Contenido

Capítulo I Números

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$\frac{1}{2}$	$\frac{1}{4}$
$\frac{2}{4}$	$\frac{3}{6}$
$\frac{1}{6}$	$\frac{3}{4}$
$\frac{4}{6}$	$\frac{5}{6}$
$\frac{3}{6}$	$\frac{2}{6}$
$\frac{2}{8}$	$\frac{1}{8}$

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$\frac{3}{4}$	$\frac{6}{8}$	$\frac{5}{6}$
$\frac{4}{7}$	$\frac{3}{9}$	$\frac{1}{2}$
$\frac{6}{9}$	$\frac{4}{6}$	$\frac{8}{9}$

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1)

1) $\frac{2}{3}$

2) $\frac{3}{7}$

3) $\frac{4}{5}$

4) $\frac{5}{9}$

5) $\frac{4}{7}$

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

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

8) $\frac{2}{5}$

9) $\frac{1}{2}$

10) $\frac{4}{5}$

11) $\frac{9}{14}$

12) $\frac{7}{143}$

13) $\frac{3}{5}$

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

15) $\frac{7}{9}$

16) $\frac{11}{12}$

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

18) $\frac{3}{8}$

19) $\frac{5}{8}$

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

21) $\frac{4}{7}$

22) $\frac{4}{7}$

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

24) $\frac{15}{17}$

2)

1) $\frac{3}{4}$

2) $\frac{1}{2}$

3) $\frac{1}{2}$

4) $\frac{2}{3}$

5) $\frac{1}{3}$

6) $\frac{1}{2}$

7) $\frac{2}{9}$

8) $\frac{3}{5}$

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

10) $\frac{3}{8}$

11) $\frac{2}{3}$

12) $\frac{5}{9}$

13) $\frac{3}{4}$

14) $\frac{3}{4}$

15) $\frac{4}{11}$

16) $\frac{4}{5}$

17) $\frac{5}{16}$

18) $\frac{4}{11}$

19) $\frac{1}{2}$

20) $\frac{4}{3}$

3)

a) $\frac{2}{3}$

b) $\frac{3}{8}$

c) $\frac{1}{5}$

d) $\frac{1}{5}$

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4)

Fracción	*2	*3	*4	*5
$\frac{5}{8}$	$\frac{10}{16}$	$\frac{15}{24}$	$\frac{20}{32}$	$\frac{25}{40}$
$\frac{3}{8}$	$\frac{6}{16}$	$\frac{9}{24}$	$\frac{12}{32}$	$\frac{15}{40}$
$\frac{1}{4}$	$\frac{2}{8}$	$\frac{3}{12}$	$\frac{4}{16}$	$\frac{5}{20}$
$\frac{1}{2}$	$\frac{2}{4}$	$\frac{3}{6}$	$\frac{4}{8}$	$\frac{5}{10}$
$\frac{3}{4}$	$\frac{6}{8}$	$\frac{9}{12}$	$\frac{15}{20}$	$\frac{15}{20}$

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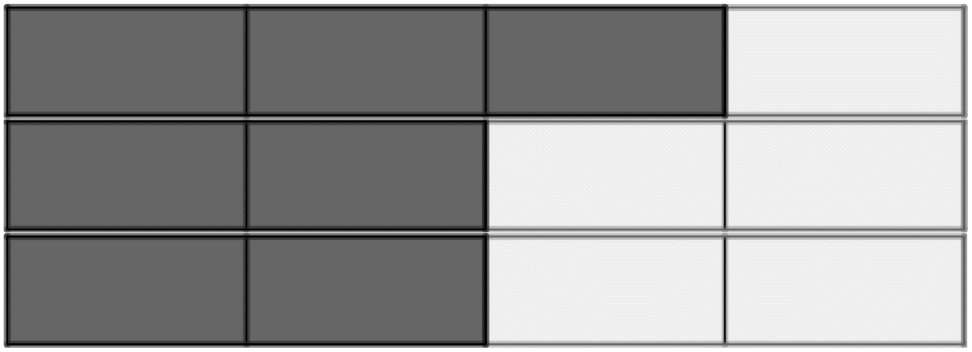
1)

2)



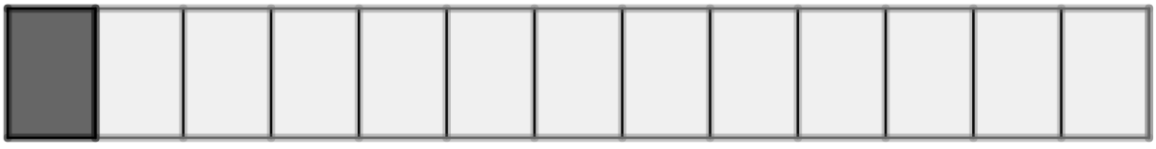
3)

4)

5)

6)

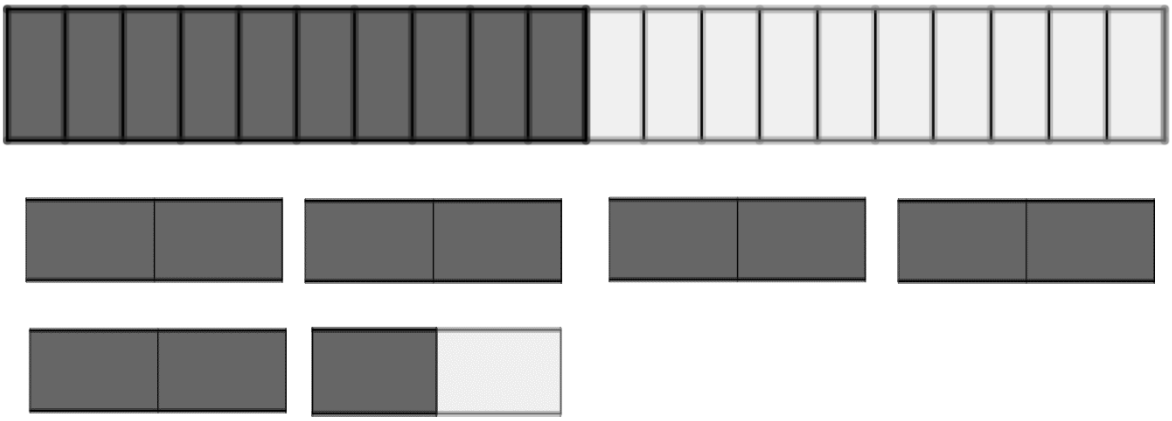
7)



8)

9)

10)



