Name key Date_____ Hour_____

9.4 – Common Logarithms

Alg 2 Trig G – day 1

Logarithms with base 10 are generally called **COMMON LOGARITHMS**. $y = \log_{10} x$

COMMON LOGS are usually written *without* the subscript 10.

$\boxed{y = \log_{10} x}$ **is equivalent to** $\boxed{y = \log x}$

Lucky for you, most scientific calculators have a $\boxed{\text{LOG}}$ key for evaluating common logs!

Use a calculator to evaluate the expression to 4 decimal places.

1. $\log 14$

1.1461

2. $\log 0.85$

−0.0706

3. $\log(-10)$

$\emptyset$

4. ***Solve the logarithmic equation*:**
The amount of energy (*E*) in ergs that an earthquake releases is related to its Richter scale magnitude (*M*) by the equation $\log E = 11.8 + 1.5M$. In 2011, an earthquake in Japan measured 8.9 on the Richter scale. How much energy did this earthquake release?

$\log E = 11.8 + 1.5(8.9)$

$\log_{10} E = 25.15$

$10^{25.15} = E$

$\boxed{E = 1.41 \times 10^{25} \text{ ergs}}$

Solve the equation using logs (and your calculator!)

5. $5^x = 62$

$\log 5^x = \log 62$

$x \log 5 = \log 62$

$x = \dfrac{\log 62}{\log 5}$

$\boxed{x = 2.5643}$

6. $3^x = 17$

$\log 3^x = \log 17$

$x \cdot \log 3 = \log 17$

$x = \dfrac{\log 17}{\log 3}$

$\boxed{x = 2.5789}$

CHANGE OF BASE FORMULA: $\boxed{\log_a n = \dfrac{\log n}{\log a}}$

Express each in terms of common logs. Then approximate its value to four decimal places.

7. $\log_3 18$

$\dfrac{\log 18}{\log 3}$

$\boxed{2.6309}$

8. $\log_5 16$

$\dfrac{\log 16}{\log 5}$

$\boxed{1.7227}$

Solve each equation or inequality.

9. $6^{x+2} = 18$

$\log 6^{x+2} = \log 18$

$(x+2)\log 6 = \log 18$

$x + 2 = \dfrac{\log 18}{\log 6}$

$x + 2 = 1.6131$

$\boxed{x = -0.3869}$

10. $6.5^{2x} \geq 200$

$(2x)\log 6.5 \geq \log 200$

$2x \geq \dfrac{\log 200}{\log 6.5}$

$2x \geq 2.8306$

$\boxed{x \geq 1.4153}$