

**Extension: Writing Equations from data points.**

Write an exponential equation in the form  $y = ab^x$  that passes through the points (2, 4) and (3, 16).

- Write two equations in general form, one using Point 1 and the other using Point 2. *Solve for a*

- Set the equations equal to each other and solve for b.

$$\begin{array}{l} (2, 4) \\ 4 = ab^2 \\ a = \frac{4}{b^2} \end{array} \quad \begin{array}{l} (3, 16) \\ 16 = ab^3 \\ a = \frac{16}{b^3} \end{array} \quad \begin{array}{l} \frac{4}{b^2} = \frac{16}{b^3} \\ 4b^3 = 16b^2 \\ \frac{4b^3}{b^2} = \frac{16b^2}{b^2} \end{array} \quad \begin{array}{l} 4b = 16 \\ b = 4 \end{array}$$

- Substitute your b value back into one of the original equations to solve for a.

$$b = 4 \quad a = \frac{4}{b^2} = \frac{4}{16} = \frac{1}{4}$$

- Write your final equation using your values for a and b.

$$y = \frac{1}{4}(4)^x$$

Your Turn 2: Write an exponential equation in the form  $y = ab^x$  that passes through the points (4, 8) and (6, 32).

$$\begin{array}{l} y = ab^x \\ 8 = ab^4 \\ a = \frac{8}{b^4} \end{array} \quad \begin{array}{l} y = ab^x \\ 32 = ab^6 \\ a = \frac{32}{b^6} \end{array}$$

$$\frac{8}{b^4} = \frac{32}{b^6}$$

$$8b^6 = 32b^4$$

$$b^2 = \frac{32}{8} = 4$$

$$b = 2$$

$$a = \frac{8}{2^4} = \frac{8}{16} = \frac{1}{2}$$

$$y = \frac{1}{2}(2)^x$$

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- Substitute your  $b$  value back into one of the original equations to solve for  $a$ .

$$b = 4 \quad a = \frac{4}{b^2} = \frac{4}{16} = \frac{1}{4}$$

- Write your final equation using your values for  $a$  and  $b$ .

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