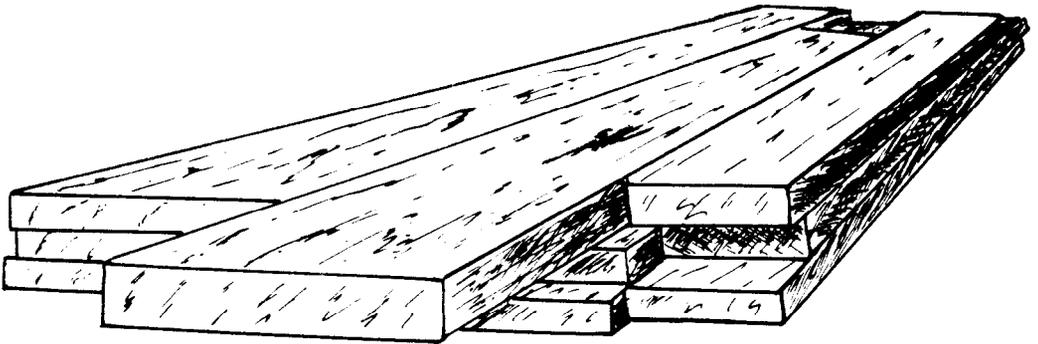
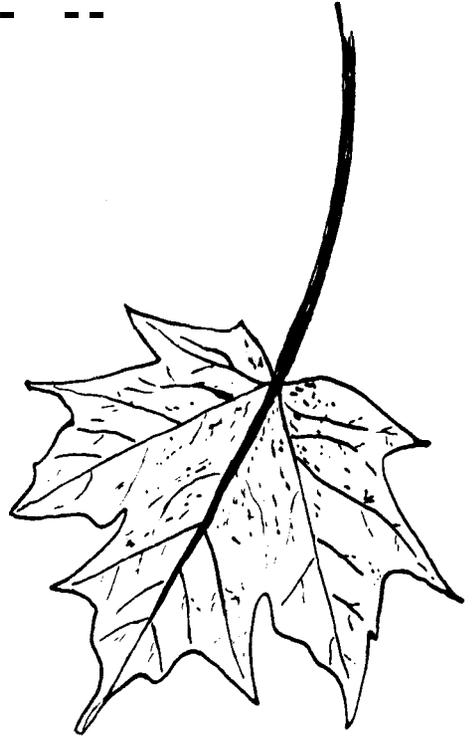


SIMPLIFIED
GUIDELINES TO- --

HARDWOOD LUMBER GRADING



BY

WALTON R. SMITH

About the author. --When this book was written, Walton Smith was Assistant Director of the Southeastern Forest Experiment Station, Forest Service, U. S. Department of Agriculture, Asheville, North Carolina. Since then he has retired from the Forest Service. He is now Forest Products Consultant, Franklin, North Carolina.

August 1967

Reprinted January 1989

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Simplified Guidelines

to ----

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Foreword

I developed this system of teaching the elements of hardwood lumber grading when I operated a hardwood lumber yard in 1950-52. It worked well with my yard hands, sawmill operators, and college students. Many people urged me to put it in print.

It was first mimeographed and used in Forest Service training courses for log grading to give a little background in lumber grading. It was later used for short-short courses in lumber grading, primarily to develop an appreciation of hardwood lumber grades.

I have had about 20 people knowledgeable in hardwood lumber grades review and give critical comments on this presentation. Practically all of their suggestions have been incorporated.

I have been advised by some that it is unnecessary to publish another simplified guide like this, but the pressure for publication has far outweighed the pressure against.

It is being published in the hope that it will be used only to stimulate interest and a general understanding of hardwood lumber grading. To become a proficient and recognized lumber grader, one must take the full training course offered by the National Hardwood Lumber Association and then serve an apprenticeship to perfect his skill.

With this explanation, I expose myself to the wrath of the professional hardwood lumber inspectors who can quote page number, verse, line, and word of every exception.

Walton R. Smith



Introduction

ALL NATIVE HARDWOOD LUMBER is graded according to the rules established by the National Hardwood Lumber Association.¹ The rules are complete and detailed so that they permit accurate lumber grading with a minimum of personal judgment. To the student lumber grader, the many fine points and exceptions by species are often confusing and hide the basic rules of standard lumber grades. This short course emphasizes the basic requirements for grading hardwood lumber on the proportion of clear pieces that can be cut from a board. Once these requirements are mastered, practice grading and continued study of the Rule Book will give the novice an appreciation of hardwood lumber grading. For information on construction grading, special grading, etc., see the Rule Book.

Many people who work with lumber every day do not know specifically how to grade it. Sawyers, edgermen, trim saw operators, cut-up men in furniture plants, lumber purchasing agents, and many others in similar positions, need to have a good knowledge of basic lumber grades, even though they may never grade a car or truck of lumber. This course is designed to simplify lumber grading to the point where many people can acquire an understanding of the grades and be able to apply standard grades to individual boards. The course is not intended to be used in training lumber inspectors or to serve as a substitute for the official rules.

¹ National Hardwood Lumber Association Rules for the Measurement and Inspection of Hardwood Lumber, Cypress Veneers, and Thin Lumber. National Hardwood Lumber Association, 59 East Van Buren Street, Chicago, Illinois. Price 50 cents. Data in this booklet based on 1965-66 issue.

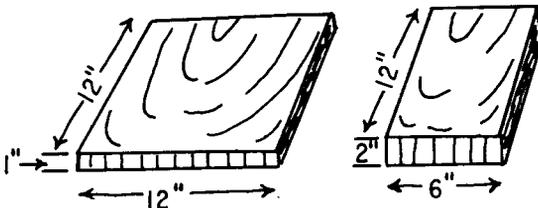
We will begin with an explanation of how lumber is measured; delve into the requirements and method of grading; discuss in some detail the standard lumber grades; and finally apply these grading principles to diagrams of boards. If the reader will master each step before proceeding to the next, he will find that he can do a fair job of grading hardwood lumber in a few hours.

Before getting into the mechanics of grading, the student should know that hardwood lumber grades are entirely different from pine lumber grades. Pine is generally used in construction in the full width, thickness, and length that it is cut at the sawmill. Because the grades are based primarily on strength, the size and distribution of knots are important. Pine is graded on the best side of the board. Hardwood lumber is generally sold to a manufacturing plant that cuts the boards into smaller pieces to make such products as furniture, boxes, and flooring. Hardwood lumber is graded primarily on the basis of the proportion of the board that can be cut in clear pieces. The board is usually graded on its worst side.