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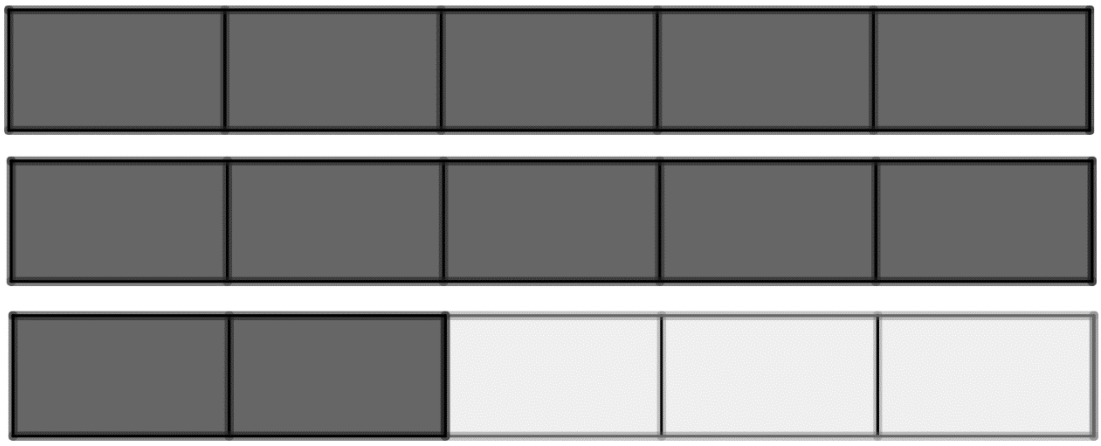

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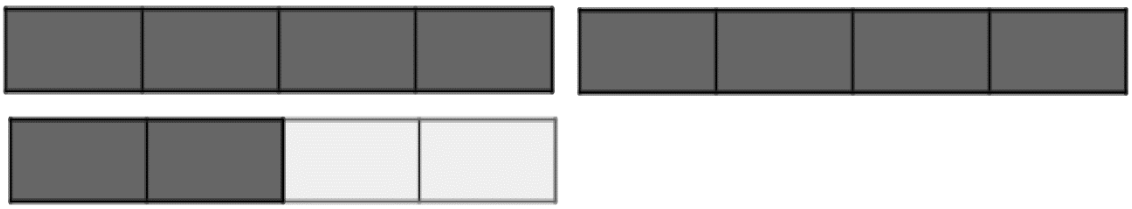
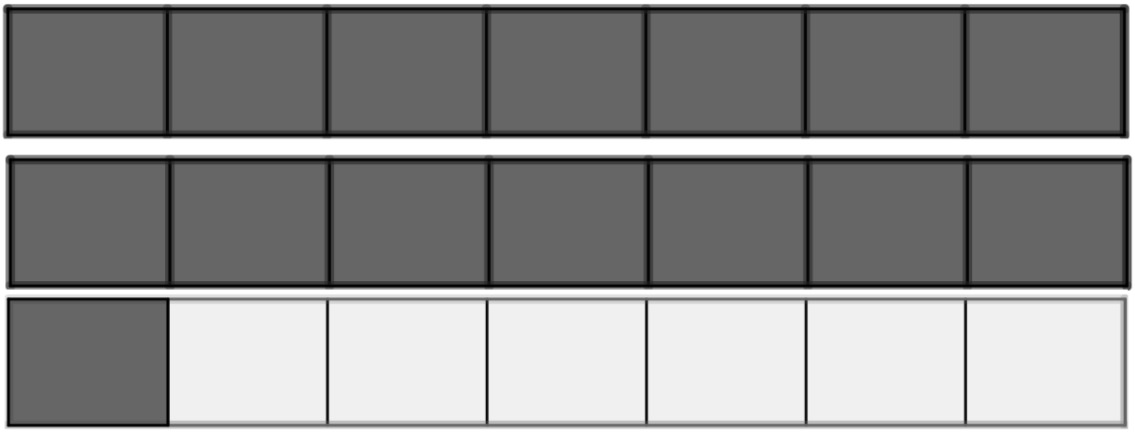
13)



14)

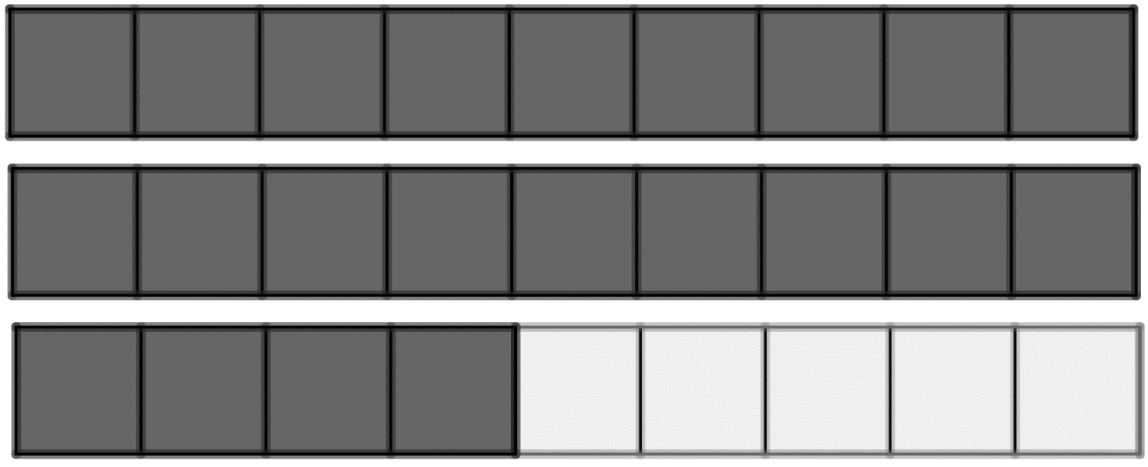
15)

16)



17)

18)



19)

20)

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2)

1) $\frac{1+1*1}{1} = 2$

2) $\frac{4*3+1}{3} = \frac{13}{3}$

3) $\frac{9*4+2}{4} = \frac{38}{4} = \frac{19}{2}$

4) $\frac{11*5+2}{5} = \frac{57}{5}$

5) $\frac{1*4+1}{4} = \frac{5}{4}$

6) $\frac{6*5+2}{5} = \frac{32}{5}$

7) $\frac{9*6+5}{6} = \frac{59}{6}$

8) $\frac{12*4+3}{4} = \frac{51}{4}$

9) $\frac{1*2+1}{2} = \frac{3}{2}$

10) $\frac{7*4+3}{4} = \frac{31}{4}$

11) $\frac{10*3+1}{3} = \frac{31}{3}$

12) $\frac{15*3+2}{3} = \frac{47}{3}$

13) $\frac{3*4+1}{4} = \frac{13}{4}$

14) $\frac{8*2+1}{2} = \frac{17}{2}$

15) $\frac{10*8+3}{8} = \frac{83}{8}$

16) $\frac{16*4+1}{4} = \frac{65}{4}$

17) $\frac{3*4+1}{4} = \frac{13}{4}$

18) $\frac{8*7+3}{7} = \frac{59}{7}$

19) $\frac{10*7+5}{7} = \frac{75}{7}$

20) $\frac{18*6+3}{6} = \frac{111}{6} = \frac{37}{2}$

3) $\frac{8}{3}, \frac{10}{4}, \frac{12}{5}, \frac{4}{3}, \frac{11}{6}, \frac{8}{6}, \frac{10}{3}, \frac{15}{2}, \frac{8}{5}$

