

① OPERA Y CALCULA (pág 16)

1) a) $-17 + (-13) = -30$

b) $-15 + 17 - (-8) = 10$

c) $5 \cdot (-7 - 5) = 5 \cdot (-12) = -60$

d) $-50 - 5(-11) = 5$

e) $-3(6+4) + 7 = -30 + 7 = -23$

f) $(-3) - (-2) = 9 - (-8) = 17$

2) a) $\left(\frac{1}{2} + \frac{1}{7}\right) \cdot \left(\frac{5}{6} + \frac{1}{3}\right) = \left(\frac{7}{14} + \frac{2}{14}\right) \cdot \left(\frac{5}{6} + \frac{2}{6}\right) = \frac{9}{14} \cdot \frac{7}{6} = \frac{63}{84} = \frac{3}{4}$

$mcm(2,7)=14$ $mcm(6,3)=6$

b) $\left(\frac{5}{9} - \frac{2}{3}\right) \cdot \left(\frac{6}{5} - 3\right) = \left(\frac{5}{9} - \frac{6}{9}\right) \cdot \left(\frac{6}{5} - \frac{15}{5}\right) = -\frac{1}{9} \cdot \left(-\frac{9}{5}\right) = \frac{1}{5}$

$mcm(9,3)=9$

c) $\left(1 - \frac{7}{10}\right) : \left(\frac{2}{3} - \frac{1}{5}\right) = \left(\frac{10}{10} - \frac{7}{10}\right) : \left(\frac{10}{15} - \frac{3}{15}\right) = \frac{3}{10} : \frac{7}{15} = \frac{45}{70} = \frac{9}{14}$

$mcm(3,5)=15$

d) $\left(\frac{7}{3} - 2\right) : \left(\frac{3}{4} - \frac{1}{3}\right) = \left(\frac{7}{3} - \frac{6}{3}\right) : \left(\frac{9}{12} - \frac{4}{12}\right) = \frac{1}{3} : \frac{5}{12} = \frac{12}{15} = \frac{4}{5}$

$mcm(4,3)=12$

3)

a) $\frac{\frac{2}{3} - \frac{3}{5}}{1 - \frac{1}{5}} = \frac{\frac{10}{15} - \frac{9}{15}}{\frac{5}{5} - \frac{1}{5}} = \frac{\frac{1}{15}}{\frac{4}{5}} = \frac{1}{15} : \frac{4}{5} = \frac{5}{60} = \frac{1}{12}$

b) $\frac{\frac{1}{3} - \frac{1}{7}}{\frac{1}{3} + \frac{1}{7}} = \frac{\frac{7}{21} - \frac{3}{21}}{\frac{7}{21} + \frac{3}{21}} = \frac{\frac{4}{21}}{\frac{10}{21}} = \frac{4}{21} : \frac{10}{21} = \frac{4 \cdot 21}{10 \cdot 21} = \frac{4}{10} = \frac{2}{5}$

c) $\frac{2 \cdot \left(\frac{3}{4} - \frac{1}{5}\right)}{(-3) \cdot \left(\frac{3}{10} - \frac{8}{15}\right)} = \frac{2}{-3} \cdot \frac{\frac{15}{20} - \frac{4}{20}}{\frac{9}{30} - \frac{16}{30}} = \frac{2}{-3} \cdot \frac{\frac{11}{20}}{\frac{-7}{30}} = \frac{2}{-3} \cdot \left(\frac{11}{20} : \frac{-7}{30}\right) =$

$= \frac{2}{-3} \cdot \frac{33}{-14} = \frac{66}{42} = \frac{11}{7}$

d) $\frac{(-4) \cdot \left(\frac{1}{2} + \frac{3}{5}\right)}{(-11) \cdot \left(\frac{3}{2} - \frac{1}{5}\right)} = \frac{-4}{-11} \cdot \frac{\frac{5}{10} + \frac{6}{10}}{\frac{15}{10} - \frac{2}{10}} = \frac{4}{11} \cdot \left(\frac{11}{10} : \frac{13}{10}\right) = \frac{4}{11} \cdot \frac{11 \cdot 10}{10 \cdot 13} = \frac{4}{13}$

5)

