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FULLERTON

CIRCULAR SLIDE RULES

No. 1450 ✓



PREFACE

The **FULLERTON** Circular Slide Rule may best be described as a useful instrument which saves time and labor when applied to solve many of the calculations that daily occur in practice.

By means of this ingenious little instrument one can easily solve with a sufficient degree of accuracy all manner of problems involving multiplication and division such as proportion, squares, square roots, cubes, cube roots, logarithms, trigonometric functions, etc.

The Merits of **FULLERTON** Circular Slide Rule:

- 1) this slide rule helps facilitate the working out of multiple computation without error and without allowing the pointers to go off.
- 2) All the scales are divided by means of special deep cut graduations thus ensuring a life time of accurate calculation.



Slide Rule Diagram:

The slide rule diagram is provided for your convenience.

The symbols in the diagram are explained hereunder.

↗..... Set the graduation like this.

↑..... Put the indicator line here.

*..... The sequence can be read off here.

The **FULLERTON** Circular Slide Rule makes an ideal gift and is recommended as a "Give-away" item for friends and business associates. The name of your company or trade mark may be imprinted thereon, in the course of manufacture to meet your needs.

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1. Arrangement of scales and usage:

Size mm	Cat. No.	Scale		Character- istics
		Front face	Rear face	
80	1450	D. C. CI. A. K	Conversion Table	For small business use
96	320	D. C. CI. A. K	// and Calendar	
//	1452	D. C. CI. A. K	D.S.T. S & T. L	
100	1454	L. D. C. CI. A. K	DI. D. ST ₁ , T ₂ . ST	For general engi- neering and business use.
//	1455	//	{ DI. D. SI. TI ₁ . TI ₂ . SITI	
//	1456	A. D. C. CI. B. K	L.D.S.T ₁ .T ₂ .S&T	
110	1458	K. A. D.C. CI.B.L	{ LL ₃ .LL ₂ .D.C.S. T ₁ .T ₂ . ST	For expert eng neering use.
100	1499	D. sin cos. cos ²	D. C. S. S&T. L	"Stadia" Computer

(4)

Usage of Scales:

Scale	Remarks:
C, D	These are the fundamental scales of the FULLERTON Circular Slide Rule.
CI	Multiplication and division may be done freely. This scale is a supplement to C and D.
A, B	These are used for computation of squares and square roots conjointly with C and D scales.
K	This is used for computing cubes and cube roots conjointly with C and D scale.
L	This is the scale used to find logarithms in "reference scale" with D scale.
S, SI	These are used for Sin θ computation.
T, TI	These are used for Tan θ computation.
S&T	These are used to compute small angles by Sin θ and Tan θ .
LL ₂ , LL ₃	These are the scales used to find the form of A ^x in joint use with C scale.

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2. Multiplication:

Of two given numbers:

Rule: Set 1 on scale C to multiply on scale D, against the multiplier on scale C read the product on scale D.

Example 1. $1.8 \times 2.5 = 4.5$ (Fig. 1)

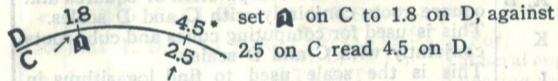


Fig. 1

Example 2. $3 \times 2 = 6$,
 $3 \times 5 = 15$, $3 \times 7 = 21$

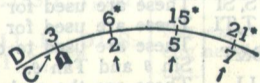


Fig. 2

(6)

Set 1 on C to 3 on D, against 2, 5, 7 on C and the answers 6, 15, 21 can be obtained on D respectively.

By means of FULLERTON Circular Slide Rule you can accomplish many computations by single setting of the slide.

No instrument is needed other than a circular slide rule.

Of three given numbers:

Example 3. $3 \times 4 \times 5 = 60$ (Fig. 3)

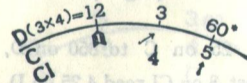


Fig. 3

Set 4 on CI to 3 on D, against 5 on C read 60 on D.

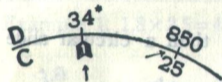
(7)



3. Division:

Of two given numbers:

Rule: Set the divisor on C to the dividend on D, against the index \uparrow of C read the quotient on D.



F.g. 4

Example 4. $850 \div 25 = 34$ (Fig. 4)

Set 25 on C to 850 on D, against \uparrow on C read 34 on D.

Of three Given Numbers:

Example 5. $850 \div 25 \div 8 = 4.25$

(Fig. 5)

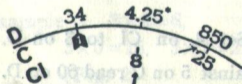


Fig. 5

Set 25 on C to 850 on D, against 8 on CI read 4.25 on D.

(8)

4. Mixture of Multiplication and Division:

When multiplication and division are mixed together, you can of course do them one by one in continuation; but for the sake of speed there is a simpler method.

You may do both at once. Such instances occur very often and you must keep the method at your finger tips.

Example 6. $\frac{3 \times 6}{5} = 3.6$ (Fig. 6)

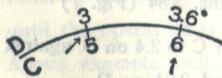


Fig. 6

Set 5 on C to 3 on D, against 6 on C read 3.6 on D.

(9)



5. Proportion:

As an example of the mixture of multiplication and division we shall deal with proportion.

Proportion can be found by the use of "*reference scale method*" with reference to C and D scale. This method is widely applied for conversion, indexes, proportional division, percentage and also sale and purchase of commodities.

