Name:
Date:

Do Now

1. How long is your writing utensil in inches?

2. How long is your writing utensil in centimeters?

3. Did you get the same answer to #1 and #2? How is it possible that the length of a writing utensil can be represented using two different numbers?

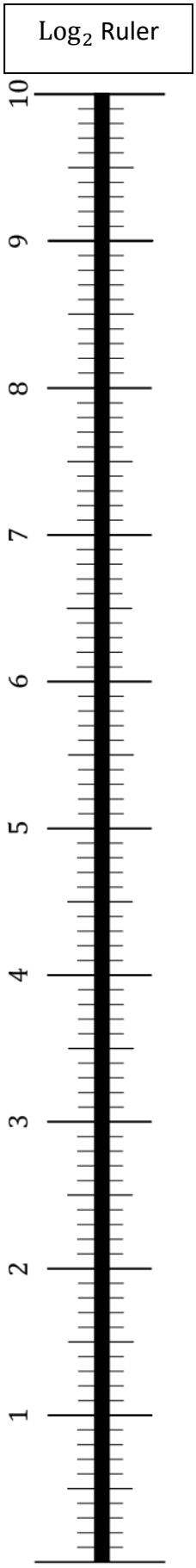
4. Can you give another example of how we can measure the same thing in two different ways and get different answers?

Name:
Date:

LOGS & Scale

Required Materials: LOG 2, LOG 4, LOG 8, LOG 10, LOG 16, LOG32, LOG 40, LOG 64, and LOG 100

Part I: To right is what we call a "Log Base 2" ruler, typically written as "Log_2"ruler. We refer to the subscript (the small number) as the base. You use it just like a normal ruler: you line up the bottom of your LOG with the zero and measure the height by reading the number off the ruler.



1. What is the measure of a Log 2 on the Log_2 ruler?
   (Ignore the nub that connects LOGs when measuring them.)

   This can be written this using the following notation: $\text{Log}_2 2 =$ ____

2. What is the measure of a Log 4 on the Log_2 ruler?

   This can be written this using the following notation: $\text{Log}_2 4 =$ ____

3. What is the measure of a Log 8 on the Log_2 ruler?

   This can be written this using the following notation: $\text{Log}_2 8 =$ ____

4. What is the measure of a Log 16 on the Log_2 ruler? $\text{Log}_2 16 =$ ____

5. What is the measure of a Log 32 on the Log_2 ruler? $\text{Log}_2 32 =$ ____

6. What is the measure of a Log 10 on the Log_2 ruler? $\text{Log}_2 10 =$ ____
   (It's okay to estimate if you have to)

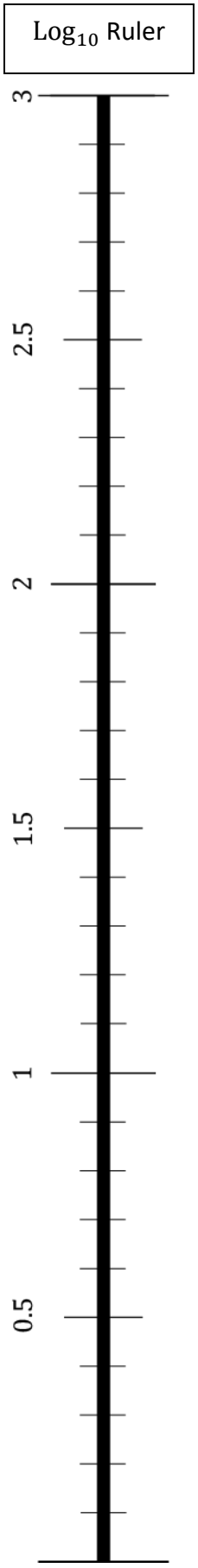
7. What is the measure of a Log 40 on the Log_2 ruler? $\text{Log}_2 40 =$ ____
   (It's okay to estimate if you have to)

8. Which numbers measured out to whole numbers? Which numbers didn't? What kinds of numbers are easiest to measure using a Log_2 ruler?

