1. Resolver las siguientes operaciones con fracciones, simplificando en todo momento los pasos intermedios y el resultado.

a) $\dfrac{\left(\frac{3}{5}-\frac{1}{6}+\frac{2}{24}\right)-\left(\frac{2}{30}-\frac{1}{4}+\frac{3}{9}\right)}{\left(\frac{1}{3}-\frac{5}{10}\right):\frac{5}{3}-\frac{4}{16}\left(3-\frac{5}{3}\right)}=$ **(0,5 puntos)**

b) $\dfrac{\frac{3}{2}+\frac{1}{2}\left(\frac{2}{3}-\frac{3}{5}-3\right)+\frac{29}{6}:5}{1+\frac{2}{3+\frac{4}{5}}:\left(2-\frac{28}{19}\right)}=$ **(1 punto)**

2. Realiza la siguiente operación, pasando previamente cada número decimal a su fracción generatriz: $0,\widehat{6}+1,3\widehat{8}\cdot 0,72$ **(1 punto)**

3. Realiza las siguientes operaciones, aplicando siempre las propiedades de las potencias, y simplifica el resultado todo lo posible *(se puede dejar el resultado en forma de potencia)*. **(2 puntos; 1 punto por apartado)**

a) $\dfrac{81^{-1}\cdot 2^{-4}\cdot 18^{3}\cdot 4^{-1}}{6^{-3}\cdot 3^{-2}\cdot 9^{3}\cdot 3^{3}}=$ b) $\dfrac{2^{3}\cdot(-3)^{-5}\cdot 18^{2}\cdot\left(\frac{3}{2}\right)^{-2}}{(-2)^{2}\cdot 2^{-3}\cdot(-3)^{3}\cdot\left(-\frac{2}{3}\right)^{3}\cdot\left(-\frac{3}{2}\right)^{-3}}=$

4. Opera y simplifica extrayendo factores siempre que sea posible (recuerda que has de factorizar los números que no sean primos): **(2 puntos; 1 punto por apartado)**

a) $\sqrt{\sqrt{3}\cdot\sqrt[3]{3\sqrt{27}}}=$ b) $\frac{2}{3}\sqrt[3]{16}+2\sqrt[3]{2}-\frac{2}{3}\sqrt[3]{128}+\sqrt[3]{\frac{2}{27}}=$

5. Racionalizar y simplificar: **(1,5 puntos; 0,5 puntos por apartado)**

a) $\dfrac{3}{2\sqrt{3}}=$ b) $\dfrac{\sqrt{3}}{\sqrt[5]{9}}=$ c) $\dfrac{3\sqrt{2}-4}{3\sqrt{2}+4}=$

6. Resuelve las siguientes ecuaciones: **(2 puntos; 1 punto por apartado)**

a) $\dfrac{3(x-2)}{4}-\dfrac{2(x-3)}{3}=\dfrac{x}{6}-\dfrac{3x-6}{4}$ b) $\left(\dfrac{1}{2}x+3\right)^{2}-x=(3x-4)(3x+4)-12$

① a) $\dfrac{\left(\frac{3}{5}-\frac{1}{6}+\frac{2}{24}\right)-\left(\frac{2}{30}-\frac{1}{4}+\frac{3}{9}\right)}{\left(\frac{1}{3}-\frac{5}{10}\right):\frac{5}{3}-\frac{4}{16}\left(3-\frac{5}{3}\right)}=\dfrac{\left(\frac{3}{5}-\frac{1}{6}+\frac{1}{12}\right)-\left(\frac{1}{15}-\frac{1}{4}+\frac{1}{3}\right)}{\left(\frac{1}{3}-\frac{1}{2}\right):\frac{5}{3}-\frac{1}{4}\left(3-\frac{5}{3}\right)}=$

$=\dfrac{\left(\frac{36}{60}-\frac{10}{60}+\frac{5}{60}\right)-\left(\frac{4}{60}-\frac{15}{60}+\frac{20}{60}\right)}{\left(\frac{2}{6}-\frac{3}{6}\right):\frac{5}{3}-\frac{1}{4}\left(\frac{9}{3}-\frac{5}{3}\right)}=\dfrac{\frac{31}{60}-\frac{9}{60}}{\frac{-1}{6}:\frac{5}{3}-\frac{1}{4}\cdot\frac{4}{3}}=$

