CONJUNTO DE LOS NÚMEROS REALES

Resolución. NÚMEROS RACIONALES

COMPETENCIA	UNIDAD DE COMPETENCIA	CRITERIOS DE DESEMPEÑO
(CG1): Aprender a aprender con calidad	(CG1 – U1): Abstrae, analiza y sintetiza información.	CG1-U1-CD1. Resume información de forma clara y ordenada.
(CG1): Aprender a aprender con calidad	(CG1 – U2):Demuestra conocimiento sobre su área de estudio y profesión	CG1-U2-CD1. Explica las conceptualizaciones, métodos y aplicaciones de su disciplina CG1-U2-CD2. Aplica los procedimientos de la disciplina para resolver problema y aportar soluciones
(CG2): Aprender a trabajar con el otro	(CG2 – U1): Participa y trabaja en equipo	CG2-U1-CD1. Realiza tareas establecidas por el equipo.

Considerar realizar esta guía de manera grupal. El aporte es mucho más enriquecedor

Efectúa y simplifica al máximo cada una de las siguientes expresiones. Explica los procesos aplicados para su resolución.

1) $\frac{1}{3}-\left[\frac{1}{2}+2\frac{1}{4}-\left(\frac{5}{3}+\frac{3}{4}-3\frac{1}{2}\right)-\frac{169}{26}-\frac{3}{4}\right]$

2) $-3-\left\{-\frac{1}{2}+\frac{2}{3}-\left[-\left(-\frac{3}{4}-\frac{2}{3}+\frac{7}{2}\right)-\frac{3}{4}+\frac{2}{3}-\frac{1}{2}\right]-3\frac{1}{4}\right\}$

3) $-0,\hat{7}-0,\hat{6}-3,8\hat{3}+3\frac{1}{2}-1,\hat{2}-8,\hat{3}+2,1\hat{6}-0,75$

4) $3,75-\left\{0,375-\left[-0,\widehat{36}-\left(0,\widehat{63}-5\frac{1}{4}\right)\right]-1,2-0,8\right\}$

5) $4,1\hat{6}-7\frac{1}{6}\div\left[5,\hat{5}-\frac{2}{3}+\frac{20}{5}\div\left(-\frac{16}{10}\right)\right]$

6) $\frac{-\frac{3}{2}+\frac{4}{3}}{-\frac{1}{2}-\frac{3}{4}}\div\frac{\left(-\frac{1}{3}\right)^{-1}+3^{-1}}{-\frac{5}{3}\left(-\frac{144}{72}\right)}$

7) $\dfrac{2-3^{-1}-4^{-1}}{\frac{51}{6}}+\left(\dfrac{1}{2}-2^{-1}\right)^{2}-\left(-\dfrac{3}{2}+\dfrac{4}{56}\right)^{0}$

8) $\dfrac{3}{4}-\left(\dfrac{2}{3}\right)^{-1}-\dfrac{2^{-1}+4^{-1}}{\left(-\frac{1}{3}\right)^{-1}}+\dfrac{2^{3}+(-2)^{-2}}{\left(\frac{1}{2}\right)^{-1}+\left(\frac{4}{11}\right)^{-1}}$

9) $-0,\widehat{36}\left(0{,}25-1\dfrac{1}{3}\right)-\dfrac{11^{-1}+(-4)^{0}}{2}$

10) $\dfrac{1}{1-\dfrac{1}{2-\frac{1}{3}}}+\dfrac{1-\dfrac{1}{2-\frac{1}{3}}}{5}$

11) $-4^{-3}\div 4^{-2}+\dfrac{\left(-\frac{5}{3}\right)^{0}+2^{-1}}{\frac{17}{34}}-\left(\dfrac{2}{3}-\dfrac{1}{2^{-1}}\right)^{-1}$

12) $\left(-\dfrac{-3}{5}\right)\div\left[\dfrac{3}{2}.\dfrac{8}{5}.\left(-\dfrac{4}{-3}\right).\left(-\dfrac{2}{3}\right)\right]$

13) $\left(-\dfrac{625}{125}\right).\left(-\dfrac{49}{25}\right).\left(-\dfrac{36}{144}\right).\left(-\dfrac{63}{21}\right)\div\dfrac{9}{4}$

