Determining Exponential Functions pt 2

(2, 25) and (7, 160)

1) ① $25 = ab^2$
② $160 = ab^7$

1) create two equations from ordered pairs

2) $\frac{25}{b^2} = \frac{ab^2}{b^2} \rightarrow \frac{25}{b^2} = a$

2) isolate "a" in equation ①

3) $160 = \frac{25}{b^2} \cdot b^7$

3) substitute "a" in equation ② with expression from step 2

4) $160 = 25b^5$

4) simplify exponents

5) $\frac{160}{25} = b^5 \rightarrow 6.4 = b^5$

$(6.4)^{(1/5)} \rightarrow b = 1.45$

5) isolate b, divide by coefficient and raise to the (1/n); n = exponent of b

6) $\frac{25}{b^2} = a \rightarrow \frac{25}{(1.45)^2}$

$a = 11.89$

6) Replace b in expression from step two to solve for a

7) $f(x) = 11.89(1.45)^x$

7) write final equation using a and b, leave x and f(x) as variables

Example (5, 38) and (9, 265)

① $38 = ab^5$
② $265 = ab^9$

$\frac{38}{b^5} = a$

$265 = \frac{38}{b^5} \cdot b^9$

$265 = 38b^4$

$6.974 = b^4$

$(6.974)^{(1/4)} = b$

$1.625 = b$

$\frac{38}{(1.625)^5}$

$3.354 = a$

$f(x) = 3.354(1.625)^x$

Example 2 (6, 215) and (10, 20)

① $215 = ab^6$

② $20 = ab^{10}$

$\frac{215}{b^6} = a$

$20 = \frac{215}{b^6} \cdot b^{10}$

$20 = 215b^4$

$.093 = b^4$

$(.093)^{1/4} = b$

$.552 = b$

$\frac{215}{(.552^6)} = a$

$7599.8 = a$

$f(x) = 7599.8(.552)^x$

Homework

① (3, 15) and (7, 40)

② (9, 6) and (14, 2)