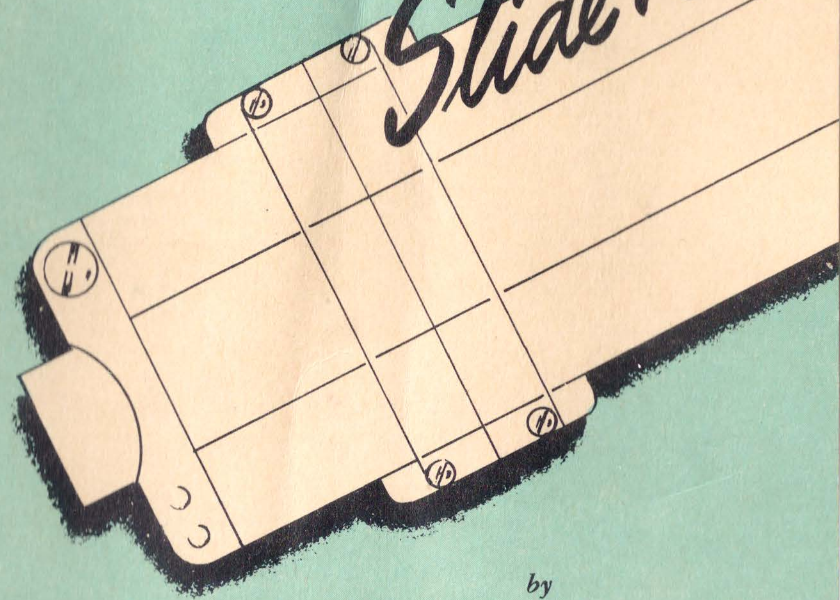
How to use the *Fuller* TRAFFIC *Slide Rule*



by

CAPTAIN L. J. FULLER

Los Angeles Police Department

LOS ANGELES, CALIFORNIA

Pickett

DISTRIBUTED BY

PORTO · CLINIC *Instruments Inc.*

298 BROADWAY NEW YORK 7, N. Y. U.S.A.

WOrth 2-4974–5–6

C.

PRICE 50 CENTS

PREFACE

The field of accident investigation dealing with the *Physical Laws* relating to speed, stopping distances, coefficient of friction of road surfaces, interpretation of skid marks and other related data has become highly important to the American automobile driver.

This slide rule, by which mathematical formulae can be applied to the physical data at the scene of an accident to give true and unbiased answers to the questions involved was designed by Lt. L. J. Fuller of the Los Angeles Police Department. Lt. Fuller has been a member of the Los Angeles Police Traffic Bureau for 20 years and is a graduate of the Northwestern University Traffic Institute.

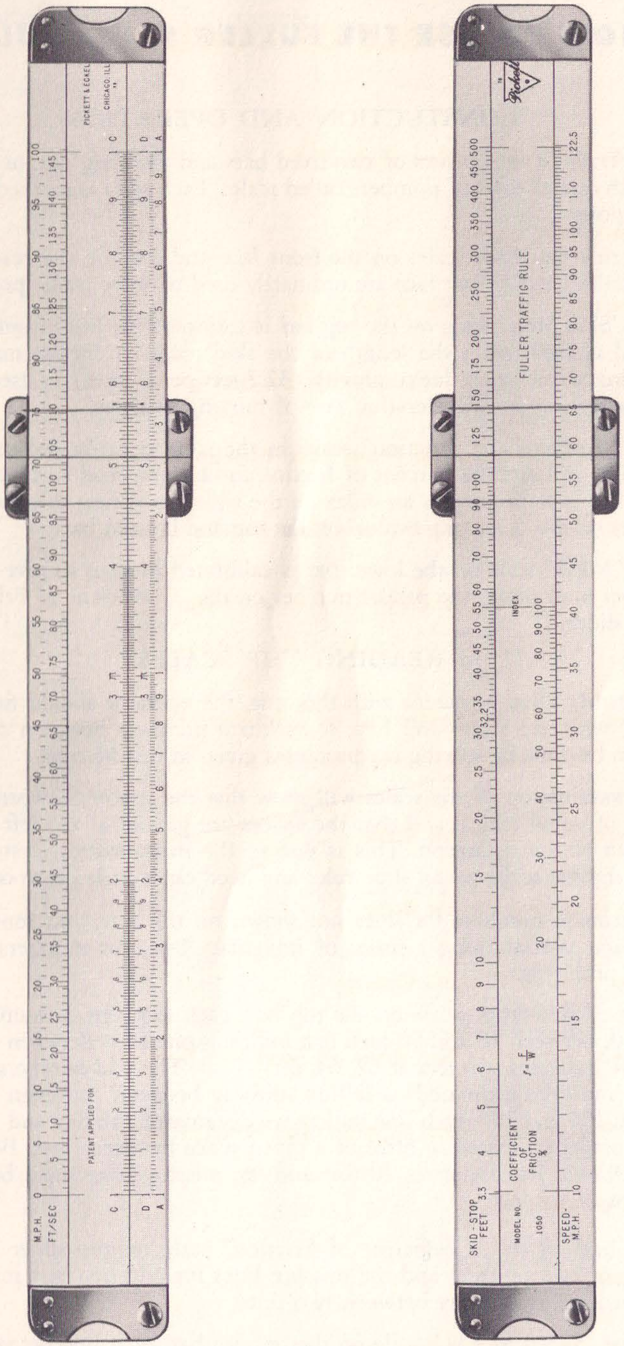
Many persons do not have the required mathematical training to properly evaluate and interpret the physical evidence at the scene of an accident. The Fuller Slide Rule was designed and constructed as a precision instrument to give exact and true answers to the many and varied mathematical problems which confront traffic accident investigators. It is based on data from many thousands of field and laboratory tests and the application of mathematics to solving problems arising from collision accidents. The experience gained from field and laboratory tests has demonstrated and proved that the science of mathematics, when properly applied to known physical data, will give undisputable evidence for court presentation.

