We used to calculate logarithms by looking them up on a log table as shown below...

Table 3 / Common Logarithms of Numbers

N	0	1	2	3	4	5	6	7	8	9
10	0000	0043	0086	0128	0170	0212	0253	0294	0334	0374
11	0414	0453	0492	0531	0569	0607	0645	0682	0719	0755
12	0792	0828	0864	0899	0934	0969	1004	1038	1072	1106
13	1139	1173	1206	1239	1271	1303	1335	1367	1399	1430
14	1461	1492	1523	1553	1584	1614	1644	1673	1703	1732

...when the number we were looking for wasn't listed, we used a process called interpolation to calculate the value of the logarithm. Today, let's use our scientific calculators...

Ex 1 Use a calculator

1a) $\log_{10} 3.8$ common logs

≈ 0.5798

1b) $\log 97{,}500 \approx 4.9890$

1c) $\log 0.000542 \approx -3.2660$

Ex 2 $\log_{10} y = 0.8995$

$10^{0.8995} = y$

$y \doteq 7.9341$

2b) $\log_{10} y = 2.4825$

$10^{2.4825} = y$

$y = 303.7386$

Ex 3) Find the value of each expression to 4 significant digits.

3a) $\sqrt[5]{493} = 493^{\frac{1}{5}} = 493^{0.2}$ $\boxed{y^x}$

493 $\boxed{y^x}$ 0.2 = 3.4560

3b) $(0.173)^6 = 0.000002681$

EX 4) Solve $3^{2x} = 5$

$$\log 3^{2x} = \log 5$$

$$\frac{2x \cdot \log 3}{2 \log 3} = \frac{\log 5}{2 \log 3}$$

$$x = \frac{\log 5}{2 \log 3}$$

$$x = \frac{0.6990}{2(0.4771)}$$

$$x = \frac{0.6990}{0.9542}$$

$$x \approx 0.7326$$

Change of Base Formula

$$\log_a x = \frac{\log_b x}{\log_b a}$$

Ex 5) Find $\log_4 7$

$$\frac{\log_{10} 7}{\log_{10} 4}$$

$$\frac{0.8451}{0.6021}$$

$$1.4036$$

Check: $\log_4 7 \approx 1.4036$

$$4^{1.4036} \approx 7$$

$$\approx 6.999248354$$