MATEMATICAS. 4ºESO-B   TEMA 1: Números Reales

1.- Clasifica los números indicando los conjuntos numéricos a los que pertenecen:

$$\frac{\pi}{2} \qquad \sqrt{36} \qquad 2.25111\ldots \qquad \sqrt{-5} \qquad \frac{75}{-5}$$

2.- Representa en la recta real los números $\sqrt{17}$ y $\sqrt{13}$

3.- Representa en la recta real los números que verifican las siguientes relaciones:

1. $|x| < 1$ **2.** $|x| \geq 1$ **3.** $|x-2| < 1$

4. $|x-2| \leq 1$ **5.** $|x-2| > 1$ **6.** $|x-2| \geq 1$

4.- Pasar a fracción los siguientes decimales:

$$0.037, \qquad 0.\overline{037}, \qquad 0.03\overline{7}, \qquad 1.\overline{0001}, \qquad 1.0001, \qquad 1.0\overline{001}$$

5.- Calcula:

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

2. $1-\dfrac{1}{1-\dfrac{1}{1-\dfrac{1}{2}}}=$

6.- Realiza las siguientes operaciones:

1. $5.\overline{5}+0.1=$ **2.** $0.1+0.\overline{1}-0.0\overline{1}=$ **3.** $2.\overline{3}:1.5=$

7.- Agrupa las siguientes potencias:

1. $\left(\frac{3}{2}\right)^{-2}:\left(\frac{2}{3}\right)^{-3}=$ **2.** $\left[\left(\frac{2}{3}\right)^{2}\right]^{3}=$ **3.** $\left\{\left[\left(\frac{2}{3}\right)^{2}\right]^{3}\right\}^{-4}=$ **4.** $\left(\frac{4}{9}\right)^{-2}:\left(\frac{27}{8}\right)^{-3}=$

5. $\dfrac{\left(\frac{2}{3}\right)^{5}\left(\frac{2}{3}\right)^{0}\left(\frac{2}{3}\right)^{-2}\left(\frac{81}{16}\right)^{-2}}{\left(\frac{3}{2}\right)^{5}\left(\frac{2}{3}\right)\left[\left(\frac{2}{3}\right)^{5}\right]^{2}\left(\frac{8}{27}\right)^{3}}=$

6. $\dfrac{\left(2-\frac{1}{5}\right)^{2}}{\left(3-\frac{2}{9}\right)^{-1}}:\dfrac{\left(\frac{6}{7}\cdot\frac{5}{4}-\frac{2}{7}:\frac{1}{2}\right)^{3}}{\left(\frac{1}{2}-\frac{1}{3}\cdot\frac{1}{4}:\frac{1}{5}\right)}-5\frac{1}{7}=$

8.- Opera sacando factor común:

1. $\dfrac{3}{4}\cdot\dfrac{1}{6}+\dfrac{1}{4}\cdot\dfrac{1}{6}=$ **2.** $\dfrac{1}{5}\cdot\dfrac{3}{7}+\dfrac{1}{5}\cdot\dfrac{4}{7}=$

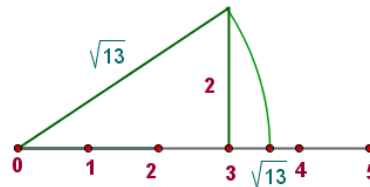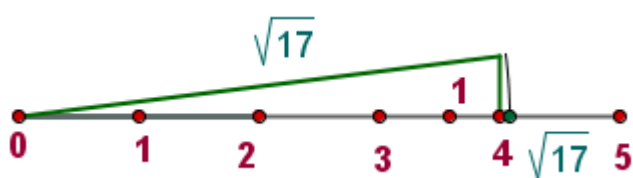**9.-** Realiza las siguientes operaciones con intervalos:

SOLUCIONES

$$\frac{\pi}{2} \in \mathbb{R} \qquad \sqrt{36} \in \mathbb{N} \qquad 2.25111\ldots \in \mathbb{Q} \qquad \sqrt{-5} \notin \mathbb{R} \qquad \frac{75}{-5} \in \mathbb{Z}$$

$$\sqrt{17} = 4^2 + 1^2$$

1.- $|x| < 1$ $-1 < x < 1$ $x \in (-1, 1)$

2.- $|x| \geq 1$ $-1 \geq x \geq 1$ $x \in (-\infty, -1] \cup [1, +\infty)$

3.- $|x - 2| < 1$ $-1 < x - 2 < 1$ $1 < x < 3$ $x \in (1, 3)$

4.- $|x - 2| \leq 1$ $-1 \leq x - 2 \leq 1$ $1 \leq x \leq 3$ $x \in [1, 3]$

5.- $|x - 2| > 1$ $-1 > x - 2 > 1$ $1 > x > 3$ $x \in (-\infty, 1) \cup (3, +\infty)$