Before getting into the actual grading, we need to understand thoroughly how to measure lumber footage and how to use a lumber scale stick—so let's get on with the course.

Measuring Lumber With A Scale Stick

A lumber scale is something like a yardstick, but it is used to measure board feet rather than inches. A board foot is a piece of lumber 1 inch thick, 12 inches wide, and 12 inches long, or the equivalent.



We can find the number of board feet in any board by multiplying the thickness in inches by the width in inches by the length in feet and dividing the result by 12. For instance, if we have a board 1 inch thick, 6 inches wide, and 8 feet long, we say:

$$\frac{1 \times 6 \times 8}{12} \text{ equals } \frac{48}{12} \text{ or 4 board feet}$$

If the timber is 4 inches thick, 8 inches wide, and 16 feet long, we have:

$$\frac{4 \times 8 \times 16}{12} \text{ equals } \frac{512}{12} \text{ or } 42\text{-}2/3 \text{ board feet,}$$

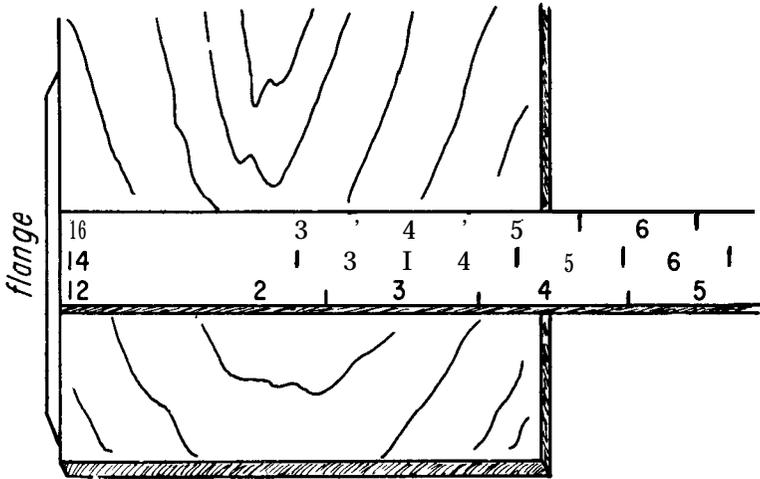
which we round off to 43 board feet.

The lumber scale stick has all this figured out for us so that we can read the answer quickly. The stick has 6 or 8 rows of figures. Each row of figures is for a different length of board. At the end of the stick opposite the handle is a metal flange with points on two ends. The points are used to stick in the edge of boards to turn them over. The flange is caught on one edge of the board so that you can read the board feet of the rule on the other edge of the board. Next to the metal flange are numbers that correspond to the length of the boards and show you which scale to read. When there are 6 scale lengths, the stick will often show 16, 14, and 12 feet on one side of the rule and 18, 10, and 8 feet on the other side. There may be as many as 5 lengths on each side of the rule.

The following drawing shows the side of a rule with the 16-, 14-, and 12-foot scales placed on top a board 4 inches wide.

If the board in this drawing is 12 feet long, it contains 4 board feet; if it is 14 feet long, it contains 5 board feet; if it is 16 feet long, it still contains 5 board feet. You will see that there are marks halfway between each of the numbers. If the edge of the board falls below the half mark, it is scaled to the lower number; if it goes above the half way mark, it is scaled to the higher number. The first board that falls exactly on the halfway mark is scaled to the higher number and the next one exactly on the halfway mark is scaled to the lower number, etc. Hardwood lumber is always scaled to the nearest board foot and never to fractions of a foot, like pine.

This lumber scale is made for 1-inch lumber. One-inch lumber is referred to in the trade as 4/4 (four-quarter) and is the standard. Other thicknesses are given in quarter-inch variations with the



denominator always remaining as 4. If you are measuring $5/4$ lumber, you must multiply the scale obtained with the stick by 1.25, for $6/4$ lumber you multiply by 1.50, for $8/4$ by 2.0, etc.

Because some companies buy green lumber and others buy dry lumber, there are different lumber scales for each, and you should be sure to use the correct scale stick. This is easy to determine because the marks on a dry lumber scale for a 12-foot board are exactly 1 inch apart, just like a standard yardstick. The green rule, however, allows for shrinkage and the marks for a 12-foot board are slightly longer than 1 inch. Thus, 12 board feet will be at a point slightly more than 12 inches from the metal flange.

A good lumber grader can use a lumber scale stick for months without breaking it; a novice will break scale sticks frequently. You should keep the point on your scale stick filed bluntly so it will grab the edge of the board for turning, and the edge of the flange sharp enough to scrape defects or stained lumber to determine extent or depth. Always keep the stick in straight tension and never put it in a twist. Part of your training is in the proper use and care of the scale stick.

Cuttings-What Are They?

We now know that most hardwood lumber is sold to a factory, where it is cut into smaller pieces. This is usually done in two different operations; one with a crosscut saw and one with a rip saw. The following drawing shows how a man in a furniture plant might crosscut a board first and then rip it to get clear cuttings. The round solid circles represent knots, and the dashed lines represent the saw cuts.

Lumber Thickness

Hardwood lumber must be dried to the thickness called for. In other words, 4'4" hardwood lumber must be a full inch thick when it is dry, or it is scaled at the lesser thickness. Since many plants cannot use the lesser thickness, the board is thrown aside as too thin to be included in the sale. Furthermore, a hardwood lumber board from 1 to 1-3/4 inches thick (4/4 to 7/4) must not vary more than 1/4 inch between its thickest and thinnest points or it is classified as a miscut. Saw mills must cut hardwood lumber thicker to permit shrinkage during drying. Circle saw mills should cut inch lumber 1-1/8 inches thick to allow for shrinkage and sawing inefficiencies. Band saw mills are generally more accurate, and a good band mill can saw lumber 1-1/16 inches thick and still have a full inch of dry lumber.

A good lumber grader will have some type of thickness gauge for green and dry lumber, and he will use it frequently to check for thick or thin spots on questionable boards. Thin spots are permitted if they do not occur in the cuttings used to determine the grade of the board.

