Name: _____ Group Members: _____

Exploration 8-4a: Log-log and Semilog Graph Paper

Date: _____

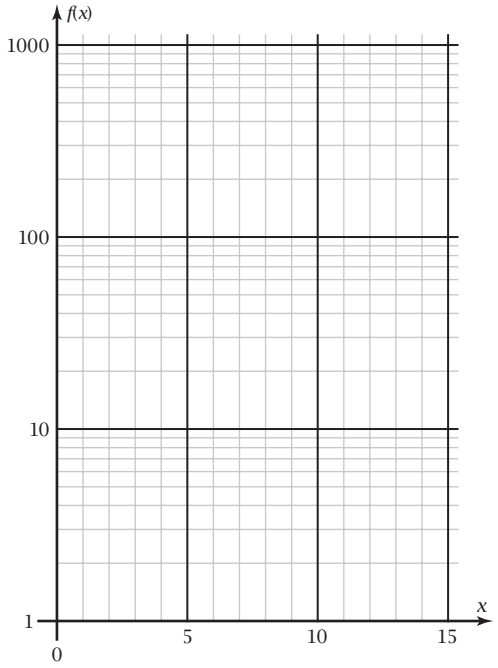
Objective: Given a table of data with irregularly spaced *x*-values, find by regression the particular equation of the best-fitting function, and show that the graph is a straight line on the appropriate kind of graph paper.

For Problems 1–3, use these data.

x	$f(x)$
3	4.1
7	24
8	37
11	136
12	212

1. By regression, find the particular equation of the best-fitting linear, exponential, or power function.

2. Plot the data on this **semilog** graph paper. What do you notice about the points?



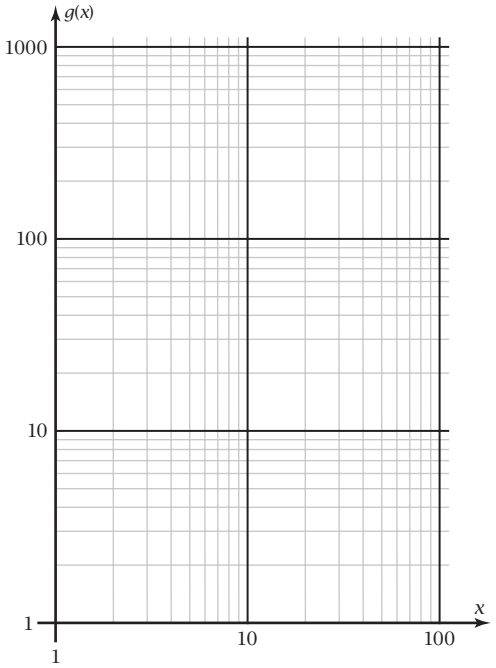
3. Calculate $f(0)$ and $f(15)$. Plot these points on the graph. Do these points lie on the same straight line as the given data points?

For Problems 4–6, use these data.

x	$g(x)$
2	261
5	87
9	43
20	16.5
70	3.7
100	2.4

4. By regression, find the particular equation of the best-fitting linear, exponential, or power function.

5. Plot the data on this **log-log** graph paper. What do you notice about the points?



6. Calculate $g(1)$ and $g(50)$. Plot these points on the graph. Do these points lie on the same straight line as the given data points?

(Over)

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Exploration 8-4a: Log-log and Semilog Graph Paper continued

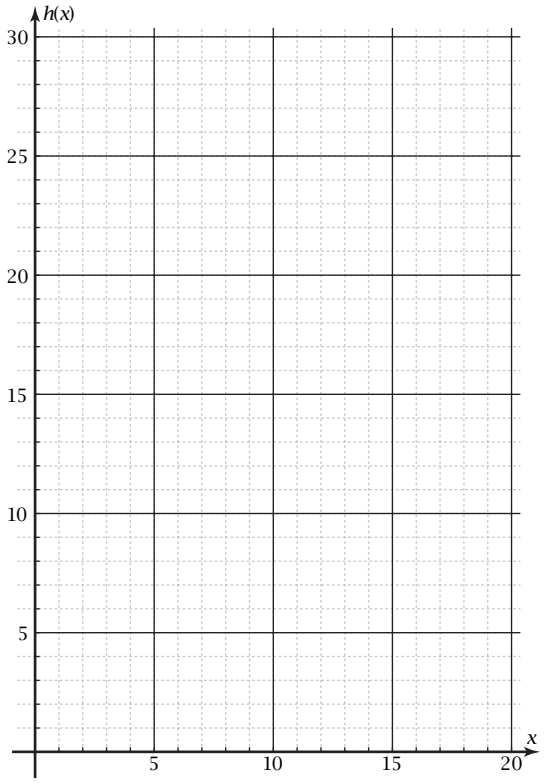
Date: _____

For Problems 7–9, use these data.

x	$h(x)$
1	5.3
6	11.8
10	17.0
13	20.9
18	27.4

7. By regression, find the particular equation of the best-fitting linear, exponential, or power function.

8. Plot the data on this arithmetic graph paper. What do you notice about the points?



9. Calculate $h(0)$ and $h(20)$. Plot these points on the graph. Plot a straight line through these points. How do the given data relate to the line?

10. What kind of graph paper gives a straight-line graph for

    Linear functions?

    Exponential functions?

    Power functions?

11. Let $y = 13 \cdot 7^x$. What kind of function is this? How do you tell?

12. Take the log of both sides of the equation in Problem 11. By appropriate use of the properties of logs, show that log y varies linearly with x.

13. From the semilog paper in Problem 2, measure to the nearest 0.1 mm the following distances on the vertical scale:

***y*-values**	**Distance (mm)**	**Ratio**	**log 2 (3, 4, . . .)**
1 to 2			
1 to 3			
1 to 4			
1 to 5			
1 to 6			
1 to 7			
1 to 8			
1 to 9			
1 to 10			

14. Make another column in the table above and record

$$\frac{\text{Distance from 1 to 2 (3, 4, . . .)}}{\text{Distance from 1 to 10}}$$

    Round the ratios to two decimal places.

15. Make another column in the table above and record log 2 (3, 4, . . .). That is, record log 5 in the 1 to 5 row and so on. Round to two decimal places.

16. Based on the table above, what do the distances on the y-scale of the semilog paper represent?

17. What did you learn as a result of doing this Exploration that you did not know before?