

## HATVÁNYOZÁS EGÉSZ ÉS TÖRT KITEVŐVEL

Számold ki az alábbi kifejezések pontos értékét számológép használata nélkül!

1.  $3^8 \cdot 3^{-3}$

2.  $2^{-7} \cdot 2^{12}$

3.  $5^{-6} \cdot 5^8$

4.  $\left(\frac{2}{3}\right)^{-5} \cdot \left(\frac{2}{3}\right)^4$

5.  $\left(\frac{3}{5}\right)^{10} \cdot \left(\frac{3}{5}\right)^{-8}$

6.  $\left(\frac{4}{3}\right)^{-8} \cdot \left(\frac{4}{3}\right)^5$

7.  $\frac{2^{-5}}{2^{-11}}$

8.  $\frac{3^{-8}}{3^{-10}}$

9.  $\frac{7^{-9}}{7^{-8}}$

10.  $\frac{\left(\frac{3}{2}\right)^{-4}}{\left(\frac{3}{2}\right)^{-5}}$

11.  $\frac{\left(\frac{2}{5}\right)^{-6}}{\left(\frac{2}{5}\right)^{-3}}$

12.  $\frac{\left(\frac{5}{4}\right)^{-3}}{\left(\frac{5}{4}\right)^{-5}}$

13.  $(3^{-2})^{-3}$

14.  $(2^{-4})^{-2}$

15.  $(4^{-1})^2$

16.  $2^{-3} \cdot 5^{-3}$

17.  $8^{-2} \cdot \left(\frac{1}{2}\right)^{-2}$

18.  $\left(\frac{3}{4}\right)^{-3} \cdot \left(\frac{2}{3}\right)^{-3}$

19.  $\left(\frac{6}{5}\right)^{-1} \cdot \left(\frac{25}{3}\right)^{-1}$

20.  $\frac{8^{-3}}{4^{-3}}$

21.  $\frac{24^{-4}}{8^{-4}}$

22.  $\frac{6^{-1}}{30^{-1}}$

Írd fel a következő tört legegyszerűbb alakját úgy, hogy ne tartalmazzon sem negatív kitevőt, sem zárójelet!

18.  $\frac{(a^3 b^{-2})^{-4} (b^3)^2}{(a^{-3} b^2)^7} =$

20.  $\frac{(x^{-3} y^2)^{-2} (x^2 y^4)^3}{(x^{-3})^{-4}} =$

19.  $\frac{(a^2 b^{-5})^3 (b^{-4})^2}{(a^{-2} b^3)^{-5}} =$

$$21. \frac{(x^4 y^{-3})^2 (y^4)^3}{(x^{-2} y^{-3})^{-2}} = ?$$

$$26. \frac{(a^{-3} b^4)^{-2} \cdot (b^5)^3 \cdot (a^2 b^4)^{-3} \cdot a^{-14}}{(b a^{-3})^5 \cdot b^{-13}} = ?$$

$$22. \frac{(x^{-2} y^5)^{-3} \cdot (y^3)^4 \cdot (x^4 y^3)^{-2} \cdot x^{-8}}{(y x^{-3})^4 \cdot y^{-13}} = ?$$

$$27. \frac{(x^3 y^2)^4 \cdot (x^2)^3 \cdot (y^{-5})^{-2} \cdot x^{-9}}{(y^4 x^3)^2 \cdot (x y^3)^3} = ?$$

$$23. \frac{(x^{-4} y^3)^{-2} \cdot (y^2)^4 \cdot (x^3 y^5)^{-2} \cdot x^{-10}}{(y x^{-3})^3 \cdot y^{-10}} = ?$$

$$28. \frac{(x^5 y^7)^2 \cdot (x^4)^3 \cdot y^{-4} \cdot x^{-10}}{(y^3 x)^3 \cdot (x y^3)^2} = ?$$

$$24. \frac{\left(\frac{x^{-5}}{y^7}\right)^{-2} \cdot \left(\frac{y}{x^3}\right)^{-4} \cdot \left(\frac{1}{x}\right)^{10}}{(y^3 x)^3 \cdot (x y^3)^2} = ?$$

$$29. \frac{(ab)^2 \cdot (b^2)^3 \cdot a^4 \cdot b^7}{(a^2 b)^3 \cdot (ab^3)^2} = ?$$

$$25. \frac{(a^4 b^5)^3 \cdot (a^3)^2 \cdot (b^{-8})^{-1} \cdot a^{-12}}{(b^3 a)^2 \cdot (ab^3)^3} = ?$$

$$30. \frac{(a^{-5} b^4)^{-3} \cdot (a^4)^{-2} \cdot (b^{-3})^3 \cdot a^{-4}}{(b^3 a)^4 \cdot (a^2 b^{-4})^3} = ?$$

$$31. \frac{(a^2 b^{-4})^{-4} \cdot (b^4)^{-3} \cdot (a^{-5})^2 \cdot b^{-2}}{(b^2 a^3)^{-4} \cdot (a^{-4} b^3)^2} = ?$$

