

I. Simplify the expression. Remember the answer should have only positive exponents. No calculator is allowed.

1.  $-4^2 = -16$
2.  $(3^{-2})^{-2} = 3^4 = 81$
3.  $2 \cdot 8^{-2} = 2^{-5} = \frac{1}{32}$
4.  $(2 \cdot 8)^{-2} = \frac{1}{256}$
5.  $\left(\frac{6}{5}\right)^{-1} \left(\frac{10}{3}\right)^{-1} = \frac{1}{4}$
6.  $\frac{3^7 \cdot 3^{-4}}{3^4} = \frac{1}{3}$
7.  $\frac{2^3 \cdot 2^{-5}}{2^2} = \frac{1}{16}$
8.  $\frac{2^4 \cdot 3^4}{12^4} = \frac{1}{16}$
9.  $(m^{-1} \cdot n^{-2})^3 = \frac{1}{m^3 n^6}$
10.  $(-4a^{-5})^{-3} = \frac{-a^{15}}{64}$
11.  $(2x^{-1})^2 \cdot 2x^0 = \frac{8}{x^2}$
12.  $(a^{-2})^{-3} = a^6$
13.  $(3a^{-2})^2 \cdot 3a^5 = 27a$
14.  $(-4x^3)^2 \cdot 3x^{-2} = 48x^4$
15.  $(3n^2)^{-1} (3n^2)^7 = 3^6 n^{12}$
16.  $\frac{(2a^{-1})^2}{(2a^{-1})^{-2}} = \frac{16}{a^4}$
17.  $\frac{(ab^2)^3}{(a^2b)^{-1}} = a^5 b^7$
18.  $\frac{(-3n^{-3})^2}{-9n^{-4}} = \frac{-1}{n^2}$
19.  $2x^{-3}(x^5 - 2x^3) = 2x^2 - 4$
20.  $\frac{3x^2 + 6x^2}{3x^{-2}} = 3x^4$
21.  $\frac{8n^4 - 4n^{-2}}{(2n)^{-2}} = 32n^6 - 16$
22.  $(a^{-1} - b^{-1})^{-1} = \frac{ab}{b-a}$
23.  $\frac{125^{-3} \cdot 25}{5^{-8}} = 5$
24.  $\sqrt{\frac{8^n \cdot 2^7}{4^n}} = 2^{\frac{n+7}{2}}$
25.  $\left(\frac{9}{25}\right)^{-\frac{1}{2}} = \frac{5}{3}$
26.  $\left(\frac{9}{25}\right)^{-\frac{3}{2}} = \frac{125}{27}$
27.  $\left(\frac{a^6}{27}\right)^{-\frac{2}{3}} = \frac{9}{a}$
28.  $\left(16^{-\frac{3}{4}}\right)^{\frac{5}{4}} = \frac{1}{16^{\frac{15}{16}}} = \frac{1}{8^{\frac{5}{4}}}$
29.  $(a^{-2}b)^{-\frac{1}{2}} \left(ab^{\frac{1}{2}}\right) = a^2$
30.  $(4x^{-3})^{-\frac{1}{2}} \cdot 4x^{\frac{1}{2}} = 2x^2$

$$31. \left(81^{\frac{1}{2}} - 9^{\frac{1}{2}}\right)^2 = \underline{36} \quad 32. (3^{-2} + 4^{-2})^{\frac{1}{2}} = \underline{\frac{12}{5}} \quad 33. (3^{-2} \cdot 4^{-2})^{\frac{1}{2}} = \underline{12}$$

$$34. \frac{8^{\frac{3}{2}}}{2^{\frac{3}{2}}} = \underline{2^3 = 8} \quad 35. \frac{9^{\frac{1}{6}} \cdot 9^{\frac{1}{4}}}{9^{\frac{1}{12}}} = \underline{9^{\frac{1}{2}} = 3} \quad 36. \sqrt{x} \cdot \sqrt[3]{x} \cdot \sqrt[6]{x} = \underline{X}$$

$$37. \left(x^{\frac{1}{2}} + x^{\frac{5}{2}}\right)^2 = \underline{X^5 + 2x^3 + X} \quad 38. n^{\frac{1}{3}} \left(n^{\frac{2}{3}} + n^{-\frac{1}{3}}\right) = \underline{n} \quad 39. \frac{x^{\frac{1}{2}} - 2x^{-\frac{1}{2}}}{x^{-\frac{1}{2}}} = \underline{X - 2}$$

$$40. \frac{4ab^{-\frac{1}{2}} - 2ab^{\frac{1}{2}}}{(a^2b)^{-\frac{1}{2}}} = \underline{4a^2 - 2a^2b}$$

II. Solve for x using common bases and exponent rules.

$$41. 8^x = 2^6 \quad 42. 9^{4x} = 81 \quad 43. 8^{x-1} = 2^{x+1} \quad 44. 8^x = \sqrt[3]{16}$$

$$x = \underline{2}$$

$$x = \underline{\frac{1}{2}}$$

$$x = \underline{2}$$

$$x = \underline{\frac{4}{9}}$$

$$45. (\sqrt{2})^x = \sqrt[3]{2} \quad 46. \sqrt[4]{9^x} = 27 \quad 47. (8x)^{-3} = 64 \quad 48. 8x^{-3} = 64$$

$$x = \underline{\frac{2}{3}}$$

$$x = \underline{6}$$

$$x = \underline{\frac{1}{32}}$$

$$x = \underline{\frac{1}{2}}$$

$$49. (8+x)^{-3} = 64 \quad 50. [8(x-2)]^3 = 27$$

$$x = \underline{\frac{-31}{4}}$$

$$x = \underline{\frac{19}{8}}$$