1

Calcola il valore di queste espressioni indicando i passaggi necessari per risolverle **senza** calcolatrice

$a)\ \left(-\frac{2}{5}\right)^3 =$ $\quad b)\ \left(-\frac{70}{210}\right)^{-4} =$ $\quad c)\ \left(-\frac{1}{2}\right)^6$

$d)\ \frac{6^2}{30} =$ $\quad e)\ \left(\frac{3}{5}\right)^{-3} =$ $\quad f)\ \left(-\frac{1}{8}\right)^{-2} =$

$g)\ \left(\frac{7}{5}\right)^{-1} =$ $\quad h)\ \left(\frac{4}{3}\right)^5 : \left(\frac{4}{3}\right)^7 =$ $\quad i)\ \frac{1}{2^{-1}} + \frac{2^{-2}}{3}$

$l)\ \left[\left(-\frac{3}{7}\right)\cdot\left(-\frac{3}{7}\right)^4 \cdot \left(-\frac{3}{7}\right)^{-7}\right]^2 =$

Verifica il risultato:

a) $-\frac{8}{125}$ b) 81 c) $\frac{1}{64}$ d) $\frac{6}{5}$ e) $\frac{125}{27}$ f) 64 g) $\frac{5}{7}$ h) $\frac{9}{16}$ i) $\frac{259}{12}$ l) $\frac{2401}{81}$

2

Determinare i valori di x per cui le uguaglianze seguenti sono verificate.

a) $\frac{1}{a^{17}} = a^{3x+1}$ **[x = -6]**

b) $\frac{a^{10x}}{a} = a$ **[x =1/5]**

c) $\frac{a^{-3x+12}}{a^7} = 1$ **[x = 19/3]**

d) $\frac{1}{a^{-15}} * \frac{1}{a^7} = \frac{a^{6x}}{a^{2x}}$ **[x = 2]**

3	Risolvi le seguenti espressioni
	a) $\frac{4}{1-\frac{2}{3+\frac{1}{2-\frac{1}{3}}}} - [(-1)^2 \cdot (-1)^3 : (-1)^4 + (-2)^2 : (-2)^3 \cdot (-2)^4] \cdot 3^{-1}$ [12] [1]
	b) $1 - \frac{-4 \cdot \left[-\frac{2}{3} \cdot \left(-\frac{1}{4}\right)^{-1}\right]^{-1} + \frac{3}{2}}{-\frac{4}{3}}$ [−2]
	c) $1 + \frac{2}{1-\frac{3}{1+\frac{4}{5}}}$

4	Calcolare il valore delle seguenti potenze.	
	a) $\left[\left(-\frac{10}{7}\right)^{222}\right]^5 : \left(-\frac{10}{7}\right)^{1110} =$ [1]	e) $\frac{\frac{b}{4}}{\frac{b}{8}} + \frac{4}{5} =$ $\left[\frac{14}{5}\right]$
	b) $\left(\frac{3}{8}\right)^3 \cdot \left(\frac{16}{15}\right)^3 =$ $\left[\frac{8}{125}\right]$	f) $\left(\frac{3}{4}\right)^{-2} - \frac{2^3 - 3^{-2}}{3^2} + 2 \cdot 3^{-1} \cdot \left(\frac{6}{9}\right)^{-2} =$ $\left[\frac{389}{162}\right]$
	c) $\left(\frac{7}{11}\right)^{-3} : \left(\frac{21}{33}\right)^{-3} =$ [1]	g) $\frac{\left(\frac{3}{4}\right)^{-2}}{\left(\frac{2}{3}\right)^3} - \left(1 - \left(\frac{4}{3}\right)^{-1}\right)^3 \cdot \frac{4^2}{3} + \frac{2^{-4}}{\frac{3}{2}} =$ $\left[\frac{143}{24}\right]$
	d) $\frac{1}{4} - \frac{\frac{2}{3} - 0{,}5}{\frac{3}{4} + \frac{4}{5}} =$ $\left[\frac{53}{372}\right]$	h) $\left(\frac{2}{a}\right)^{-2} \cdot \left(\frac{4}{a}\right)^3 + \left(\frac{a}{4}\right)^{-2} \cdot \frac{3a}{4} \cdot \frac{1}{6} - 1 : \frac{a^2}{8a} =$ $\left[\frac{10}{a}\right]$

5 Calco il valore delle seguenti espressioni in Q.

a) $\frac{2}{3}\cdot\left[\left(-1+\frac{3}{4}\right):(-2)^{-2}-\left(4-\frac{3}{2}\right)\cdot\left(\frac{1}{2}\right)^{-3}\right]\cdot\left(-\frac{1}{3}\right)^{2}-\frac{13}{9}=$ [-3].