$\frac{21}{49}$	$\frac{24}{36}$	$\frac{4}{5}$	$\frac{14}{21}$	$\frac{10}{15}$	$\frac{15}{35}$	$\frac{3}{7}$
$\downarrow$	$\downarrow$	$\downarrow$	$\downarrow$	$\downarrow$	$\downarrow$	$\downarrow$
$\frac{3}{7}$	$\frac{2}{3}$	$\frac{4}{5}$	$\frac{2}{3}$	$\frac{2}{3}$	$\frac{3}{7}$	$\frac{3}{7}$

6)

$$\frac{24}{60} = \frac{\cancel{2} \cdot \cancel{2} \cdot \cancel{2} \cdot \cancel{3}}{\cancel{2} \cdot \cancel{2} \cdot \cancel{3} \cdot 5} = \frac{2}{5}$$

$$\frac{114}{72} = \frac{\cancel{2} \cdot \cancel{3} \cdot 19}{\cancel{2} \cdot \cancel{2} \cdot \cancel{2} \cdot \cancel{3} \cdot 3} = \frac{19}{12}$$

$$\frac{51}{68} = \frac{3 \cdot \cancel{17}}{2 \cdot 2 \cdot \cancel{17}} = \frac{3}{4}$$

$$\frac{26}{39} = \frac{2 \cdot \cancel{13}}{3 \cdot \cancel{13}} = \frac{2}{3}$$

$$\frac{125}{50} = \frac{\cancel{5} \cdot \cancel{5} \cdot 5}{\cancel{5} \cdot \cancel{5} \cdot 2} = \frac{5}{2}$$

$$\frac{225}{400} = \frac{\cancel{5} \cdot \cancel{5} \cdot 3 \cdot 3}{2 \cdot 2 \cdot 2 \cdot 2 \cdot \cancel{5} \cdot \cancel{5}} = \frac{9}{16}$$

7)

a) $\frac{5}{6}, \frac{3}{5}, \frac{2}{3}, \frac{7}{10}, \frac{8}{15}$; $\text{mcm}(6, 5, 3, 10, 15) = 30$; $\frac{8}{15} < \frac{3}{5} < \frac{2}{3} < \frac{7}{10} < \frac{5}{6}$

$\frac{5}{6}$	$\frac{3}{5}$	$\frac{2}{3}$	$\frac{7}{10}$	$\frac{8}{15}$
$\downarrow$	$\downarrow$	$\downarrow$	$\downarrow$	$\downarrow$
$\frac{25}{30}$	$\frac{18}{30}$	$\frac{20}{30}$	$\frac{21}{30}$	$\frac{16}{30}$

b) $-\frac{1}{2}, -\frac{5}{8}, -\frac{7}{12}, -\frac{3}{4}$; $\text{mcm}(2, 8, 12, 4) = 24$; $-\frac{3}{4} < -\frac{5}{8} < -\frac{7}{12} < -\frac{1}{2}$

$-\frac{1}{2}$	$-\frac{5}{8}$	$-\frac{7}{12}$	$-\frac{3}{4}$
$\downarrow$	$\downarrow$	$\downarrow$	$\downarrow$
$-\frac{12}{24}$	$-\frac{15}{24}$	$-\frac{14}{24}$	$-\frac{18}{24}$

8)

a) $2 + \frac{1}{3} = \frac{6}{3} + \frac{1}{3} = \frac{7}{3}$ b) $\frac{1}{2} + \frac{1}{4} = \frac{2}{4} + \frac{1}{4} = \frac{3}{4}$

c) $\frac{1}{2} - \frac{1}{5} = \frac{5}{10} - \frac{2}{10} = \frac{3}{10}$ d) $2 \cdot \frac{5}{4} = \frac{10}{4} = \frac{5}{2}$ e) $\frac{2}{3} : 2 = \frac{2}{6} = \frac{1}{3}$

f) $\frac{3}{5} \cdot \frac{1}{3} = \frac{1}{5}$ g) $\frac{2}{3} \cdot \frac{9}{4} = \frac{\cancel{2} \cdot \cancel{3} \cdot 3}{\cancel{3} \cdot 2 \cdot 2} = \frac{3}{2}$ h) $\frac{12}{7} : 3 = \frac{\cancel{3} \cdot 4}{\cancel{3} \cdot 7} = \frac{4}{7}$ i) $\frac{7}{3} \cdot 21 = \frac{7 \cdot \cancel{7} \cdot 3}{\cancel{3}} = 49$