14) $\dfrac{15}{144}.\left(-\dfrac{12}{225}\right).\dfrac{343}{49}.\left(-\dfrac{6}{15}\right)\div\dfrac{3}{5}$

15) $\dfrac{\left(-\frac{1}{2}\right)^{2}-\left(-\frac{2}{3}\right)^{-1}+\left(\frac{3}{4}\right)^{-1}.\left(-\frac{3}{5}\right)^{-1}}{-2^{-1}+\left(\frac{2}{3}\right)^{-1}.\left(-\frac{2}{5}\right)^{-1}}$

16) $\dfrac{\left(-\frac{2}{3}\right)^{4}\cdot\left(\frac{15}{16}\right)^{2}\cdot\left(\frac{-243}{225}\right)^{-4}}{\left(-325+\frac{4}{625}\right)^{0}\cdot\left(\frac{8}{-9}\right)^{2}}$

17) $1-3\left(\dfrac{0{,}5^{-1}-2^{-1}}{1{,}5^{-1}+\frac{3}{9}}\right)^{-2}-\dfrac{\left(\left(\frac{3}{2}\right)^{-2}\right)^{0{,}5}}{\left(1\frac{1}{6}-1\right)}\div\left(\frac{81}{16}\right)^{-0{,}25}$

18) $1-5^{-1}\left[\left(\frac{81}{16}\right)^{-0{,}25}+\left(\frac{135}{32}\right)^{0}\right]^{2}-\left[\frac{4}{11}\left(0{,}25-1\frac{1}{3}\right)\right]\div\left[\left(\dfrac{\frac{3}{15}-1\frac{1}{5}}{\frac{121}{13}}\right)^{2}\right]^{\frac{1}{2}}$

Respuestas:

1) $\frac{15}{4}$

2) $-\frac{31}{12}$

3) $-\frac{119}{12}$

4) $\frac{77}{8}$

5) $\frac{7}{6}$

6) $-\frac{1}{6}$

7) $-\frac{5}{6}$

8) $\frac{47}{38}$

9) $-\frac{5}{33}$

10) $\frac{129}{50}$

11) $\frac{7}{2}$

12) $-\frac{9}{32}$

13) $\frac{49}{15}$

14) $\frac{7}{270}$

15) $\frac{1}{9}$

16) $6^{-10}.5^{10}$

17) $-\frac{19}{3}$

18) $\frac{37}{9}$

RESOLUCIÓN

1) $\frac{1}{3}-\left[\frac{1}{2}+2\frac{1}{4}-\left(\frac{5}{3}+\frac{3}{4}-3\frac{1}{2}\right)-\frac{169}{26}-\frac{3}{4}\right]$

$=\frac{1}{3}-\left[\frac{1}{2}+\frac{9}{4}-\left(\frac{20+9}{12}-\frac{7}{2}\right)-\frac{13}{2}-\frac{3}{4}\right]$

$=\frac{1}{3}-\left[\frac{2+9}{4}-\left(\frac{29}{12}-\frac{7}{2}\right)+\frac{-26-3}{4}\right]$

$=\frac{1}{3}-\left[\frac{11}{4}-\left(\frac{29-42}{12}\right)+\frac{-29}{4}\right]$

$=\frac{1}{3}-\left[\frac{-18}{4}+\frac{13}{12}\right]$

$=\frac{1}{3}-\left[\frac{-9}{2}+\frac{13}{12}\right]$

$=\frac{1}{3}-\left[\frac{-54+13}{12}\right]$

$=\frac{1}{3}-\left[\frac{-41}{12}\right]$

$=\frac{1}{3}+\frac{41}{12}=\frac{4+41}{12}=\frac{45}{12}=\boxed{\frac{15}{4}}$

2) $-3-\left\{-\frac{1}{2}+\frac{2}{3}-\left[-\left(-\frac{3}{4}-\frac{2}{3}+\frac{7}{2}\right)-\frac{3}{4}+\frac{2}{3}-\frac{1}{2}\right]-3\frac{1}{4}\right\}$

