

Extra Practice**8.1**

Name _____

In 1–12, simplify, if possible.

1. $3^2 \cdot 3^4$

2. $(2^3)^5$

3. $x^5 \cdot x^3$

4. $(y^2)^8$

5. $(2x)^3$

6. $(-3x^4)^2$

7. $(x^2)^7$

8. $(-2x)^3(-x^2)$

9. $(xy)^3(z^6)^2$

10. $(a^2bc^3)^4 \cdot (b^2c)^3$

11. $(-x)^3(-y^2)^4(xyz^5)^2$

12. $(2x)^3(2y^2)^4\left(\frac{1}{2}xy\right)^5$

In 13–24, simplify. Then evaluate the expression when $x = 2$ and $y = 1$.

13. $(x^3)^2$

14. $(xy^2)^3$

15. $(x^2y)(3x)$

16. $(x^4y^2)(y^5)$

17. $(-2xy)^3$

18. $(-3x)^2(2y)^3$

19. $(xy^2)^2(5y^3)$

20. $(2y)^4(3y^2)^2$

21. $(-3x)^3(4y^3)^2$

22. $(-xy)^4(xy^8)^2$

23. $(x^2y)(xy^2)^2$

24. $-2x^2y(x^3y^2)^3$

Extra Practice**8.2**

Name _____

In 1–12, evaluate the expression.

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

In 13–24, rewrite the expression using positive exponents.

- | | | |
|---------------------------|---------------------|----------------------------------|
| 13. x^{-8} | 14. $3x^{-5}$ | 15. $\frac{1}{7x^{-2}}$ |
| 16. $\frac{9}{x^{-4}}$ | 17. $8x^{-7}y^{-8}$ | 18. $\frac{1}{6x^{-4}y^{-3}z^5}$ |
| 19. $\frac{3x^0}{y^{-3}}$ | 20. $(4x)^{-2}$ | 21. $(-2x)^{-4}$ |
| 22. $\frac{1}{(3x)^{-3}}$ | 23. $(5x)^0y^{-2}$ | 24. $(2x)^{-2} \cdot 3y^5$ |

Extra Practice**8.3**

Name _____

In 1–12, evaluate the expression.

1. $\frac{7^5}{7^3}$

2. $\frac{6^5}{6^7}$

3. $\frac{18^6}{18^6}$

4. $\frac{(-5)^9}{5^9}$

5. $\frac{2^3}{2^{-4}}$

6. $\frac{4^5 \cdot 4^3}{4^6}$

7. $\frac{3^2 \cdot 3^4}{3^9}$

8. $\left(\frac{2}{3}\right)^3$

9. $\left(\frac{4}{5}\right)^2$

10. $\left(-\frac{1}{2}\right)^5$

11. $\left(\frac{11}{3}\right)^{-1}$

12. $\left(\frac{3}{2}\right)^{-2}$

In 13–24, simplify the expression.

13. $\left(\frac{x}{3}\right)^4$

14. $\frac{x^7}{x^2}$

15. $\left(\frac{2}{x}\right)^6$

16. $x^5 \cdot \frac{1}{x^8}$

17. $x^{12} \cdot \frac{1}{x^3}$

18. $\frac{2x^2y}{x^3y^2} \cdot \frac{4x^7y^2}{2x^3}$

19. $\frac{3xy^4}{2x^5y} \cdot \frac{6x^{-3}y^2}{4y}$

20. $\frac{-8x^6y^{-3}}{3x^{-2}y^{-5}} \cdot \frac{-6x^{-10}y}{-4x}$

21. $\frac{4x^{-2}y^{-1}}{3x^{-3}} \cdot \frac{6x^{-3}y^{-2}}{8y^{-7}}$

22. $\frac{(4x^2y^3)^{-1}}{3y} \cdot \frac{(2xy^2)^2}{x^{-3}}$

23. $\left(\frac{2x^2y}{3y}\right)^{-3} \cdot \left(\frac{4y^3}{x^4}\right)^2$

24. $\frac{5x^{-1}y^3}{xy^{-4}} \cdot \frac{(-2x^2)^{-3}}{y}$

Extra Practice**8.4**

Name _____

In 1–9, rewrite the scientific notation in decimal form.

1. 2.03×10^3

2. 3.4578×10^4

3. 6.43×10^1

4. 7.2×10^5

5. 5.2×10^0

6. 4.68×10^{-2}

7. 1.3×10^{-6}

8. 8.497×10^{-3}

9. 9.8×10^{-4}

In 10–18, rewrite the decimal in scientific notation.

10. 25,000

11. 36.41

12. 4,000,000

13. 564,200

14. 9.32

15. 0.15

16. 0.0083

17. 0.000000718

18. 0.0673

In 19–27, evaluate the expression without a calculator. Write the answer in scientific notation.