9)

$\frac{9}{25} = 0,36$ $\begin{array}{r} 90 \overline{) 250} \\ 180 \\ \hline 70 \\ 50 \\ \hline 20 \end{array}$	$\frac{13}{9} = 1,4\hat{4}$ $\begin{array}{r} 13 \overline{) 13} \\ 9 \\ \hline 40 \\ 36 \\ \hline 40 \\ 36 \\ \hline 4 \end{array}$	$\frac{23}{6} = 3,8\hat{3}$ $\begin{array}{r} 23 \overline{) 23} \\ 18 \\ \hline 50 \\ 36 \\ \hline 14 \\ 12 \\ \hline 20 \\ 18 \\ \hline 2 \end{array}$	$\frac{17}{200} = 0,085$ $\begin{array}{r} 1700 \overline{) 2000} \\ 1000 \\ \hline 700 \\ 600 \\ \hline 100 \end{array}$
--	---	---	--

$\frac{5}{7} = 0,714285$ $\begin{array}{r} 50 \overline{) 70} \\ 35 \\ \hline 35 \\ 28 \\ \hline 42 \\ 35 \\ \hline 7 \end{array}$	$\frac{233}{990} = 0,235$ $\begin{array}{r} 2330 \overline{) 9900} \\ 1980 \\ \hline 3500 \\ 2970 \\ \hline 530 \\ 495 \\ \hline 35 \end{array}$	$\frac{13}{22} = 0,59\hat{0}$ $\begin{array}{r} 1300 \overline{) 2200} \\ 1100 \\ \hline 200 \\ 1980 \\ \hline 20 \end{array}$	$\frac{130}{200} = 0,65$ $\begin{array}{r} 1300 \overline{) 2000} \\ 1000 \\ \hline 300 \\ 2600 \\ \hline 400 \end{array}$
---	---	---	---

10) a) $3,\widehat{5} < 3,5\widehat{6} < 3,\widehat{56} < 3,5\widehat{6}$

b) $-1,\widehat{32} < -1,3\widehat{2} < -1,32 < -1,\widehat{3}$

② OPERA Y CALCULA (pág. 27)

1) a) $(-3)^3 = -27$ *impar* b) $(-2)^4 = +16$ *par* c) $(-2)^{-3} = \frac{1}{(-2)^3} = -\frac{1}{8}$

d) $-3^2 = -9$ *No hay paréntesis, no está "incluido" en el cuadrado* e) $-4^{-1} = -\frac{1}{4}$ f) $(-1)^{-2} = \frac{1}{(-1)^2} = \frac{1}{1} = 1$

g) $\left(\frac{1}{2}\right)^{-3} = \left(\frac{2}{1}\right)^3 = 2^3 = 8$ h) $\left(-\frac{1}{2}\right)^{-2} = \left(-\frac{2}{1}\right)^2 = (-2)^2 = 4$ i) $\left(\frac{4}{3}\right)^0 = 1$

2) a) $3^{-2} = \frac{1}{3^2} = \frac{1}{9}$ b) $2^{-3} = \frac{1}{2^3} = \frac{1}{8}$ c) $5^{-1} = \frac{1}{5}$

d) $\frac{1}{3^{-2}} = 3^2 = 9$ e) $\frac{1}{2^{-3}} = 2^3 = 8$ f) $\frac{1}{5^{-1}} = 5$

3) a) $4^3 \cdot 4^{-2} = 4^{3-2} = 4$ b) $3^2 \cdot 3^{-3} = 3^{2-3} = 3^{-1} = \frac{1}{3}$

c) $4^2 \cdot 2^{-2} = (2^2)^2 \cdot 2^{-2} = 2^4 \cdot 2^{-2} = 2^{4-2} = 2^2 = 4$ d) $5^3 \cdot 5^{-4} = 5^{3-4} = 5^{-1} = \frac{1}{5}$

e) $6^4 \cdot 6^{-4} = 6^{4-4} = 6^0 = 1$ f) $3^5 \cdot 3^{-2} = 3^{5-2} = 3^3 = 27$

4) a) $a^{-3} \cdot a^5 = a^{-3+5} = a^2$ b) $a^2 \cdot a^{-6} = a^{2-6} = a^{-4} = \frac{1}{a^4}$

c) $a^{-1} \cdot a^5 = a^{-1+5} = a^4$ d) $\frac{x^3}{x^4} = x^{3-4} = x^{-1} = \frac{1}{x}$

e) $\frac{1}{x^2 \cdot x^3} = \frac{1}{x^5}$ f) $\frac{1}{x^{-2}} = x^2$

Ante la ausencia de otra indicación, siempre dejaremos el resultado sin exponentes negativos.