4)

a) $\frac{24}{16} = \frac{3}{2}$

b) $\frac{40}{16} = \frac{5}{2}$

c) $\frac{36}{16} = \frac{9}{4}$

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5)

a) $2\frac{2}{3}$

b) $4\frac{4}{5}$

c) $3\frac{1}{4}$

d) $1\frac{2}{7}$

6)

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

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

c) $\frac{13}{3}$

d) $\frac{12}{5}$

7)

	Cociente	Resto	Número Mixto
a)	1	5	$1\frac{5}{7}$
b)	4	1	$4\frac{1}{2}$
c)	1	2	$1\frac{2}{3}$
d)	1	1	$1\frac{1}{9}$

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1)

a) 2,6

b) 6,916

c) -0,26

d) -0,084

e) 0,307692

f) -0,975

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1)

a) $\frac{1265429}{100000}$

b) $-\frac{78665423}{100000000}$

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1)

a) $\frac{1212373-12}{99999} = \frac{1212361}{99999}$

b) $-\frac{[5345297-5]}{999999} = -\frac{5345292}{999999}$

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a) $\frac{9230167237-9230}{999999000} = \frac{9230158007}{999999000}$

b) $-\frac{[1323042167-1323042]}{99900000} = -\frac{1321719125}{99900000}$

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Exactas:

0,25 = $\frac{25}{100} = \frac{1}{4}$

6,48 = $\frac{648}{100} = \frac{162}{25}$

0,123 = $\frac{123}{1000}$

4,657 = $\frac{4657}{1000}$

0,69 = $\frac{69}{100}$

7,81 = $\frac{781}{100}$

1,214 = $\frac{1214}{1000} = \frac{607}{500}$

2,226 = $\frac{2226}{1000} = \frac{1113}{500}$

Puras:

a) $0,\overline{25} = \frac{25}{99}$

b) $6,\overline{48} = \frac{648-6}{99} = \frac{642}{99} = \frac{214}{33}$

c) $0,\overline{123} = \frac{123}{999} = \frac{41}{333}$

d) $4,\overline{657} = \frac{4657-4}{999} = \frac{4653}{999} = \frac{517}{111}$

e) $0,\overline{69} = \frac{69}{99} = \frac{23}{33}$

f) $7,\overline{81} = \frac{781-7}{99} = \frac{774}{99} = \frac{86}{11}$

g) $1,\overline{214} = \frac{1214-1}{999} = \frac{1213}{999}$

h) $2,\overline{226} = \frac{2226-2}{999} = \frac{2224}{999}$

Mixtas:

a) $0,2\bar{5} = \frac{25-2}{90} = \frac{23}{90}$

b) $6,4\bar{8} = \frac{648-64}{90} = \frac{584}{90} = \frac{292}{45}$

c) $0,1\overline{23} = \frac{123-1}{990} = \frac{122}{990} = \frac{61}{495}$

d) $4,65\bar{7} = \frac{4657-465}{900} = \frac{4192}{900} = \frac{1048}{225}$

e) $0,6\bar{9} = \frac{69-6}{90} = \frac{63}{90} = \frac{7}{10}$

f) $7,8\bar{1} = \frac{781-78}{90} = \frac{703}{90}$

g) $1,2\overline{14} = \frac{1214-12}{990} = \frac{1202}{990} = \frac{601}{495}$

h) $2,2\overline{26} = \frac{2226-22}{990} = \frac{2204}{990} = \frac{1102}{495}$

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Fracción	Número Mixto	Forma Decimal	Clasificación de la forma decimal	Inverso multiplicativo	Opuesto aditivo	Clasificación de la fracción
$\frac{23}{9}$	$2\frac{5}{9}$	$2,\overline{5}$	Pura	$\frac{9}{23}$	$-\frac{23}{9}$	Impropia
$\frac{19}{9}$	$2\frac{1}{9}$	$2,\overline{1}$	Pura	$\frac{9}{19}$	$-\frac{19}{9}$	Impropia
$\frac{32}{5}$	$6\frac{2}{5}$	$6{,}4$	Exacta	$\frac{5}{32}$	$-\frac{32}{5}$	Impropia
$\frac{5}{33}$	$0\frac{5}{33}$	$0,\overline{15}$	Pura	$\frac{33}{5}$	$-\frac{5}{33}$	Propia
$\frac{27}{9}$	$3\frac{0}{9}$	$3{,}0$	Exacta	$\frac{9}{27}$	$-\frac{27}{9}$	Impropia
$\frac{43}{180}$	$0\frac{43}{180}$	$0{,}23\overline{8}$	Mixta	$\frac{180}{43}$	$-\frac{43}{180}$	Propia
$\frac{4}{5}$	$0\frac{4}{5}$	$0{,}8$	Exacta	$\frac{5}{4}$	$-\frac{4}{5}$	Propia
$\frac{1}{9}$	$0\frac{1}{9}$	$0,\overline{1}$	Pura	9	$-\frac{1}{9}$	Propia
$-\frac{20}{99}$	$-0\frac{20}{99}$	$0,\overline{20}$	Pura	$-\frac{99}{20}$	$\frac{20}{99}$	Propia
$\frac{856}{99}$	$8\frac{64}{99}$	$8,\overline{64}$	Pura	$\frac{99}{856}$	$-\frac{856}{99}$	Impropia
$\frac{2539}{450}$	$\frac{5\ 289}{450}$	$5{,}64\overline{2}$	Mixta	$\frac{450}{2539}$	$-\frac{2539}{450}$	Impropia

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1)

a) $<$

b) $<$

c) $>$

d) $>$

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e) $=$

f) $=$

g) $>$

h) $>$

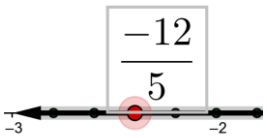
i) $<$

j)$<$

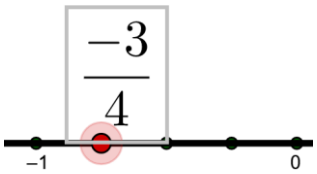
1)

a) $\frac{1}{2}, \frac{2}{3}, \frac{4}{5}$

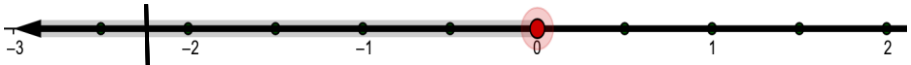
c) $-\frac{2}{5}, \frac{5}{16}, \frac{9}{6}$



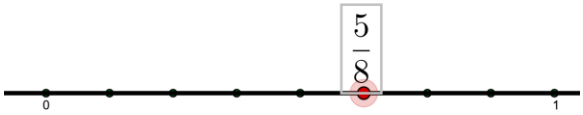
$-\frac{12}{5}$:



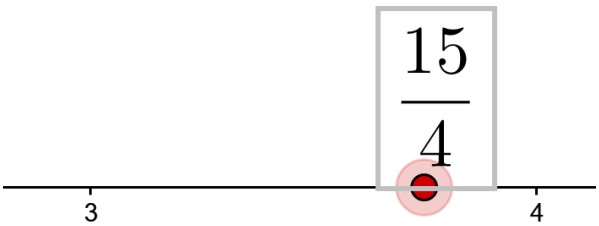
$-\frac{3}{4}$:



