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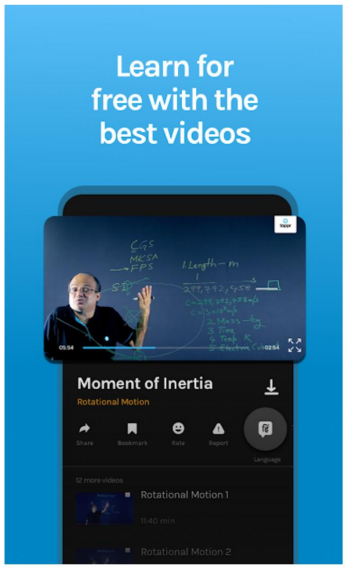

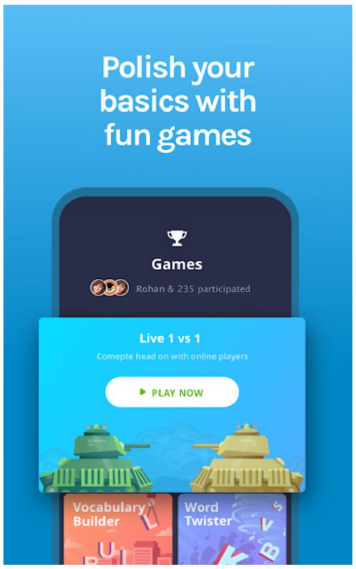

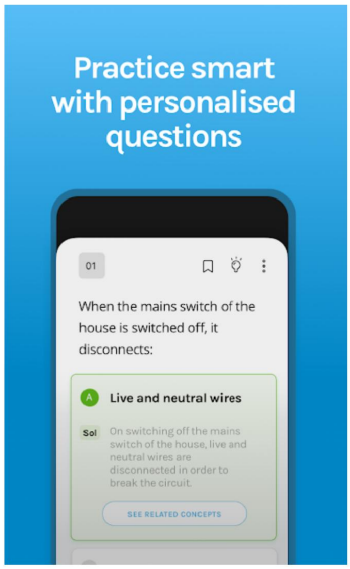

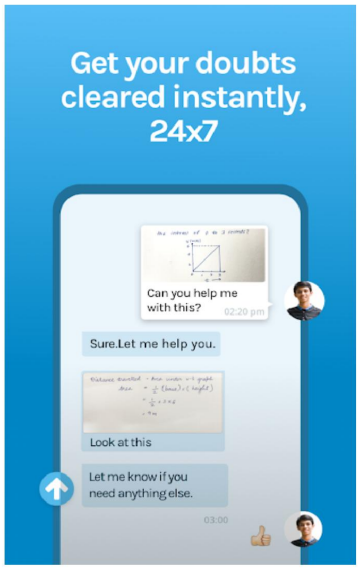

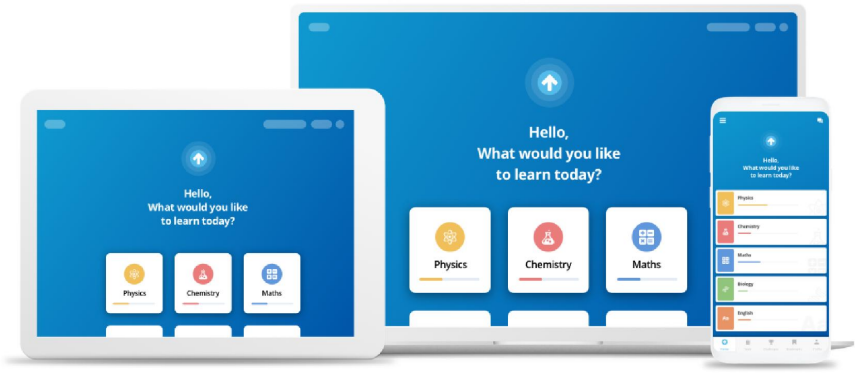

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#463567

Find:

(i) $64^{\frac{1}{2}}$ (ii) $32^{\frac{1}{5}}$ (iii) $125^{\frac{1}{3}}$

Solution

i) $(64)^{\frac{1}{2}}$

Express 64 in terms of 8

$= (8^2)^{\frac{1}{2}} = 8^{2\times\frac{1}{2}} = 8^1 = 8$

ii) $(32)^{\frac{1}{5}}$

Express 32 in terms of 2

$= (2^5)^{\frac{1}{5}} = 2^{5\times\frac{1}{5}} = 2^1 = 2$

iii) $(125)^{\frac{1}{3}}$

Express 125 in terms of 5

$= (5^3)^{\frac{1}{3}} = 5^{3\times\frac{1}{3}} = 5^1 = 5$

#463569

Find:

(i) $9^{\frac{3}{2}}$ (ii) $32^{\frac{2}{5}}$ (iii) $16^{\frac{3}{4}}$ (iv) $125^{\frac{-1}{3}}$