$$= -3 - \left\{ -\frac{3+4}{6} - \left[\frac{3}{4} + \frac{2}{3} + \frac{7}{2} - \frac{3}{4} + \frac{2}{3} - \frac{1}{2} \right] - \frac{13}{4} \right\}$$

$$= -3 - \left\{ \frac{1}{6} - \left[\frac{4}{3} - \frac{8}{2} \right] - \frac{13}{4} \right\}$$

$$= -3 - \left\{ \frac{1}{6} - \frac{4}{3} + 4 - \frac{13}{4} \right\}$$

$$= -3 - \left\{ \frac{2 - 16 + 48 - 39}{12} \right\}$$

$$= -3 - \left\{ \frac{-5}{12} \right\}$$

$$= -3 + \frac{5}{12}$$

$$= \frac{-36 + 5}{12} = \boxed{\frac{-31}{12}}$$

3) $-0,\hat{7} - 0,\hat{6} - 3,8\hat{3} + 3\frac{1}{2} - 1,\hat{2} - 8,\hat{3} + 2,1\hat{6} - 0,75$

$$= -\frac{7}{9} - \frac{2}{3} - \frac{23}{6} + \frac{7}{2} - \frac{11}{9} - \frac{25}{3} + \frac{13}{6} - \frac{3}{4}$$

$$= \frac{-28 - 24 - 138 + 126 - 44 - 300 + 78 - 27}{36}$$

$$= \frac{-357}{36} = \boxed{\frac{-119}{12}}$$

4) $3,75 - \left\{ 0,375 - \left[-0,\widehat{36} - \left(0,\widehat{63} - 5\frac{1}{4} \right) \right] - 1,2 - 0,8 \right\}$

$$= \frac{15}{4} - \left\{ \frac{3}{8} - \left[-\frac{4}{11} - \left(\frac{7}{11} - \frac{21}{4} \right) \right] - \frac{6}{5} - \frac{4}{5} \right\}$$

$$= \frac{15}{4} - \left\{ \frac{3}{8} - \left[-\frac{4}{11} - \frac{7}{11} + \frac{21}{4} \right] + \frac{-6-4}{5} \right\}$$

$$= \frac{15}{4} - \left\{ \frac{3}{8} + 1 - \frac{21}{4} - 2 \right\}$$

$$= \frac{15}{4} - \left\{ \frac{3}{8} - \frac{21}{4} - 1 \right\}$$

$$= \frac{15}{4} - \left\{\frac{3 - 42 - 8}{8}\right\}$$

$$= \frac{15}{4} - \left\{\frac{-47}{8}\right\}$$

$$= \frac{15}{4} + \frac{47}{8}$$

$$= \frac{30 + 47}{8} = \boxed{\frac{77}{8}}$$

5) $4{,}1\hat{6} - 7\frac{1}{6} \div \left[5{,}\hat{5} - \frac{2}{3} + \frac{20}{5} \div \left(-\frac{16}{10}\right)\right]$

$$= \frac{25}{6} - \frac{43}{6} \div \left[\frac{50}{9} - \frac{2}{3} + 4 \div \left(-\frac{8}{5}\right)\right]$$

$$= \frac{25}{6} - \frac{43}{6} \div \left[\frac{50 - 6}{9} - 4.\frac{5}{8}\right]$$

$$= \frac{25}{6} - \frac{43}{6} \div \left[\frac{44}{9} - \frac{5}{2}\right]$$

$$= \frac{25}{6} - \frac{43}{6} \div \left[\frac{88 - 45}{18}\right]$$

$$= \frac{25}{6} - \frac{43}{6} \div \frac{43}{18}$$

$$= \frac{25}{6} - \frac{43}{6} . \frac{18}{43}$$

$$= \frac{25}{6} - 3$$

$$= \frac{25 - 18}{6} = \boxed{\frac{7}{6}}$$

6) $\dfrac{-\frac{3}{2} + \frac{4}{3}}{-\frac{1}{2} - \frac{3}{4}} \div \dfrac{\left(-\frac{1}{3}\right)^{-1} + 3^{-1}}{-\frac{5}{3}\left(-\frac{144}{72}\right)}$

$$= \frac{\frac{-9+8}{6}}{\frac{-2-3}{4}} \div \frac{-3+\frac{1}{3}}{-\frac{5}{3}(-2)}$$

