## 8.7 Writing Exponential and Power Functions

std. 12.0

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- **exponential function:** $y = ab^x$

**1** **Write an exponential function whose graph passes through (2, 9) and (4, 20.25).**

x y x y

$y = 4(1.5)^x$

$y = ab^x$

$9 = ab^2$

$\frac{9}{1.5^2} = \frac{9}{b^2} = a$

$4 = a$

$20.25 = ab^4$

$20.25 = \frac{9}{b^2} \cdot b^4$

$20.25 = 9b^2$

$\pm 1.5 = b$

$1.5 = b$

- **power function:** $y = ax^b$

$\frac{12^b}{6^b} = \left(\frac{12}{6}\right)^b$

**2** **Write a power function whose graph passes through (6, 8) and (12, 36).**

x, y x, y

$y = .164x^{2.170}$

$y = ax^b$

$8 = a \cdot 6^b$

$\frac{8}{6^{2.17}} \approx \frac{8}{6^b} = a$

$.164 \approx a$

$36 = a \cdot 12^b$

$36 = \frac{8}{6^b} \cdot 12^b$

$36 = 8 \cdot 2^b$

$\log 4.5 = \log 2^b$

$\log 4.5 = b \log 2$

$\frac{\log 4.5}{\log 2} = b \approx 2.170$

**change of base formula:** $\log_b a = \dfrac{\log_{10} a}{\log_{10} b}$

**3** $\log_5 9 = \dfrac{\log_{10} 9}{\log_{10} 5}$

$\log_5 9 = x$

$\log_{10} 5^x = \log_{10} 9$

$x \log_{10} 5 = \log_{10} 9$

$x = \dfrac{\log_{10} 9}{\log_{10} 5}$