$\left.\begin{matrix}-3\\0\\2\end{matrix}\right\}$



$\frac{5}{8}$



$\frac{15}{4}$:

2)

1)<

2)>

3)<

4)<

5)<

6)>

7)>

8)>

9)>

10)>

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h) $\frac{7}{9}$

i) $\frac{2}{3}$

j) $\frac{9}{16}$

k) $\frac{3}{5}$

l) 7

m) $\frac{2}{3}$

n) $\frac{3}{2}$

2)

a) $\frac{14}{22}, \frac{21}{33}, \frac{28}{44}, \frac{35}{55}, \frac{42}{66}$

b) $\frac{24}{10}, \frac{36}{15}, \frac{48}{20}, \frac{60}{25}, \frac{72}{30}$

c) $-\frac{6}{14}, -\frac{9}{21}, -\frac{12}{28}, -\frac{15}{35}, -\frac{18}{42}$

3) $\frac{6}{14}, \frac{9}{21}, \frac{12}{28}, \frac{15}{35}, \frac{27}{63}$

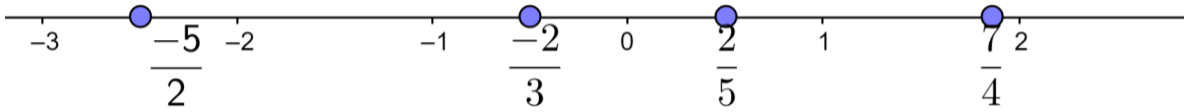
4)

a) $-\frac{50}{30}$

b) $\frac{1}{3} = \frac{2}{6} = \frac{3}{9} = \frac{4}{12} = \frac{5}{15}$

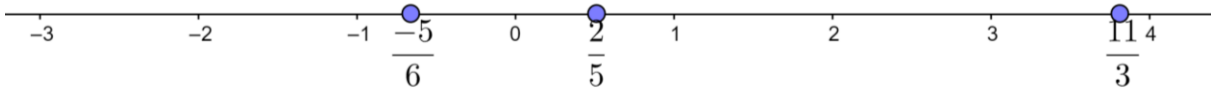
5)

a)



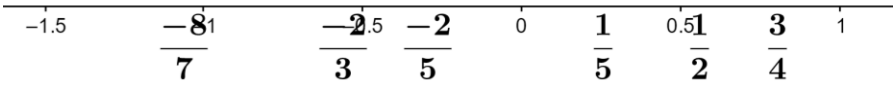
b)

c)

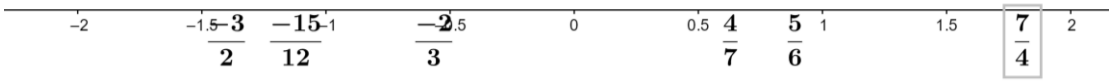


6)

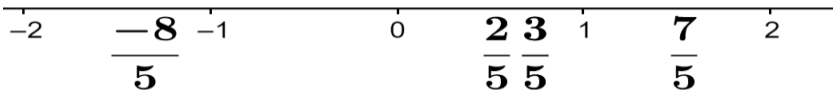
a) $-\frac{8}{7}, -\frac{2}{3}, -\frac{2}{5}, \frac{1}{5}, \frac{1}{2}, \frac{3}{4}$



b) $-\frac{3}{2}, -\frac{15}{12}, -\frac{2}{3}, \frac{4}{7}, \frac{4}{7}, \frac{5}{6}, \frac{7}{4}$



c) $-\frac{8}{5}, \frac{2}{5}, \frac{3}{5}, \frac{7}{5}$



7)

a) $-\frac{4}{5}: -1\ y\ 0$

b) $\frac{38}{7}: 5\ y\ 6$

c) $-\frac{43}{8}: -6\ y\ -5$

d) $\frac{1}{6}: 0\ y\ 1$

8)

a) $\frac{2}{7}, \frac{5}{7}, \rightarrow \frac{3}{7}\ y \frac{4}{7}$

b) $\frac{4}{7}, \frac{3}{5} \rightarrow \frac{7}{12}, \frac{23}{40}$

c) $\frac{2}{9}, \frac{3}{8} \rightarrow \frac{1}{4}, \frac{7}{20}$

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1)

a) $\frac{13}{6} + \ -\frac{3}{6} = \frac{10}{6} = \frac{5}{3}$

b) $\frac{3}{7} + \ -\frac{8}{7} + \frac{10}{7} = \frac{5}{7}$

c) $-\frac{15}{2} + \frac{8}{2} + \frac{11}{2} + \ -\frac{5}{2} = -\frac{1}{2}$

d) $\frac{12}{15} + \frac{11}{15} - \frac{6}{15} + \frac{8}{15} = \frac{25}{15} = \frac{5}{3}$

e) $\frac{17}{3} + \frac{1}{3} + -\frac{5}{3} + \frac{11}{3} = \frac{24}{3} = 8$

f) $-\frac{23}{6} + \frac{11}{6} - \frac{7}{6} + \frac{1}{6} + \frac{1}{6} = -\frac{18}{6} = -3$

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a) $\frac{13}{2} \pm \frac{3}{5} = \frac{65-6}{10} = \frac{59}{10}$

b) $\frac{3}{7} + -\frac{8}{2} = \frac{6-56}{14} = -\frac{50}{14} = -\frac{25}{7}$

c) $-\frac{15}{2} + \frac{8}{9} = -\frac{135+16}{18} = -\frac{119}{18}$

d) $\frac{12}{15} + -\frac{1}{4} = \frac{48-15}{60} = \frac{33}{60} = \frac{11}{20}$

e) $-\frac{17}{3} + -\frac{1}{11} = -\frac{187+3}{33} = \frac{184}{33}$

f) $-\frac{23}{5} + \frac{11}{2} = -\frac{46+55}{10} = \frac{9}{10}$

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a) $\frac{13}{2} + -\frac{3}{16} = \frac{104-3}{16} = \frac{101}{16}$

b) $\frac{3}{7} \pm \frac{8}{14} = \frac{6-8}{14} = -\frac{2}{14} = -\frac{1}{7}$

c) $-\frac{15}{2} + \frac{7}{10} = -\frac{75+7}{10} = -\frac{68}{10} = -\frac{34}{5}$

d) $\frac{12}{5} + -\frac{1}{30} = \frac{72-1}{30} = \frac{71}{30}$

e) $-\frac{17}{3} + \frac{1}{15} + \frac{7}{30} = -\frac{170+2+7}{30} = -\frac{161}{30}$

f) $-\frac{23}{5} + \frac{11}{15} + \frac{4}{3} = -\frac{69+11+20}{15} = -\frac{38}{15}$