The rule is simple to use and easily read. No mathematical training is required in the use of this precision instrument. Any person should be able to quickly learn the use of the rule by reference to this manual.

FORM M-11

TABLE OF CONTENTS

PAGE



HOW TO USE THE FULLER SLIDE RULE

CONSTUCTION AND OPERATION

The Traffic Rule consists of two fixed bars and a sliding bar, or slider, each of which carries rows of numbers called scales. Each scale is marked to indicate its purpose.

The rule has three scales on the front face and four on the rear face. Only those scales on the front face are ordinarily used to solve traffic problems.

The "Skid Stop" scale on the top bar is calibrated in lines from 3.3 to 500 feet and is used to set the length of the skid mark. A special mark at 32.2, indicating acceleration due to gravity (32.2 feet per second), is used in finding the acceleration and deceleration rate of moving vehicles.

The "Coefficient of Friction" scale on the slide is calibrated in lines from 20 to 100 and sets the percent of friction for a given road surface. The index line at 100 is to be used as an index on the slider in setting this scale opposite numbers on the "Coacting Scales" on the top and bottom bars.

The "MPH" scale on the lower bar is calibrated in lines to give readings in miles per hour under the proper number on the "Coefficient of Friction" scale on the slider.

READING THE SCALES

To readily solve problems with this rule, the operator should first acquaint himself with the scales and how to estimate numbers between scale marks. This can be done by solving the problems given in this Manual.

An examination of the scales will show that the spaces between scale lines are not of equal length and that the spaces are greater at the left end of the rule than at the right end. This is due to the mathematical system used in graduating the scales on all slide rules and need cause little or no concern.

To estimate numbers for lines not shown on the rule, you must think of each space as containing a series of imaginary lines for numbers needed in solving problems.

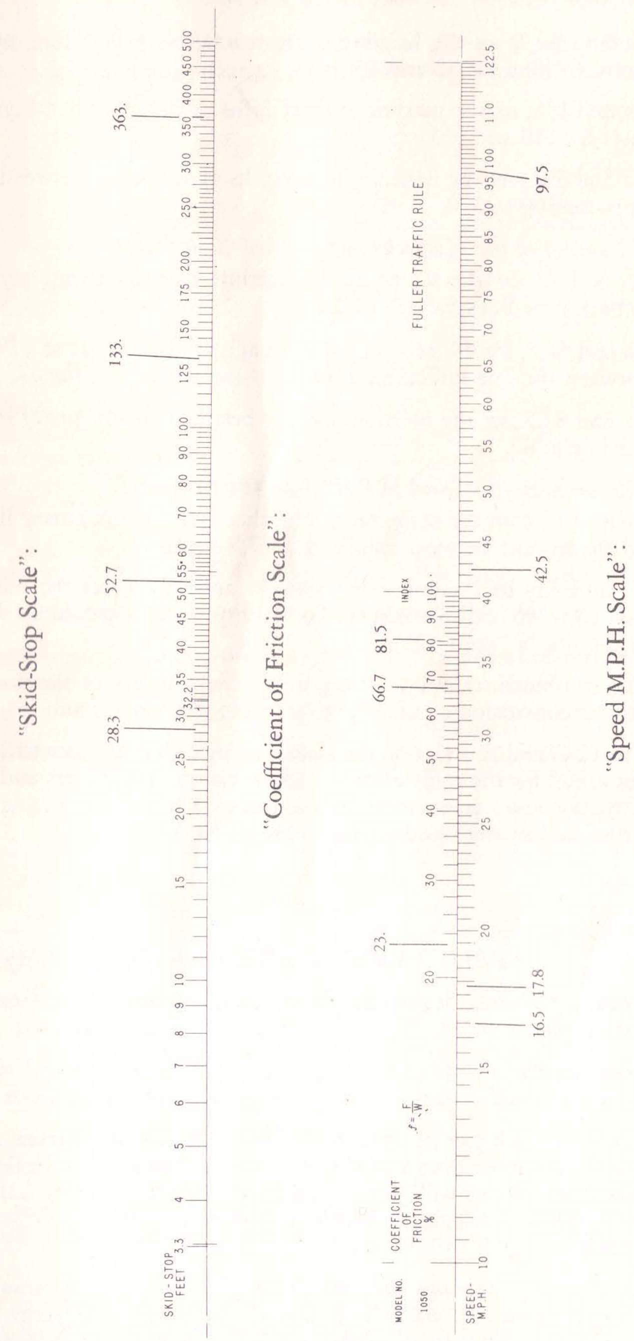
On the "Skid-Stop" scale on the top bar, each foot line is numbered from 3.3 to 10. Between 10 and 60 each line indicates one foot. Between 60 and 100 each line indicates two feet at 62, 64, 66 — — —. The odd numbers 61, 63, 65 — — — must be estimated as falling midway between the even scale lines. Between 100 and 300, each line indicates a distance of five feet and the missing lines must be estimated in fifths of a given space between lines. Between 300 and 500, each line indicates 10 feet and the missing lines must be estimated in tenths of a space.