5) a) $\left(\frac{a}{b}\right)^3 \cdot \frac{b^4}{a^3} = \frac{a^3}{b^3} \cdot \frac{b^4}{a^3} = b^{4-3} = b$

b) $\left(\frac{a}{b}\right)^3 \cdot \left(\frac{b}{a}\right)^3 = \frac{a^3}{b^3} \cdot \frac{b^3}{a^3} = \frac{(ab)^3}{(ab)^3} = 1$ c) $\left(\frac{a}{b}\right)^{-3} \cdot \frac{a^4}{b^3} = \left(\frac{b}{a}\right)^3 \cdot \frac{a^4}{b^3} =$

$= \frac{b^3 a^4}{a^3 b^3} = a^{4-3} = a$ d) $\left(\frac{a}{b}\right)^3 \cdot \left(\frac{a}{b}\right)^{-3} = \left(\frac{a}{b}\right)^{3-3} = \left(\frac{a}{b}\right)^0 = 1$

6) a) $\frac{3^4}{3^{-3}} = 3^{4-(-3)} = 3^{4+3} = 3^7 = 3$

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

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

Primero actúo dentro del paréntesis

Porque me piden potencia única

misma base

Vamos a quedarnos, si no se especifica nada, con la raíz positiva

7) a) $\sqrt[4]{16} = \sqrt[4]{2^4} = 2$ b) $\sqrt[7]{\frac{16}{25}} = \sqrt[7]{\frac{4^2}{5^2}} = \sqrt{\left(\frac{4}{5}\right)^2} = \frac{4}{5}$

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

→ -1, elevado a un exponente impar, no deja de ser -1.

8) a) $\sqrt[6]{64} = \sqrt[6]{2^6} = 2$ b) $\sqrt[3]{216} = \sqrt[3]{6^3} = 6$

c) $\sqrt{14400} = \sqrt{144 \cdot 100} = \sqrt{12^2 \cdot 10^2} = \sqrt{(12 \cdot 10)^2} = \sqrt{120^2} = 120$

d) $\sqrt[6]{\frac{1}{64}} = \sqrt[6]{\frac{1}{2^6}} = \sqrt[6]{\left(\frac{1}{2}\right)^6} = \frac{1}{2}$ e) $\sqrt[3]{\frac{64}{216}} = \sqrt[3]{\frac{4^3}{6^3}} = \sqrt[3]{\left(\frac{4}{6}\right)^3} = \frac{4}{6} = \frac{2}{3}$

8) $\sqrt[3]{\frac{3375}{1000}} = \sqrt[3]{\frac{15^3}{10^3}} = \sqrt[3]{\left(\frac{15}{10}\right)^3} = \frac{15}{10} = \frac{3}{2}$

$$\begin{array}{r|l} 3375 & 3 \\ 1125 & 3 \\ 375 & 3 \\ 125 & 5 \\ 25 & 5 \\ 5 & 5 \\ 1 & 1 \end{array} \left. \begin{array}{l} \\ \\ \\ \\ \\ \end{array} \right\} \begin{array}{l} 3^3 \\ 3^3 \\ 3^3 \\ 5^3 \\ 5^3 \\ 5^3 \end{array}$$

9) a) Como $(-5)^2 = 25$, entonces $\sqrt{25} = -5$

Es cierto. Hay que saber que $\sqrt{25}$ tiene dos soluciones $\begin{cases} +5 \\ -5 \end{cases}$. Si no se dice nada, lo más habitual es adoptar el valor positivo, pero eso no quita para que exista el negativo.

b) -5 es una raíz cuadrada de 25. Correcto.

Es prácticamente el mismo razonamiento que en a). La otra raíz cuadrada de 25 es +5.

c) 81 tiene dos raíces cuadradas: 3 y -3.