Rule. In order to solve $a:b=c:x$, set a on C to b on D, against c on C read x on D.

Example 7. $5:2.4=8:x$ Ans. 3.84 (Fig. 7)

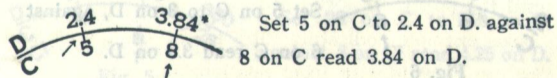


Fig. 7

(10)

Example 8. — Conversion:—

Fill the following blanks, given $1 \text{ lb} = 0.4536 \text{ kg}$

lbs	45	63	(50.7)	(150)	180
kg	(20.4)	(28.6)	23	68	(81.6)

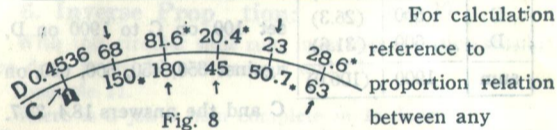


Fig. 8

concrete number or quantity and scale should be fixed until the operation is finished.

Above example indicating "lb" is set on C scale and "kg" on D scale with fixed relationship.

(11)



Example 9.

—Percentage:—

Fill up the blank columns in the following table:-

A	\$ 350	(18.4)
B	450	(23.7)
C	500	(26.3)
D	600	(31.6)
sum	1900	(100.0)

Make the total sum of parts.

$$350 + 450 + 500 + 600 = 1900$$

set 100 on C to 1900 on D,

against 350, 450, 500, 600, on

C and the answers 18.4, 23.7,

26.3, 31.6 can be

obtained on D.

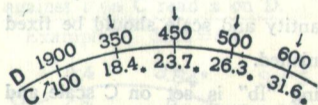


Fig. 9

(12)

Example 10. —Sale and purchase:—

How much is 30 pcs. of a commodity @ 15 dollars per dozen; how many pcs. can be purchased at 40 dollars ?

Ans. \$ 37.50,
32 Pcs.



Fig. 10

6. Inverse Prop tion:

With this circular slide rule, inverse proportion should be done invariably between D and CI.

Example 11.

There is a job 6 men complete in 14 days:
How many days will it take for 8 men to finish the job?

Ans. 10.5 days (Fig. 11)

Set 6 on CI to 14 on D,
against 8 on CI read 10.5 on D.

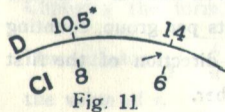


Fig. 11

(13)



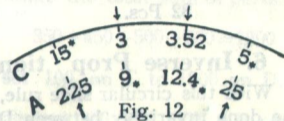
7. Squares and Square Root:

To extract squares, square roots, answer may be secured with A and C scales in the reference relation.

Example. 12

$$3^2 = 9 \quad 3.52^2 = 12.4$$

$$\sqrt{25} = 5 \quad \sqrt{225} = 15$$



Method of placing the decimal point for squares is the same as for that of multiplication.

In case of square roots, the given number is divided into several groups with two digits per group, counting from the decimal point in the direction of the first significant figure of a given number.

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If the value in the top group is less than 10, the given number is set between 1-10 on A scale. If it is over 10, it is set between 10-100.

Place the decimal point of the answer, taking one digit per group.

How to use Gauge mark "c"

There is a gauge mark "c" at point 1.128 on D scale, which is used for relation of circle diameter and area. It is derived from the following formula,

$$\text{area of circle } a = \frac{\pi}{4} d^2 \quad d = \text{diameter of circle}$$

$$\text{Changing the form, } a = \left(\sqrt{\frac{\pi}{4}} d \right)^2 = \left(d / \sqrt{\frac{4}{\pi}} \right)^2$$

Denominator $\sqrt{\frac{4}{\pi}}$ in parenthesis corresponds to the value of c.

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Example 13. Find the area of a circle with diameter of 2.3m.

Ans. 4.15m^2

Reference scale:



Fig. 13

A and D scales may be used as the "reference scale" Calculation of circle areas from many given diameters by the use of the gauge mark c at the same time is shown in the following example

Example. 14.

Find circle area, given diameters of 2m, 2.3m, and 2.5m respectively.

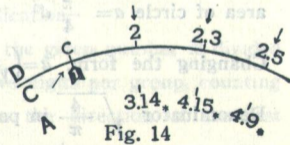


Fig. 14

8. Cubes and Cube Roots:

These are to be done between C and K scales.

Example 15. $2^3=8$, $\sqrt[3]{125}=5$

In the case of calculating cube roots, given number is divided into several groups with 3 digits per group, counting from decimal point in the direction of the first significant figure. According to the significant figure in the first group being one, two or three. the given number is set in the section 1~10, 10~100, and 100~1000 of K scale respectively.

The method of placing the decimal point is determined on the basis of one digit per group.



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8. Cubes and Cube Roots

These are to be done between L and K scales

Example 15. $2^3 = 8$ $115^3 = 1520875$

In the case of calculating cube roots, given number is divided into several groups with 3 digits per group, counting from the right.

According to the sign and figure in the first group, one, two or three, the given number is set in the section L, 10, 100 and 1000 of K scale respectively.

The method of placing the decimal point is determined on the basis of one digit per group.

2.5m, 2.3m, and 2.5m respectively.

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