Each line on the "Coefficient of Friction" scale on the slider indicates a distance of two percent, and the missing lines for odd percents must be estimated at a point midway between two lines.

On the "Speed M.P.H." scale on the bottom bar, each line between 10 and 30 indicates a half mile. Between 30 and 122.5, each line indicates one mile per hour.

The method of estimating readings on imaginary lines between scale lines is demonstrated in Figure 1. For example:

Figure 1



"Skid-Stop" Scale (Top Bar):

To find 28.3 on the scale, set the hairline over an imaginary line (.3) of the distance between the lines for 28 and 29.

To find 52.7, set the hairline over an imaginary line (.7) of the distance between lines for 52 and 53.

To find 133, set the hairline at three-fifths of the space between the indicated lines for 130 and 135.

To find 363, set the hairline three-tenths of the space between the indicated lines for 360 to 370.

For Readings on the "Coefficient of Friction" Scale (Slider):

To find 23 on the scale, set the hairline over an imaginary line midway between the lines for 22 and 24.

To find 66.7, set the hairline on an imaginary line equal to (.7) the distance between the line indicating 66 and an imaginary line for 67.

To find 81.5, set the hairline midway between an imaginary line for 81 and the line at 82.

For Readings on the "Speed M.P.H." Scale (Bottom Bar):

To find 17.8 on the scale, set the hairline over an imaginary line three-fifths of the distance between the lines at 17.5 and 18.

To find any half number between 30 and 122.5, set the hairline midway between two indicated lines. For example—42.5 would be located at the mid-point between 42 and 43.

The combined scales on the top bar of the rear face of the rule may be used for direct conversion of miles per hour into feet per second.

The C, D and A scales on the slide and lower bar are conventional slide rule scales useful for the multiplication and division of numbers and for obtaining the squares and square roots of numbers. Detailed instruction for their use can be found in any standard slide rule work.

APPLICATION TO TRAFFIC PROBLEMS

Usually the most important factor which a traffic investigator wishes to determine is the speed of a car or cars involved in an accident.

With the Fuller slide rule, if the length of the skid mark and the coefficient of friction of the road surface are known, the speed can be quickly determined.

The skid mark can be measured. The coefficient of friction may be determined from known tests and observation data. As a general rule, all dry, hard surface paved streets will give at least sixty (60%) efficiency. Some pavements, such as asphaltic concrete and white concrete, will give at least seventy (70%) efficiency.

To accurately determine the coefficient of friction of any road surface, it is necessary to run a test skid. The speed of the test need not be greater than 20 m.p.h. This method of determining the friction efficiency of pavement can be used in all accident cases to find speed from accident skids.

TO FIND SPEED FROM SKID-MARK BY USE OF TEST SKID

EXAMPLE:

A vehicle skids 180 feet and is wrecked. A test skid with a police car at 20 m.p.h. results in a stopping distance of 20 feet. Find speed of accident vehicle.

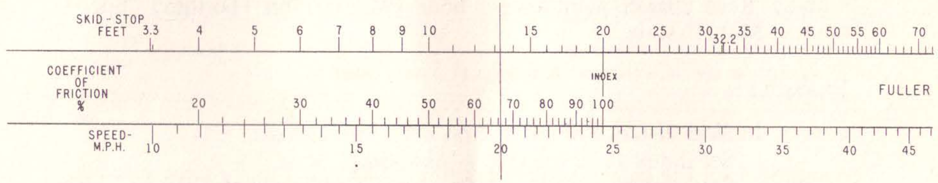


Fig. 2

(a) Set index on slide under 20 feet on (top) "Skid-Stop" scale.