$$= \frac{\frac{-1}{6}}{\frac{-5}{4}} \div \frac{\frac{-9+1}{3}}{\frac{10}{3}}$$

$$= \frac{2}{15} \div \frac{\frac{-8}{3}}{\frac{10}{3}}$$

$$= \frac{2}{15} \div \left(\frac{-4}{5}\right)$$

$$= \frac{2}{15} \cdot \left(\frac{5}{-4}\right)$$

$$\boxed{= \frac{-1}{6}}$$

7) $\dfrac{2-3^{-1}-4^{-1}}{\frac{51}{6}} + \left(\frac{1}{2}-2^{-1}\right)^{2} - \left(-\frac{3}{2}+\frac{4}{56}\right)^{0}$

1

0

$$= \frac{2-\frac{1}{3}-\frac{1}{4}}{\frac{17}{2}} + \left(\frac{1}{2}-2^{-1}\right)^{2} - 1$$

$$= \frac{\frac{24-4-3}{12}}{\frac{17}{2}} - 1$$

$$= \frac{\frac{17}{12}}{\frac{17}{2}} - 1$$

$$= \frac{1}{6} - 1 = \frac{1-6}{6} = \boxed{\frac{-5}{6}}$$

8) $\frac{3}{4}-\left(\frac{2}{3}\right)^{-1}-\frac{2^{-1}+4^{-1}}{\left(-\frac{1}{3}\right)^{-1}}+\frac{2^{3}+(-2)^{-2}}{\left(\frac{1}{2}\right)^{-1}+\left(\frac{4}{11}\right)^{-1}}$

$$=\frac{3}{4}-\frac{3}{2}-\frac{-\frac{1}{2}+\frac{1}{4}}{-3}+\frac{8+\frac{1}{4}}{2+\frac{11}{4}}$$

$$=\frac{3}{4}-\frac{3}{2}-\frac{\frac{3}{4}}{-3}+\frac{\frac{33}{4}}{\frac{19}{4}}$$

$$=\frac{-3}{4}+\frac{1}{4}+\frac{33}{19}$$

$$=\frac{-2}{4}+\frac{33}{19}$$

$$=\frac{-1}{2}+\frac{33}{19}$$

$$=\frac{-19+66}{38}$$

$$=\boxed{\frac{47}{38}}$$

9) $-0,\widehat{36}\left(0,25-1\frac{1}{3}\right)-\frac{11^{-1}+(-4)^{0}}{2}$

$$=-\frac{4}{11}\left(\frac{1}{4}-\frac{4}{3}\right)-\frac{\frac{1}{11}+1}{2}$$

$$=-\frac{4}{11}\left(\frac{-13}{12}\right)-\frac{6}{11}$$

$$=\frac{13}{33}-\frac{6}{11}=\frac{13-18}{33}=\boxed{\frac{-5}{33}}$$

10) $\dfrac{1}{1-\dfrac{1}{2-\frac{1}{3}}}+\dfrac{1-\dfrac{1}{2-\frac{1}{3}}}{5}$

$=\dfrac{1}{1-\frac{1}{\frac{5}{3}}}+\dfrac{1-\frac{1}{\frac{5}{3}}}{5}$

$=\dfrac{1}{1-\frac{3}{5}}+\dfrac{1-\frac{3}{5}}{5}$

$=\dfrac{1}{\frac{2}{5}}+\dfrac{\frac{2}{5}}{5}$

$=\dfrac{5}{2}+\dfrac{2}{25}$

$=\dfrac{125+4}{50}=\boxed{\dfrac{129}{50}}$

11) $-4^{-3}\div 4^{-2}+\dfrac{\left(-\frac{5}{3}\right)^{0}+2^{-1}}{\frac{17}{34}}-\left(\dfrac{2}{3}-\dfrac{1}{2^{-1}}\right)^{-1}$

