

Exponent Problems

Math 130 *Kovitz* 2012

Do this entire page without a calculator, leaving your answers in radical form or as expressions with fractional exponents. If you want, use a calculator afterwards to check the accuracy of the results.

- Find: $32^{-0.8}$, 10^{-3} , $81^{0.75}$.
- Simplify: 4^{-2} , $4^{1/2}$, $4^{-1/2}$, $4^{-2/3}$, $256^{-3/4}$, 243^{-6} , $144^{1/4} \cdot 144^{3/4}$, $16^{3/4} + 16^{1/4}$.
- Simplify:

$$3^4 \cdot 3^2, \quad (2^2)^3, \quad 2^5 \cdot 2^2, \quad \frac{9^3}{9^3}, \quad \frac{10^4}{5^4}, \quad \left(\frac{2}{3}\right)^4, \quad (-27)^0, \quad (2^0)^3, \quad 3^4 + 3^4,$$

$$(a^2b)^3, \quad (a+b)^0, \quad a^2 + a^2, \quad \frac{1}{2^{-3}}, \quad (2+\pi)^{-2}, \quad \frac{2^{-5}}{2^3}, \quad -10^4.$$

$$4. \text{ Simplify: } \left(\frac{1}{2}\right)^3 (-2)^3, \quad \frac{3^2}{3^0}, \quad \frac{(-2)^5}{(-2)^2}.$$

$$5. \text{ Simplify } \left(\frac{1}{2}\right)^{-\frac{1}{2}} + \left(\frac{1}{2}\right)^0 \div 5.$$

6. *True or False?*

(a) $4^{8/3} \cdot 4^{4/3} = 256$.

(b) $4^{8/3} \div 4^{2/3} = 16$.

(c) $8^{5/6} \div 8^{-1/6} = 4$.

(d) $(4^{4/3})^3 = (\sqrt[4]{4})^{16}$.

(e) $4^{3 \times 7} = 4^3 + 4^7$.

(f) $4^{3 \times 7} = 4^3 \cdot 4^7$.

(g) $4^{-3/4} = \sqrt{2}/4$.

(h) $\left(\frac{4}{\sqrt[4]{4}}\right)^4 = 64$.

(i) $8^{4/3} + 8^{2/3} = 24$.

7. Let $y = 16^x$

(a) Find y when $x =: \frac{1}{4}, -1, 2$.

(*b) For which x is y equal to: $4, \frac{1}{16}, \frac{1}{\sqrt{2}}, -256$?

8. Simplify: $\sqrt{x} \cdot \sqrt{x}$.

9. Evaluate. $81^{-1/2}$, $(16^{1/4})^3$, $(64)^{-2/3}$, $(-64)^{1/3}$, $-125^{1/3}$, $\sqrt[3]{9\sqrt[3]{-3}}$, $\frac{\sqrt{75}}{\sqrt{3}}$, $\sqrt{72}$

10. Find: $(32^2)^{-0.6}$, $32^{2+(-0.6)}$, $32^2 \cdot 32^{-0.6}$.

11. Find: $32^{1.8}$, $(\sqrt[3]{2})^{1.2}$, $(5^{-1/8})^{24}$, $((\sqrt{7})^{1/2})^3$.

12. Convert to scientific notation.

(a) 200,000,000

(b) .00037

13. Convert to decimal notation.

(a) 7.89×10^4

(b) 1.75×10^{-2}

14. Rewrite using positive exponents and then simplify: $x^{-2} + y^{-2}$.

15. Solve for x : $(\sqrt[3]{x})^2 = 4$.

16. Solve for x :

$$8^x = \frac{1}{\sqrt[3]{4}}.$$

17. Solve for c and x .

$$cx^2 = 0.5$$

$$cx^5 = 32$$

18. Rationalize the denominator.

(a) $\frac{1}{\sqrt{3}}$

(b) $\frac{1}{\sqrt[4]{2}}$

(c) $\frac{24}{\sqrt{6}}$

(d) $\frac{\sqrt{x}}{\sqrt{x} - x}$

(e) $\frac{\sqrt{8}}{\sqrt{6} - \sqrt{2}}$

19. Write in a simpler form: $(\sqrt[3]{6})^{3/2}$.