Határozd meg az alábbi kifejezések pontos értékét számológép használata nélkül!

$$32. \frac{(2^4 \cdot 3^2)^5 \cdot 5^0 \cdot 2^4}{(3^4 \cdot 2^{12})^2} =$$

$$33. \frac{\left(\frac{1}{3}\right)^{-1} \cdot 4^0 + (-2)^3 + (4^{-1})^{-2} \cdot (-2)^{-4} + 7 \cdot 1^0}{(-1)^6 \cdot (-3)^2} =$$

$$34. \frac{\left(\frac{1}{2}\right)^{-1} \cdot 5^0 - (-2)^2 + (3^{-1})^2 (-9)^2 + 1^0}{(-2)^6 \cdot (-4)^{-2}} =$$

$$35. \frac{(-3)^{-3} \cdot 9^0 + \left(-\frac{2}{3}\right)^3 - 2^3 \cdot 3 \cdot 6^2}{0^5 + 3^{-1}} =$$

$$36. \frac{(-1)^{-2} \cdot 3^0 + \left(\frac{1}{2}\right)^{-1} - (-3)^3 \cdot 3^2}{-2^0 + 3^1} =$$

$$37. \frac{\left(\frac{3}{2}\right)^{-1} \cdot 9^1 + (-3)^2 + (2^{-1})^{-3} \cdot 2^{-2} + 4^0 \cdot 1^5}{(-1)^8 \cdot (-3)^2} =$$

$$38. \frac{\left(\frac{3}{2}\right)^{-1} \cdot 9^1 - (-4)^2 + (2^{-2})^2 (-8)^2 \cdot 7^0}{(-3)^3 \cdot \left(-\frac{1}{3}\right)^2} =$$

$$39. \left(-\frac{2}{3}\right)^3 \cdot 3^2 + \frac{(-1)^5 \cdot (-5)}{2^5 - 5 \cdot 6} \cdot \frac{3 \cdot 7^0}{(-2)^2} - 0^5 =$$

$$40. \left(-\frac{4}{5}\right)^2 \cdot \frac{125}{2^5} + \frac{(-1)^4 \cdot (-2)^3}{\left(\frac{1}{3}\right)^{-3} - (-5) \cdot 6^0} + \left(-\frac{1}{2}\right)^2 =$$

$$41. \frac{\left(\frac{2}{3}\right)^{-1} \cdot 6^1 - (-3)^2 + (2^{-1})^3 (-4)^2 + 5^0}{(-5)^2 \cdot \left(-\frac{1}{5}\right)^2} =$$

$$42. \left(-\frac{2}{3}\right)^2 \cdot \frac{(-3)^3}{2^3} + \frac{\left(-\frac{1}{2}\right)^2 \cdot (-4)^3}{\left(\frac{1}{10}\right)^{-2} - (-2)^0 \cdot (-6)^2} + \left(\frac{1}{2}\right)^{-1} =$$

Számold ki az alábbi hatványok pontos értékét számológép használata nélkül!