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

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

$=-\dfrac{1}{4}+3-\left(\dfrac{-3}{4}\right)$

$=-\dfrac{1}{4}+3+\dfrac{3}{4}$

$$= \frac{2}{4} + 3$$

$$= \frac{1}{2} + 3 = \boxed{\frac{7}{2}}$$

12) $\left(-\frac{-3}{5}\right) \div \left[\frac{3}{2} . \frac{8}{5} . \left(-\frac{4}{-3}\right) . \left(-\frac{2}{3}\right)\right]$

$$= \left(\frac{3}{5}\right) \div \left[\frac{3}{2} . \frac{8}{5} . \left(\frac{4}{3}\right) . \left(-\frac{2}{3}\right)\right]$$

$$= \left(\frac{3}{5}\right) \div \left[\frac{-5.3}{8.4}\right]$$

$$= \boxed{\frac{-9}{32}}$$

13) $\left(-\frac{625}{125}\right) . \left(-\frac{49}{25}\right) . \left(-\frac{36}{144}\right) . \left(-\frac{63}{21}\right) \div \frac{9}{4}$

$$= -\left(\frac{5^4}{5^3}\right) . \left(-\frac{7^2}{5^2}\right) . \left(-\frac{2^2 3^2}{2^4 3^2}\right) . \left(-\frac{3^2 . 7}{7 . 3}\right) . \frac{2^2}{3^2}$$

$$= \frac{7^2}{5 \, . \, 3} = \boxed{\frac{49}{15}}$$

14) $\frac{15}{144} . \left(-\frac{12}{225}\right) . \frac{343}{49} . \left(-\frac{6}{15}\right) \div \frac{3}{5}$

$$= \frac{3.5}{2^4 . 3^2} . \left(-\frac{2^2 . 3}{5^2 . 3^2}\right) . \frac{7^3}{7^2} . \left(\frac{-2 \, . \, 3}{3 \, . 5}\right) . \frac{5}{3}$$

$$= \frac{3^3.5^2.2^3.7^3}{2^4.3^6.5^3.7^2} = \frac{7}{3^3.2\ .5} = \boxed{\frac{7}{270}}$$

15) $$\frac{\left(-\frac{1}{2}\right)^2 - \left(-\frac{2}{3}\right)^{-1} + \left(\frac{3}{4}\right)^{-1}.\left(-\frac{3}{5}\right)^{-1}}{-2^{-1} + \left(\frac{2}{3}\right)^{-1}.\left(-\frac{2}{5}\right)^{-1}}$$

$$= \frac{\frac{1}{4} - \left(-\frac{3}{2}\right) + \left(\frac{4}{3}\right).\left(-\frac{5}{3}\right)}{-\frac{1}{2} + \left(\frac{3}{2}\right).\left(-\frac{5}{2}\right)}$$

$$= \frac{\frac{1}{4} + \frac{3}{2} + \frac{20}{9}}{-\frac{1}{2} - \frac{15}{4}}$$

$$= \frac{\frac{9 + 54 - 80}{36}}{\frac{-2 - 15}{4}}$$

$$= \frac{\frac{-17}{36}}{\frac{-17}{4}} = \boxed{\frac{1}{9}}$$

16) $$\frac{\left(-\frac{2}{3}\right)^4.\left(\frac{15}{16}\right)^2.\left(\frac{-243}{225}\right)^{-4}}{\left(-325+\frac{4}{625}\right)^0.\left(\frac{8}{-9}\right)^2}$$

1

$$= \frac{\frac{2^4}{3^4}.\left(\frac{3.5}{2^4}\right)^2.\left(\frac{-3^5}{3^2 5^2}\right)^{-4}}{1.\left(\frac{2^3}{3^2}\right)^2}$$

$$= \frac{\frac{2^4}{3^4} \cdot \frac{3^5 . 5^2}{2^8} \cdot \frac{3^8 . 5^8}{3^{20}}}{\frac{2^6}{3^4}}$$

$$= \frac{\frac{2^4 . 3^{10} . 5^{10}}{3^{24} . 2^8}}{\frac{2^6}{3^4}}$$

$$\frac{2^{-4} . 3^{-14} . 5^{10}}{2^6 . 3^{-4}} = \boxed{2^{-10} . 3^{-10} . 5^{10}}$$