6.- $|x - 2| \geq 1$ $-1 \geq x - 2 \geq 1$ $1 \geq x \geq 3$ $x \in (-\infty, 1] \cup [3, +\infty)$

$$0.037 = \frac{37}{1000} \qquad 0.\widehat{037} = \frac{37}{999} \qquad 0.03\widehat{7} = \frac{37 - 3}{900} = \frac{34}{900} = \frac{17}{450}$$

$$1.\widehat{0001} = \frac{10001 - 1}{9999} = \frac{1000}{9999} \qquad 1.0001 = \frac{10001}{10000} \qquad 1.0\widehat{001} = \frac{10001 - 10}{9990} = \frac{9991}{9990}$$

1.-
$$\left[\left(\frac{2}{3} - \frac{1}{9}\right) + 13\left(\frac{2}{3} - 1\right)^2\right] : \left[\left(\frac{1}{2} - 1\right) : 2\frac{1}{2}\right] = = \left[\left(\frac{6-1}{9}\right) + 13\left(\frac{2-3}{3}\right)^2\right] : \left[\left(\frac{-2}{2}\right) : \frac{2 \cdot 2 + 1}{2}\right] =$$

$$= \left[\frac{5}{9} + 13\left(\frac{-1}{3}\right)^2\right] : \left(-\frac{1}{2} : \frac{5}{2}\right) = = \left(\frac{5}{9} + 13 \cdot \frac{1}{9}\right) : \left(-\frac{1}{2} : \frac{5}{2}\right) = = \left(\frac{5}{9} + \frac{13}{9}\right) : \left(-\frac{2}{10}\right) =$$

$$= \frac{18}{9} : \left(-\frac{1}{5}\right) = 2 : \left(-\frac{1}{5}\right) = -\frac{10}{1} = -10$$

2.-
$$1 - \cfrac{1}{1 - \cfrac{1}{1 - \frac{1}{2}}} = 1 - \cfrac{1}{1 - \cfrac{1}{\frac{2-1}{2}}} = 1 - \cfrac{1}{1 - \frac{1}{\frac{1}{2}}} = 1 - \cfrac{1}{1 - 2} = 1 - \frac{1}{-1} = 1 + 1 = 2$$

Ejercicio nº 6.-

1.- $5.\tilde{6} + 0.1 = \dfrac{56-5}{9} + \dfrac{1}{10} = \dfrac{51}{9} + \dfrac{1}{10} = \dfrac{510+9}{90} = \dfrac{519}{90}$

2.- $0.1 + 0.\tilde{1} - 0.0\tilde{1} = \dfrac{1}{10} + \dfrac{1}{9} - \dfrac{1}{90} = \dfrac{9+10-1}{90} = \dfrac{18}{90} = \dfrac{2}{10} = \dfrac{1}{5}$

3.- $2.\tilde{3} : 1.5 = \dfrac{23-2}{9} : \dfrac{15}{10} = \dfrac{21}{9} : \dfrac{3}{2} = \dfrac{42}{27} = \dfrac{14}{9}$

Ejercicio nº 7.-

1.- $\left(\dfrac{3}{2}\right)^{-2} : \left(\dfrac{2}{3}\right)^{-3} = \left(\dfrac{2}{3}\right)^{2} : \left(\dfrac{2}{3}\right)^{-3} = \left(\dfrac{2}{3}\right)^{5}$

2.- $\left[\left(\dfrac{2}{3}\right)^{2}\right]^{3} = \left(\dfrac{2}{3}\right)^{6}$

3.- $\left\{\left[\left(\dfrac{2}{3}\right)^{2}\right]^{3}\right\}^{-4} = \left(\dfrac{2}{3}\right)^{-24} = \left(\dfrac{3}{2}\right)^{24}$

4.- $\left(\dfrac{4}{9}\right)^{-2} : \left(\dfrac{27}{8}\right)^{-3} = \left[\left(\dfrac{2}{3}\right)^{2}\right]^{-2} : \left[\left(\dfrac{3}{2}\right)^{3}\right]^{-3} = \left(\dfrac{2}{3}\right)^{-4} : \left(\dfrac{3}{2}\right)^{-9} = = \left(\dfrac{2}{3}\right)^{-4} : \left(\dfrac{2}{3}\right)^{9} = \left(\dfrac{2}{3}\right)^{-13} = \left(\dfrac{3}{2}\right)^{13}$