Falso. Tiene dos, pero son 9 y -9.

d) 27 tiene dos raíces cúbicas: 3 y -3.

Falso. Sólo es correcto el valor 3, pues $3 \cdot 3 \cdot 3 = 27$.

Sin embargo: $(-3) \cdot (-3) \cdot (-3) = -27$, que no coincide con 27.

10 | a) $3\,570\,000 = 3,57 \cdot 10^6$ b) $0,000083 = 8,3 \cdot 10^{-5}$

c) $157,4 \cdot 10^3 = 1,574 \cdot 10^5$ d) $93,8 \cdot 10^{-5} = 9,38 \cdot 10^{-4}$

e) $14700 \cdot 10^5 = 1,47 \cdot 10^9$ f) $0,003 \cdot 10^8 = 3 \cdot 10^5$

11 | a) $3,6 \cdot 10^{12} - 4 \cdot 10^{11} = 3,6 \cdot 10^{12} - 0,4 \cdot 10^{12} = 3,2 \cdot 10^{12}$

b) $5 \cdot 10^9 + 8,1 \cdot 10^{10} = 5 \cdot 10^9 + 81 \cdot 10^9 = 86 \cdot 10^9 = 8,6 \cdot 10^{10}$

c) $8 \cdot 10^{-8} - 5 \cdot 10^{-9} = 80 \cdot 10^{-9} - 5 \cdot 10^{-9} = 75 \cdot 10^{-9} = 7,5 \cdot 10^{-8}$

d) $5,32 \cdot 10^{-4} + 8 \cdot 10^{-6} = 532 \cdot 10^{-6} + 8 \cdot 10^{-6} = 540 \cdot 10^{-6} = 5,4 \cdot 10^{-4}$

③ PRACTICA (pág 35)

1) a) $-10, -3, 4, 11, 18, \dots$

b) $0,1 ; 0,2 ; 0,4 ; 0,8 ; 1,6 ; \dots$

c) $2, 4, 3, 3,5, 3,25, \dots$

2) a) $a_n = 3n - 1 ; a_{10} = 3 \cdot 10 - 1 = 29 ; a_{25} = 3 \cdot 25 - 1 = 74$

b) $b_n = \frac{n^2 + 1}{2} ; b_{10} = \frac{10^2 + 1}{2} = \frac{101}{2} ; b_{25} = \frac{25^2 + 1}{2} = \frac{626}{2} = 313$

c) $c_n = (-1)^n + \frac{1}{n} ; c_{10} = (-1)^{10} + \frac{1}{10} = 1 + \frac{1}{10} = \frac{11}{10} ; c_{25} = (-1)^{25} + \frac{1}{25} = -1 + \frac{1}{25} = -\frac{24}{25}$

d) $d_n = 1 + \frac{(-1)^n}{10} ; d_{10} = 1 + \frac{(-1)^{10}}{10} = 1 + \frac{1}{10} = \frac{11}{10}$

$d_{25} = 1 + \frac{(-1)^{25}}{10} = 1 - \frac{1}{10} = \frac{9}{10}$

e) $e_n = n(n-1) ; e_{10} = 10 \cdot (10-1) = 10 \cdot 9 = 90 ; e_{25} = 25(25-1) = 25 \cdot 24 = 600$

f) $f_n = \frac{n-2}{n+2} ; f_{10} = \frac{10-2}{10+2} = \frac{8}{12} = \frac{2}{3} ; f_{25} = \frac{25-2}{25+2} = \frac{23}{27}$

3) $a_1 = 1 ; a_n = 2a_{n-1} + 3$

$a_2 = 2 \cdot 1 + 3 = 5 ; a_3 = 2 \cdot 5 + 3 = 13 ; a_4 = 2 \cdot 13 + 3 = 29$

$a_5 = 2 \cdot 29 + 3 = 61$

4) a) $11, 9, 7, 5, \dots$ "restando 2 al anterior"

b) $\frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \frac{1}{16}, \dots$ "multiplicando por $\frac{1}{2}$ el anterior"

c) $4, 5, 2, 9, 3, 3, 3, 7, \dots$ "sumando 0,4 al anterior"

d) $1, \frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \dots$ "aumentando el denominador anterior en una unidad"

e) $8, 12, 18, 27, \dots$ "multiplicando por 1,5 el anterior"

f) $0, 3, 8, 15, \dots$ "restando 1 al cuadrado del número de su posición"