- $2^{-10} . 3^{-10} . 5^{10} \neq 30^{-10}$

En todo caso $(2 . 3)^{-10} . 5^{10} = \boxed{\left(\frac{5}{6}\right)^{10}}$

17) $1 - 3\left(\frac{0{,}5^{-1} - 2^{-1}}{1{,}5^{-1} + \frac{3}{9}}\right)^{-2} - \frac{\left(\left(\frac{3}{2}\right)^{-2}\right)^{0{,}5}}{\left(1\frac{1}{6} - 1\right)} \div \left(\frac{81}{16}\right)^{-0{,}25}$

$$= 1 - 3\left(\frac{\left(\frac{1}{2}\right)^{-1} - \frac{1}{2}}{\left(\frac{3}{2}\right)^{-1} + \frac{1}{3}}\right)^{-2} - \frac{\left(\left(\frac{3}{2}\right)^{-2}\right)^{\frac{1}{2}}}{\left(\frac{7}{6} - 1\right)} \div \left(\frac{81}{16}\right)^{-\frac{1}{4}}$$

$$= 1 - 3\left(\frac{2 - \frac{1}{2}}{\frac{2}{3} + \frac{1}{3}}\right)^{-2} - \frac{\left(\frac{3}{2}\right)^{-1}}{\left(\frac{1}{6}\right)} \div \left(\left(\frac{3}{2}\right)^{4}\right)^{-\frac{1}{4}}$$

$$= 1 - 3\left(\frac{\frac{3}{2}}{\frac{3}{3}}\right)^{-2} - \frac{\frac{2}{3}}{\frac{1}{6}} \div \left(\frac{3}{2}\right)^{-1}$$

$$= 1 - 3\left(\frac{3}{2}\right)^{-2} - 4 \div \frac{2}{3}$$

$$= 1 - 3\left(\frac{2}{3}\right)^{2} - 4.\frac{3}{2}$$

$$= 1 - 3\frac{2^{2}}{3^{2}} - 6$$

$$= 1 - \frac{4}{3} - 6$$

$$= \frac{-15 - 4}{3} = \boxed{\frac{-19}{3}}$$

18) $1 - 5^{-1}\left[\left(\frac{81}{16}\right)^{-0,25} + \left(\frac{135}{32}\right)^{0}\right]^{2} - \left[\frac{4}{11}\left(0,25 - 1\frac{1}{3}\right)\right] \div \left[\left(\frac{\frac{3}{15} - 1\frac{1}{5}}{\frac{121}{13}}\right)^{2}\right]^{\frac{1}{2}}$

$$= 1 - \frac{1}{5}\left[\left(\frac{3^{4}}{2^{4}}\right)^{-\frac{1}{4}} + 1\right]^{2} - \left[\frac{4}{11}\left(\frac{1}{4} - \frac{4}{3}\right)\right] \div \left[\left(\frac{\frac{1}{5} - \frac{6}{5}}{\frac{121}{13}}\right)^{2}\right]^{\frac{1}{2}}$$

$$= 1 - \frac{1}{5}\left[\left(\frac{3}{2}\right)^{4.\ (-\frac{1}{4})} + 1\right]^{2} - \left[\frac{4}{11}\left(\frac{3 - 16}{12}\right)\right] \div \left[\left(\frac{\frac{3 - 18}{15}}{\frac{121}{13}}\right)^{2}\right]^{\frac{1}{2}}$$

$$= 1 - \frac{1}{5}\left[\left(\frac{3}{2}\right)^{-1} + 1\right]^{2} - \left[\frac{4}{11}\left(\frac{-13}{12}\right)\right] \div \left[\left(\frac{\frac{-5}{5}}{\frac{11^{2}}{13}}\right)^{2}\right]^{\frac{1}{2}}$$

$$= 1 - \frac{1}{5}\left[\frac{2}{3} + 1\right]^2 - \left[\frac{-13}{11.3}\right] \div \left|\frac{-13}{11^2}\right|$$

$$= 1 - \frac{1}{5}\left[\frac{5}{3}\right]^2 - \left[\frac{-13}{11.3}\right] . \frac{11^2}{13}$$

$$= 1 - \frac{1}{5} . \frac{5^{\,2}}{3^2} + \frac{11}{3}$$

$$= 1 - \frac{5}{9} + \frac{11}{3}$$

$$= \frac{9 - 5 + 33}{9} = \frac{37}{9}$$