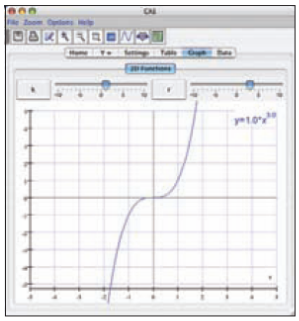
The Power Function Family The functions describing dependence of light circle area and light intensity on distance are only two of many direct and inverse variation patterns that can be modeled by rules in the form $y = kx^r$ and $y = \frac{k}{x^r}$.

Use your calculator or a computer graphing tool to explore the relationship between the power r, the constant of proportionality k, and the numerical patterns relating x and y. To get a good picture of each graph, be sure to set your graphing window so you see both positive and negative values of x and y. You can use the zoom feature of your graphing tool to see more of each graph.



3. How is shape of the graph for a direct variation function $y = kx^r$ related to the values of r and k?
   - **a.** To see patterns that help answer this question, you might begin by studying examples in which $k = 1$ and $r = 1, 2, 3, 4, 5$, and 6. Then explore what happens for different positive and negative values of the proportionality constant k. Describe the patterns you observe.
   - **b.** Based on the calculations involved in the different rules used in Part a, explain why the different observed patterns make sense.

4. How is the shape of the graph for an inverse variation function $y = \frac{k}{x^r}$ related to the values of r and k?
   - **a.** To see patterns that help answer this question, you might begin by studying examples in which $k = 1$ and $r = 1, 2, 3, 4, 5$, and 6. Then explore what happens for different positive and negative values of the proportionality constant k. Describe the patterns that you observe.
   - **b.** Based on the calculations involved in the different rules that you used in Part a, explain why those patterns make sense.

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