Standard Hardwood Lumber Grades

The standard grades for hardwood lumber are as follows:

- Firsts
- Seconds
- Selects
- No. 1 Common
- No. 2 Common
- Sound Wormy
- No. 3A Common
- No. 3B Common

As we get further into grading, you will see that there are certain combinations and variations in the standard grades. For instance, Firsts and Seconds are practically always combined and referred to as FAS. So, we will not consider them separately here. In yellow-poplar, we have a special grade called SAPS that is often used in place of Selects. Also in yellow-poplar, No. 2 Common is divided into No. 2A and No. 2B, the only difference being that No. 2A requires Clear Face Cuttings, whereas No. 2B requires only Sound Cuttings. Gums, cottonwoods, and other soft hardwoods have only sound cuttings in No. 2 Common, and the No. 2A grade is not recognized. Sound Wormy is a grade used for species where insect damage is prevalent. In many cases, the terms WHND (worm holes no defect) and WHAD (worm holes a defect) are used in connection with other Standard Grades rather than using the Sound Wormy grade.

With this general information, it is now possible for us to take the Standard Grades one by one and examine the grade requirements. It makes it easier if you actually have several boards of each grade to practice on.

FAS Grade

The FAS grade is really two grades: Firsts and Seconds. Many years ago, when there were still virgin forests and a lot of high quality lumber, a sawmill operation developed a considerable volume of Firsts and Seconds lumber. Unfortunately, the timber we have left today is practically all second growth, and we are in such a hurry to cut it that we don't let it grow big enough to develop much Firsts or Seconds. So we now combine these two top grades into one grade, FAS.

Length

To make the FAS grade: a board must be at least 8 feet long, and it can be up to 16 feet long. In a lot of lumber, you may have up to one-half of the boards in odd lengths; that is, 9, 11, 13, and 15 feet long. Most companies, however, prefer to get their lumber in even lengths of 8, 10, 12, 14, and 16 feet, so that it can be properly and evenly stacked for air seasoning or kiln drying.

Width

Lumber must be at least 6 inches wide to make the FAS grade. Some sawmill men who are used to sawing pine waste a lot of hardwood lumber by edging it to even widths of 4, 6, 8, and 10 inches. Hardwood lumber should be edged to remove bark or other defects, but not just to reduce its width to even inches. Remember that in scaling lumber we measure the board feet to the nearest foot. So, if you are a sawmill operator, *do not* edge your lumber to the even inch as you do in pine.

Heartwood Requirement

The standard FAS grades do not have any heartwood requirement, but certain species, such as poplar, redgum, cherry, walnut, and others, do require percentages of heartwood.

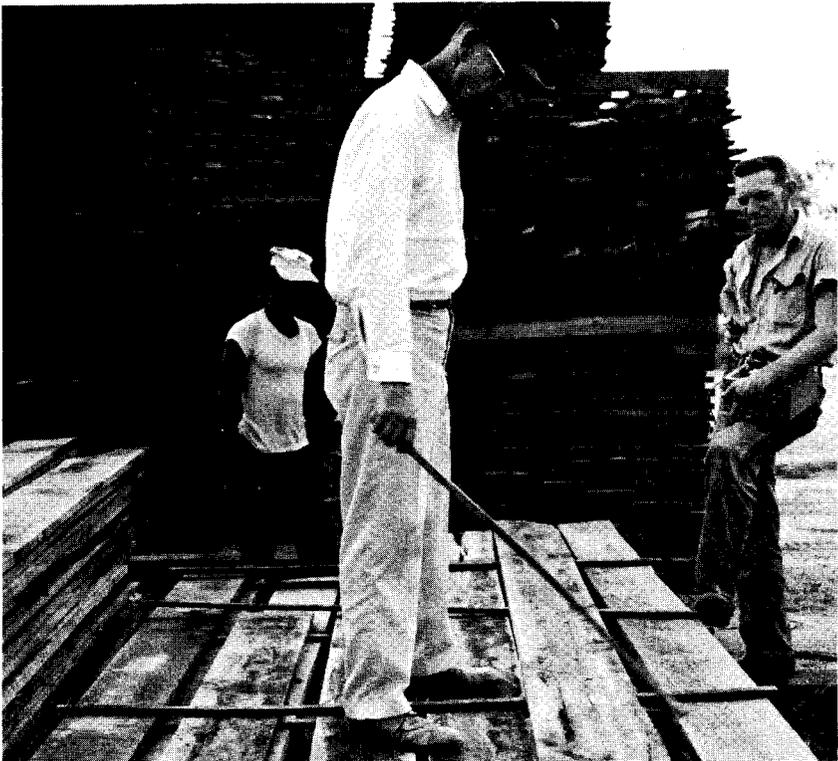
Heartwood is usually easy to distinguish. Heartwood of poplar, for instance, is usually yellow, but may be purple, pinkish, greenish, or a variety of other colors. Other species have similar distinctions. The old virgin poplar is almost all heartwood and is noted for its soft texture and ease of working. It is much desired, and the FAS grade requires that boards 8 inches and over contain 66-2/3 percent heartwood on one side and 50 percent heartwood on the other.

Size of Cuttings

We have described cuttings and differentiated between Clear Face and Sound cuttings. Now we will see how they are used in determining lumber grade. The FAS grade requires that the cuttings must be Clear Face and that each one must be at least 4 inches wide and 5 feet long or 3 inches wide and 7 feet long.

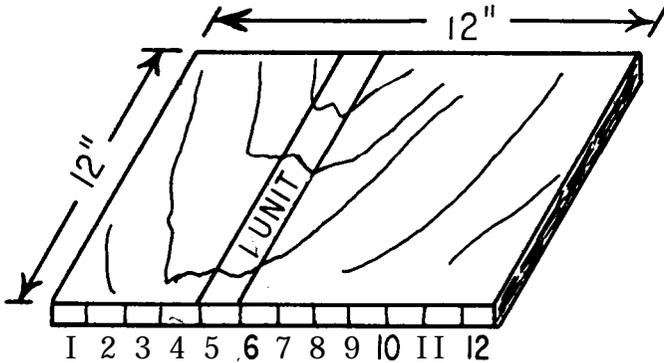
Number of Cuttings Allowed

There is a limit to the number of cuttings permitted, depending on the size of the board. First, determine the surface measure (SM) of the board. If the board is 1 inch thick, the surface measure will be the same as the number of board feet in the board. If the board is more than 1 inch thick, multiply the width of the board in inches by the length in feet and divide the result by 12. The simplest way to determine the SM is to use a lumber scale stick and figure the board feet as if the board were only 1 inch thick; your answer will be the SM.