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a) $\frac{13}{2} - \frac{3}{2} = \frac{10}{2} = 5$

b) $\frac{3}{7} - \frac{8}{7} = -\frac{5}{7}$

c) $\frac{15}{10} - \frac{7}{10} = \frac{8}{10} = \frac{4}{5}$

d) $\frac{12}{5} - \frac{1}{5} = \frac{11}{5}$

e) $\frac{17}{30} - \frac{7}{30} = \frac{10}{30} = \frac{1}{3}$

f) $\frac{23}{15} - \frac{11}{15} = \frac{12}{15} = \frac{4}{5}$

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1)

a) $\frac{\mathbf{13}}{\mathbf{2}} - \frac{\mathbf{3}}{\mathbf{5}} = \frac{\mathbf{65-6}}{\mathbf{10}} = \frac{\mathbf{59}}{\mathbf{10}}$

b) $\frac{\mathbf{3}}{\mathbf{7}} - \frac{\mathbf{8}}{\mathbf{3}} = \frac{\mathbf{9-56}}{\mathbf{21}} = -\frac{\mathbf{47}}{\mathbf{21}}$

c) $\frac{1}{20} - \frac{7}{10} = \frac{1-14}{20} = -\frac{13}{20}$

d) $\frac{12}{5} - \frac{1}{4} = \frac{48-5}{20} = \frac{43}{20}$

e) $\frac{13}{2} - \frac{3}{16} = \frac{104-3}{16} = \frac{101}{16}$

f) $\frac{3}{7} - \frac{8}{14} = -\frac{6-8}{14} = -\frac{2}{14} = -\frac{1}{7}$

g) $\frac{15}{2} - \frac{7}{10} = \frac{75-7}{10} = \frac{68}{10} = \frac{34}{5}$

h) $\frac{12}{5} - \frac{1}{30} = \frac{72-1}{30} = \frac{71}{30}$

i) $\frac{17}{3} - \frac{1}{15} = \frac{85-1}{15} = \frac{84}{15} = \frac{28}{5}$

j) $\frac{23}{5} - \frac{11}{15} = \frac{69-11}{15} = \frac{58}{15}$

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1)

A) $\frac{13}{2} * \frac{3}{16} = \frac{39}{32}$

b) $\frac{3}{7} * \frac{8}{14} = \frac{24}{98} = \frac{12}{49}$

c) $\frac{15}{2} * \frac{7}{10} = \frac{105}{20} = \frac{21}{4}$

d) $\frac{12}{5} * \frac{1}{30} = \frac{12}{150} = \frac{2}{25}$

e) $\frac{17}{3} * \frac{1}{15} = \frac{17}{45}$

f) $\frac{23}{5} * \frac{11}{15} = \frac{253}{75}$

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a) $\frac{13}{2} \div \frac{3}{16} = \frac{13*16}{2*3} = \frac{208}{6} = \frac{104}{3}$

b) $\frac{3}{7} \div \frac{8}{14} = \frac{3*14}{7*8} = \frac{42}{56} = \frac{3}{4}$

c) $\frac{15}{2} \div \frac{7}{10} = \frac{15*10}{14} = \frac{150}{14} = \frac{75}{7}$

d) $\frac{12}{5} \div \frac{1}{30} = \frac{12*30}{5*1} = \frac{360}{5} = 72$

e) $\frac{17}{3} \div \frac{1}{15} = \frac{17*15}{3*1} = \frac{255}{3} = 85$

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A)

1) $\frac{4}{5}+\frac{11}{5}+\frac{3}{5}=\frac{18}{5}$

2) $\frac{13}{3}+\frac{11}{3}+\frac{2}{3}=\frac{4}{3}$

3) $\frac{1}{4}+\frac{9}{5}=\frac{5+36}{20}=\frac{41}{20}$

4) $\frac{7}{11}+\frac{15}{22}+\frac{1}{33}=\frac{42+45+2}{66}=\frac{89}{66}$

5) $-\frac{9}{8}+\frac{7}{16}=-\frac{18+7}{16}=-\frac{11}{16}$

6) $\frac{14}{15}+\frac{1}{4}=\frac{56+15}{60}=\frac{71}{60}$

B)

1) $\frac{7}{2}-\frac{9}{2}=-\frac{2}{2}=-1$

2) $\frac{21}{4}-\frac{3}{5}=\frac{105-12}{20}=\frac{93}{20}$

3) $\frac{3}{15}-\frac{7}{24}=\frac{10-7}{24}=\frac{3}{24}=\frac{1}{8}$

4) $\frac{11}{2}-\frac{15}{16}=\frac{88-15}{16}=\frac{73}{16}$

5) $\frac{7}{4}-\frac{6}{7}=\frac{49-24}{28}=\frac{25}{28}$

6) $\frac{13}{9}-\frac{12}{7}=\frac{91-108}{63}=-\frac{17}{63}$

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C)

1) $\frac{2}{3}*\frac{5}{4}=\frac{10}{12}=\frac{5}{6}$

2) $-\frac{7}{6}*\frac{9}{10}=-\frac{63}{60}=-\frac{21}{20}$

3) $-\frac{8}{13}*-\frac{4}{3}=\frac{32}{39}$

4) $\frac{2}{9}*-\frac{21}{8}=-\frac{42}{72}=-\frac{7}{12}$

5) $\frac{7}{11}*\frac{22}{14}=\frac{154}{154}=1$

6) $-\frac{6}{17} * -\frac{9}{2} = \frac{54}{34} = \frac{27}{17}$

D)

1) $\frac{9}{2} \div \frac{4}{3} = \frac{27}{8}$

2) $-\frac{11}{5} \div \frac{7}{2} = -\frac{22}{35}$

3) $-\frac{3}{8} \div \frac{5}{11} = -\frac{33}{40}$

4) $-\frac{12}{7} \div -\frac{6}{5} = -\frac{60}{-42} = \frac{10}{7}$

5) $\frac{8}{9} \div -\frac{7}{3} = \frac{24}{-63} = -\frac{8}{21}$

6) $\frac{16}{3} \div \frac{5}{9} = \frac{144}{15} = \frac{48}{5}$

E)

1) $\frac{4}{5} + \frac{6}{5} + \frac{12}{5} = \frac{22}{5}$

2) $\frac{40}{7} - \frac{70}{7} - \frac{120}{7} = -\frac{150}{7}$

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

4) $\frac{50}{8} + \frac{10}{8} - \frac{110}{8} = -\frac{50}{8} = -\frac{25}{4}$

5) $\frac{4}{6} + \frac{8}{5} + 2 = \frac{20+48+60}{30} = \frac{128}{30} = \frac{64}{15}$

6) $\frac{10}{9} - 3 - \frac{10}{6} = \frac{20-54-30}{18} = -\frac{64}{18} = -\frac{32}{9}$

7) $2\frac{1}{5} + \frac{1}{6} - \frac{10}{4} = \frac{11}{5} + \frac{1}{6} - \frac{10}{4} = \frac{132+10-150}{60} = -\frac{8}{60} = -\frac{2}{15}$

8) $3\frac{2}{5} - \frac{1}{6} + 4\frac{1}{7} = \frac{17}{5} - \frac{1}{6} + \frac{29}{7} = \frac{714-35+870}{210} = \frac{1549}{210}$

