

CONCISE INSTRUCTION MANUAL

NO. 28 N NO. 46 NO. 320

Scale Reading & Decimalization

The decimal point has no bearing upon the position of the number on the slide rule scale. Thus 1.8, 0.18, 18 and 180 etc., are located at the same position on the scales.

It is very important to place the decimal point in the proper position, otherwise, correct answers cannot be obtained. For practical calculations, the placing of the decimal point can be conducted according to common sense.

.....	setting of the scales
↑.....	setting of the cursor for reading the graduations
*.....	answer

Multiplication & Division

2-1 Multiplication

(a) By means of the C and D scales

Example 1 $18 \times 25 = 450$
 Procedure: Locate 18 on the D scale, and line up the index mark \uparrow on the C scale with it. Set the cursor to 25 on the C scale. The cursor shows the answer 450 on the D scale.

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

(b) By means of the CI and D scales

Example 3 $150 \div 12 = 1800$
 Procedure: Locate 150 on the D scale, and line up 12 on the CI scale with it. The index mark \uparrow on the C scale points to answer 1800 on the D scale.

(c) Successive Multiplication

Example 4 $3 \times 4 \times 5 = 60$
 Procedure: Locate 3 on the D scale, and line up 4 on the CI scale with it. Move the cursor to 5 on the C scale, which gives the answer 60 on the D scale.

2-2 Division

(a) By means of the C and D scales
Example 5 $850 \div 25 = 34$
 Procedure: Locate 850 on the D scale, and line up 25 on the C scale with it. The index mark \uparrow on the C scale points to answer 34 on the D scale.

(b) Successive Division

Example 6 $850 \div 25 \div 8 = 4.25$
 Procedure: Locate 850 on the D scale, and line up 25 on the C scale with it. Move the cursor to 8 on the CI scale and read the answer 4.25 on the D scale.

2-3 Combined Calculations of Multiplication & Division
Example 7 $3 \times 6 \div 5 = 3.6$
 Procedure: Locate 3 on the D scale and line up 5 on the C scale with it. Set the cursor to 6 on the C scale. Read the answer 3.6 on the D scale.

3. Proportions

3-1 Proportion

Values corresponding to each other on the C and D scales are of the same ratio (k), namely, they are in proportion.

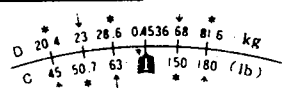
$$\frac{b}{a} = \frac{d}{c} = \frac{f}{e} = \dots = \frac{k}{1}$$

Proportions cover a wide field of computations, such as Conversion, Index, Proportional Allotment and Percentage. Proportions are calculated by "reference scale method" using the C and D scales.

(a) Conversion

Example 8 Fill the blanks in the following chart with 1 lb = 0.4536 kgs.

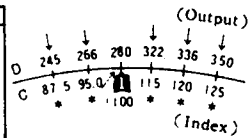
kg	(20.4)	23	(28.6)	68	(81.6)
lb	45	(50.7)	63	(150)	180



(b) Index

Example 9 Find index in the following chart.

	Output	Index
Jan.	280sets	100
Feb.	245 "	(87.5)
Mar.	266 "	(95.0)
Apr.	322 "	(115)
May	336 "	(120)
Jun.	350 "	(125)

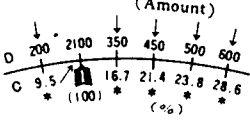


Procedure: Locate the values of output on the D scale and line up the index \uparrow (100) on the C scale with them.

(c) Percentage

Example 10 Fill in the percentage columns of the following chart.

	Amount	%
A	\$200	(9.5)
B	350	(16.7)
C	450	(21.4)
D	500	(23.8)
E	600	(28.6)
Total	\$2100	100

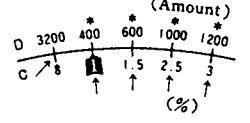


Procedure: Locate the total sum on the D scale and line up the index \uparrow on the C scale with it.

(d) Proportional Allotment

Example 11 Allot \$3,200.00 at the ratio of 1, 1.5, 2.5 and 3.

	Ratio	Amount
A	1	\$ 400
B	1.5	600
C	2.5	1,000
D	3	1,200
Total	8	\$3,200



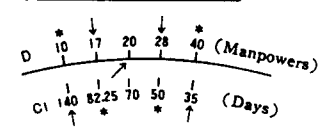
Procedure: Make the total sum of parts. Locate 400, 600, 1,000 and 1,200 on the D scale and line up 1, 1.5, 2.5, and 3 on the C scale with them.

3-2 Inverse Proportion

The CI and D scales are used for the calculation of inverse proportion.

Example 12 20 men can do a job in 70 days. Fill up blanks of the following table.

