1-5 Integer Exponents

Name _____ Date _____

Simplify: $5^{-2} + 5^0$

$5^{-2} + 5^0$ ← Identify the bases with negative and zero exponents.

$\frac{1}{5^2} + 1$ ← Use the rules for negative and zero exponents.

$\frac{1}{25} + 1 = 1\frac{1}{25}$ ← Simplify.

Remember: Any nonzero exponent raised to the zero power equals 1. If $a \neq 0$, $a^0 = 1$.

Remember: For any nonzero number a and any integer n, $a^{-n} = \frac{1}{a^n}$.

Simplify: $\frac{2^3 \bullet 2^5}{2^6}$

$\frac{2^{3+5}}{2^6}$ ← Add exponents to multiply powers with the same base.

$\frac{2^8}{2^6}$ ← Simplify.

2^{8-6} ← Subtract exponents to divide powers with the same base.

2^2 ← Write in exponential form.

4 ← Write in standard form and simplify.

Remember: For any real number a, $a \neq 0$, and integers m and n:

$a^m \bullet a^n = a^{m+n}$

$a^m \div a^n = a^{m-n}$

Write each expression as repeated multiplication and in exponential form. Then simplify in standard form.

1. 3^4

3 • 3 • 3 • 3
81

2. 5^0

3. $5 \bullet 5 \bullet 5$

4. 10^4

5. $-10 \bullet (-10) \bullet (-10)$

6. -4^4

7. $(-5)^2 \bullet (-5)^4$

8. $6^6 \div 6^2$

Find the value of each expression. Express answers in standard form.

9. 2^{-4}

$2^{-4} = \frac{1}{2^4} = \frac{1}{16}$

10. 6^0

11. 3^{-2}

12. 5^{-3}

13. 6^{-2}

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

15. $\left(\frac{1}{4}\right)^4$

16. $\left(\frac{-3}{-5}\right)^2$

17. $\left(\frac{2}{7}\right)^{-2}$

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

19. $\left(-\frac{1}{5}\right)^3$

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

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Simplify. Express answers in standard form.

21. $6^2 + 4^0 - 2^3$

$36 + 1 - 8$
$37 - 8$
29

22. $5^2 - 7^0 + 3^3$

23. $8^3 - (0.3)^4$

24. $7^2 - (0.4)^3$

25. $2^7 - 8^2 - 1^{10}$

26. $9^3 - 6^2 + 1^{23}$

27. $4 \bullet 4^2 + 3^2$

28. $6 \bullet 6^2 + 2^3$

29. $3^2 \bullet 3^{-4} \bullet 3^6$

30. $5^3 \bullet 5^5 \bullet 5^{-6}$

31. $2^2 \bullet 3^2 \bullet 8$

32. $3^3 \bullet 5^2 \bullet 6^0$

33. $\dfrac{6 \bullet 3^4}{6^2 \bullet 3^2}$

34. $\dfrac{2^4 \bullet 4^2}{2^2 \bullet 4^4}$

35. $\dfrac{3^3}{3^{-2}}$

36. $\dfrac{5^2}{5^{-2}}$

37. $\dfrac{7^2 \bullet 7^5}{7^7 \bullet 7^{-2}}$

38. $\dfrac{6^5 \bullet 6^{-4}}{6^{-2} \bullet 6^3}$

39. $8^3 \bullet \dfrac{1}{8^{-1}}$

40. $4^5 \bullet \dfrac{1}{4^{-2}}$

41. $2^{-5} \div \dfrac{1}{4^{-3}}$

42. $5^{-1} \div \dfrac{1}{25^{-2}}$

43. $\dfrac{\left(\frac{2}{5}\right)^3 \bullet \left(\frac{2}{5}\right)^0 \bullet \left(\frac{2}{5}\right)^{-4}}{\left(\frac{2}{5}\right)^{-5} \bullet \left(\frac{2}{5}\right)^2 \bullet \left(\frac{2}{5}\right)^3}$

44. $\dfrac{\left(\frac{3}{4}\right)^0 \bullet \left(\frac{3}{4}\right) \bullet \left(\frac{3}{4}\right)^{-2}}{\left(\frac{3}{4}\right) \bullet \left(\frac{3}{4}\right)^{-5} \bullet \left(\frac{3}{4}\right)^4}$

Problem Solving

45. An ant is 6 feet from a wall. The first day, it walks half the distance to the wall. Each day, it walks half the remaining distance to the wall. How many feet does it walk each of the first five days? If it walked forever in this pattern, would it ever reach the wall?

46. Maria collected 3 cans on day 1, 6 cans on day 2, 12 cans on day 3, and 24 cans on day 4. Let d be the day. Write an expression for the number of cans she collects on day d. Then find the number of cans she collects on the 10th day.

TEST PREPARATION

47. Which expression below is equivalent to $4^3 \bullet 4 \bullet 4^5$?

A. $\dfrac{4^{10}}{4^2}$ **B.** $\dfrac{4^2}{4^{10}}$ **C.** $\dfrac{4}{4^{10}}$ **D.** $\dfrac{4^{10}}{4}$

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