9) $\frac{4}{5} * \frac{6}{5} \div \frac{12}{5} = \frac{24}{25} \div \frac{12}{5} = \frac{120}{300} = \frac{2}{5}$

10) $\frac{40}{7} \div \frac{70}{7} * \frac{140}{20} = \frac{280}{490} * \frac{140}{20} = \frac{4}{7} * \frac{140}{20} = \frac{560}{140} = 4$

11) $\frac{1}{5} \div -\frac{6}{8} * \frac{30}{8} = \frac{8}{-30} * \frac{30}{8} = \frac{240}{-240} = -1$

12) $4\frac{1}{2} \div \frac{2}{7} \div \frac{63}{4} = \frac{9}{2} \div \frac{2}{7} \div \frac{63}{4} = \frac{63}{4} \div \frac{63}{4} = \frac{252}{252} = 1$

13) $-\frac{4}{8}*\frac{10}{12}*-\frac{12}{40}=-\frac{40}{96}*-\frac{12}{40}=-\frac{5}{12}*-\frac{12}{40}=\frac{60}{480}=\frac{1}{8}$

14) $4\frac{4}{5}*\frac{10}{8}\div 1\frac{3}{2}=\frac{24}{5}*\frac{10}{8}\div\frac{5}{2}=\frac{240}{40}\div\frac{5}{2}=\frac{6}{1}\div\frac{5}{2}=\frac{12}{5}$

15) $\frac{4}{5}+-\frac{8}{3}\div\frac{12}{5}=\frac{4}{5}+-\frac{40}{36}=\frac{4}{5}+\ -\frac{10}{9}=\frac{36-50}{45}=-\frac{14}{45}$

16) $-\frac{5}{8}*\frac{20}{5}-\frac{10}{7}=-\frac{100}{40}-\frac{10}{7}=-\frac{5}{2}-\frac{10}{7}=-\frac{35-20}{14}=-\frac{55}{14}$

17) $\frac{4}{5}\left(\frac{6}{5}+\frac{1}{2}\right)=\frac{4}{5}\left(\frac{12+5}{10}\right)=\frac{4}{5}*\frac{17}{10}=\frac{68}{50}=\frac{34}{25}$

18) $\frac{4}{5}\div\left(\frac{6}{5}-\frac{1}{2}\right)=\frac{4}{5}\div\left(\frac{12-5}{10}\right)=\frac{4}{5}\div\frac{7}{10}=\frac{40}{35}=\frac{8}{7}$

19) $\frac{1}{2}\left(4\frac{1}{5}+\frac{12}{5}\right)=\frac{1}{2\left(\frac{21}{5}+\frac{12}{5}\right)}=\frac{1}{2}-\frac{33}{5}=\frac{33}{10}$

20) $\frac{1}{2}\div\left(2\frac{1}{3}+5\frac{1}{3}\right)=\frac{1}{2}\div\left(\frac{7}{3}+\frac{16}{3}\right)=\frac{1}{2}\div\frac{23}{3}=\frac{3}{46}$

21) $\left(-\frac{1}{5}-\ -\frac{1}{3}\right)*-4\frac{1}{3}=-\frac{3+5}{15}*-\frac{13}{3}=\frac{2}{15}*-\frac{13}{3}=-\frac{26}{45}$

22) $-\frac{4}{6}+-\frac{10}{8}\div 4\frac{6}{5}=-\frac{4}{6}+\ -\frac{10}{8}\div\frac{26}{5}=-\frac{4}{6}+\ -\frac{50}{208}=-\frac{4}{6}+\ -\frac{25}{104}=$
$-\frac{208+-75}{312}=-\frac{283}{312}$

23) $\left(\frac{4}{5}+\frac{6}{5}\right)\left(6+\frac{12}{5}\right)=\frac{10}{5}*\left(\frac{30+12}{5}\right)=\frac{10}{5}*\frac{42}{5}=\frac{420}{25}=\frac{84}{5}$

24) $\left(\frac{1}{5}+\frac{6}{5}\right)\div\left(2+\frac{12}{5}\right)=\frac{7}{5}\div\left(\frac{10+12}{5}\right)=\frac{7}{5}\div\frac{22}{5}=\frac{35}{110}=\frac{7}{22}$

25) $\left(-\frac{4}{5}+3\frac{6}{5}\right)\left(6+4\frac{12}{8}\right)=\left(-\frac{4}{5}+\frac{21}{5}\right)\left(6+\frac{44}{8}\right)=\frac{17}{5}*\frac{92}{8}=\frac{1564}{40}=\frac{391}{10}$

26) $\left(2\frac{4}{5}+3\frac{6}{5}\right)\left(6+4\frac{12}{5}\right)=\left(\frac{14}{5}+\frac{21}{5}\right)\left(6+\frac{32}{5}\right)=\frac{35}{5}*\frac{30+32}{5}=7*\frac{62}{5}=\frac{434}{5}$

27) $\left(1\frac{4}{5}-3\frac{6}{5}\right)\div\left(\frac{2}{3}-4\frac{12}{8}\right)=\left(\frac{9}{5}-\frac{21}{5}\right)\div\left(\frac{2}{3}-\frac{44}{8}\right)=-\frac{12}{5}\div\left(\frac{16-132}{24}\right)=$
$-\frac{12}{5}\div-\frac{116}{24}=-\frac{12*24}{5*-116}=\frac{288}{580}=\frac{72}{145}$

28) $\left(-\frac{1}{5}-\ -\frac{1}{5}\right)\div\left(6+\frac{2}{8}\right)=\left(-\frac{1+1}{5}\right)\div\left(\frac{48+2}{8}\right)=\frac{0}{5}\div\frac{50}{8}=\frac{0*8}{5*50}=\frac{0}{250}=0$

29) $\left(-\frac{1}{5}-\frac{1}{5}\right)\left(2+\frac{1}{2}\right)=\left(-\frac{1-1}{5}\right)\left(\frac{4+1}{2}\right)=-\frac{2}{5}*\frac{5}{2}=-\frac{2*5}{5*2}=-\frac{10}{10}=-1$

30) $\left(\frac{1}{3}-\ -\frac{1}{2}\right)+\left(2-\frac{2}{4}\right)=\left(\frac{2-\ -3}{6}\right)+\left(\frac{8-2}{4}\right)=\frac{5}{6}+\frac{6}{4}=\frac{5}{6}+\frac{3}{2}=\frac{5*1+3*3}{6}=\frac{5+9}{6}=$
$\frac{14}{6}=\frac{7}{3}$

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F. Abraham: $\frac{11}{2} * \frac{1}{4} = \frac{11*1}{12*4} = \frac{11}{48}$

Mona: $\frac{2}{3} * \frac{3}{4} = \frac{2*3}{3*4} = \frac{6}{12} = \frac{1}{2}$

Clancy: $\frac{1}{2} * \frac{1}{5} = \frac{1*1}{2*5} = \frac{1}{10}$

Jackie: $\frac{1}{3} * \frac{2}{3} = \frac{1*2}{3*3} = \frac{2}{9}$

Herb: $\frac{5}{8} * \frac{8}{9} = \frac{5*8}{8*9} = \frac{40}{72} = \frac{5}{9}$