9. Give an example of at least two additional numbers that would measure out to a whole number using a Log_2 ruler:

   Give an example of at least two numbers that would NOT measure out to a whole number using a Log_2 ruler:

Part II: To right is what we call a "Log Base 10" ruler, typically written as "Log_{10}"ruler. We refer to the subscript (the small number) as the base. You use it just like a normal ruler: you line up the bottom of your LOG with the zero and measure the height by reading the number off the ruler.



10. What is the measure of a Log 10 on the Log_{10} ruler?

    This can be written this using the following notation: $\text{Log}_{10}\,10 =$ ____

11. What is the measure of a Log 100 on the Log_{10} ruler?

    This can be written this using the following notation: $\text{Log}_{10}\,100 =$ ____

    This can also be written as: $\text{Log}_{10}\,10^2 =$ ____

12. Even though we don't have one, what would be the measure of LOG 1000 on the Log_{10} ruler? $\text{Log}_{10}\,1000 = \text{Log}_{10}\,10^3 =$ ____

13. Even though we don't have one, what would be the measure of LOG 10000 on the Log_{10} ruler? $\text{Log}_{10}\,10000 =$ ____

14. What is the measure of a Log 2 on the Log_{10} ruler? $\text{Log}_{10}\,2 =$ ____
    (It's okay to estimate if you have to)

15. What is the measure of a Log 16 on the Log_{10} ruler? $\text{Log}_{10}\,16 =$ ____

16. What is the measure of a Log 40 on the Log_{10} ruler? $\text{Log}_{10}\,40 =$ ____

17. Which numbers measured out to whole numbers? Which numbers didn't? What kinds of numbers are easiest to measure using a Log_{10} ruler?

18. Give an example of at least two additional numbers that would measure out to a whole number using a Log_{10} ruler:

    Give an example of at least two numbers that would NOT measure out to a whole number using a Log_{10} ruler:

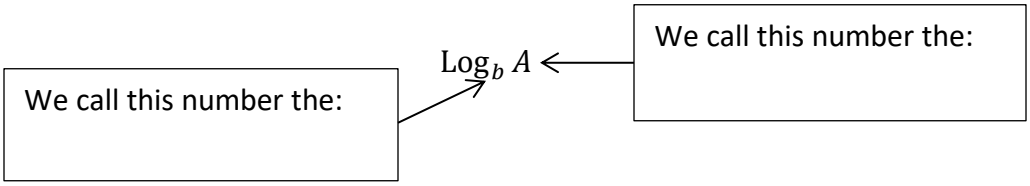
Part III: Generalizing

19. Arguments that are powers of ____ will measure out to be whole numbers on a Log_2 ruler.

20. Arguments that are powers of ____ will measure out to be whole numbers on a Log_{10} ruler.

21. Arguments that are powers of ____ will measure out to be whole numbers on a Log_n ruler.

22. Vocabulary:



Part IV: Practice & Application

23. $\text{Log}_{10} 10 =$ ____

24. $\text{Log}_{10} 10^5 =$ ____

25. $\text{Log}_2 2^5 =$ ____

26. $\text{Log}_2 2^{18} =$ ____

27. $\text{Log}_{10} 100000 =$ ____

28. $\text{Log}_2 128 =$ ____

29. $\text{Log}_5 5 =$ ____

30. $\text{Log}_5 5^8 =$ ____

31. $\text{Log}_5 5^{458} =$ ____

32. $\text{Log}_5 5^2 =$ ____

33. $\text{Log}_5 25 =$ ____

34. $\text{Log}_5 125 =$ ____

35. $\text{Log}_3 9 =$ ____

36. $\text{Log}_3 27 =$ ____

37. $\text{Log}_7 49 =$ ____

38. $\text{Log}_4 64 =$ ____

Part V: More Challenging Questions

39. $\text{Log}_x x =$ ____

40. $\text{Log}_{10} 10^{4.5} =$ ____

41. $\text{Log}_Q Q^6 =$ ____

42. $\text{Log}_2 4^3 =$ ____

43. $\text{Log}_e e^{rt} =$ ____

44. $\text{Log}_{10} 10^{\text{Log}_{10} 10} =$ ____

45. Describe in words how you would build or draw a Log_5 ruler if you were given a Log 5 piece.