$\qquad$

## Practice A

Complete the table.

|  | Exponent, $\boldsymbol{n}$ | 3 | 2 | 1 | 0 | -1 | -2 | -3 |
| :--- | :--- | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1. | Power, $2^{n}$ | 8 |  |  |  |  |  |  |
| 2. | Power, $3^{n}$ | 27 |  |  |  |  |  |  |
| 3. | Power, $4^{n}$ | 64 |  |  |  |  |  |  |

Evaluate the exponential expression. Write your answer as a fraction in simplest form.
4. $3^{-3}$
5. $2^{-5}$
6. $5^{0}$
7. $8^{0} \cdot 2^{-3}$
8. $3^{5} \cdot 3^{-4}$
9. $5^{-7} \cdot 5^{9}$
10. $\left(2^{3}\right)^{-2}$
11. $\left(6^{-1}\right)^{2}$
12. $\left(-2^{3}\right)^{-1}$

Rewrite the expression with positive exponents.
13. $x^{-8}$
14. $3 x^{-5}$
15. $\frac{7}{x^{-2}}$
16. $\frac{9}{x^{-4}}$
17. $8 x^{-7} y^{-8}$
18. $3 a^{-3}$
19. $\frac{3 x^{0}}{y^{-3}}$
20. $(4 x)^{-2}$
21. $(-2 x)^{-4}$
22. $(5 x)^{0} y^{-2}$
23. $\frac{1}{(3 x)^{-3}}$
24. $(2 x)^{-2} \cdot 3 y^{5}$
25. Complete the table.

| $x$ | -3 | -2 | -1 | 0 | 1 | 2 | 3 |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| $y=3^{x}$ |  |  |  |  |  |  |  |

26. Graph the table of values you found in Exercise 25.
27. For the graph in Exercise 26, as the value of $x$ increases, what happens to the value of $y$ ?
28. Complete the table.

| $\boldsymbol{x}$ | -3 | -2 | -1 | 0 | 1 | 2 | 3 |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| $\boldsymbol{y}=\left(\frac{1}{2}\right)^{\boldsymbol{x}}$ |  |  |  |  |  |  |  |

29. Graph the table of values you found in Exercise 28.
30. For the graph in Exercise 29, as the value of $x$ increases, what happens to the value of $y$ ?
$\qquad$ Date $\qquad$

## Practice B

## Evaluate the exponential expression. Write your answer as a

## fraction in simplest form.

1. $5^{-3}$
2. $\left(\frac{1}{3}\right)^{-1}$
3. $6\left(6^{-4}\right)$
4. $-2^{0} \cdot \frac{1}{4^{-2}}$
5. $3^{5} \cdot 3^{-7}$
6. $7^{3} \cdot 0^{-2}$
7. $10^{-2} \cdot 10^{2}$
8. $-2 \cdot(-2)^{-5}$
9. $\left(8^{2}\right)^{-1}$
10. $9^{-2} \cdot 12^{0}$
11. $\left(-4^{-3}\right)^{-1}$
12. $1 \cdot 1^{-8}$

## Rewrite the expression with positive exponents.

13. $4 x^{-2}$
14. $\frac{1}{3 x^{-4}}$
15. $x^{3} y^{-6}$
16. $7 x^{-5} y^{-1}$
17. $\frac{1}{11 x^{-2} y^{-7}}$
18. $(-12)^{0} y^{-2}$
19. $(9 x)^{-4}$
20. $\left(2 x^{3} y^{-8}\right)^{-3}$
21. $\left(2^{-1} x^{-10}\right)^{7}$
22. $\frac{15}{5 y^{-3}}$
23. $\frac{1}{\left(8 x^{2}\right)^{-3}}$
24. $\left(\frac{-12 x^{-5}}{4 x^{-5}}\right)^{-4}$
25. Complete the table.

| $x$ | -2 | -1 | 0 | 1 | 2 |
| :--- | :--- | :--- | :--- | :--- | :--- |
| $y=\left(\frac{2}{3}\right)^{x}$ |  |  |  |  |  |

26. Graph the table of values in Exercise 25.
27. For the graph in Exercise 26, as the value of $x$ increases, what happens to the value of $y$ ?
28. Endangered Species Between 1990 and 2000, the population of an endangered species decreased at a rate of $0.1 \%$ per year. The population $P$ in year $t$ is given by $P=1200(0.999)^{\prime}$, where $t=0$ corresponds to 1995 . Find the population of the species in 1990, 1995, 2000, and the projected population in 2010.

| $t$ | 1990 <br> $(t=-5)$ | 1995 <br> $(t=0)$ | 2000 <br> $(t=5)$ | 2010 <br> $(t=15)$ |
| :--- | :---: | :---: | :---: | :---: |
| $\boldsymbol{P}=\mathbf{1 2 0 0}(\mathbf{0 . 9 9 9})^{\prime}$ |  |  |  |  |

29. Town Population Between 1960 and 1990, the population of a town increased at a rate of $0.34 \%$ per year. The population $P$ in year $t$ is given by $P=2000(1.0034)^{\mathrm{s}}$, where $t=0$ corresponds to 1980 . Find the population of the town in 1960, 1970, 1980, and 1990.

| $t$ | 1960 <br> $(t=-20)$ | 1970 <br> $(t=-10)$ | 1980 <br> $(t=0)$ | 1990 <br> $(t=10)$ |
| :--- | :---: | :---: | :---: | :---: |
| $P=2000(\mathbf{1 . 0 0 3 4})^{\prime}$ |  |  |  |  |