Homero: $\frac{3}{7} * \frac{5}{8} = \frac{3*5}{7*8} = \frac{15}{56}$

Marge: $\frac{2}{5} * \frac{2}{3} = \frac{2*2}{5*3} = \frac{4}{15}$

Patty: $\frac{7}{9} * \frac{1}{6} = \frac{7*1}{9*6} = \frac{7}{54}$

Selma: $\frac{3}{11} * \frac{3}{8} = \frac{3*3}{11*8} = \frac{9}{88}$

Bart: $\frac{3}{4} * \frac{1}{6} = \frac{3*1}{4*6} = \frac{3}{24} = \frac{1}{8}$

Lisa: $\frac{3}{4} * \frac{1}{8} = \frac{3*1}{4*8} = \frac{3}{32}$

Maggie: $\frac{5}{8} * \frac{7}{8} = \frac{5*7}{8*8} = \frac{35}{64}\left(Viene\ \frac{4}{15} por\ error\right)$

Ling: $\frac{1}{2} * \frac{7}{9} = \frac{1*7}{2*9} = \frac{7}{18}$

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1)

a) $-\frac{\mathbf{125}}{\mathbf{27}}$

b) $\frac{\mathbf{169}}{\mathbf{25}}$

c) $\frac{\mathbf{16}}{\mathbf{81}}$

d) $\frac{\mathbf{1000}}{\mathbf{1331}}$

e) $-\frac{\mathbf{27}}{\mathbf{8000}}$

f) $\frac{121}{2500}$

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a) $\frac{1}{32}$

b) $-\frac{7}{13}$

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

d) $\frac{400}{9}$

e) $\frac{2500}{121}$

f) $\frac{1}{81}$

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3.

a) $\mathbf{10^{-2}}$

b) $\left(-\frac{2}{5}\right)^{8}$

c) $(0,2)^{2}$

d) $\left[\left(\frac{1}{2}\right)^{3}\right]^{-5} * \left(\frac{1}{2}\right)^{-2} = \left(\frac{1}{2}\right)^{-17}$

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4.

a) $\mathbf{2^{4}}$

b) $\mathbf{10^{-5}} = \left(\frac{1}{10}\right)^{5}$

c) $\left(\frac{5}{11}\right)^{-1} = \frac{11}{5}$

d) $(0,6)^{4}$

e) $\left(-\frac{17}{21}\right)^{22}$

f) $(-1,3)^{-2}$

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a) $\left(\frac{1}{5}\right)^{6}$

b) $(-1,3)^{3}$

c) $\left(\frac{11}{10}\right)^{-10} = \left(\frac{10}{11}\right)^{10}$

d) $(-13)^{-6} = \left(-\frac{1}{13}\right)^{6}$

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6.

a) $\mathbf{2^9 * \frac{5^{12}}{2^{12}} = \frac{5^{12}}{2^3}}$

b) $\mathbf{\left[\left(-\frac{3}{5}\right)^3 * \left(-\frac{3}{5}\right)^7\right]^4 = \left[\left(-\frac{3}{5}\right)^{10}\right]^4 = \left(-\frac{3}{5}\right)^{40}}$

c) $\mathbf{\frac{1^8}{7^8} * \frac{5^{24}}{7^{24}} = \frac{5^{24}}{7^{32}}}$

d) $\mathbf{\left(-\frac{1}{13}\right)^{-6} * 13^{-10} = (-13)^6 * 13^{-10} = 13^{-4}}$

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Operación	Aplicación de la Ley	Resultado
$\left(\frac{2}{8}\right)^4 * \left(\frac{2}{8}\right)^{-2}$	$\left(\frac{2}{8}\right)^{4-2} = \left(\frac{2}{8}\right)^2 = \left(\frac{1}{4}\right)^2$	$\frac{1}{16}$
$\left(\frac{4}{8}\right)^4 \div \left(\frac{4}{8}\right)^{-2}$	$\left(\frac{4}{8}\right)^{4--2} = \left(\frac{4}{8}\right)^6 = \left(\frac{1}{2}\right)^6$	$\frac{1}{64}$
$\left[\left(\frac{4}{8}\right)^3\right]^4$	$\left(\frac{4}{8}\right)^{12} = \left(\frac{1}{2}\right)^{12}$	$\frac{1}{4096}$
$\left(\frac{2}{8} * \frac{16}{10} * \frac{5}{3}\right)^4$	$\frac{2^4}{8^4} * \frac{16^4}{10^4} * \frac{5^4}{3^4} = \frac{16}{4096} * \frac{65536}{1000} * \frac{625}{81}$	$\frac{16}{81}$
$\left(\frac{8}{10}\right)^4$	$\frac{8^4}{10^4} = \frac{4096}{1000}$	$\frac{256}{625}$
$\left(\frac{2}{8}\right)^2 * \left(\frac{2}{8}\right)^{-2}$	$\left(\frac{2}{8}\right)^{2\pm2} = \left(\frac{2}{8}\right)^0 = \frac{2^0}{8^0}$	1
$\left(\frac{8}{7}\right)^4 \div \left(\frac{8}{7}\right)^{-4}$	$\left(\frac{8}{7}\right)^{4--4} = \left(\frac{8}{7}\right)^8 = \frac{8^8}{7^8}$	$\frac{16777216}{5764801}$
$\left(\frac{8}{10}\right)^4 * \left(\frac{8}{10}\right)^{-6}$	$\left(\frac{8}{10}\right)^{4+-6} = \left(\frac{8}{10}\right)^{-2} = \left(\frac{4}{5}\right)^{-2}$	$\frac{25}{16}$

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Operación	Aplicación de la Ley	Resultado
$\left(\frac{2}{8}\right)^{10} * \left(\frac{2}{8}\right)^{-12}$	$\left(\frac{2}{8}\right)^{10+\ -12} = \left(\frac{2}{8}\right)^{-2} = \left(\frac{1}{4}\right)^{-2} = 4^{-2}$	16
$\left(\frac{2}{10}\right)^{9} \div \left(\frac{2}{10}\right)^{5}$	$\left(\frac{2}{10}\right)^{9-5} = \left(\frac{2}{10}\right)^{4} = \left(\frac{1}{5}\right)^{4}$	$\frac{1}{625}$

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- **a)** $\frac{1}{4}$
- **b)** $\frac{2}{5}$
- **c)** $-\frac{1}{3}$
- **d)** $\frac{7}{10}$
- **e)** $-\frac{1}{2}$
- **f)** $\frac{9}{2}$
- **g)** $\frac{1}{10}$
- **h)** $\frac{13}{10}$