19. $2 \times 10^3 \cdot 3 \times 10^8$

20. $3 \times 10^{-4} \cdot 3 \times 10^{-5}$

21. $2 \times 10^{-5} \cdot 3 \times 10^7$

22. $4 \times 10^{-6} \cdot 2 \times 10^5$

23. $3 \times 10^6 \cdot 4 \times 10^3$

24. $7 \times 10^{-3} \cdot 5 \times 10^{-1}$

25. $3 \times 10^5 \cdot 8 \times 10^{-2}$

26. $12 \times 10^3 \cdot 3 \times 10^{-6}$

27. $6 \times 10^{-8} \cdot 7 \times 10^6$

Extra Practice**8.6**

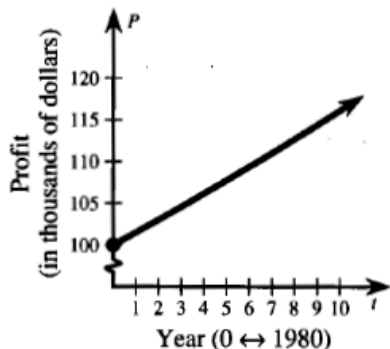
Name _____

1. **What is the Balance?** A principal of \$200 is deposited in an account that pays 5% interest compounded yearly. Find the balance after 10 years.

3. **Money Choices** Which option gives the greater ending balance?

- Put \$100 in an account that pays 5% interest compounded yearly for 5 years.
- Keep \$105 in your room and add \$4 to it each year for 5 years.

5. **Profit Increases** From 1980 to 1990, the profit earned by a company increased by about 1.5% per year. Use the graph below to write an exponential growth equation.

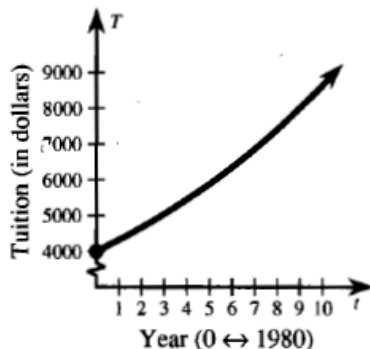


2. **What is the Balance?** A principal of \$1000 is deposited in an account that pays 6% interest compounded yearly. Find the balance after 3 years.

4. **Money Choices** Which option gives the greater ending balance?

- Put \$100 in an account that pays 8% interest compounded yearly for 10 years.
- Put \$150 in an account that pays 7% interest compounded yearly for 5 years.

6. **College Tuition** From 1980 to 1990, the cost of tuition at a college increased by about 8% per year. Use the graph below to write an exponential growth equation.



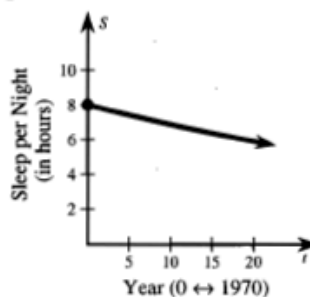
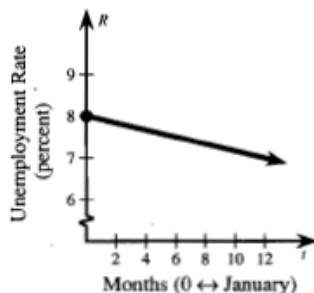
Extra Practice**8.7**

Name _____

1. **Depreciation** In 1990, your family bought a new car for \$20,000. Each year the value of the car decreased by 25%. What was the value of the car in 1992? Approximate the value of the car in the year 2000.
2. **Memory** The Sunday before the SAT tests you studied 60 new vocabulary words. The test is on Saturday. How many of the vocabulary words will you remember by Saturday if you forget 3% each day?
3. **Declining Employment** TRL Industries had 14,000 employees in 1980. Each year for 10 years, the number of employees decreased by 4%. Complete the table showing the number of employees for each year. Sketch a graph of the results.

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Number of Employees	?	?	?	?	?	?	?	?	?	?	?

4. **Unemployment Rate** In 1987, the unemployment rate of a city decreased by approximately 1.2% each month. In January the unemployment rate was 8%. What was the rate in December?
5. **Sleeping Behavior** On an average, as people grow old, they sleep fewer hours during the night. The amount of sleep that your grandfather gets has decreased by 1.5% each year since 1970. Using the graph below write an exponential decay model showing the number of hours your grandfather sleeps per night. How many hours per night did he sleep in 1990?



