

# Target 7-4 (continued)

## Property of Equality for Exponential Functions

Algebra I  
4-14-14

If  $b > 0$  and  $b \neq 1$ , then  $b^x = b^y$ , if and only if  $x = y$ .

If base is the same, exponent is the same

$$2^x = 2^2 \quad x = 2$$

Solve:  $3^x = 9 \leftrightarrow$  can't use Equality unless bases are the same

$$\begin{array}{c} \wedge \\ 3 \quad 3 \\ 3^x = 3^2 \\ \downarrow \quad \downarrow \\ x = 2 \end{array}$$

Ex:  $5^x = 15625$

$$\begin{array}{c} \textcircled{5} \quad 15625 \\ \swarrow \quad \searrow \\ \textcircled{5} \quad 3125 \\ \swarrow \quad \searrow \\ \textcircled{5} \quad 625 \\ \swarrow \quad \searrow \\ \textcircled{5} \quad 125 \\ \swarrow \quad \searrow \\ \textcircled{5} \quad 25 \\ \swarrow \quad \searrow \\ \textcircled{5} \quad \textcircled{5} \end{array}$$

$$\begin{array}{c} 5^x = 5^6 \\ \downarrow \quad \downarrow \\ x = 6 \end{array}$$

①  $3^x = 729$

$$\begin{array}{c} \textcircled{3} \quad 729 \\ \swarrow \quad \searrow \\ \textcircled{3} \quad 243 \\ \swarrow \quad \searrow \\ \textcircled{3} \quad 81 \\ \swarrow \quad \searrow \\ \textcircled{3} \quad 27 \\ \swarrow \quad \searrow \\ \textcircled{3} \quad 9 \\ \swarrow \quad \searrow \\ \textcircled{3} \quad \textcircled{3} \end{array}$$

$$3^x = 3^6$$

$$\boxed{x = 6}$$

②  $4^x = 4096$

$$\begin{array}{c} \textcircled{4} \quad 4096 \\ \swarrow \quad \searrow \\ \textcircled{4} \quad 1024 \\ \swarrow \quad \searrow \\ \textcircled{4} \quad 256 \\ \swarrow \quad \searrow \\ \textcircled{4} \quad 64 \\ \swarrow \quad \searrow \\ \textcircled{4} \quad 16 \\ \swarrow \quad \searrow \\ \textcircled{4} \quad \textcircled{4} \end{array}$$

$$4^x = 4^6$$

$$\boxed{x = 6}$$

③  $4^{3x+4} = 16384$

$$4^{3x+4} = 4^7$$

$$3x+4 = 7$$

$$\begin{array}{r} -4 \quad -4 \\ \hline \end{array}$$

$$\begin{array}{r} 3x = 3 \\ \hline 3 \quad 3 \end{array}$$

$$\boxed{x = 1}$$

16384

$$\begin{array}{c} 4 \quad 16384 \\ \swarrow \quad \searrow \\ 4 \quad 4096 \\ \swarrow \quad \searrow \\ 4 \quad 1024 \\ \swarrow \quad \searrow \\ 4 \quad 256 \\ \swarrow \quad \searrow \\ 4 \quad 64 \\ \swarrow \quad \searrow \\ 4 \quad 16 \\ \swarrow \quad \searrow \\ 4 \quad 4 \end{array}$$

check:

$$4^{3(1)+4} = 4^7$$

$$4^7 = 4^7 \checkmark$$

$$3^{x+1} = 27$$

$$3^{x+1} = 3^3$$

$$x+1 = 3$$

$$\boxed{x=2}$$

$$27$$

$$\begin{array}{l} 3 \ 9 \\ \hline 3 \end{array}$$

$$\begin{array}{l} 3 \ 3 \\ \hline 3 \end{array}$$

Check:

$$3^{2+1} = 3^3$$

$$27 = 27 \checkmark$$

$$6^{x+3} = 7776$$

$$6^{x+3} = 6^5$$

$$7776$$

$$\begin{array}{l} 6 \ 1296 \\ \hline 6 \end{array}$$

$$\begin{array}{l} 6 \ 216 \\ \hline 6 \end{array}$$

$$\begin{array}{l} 6 \ 36 \\ \hline 6 \end{array}$$

$$\begin{array}{l} 6 \ 6 \\ \hline 6 \end{array}$$

$$\frac{-15u^0 u^{-1}}{5u^3} = \frac{-3 \cdot 1}{1u^3 u^1} = \boxed{\frac{-3}{u^4}}$$

$$\frac{-12t^{-1} u^5 x^{-4}}{2t^{-3} u x^5} = \frac{-6t^3 u^5}{1t^1 u^1 x^5 x^4} = \frac{-6t^{3-1} u^{5-1}}{x^{5+4}} =$$

$$\boxed{\frac{-6t^2 u^4}{x^9}}$$

Homework: T 7-3 "More Properties" all  
T 7-4 ws Solving #19-27