# Introduction

Before you begin, make sure you and your partner each have a slide rule. It is important that you do each problem completely before moving on, and compare with your partner. The point is not just to understand the principle behind each computation, but also to practice the mechanics of how to do each computation efficiently.

# 1 Reading the D scale

For each number listed, simply move the indicator to the point on D corresponding to the number. Confirm your answers with your partner.

| | | | |
|---|---|---|---|
| 27 | 43 | 92 | 143 |
| 56 | $\pi$ | 365 | 118 |

# 2 Multiplication on C/D

Multiply $x \times y$ by placing 1 on C above $x$ on D, then placing the indicator above $y$ on C, then reading the answer from the indicator on D. Choose the correct 1 on C so that your answer is on the scale.

Write your answers down, keeping only 2 significant figures. Compare with your partner as you go, then check them against a calculator.

| | | |
|---|---|---|
| $2 \times 4$ | $2.2 \times 4.3$ | $2.2 \times \pi$ |
| $6 \times 7$ | $8.8 \times 3.1$ | $1.53 \times 5.3$ |

# 3 Scientific notation

Compute these products using the same method. Give your answer in scientific notation keeping 2 significant figures.

| | |
|---|---|
| $(3.2 \times 10^{1})(4.1 \times 10^{3})$ | $(1.14 \times 10^{-8})(\pi \times 10^{3})$ |
| $(6.1 \times 10^{23})(3.1 \times 10^{8})$ | $(4.9 \times 10^{0})(3.3 \times 10^{-1})$ |

# 4 Tax day

Indiana's sales tax is 7%. Find the correct tax on each of these sales, rounding up to the nearest cent.

| | | |
|---|---|---|
| \$53.03 | \$2.68 | \$34.50 |
| \$22.53 | \$1.86 | \$45.00 |

Was the slide rule precise enough for this?

# 5 Reciprocals

Move scale C directly over D. Find $1/x$ by moving the indicator to $x$ on C, then reading the answer off of CI.

| | | | | |
|---|---|---|---|---|
| 5 | 7.4 | 1.6 | $\pi$ | 5.7 |

What two numbers appear at the same place on the C and the CI scales?

# 6 Division

Compute $x/y$ by moving $y$ on C above 1 on D. Then move the indicator to $x$ on C, and read your answer on D. (You can think of this as computing $(1/y) \times x$.

| | | |
|---|---|---|
| 2.7/1.43 | 7.8/4.9 | 3.2/8.1 |
| 4.3/9.8 | 22/7 | $\pi/4$ |

# 7 Compound operations

Compute each number without writing down any intermediate values (you may store numbers on the slide rule by placing your indicator above them).

$$\frac{5.7 \times 3.4}{8.2} \qquad \frac{9.4 \times 4.8}{7}$$

# 8 Reading the A scale

Move your indicator above each number indicated on the A scale. Notice that 49 and 4.9 are two different points on the A scale; they are not interchangeable.

| | | | | |
|---|---|---|---|---|
| 2 | 4.9 | 110 | 16 | $3.6 \times 10^{8}$ |
| $\pi$ | 49 | 11 | 680 | $3.6 \times 10^{5}$ |

## 9 Squares

To find $x^2$ move your indicator to $x$ on D. Read your answer on A.

$$2^2 \quad 4^2 \quad \pi^2 \quad 4.7^2 \quad 9.5^2$$

## 10 Square roots

Move your indicator to $x$ on A. Read $\sqrt{x}$ on D.

$$\sqrt{16} \quad \sqrt{10} \quad \sqrt{\pi} \quad \sqrt{45} \quad \sqrt{7800}$$

## 11 Combine your skills

Use what you have learned to compute each of these numbers. Compare with your partner before checking with a calculator.

$$5 \times \sqrt{\frac{3.4 \times 1.7}{14}} \qquad 4\pi\left(\frac{7.8 \times 5.5}{6.7}\right)^2$$

## 12 Find areas of circles from diameters

Set $\pi$ on B under 4 on A. To find the area of a circle with diameter $x$, move your indicator to $x$ on D and read your answer on B. Find the area of a circle of each diameter. Then, explain why this works.

$$f(4.2) \quad f(1.7) \quad f(8.3) \quad f(3.8)$$

## 13 Reflect

Discuss each of these questions with your partner:

- What types of computations are harder with a slide rule compared to a calculator? What types of computations are easier with a slide rule?
- Imagine you are setting up a computation which you know will be computed using a slide rule. What types of factoring or grouping would you do before going to the slide rule? Would you prefer your numbers to be in scientific notation, engineering notation, or fixed-point notation?
- Imagine you don't have access to an electronic computer, but you do have paper and a slide rule. What types of computations would you prefer to do by hand on paper, and what types would you prefer to use a slide rule for?
- Suppose you are trying to make your own 10-inch slide rule. How many inches from the end should the 2 mark on D be? How would you construct the other scales?

## 14 Compute logarithms

Find the integer part of $\log_{10} x$ by counting decimal places. Then find the fractional part of $\log_{10} x$ using the L scale; how you do this will depend on your specific slide rule. For example, $\log_{10} 470 = 2 + \log_{10} 4.7 = 2.67$. Check your answers using a calculator.

$$\log_{10} 1.8 \quad \log_{10} 5890 \quad \log_{10} 0.0052$$

## 15 Compute sines

Find the sine scale on your slide rule. Double check that $\sin(45°) = 0.71$. Then compute each of these:

$$4\sin(50°) \quad \tfrac{1}{2}\sin(32°) \quad \sin^2(76°)$$

## 16 Challenges

Figure out how you would compute:

$$173^{2/3} \quad \cos(76°) \quad \sin(3°) \quad 10^{4.36}$$

## 17 Explore

If your slide rule has any scales you have not used, see if you can figure out how to use them. Ask for help if you can't figure out one of the scales.