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Practice

Form K

Zero and Negative Exponents

Simplify each expression.

$$1. 37^0 = 1$$

$$2. 3^{-4} = \frac{1}{3^4} = \frac{1}{81}$$

$$3. \frac{5}{5^{-2}} = 5(5^2) = 5^3 = 125$$

$$4. \frac{3}{6^{-1}} = 3(6) = 18$$

$$5. -(5)^{-2} = -\frac{1}{5^2} = -\frac{1}{25}$$

$$6. 112^{-1} = \frac{1}{112}$$

$$7. -11^0 = -1$$

$$8. -(7n)^{-2} = -\frac{1}{(7n)^2} = -\frac{1}{49n^2}$$

$$9. -(15p)^0 = -1$$

$$10. \left(\frac{3}{5}\right)^{-2} = \left(\frac{5}{3}\right)^2 = \frac{25}{9}$$

$$11. 4x^{-3}y^0 = \frac{4}{x^3}$$

$$12. \frac{8m^{-2}}{4n^{-1}} = \frac{8n}{4m^2} = \frac{2n}{m^2}$$

$$13. \frac{-6a^{-2}(bc)^2}{d^{-4}} = \frac{-6d^4b^2c^2}{a^2}$$

$$14. \left(\frac{5s}{6t}\right)^{-2} = \left(\frac{6t}{5s}\right)^2 = \frac{36t^2}{25s^2}$$

$$15. 4^{-2}h^{-4}j^3 = \frac{j^3}{4^2h^4} = \frac{j^3}{16h^4}$$

$$16. -(6yz)^{-2}x^0 = \frac{-1}{(6yz)^2} = \frac{-1}{36y^2z^2}$$

$x^0 = 1$

$$17. \frac{10fg^{-5}h^0}{h^{-2}} = \frac{10fh^2}{g^5}$$

$$18. \frac{6t^{-1}}{11(uv)^{-3}w^4} = \frac{6(uv)^3}{11tw^4} = \frac{6u^3v^3}{11tw^4}$$

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Practice (continued)

Form K

Zero and Negative Exponents

Evaluate each expression for $x = -2$, $y = 4$, and $z = 2$.

19. $4x^{-1} = \frac{4}{x} = \frac{4}{-2} = -2$

20. $z^{-3} = \frac{1}{z^3} = \frac{1}{(2)^3} = \frac{1}{8}$

21. $2xy^{-2}z^2 = \frac{2 \times z^2}{y^2} = \frac{2(-2)(2)^2}{(4)^2} = \frac{-16}{16} = -1$

22. $6x^3z^0 = 6(-2)^3(1) = 6(-8) = -48$

23. $-x^{-2} = -\frac{1}{x^2} = -\frac{1}{(-2)^2} = -\frac{1}{4}$

24. $(-y)^{-3} = -\frac{1}{y^3} = -\frac{1}{(4)^3} = -\frac{1}{64}$

Write each number as a power of 10 using negative exponents.

25. $\frac{1}{10,000} = \frac{1}{10^4} = 10^{-4}$

26. $\frac{1}{100,000} = \frac{1}{10^5} = 10^{-5}$

Write each expression as a decimal.

27. $10^{-6} = \frac{1}{1000000} = 0.000001$

28. $6 \times 10^{-3} = 0.006$

29. The population of a suburb is 4000 people. The population of the suburb is expected to double each decade. The expression $4000 \cdot 2^d$ models the population of the suburb after each decade d . Evaluate the expression for $d = -2$. Describe what the value of the expression represents in this situation.

$$4000 \cdot 2^{-2} = 4000 \cdot \frac{1}{4} = 1000$$

Two decades ago the population was 1000 people.

30. **Writing** Describe how a power with a zero exponent and a power with a negative exponent can be simplified.

The power with a zero exponent equals 1.
The power with a negative exponent is reciprocated.