$=\dfrac{\frac{22}{60}}{\frac{-3}{30}-\frac{4}{12}}=\dfrac{\frac{11}{30}}{\frac{-1}{10}-\frac{1}{3}}=\dfrac{\frac{11}{30}}{\frac{-3}{30}-\frac{10}{30}}=\dfrac{\frac{11}{30}}{\frac{-13}{30}}=\dfrac{11\cdot 30}{-13\cdot 30}=\underline{\underline{-\frac{11}{13}}}$

b) $\dfrac{\frac{3}{2}+\frac{1}{2}\left(\frac{2}{3}-\frac{3}{5}-3\right)+\frac{29}{6}:5}{1+\frac{2}{3+\frac{4}{5}}:\left(2-\frac{28}{19}\right)}=\dfrac{\frac{3}{2}+\frac{1}{2}\left(\frac{10}{15}-\frac{9}{15}-\frac{45}{15}\right)+\frac{29}{30}}{1+\frac{2}{\frac{15}{5}+\frac{4}{5}}:\left(\frac{38}{19}-\frac{28}{19}\right)}=$

$=\dfrac{\frac{3}{2}+\frac{1}{2}\cdot\frac{-44}{15}+\frac{29}{30}}{1+\frac{2}{19/5}:\frac{10}{19}}=\dfrac{\frac{3}{2}-\frac{44}{30}+\frac{29}{30}}{1+\frac{10}{19}:\frac{10}{19}}=\dfrac{\frac{45}{30}-\frac{44}{30}+\frac{29}{30}}{1+\frac{190}{190}}=$

$=\dfrac{\frac{30}{30}}{1+1}=\underline{\underline{\frac{1}{2}}}$

② $0'\widehat{6}=\frac{6}{9}=\frac{2}{3}$; $1'3\widehat{8}=\frac{125}{90}=\frac{25}{18}$; $0'72=\frac{72}{100}=\frac{18}{25}$

Entonces: $0'\widehat{6}+1'3\widehat{8}\cdot 0'72=\frac{2}{3}+\frac{25}{18}\cdot\frac{18}{25}=\frac{2}{3}+1=\underline{\underline{\frac{5}{3}}}$

③ a) $\dfrac{81^{-1}\cdot 2^{-4}\cdot 18^3\cdot 4^{-1}}{6^{-3}\cdot 3^{-2}\cdot 9^3\cdot 3^3}=\dfrac{(3^4)^{-1}\cdot 2^{-4}\cdot(2\cdot 3^2)^3\cdot(2^2)^{-1}}{(2\cdot 3)^{-3}\cdot 3^{-2}\cdot(3^2)^3\cdot 3^3}=$

$=\dfrac{3^{-4}\cdot 2^{-4}\cdot 2^3\cdot 3^6\cdot 2^{-2}}{2^{-3}\cdot 3^{-3}\cdot 3^{-2}\cdot 3^6\cdot 3^3}=\dfrac{2^{-3}\cdot 3^2}{2^{-3}\cdot 3^4}=2^0\cdot 3^{-2}=\dfrac{1}{3^2}=\underline{\underline{\frac{1}{9}}}$

b) $\dfrac{2^3(-3)^{-5}\cdot 18^2\left(\frac{3}{2}\right)^{-2}}{(-2)^2\cdot 2^{-3}(-3)^3\left(-\frac{2}{3}\right)^3\left(-\frac{3}{2}\right)^{-3}}=\dfrac{-2^3\,\frac{1}{3^5}\,(2\cdot 3^2)^2\left(\frac{2}{3}\right)^2}{-2^2\,\frac{1}{2^3}\,3^3\left(\frac{2}{3}\right)^3\left(\frac{2}{3}\right)^3}=$

$=\dfrac{\frac{2^3\cdot 2^2\cdot 3^4\cdot 2^2}{3^5\cdot 3^2}}{\frac{2^2\cdot 3^3\cdot 2^3\cdot 2^3}{2^3 3^3 3^3}}=\dfrac{2^7\cdot 3^{-3}}{2^5\cdot 3^{-3}}=2^2\cdot 3^0=\underline{\underline{4}}$