b) $\left[(+3)^{-1}+2\cdot\left(-\frac{1}{3}\right)+\left(\frac{1}{2}\right)^{-3}\cdot\left(\frac{2}{3}\right)\right]\cdot\frac{3}{5}-\left(\frac{2}{7}\right)^{-1}+\frac{1}{2}=$ [0]

c) $\frac{8}{10}\cdot\left[\left(1+\frac{1}{2}\right)\cdot\left(\frac{3}{2}\right)^{-1}-\left(2-\frac{1}{3}\right)\cdot\left(-\frac{5}{3}\right)^{-2}\cdot 3^{-1}\right]^{-1}=$ [1]

d) $\frac{3}{4}\cdot\left[\left(-2+\frac{2}{3}\right):(-2)^{-2}-\left(\frac{1}{4}+2\right)\cdot\left(\frac{3}{2}\right)^{-3}\right]^{-2}-\left(1-\frac{1}{5}\right)^{-1}-\frac{37}{48}+1=$ [-1]

6 Calcolare il valore delle seguenti potenze.

a) $\frac{1}{1+\frac{2}{3}}=$ $\left[\frac{3}{5}\right]$

b) $\frac{\frac{1}{4}+\frac{2}{3}}{\frac{1}{2}+1}=$ $\left[\frac{11}{18}\right]$

c) $\left(\frac{a}{2}+\frac{a}{3}\right)\cdot 10^{-1}=$ $\left[\frac{a}{12}\right]$

d) $\left(\frac{1}{6}\right)^{-1}+\left(\frac{1}{6}\right)^{0}+\left(\frac{1}{6}\right)^{1}=$ $\left[\frac{43}{6}\right]$

e) $\left(\frac{3}{5}\right)^{2}-\left(\frac{2}{5}\right)^{2}=$ $\left[\frac{1}{5}\right]$

f) $2^{3}\cdot 3^{3}\cdot\left(\left(\frac{1}{6}\right)+\left(\frac{1}{6}\right)^{-1}\right)\cdot\frac{1}{6^{2}+1}=$ [36]

g) $\left(\frac{1}{2}\right)^{136}:\left(1-\frac{1}{2}\right)^{137}-\left(3-\frac{15}{4}\right)^{-1}=$ $\left[\frac{10}{3}\right]$

h) $\left(\left(\frac{\frac{1}{2}:\frac{2}{3}}{3}\right)^{-2}\cdot 3^{23}\right):(0,\overline{3})^{-28}=$ $\left[\frac{1}{3}\right]$

7 Calcolare il valore delle seguenti potenze.

a) $2^3 \cdot 16^x = 2048$ [2]

b) $\left(\frac{1}{3}\right)^{x+1} = 27$ $[-4]$

c) $5^{-2} \cdot x^{-3} = \frac{1}{5}$ $\left[5^{\frac{1}{3}}\right]$

d) $(10^x)^3 = 10^{2x+5}$ [5]

e) $\frac{6^{27}}{6^x} = 6^{2x}$ [9]

f) $5^2 + 12^2 = \left(\frac{1}{x}\right)^{-2}$ [13]

8 Semplificare la seguente espressione il più possibile, mostrando chiaramente i passaggi eseguiti.
Scrivere il risultato come una potenza in base 2

$$\frac{(4^{12} : 16^{25}) \cdot (8^{-4})^3}{2^{100} : 4^{20}} \bullet (2^3 \bullet 8^5)^{-2}$$ $[2^{-208}]$

9 Calcolare il valore delle seguenti espressioni in $\mathbb{Q}$ riducendo il risultato ai minimi termini. Mostrare i vari passaggi significativi.

a) $(0,\bar{3})^3 \cdot (1{,}5)^2 + \left(1 - \frac{2}{3}\right)^2 + \left(\frac{1}{2}\right)^2 - \frac{1}{6} =$ $\left[\frac{5}{18}\right]$

b) $\frac{\frac{2}{3}+\frac{1}{4}-\frac{5}{12}}{\frac{3}{5}-\frac{1}{3}-\frac{8}{15}} =$ $\left[-\frac{15}{8}\right]$

c) $\left(\frac{3}{4}\right)^{-2} - \frac{2^3}{3^2} + \frac{2}{3^{-1}} \cdot \left(\frac{6}{9}\right)^{-2} =$ $\left[\frac{259}{18}\right]$

d) $3 + \frac{3+\frac{1+\frac{1}{3}}{3}}{3} =$ $\left[\frac{112}{27}\right]$

e) $0,\bar{6} + \frac{4}{5} - (1 - 0,\bar{4}) + \left(\frac{4}{3}\right)^{-1} =$ $\left[\frac{299}{180}\right]$

f) $\left(\frac{4^{-2}}{8^{-2}} \cdot \frac{1}{4^2}\right)^{-2} =$ [16]