(b) Set hairline of indicator at 20 on (bottom) "Speed-M.P.H." scale.

(c) Read coefficient of friction 66.7 on (center) "Coefficient of Friction" scale.

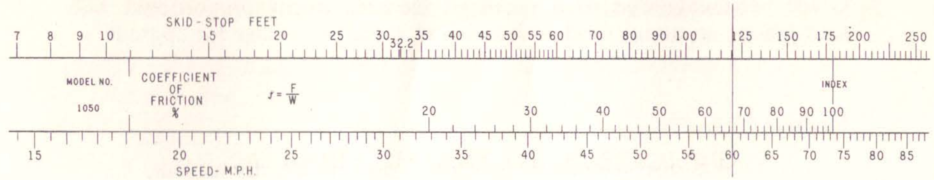


Fig. 3.

(d) Now, with the coefficient of friction known, set the index of the (center) "Coefficient of Friction" scale under 180 on the (top) "Skid-Stop" scale.

(e) Move hairline to 66.7 on the (center) "Coefficient of Friction" scale and under hairline on (bottom) "Speed-M.P.H." scale read the answer—60 m.p.h.

When the length of the skid-mark is determined, we can proceed as follows:

1. *To Find Speed from Skid-Marks:*

   (a) Set the index at Skid distance on (top) "Skid-Stop" scale.
   (b) Set slide hairline at effective coefficient of friction on (center) "Coefficient of Friction" scale.
   (c) Read answer in miles per hour (M.P.H.) on (bottom) "Speed-M.P.H." scale.

EXAMPLE:

1. Skid distance of 30 feet on dry, level asphalt.
   Set index at 30 on (top) "Skid-Stop" scale.
   Set hairline at 60% on (center) "Coefficient of Friction" scale.
   Read answer of 23.3 M.P.H. on (bottom) "Speed-M.P.H." scale.
2. Skid distance of 40 feet on dry, level asphalt.
   Set index at 40 on (top) "Skid-Stop" scale.
   Set hairline at 70% on (center) "Coefficient of Friction" scale.
   Read answer of 29 M.P.H. on (bottom) "Speed-M.P.H." scale.
3. Skid distance of 140 feet on dry, level asphalt.
   Set index at 140 on (top) "Skid-Stop" scale.
   Set hairline at 60% on (center) "Coefficient of Friction" scale.
   Read answer of 50.2 on (bottom) "Speed-M.P.H." scale.

2. *To Find Speed from Skid-Marks on Grades:*

Grade percentage and friction percentage are directly proportional. Subtract grade percentage for downgrade, add grade percentage for upgrade.

EXAMPLE:

1. Skid distance of 60 feet on 5% downgrade, dry asphalt.
   Set index at 60 on (top) "Skid-Stop" scale.
   Set hairline at 55% (60-5) on (center) "Coefficient of Friction" scale.
   Read answer of 31.3 M.P.H. on (bottom) "Speed-M.P.H." scale.
2. Skid distance of 98 feet on 6% upgrade, dry concrete.
   Set index at 98 on (top) "Skid-Stop" scale.
   Set hairline at 76% (70 + 6) on (center) "Coefficient of Friction scale.
   Read answer of 47.2 M.P.H. on (bottom) "Speed-M.P.H." scale.
3. Skid distance of 149 feet on 7% downgrade, dry asphalt.
   Set index at 149 on (top) "Skid-Stop" scale.
   Set hairline at 53% (60-7) on (center) "Coefficient of Friction" scale.
   Read answer of 48.7 M.P.H. on (bottom) "Speed-M.P.H." scale.

3. *To Find Stopping Distance When Speed and Coefficient of Friction Are Known:*

EXAMPLE:

1. Speed 30 M.P.H.—coefficient of friction 60%.

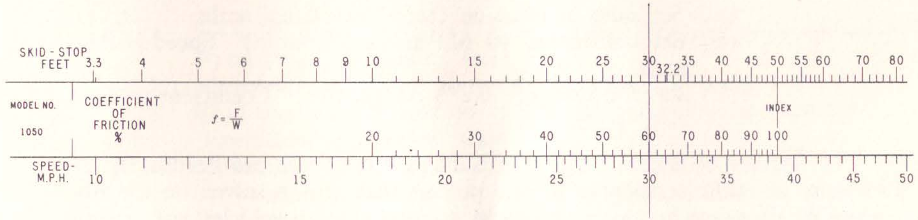


Fig. 4

   (a) Set hairline at 30 M.P.H. on (bottom) "Speed-M.P.H." scale.
   (b) Set 60% on (center) "Coefficient of Friction" scale under hairline.
   (c) Move hairline to index on (center) "Coefficient of Friction" scale and read answer—50 feet—on (top) "Skid-Stop" scale.