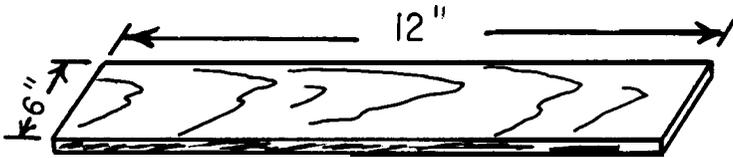


To find the number of cuttings allowed in FAS, divide the SM by 4 and drop all fractions. For example, if a board is 9 inches wide and 12 feet long, it will have a surface measure of 9. Divide 9 by 4 and the answer is 2-1/4. We drop the fraction and find that we can have only 2 cuttings in this board to get an FAS grade.

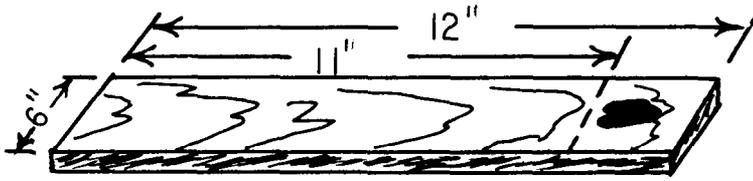
Amount Required in Clear Face Cuttings



To determine whether a board has the required proportion of clear face, we use a system of units based on 1/12 of a square foot, surface measure. Each surface foot, of course, contains 12 units, each of which is 12 square inches. We find out how many units are in a board by multiplying its width in inches by its length in feet. A board 6 inches wide by 12 feet long has 72 units. If the board is perfectly clear with no defects, it has 12/12 of its surface clear. If it meets the heartwood requirements, it will classify as FAS.



What if this board had a 1-inch knot 1 foot from the end of the board? Then we could figure that the board contained 1 clear face cutting, 6 inches wide and 11 feet long. This cutting would have 6 x 11 or 66 units. Would this be enough to make 10/12 and give us an FAS board? There is a simple way to find out. When we want to find out how many units we must have to make 10/12, all we have to do is to multiply 10 by the surface measure of the board. In this,



case the surface measure is 6, 10 times 6 gives us 60, the number of units we must have to make an FAS board. Since our clear face cuttings figured 66 units, it will make the FAS grade.

Pith

The length of the pith, either showing on the surface or boxed in, can be no longer in inches than the surface measure (SM) of the board in feet.

Wane

Bark, or the lack of wood on the edge, is referred to as wane. In FAS, it is limited to $1/12$ of the SM of the board, and it must be less than $1/2$ the length of the piece in total on either or both edges.

Splits

Splits are limited in aggregate length in inches to 2 times the SM in feet. Also, if they are more than 12 inches long, they cannot have a slope of grain of more than 1 to 12.

Knots or Holes

These defects are limited in size to a diameter in inches of $1/3$ the SM.

Warp and Cup

Warp defects are not permitted if they are great enough to prevent dressing on two sides to standard thicknesses. Slightly cupped or warped boards more than 12 inches wide may be included, provided they can be ripped to produce two FAS boards that can be dressed on both sides to standard thickness.

End Defects

The ends of FAS boards must have at least 50 percent clear face within 1 foot of ends, and they cannot have more than 25 percent unsound wood or wane. Thus, it is easy to see why a good job of end trimming can be most important in the production of FAS lumber.

After getting the FAS grade firmly fixed in mind, you will find that the other grades come much easier.

Select Grade

As we said before, hardwood lumber is graded from the poorest side, with a few exceptions. The Select grade is one of these exceptions. Many boards may have one good side that can be used advantageously for many products, such as wall paneling. Thus, the Select grade was developed to take care of these valuable boards. Generally speaking, a Select board is FAS on the good face and No. 1 Common or better on the poor face.

Length

Select grade allows boards from 6 to 16 feet long. Note that the minimum length is 2 feet less than that permitted in FAS.

Width

Lumber must be at least 4 inches wide to make select grade. This is another change from FAS grade, where width must be 6 inches.

Size of Cuttings

The Select grade requires that cuttings be at least 4 inches wide by 5 feet long or at least 3 inches wide by 7 feet long.

Number of Cuttings Allowed

As in the FAS grade, the number of cuttings permitted is determined by dividing the surface measure (SM) by 4 and dropping the fractions.

Amount Required in Clear Face Cuttings

Here is the big difference in the FAS and Select grades. We can qualify a Select board by either of two ways:

- (a) The good face will grade FAS with the reverse side of the cuttings sound. (Note that the poor side does not have to meet any special grade requirement here.)
- (b) The good face will grade FAS with the poor face grading No. 1 Common or better. The back side of the cuttings do not have to be sound.

Edge Requirements

Boards that are 4 and 5 inches wide can have wane on either or both edges up to $\frac{3}{4}$ the thickness, $\frac{1}{3}$ the width, and $\frac{1}{2}$ the length in total. Boards that are 6 inches and wider with a surface measure of 4 feet or more on the No. 1 Common side cannot have

wane exceeding $1\frac{1}{4}$ the width by $\frac{3}{4}$ the length in total. Width of the wane can be divided and show on both edges.

No. 1 Common Grade

The No. 1 Common grade is where the money is in the lumber business. A company that can get a preponderance of No. 1 Common can be in a good financial position. If the logs available are 14 inches and over, if the sawmill is properly maintained, and if care is used in turning the logs on the carriage in order to get the best grade possible, a lot of No. 1 Common can be produced. The requirements of No. 1 Common are not so stiff, and here they are.

Width

Boards must be 3 inches wide or more.

Length

Boards can be from 4 to 16 feet in length.

Size of Cuttings

Cuttings must be at least 4 inches wide by 2 feet long or 3 inches wide by 3 feet long.

Number of Cuttings Allowed

To determine how many cuttings you can have in a No. 1 Common board, take the SM and add 1, divide this by 3 and drop all fractions. For example, a board 9 inches wide and **12** feet long has an SM of 9. If we add 1 and divide by 3, we get $3\frac{1}{3}$, which means the board could have 3 cuttings. The most cuttings you can have in a No. 1 Common board of any size are 5.