5) a) $a_1 = 5, d = 4 \rightarrow a_8 = 5 + (8-1) \cdot 4 = 5 + 28 = 33$

b) $b_1 = -3, d = -2 \rightarrow b_{10} = -3 + (10-1)(-2) = -3 - 18 = -21$

c) $c_1 = 4, c_2 = 7 \rightarrow d = c_2 - c_1 = 3; c_{11} = 4 + (11-1) \cdot 3 = 4 + 30 = 34$

d) $d_1 = 12, d_4 = 18 \rightarrow d_1, d_2, d_3, d_4 \rightarrow d_9 = 12 + (9-1) \cdot 2 = 12 + 32 = 44$

$$\begin{array}{c} 12 \quad \quad \quad 18 \\ \text{---} \quad \text{---} \quad \text{---} \\ d \quad \quad d \quad \quad d \end{array} \quad \begin{array}{l} 12 + 3d = 18; \\ 3d = 18 - 12; 3d = 6; d = \frac{6}{3} = 2 \end{array}$$

e) $e_2 = 10, e_4 = 16 \rightarrow e_2, e_3, e_4 \rightarrow e_1 = e_2 - d = 10 - 3 = 7$

$$\begin{array}{c} 10 \quad \quad \quad 16 \\ \text{---} \quad \text{---} \\ d \quad \quad d \end{array} \quad \begin{array}{l} 10 + 2d = 16 \\ 2d = 16 - 10; 2d = 6; d = \frac{6}{2} = 3 \end{array}$$

6) a) $a_1 = 7, a_{10} = 34$

$a_{10} = a_1 + (10-1) \cdot d$

$34 = 7 + 9 \cdot d \rightarrow 34 - 7 = 9d; 27 = 9d; d = \frac{27}{9} = 3$

b) $b_2 = 3, b_8 = 15$

$b_8 = b_1 + (8-1) \cdot d$

$\rightarrow$ de 1 a 8 hay 7 saltos (7 veces d), pero de 2 a 7 hay 6 saltos (6 veces d)

$b_8 = b_2 + 6 \cdot d; 15 = 3 + 6d; 15 - 3 = 6d; 12 = 6d; d = \frac{12}{6} = 2$

c) $c_3 = 8, c_{11} = 16; \text{ saltos entre 3 y 11: } 11 - 3 = 8$

Por tanto: $c_{11} = c_3 + 8 \cdot d; 16 = 8 + 8 \cdot d; 16 - 8 = 8d$

$8 = 8d; d = \frac{8}{8} = 1$

7) a) $a_1 = 1,5; d = 2$

$a_2 = 1,5 + 2 = 3,5; a_3 = 5,5; a_4 = 7,5; a_5 = 9,5$

$a_{20} = a_1 + (20-1) \cdot 2 = 1,5 + 19 \cdot 2 = 1,5 + 38 = 39,5$

b) $b_1 = 32; d = -5$

$b_2 = 32 + (-5) = 27; b_3 = 22; b_4 = 17; b_5 = 12$

$b_{20} = 32 + (20-1) \cdot (-5) = 32 - 19 \cdot 5 = 32 - 95 = -63$

c) $c_1 = 5; d = 0,5$

$c_2 = 5 + 0,5 = 5,5; c_3 = 6; c_4 = 6,5; c_5 = 7$

$c_{20} = 5 + (20-1) \cdot 0,5 = 5 + 19 \cdot 0,5 = 5 + 9,5 = 14,5$

d) $d_1 = -3; d = -4$

$d_2 = -3 + (-4) = -7; d_3 = -10; d_4 = -13; d_5 = -16$

$d_{20} = -3 + (20-1) \cdot (-4) = -3 - 19 \cdot 4 = -3 - 76 = -79$

8) a) $25, 18, 11, 4, \dots$ $d = -7 \rightarrow a_n = 25 + (n-1) \cdot (-7) = -7n + 32$
 $a_{50} = -7 \cdot 50 + 32 = -350 + 32 = 318$

b) $-13, -11, -9, -7, \dots$ $d = 2 \rightarrow b_n = -13 + (n-1) \cdot 2 = 2n - 15$
 $b_{50} = 2 \cdot 50 - 15 = 100 - 15 = 85$

