



THE HELIX (UNIVERSAL) CO LTD

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REGAL SLIDE RULE SERIES

INSTRUCTION SHEET

THE SCALES AND THEIR USES

1. C and D scales. These fundamental scales are identical and are used for all operations involving Multiplication and Division.
2. CF and DF scales. These are C and D scales "folded" at $\sqrt{10}$ and are used with C and D scales to decrease the number of operations.
3. CI scale. This is an "inverted" C scale and is used with C scale in reading directly the reciprocal of a number.
4. CIF scale. This is a CI scale "folded" at $\sqrt{10}$ and is used with CF scale in the same relation as CI scale with C scale.
5. DI scale. This is an "inverted" D scale and is used with Sine (S) and Tangent (T) scales in reading directly the reciprocal of a number.
6. S scale. This scale gives the Sines and Cosines of angles.
7. T scale. This scale gives the Tangents and Cotangents of angles.
8. A and B scales. These scales are used to obtain squares and square roots when used in conjunction with C and D scales.
9. K scale. This scale is used to obtain cubes and cube roots.
10. L scale. This scale is used in conjunction with D scale in obtaining directly the mantissa of the common logarithm of a number.
11. LL scale. This scale is used in reading the natural logarithms of numbers.
12. LL₀₁, LL₀₂ and LL₀₃ scales. These scales are used with C and D scales in finding the powers of numbers less than 1.

OPERATIONS OF THE SLIDE RULE

- (a) **Multiplication.** e.g. To multiply 15 by 30: set 1 on the C scale to 15 on the D scale. Move the cursor to 30 on C scale and read the answer, 450, on the D scale. In some cases the answer may be "off-scale" in which case the following procedure must be adopted. e.g. To multiply 28 by 53: set 10 on the C scale to 28 on D scale. Move the cursor to 53 on C scale and read the answer, 1484 on the D scale.
- (b) **Division.** e.g. To divide 11.6 by 6.75: To 116 on D scale move 675 of C scale and read the answer, 1.72 opposite 10 on the C scale. To obtain the answer to the following the procedure would be as follows: e.g. $\frac{63.1 \times 15 \times 2.4}{27.3 \times .72}$. "x" represents the intermediate answers. Set 273 of C scale at 631 on D scale; move cursor to 1 on C scale and 'x' (intermediate answer) is read on D scale; set 15 on C scale against 'x'; move cursor to 72 on C scale and 'x' is read opposite this on D scale; set 24 of C scale to 'x', move cursor to 1 on C scale; the final answer, 115.5 can now be read on D scale.
- (c) **Squares and Square Roots.** To obtain the square of a number set the cursor over the number to be squared on the D scale and the result can be read direct on the A scale. Conversely, to arrive at the square root of a number place the cursor over the appropriate number on A scale and the square root can be read directly on scale D.
- (d) **Cubes and Cube Roots.** These are obtained in precisely the same way as squares and square roots except that scales D and K are used.
- (e) **Reciprocal.** Opposite any number on C scale its reciprocal can be read on CI scale.
- (f) **Sine of an Angle.** Set the cursor over the appropriate number of degrees on the S scale and the answer can be read direct from the A scale.
- (g) **Cosine of an Angle.** To obtain the Cosine one reads the sine of its complement, e.g. $\text{Cos } 58^\circ = \text{Sin } (90^\circ - 58^\circ) = \text{Sin } 32^\circ = .5299$.
- (h) **Tangent of an Angle.** Set the cursor over the appropriate number of degrees on the T scale and the answer can be read direct from the C scale.
- (i) **Cotangent of an Angle.** To obtain the Cotangent one sets the cursor over the required angle on T scale and reads the answer directly on the CI scale, e.g. $\text{Cot } 20^\circ = \frac{1}{\text{Tan } 20^\circ} = 2.747$. The Cotangent is the reciprocal of the tangent.

(j) **Logarithms.** Slide rules only give the mantissa on decimal part of the common logarithm of a number and the characteristic or integral part can be determined by inspection. The scales used are the L, C and D scales. e.g. $\text{Log } 27.5 = 1.439$. Set cursor at 2.75 on D scale and read .439 on L scale directly opposite. Add the characteristic 1 and the answer is 1.439.