Amount Required in Clear Face Cuttings

To make the No. 1 Common grade, you must get $\frac{8}{12}$ of the board in clear cuttings. As described under the FAS grade, the cuttings are figured in units, and you can find out how many units you need by multiplying the SM by 8.

Perhaps at this point it is time to admit that this course has oversimplified the required cutting yield to get you thinking on the right track. A study of the rules will show you that sometimes you must get more than $\frac{8}{12}$ in clear face cuttings. For instance, a board with an SM of only 1 foot must be 100 percent clear, with only **2** feet SM, it must be $\frac{9}{12}$ clear, and with boards of 3 to 7 feet SM, you can have an extra cutting if you can get $\frac{9}{12}$ clear face cuttings. Although these variations affect only a small percentage of the boards graded, they can be important. You will learn

SIMPLIFIED HARDWOOD STANDARD LUMBER GRADES

	FAS	SELECTS	1 COMMON	2 COMMON	3 A	3 B
WIDTH	6" +	4" +	3" +	3" +	3" +	3" +
LENGTHS	8' - 16'	6' - 16'	4' - 16'	4' - 16'	4' - 16'	4' - 16'
No. of cuttings allowed	$\frac{SM}{4}$	$\frac{SM}{4}$	$\frac{SM+1}{3}$ (not over 5)	$\frac{SM}{2}$ (not over 7)	No limit	No limit
Minimum size of cuttings	4" X 5' or 3" X 7'	4" X 5' or 3" X 7'	4" X 2' or 3" X 3'	3" X 2'	3" X 2'	1-1/2" X 2'
Amount required CF cuttings	10/12	10/12 FAS good side-- 1 Corn. or better on poor side	8/12	6/12	4/12	3/12 (sound cuttings)
PITH	Length in inches no greater than SM	Same as FAS	1/2 the length	No limit	No limit	No limit

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For definitions see instructions

Extra requirement. for FAS and Selects:

Split, - Can be up to 2 x SM in inches length.

Wane - Can be up to 1/12 SM total and must be less than 1/2 length of piece on either edge.

Maximum size of knot or hole - 1/3 SM in inches.

End defects - at least 50% clear face, maximum of 25% unsound wood or wane.

For definitions see instructions

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LENGTHS	8' - 16'	6' - 16'	4' - 16'	4' - 16'	4' - 16'	4' - 16'
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PITH	Length in inches no greater than SM	Same as FAS	1/2 the length	No limit	No limit	No limit

SIMPLIFIED HARDWOOD STANDARD LUMBER GRADES

	FAS	SELECTS	1 COMMON	2 COMMON	3 A	3 B
WIDTH	6" t	4" +	3" +	3" +	3" t	3" +
LENGTHS	8' - 16'	6' - 16'	4' - 16'	4' - 16'	4' - 16'	4' - 16'
No. of cuttings allowed	$\frac{SM}{4}$	$\frac{SM}{4}$	$\frac{SM+1}{3}$ (not over 5)	$\frac{SM}{2}$ (not over 7)	No limit	No limit
Minimum size of cuttings	4" X 5' or 3" X 7'	4" X 5' or 3" X 7'	4" X 2' or 3" X 3'	3" X 2'	3" X 2'	1-1/2" x 2'
Amount required CF cuttings	10/12	10/12 FAS good side-- 1 Com. or better on poor side	8/12	6/12	4/12	3/12 (sound cuttings)
PITH	Length in inch-e. no greater than SM	Same as FAS	1/2 the length	No limit	No limit	No limit

SIMPLIFIED HARDWOOD STANDARD LUMBER GRADES

	FAS	SELECTS	1 COMMON	2 COMMON	3 A	3 B
WIDTH	6" +	4" +	3" +	3" t	3" t	3" +
LENGTHS	8' - 16'	6' - 16'	4' - 16'	4' - 16'	4' - 16'	4' - 16'
No. of cuttings allowed	$\frac{SM}{4}$	$\frac{SM}{4}$	$\frac{SM+1}{3}$ (not over 5)	$\frac{SM}{2}$ (not over 7)	No limit	No limit
Minimum size of cuttings	4" x 5' or 3" x 7'	4" x 5' or 3" x 7'	4" x 2' or 3" x 3'	3" x 2'	3" x 2'	1-1/2" x 2'
Amount required CF cuttings	10/12	10/12 FAS good side-- 1 Com. or better on poor side	8/12	6/12	4/12	3/12 (sound cuttings)
PITH	Length in inches no greater than SM	Same as FAS	1/2 the length	No limit	No limit	No limit

For definitions see instructions

Extra requirements for FAS and Selects:

Splits - Can be up to 2 x SM in inches length.

Wane - Can be up to 1/12 SM total and must be less than 1/2 length of piece on either edge.

Maximum size of knot or hole - 1/3 SM in inches.

End defects - at least 50% clear face, maximum of 25% unsound wood or wane.

For definitions see instructions

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to apply these exceptions easily, however, as you pick up experience and study the rule book.

Pith

One other requirement that needs to be considered in No. 1 Common grade is the amount of pith permitted. You cannot have pith for more than one-half the length of the board. Although this keeps a lot of boards from making the No. 1 Common grade, it is a reasonable requirement. A trip through a seasoning yard, for example, will reveal that the boards that have pith for half the length or more will invariably split wide open from end to end. You may have noticed boards of poplar, walnut, oak, and other species curl away from the saw. This indicates they have a lot of internal stress, which is one of the things that causes lumber to pop open along the pith.

No. 2 Common Grade

The No. 2 Common grade of lumber requires you to obtain half of the board in clear face cuttings. In the Southeast, the furniture industry is the largest user of hardwood lumber, and the species most in demand for this industry is yellow-poplar. Because much of this poplar is used as core stock between veneers, sound knots can be tolerated. Thus, the No. 2 Common grade for yellow-poplar has been subdivided into 2A and 2B, the difference being that 2A requires clear face cuttings and 2B requires only sound cuttings. Other requirements for No. 2 Common lumber are standard.

Width

Boards must be 3 inches or wider to make No. 2 Common.

Length

Boards in No. 2 Common can be 4 to 16 feet long.

Size of Cuttings

In the No. 2 Common grade, cuttings must be at least 3 inches wide and 2 feet long.