$4^{\frac{1}{2}}$	$27^{\frac{2}{3}}$	$32^{-\frac{4}{5}}$	$\left(\frac{1}{4}\right)^{\frac{5}{2}}$	$\left(\frac{1}{64}\right)^{\frac{5}{6}}$
$4^{\frac{3}{2}}$	$27^{\frac{4}{3}}$	$64^{-\frac{1}{6}}$	$\left(\frac{1}{8}\right)^{\frac{2}{3}}$	$\left(\frac{1}{9}\right)^{\frac{1}{2}}$
$4^{\frac{5}{2}}$	$81^{\frac{1}{4}}$	$64^{-\frac{1}{3}}$	$\left(\frac{1}{8}\right)^{\frac{4}{3}}$	$\left(\frac{1}{9}\right)^{\frac{3}{2}}$
$8^{\frac{2}{3}}$	$81^{\frac{3}{4}}$	$64^{-\frac{2}{3}}$	$\left(\frac{1}{8}\right)^{\frac{5}{3}}$	$\left(\frac{1}{27}\right)^{\frac{1}{3}}$
$8^{\frac{4}{3}}$	$25^{\frac{1}{2}}$	$64^{-\frac{5}{6}}$	$\left(\frac{1}{16}\right)^{\frac{1}{4}}$	$\left(\frac{1}{27}\right)^{\frac{2}{3}}$
$8^{\frac{5}{3}}$	$25^{\frac{3}{2}}$	$9^{-\frac{1}{2}}$	$\left(\frac{1}{16}\right)^{\frac{3}{4}}$	$\left(\frac{1}{27}\right)^{\frac{4}{3}}$
$16^{\frac{1}{4}}$	$125^{\frac{1}{3}}$	$9^{-\frac{3}{2}}$	$\left(\frac{1}{16}\right)^{\frac{5}{4}}$	$\left(\frac{1}{81}\right)^{\frac{1}{4}}$
$16^{\frac{3}{4}}$	$125^{\frac{2}{3}}$	$27^{-\frac{1}{3}}$	$\left(\frac{1}{32}\right)^{\frac{1}{5}}$	$\left(\frac{1}{81}\right)^{\frac{3}{4}}$
$16^{\frac{5}{4}}$	$4^{-\frac{1}{2}}$	$27^{-\frac{2}{3}}$	$\left(\frac{1}{32}\right)^{\frac{2}{5}}$	$\left(\frac{1}{25}\right)^{\frac{1}{2}}$
$32^{\frac{1}{5}}$	$4^{-\frac{3}{2}}$	$27^{-\frac{4}{3}}$	$\left(\frac{1}{32}\right)^{\frac{3}{5}}$	$\left(\frac{1}{25}\right)^{\frac{3}{2}}$
$32^{\frac{2}{5}}$	$4^{-\frac{5}{2}}$	$81^{-\frac{1}{4}}$	$\left(\frac{1}{32}\right)^{\frac{4}{5}}$	$\left(\frac{1}{125}\right)^{\frac{1}{3}}$
$32^{\frac{3}{5}}$	$8^{-\frac{2}{3}}$	$81^{-\frac{3}{4}}$	$\left(\frac{1}{64}\right)^{\frac{1}{6}}$	$\left(\frac{1}{125}\right)^{\frac{2}{3}}$
$32^{\frac{4}{5}}$	$8^{-\frac{4}{3}}$	$25^{-\frac{1}{2}}$	$\left(\frac{1}{4}\right)^{\frac{1}{2}}$	$\left(\frac{1}{4}\right)^{-\frac{1}{2}}$
$64^{\frac{1}{6}}$	$8^{-\frac{5}{3}}$	$25^{-\frac{3}{2}}$	$\left(\frac{1}{4}\right)^{\frac{3}{2}}$	$\left(\frac{1}{4}\right)^{-\frac{3}{2}}$
$64^{\frac{1}{3}}$	$16^{-\frac{1}{4}}$	$125^{-\frac{1}{3}}$	$\left(\frac{1}{64}\right)^{\frac{2}{3}}$	
$64^{\frac{2}{3}}$	$16^{-\frac{3}{4}}$	$125^{-\frac{2}{3}}$		
$64^{\frac{5}{6}}$	$16^{-\frac{5}{4}}$	$\left(\frac{1}{4}\right)^{\frac{1}{2}}$		
$9^{\frac{1}{2}}$	$32^{-\frac{1}{5}}$	$\left(\frac{1}{4}\right)^{\frac{3}{2}}$		
$9^{\frac{3}{2}}$	$32^{-\frac{2}{5}}$			
$27^{\frac{1}{3}}$	$32^{-\frac{3}{5}}$			