c) $1,4 ; 1,9 ; 2,4 ; 2,9 ; \dots$ $d = 0,5 \rightarrow c_n = 1,4 + (n-1) \cdot 0,5 = 0,5n + 0,9$
 $c_{50} = 0,5 \cdot 50 + 0,9 = 25 + 0,9 = 25,9$

d) $-3, -8, -13, -18, \dots$ $d = -5 \rightarrow d_n = -3 + (n-1) \cdot (-5) = -5n + 2$
 $d_{50} = -5 \cdot 50 + 2 = -250 + 2 = -248$

9) a) $a_1 = 5 ; d = 2 \rightarrow S_{20} = \frac{(5+43) \cdot 20}{2} = 48 \cdot 10 = 480$
 $a_{20} = a_1 + (20-1) \cdot d = 5 + 19 \cdot 2 = 43$

b) $b_1 = -1 ; b_2 = -7 \rightarrow S_{20} = \frac{[-1 + (-115)] \cdot 20}{2} = -116 \cdot 10 = -1160$
 $d = b_2 - b_1 = -7 - (-1) = -6$
 $b_{20} = b_1 + (20-1) \cdot d = -1 + 19 \cdot (-6) = -115$

c) Los números pares: $c_1, c_2, c_3, c_4, \dots$ $2, 4, 6, 8, \dots$ $c_{20} = 2 + (20-1) \cdot 2 = 40$
 $+2 +2 +2 \rightarrow d=2$

$S_{20} = \frac{(2+40) \cdot 20}{2} = 42 \cdot 10 = 420$

d) Los múltiplos de 3: $d_1, d_2, d_3, d_4, d_5, \dots$ $3, 6, 9, 12, 15, \dots$ $d_{20} = 3 + (20-1) \cdot 3 = 60$
 $+3 +3 +3 +3 \rightarrow d=3$

$S_{20} = \frac{(3+60) \cdot 20}{2} = 63 \cdot 10 = 630$

10) a) $a_1 = 0,3$; $r = 2$
 $a_2 = 0,3 \cdot 2 = 0,6$; $a_3 = 0,6 \cdot 2 = 1,2$; $a_4 = 2,4$; $a_5 = 4,8$

b) $b_1 = -3$; $r = \frac{1}{2}$
 $b_2 = -3 \cdot \frac{1}{2} = -1,5$; $b_3 = -1,5 \cdot \frac{1}{2} = -0,75$; $b_4 = -0,375$; $b_5 = -0,1875$
 Alternativamente : $-\frac{3}{2}$; $-\frac{3}{4}$; $-\frac{3}{8}$; $-\frac{3}{16}$
 (con fracciones)

c) $c_1 = 200$; $r = -0,1$
 $c_2 = 200 \cdot (-0,1) = -20$; $c_3 = -20 \cdot (-0,1) = +2$; $c_4 = -0,2$; $c_5 = -0,02$

d) $d_1 = \frac{1}{81}$; $r = 3$
 $d_2 = \frac{1}{81} \cdot 3 = \frac{3}{81} = \frac{1}{27}$; $d_3 = \frac{1}{27} \cdot 3 = \frac{3}{27} = \frac{1}{9}$; $d_4 = \frac{1}{3}$; $d_5 = 1$

11) a) 20 ; 8 ; $3,2$; $1,28$; ... $r = \frac{8}{20} = \frac{3,2}{8} = \dots = \frac{2}{5}$

$$a_n = 20 \cdot \left(\frac{2}{5}\right)^{n-1}$$

b) 40 , 20 , 10 , 5 ; $r = \frac{20}{40} = \frac{10}{20} = \dots = \frac{1}{2}$

$$b_n = 40 \cdot \left(\frac{1}{2}\right)^{n-1}$$

c) 6 ; -9 ; $13,5$; $-20,25$; ... $r = \frac{-9}{6} = \frac{13,5}{-9} = \dots = -\frac{3}{2}$

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

d) $0,48$; $4,8$; 48 ; 480 ; ... $r = \frac{4,8}{0,48} = \frac{48}{4,8} = \dots = 10$

$$d_n = 0,48 \cdot 10^{n-1}$$