Number of Cuttings Allowed

To determine how many cuttings you are allowed in a No. 2 Common board, take the surface measure of the board and divide it by 2 and drop all fractions. For instance, a board 10 inches wide and 12 feet long has a surface measure of 10. Divide 10 by 2, and the answer is 5, the number of cuttings allowed. The maximum number of cuttings allowed in a No. 2 Common board is 7.

Amount Required in Clear Face Cuttings

The No. 2 Common grade requires that you get 6/12 of the board in cuttings, *clear cuttings* for 2A and *sound cuttings* for 2R. As in the other grades, the cuttings are figured in units, which you determine by multiplying the surface measure of the board by 6.

Sound Wormy Grade

Sound Wormy is a standard grade that permits cuttings to have worm holes, bird peck, stain, and sound knots not over 3/4 inch in diameter. With these exceptions, the board must grade No. 1 Common or better.

Lumber may also be graded by a combination grade that permits Sound Wormy exceptions but maintains other requirements of the standard grades.

As mentioned previously, the exceptions for WHND and WHAD can also be added to the standard grade, and then worm holes, bird peck; and streaks are the defects allowed or rejected in the cuttings.

No. 3 Common Grade

The No. 3 Common grade is divided into grades 3A and 3B. Although the grade is considered practically cull lumber for furniture use, some No. 3A Common of high value species, such as walnut, oak, and hard maple, is used in furniture plants. The grade does find wide use for flooring, containers, pallets, dunnage, and similar products.

Width

Boards must be 3 inches wide to make No. 3 Common.

Length

Boards must be 4 to 16 feet long to make No. 3 Common.

Size of Cuttings

Cuttings must be 3 inches wide by 2 feet long for No. **3A** Common. A cutting for No. 3B Common must be at least 1-1/2 inches wide and contain 36 square inches. This is the only instance in which length of cutting is not specified.

Number of Cuttings Allowed

There is no limit on the number of cuttings you can have in the No. 3 grade.

Amount Required in Clear Face Cuttings

To obtain a No. 3A grade, you must be able to obtain 4 12 of the board in clear face cuttings. The units in a cutting are figured in the same way as in the other grades. You determine how many units are needed in a board by multiplying the SM by 4.

In the 3B Common grade, you need only 3 12 of the board in sound cuttings.

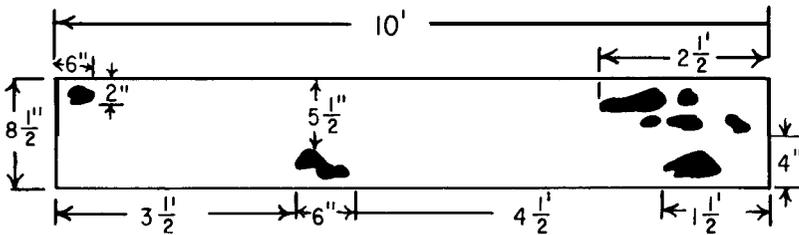
Any lumber that will not make 3B is tallied and reported as below grade.

Tally Card Summary

To help you in practice grading, we've summarized the most important information on tally cards like the one shown here. A supply of cards is attached.

Grading a Board

Now, let's use the card and our previous instructions and grade a board. See if you can do it without looking at the answer. Remember-try to get as much clear material into the fewest clear cuttings as possible. The sketch shows a board that is 1 inch thick. It is not drawn to scale, so we've added the dimensions needed. Select the highest possible grade you think the board might make, and then figure the cuttings to meet the specifications of that grade. If you can't meet the requirements, try the next lowest grade. If the board makes the chosen grade easily, perhaps you picked one too low. Try to make the next highest grade.



Answer

First, of course, you determine the board feet by using the scale stick or by multiplying it out: $\frac{T'' \times W'' \times L'}{12}$ or $\frac{1 \times 8.5 \times 10}{12} = 7$

2. Determine the surface measure in the board. For a 1-inch-thick board, it is equal to the number of board feet:

$$\frac{W'' \times L'}{12} = \frac{8.5 \times 10}{12} = 7$$

SURFACE MEASURE

FIRST and SECONDS

BOARD MUST BE 31NCHES OR OVER IN WIDTH

SIMPLIFIED HARDWOOD STANDARD LUMBER] GRADES

	FAS	SELECTS	1 COMMON	2 COMMON	3 A	3 B
WIDTH	6" t	4" +	3" t	3" +	3" +	3" t
LENGTHS	8' - 16'	6' - 16'	4' - 16'	4' - 16'	4' - 16'	4' - 16'
No. of cuttings allowed	$\frac{SM}{4}$	SM 4	$\frac{SM + 1}{3}$ (not over 5)	$\frac{SM}{2}$ (not over 7)	No limit	No limit
Minimum size of cuttings	4" x 5' or 3" x 7'	4" x 5' or 3" x 7'	4" x 2' or 3" x 3'	3" x 2'	3" x 2'	1-1/2" x 2'
Amount required (CF) cuttings	10/12	10/12 FAS good side-- 1 Com. or better on poor side	8/12	6/12	4/12	3/12 (sound cuttings)
PITH	Length in inches no greater than SM	Same as F A S	1/2 the length	No limit	No limit	No limit

16

CLEAR FACE

TEN-TWELFTHS OF BOARD MUST BE IN CLEAR FACE CUTTINGS

BOARD MUST BE 4 TO 16 FEET IN LENGTH

3. Determine the number of units in the total board:

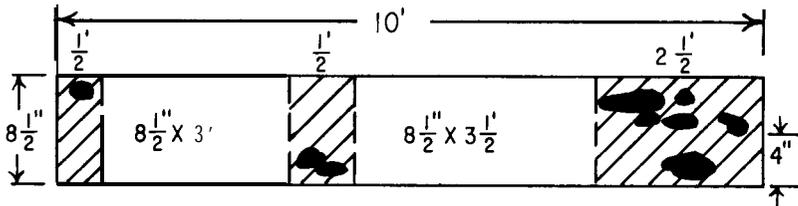
$$W \text{ " } \times L' \text{ or } 8.5 \text{ " } \times 10' = 85 \text{ units.}$$

4. Pick a grade you think the board will make a No. 1 Common perhaps?

5. Let's look at the tally card and see what it takes to make a No. 1 Common.

- Board must be at least 3 inches wide--that's 0. K.
- Board must be 4 feet to 16 feet long—it meets that specification.
- Number of cuttings allowed is $\frac{SM + 1}{3}$ or $\frac{7 + 1}{3} = \frac{8}{3} = 2\text{-}2/3$ or only two cuttings.
- Don't figure the cuttings smaller than specified for the grade (4 inches x 2 feet or 3 inches x 3 feet).
- The amount of clear material in the cuttings must be $8/12$ of the surface measure. So we multiply the 7 SM by 8 (the eight in the $8/12$), and find we need 56 units in two clear cuttings.

