UNIT 9 EXPONENTS
REVIEW SOLUTIONS

1) Express the following using exponents.

a. $2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2$ 2^9

b. $\frac{1}{x}$ x^{-1}

c. $5 \cdot 5 \cdot m \cdot m \cdot n \cdot n \cdot n \cdot n$ $5^2 m^2 n^4$

d. $\frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2}$ $\left(\frac{1}{2}\right)^3$

2) Express the following without using exponents.

a. $2^3 x^2$ $2 \cdot 2 \cdot 2 \cdot x \cdot x$

b. 4^{-3} $\frac{1}{4 \cdot 4 \cdot 4}$

c. $\left(\frac{3}{4}\right)^3$ $\frac{3}{4} \cdot \frac{3}{4} \cdot \frac{3}{4}$

d. x^{-5} $\frac{1}{x \cdot x \cdot x \cdot x \cdot x}$

Simplify. Your answer should contain only positive exponents.

3) $3^2 \cdot 3^2 = 3^4$

4) $2^{-2} \cdot 2^4 = 2^2$

5) $(3^{-4})^2 = 3^{-8} = \frac{1}{3^8}$

6) $(3^3)^2 = 3^6$

7) $\frac{2^3}{2^{-1}} = 2^4$

8) $\frac{4^{-4}}{4^2} = 4^{-6} = \frac{1}{4^6}$

9) $2n^{-4} \cdot 3n^{-3} = 6n^{-7} = \frac{6}{n^7}$

10) $4m^3 \cdot m^2 \cdot 4m^1$ $16m^6$

11) $(r^{-3})^3 = r^{-9} = \frac{1}{r^9}$

12) $(4a^4)^2$ $16a^8$

13) $-\frac{4x^0}{4x^2} = -1x^{-2} = -\frac{1}{x^2}$

14) $\frac{3n^2}{-n^3} = -3n^{-1} = -\frac{3}{n}$

15) $-2y^2 \cdot 4y^{-3} = -8y^{-1} = -\frac{8}{y}$

16) $4m^{-2}n^2 \cdot 4m^4 = 16m^2n^2$

17) $(-4x^3y^0)^2 = 16x^6$

18) $(-x^4y^2)^3 = -x^{12}y^6$

19) $\frac{4x^0y^4}{-4x^{-4}} = -1x^4y^4$

20) $\frac{4yx^2}{2yx^0} = 2x^2y^0 = 2x^2$

21) $(2x^3)^3x^{-1} = 8x^9x^{-1} = 8x^8$

22) $\frac{4r^4 \cdot r^{-2}}{r^4} = \frac{4r^2}{r^4} = 4r^{-2} = \frac{4}{r^2}$

23) $\left(\frac{2x^4}{2x^2}\right)^3 = \frac{8x^{12}}{8x^6} = 1x^6$

24) $\frac{(-2a^4)^2}{a^3 \cdot -2a^4} = \frac{\pm 4a^8}{-2a^7} = -2a$

Simplify. Write each answer in scientific notation.

25) $(5.8 \times 10^9)(3 \times 10^{-5})$ 1.74×10^5

26) $(2 \times 10^{-9})(6 \times 10^9)$ 1.2×10^1

27) $\frac{7 \cdot 10^{12}}{2.5 \cdot 10^7}$ 2.8×10^5

28) $\frac{8.8 \times 10^{-7}}{8 \times 10^{-1}}$ 1.1×10^{-6}

29) $(8 \cdot 10^{-5})^4$ 4.096×10^{-17}

30) $(3 \cdot 10^2)^9$ 1.9683×10^{22}

Express in scientific notation

31) 5,555,000,000

5.555×10^9

32) 0.0072

7.2×10^{-3}

Express in standard notation (decimal notation).

33) 5×10^{-5}

0.00005

34) 8.35×10^6

8,350,000

REVIEW APPLICATIONS

Find the area of the following rectangles:

1.

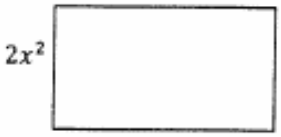
$4^2 \cdot 4^3 = 4^5$

2.

$x(3x-4)$

$3x^2 - 4x$

3.

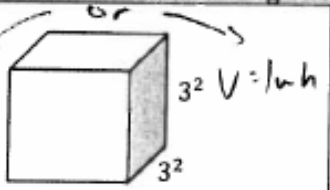


$2x^2(2x^3+4x)$

$4x^5 + 8x^3$

Find the volume of the following cubes:

4.



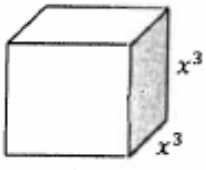
$V = s^3$ or $V = lwh$

$(3^2)^3$ $\leftrightarrow$ $(3^2)(3^2)(3^2)$

either way: 3^6 Cookie

3^6

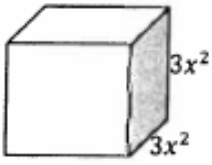
5.



$(x^3)^3$ either way $(x^3)(x^3)(x^3)$

x^9

6.



$(3x^2)^3$ $(3x^2)(3x^2)(3x^2)$

$3^3 x^6$ $27x^6$

$27x^6$

EXPAND

Expand the following to simplify. SHOW WORK!

7. $(3xy^3)^2(2x^4y^2) =$

$(3xyyy)(3xyyy)(2xxxxyy)$

$18xxxxxxyyyyyyyy$

$18x^6y^8$

RULE

Use the rules to simplify.

8. $(-5x^7y^2z)^4(4xy^0z^0)^3 =$

$(-5)^4 x^{28} y^8 z^4 \cdot 4^3 x^3 z^{27}$

$625 x^{31} y^8 z^4 \cdot 64 x^3 z^{27}$

$40000 x^{31} y^8 z^{31}$

9. List the elements in order from least to concentration to greatest concentration.

Elements in Seawater	Concentration (parts per million)	
Sulfur	904	904
Chloride	1.95×10^4	19500
Magnesium	1.29×10^3	1290
Sodium	10,770	10770

Sulfur, Magnesium, Sodium, Chloride

904 1290 10770 19500