Make Your Own Slide Rule

Teaching Suggestions

This performance task is designed to assess the specific expectations covered in Chapter 7.

The following Math Process Expectations can be assessed.

- Problem Solving
- Reasoning and Proving
- Reflecting
- Selecting Tools and Computational Strategies
- Connecting
- Representing
- Communicating

Level 3 Sample Response

a)

x	$\log x$	$30 \log x$
1	0.00	0.00
2	0.30	9.03
3	0.48	14.31
4	0.60	18.06
5	0.70	20.97
6	0.78	23.34
7	0.85	25.35
8	0.90	27.09
9	0.95	28.63
10	1.00	30.00

e) Move the 1 on the first strip over the 2 on the second strip. Notice that the 2 on the first strip is over the 4 and the 3 is over the 6. This suggests multiplication. To divide, work the multiplication backwards.
Use of a logarithmic scale between numbers allows for decimals or larger numbers.

g) Example: Calculate 2.3×3.4.
Move the 1 on the top strip to align with 2.3 in the bottom strip.
Locate 3.4 on the top strip. It is aligned with 7.8 on the bottom strip.
This is the answer.
Example: Calculate $\dfrac{4.5}{7.8}$.
Move the 7.8 on the top strip over 4.5 on the bottom strip.
Locate the 1 on the top strip This is aligned with 5.8 on the bottom strip.
We know that the correct answer is near 0.5, so adjust the decimal place to get 0.58.

h) There are many slides used for a simple slide rule. The two we are simulating are the C and D scale. A cursor is often used to overlay all the scales to be assist you in being more accurate. In order to find squares or square roots we need a new scale (B) that is reduced to half of the D's length and printed twice. The exponent for a square root is $\frac{1}{2}$. It is necessary to decide which side of the scale to use. For example, $\sqrt{144} = 12$ and $\sqrt{1.44} = 1.2$ use one side of the scale while $\sqrt{144} \doteq 3.8$ uses the other side. Good estimation skills are necessary.

Example: Calculate $\sqrt{4500}$.

- You will notice that the B scale has two similar halves. The first step is to decide which half to use to find a square root.
- The left half is used to find the square root of numbers with odd numbers of digits or leading zeros after the decimal point. The right half is used for numbers with even numbers of digits or leading zeros. Since 4500 has an even number of digits, then we'll use the right half of the scale.
- Move the cursor to 4.5 on the right half of the B scale.
- The cursor is now at 6.7 on the C scale.
- We know that 70² = 3600, which is in the ballpark of 4500. Therefore, we adjust the decimal point to get a result of 67.

For cubes and cube roots, another scale (K) is necessary. It is the same as the D scale reduced to a third and printed three times. The exponent for a cube root is $\frac{1}{3}$.

Example: Calculate $\sqrt[3]{4500}$.

- You will notice that the K scale has three similar thirds. The first step is to determine which third to use to find the cube root.
- The first third is used to find the cube root of numbers with one digit. You can cycle through the thirds, increasing the number of digits by one for each third, to find which part to use.
- For the value of 4500, which has 4 digits, we cycle through the thirds and find that we would use the first third.
- Move the cursor to 4.5 on the third third of the K scale.
- The cursor is now at 1.65 on the D scale.
- We can take a guess that the correct answer is around 10. The cube of 10 is 1000 and the cube of 20 is 8000. Thus we know that the correct answer is between 10 and 20, therefore we can move the decimal place and get the correct result of 16.5.