

Math 9
Negative Exponents

Evaluate the following

1. $3^{-1} = \frac{1}{3}$

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

3. $4^{-2} = \frac{1}{4^2} = \frac{1}{16}$

4. $3^{-3} = \frac{1}{3^3} = \frac{1}{27}$

5. $6^{-2} = \frac{1}{6^2} = \frac{1}{36}$

6. $-5^{-2} = -\frac{1}{5^2} = -\frac{1}{25}$

7. $-2^{-3} = -\frac{1}{2^3} = -\frac{1}{8}$

8. $-6^{-2} = -\frac{1}{6^2} = -\frac{1}{36}$

9. $-7^{-2} = -\frac{1}{7^2} = -\frac{1}{49}$

10. $(-5)^{-2} = \frac{1}{(-5)^2} = \frac{1}{25}$

11. $(-3)^{-4} = \frac{1}{(-3)^4} = \frac{1}{81}$

12. $(-2)^{-4} = \frac{1}{(-2)^4} = \frac{1}{16}$

13. $(-3)^{-3} = \frac{1}{(-3)^3} = -\frac{1}{27}$

14. $\frac{1}{2^{-3}} = 2^3 = 8$

15. $\frac{1}{3^{-2}} = 3^2 = 9$

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

17. $\frac{-1}{6^{-2}} = -6^2 = -36$

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

19. $\frac{1}{10^{-3}} = 10^3 = 1000$

Evaluate

$$20. 0.2^{-1} \left(\frac{1}{5}\right)^{-1} = 5$$

$$21. 0.25^{-1} \left(\frac{1}{4}\right)^{-1} = 4$$

$$22. 0.5^{-2} \left(\frac{1}{2}\right)^{-2} = 2^2 = 4$$

$$23. \left(\frac{2}{3}\right)^{-1} = \frac{3}{2}$$

$$24. \left(\frac{3}{5}\right)^{-2} \left(\frac{5}{3}\right)^2 = \frac{25}{9}$$

$$25. \left(\frac{1}{4}\right)^{-2} = 4^2 = 16$$

$$26. \left(\frac{-1}{2}\right)^{-3} (-2)^3 = -8$$

$$27. \left(\frac{-2}{5}\right)^{-3} \left(\frac{5}{-2}\right)^3 = \frac{125}{-8}$$

Simplify, then evaluate

$$28. 10^3 \times 10^{-5} 10^{-2} = \frac{1}{10^2} = \frac{1}{100}$$

$$29. 2^{-3} \div 2^2 2^{-5} = \frac{1}{2^5} = \frac{1}{32}$$

$$30. 5^2 \times 5 \times 5^{-4} 5^{-1} = \frac{1}{5}$$

$$31. 4^2 \div 4^{-1} 4^3 = 64$$

$$32. (-3)^{-2} \div (-3)^2 (-3)^{-4} = \frac{1}{(-3)^4} = \frac{1}{81}$$

$$33. (-3)^2 \times (-3)^{-1} \div (-3)^4 (-3)^{-3} = \frac{1}{(-3)^3} = -\frac{1}{27}$$

$$34. \frac{(-2)^2}{(-2)^5} (-2)^{-3} = \frac{1}{(-2)^3} = -\frac{1}{8}$$

$$35. \frac{3^{-2}}{3^{-1}} 3^{-1} = \frac{1}{3}$$

Simplify, then evaluate

$$36. 5^3 \times 5^{-1} \div 5^4$$
$$5^{-2} = \frac{1}{5^2} = \frac{1}{25}$$

$$37. \frac{(-2)^3}{(-2)^7} \times \frac{(-2)^2}{(-2)^{-1}}$$
$$(-2)^{-1} = -\frac{1}{2}$$

Simplify to lowest single base

$$38. \frac{3}{3^{-2}} \times \frac{9^2}{9^4}$$
$$= \frac{3}{3^{-2}} \times \frac{3^4}{3^8}$$
$$= 3^{-1} = \frac{1}{3}$$

Evaluate each expression then simplify

$$39. 3^{-1} + 3^{-2}$$
$$\frac{1}{3} + \frac{1}{9} = \frac{4}{9}$$

$$40. 2^{-3} - 2^{-1} + 2^0$$
$$\frac{1}{8} - \frac{1}{2} + 1$$
$$\frac{1}{8} - \frac{4}{8} + \frac{8}{8}$$
$$= \frac{5}{8}$$

$$41. 5^{-2} + 2^{-1}$$
$$= \frac{1}{5^2} + \frac{1}{2}$$
$$= \frac{2+25}{50} = \frac{27}{50}$$

For each pair of expressions, which one is greater?

$$42. 2^{-3}, 3^{-2} \rightarrow \frac{1}{8} > \frac{1}{9}$$

$\frac{1}{8}$ $\frac{1}{9}$

$$43. 2^{-4}, 4^{-2}$$

$\frac{1}{16} = \frac{1}{16}$

Simplify, then evaluate

36. $5^3 \times 5^{-1} \div 5^4$

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

37. $\frac{(-2)^3}{(-2)^7} \times \frac{(-2)^2}{(-2)^{-1}}$

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

41. $5^{-2} + 2^{-1}$

$$\begin{aligned} &= \frac{1}{5^2} + \frac{1}{2} \\ &= \frac{1}{25} + \frac{1}{2} \\ &= \frac{2+25}{50} = \frac{27}{50} \end{aligned}$$

For each pair of expressions, which one is greater?

42. $2^{-3}, 3^{-2}$

$$\begin{array}{l} \swarrow \quad \searrow \\ \frac{1}{8} \quad \frac{1}{9} \end{array} \rightarrow \frac{1}{8} > \frac{1}{9}$$

Simplify to lowest single base

38. $\frac{3}{3^{-2}} \times \frac{9^2}{9^4}$

$$\begin{aligned} &= \frac{3}{3^{-2}} \times \frac{3^4}{3^8} \\ &= 3^{-1} = \frac{1}{3} \end{aligned}$$

43. $2^{-4}, 4^{-2}$

$$\begin{array}{l} \swarrow \quad \searrow \\ \frac{1}{16} = \frac{1}{16} \end{array}$$

Evaluate each expression then simplify

39. $3^{-1} + 3^{-2}$

$$\frac{1}{3} + \frac{1}{9} = \frac{4}{9}$$

40. $2^{-3} - 2^{-1} + 2^0$

$$\begin{aligned} &\frac{1}{8} - \frac{1}{2} + 1 \\ &\frac{1}{8} - \frac{4}{8} + \frac{8}{8} \\ &= \frac{5}{8} \end{aligned}$$