2. Speed 55 M.P.H.—coefficient of friction 70%.

   (a) Set hairline at 55 M.P.H. on (bottom) "Speed-M.P.H." scale.
   (b) Set 70% on (center) "Coefficient of Friction" scale under hairline.
   (c) Opposite index line on (center) "Coefficient of Friction" scale read 144 feet on (top) "Skid-Stop" scale.

4. *To Find Coefficient of Friction When Speed and Stopping Distance Are Known:*

EXAMPLE:

1. Speed 60 M.P.H.—stopping distance 200 feet.

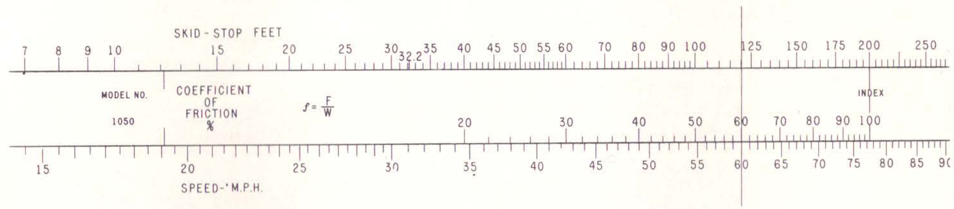


Fig. 5

(a) Set index at 200 on (top) "Skid-Stop" scale.
(b) Set hairline at 60 M.P.H. on (bottom) "Speed-M.P.H." scale.
(c) Read answer of 60% on (center) "Coefficient of Friction" scale.

2. Speed 40 M.P.H.—stopping distance 106.6 feet.

(a) Set index at 106.6 on (top) "Skid-Stop" scale.
(b) Set hairline at 40 M.P.H. on (bottom) "Speed-M.P.H." scale.
(c) Read answer of 50.2% on (center) "Coefficient of Friction" scale.

The features of the rule, illustrated above, are all that are needed for the majority of traffic accidents. Other problems that can be solved on the rule relate to deceleration and acceleration rates of motor vehicles and kinetic energy. The M.P.H./ft. scale on the upper bar of the rear face of the rule will convert miles per hour to feet per second and vice versa.

A. *To Find Deceleration Rate:*

EXAMPLE:

1. A vehicle stops in 96.8 feet from a speed of 30 M.P.H. What is the deceleration rate in feet per second?

(a) Set index on (center) "Coefficient of Friction" scale under 96.8 on (top) "Skid-Stop" scale.
(b) Set hairline at 30 M.P.H. on (bottom) "Speed-M.P.H." scale.
(c) Read coefficient of friction, 30.8 on the (center) "Coefficient of Friction" scale.
(d) Set index on (center) "Coefficient of Friction" scale under 32.2 on (top) "Skid-Stop" scale.
(e) Move hairline to 30.8 on (center) "Coefficient of Friction" scale.
(f) Read deceleration rate of 10 feet per second on (top) "Skid-Stop" scale.

2. A vehicle stops in 240 feet from a speed of 60 M.P.H. What is the deceleration rate in feet per second?

(a) Set index on (center) "Coefficient of Friction" scale under 240 on (top) "Skid-Stop" scale.
(b) Set hairline at 60 M.P.H. on (bottom) "Speed-M.P.H." scale.
(c) Read coefficient of friction as 50% on (center) "Coefficient of Friction" scale.
(d) Set index line on (center) "Coefficient of Friction" scale under 32.2 on (top) "Skid-Stop" scale.
(e) Move hairline to 50% on (center) "Coefficient of Friction" scale.
(f) Read deceleration rate of 16.1 feet per second on (top) "Skid-Stop" scale.

B. *To Find Acceleration Rate:*

EXAMPLE:

1. A vehicle starts from a stopped position and reaches a speed of 40 M.P.H. in 76 feet. What is the rate of acceleration in feet per second?

(a) Set index line on (center) "Coefficient of Friction" scale under 76 on (top) "Skid-Stop" scale.
(b) Set hairline at 40 on (bottom) "Speed-M.P.H." scale.
(c) Read coefficient of friction as 70% under hairline on (center) "Coefficient of Friction" scale.
(d) Move index line under 32.2 on (top) "Skid-Stop" scale.
(e) Set hairline at 70% on (center) "Coefficient of Friction" scale.
(f) Read acceleration rate of 22.5 feet per second on (top) "Skid-Stop" scale.

2. A vehicle starts from a stopped position and reaches a speed of 30 M.P.H. in 50 feet. What is the rate of acceleration?