Solution

(i) $9^{\frac{3}{2}}$

Express 9 in terms of 3

$= (3^2)^{\frac{3}{2}} = 3^{2\times\frac{3}{2}} = 3^3 = 27$

(ii) $32^{\frac{2}{5}}$

Express 32 in terms of 2

$= (2^5)^{\frac{2}{5}} = 2^{5\times\frac{2}{5}} = 2^2 = 4$

(iii) $16^{\frac{3}{4}}$

Express 16 in terms of 4

$= (2^4)^{\frac{3}{4}} = 2^{4\times\frac{3}{4}} = 2^3 = 8$

(iv) $125^{\frac{-1}{3}}$

Express 125 in terms of 5

$= (5^3)^{\frac{-1}{3}} = 5^{3\times\frac{-1}{3}} = 5^{-1} = \dfrac{1}{5}$

#463571

Simplify:

(i) $2^{\frac{3}{2}}2^{\frac{1}{5}}$ (ii) $\left(\dfrac{1}{3^3}\right)^7$ (iii) $\dfrac{11^{\frac{1}{2}}}{11^{\frac{1}{4}}}$ (iv) $7^{\frac{1}{2}}\cdot 8^{\frac{1}{2}}$

Solution

(i) $2^{\frac{3}{2}}.2^{\frac{1}{5}}$

By using property $X^a.\ X^b = X^{a+b}$

$= 2^{\frac{3}{2}+\frac{1}{5}} = 2^{\frac{17}{10}}$

(ii) $\left(\frac{1}{3^3}\right)^7$

By using property $\left(\frac{x}{y}\right)^a = \frac{x^a}{y^b}$

$= \frac{1}{(3^3)^7}$

$= \frac{1}{3^{21}}$ ..... $[\because (x^a)^b = x^{ab}]$

(iii) $\frac{11^{\frac{1}{2}}}{11^{\frac{1}{4}}}$

By using property $\frac{X^a}{X^b} = X^{a-b}$

$= 11^{\frac{1}{2}-\frac{1}{4}} = 11^{\frac{1}{4}}$

(iv) $7^{\frac{1}{2}}.8^{\frac{1}{2}}$

$= 56^{\frac{1}{2}}$ ..... $[\because x^a y^a = (xy)^a]$

#463724

Evaluate:

(i) 3^{-2}

(ii) $(-4)^{-2}$

(iii) $\left(\frac{1}{2}\right)^{-5}$

Solution

(i) $3^{-2} = \frac{1}{3^2} = \frac{1}{9}$

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

(iii) $\left(\frac{1}{2}\right)^{-5} = \frac{1}{(2)^{-5}} = 2^5 = 32$

#463725

Simplify and express the result in power notation with positive exponent.

(i) $(-4)^5 \div (-4)^8$

(ii) $\left(\frac{1}{2^3}\right)^2$

(iii) $(-3)^4 \times \left(\frac{5}{3}\right)^4$

(iv) $\left(3^{-7} \div 3^{-10}\right) \times 3^{-5}$

(v) $2^{-3} \times (-7)^{(-3)}$

Solution

(i) $(-4)^5 \div (-4)^8 = \dfrac{(-4)^5}{(-4)^8} = (-4)^{5-8} = (-4)^{-3} = \dfrac{1}{(-4)^3}$

(ii) $\left(\dfrac{1}{2^3}\right)^2 = \dfrac{1}{2^{3\times 2}} = \dfrac{1}{2^6}$

(iii) $(-3)^4 \times \left(\dfrac{5}{3}\right)^4 = (-1)^4 \times (3)^4 \times \left(\dfrac{5}{3}\right)^4 = (-1)^4 \times 5^4 = 5^4$

(iv) $(3^{-7} \div 3^{-10}) \times 3^{-5} = \left(\dfrac{3^{-7}}{3^{-10}}\right) \times (3)^{-5} = 3^{-7+10} \times 3^{-5}$
$= 3^{3-5}$
$= 3^{-2} = \dfrac{1}{3^2}$

(v) $2^{-3} \times (-7)^{(-3)} = \dfrac{1}{2^3} \times \dfrac{1}{(-7)^3} = \left(\dfrac{1}{2 \times (-7)}\right)^3$
$= \dfrac{1}{(-14)^3}$

#463729

Find the value of:

(i) $(3^0 + 4^{-1}) \times 2^2$

(ii) $\left(2^{-1} \times 4^{-1}\right) \div 2^{-2}$

(iii) $\left(\dfrac{1}{2}\right)^{-2} + \left(\dfrac{1}{3}\right)^{-2} + \left(\dfrac{1}{4}\right)^{-2}$

(iv) $\left(3^{-1} + 4^{-1} + 5^{-1}\right)^0$

(v) $\left(\left(\dfrac{-2}{3}\right)^{-2}\right)^2$

Solution

(i) $(3^0 + 4^{-1}) \times 2^2 = \left(1 + \dfrac{1}{4}\right) \times 2^2 = \dfrac{5}{4} \times 4 = 5$