④ a) $\sqrt{\sqrt{3}\sqrt[3]{3\sqrt{27}}} = \sqrt{\sqrt{3}\sqrt[3]{3\sqrt{3^3}}} = \sqrt{\sqrt{3}\sqrt[3]{\sqrt{3^5}}} =$

$= \sqrt{\sqrt{3}\sqrt[6]{3^5}} = \sqrt{\sqrt[6]{3^3}\sqrt[6]{3^5}} = \sqrt{\sqrt[6]{3^8}} = \sqrt[12]{3^8} = \underline{\underline{\sqrt[3]{9}}}$

b) $\frac{2}{3}\sqrt[3]{16} + 2\sqrt[3]{2} - \frac{2}{3}\sqrt[3]{128} + \sqrt[3]{\frac{2}{27}} = \frac{2}{3}\sqrt[3]{2^4} + 2\sqrt[3]{2} - \frac{2}{3}\sqrt[3]{2^7} + \sqrt[3]{\frac{2}{3^3}} =$

$= \frac{2}{3}2\sqrt[3]{2} + 2\sqrt[3]{2} - \frac{2}{3}\cdot 2^2\sqrt[3]{2} + \frac{1}{3}\sqrt[3]{2} = \frac{4}{3}\sqrt[3]{2} + 2\sqrt[3]{2} - \frac{8}{3}\sqrt[3]{2} + \frac{1}{3}\sqrt[3]{2} =$

$= \left(\frac{4}{3} + 2 - \frac{8}{3} + \frac{1}{3}\right)\sqrt[3]{2} = 1\sqrt[3]{2} = \underline{\underline{\sqrt[3]{2}}}$

⑤ a) $\frac{3}{2\sqrt{3}} = \frac{3\sqrt{3}}{2\sqrt{3}\sqrt{3}} = \frac{3\sqrt{3}}{2\cdot 3} = \frac{3\sqrt{3}}{6} = \underline{\underline{\frac{\sqrt{3}}{2}}}$

b) $\frac{\sqrt{3}}{\sqrt[5]{9}} = \frac{\sqrt{3}}{\sqrt[5]{3^2}} = \frac{\sqrt{3}\sqrt[5]{3^3}}{\sqrt[5]{3^2}\sqrt[5]{3^3}} = \frac{\sqrt[10]{3^5}\sqrt[10]{3^6}}{\sqrt[5]{3^5}} = \frac{\sqrt[10]{3^{11}}}{3} =$

$= \frac{3\sqrt[10]{3}}{3} = \underline{\underline{\sqrt[10]{3}}}$

c) $\frac{3\sqrt{2}-4}{3\sqrt{2}+4} = \frac{(3\sqrt{2}-4)(3\sqrt{2}-4)}{(3\sqrt{2}+4)(3\sqrt{2}-4)} = \frac{18-12\sqrt{2}-12\sqrt{2}+16}{(3\sqrt{2})^2-4^2} =$

$= \frac{34-24\sqrt{2}}{18-16} = \frac{34-24\sqrt{2}}{2} = \underline{\underline{17-12\sqrt{2}}}$

⑥ a) $\frac{3(x-2)}{4} - \frac{2(x-3)}{3} = \frac{x}{6} - \frac{3x-6}{4}$; $9(x-2)-8(x-3) = 2x-3(3x-6)$

$9x-18-8x+24 = 2x-9x+18 \Rightarrow x+6 = -7x+18 \Rightarrow 8x = 12$

$\Rightarrow x = \frac{12}{8} \Rightarrow \underline{\underline{x = \frac{3}{2}}}$

b) $\left(\frac{1}{2}x+3\right)^2 - x = (3x-4)(3x+4) - 12 \Rightarrow \frac{1}{4}x^2+3x+9-x = 9x^2-16-12$

$\Rightarrow x^2+12x+36-4x = 36x^2-64-48 \Rightarrow 35x^2-8x-148 = 0$

$\Delta = (-8)^2 - 4\cdot 35(-148) = 64+20720 = 20784$

$x = \frac{8 \pm \sqrt{20784}}{70}$

$\underline{\underline{x_1 = \frac{8+\sqrt{20784}}{70}}}$

$\underline{\underline{x_2 = \frac{8-\sqrt{20784}}{70}}}$