Lesson 8.1

1. 3^6 or 729
2. 2^{15} or 32,768
3. x^8
4. y^{16}
5. $8x^3$
6. $9x^8$
7. x^{14}
8. $8x^5$
9. $x^3y^3z^{12}$
10. $a^8b^{10}c^{15}$
11. $-x^5y^{10}z^{10}$
12. $4x^8y^{13}$
13. $x^6, 64$
14. $x^3y^6, 8$
15. $3x^3y, 24$
16. $x^4y^7, 16$
17. $-8x^3y^3, -64$
18. $72x^2y^3, 288$
19. $5x^2y^7, 20$
20. $144y^8, 144$
21. $-432x^3y^6, -3456$
22. $x^6y^{20}, 64$
23. $x^4y^5, 16$
24. $-2x^{11}y^7, -4096$

■ Lesson 8.2

1. $\frac{1}{27}$

2. $\frac{1}{32}$

3. 16

4. $\frac{1}{8}$

5. 3

6. 25

7. 1

8. $\frac{1}{16}$

9. 8

10. $\frac{1}{64}$

11. $\frac{1}{36}$

12. $-\frac{1}{8}$

13. $\frac{1}{x^8}$

14. $\frac{3}{x^5}$

15. $\frac{x^2}{7}$

16. $9x^4$

17. $\frac{8}{x^7 y^8}$

18. $\frac{x^4 y^3}{6z^5}$

19. $3y^3$

20. $\frac{1}{16x^2}$

21. $\frac{1}{16x^4}$

22. $27x^3$

23. $\frac{1}{y^2}$

24. $\frac{3y^5}{4x^2}$

■ Lesson 8.3

1. 49

2. $\frac{1}{36}$

3. 1

4. -1

5. 128

6. 16

7. $\frac{1}{27}$

8. $\frac{8}{27}$

9. $\frac{16}{25}$

10. $-\frac{1}{32}$

11. $\frac{3}{11}$

12. $\frac{4}{9}$

13. $\frac{x^4}{81}$

14. x^5

15. $\frac{64}{x^6}$

16. $\frac{1}{x^3}$

17. x^9

18. $4x^3y$

19. $\frac{9y^4}{4x^7}$

20. $-\frac{4y^3}{x^3}$

21. $\frac{y^4}{x^2}$

22. $\frac{x^3}{3}$

23. $\frac{54y^6}{x^{14}}$

24. $-\frac{5y^6}{8x^8}$

■ Lesson 8.4

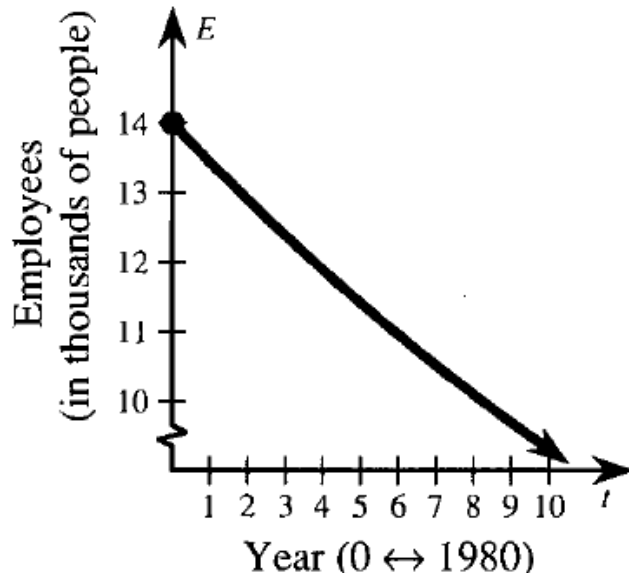
1. 2030 2. 34,578 3. 64.3 4. 720,000
5. 5.2 6. 0.0468 7. 0.0000013
8. 0.008497 9. 0.00098 10. 2.5×10^4
11. 3.641×10^1 12. 4×10^6
13. 5.642×10^5 14. 9.32×10^0
15. 1.5×10^{-1} 16. 8.3×10^{-3}
17. 7.18×10^{-7} 18. 6.73×10^{-2}
19. 6×10^{11} 20. 9×10^{-9}
21. 6×10^2 22. 8×10^{-1}
23. 1.2×10^{10} 24. 3.5×10^{-3}
25. 2.4×10^4 26. 3.6×10^{-2}
27. 4.2×10^{-1} 28. 2.7×10^9

■ Lesson 8.6

1. \$325.78 2. \$1191.02 3. **a**
4. **a** 5. $P = 100,000(1.015)^t$
6. $T = 4000(1.08)^t$

■ Lesson 8.7

1. \$11,250.00, \$1,126.27 2. ≈ 50
 3. 14,000, $\approx 13,440$, $\approx 12,902$, $\approx 12,386$,
 $\approx 11,891$, $\approx 11,415$, $\approx 10,959$, $\approx 10,520$,
 $\approx 10,099$, ≈ 9695 , ≈ 9308



4. $\approx 7.0\%$ 5. ≈ 5.9 hr, $s = 8(0.985)^t$



Hard work beats talent...
When talent doesn't work hard...