$\left(\frac{1}{4}\right)^{-\frac{5}{2}}$	$\left(\frac{1}{9}\right)^{-\frac{1}{2}}$	$\left(\frac{9}{4}\right)^{\frac{5}{2}}$	$\left(\frac{100}{9}\right)^{\frac{1}{2}}$	$\left(\frac{16}{81}\right)^{\frac{3}{4}}$
$\left(\frac{1}{8}\right)^{-\frac{2}{3}}$	$\left(\frac{1}{9}\right)^{-\frac{3}{2}}$	$\left(\frac{25}{4}\right)^{\frac{5}{2}}$	$\left(\frac{4}{9}\right)^{\frac{3}{2}}$	$\left(\frac{4}{25}\right)^{\frac{1}{2}}$
$\left(\frac{1}{8}\right)^{-\frac{4}{3}}$	$\left(\frac{1}{27}\right)^{-\frac{1}{3}}$	$\left(\frac{27}{8}\right)^{\frac{2}{3}}$	$\left(\frac{16}{9}\right)^{\frac{3}{2}}$	$\left(\frac{9}{25}\right)^{\frac{1}{2}}$
$\left(\frac{1}{8}\right)^{-\frac{5}{3}}$	$\left(\frac{1}{27}\right)^{-\frac{2}{3}}$	$\left(\frac{125}{8}\right)^{\frac{2}{3}}$	$\left(\frac{25}{9}\right)^{\frac{3}{2}}$	$\left(\frac{16}{25}\right)^{\frac{1}{2}}$
$\left(\frac{1}{16}\right)^{-\frac{1}{4}}$	$\left(\frac{1}{27}\right)^{-\frac{4}{3}}$	$\left(\frac{27}{8}\right)^{\frac{4}{3}}$	$\left(\frac{100}{9}\right)^{\frac{3}{2}}$	$\left(\frac{36}{25}\right)^{\frac{1}{2}}$
$\left(\frac{1}{16}\right)^{-\frac{3}{4}}$	$\left(\frac{1}{81}\right)^{-\frac{1}{4}}$	$\left(\frac{125}{8}\right)^{\frac{4}{3}}$	$\left(\frac{8}{27}\right)^{\frac{1}{3}}$	$\left(\frac{49}{25}\right)^{\frac{1}{2}}$
$\left(\frac{1}{16}\right)^{-\frac{5}{4}}$	$\left(\frac{1}{81}\right)^{-\frac{3}{4}}$	$\left(\frac{27}{8}\right)^{\frac{5}{3}}$	$\left(\frac{64}{27}\right)^{\frac{1}{3}}$	$\left(\frac{64}{25}\right)^{\frac{1}{2}}$
$\left(\frac{1}{32}\right)^{-\frac{1}{5}}$	$\left(\frac{1}{25}\right)^{-\frac{1}{2}}$	$\left(\frac{125}{8}\right)^{\frac{5}{3}}$	$\left(\frac{125}{27}\right)^{\frac{1}{3}}$	$\left(\frac{81}{25}\right)^{\frac{1}{2}}$
$\left(\frac{1}{32}\right)^{-\frac{2}{5}}$	$\left(\frac{1}{25}\right)^{-\frac{3}{2}}$	$\left(\frac{81}{16}\right)^{\frac{1}{4}}$	$\left(\frac{1000}{27}\right)^{\frac{1}{3}}$	$\left(\frac{4}{25}\right)^{\frac{3}{2}}$
$\left(\frac{1}{32}\right)^{-\frac{3}{5}}$	$\left(\frac{1}{125}\right)^{-\frac{1}{3}}$	$\left(\frac{81}{16}\right)^{\frac{3}{4}}$	$\left(\frac{8}{27}\right)^{\frac{2}{3}}$	$\left(\frac{9}{25}\right)^{\frac{3}{2}}$
$\left(\frac{1}{32}\right)^{-\frac{4}{5}}$	$\left(\frac{1}{125}\right)^{-\frac{2}{3}}$	$\left(\frac{4}{9}\right)^{\frac{1}{2}}$	$\left(\frac{64}{27}\right)^{\frac{2}{3}}$	$\left(\frac{16}{25}\right)^{\frac{3}{2}}$
$\left(\frac{1}{64}\right)^{-\frac{1}{6}}$	$\left(\frac{9}{4}\right)^{\frac{1}{2}}$	$\left(\frac{16}{9}\right)^{\frac{1}{2}}$	$\left(\frac{125}{27}\right)^{\frac{2}{3}}$	$\left(\frac{8}{125}\right)^{\frac{1}{3}}$
$\left(\frac{1}{64}\right)^{-\frac{1}{3}}$	$\left(\frac{25}{4}\right)^{\frac{1}{2}}$	$\left(\frac{25}{9}\right)^{\frac{1}{2}}$	$\left(\frac{1000}{27}\right)^{\frac{2}{3}}$	$\left(\frac{27}{125}\right)^{\frac{1}{3}}$
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$\left(\frac{1}{64}\right)^{-\frac{5}{6}}$	$\left(\frac{25}{4}\right)^{\frac{3}{2}}$	$\left(\frac{64}{9}\right)^{\frac{1}{2}}$	$\left(\frac{16}{81}\right)^{\frac{1}{4}}$	$\left(\frac{8}{125}\right)^{\frac{2}{3}}$

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