sometimes used for cutting mortises.
- T F 9. When cutting off the ends of cylindrical shaped stock with the bandsaw, the stock should be held in a clamp or a jig.
- T F 10. It is as easy to rip stock straight on the bandsaw as it is on the circular saw.

## Completion

Directions: In each blank space at the left, write in the word or words that will make the sentence correct and complete.

- \_\_\_\_\_ 11. Cutting thicker stock into two or more thinner pieces on the band saw is called -----.
- \_\_\_\_\_ 12. The size of a band saw is shown by the ----- of wheels.
- \_\_\_\_\_ 13. To cut a sharp curve on the band saw when the blade is wider than desired, make several ----- cuts.
- \_\_\_\_\_ 14. How high should the guide be placed above the stock to be cut -----.
- \_\_\_\_\_ 15. Name two things the operator should do when the band saw blade breaks.
- \_\_\_\_\_ 16. Does the saw blade cut on the upward or downward stroke?
- \_\_\_\_\_ 17. How far from the blade should you keep your hands while operating the handsaw?
- \_\_\_\_\_ 18. A  $\frac{3}{8}$  inch band-saw blade will cut a circle as small as ----- inches in diameter.
- \_\_\_\_\_ 19. When should one begin using a band saw after turning on the power?

## Enumeration

20. List eight principle parts of the band saw.

1.

2.

3.

4.

5.

6.

7.

8.

Unit XXII

Jointer

Name \_\_\_\_\_ Date \_\_\_\_\_ Score \_\_\_\_\_

True - False

Directions: Read each statement below, and decide whether it is true or false. If true, circle the letter "T", if false, circle the letter "F".

- T F 1. A bevel can be cut on a jointer.
- T F 2. When using a jointer, apply equal pressure with both hands throughout the cutting.
- T F 3. A chamfer can be cut on a jointer.
- T F 4. The depth of the cut is adjusted after the power is turned on.
- T F 5. The jointer must not be used for stock less than 10 inches long.
- T F 6. A push stick must be used when jointing narrow or flat stock.
- T F 7. The end grain of wood may be run over the jointer.
- T F 8. The fence must not be adjusted while the cylinder is running.
- T F 9. Special set-ups are checked by the teacher before the power is turned on.
- T F 10. The jointer is used for surfacing the working face of stock.

## Completion

Directions: In each blank space at the left, write in the word or words that will make the sentence correct and complete.

- \_\_\_\_\_ 11. What is the shortest piece of stock that should be run over the jointer.
- \_\_\_\_\_ 12. When is the depth adjustment made?
- \_\_\_\_\_ 13. What is the limit of depth that should be cut on the jointer?
- \_\_\_\_\_ 14. When should the safety shoe be used?
- \_\_\_\_\_ 15. If the material is pushed too fast across the knives, what will happen to the surface of the board?
- \_\_\_\_\_ 16. What may cause a kick back on the jointer?
- \_\_\_\_\_ 17. What is the widest cut that can be taken on an 8" jointer?
- \_\_\_\_\_ 18. If you want to joint the edge of a board on the jointer at an angle what must one do first?

## Enumeration

19. Name seven parts of a jointer.

1.

2.

3.

4.

5.

6.

7.

20. List six safety rules to be observed when using the jointer.

1.

2.

3.

4.

5.

6.

Unit XXIII

Jig Saw

Name \_\_\_\_\_ Date \_\_\_\_\_ Score \_\_\_\_\_

True - False

Directions: Read each statement below and decide whether it is true or false. If true, circle the letter "T", if false, circle the letter "F".

- T F 1. The jig saw cuts on the "up" stroke.
- T F 2. The 36" jigsaw is the most popular size.
- T F 3. When a blade is inserted in the jigsaw the teeth should be pointed down.
- T F 4. The jig saw can be used for cutting internal openings.
- T F 5. The size of a jig saw is determined by the length of the blade.
- T F 6. The most common cause of blade breakage is cutting too sharp of curves.
- T F 7. The guide should be adjusted one half inch above the thickness of the wood to be cut.
- T F 8. The speed of the jigsaw can be adjusted by shifting the belt to various pulleys.
- T F 9. The tension sleeve is mounted in the end of the overarm.
- T F 10. A jig saw may be used for cutting internal cuts.
- T F 11. It is impossible to cut a bevel with the jig saw.
- T F 12. Extreme care should be taken when operating the jig saw.
- T F 13. There are two types of blades.

Unit XXIV

Wood Lathe

Name \_\_\_\_\_ Date \_\_\_\_\_ Score \_\_\_\_\_

True - False

Directions: Read each statement below and decide whether it is true or false. If true, circle the letter "T", if false, circle the letter "F".

- T F 1. Wood turning lathes are made to run at one constant speed.
- T F 2. When turning stock on the lathe, the edge of the tool rest should be kept at least 1 inch from the edge of the stock being turned.
- T F 3. To find the centers on the ends of square stock to be turned, draw diagonals from corner to corner.
- T F 4. The live center fits into the tail stock of the lathe.
- T F 5. All cutting with the skew chisel is done with the toe of the chisel.
- T F 6. It is necessary to learn to cut both right and left handed with the skew chisel.
- T F 7. It is not necessary to have both faces of stock planed true before it is fastened on the faceplate.
- T F 8. Most stock to be turned on the faceplate should first be sawed to rough diameter on the bandsaw.
- T F 9. The large gouge is used for rough turning.
- T F 10. The live center may be set in the stock with the aid of a mallet.