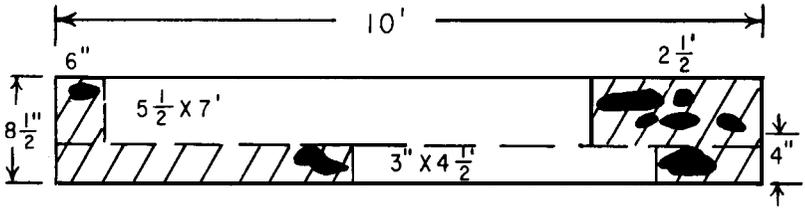
6. Let's try cutting the board by method 1 shown in the sketch. We find that we are just a fraction short of the needed 56 units. That's tough-but don't give up-let's try another method with only two cuttings.



So we try method 2 which only yields 52 units-even less than before. We can't think of any other way to squeeze out more clear units in two cuttings-so that eliminates No. 1 Common grade.

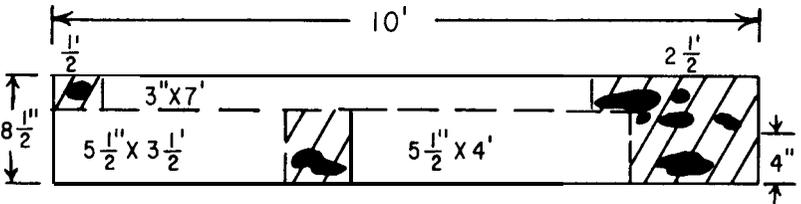
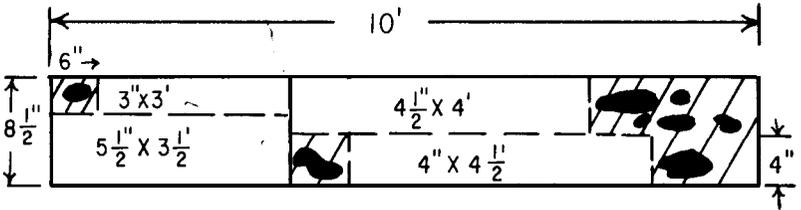
7. Now we have to see if it will make a No. 2 Common.

- Number of cuttings allowed is $\frac{SM}{2}$ or $\frac{7}{2} = 3\text{-}1/2$ or 3 cuttings.
- The cuttings can be small-down to 3 inches x 2 feet.
- Only $6/12$ of the board must be in clear cuttings or $7 \times 6 = 42$ units (SM x 6 which is the six in $6/12$).



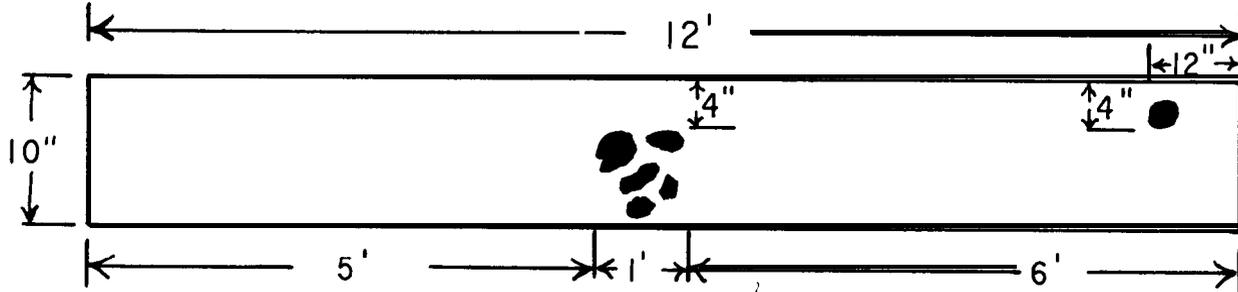
8. Well, we know already that the board will make 55 units in two cuts and, therefore, easily makes a No. 2 Common grade.

9. Just for the fun of it take a look at cutting methods 3 and 4. These produce 62 and 64 units of clear material but it takes 3 and 4 cuttings to do it.



Practice Grading

The following six boards have been included in the course so that you may test yourself on how well you have learned these grading principles and rules. Grade these boards step by step as you did in the previous example. The necessary factors to determine a grade are listed under each practice board. When figuring out how to get the cuttings, be sure to try several ways, and also try to get as much clear wood as possible from it. If care is taken in grading these boards on paper and other practice boards, you should have a good foundation as a hardwood lumber grader. With continued study of the rule book and attention to exceptions and variations not covered in this short course, you can become a good hardwood lumber grader.



A

Board feet

Surface measure

Number of units in board

Estimated grade of board

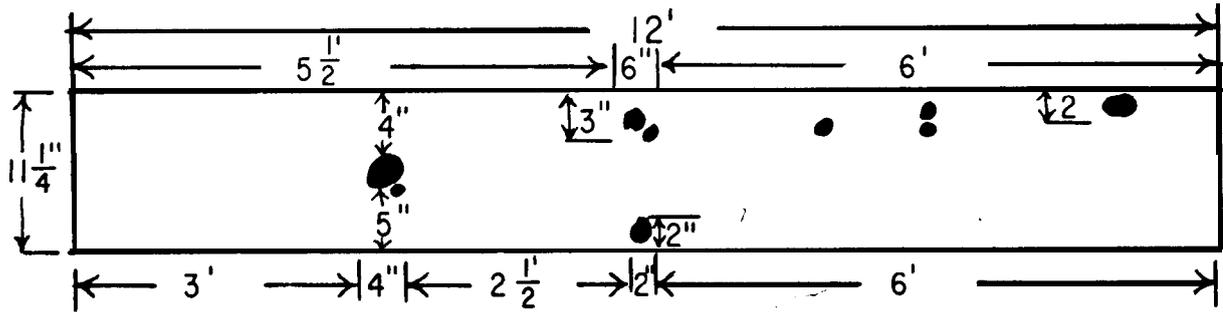
Estimated grade; number of cuttings allowed