(a) Set index line on (center) "Coefficient of Friction" scale under 50 on (top) "Skid-Stop" scale.
(b) Set hairline at 30 on (bottom) "Speed-M.P.H." scale.
(c) Read coefficient of friction as 60% under hairline on (center) "Coefficient of Friction" scale.
(d) Move index line on (center) "Coefficient of Friction" scale under 32.2 on (top) "Skid-Stop" scale.
(e) Set hairline to 60% on center "Coefficient of Friction" scale.
(f) Read acceleration rate 19.3 feet per second on (top) "Skid-Stop" scale.

C. *To Determine Kinetic Energy:*

EXAMPLE:

1. A 3,000 lb. car is traveling at a speed of 30 M.P.H. Find kinetic energy** in foot pounds?

(a) Set hairline over 30 M.P.H. on (bottom) "Speed-M.P.H." scale.
(b) Under hairline on (top) "Skid-Stop" scale read 30.
(c) Multiply 30 x 3,000 lbs. Answer = 90,000 ft. lbs.

2. A 3,000 lb. car is traveling at 60 M.P.H. Find kinetic energy?
(a) Set hairline at 60 M.P.H. on (bottom) "Speed-M.P.H." scale.
(b) On (top) "Skid-Stop" scale under hairline read 120.
(c) Multiply 120 x 3,000 lbs. Answer = 360,000 ft. lbs.

** Energy possessed by a body due to its motion is kinetic energy and is measured in foot pounds.

D. *To Convert Miles Per Hour to Feet Per Second:*

On the reverse side of the Traffic Rule, the upper bar is scaled in graduations of miles per hour and feet per second. The lines M.P.H. are set to give direct readings on the ft./sec. scale.

EXAMPLE:

1. To convert 60 M.P.H. to ft./sec.

   (a) Place hairline over 60 M.P.H. and read 88 feet per second on ft./sec. scale.

HOW TO USE THE C AND D SCALES FOR MULTIPLICATION AND DIVISION

When any number on the C scale is positioned over a number on the D scale, multiplication and division with two numbers can be done. These two scales are exactly alike. The total length of these scales has been separated into many smaller parts by fine lines called "graduations."

If these scales were long enough the total length of each would be separated into 1000 parts. First they would be separated into 10 parts. Then each of these parts would be again separated into 10 parts. Finally each of these smaller parts would be separated into 10 parts, making 1000 parts in all. On the C and D scales the parts are not all equal. They are longer at the left-hand end than at the right-hand end. At the left end there is enough space to *print* all of the fine graduations. Near the right end of a short rule there is not enough room to print all the graduations. In using the rule, however, you soon learn to *imagine* that the lines are all there, and to use the *hairline* on the indicator to help locate where they would be.

Reading the Scales

The marks which first separate the entire D scale into ten parts are called the *primary* graduations. The points of separation are labeled **2**, **3**, **4**, etc., and the end points are both labeled **1**. These are the largest numerals printed on the rule. Do not confuse these with the smaller numerals 1, 2, 3, etc., to 9 which are found at the left end between the large **1** and **2**. The line above the **1** on the left end is called the *left index;* the line above **1** on the right is the *right index*.

Next notice again that the distance between **1** and **2** on the D scale has been separated into ten parts, marked with smaller numerals 1, 2, 3, etc. These are *secondary* graduations. Each of the spaces between the large numerals **2** and **3**, between **3** and **4**, and between the other primary graduations is also divided into ten parts. Numerals are not printed beside these smaller secondary graduations because it would crowd the numerals too much.

The space between each secondary graduation at the left end of the rule (over to primary graduation **2**) is separated into ten parts, but these shortest graduation marks are not numbered. In the middle part of the rule, between the primary graduations **2** and **4**, the smaller spaces between the *secondary* graduations are separated into five parts. Finally, the still smaller spaces between the secondary graduations at the right of **4** are separated into only two parts.

MULTIPLICATION

Simple examples of multiplication can now be done. Numbers that are to be multiplied are called *factors*. The result is called the *product*. Thus in the statement $6 \times 7 = 42$, the numbers 6 and 7 are factors, and 42 is the product.

Rule for Multiplication: **Over one of the factors on the D scale, set the index of the C scale.** Locate the other factor on the C scale, and directly below it read the product on the D scale.**

EXAMPLE: Multiply 4 × 2.

Setting the Scales: Set the left index of the C scale on **4** of the D scale. Find **2** on the C scale, and below it read the product, **8**, on the D scale.

Think: The length for 4 plus the length for 2 will be the length for the product. This length, measured by the D scale, is 8.

EXAMPLE: Multiply 2 × 3.

Setting the Scales: Set the left index of the C scale on **2** of the D scale. Find **3** on the C scale, and below it read the product, **6**, on the D scale.

Think: The length for 2 plus the length for 3 will be the length for the product. This length, measured by the D scale, is 6.