- T F 11. The faceplate is fastened to the tail stock assembly when it is used.
- T F 12. To do most elementary work on a lathe, a satisfactory job can be done by scraping the surface of the wood.

#### Enumeration

13. Name six parts of the lathe.

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.

14. Name four common cutting tools used on the lathe.

- 1.
- 2.
- 3.
- 4.

Unit XXV

Drill Press

Name \_\_\_\_\_ Date \_\_\_\_\_ Score \_\_\_\_\_

True - False

Directions: Read each statement below and decide whether it is true or false. If true, circle the letter "T", if false, circle the letter "F".

- T F 1. It is important to adjust a drill press to the correct speed.
- T F 2. Work should be fastened to the table for drilling.
- T F 3. It is important to ease the pressure on the feed as the drill breaks through the under side of the work.
- T F 4. Stock that is caught in the drill should be stopped by the operator before the machine is cut off.
- T F 5. The chuck key should always be removed from the chuck before starting the machine.
- T F 6. Your eyes should always be protected from flying chips.
- T F 7. Auger bits are made to be use in the drill press.
- T F 8. A mortising attachment is used on a drill press to cut rectangular shaped openings.
- T F 9. A V-block should be used when drilling holes in a cylindrical piece of stock.
- T F 10. The drill press is used for only one operation in the wood shop.
- T F 11. A drill press in the woodworking shop should have a variable speed spindle.

- T F 12. Bits used in the drill press must have a straight shank.
- T F 13. The depth of a hole to be drilled can be controlled by using the depth gauge.

Unit XXVI

Surfacer

Name \_\_\_\_\_ Date \_\_\_\_\_ Score \_\_\_\_\_

True - False

Directions: Read each statement below and decide whether it is true or false. If true, circle the letter "T", if false, circle the letter "F".

- T F 1. The cutting head of the wood surfacer is similar to that of the wood jointer.
- T F 2. The pressure bar on the surfacer acts as a chip breaker.
- T F 3. Thin stock is sometimes planed to thickness by placing it on top of a thicker piece.
- T F 4. Both faces of stock that are warped, may be planed true on the single surfacer.
- T F 5. When planing stock to thickness on the surfacer, the final cut should reduce the stock to the exact thickness needed for the finished product.
- T F 6. Stock as short as 8 inches may be fed through the surfacer if it is fed end against end.
- T F 7. It is safe to plane several pieces of stock of unequal thickness at the same time.
- T F 8. It is safe to stand directly behind the stock being surfaced.
- T F 9. The operator should keep his hands a safe distance from the feed rolls.
- T F 10. The first surface to be surfaced on the wood surfacer is the face surface.

- T F 11. The stock should be fed into the surfacer against the grain.
- T F 12. A long board should be supported at the out feed end of the surfacer.
- T F 13. The surfacer cuts on the bottom surface of the board.
- T F 14. Fingers should not be placed underneath the stock when feeding the material into the machine.
- T F 15. Depth adjustments on the surfacer may be made without turning the machine off.

#### Enumeration

16. Name five principle parts of the surfacer.
- 1.
  - 2.
  - 3.
  - 4.
  - 5.
17. List three safety steps to be followed if a board gets stuck in the surfacer.
- 1.
  - 2.
  - 3.
18. List two reasons why the operator should not stand directly behind the machine while it is running.
- 1.
  - 2.

## CHAPTER V

### CONCLUSIONS AND RECOMMENDATIONS

This report was undertaken to gather test material for a course of study in woodworking for the junior high school. The material has been carefully selected and the tests are presented in this report.

The preceding chapters contain a history of the testing movement, a criteria of the objective tests and a statement and discussion of the problem. Statements of conclusions and recommendations will be made in this chapter.

CONCLUSIONS. It was the findings of this report that the instructor in industrial arts must have a good set of objectives in mind in order to do a good job of teaching.

The report revealed that industrial arts teachers need reliable measuring instruments in order to give more adequate educational guidance, to evaluate personality traits, to motivate learning, to study the effectiveness of teaching material and methods and to measure pupil progress more accurately. The testing program in any industrial arts class will serve as an instrument for the purpose of determining whether the students are, in actual practice, realizing those objectives.

The study showed that the completion type of objective test was the most reliable, followed respectively by the multiple-choice and true-false questions.

RECOMMENDATIONS. It is the writer's purpose in making these recommendations that it might be an encouragement to all industrial arts teachers to devise and operate a better testing program for the advancement of their students and for their own professional progress.

It is further recommended that each teacher have a definite testing program with a clear conception of its purposes, aims and what accomplishment is expected of the student.

It is recommended that the city school systems devise a course of study in woodwork, including test, projects and amount charged for certain projects, to enable a student to transfer from one school to another in the system with a minimum of difficulty. This would require less adjustment in a new environment.

Standardized aptitude tests are given today, enabling both the teacher and pupil a more definite understanding of the students needs. These tests can be used to place the student in the area in which the most accomplishment can be made.

Many of the problems relating to testing in the field of industrial arts, that have been puzzling the writer, have been solved. It is the desire of the writer that the answers and material found in this report will be of some benefit to all industrial arts teachers.

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1918, the son of Chase and Leola Wilson.

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REPORT TITLE: Testing Program Correlated with the Course  
of Study for Woodwork in the Junior High  
Schools, Wichita, Kansas

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