(k) **Fundamental calculations**

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|-----|---------------------------|---------------------------------------|-----------|---------------------------------------------------------------------------------------------|
| 1. | $a^2b = x$ | $1.5^2 \times 3.14$ | $= 7.07$ | Set left index of C scale opposite 1.5 on D scale; opposite 3.14 on B read 7.07 on A scale. |
| 2. | $a^2b^2 = x$ | $72^2 \times 0.45^2$ | $= 1050$ | Set right index of C opposite 72 on D. Opposite 0.45 on C read 1050 on A scale. |
| 3. | $\frac{a^2}{b} = x$ | $\frac{11^2}{4.9}$ | $= 24.7$ | Opposite 11 on D, set 4.9 on B. Opposite right index of C read 24.7 on A scale. |
| 4. | $\frac{a^2b}{c} = x$ | $\frac{8.05^2 \times 0.34}{51.5}$ | $= 0.428$ | Opposite 8.05 on D, set 51.5 on B. Opposite 0.34 on B, read 0.428 on A scale. |
| 5. | $\sqrt{ab} = x$ | $\sqrt{1.83 \times 0.26}$ | $= 0.69$ | Opposite 1.83 on A, set index of B. Opposite 0.26 on B, read 0.69 on D. |
| 6. | $\frac{a}{\sqrt{b}} = x$ | $\frac{79.3}{\sqrt{2.35}}$ | $= 51.7$ | Opposite 79.3 on D, set 2.35 on B. Opposite index of C, read 51.7 on D. |
| 7. | $\frac{a\sqrt{b}}{c} = x$ | $\frac{31.93 \times \sqrt{147}}{3.2}$ | $= 120.9$ | Opposite 31.93 on D, set 3.2 on C. Opposite 147 on A, read 120.9 on D. |
| 8. | $ab^3 = x$ | 0.65×2.3^3 | $= 7.91$ | Opposite 0.65 on K, set index of C. Opposite 2.3 on C, read 7.91 on K. |
| 9. | $\frac{ab^3}{c^3} = x$ | $\frac{1.95 \times 6.08^3}{3.9^3}$ | $= 7.39$ | Opposite 1.95 on K, set 3.9 on C. Opposite 6.08 on C, read 7.39 on K. |
| 10. | $\sqrt{a^3b^3} = x$ | $\sqrt{9.42^3 \times 4.12^3}$ | $= 242$ | Opposite 9.42 on A, set index of B. Opposite 4.12 on B, read 242 on K. |

NOTE: The foregoing instructions are intended as a guide only to the general use of Regal Slide Rules. It is possible that the actual operations differ slightly according to the scale layout on individual Slide Rules but it is felt that it should not be too problematical to adapt the procedure which is applicable in each case.

REGAL SLIDE RULES SERIES

Ref. No.	Length	Scales	Side Scale	User
A102S	10"	S. K. A. B. CI. C. D. L. T ₁		Student rule for beginners, Secondary and Grammar School students.
A103W	10"	A. B. CI. C. D. K. S. L. T ₁	c.m. inches	High School, College, Universities, Mechanical and Industrial Engineers, Constructors, Foremen, Technicians, Craftsmen, Architects, Chemists.
F106	10"	K. DF. CF. CIF. CI. C. D. A. T ₂ , T ₁ L. S.	c.m.	High School, College, Universities, Mechanical and Industrial Engineers, Constructors, Foremen, Technicians, Craftsmen, Architects, Chemists.
A101	10"	LL ₃ LL ₂ LL ₁ A. B. BI. CI. C. D. DI. K. LL ₀ T ₂ T ₁ L. S.	c.m.	Students, Chemists, Engineers, Electricians, Scientists, Constructors, Mathematicians, Physicists.
A13	10"	LL ₂ A. B. C. D. LL ₃	c.m.	Log-Log rule for all Students, Chemists, Engineers, Electricians, Scientists, Constructors, Mathematicians, Physicists.
A50S	5"	A. B. CI. C. D. K. S. L. T.	c.m. inches	Student rule for beginners, Secondary and Grammar School Students.
A50LL	5"	LL ₃ LL ₂ A. B. CI. C. D. K. LL ₁ T ₂ T ₁ L. S.	c.m.	Log-Log rule for all Students, Chemists, Engineers, Electricians, Scientists, Constructors, Mathematicians, Physicists.

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