Estimated grade; number of clear units needed

Number of clear cuts obtainable for estimated grade
(within size limits)

Actual number of units in clear cuts

Actual grade of board



B

Board feet

Surface measure

Number of units in board

Estimated grade of board

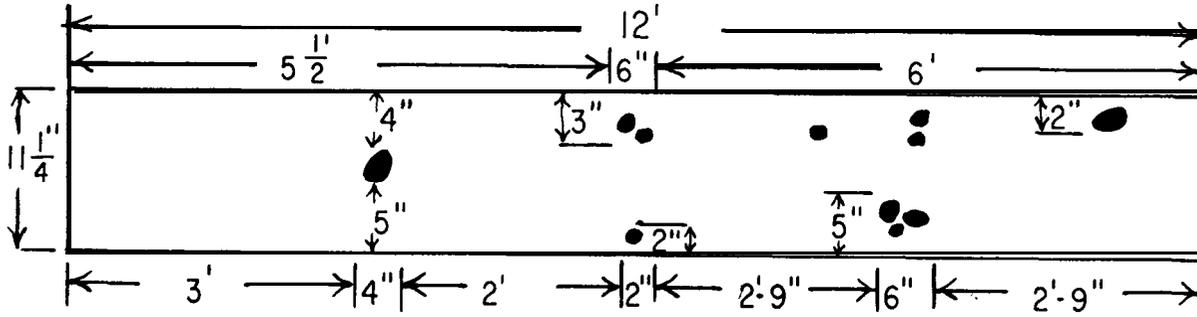
Estimated grade; number of cuttings allowed

Estimated grade; number of clear units needed

Number of clear cuts obtainable for estimated grade
(within size limits)

Actual number of units in clear cuts

Actual grade of board



C

Board feet

Surface measure

Number of units in board

Estimated grade of board

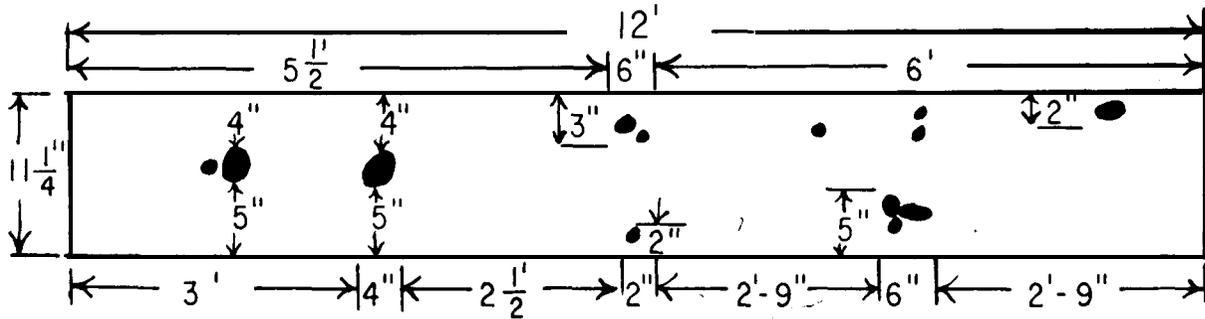
Estimated grade; number of cuttings allowed

Estimated grade; number of clear units needed

Number of clear cuts obtainable for estimated grade
(within size limits)

Actual number of units in clear cuts

Actual grade of board



D

Board feet

Surface measure

Number of units in board

Estimated grade of board

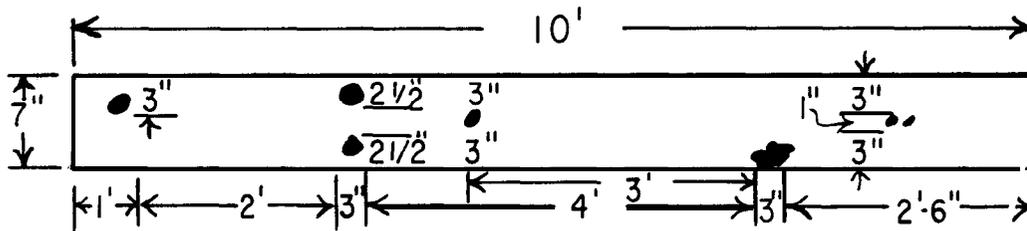
Estimated grade; number of cuttings allowed

Estimated grade; number of clear units needed

Number of clear cuts obtainable for estimated grade
(within size limits)

Actual number of units in clear cuts

Actual grade of board



E

Board feet

Surface measure

Number of units in board

Estimated grade of board

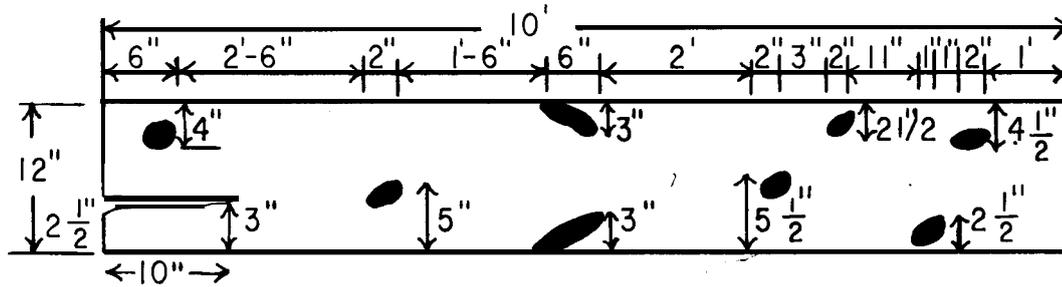
Estimated grade; number of cuttings allowed

Estimated grade; number of clear units needed

Number of clear cuts obtainable for estimated grade
(within size limits)

Actual number of units in clear cuts

Actual grade of board



F

- Board feet _____
- Surface measure _____
- Number of units in board _____
- Estimated grade of board _____
- Estimated grade; number of cuttings allowed _____
- Estimated grade; number of clear units needed _____
- Number of clear cuts obtainable for estimated grade
(within size limits) _____
- Actual number of units in clear cuts _____
- Actual grade of board _____

NOTES

ANSWERS

Board A - FAS

Board B - No. 1 Common

Board C - No. 1 Common

Board D - No. 1 Common

Board E - No. 2 Common

Board F - No. 3 Common



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