Manpowers	(10)	17	28	(40)
Days	140	(82.25)	(50)	35



Procedure: Locate 20 on the D scale, and line up 70 on the CI scale with it.

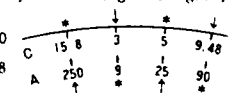
It is not necessary to specify scales to represent "manpowers" and "days" in the inverse proportion.

4. Squares & Square Roots

4-1 Square Values & Square Roots

- To obtain square x^2 , set the cursor to x on the C scale, and read the answer against it on the A scale.
- To find square root \sqrt{x} , set the cursor to x on the A scale, and read the answer against it on the C scale. In calculation of square roots, the given value is divided into two digit groups, counting from the decimal point to the direction of the first significant figure, and if the group including the first significant figure is smaller than 10, the position must be set in between the section of 1 ~ 10 and if larger than 10, between 10 ~ 100 on the A scale.
- The method of placing decimal point for squares is the same as that for multiplication and division. The decimal point is placed by considering each group as one digit.

Example 13 $3^2 = 9$, $9.48^2 = 90$
 $\sqrt{25} = 5$, $\sqrt{250} = 15.8$

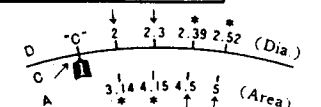


4-2 Use of Gauge Mark "c"

The gauge mark "c" at 1.128 on the D scale is used for problems involving diameters and areas of circles.

Example 14 Fill up the blanks in the following chart.

Area of circle	(3.14)	(4.15)	4.5	5
Dia of circle	2	2.3	(2.39)	(2.52)



Use of Gauge Mark "π"

The mark "π" on the C and D scales shows 3.141592... ratio of circumference of a circle to its diameter. Multiply 3.141592 by diameter, then read the circumference.

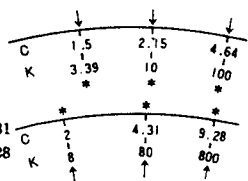
5. Cubes & Cube Roots

- Cube x^3 is obtained on the K scale against x on the C scale.
- When calculating the cube root of the given value x , x is divided into groups of three digits counting from the decimal point to the direction of the first significant figure, and depending on the number of significant figure, 1, 2 or 3 in the group in which the first significant figure is included, x is set in the section 1~10, 10~100 or 100~1000 of the K scale respectively.

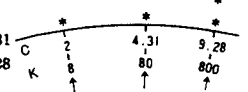
Example 15 $1.5^3 = 3.39$

$$2.15^3 = 10$$

$$4.64^3 = 100$$



Example 16 $\sqrt[3]{8} = 2$
 $\sqrt[3]{80} = 4.31$
 $\sqrt[3]{800} = 9.28$



6. Profit Calculation

Cost accounting and calculations of selling prices and profit percentage are frequently carried out in the business circle.

There are two conceivable ways of the profit percentage, namely, the profit to the cost and that to the selling price.

6-1 Calculation based on the cost

Example 17 What would be the selling price of a commodity, the cost of which is \$120 if you expect the 25% profit? Ans: \$150

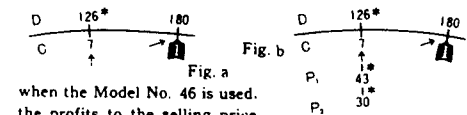
(a) By cooperative use of the C and D scales
 The selling price is 1.25 times of the cost.
 $(1 + 0.25) = 1.25$

(b) By cooperative use of P₁ and P₂ scales
 (Model No. 46) Locate 25 on the profit percentage to the cost on the P₁ scale, and the selling price 150 is read on the D scale to 25.
 At the same time, 20, the profit percentage to the selling price is also read on the P₂ scale.

6-2 Calculation based on the selling price

Example 18 What would be the cost being 70% of the selling price of \$180?

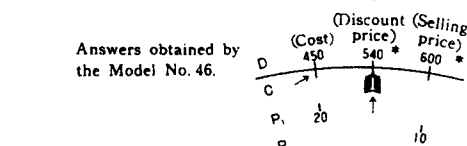
(a) By means of the C and D scales (Fig. a)
 (b) By means of the P₁ and P₂ scales (Fig. b)



when the Model No. 46 is used, the profits to the selling price and the cost can be obtained at the same time. 30% profit on the P₂ scale to the selling price, 43% profit on the P₁ scale to the cost.

6-3 Applied Example

Example 19 What would be the selling price of a commodity, the cost of which is \$450, in order to get a 20% profit to the cost even if we undersell it by 10%? What would be its discount price?
 Ans: selling price \$600 discount price \$540



Answers obtained by the Model No. 46.

As seen from the above examples, the Model No. 46 is a helpful aid to various profit calculations.