Exponents Review

Exercise 4.2

PART A

1. Write each of the following with positive exponents.

a. 5^{-3} b. $\frac{1}{4^{-3}}$ c. $\frac{x^3}{y^{-2}}$

d. $\left(\frac{3}{5}\right)^{-4}$ e. $\frac{2x^{-2}y^3}{3w^{-4}}$ f. $\frac{1}{a^3b^{-2}}$

2. Evaluate each of the following:

a. 2^{-3} b. $(-5)^{-2}$ c. $\left(\frac{5}{3}\right)^{-3}$

d. $(-7)^0$ e. $\frac{2}{3^{-2}}$ f. $\frac{5^{-1}}{2^3}$

g. $\left(\frac{3^3}{5}\right)^{-2}$ h. $\left(\frac{2^{-2}}{3^{-1}}\right)^{-2}$ i. $\left(-12\frac{3}{4}\right)^0$

3. Simplify each of the following expressions. Write the answer with positive exponents.

a. $m^6 \cdot m^{-3}$ b. $a^{-3} \div a^{-5}$ c. $(x^2y^{-1})^{-1}$

d. $\left(\frac{b^{-2}}{b^{-1}}\right)^{-3}$ e. $(x^{-1}y^0)^{-3}$ f. $(15r^{-4})(2r^{-3})$

g. $12a^4 \div (3a^{-3})$ h. $\left[\frac{(3a)^{-1}}{2a^{-2}}\right]^{-1}$

PART B

4. Evaluate each of the following:

a. $(3^{-1} + 3^0)^{-1}$ b. $\left(\frac{1}{3}\right)^{-2} + 3^3$ c. $5^{-2}(5^2 - 5^0)$

d. $(2^3 - 2^2)(2^{-1} - 2^2)$ e. $(4 - 2^3) \div (4^{-1} - 2^{-3})^0$ f. $\frac{2^{-1} + 2^{-3}}{2^{-2}}$

g. $\frac{3^{-2} + 3^{-3}}{3^{-2} - 3^{-3}}$ h. $\frac{3^{-6} \times 3^{-5}}{3^{-9}}$

5. Evaluate each of the following:

a. $3^9 \times 27^{-4}$ b. $2^{16} \times 4^2 \times (-8)^{-7}$

c. $\frac{32^3 \times 4^{-2}}{16^4}$ d. $25^4 \times \left(\frac{1}{5}\right)^{-2} \div 125^2$

6. Simplify each of the following:

a. $(8^{4+2a})(16^{a-1}) \div 4^{3a+2}$ b. $[(27^{m+1}) \div (9^{m-2})]^{-2}$

7. If $x = 2$ and $y = -1$, evaluate each of the following:

a. $\frac{25x^{-2}y^{-1}}{15x^{-1}y^2}$ b. $(2x^{-2}y^{-4})^{-2}$

3.2 Exercise

A 1 Evaluate.

(a) -3^{-2} (b) $(-3)^{-2}$ (c) -3^0 (d) $(-3)^0$

(e) $2^2 \times 3^{-1}$ (f) $(2^2 \times 3)^{-1}$ (g) $(-3)^2$ (h) $-(-3)^{-2}$

2 Evaluate.

(a) 2^{-3} (b) $3^0 \times 2^{-2}$ (c) 5^{-2} (d) -3×3^{-1} (e) $\left(\frac{1}{3}\right)^{-2}$

(f) $(-7)^0$ (g) $3^0 - 3^{-1}$ (h) $-3^{-2} + 3^0$ (i) $8 \div 2^{-2}$ (j) $\left(\frac{3^{-1}}{2^{-1}}\right)^{-2}$

3 Express each of the following with a positive exponent.

(a) x^{-2} (b) y^{-3} (c) a^{-7} (d) b^{-5} (e) $\frac{1}{x^{-2}}$ (f) $\frac{1}{a^{-1}}$

(g) $\frac{1}{c^{-4}}$ (h) $2x^{-4}$ (i) ab^{-5} (j) $\frac{x^{-3}}{y^{-4}}$ (k) $4a^{-2}$ (l) $\frac{3x^{-4}}{2y^{-2}}$

4 Express each of the following with all variables in the numerator.

(a) $\frac{1}{x^3}$ (b) $\frac{x}{y^4}$ (c) $\frac{3a}{b^3}$ (d) $\frac{4}{a^{-3}}$ (e) $\frac{3}{a^{-2}b^{-1}}$ (f) $\frac{3}{(x+y)^{-2}}$

5 Simplify each of the following.

(a) $a^5 \times a^{-3}$ (b) $(m^{-3})^2$ (c) $a^5 \div a^{-8}$ (d) $(3a)^{-1}$

(e) $x^5 \div x^{-1}$ (f) $(xy^2)^{-1}$ (g) $(a^{-1})^3 \div a^{-1}$ (h) $\left(\frac{b^3}{b^{-3}}\right)^{-2}$

B 6 Evaluate.

(a) $(3^0 + 3^2)^{-2}$ (b) $2^4 + \left(\frac{1}{2}\right)^{-3}$ (c) $4^{-1}(4^2 + 4^0)$

(d) $(3^3 - 3^2)^2 \div 3^2$ (e) $(5^7 \div 5^{-2})(5^0 - 1)$ (f) $\frac{2^5}{3^{-2}} \times \frac{3^{-1}}{2^4}$

7 Evaluate.

(a) $(-3)^{-2}(3^3 - 3^4)$ (b) $\frac{3^{-2} \times 2^{-3}}{3^{-2} + 2^{-3}}$ (c) $\frac{4^{-1} + 3^{-2}}{3^{-2} + 2^{-3}}$ (d) $\frac{5^{-1} - 2^{-2}}{5^{-1} + 2^{-2}}$

8 Simplify. Write each as a power with a single base.

(a) $(8^{2-2n})(16^{3-n}) \div (4^{2n})^{-1}$ (b) $[3^{-2}(27^m \div 9^{-m})]^{-1}$

C 9 If $x = -1$ and $y = 2$, find the value of each of the following.

(a) $\frac{16x^{-3}y^{-2}}{4x^5}$ (b) $(3x^4y^{-2})^{-2}$ (c) $\frac{2x^{-5}y^{-2}}{x^{-2}y^{-1}}$ (d) $\frac{x^{-2} - y^{-1}}{x^{-2} + y^{-1}}$