5.- $\dfrac{\left(\dfrac{2}{3}\right)^{5}\left(\dfrac{2}{3}\right)^{0}\left(\dfrac{2}{3}\right)^{-3}\left(\dfrac{81}{16}\right)^{-2}}{\left(\dfrac{3}{2}\right)^{-5}\left(\dfrac{2}{3}\right)\left[\left(\dfrac{2}{3}\right)^{5}\right]^{2}\left(\dfrac{8}{27}\right)^{3}} = = \dfrac{\left(\dfrac{2}{3}\right)^{5}\left(\dfrac{2}{3}\right)^{0}\left(\dfrac{2}{3}\right)^{-3}\left[\left(\dfrac{3}{2}\right)^{4}\right]^{-2}}{\left(\dfrac{3}{2}\right)^{-5}\left(\dfrac{2}{3}\right)\left[\left(\dfrac{2}{3}\right)^{5}\right]^{2}\left[\left(\dfrac{2}{3}\right)^{3}\right]^{3}} = = \dfrac{\left(\dfrac{2}{3}\right)^{5}\left(\dfrac{2}{3}\right)^{0}\left(\dfrac{2}{3}\right)^{-3}\left(\dfrac{3}{2}\right)^{-8}}{\left(\dfrac{3}{2}\right)^{-5}\left(\dfrac{2}{3}\right)\left(\dfrac{2}{3}\right)^{10}\left(\dfrac{2}{3}\right)^{9}} =$

$= \dfrac{\left(\dfrac{2}{3}\right)^{5}\left(\dfrac{2}{3}\right)^{0}\left(\dfrac{2}{3}\right)^{-3}\left(\dfrac{2}{3}\right)^{8}}{\left(\dfrac{2}{3}\right)^{5}\left(\dfrac{2}{3}\right)\left(\dfrac{2}{3}\right)^{10}\left(\dfrac{2}{3}\right)^{9}} = = \dfrac{\left(\dfrac{2}{3}\right)^{10}}{\left(\dfrac{2}{3}\right)^{25}} = \left(\dfrac{2}{3}\right)^{-15} = \left(\dfrac{3}{2}\right)^{15}$

6.- $\dfrac{\left(2-\dfrac{1}{5}\right)^{2}}{\left(3-\dfrac{2}{9}\right)^{-1}} : \dfrac{\left(\dfrac{6}{7}\cdot\dfrac{5}{4}-\dfrac{2}{7}:\dfrac{1}{2}\right)^{3}}{\left(\dfrac{1}{2}-\dfrac{1}{3}\cdot\dfrac{1}{4}:\dfrac{1}{5}\right)} - 5\dfrac{1}{7} = = \dfrac{\left(\dfrac{10-1}{5}\right)^{2}}{\left(\dfrac{27-2}{9}\right)^{-1}} : \dfrac{\left(\dfrac{30}{28}-\dfrac{4}{7}\right)^{3}}{\left(\dfrac{1}{2}-\dfrac{1}{12}:\dfrac{1}{5}\right)} - \dfrac{35+1}{7} =$

$= \dfrac{\left(\dfrac{9}{5}\right)^{2}}{\left(\dfrac{25}{9}\right)^{-1}} : \dfrac{\left(\dfrac{15}{14}-\dfrac{4}{7}\right)^{3}}{\left(\dfrac{1}{2}-\dfrac{5}{12}\right)} - \dfrac{36}{7} = = \dfrac{\left(\dfrac{9}{5}\right)^{2}}{\left(\dfrac{25}{9}\right)^{-1}} : \dfrac{\left(\dfrac{15-8}{14}\right)^{3}}{\left(\dfrac{6-5}{12}\right)} - \dfrac{36}{7} = = \dfrac{\left(\dfrac{9}{5}\right)^{2}}{\left(\dfrac{25}{9}\right)^{-1}} : \dfrac{\left(\dfrac{1}{2}\right)^{3}}{\dfrac{1}{12}} - \dfrac{36}{7} =$

$= \dfrac{\dfrac{81}{25}}{\dfrac{9}{25}} : \dfrac{\dfrac{1}{8}}{\dfrac{1}{12}} - \dfrac{36}{7} = \dfrac{81}{9} : \dfrac{12}{8} - \dfrac{36}{7} = = 9 : \dfrac{3}{2} - \dfrac{36}{7} = \dfrac{18}{3} - \dfrac{36}{7} = 6 - \dfrac{36}{7} = \dfrac{42-36}{7} = \dfrac{6}{7}$

Ejercicio nº 8.-

1.- $\dfrac{3}{4}\cdot\dfrac{1}{6} + \dfrac{1}{4}\cdot\dfrac{1}{6} = = \dfrac{3}{4}\cdot\dfrac{1}{6} + \dfrac{1}{4}\cdot\dfrac{1}{6} = \dfrac{1}{6}\cdot\left(\dfrac{3}{4} + \dfrac{1}{4}\right) = \dfrac{1}{6}\cdot\dfrac{4}{4} = \dfrac{1}{6}$

2.- $\dfrac{1}{5}\cdot\dfrac{3}{7} + \dfrac{1}{5}\cdot\dfrac{4}{7} = = \dfrac{1}{5}\cdot\dfrac{3}{7} + \dfrac{1}{5}\cdot\dfrac{4}{7} = \dfrac{1}{5}\cdot\left(\dfrac{3}{7} + \dfrac{4}{7}\right) = \dfrac{1}{5}\cdot\dfrac{7}{7} = \dfrac{1}{5}$