Name _____

1.11 Zero and Negative Exponents
MATHPOWER™ Nine, pp. 36–39

Any integral base with the exponent 0, except 0, has a value of 1, that is, $x^0 = 1$, $x \neq 0$.

Any integral base with a negative exponent can be rewritten as a fraction with a numerator of 1, and a denominator with the integral base and a positive exponent, that is, $x^{-m} = \frac{1}{x^m}$, $x \neq 0$.

Complete the table. The first one is done for you.

	Exponential Form	Expanded Fraction	Standard Fraction
1.	3^{-2}	$\frac{1}{3 \times 3}$	$\frac{1}{9}$
2.		$\frac{1}{(-7)(-7)(-7)}$	
3.			$-\frac{1}{125}$
4.	$(-m)^{-4}$		
5.		$\frac{1}{2 \times 2 \times 2 \times 2 \times 2 \times 2}$	

Find the value of y.

6. $6^y = 1$ _____

7. $y^3 = 64$ _____

8. $y^{-2} = \frac{1}{9}$ _____

9. $y^{-3} = -\frac{1}{8}$ _____

10. $(-y)^{-3} = -\frac{1}{1000}$ _____

11. $\frac{(-6)}{(-6)} = y$ _____

12. $2^3 \times 2^y \times 2^2 = 2^3$ _____

13. $5^y \times 5^{-9} \div 5^2 = 1$ _____

14. $\frac{3^y}{3^2} = 3$ _____

15. $((-7)^2)^y = 1$ _____

16. $\frac{(-5)^y}{(-2)^2} = \frac{1}{4}$ _____

17. $-3^3 = y$ _____

18. $-5^2 \times 5^{-2} = y$ _____

Simplify.

19. $t^3 \times t^{-5}$ _____

20. $y^3 \times y^2$ _____

21. $m^{-3} \times m^{-2}$ _____

22. $(-b^3)^3$ _____

23. $(c^2)^{-2}$ _____

24. $t^3 \div t^2$ _____

25. $a^4 \div a^{-2}$ _____

26. $y^{-3} \div y^{-2}$ _____

27. $c^{-4} \times c^2 \div c^{-3}$ _____

Evaluate for $q = 3$ and $r = 2$.

28. r^q _____

29. $\frac{r^3}{q} \times r^{-4}$ _____

30. $6q^0 \div r$ _____

31. $r^{-3} \times r^{-3} \div r$ _____

32. $(r^q)^r \div (r^r)^q$ _____

33. Decide whether each of the following statements is always true, sometimes true, or never true, and under what conditions.

a) Two powers in which the exponents are both -2 have equal values.

_____

b) $(-x)^2 = (+x)^2$ for any x

_____

c) $(y)^{-x} = (-y)^x$

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