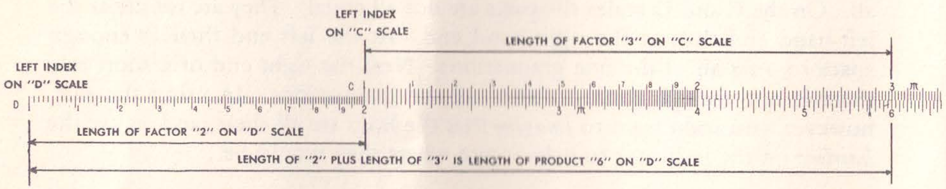


Fig. 6

The symbols 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, used in writing numbers are called *digits.* One way to describe a number is to tell how many digits are used in writing it. Thus 54 is a "two digit number," and 1,348,256 is a "seven-digit number." In many computations only the first three or four digits of a number need to be used to get an approximate result which is accurate enough for practical purposes. Usually only the first three digits of a number can be "set" on the slide rule scales. If the first digit of a number is 1, however, the number is located near the left end of the rule and the first four digits can be "set." In the majority of practical problems this degree of accuracy is sufficient.

Multiplication of numbers having three digits can now be done.

EXAMPLE: Multiply 2.34 × 36.8.

Estimate the result: First note that the result will be roughly the same as 2 × 40, or 80: that is, there will be two digits to the left of the decimal point. Hence we can ignore the decimal points for the present and multiply as though the problem was 234 × 368.

Set the Scales: Set the left index of the C scale on 234 of the D scale. Find 368 on the C scale and read the product 861 on the D scale.

Think: The length for 234 plus the length for 368 will be the length for the product. This length is measured on the D scale. Since we already knew the result was somewhere near 80, the product must be 86.1, approximately.

**This may be either the left or the right index, depending upon which one must be used in order to have the other factor (on the C scale) located over the D scale. If the "other factor" falls outside the D scale, the "other index" is used.

EXAMPLE: Multiply 28.3 × 5.46.

Note first that the result will be about the same as 30 × 5, or 150. Note also that if the left index of the C scale is set over 283 on the D scale, and 546 is then found on the C scale, the slide projects so far to the right of the rule that the D scale is no longer below the 546. When this happens, the *other* index of the C scale must be used. That is, set the *right* index of the C scale over 283 on the D scale. Find 546 on the C scale and below it read the product on the D scale. The product is approximately 154.5.

This illustrates how in simple examples the decimal point can be placed by use of the estimate (the result was *estimated* to be near 150), and also shows how "four-digit accuracy" can often be obtained when the result falls at the left end of the D scale.

PROBLEMS	ANSWERS
1. 15 × 3.7	55.5
2. 280 × 0.34	95.2
3. 753 × 89.1	67,100
4. 9.54 × 16.7	159.3
5. 0.0215 × 3.79	0.0815

DIVISION

In mathematics, division is the opposite or *inverse* operation of multiplication. In using a slide rule this means that the process for multiplication is reversed. To help in understanding this statement, set the rule to multiply 2 × 4 (see page 5). Notice the result 8 is found on the D scale under 4 of the C scale. Now to divide 8 by 4 these steps are reversed. First find 8 on the D scale, set 4 on the C scale over it, and read the result 2 on the D scale under the index of the C scale.

Think: From the length for 8 (on the D scale) *subtract* the length for 4 (on the C scale). The length for the difference, read on the D scale, is the result, or quotient.

With this same setting you can read the quotient of 6 ÷ 3, or 9 ÷ 4.5, and in fact all divisions of one number by another in which the result is 2.

Rule for Division: **Set the *divisor* (on the C scale) opposite the number to be divided (on the D scale). Read the result, or quotient, on the D scale under the index of the C scale.**

EXAMPLES:

(a) Find 63.4 ÷ 3.29. The quotient must be near 20, since 60 ÷ 3 = 20. Set indicator on 63.4 of the D scale. Move the slide until 3.29 of the C scale is under the hairline. Read the result 19.27 on the D scale at the C index.

(b) Find 26.4 ÷ 47.7. Since 26.4 is near 25, and 47.7 is near 50, the quotient must be roughly 25/50 = ½ = 0.5. Set 47.7 of C opposite 26.4 of D, using the indicator to aid the eyes. Read 0.553 on the D scale at the C index.

PROBLEMS	ANSWERS
1. 83 ÷ 7	11.86
2. 75 ÷ 92	0.815
3. 137 ÷ 513	0.267
4. 17.3 ÷ 231	0.0749
5. 8570 ÷ .0219	391,000

SQUARE ROOTS AND SQUARES

When a number is multiplied by itself the result is called the *square* of the number. Thus 25 or 5×5 is the square of 5. The factor 5 is called the *square root* of 25. Similarly, since $12.25 = 3.5 \times 3.5$, the number 12.25 is called the square of 3.5; also 3.5 is called the square root of 12.25. Squares and square roots are easily found on a slide rule.

