Name:
Date:
Revisiting Prerequisite Knowledge for fractions of LOGS

1. List the first 8 square numbers:

2. List the square root of the first 8 square numbers:

3. What makes a number a square number?

4. List the first 5 cubic numbers:

5. List the cubed root of the first 5 cubic numbers:

6. What makes a number a cubic number?

7. List the first 3 biquadratic numbers (Numbers that can be represented as a whole number to the fourth power, n^4):

8. List the fourth root of the first 3 biquadratic numbers:

Name:
Date:

Fractions of LOGS

Required Materials: 3 x LOG 2, 2 x LOG 5, 2 x LOG 4, 2 x LOG 8, LOG 10, LOG 16, LOG 25, LOG 64, and LOG 100

<u>Part I</u>: Discovering Log Properties

1. What LOG is half the height of a LOG 25?

   This can be written this using the following notation: $\frac{1}{2}$ • LOG 25 = LOG_____

2. What LOG is half the height of a LOG 100?

   This can be written this using the following notation: $\frac{1}{2}$ • LOG 100 = LOG_____

3. What LOG is half the height of a LOG 4? $\frac{1}{2}$ • LOG 4 = LOG_____

4. What LOG is half the height of a LOG 64? $\frac{1}{2}$ • LOG 64 = LOG_____

5. Describe (in symbols, works or both) how you can determine the argument:

   $$\frac{1}{2} \bullet \mathrm{LOG}\, A = \log \_\_\_$$

<u>Part II</u>: Applying knowledge

We have multiple ways to think about and explain this result.

1) An example of multiple LOGS where the multiple happens to be a fraction:

   We know that: **B • LOG A = LOG A^B,**

   Applying this we get: $\frac{1}{2} \bullet \mathrm{LOG}\ 25 = \mathrm{LOG}\ 25^{\frac{1}{2}}$

2) We also know from lining up and looking at our logs that:
   Two LOG 5s are the same height as a LOG 25.
   (Or that a LOG 5 is half the height of a LOG 25.)

Putting these two ways of thinking about $\frac{1}{2} \bullet \text{LOG } 25$ together we can see that:

$\frac{1}{2} \bullet \text{LOG } 25 = \text{LOG } 25^{\frac{1}{2}} = \text{LOG } 5$ and by extension $25^{\frac{1}{2}} = \sqrt{25} = 5$

Raising a quantity, a, to the $\frac{1}{2}$ power is the same as taking the square root of the quantity: $a^{\frac{1}{2}} = \sqrt{a}$

Examples: $25^{\frac{1}{2}} = \sqrt{25} = 5$ $\quad 100^{\frac{1}{2}} = \sqrt{100} = 10$ $\quad 9^{\frac{1}{2}} = \sqrt{9} = 3$

Part III: Generalizing

6. What LOG is half the height of a LOG 16?

   This can be written this using the following notation: $\frac{1}{2} \bullet \text{LOG } 16 = \text{LOG } 16^{\frac{1}{2}} = \text{LOG}$ ___

7. What LOG is one fourth the height of a LOG 16?

   This can be written this using the following notation: $\frac{1}{4} \bullet \text{LOG } 16 = \text{LOG } 16^{?} = \text{LOG}$ ___

8. What LOG is one third the height of a LOG 8? $\frac{1}{3} \bullet$ LOG 8 = LOG_____ = LOG_____

9. What LOG is one third the height of a LOG 64? $\frac{1}{3} \bullet$ LOG 64 = LOG_____ = LOG_____

10. What LOG is $\frac{1}{3}$ the height of a LOG A? $\frac{1}{3} \bullet \text{LOG } A = \text{LOG } A^{\frac{1}{3}} = $ LOG_____

    How large is log $A^{\frac{1}{3}}$? → *It is $\frac{1}{3}$ the size of log A.*

    How large is log $\sqrt[3]{A}$? → *It is $\frac{1}{3}$ the size of log A.*

11. What LOG is $\frac{1}{n}$ the height of a LOG A? $\frac{1}{n} \bullet \text{LOG } A = \text{LOG } A^{\frac{1}{n}} = $ LOG_____

    How large is log $A^{\frac{1}{n}}$? → *It is $\frac{1}{n}$ the size of log A.*

    How large is log $\sqrt[n]{A}$? → *It is $\frac{1}{n}$ the size of log A.*

Part IV: Practice & Application

12. What LOG is $\frac{1}{3}$ the height of a LOG 125? $\frac{1}{3} \bullet$ LOG 125 = LOG_____

13. What LOG is $\frac{1}{5}$ the height of a LOG 32? $\frac{1}{5} \bullet$ LOG 32= LOG_____

14. What LOG is $\frac{1}{5}$ the height of a LOG 1024? $\frac{1}{5} \bullet$ LOG 1024= LOG_____

15. What LOG is $\frac{1}{10}$ the height of a LOG 1024? $\frac{1}{10} \bullet$ LOG 1024= LOG_____

16. What LOG is $\frac{1}{2}$ the height of a LOG 81? $\frac{1}{2} \bullet$ LOG 81= LOG_____

17. What LOG is $\frac{1}{4}$ the height of a LOG 81? $\frac{1}{4} \bullet$ LOG 81= LOG_____

18. What LOG is $\frac{1}{4}$ the height of a LOG 625? $\frac{1}{4} \bullet$ LOG 625 = LOG_____

19. What LOG is 20% the height of a LOG 625? $.2 \bullet$ LOG 625 = LOG_____

20. What LOG is $\frac{1}{\pi}$ the height of a LOG 9? $\frac{1}{\pi} \bullet$ LOG 9= LOG_____

21. What LOG is $\frac{1}{☺}$ the height of a LOG ☹? $\frac{1}{☺} \bullet$ LOG ☹= LOG_____

Make up your own! Make up three that work out to a with a LOG whole number argument:

22. What LOG is ________ the height of a LOG _____? _____ • LOG _____ = LOG_____

23. What LOG is ________ the height of a LOG _____? _____ • LOG _____ = LOG_____

24. What LOG is ________ the height of a LOG _____? _____ • LOG _____ = LOG_____

Evaluate

25. $8^{\frac{1}{3}}$

26. $10000000^{\frac{1}{7}}$

27. $125^{\frac{1}{3}}$

28. $3^{\frac{1}{4}}$