10	Semplificare la seguente espressione il più possibile, mostrando chiaramente tutti i passaggi significativi.

a) $\left(\frac{2}{9}+\frac{1}{4}\right)\cdot\frac{27}{51}+\frac{10}{7}\cdot\frac{2}{21}\cdot\left(\frac{1}{3}-\frac{1}{10}\right)$ $\left[\frac{71}{252}\right]$

b) $-6\cdot\left(-\frac{2}{3}+\frac{3}{2}-\frac{1}{6}\right)\cdot\left(-\frac{3}{10}\right)+\frac{3}{29}\cdot\left(2-\frac{2}{5}+\frac{1}{3}\right)-\left(2+\frac{1}{2}\right)$ $\left[-\frac{11}{10}\right]$

c) $\left[\left(-\frac{4}{5}+\frac{1}{5}\right)^2-1\right]:\left(\frac{3}{5}+\frac{2}{25}\right)$ $\left[-\frac{16}{17}\right]$

d) $\left[\left(-\frac{3}{5}\right)^3\cdot\left(-\frac{3}{5}\right)^2\right]:\left(-\frac{5}{3}\right)^{-1}$ $\left[\frac{81}{625}\right]$

e) $\frac{2}{63}\cdot\left[\frac{63^3}{2}\right]^0$ $\left[\frac{2}{63}\right]$

f) $\left[\left(-\frac{10}{7}\right)^{222}\right]^5:\left(-\frac{10}{7}\right)^{1110}$ $[1]$

g) $\left(\frac{3}{8}\right)^3\cdot\left(\frac{16}{15}\right)^3$ $\left[\frac{8}{125}\right]$

h) $\left(\frac{7}{11}\right)^{-3}:\left(\frac{21}{33}\right)^{-3}$ $[1]$

i) $\frac{1}{4}-\frac{\frac{2}{3}-0{,}5}{\frac{3}{4}+\frac{4}{5}}$ $\left[\frac{53}{372}\right]$

$\left[\frac{14}{5}\right]$

j) $\frac{\frac{b}{4}}{\frac{b}{8}}+\frac{4}{5}$ $\left[\frac{389}{162}\right]$

k) $\left(\frac{3}{4}\right)^{-2}-\frac{2^3-3^{-2}}{3^2}+2\cdot3^{-1}\cdot\left(\frac{6}{9}\right)^{-2}$

l) $\frac{\left(\frac{3}{4}\right)^{-2}}{\left(\frac{2}{3}\right)^3}-\left(1-\left(\frac{4}{3}\right)^{-1}\right)^3\cdot\frac{4^2}{3}+\frac{2^{-4}}{\frac{3}{2}}$ $\left[\frac{143}{24}\right]$

m) $\left(\frac{2}{a}\right)^{-2}\cdot\left(\frac{4}{a}\right)^3+\left(\frac{a}{4}\right)^{-2}\cdot\frac{3a}{4}\cdot\frac{1}{6}-1:\frac{a^2}{8a}$ $\left[\frac{10}{a}\right]$

11 Calcolare il valore delle seguenti espressioni in $\mathbb{Q}$ riducendo il risultato ai minimi termini. Mostrare i vari passaggi significativi.

a) $\left[\frac{5}{2}\cdot\left(\frac{2}{5}\right)^2+\left(\frac{5}{8}-\frac{1}{2}\cdot 3/4\right):\left(\frac{1}{2}\right)^2\right]:4,\overline{6}$ $\left[\frac{3}{10}\right]$

b) $-\left[0,1\overline{6}+\frac{1}{12}:\left(\frac{9}{16}\cdot\frac{2^2}{3}+\frac{1}{2^3}:0,5\right)\right]:\frac{5}{18}+3,4$ $\left[\frac{5}{2}\right]$

c) $\frac{3}{2}:\left\{\left(0,\overline{3}+\frac{1}{4}\right)^2:\left[\frac{1}{6}+\left(\frac{7}{15}\right)^2\cdot\left(\frac{23}{35}-0,75\cdot\frac{2}{5}\right)^2\right]^2\right\}$ $\left[\frac{1}{6}\right]$

d) $\dfrac{\frac{5}{2}+\left(\frac{3}{14}+\frac{10}{21}\cdot\frac{9}{50}\right)^2:\left(\frac{3}{10}\right)^3}{1+\left(\frac{3}{4}+0,\overline{6}\right)\cdot\left(1-\frac{15}{17}\right)}$ [5]

12 Calcolare il valore delle seguenti espressioni in $\mathbb{Q}$ riducendo il risultato ai minimi termini. Mostrare i vari passaggi significativi.

a) $\dfrac{\left[\left(-\frac{1}{2}+\frac{3}{7}\right)\cdot\left(\frac{1}{2}+\frac{1}{8}\right)+\left(-\frac{1}{2}\right)^4+\frac{3}{7}\left(-\frac{1}{2}\right)^2\right]\cdot\left(2+2^{-3}\right)}{\left[-\frac{5}{3}:(-2)^3\right]\cdot\left[\left(-\frac{3}{2}\right)^2-\left(\frac{1}{2}\right)^3\right]}=$ $\left[\frac{3}{5}\right]$

b) $\left(\frac{2}{3}\right)^{-3}\cdot\left\{\left[\dfrac{\left(\frac{17}{12}-\frac{3}{4}\right)^4}{\left(\frac{2}{3}\right)^2}\right]^2:\left(2-\frac{4}{3}\right)\right\}=$ [1]

c) $\dfrac{4^{-2}+4^2}{4^{-2}-4^2}$ $\left[-\frac{257}{255}\right]$