***Rule:* The square root of any number located on the A scale is found above it on the D scale.**

EXAMPLES: Find the $\sqrt{4}$. Place the hairline of the indicator over 4 on the left end of the A scale. The square root, 2, is read above on the D scale. Similarly the square root of 9 (or $\sqrt{9}$) is 3, found on the D scale above the 9 on the left end of the A scale.

Reading the Scales: The A scale is a contraction of the D scale itself. The D scale has been shrunk to half its former length and printed twice on the same line. To find the square root of a number between 0 and 10 the left half of the A scale is used (as in the examples above). To find the square root of a number between 10 and 100 the right half of the A scale is used. For example, if the hairline is set over 16 on the right half of the A scale (near the middle of the rule), the square root of 16, or 4, is found above it on the D scale.

In general, to find the square root of any number with an odd number of digits or zeros (1, 3, 5, 7, . . .), the left half of the A scale is used. If the number has an even number of digits or zeros (2, 4, 6, 8, . . .), the right half of the A scale is used.

HOW TO ADJUST YOUR SLIDE RULE

A perfect slide rule, when out of adjustment, often appears defective. Each rule is accurately adjusted before it leaves the factory. However, handling during shipment, dropping the rule, or even a series of slight jars while laying the rule down during use, may loosen the adjusting screws and throw the rule out of alignment. Follow these simple directions for slide rule adjustment.

CUSTOM-HAIRLINE ADJUSTMENT • Loosen the bottom two screws on both Cursor windows on spacer opposite tension spring. Press with left thumb to maintain constant contact with edge of rule; align hairline with left hand indices and tighten screws on that side. Turn rule over and check alignment of hairline on other Cursor window. If necessary, loosen all screws on this side and align with left hand indices as needed, and tighten screws carefully.

SLIDER TENSION ADJUSTMENT • Loosen adjustment screws on end brackets; regulate tension of slider, tighten the screws using care not to misalign the scales. The adjustment needed may be a fraction of a thousandth of an inch, and several tries may be necessary to get perfect slider action.

SCALE LINE-UP ADJUSTMENTS • (1) Move slider until indices of C and D scales conincide. (2) Move cursor to one end. (3) Place rule on flat surface with face uppermost. (4) Loosen end plate adjusting screw slightly. (5) Adjust upper portion of rule until graduations on DF scale coincide with corresponding graduations on CF scale. (6) Tighten screws in end plates.

REPLACEABLE ADJUSTING SCREWS • All Pickett All-Metal rules are equipped with Telescopic Adjusting Screws. In adjusting your rule, if you should strip the threads on one of the Adjusting Screws, simply "push out" the female portion of the screw and replace with a new screw obtainable from your dealer, or from the factory. We do not recommend replacing only the male or female portion of the screw.

HOW TO KEEP YOUR SLIDE RULE IN CONDITION

Always hold your rule between thumb and forefinger at the ENDS of the rule. This will insure free, smooth movement of the slider. Holding rule at center tends to bind the slider.

LUBRICATION • Your slide rule is treated with a light lubricant at the factory. This oil, which works into the surface of the metal, is designed to lubricate your rule indefinitely.

If your rule should run dry, or if the slider begins to move hard or with a dry rasping sound:

1. Lubricate with a light lubricant. Work in well by moving slider back and forth, then wipe off.
2. Any pure light oil is a satisfactory lubricant.

MAINTENANCE • The body of your rule is made of a corrosion resistant alloy. The edges may gradually darken (or oxidize) with age.

This normal ageing of the rule affects neither the accuracy of the scales nor ease of operation.

Extreme atmospheric exposure tends to warp and distort wood, and to rust steel, which is common knowledge. This is not true of the alloy used in your slide rule, but, such exposure may tend to deposit an oxidation film on the surface, causing the slider to move hard.

If this happens to your rule, take out the Telescopic Adjusting Screws and remove both Top Rule Member and Slider without disassembling the Cursor. Clean the oxidized edges of the rule with a silver polish, Bon Ami, rubber ink eraser or other cleaning agent. Slide Top Rule Member and Slider back into position. Relubricate. Then make Scale Line-Up and Slider-Tension Adjustments.

WHY YOUR RULE OPERATES BETTER WITH CONSTANT USE • Being made of metal, the moving parts of your slide rule "lap in" with use. This process of wearing smooth means your slide rule will operate with increasing smoothness year after year.

CLEANING • Wash surface of the rule with non-abrasive soap and water when cleaning the scales.. If Cursor window becomes dulled from long use, simply polish and brighten the window surfaces with a small rag and tooth powder.

PICKETT & ECKEL INC • 5 South Wabash • CHICAGO 3 ILLINOIS