(ii) $(2^{-1} \times 4^{-1}) \div 2^{-2} = \dfrac{2^{-1} \times \left(2^2\right)^{-1}}{2^{-2}} = \dfrac{2^{-1+(-2)}}{2^{-2}}$
$= \dfrac{2^{-3}}{2^{-2}} = 2^{-3-(-2)} = 2^{-1} = \dfrac{1}{2}$

(iii) $\left(\dfrac{1}{2}\right)^{-2} + \left(\dfrac{1}{3}\right)^{-2} + \left(\dfrac{1}{4}\right)^{-2}$
$= 2^2 + 3^2 + 4^2 = 4 + 9 + 16 = 29$

(iv) $(3^{-1} + 4^{-1} + 5^{-1})^0 = 1$

(v) $\left(\left(\dfrac{-2}{3}\right)^{-2}\right)^2 = \left(\dfrac{9}{4}\right)^2 = \dfrac{81}{16}$

#463730

Evaluate:

(i) $\dfrac{8^{-1} \times 5^3}{2^{-4}}$

(ii) $(5^{-1} \times 2^{-1}) \times 6^{-1}$

Solution

(i) $\frac{8^{-1} \times 5^3}{2^{-4}}$

$= \frac{2^{-3} \times 5^3}{2^{-4}}$

$= \frac{2^4 \times 5^3}{2^3} = 250$

(ii) $(5^{-1} \times 2^{-1}) \times 6^{-1}$

$= \left(\frac{1}{5} \times \frac{1}{2}\right) \times \frac{1}{6}$

$= \frac{1}{60}$

#463732

Find the value of m for which $5^m / 5^{-3} = 5^5$.

Solution

$\frac{5^m}{5^{-3}} = 5^5$

$\Rightarrow 5^m = 5^5 \times 5^{-3} = 5^2$

$\Rightarrow m = 2$

When the bases are same, the powers can be equated.

#463734

Evaluate:

(i) $\left(\frac{1}{3}\right)^{-1} - \left(\frac{1}{4}\right)^{-1}$

(ii) $\left(\frac{5}{8}\right)^{-7} \times \left(\frac{8}{5}\right)^{-4}$

Solution

(i) $\left(\frac{1}{3}\right)^{-1} - \left(\frac{1}{4}\right)^{-1}$

$= [3 - 4]^{-1} = (-1)$

(ii) $\left(\frac{5}{8}\right)^{-7} \times \left(\frac{8}{5}\right)^{-4}$

$= \left(\frac{8}{5}\right)^{7} \times \left(\frac{5}{8}\right)^{4}$

$= \frac{512}{125}$

#463736

Simplify

(i) $\frac{25 \times t^{-4}}{5^{-3} \times 10 \times t^{-8}}$

(ii) $\frac{3^{-5} \times 10^{-5} \times 125}{5^{-7} \times 6^{-5}}$

Solution

(i) $\dfrac{25 \times t^{-4}}{5^{-3} \times 10 \times t^{-8}}$

$= \dfrac{5^{2+2} \times t^{-4+8}}{2}$

$= \dfrac{625t^4}{2}$

(ii) $\dfrac{3^{-5} \times 10^{-5} \times 125}{5^{-7} \times 6^{-5}}$

$= 3^0 \times 2^0 \times 5^5$

$= 5^5$

#463738

Express the following numbers in the standard form :

$(i) 0.0000000000085$

$(ii) 0.00000000000942$

$(iii) 6020000000000000$

$(iv) 0.00000000837$

$(v) 31860000000$

Solution

(i) $0.0000000000085 = 8.5 \times 10^{-12}$

(ii) $0.00000000000942 = 9.42 \times 10^{-12}$

(iii) $6020000000000000 = 6.02 \times 10^{15}$

(iv) $0.00000000837 = 8.37 \times 10^{-9}$

(v) $31860000000 = 3.186 \times 10^{10}$

#463740

Express the following numbers in usual form

(i) 3.02×10^{-6}

(ii) 4.5×10^{4}

(iii) 3×10^{-8}

(iv) 1.0001×10^{9}

(v) 5.8×10^{12}

(vi) 3.61492×10^{6}

Solution

(i) $3.02 \times 10^{-6} = 0.00000302$

(ii) $4.5 \times 10^{4} = 45000$

(iii) $3 \times 10^{-8} = 0.00000003$

(iv) $1.0001 \times 10^{9} = 1000100000$

(v) $5.8 \times 10^{12} = 5800000000000$

(vi) $3.61492 \times 10^{6} = 3614920$

#463743

Express the number appearing in the following statements in standard form:

(i) 1 micron is equal to $\frac{1}{1000000}$ m

(ii) charge of an electron is $0.000,000,000,000,000,16$coulomb

(iii) size of bacteria is 0.0000005 m

(iv) size of plant cell is 0.00001275 m

(v) Thickness of a thick paper is 0.07 mm

Solution

(i) $1000000 = 1 \times 10^{-6}$

(ii) $0.000,000,000,000,000,16 = 1.6 \times 10^{-19}$

(iii) $0.0000005 = 5 \times 10^{-7}$

(iv) $0.00001275 = 1.275 \times 10^{-5}$

(v) $0.07 = 7 \times 10^{-2}$