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a)

$$\frac{2+\frac{1}{3}\left(\frac{2}{5}+4\right)}{4+\frac{2}{7}\div\frac{5}{6}} = \frac{2+\frac{1}{3\left(\frac{2+20}{5}\right)}}{4+\frac{12}{35}} = \frac{2+\frac{22}{15}}{\frac{4*35+12}{35}} = \frac{\frac{2*15+22}{15}}{\frac{152}{35}} = \frac{\frac{52}{15}}{\frac{152}{35}} = \frac{52*35}{15*152} = \frac{1820}{2280} = \frac{91}{114}$$

b) $$\frac{-7+\frac{5}{4}*\left(-\frac{3}{2}-8\right)}{-\frac{1}{2}+\frac{3}{4}\div\frac{1}{3}} = \frac{-7+\frac{5}{4}*\left(-\frac{3-16}{2}\right)}{-\frac{1}{2}+\frac{3*3}{4*1}} = \frac{-7+\ -\frac{95}{8}}{-\frac{2+9}{4}} = \frac{-\frac{56+\ -95}{8}}{\frac{7}{4}} = \frac{-\frac{151}{8}}{\frac{7}{4}} = \frac{-151*4}{8*7} = -\frac{604}{56} = -\frac{151}{14}$$

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1.

a) $\frac{(3^4)^{-1}*\left(5^{\frac{1}{2}}\right)^{\frac{2}{5}}}{4^7*4^0*5^{\frac{1}{5}}} = \frac{3^{-4}*5^{\frac{2}{10}}}{4^{7+0}*5^{\frac{1}{5}}} = \frac{\frac{1}{81}*\cancel{5^{\frac{1}{5}}}}{4^7*\cancel{5^{\frac{1}{5}}}} = \frac{\frac{1}{81}}{\frac{16384}{1}} = \frac{1*1}{81*16384} = \frac{1}{1327104}$

b) $\frac{(2^{-5})^3*\left(6^{\frac{3}{2}}\right)^{\frac{2}{3}}}{5^{11}*5^1*6} = \frac{2^{-15}*6^{\frac{6}{6}}}{5^{11+1}*6} = \frac{2^{-15}*6^1}{5^{12}*6^1} = \frac{\frac{1}{2^{15}}}{\frac{5^{12}}{1}} = \frac{1*1}{2^{15}*5^{12}} = \frac{1}{32768*244140625} = \frac{1}{8000000000000}$

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a)

$\sqrt[4]{\frac{16}{81}}\left[\sqrt[5]{32}+\frac{1}{2}\left[\left(\frac{2}{3}\right)^3 \div \left(\frac{2}{3}\right)^2\right]-\left(\sqrt[3]{8}\div 2\right)\right] = \frac{2}{3}\left[2+ \ -\frac{1}{2}*\left(\frac{2}{3}\right)^1-(2\div 2)\right] = \frac{2}{3}\left[2+ \ -\frac{2}{6}-1\right] = \frac{2}{3}\left[\frac{6-1-3}{3}\right] = \frac{2}{3}*\frac{2}{3} = \frac{4}{9}$

b) $\sqrt[3]{\frac{8}{125}}\left[\sqrt{121}+ \ -\frac{3}{4}\left[\left(\frac{1}{5}\right)^4 \div \left(\frac{1}{5}\right)^0\right]- \ \left(\sqrt[4]{1}\div 10^0\right)\right] = \frac{2}{5}\left[11-\frac{3}{4}*\left(\frac{1}{5}\right)^4-(1\div 1)\right] = \frac{2}{5}\left[11-\frac{3}{4}*\frac{1}{625}-1\right] = \frac{2}{5}\left[11-\frac{3}{2500}-1\right] = \frac{2}{5}\left[\frac{11*2500-3-2500}{2500}\right] = \frac{2}{5}*\frac{24997}{25000} = \frac{24997*2}{12500} = \frac{24997}{6250}$

a) $3-\frac{4}{5}*\frac{5}{3}-\left\{6-\left[\frac{2}{7}-3+\frac{2}{9}\left(-3+\frac{6}{5}\right)-3\right]\right\} =$

$3-\frac{20}{15}-\left\{6-\left[\frac{2}{7}-3+\frac{2}{9}*-\frac{15+6}{5}-3\right]\right\} =$

$3-\frac{4}{3}-\left\{6-\left[\frac{2}{7}-3+\frac{2}{9}*-\frac{9}{5}-3\right]\right\} =$

$3-\frac{4}{3}-\left\{6-\left[\frac{2}{7}-3-\frac{2}{5}-3\right]\right\} =$

$3-\frac{4}{3}-\left\{6-\frac{10-105-14-105}{34}\right\} =$

$3-\frac{4}{3}-\left\{6-\frac{-214}{35}\right\} =$

$$3-\frac{4}{3}-\frac{6*35+214}{35}=$$
$$3-\frac{4}{3}-\frac{424}{35}=$$
$$\frac{3*105-4*35-424*3}{105}=$$
$$\frac{315-140-1272}{105}=$$
$$\frac{1097}{105}$$

b) $\sqrt[3]{8}-\sqrt{\frac{4}{9}}*\sqrt{\frac{25}{4}}-\left\{\frac{2}{9}-\left[\sqrt{121}-\frac{1}{4}+\frac{3}{5}\left(\sqrt{\frac{1}{4}}+\frac{7}{2}\right)-\sqrt{16}\right]\right\}=$

$$2-\frac{2}{3}*\frac{5}{2}-\left\{\frac{2}{9}-\left[11-\frac{1}{4}+\frac{3}{5}\left(\frac{1}{2}+\frac{7}{2}\right)-4\right]\right\}=$$
$$2-\frac{5}{3}-\left\{\frac{2}{9}-\left[11-\frac{1}{4}+\frac{3}{5}*4-4\right]\right\}=$$
$$2-\frac{5}{3}-\left\{\frac{2}{9}-\frac{11*20-1*5+12*4-4*20}{20}\right\}=$$
$$2-\frac{5}{3}-\left\{\frac{2}{9}-\frac{183}{20}\right\}=$$
$$2-\frac{5}{3}-\frac{2*20-183*9}{180}=$$
$$2-\frac{5}{3}--\frac{1607}{180}=$$
$$2-\frac{5}{3}+\frac{1607}{180}=$$
$$\frac{2*180-5*60+1607}{180}=\frac{1667}{180}$$

a) $\frac{7}{3}\left[\frac{1}{5}-\sqrt{\frac{144}{16}}+\left(\frac{1}{3}\right)^2\div\left(\frac{1}{3}\right)^0-\sqrt{\frac{4}{9}}-\left(\left(\frac{5}{3}\right)^2*\left(\frac{5}{3}\right)^3\right)\right]=$

$$\frac{7}{3}\left[\frac{1}{5}-\frac{12}{4}+\left(\frac{1}{3}\right)^{2-0}*\frac{2}{3}-\left(\frac{5}{3}\right)^5\right]=$$
$$\frac{7}{3}\left[\frac{1}{5}-3+\frac{1}{9}*\frac{2}{3}-\frac{3125}{243}\right]=$$
$$\frac{7}{3}\left[\frac{1}{5}-3+\frac{2}{27}-\frac{2125}{243}\right]=$$
$$\frac{7}{3}\left[\frac{1*243-3*1215*2*45-3125*5}{1215}\right]=$$
$$\frac{7}{3}*-\frac{18937}{1215}=-\frac{112687}{3645}$$

b) $-\frac{5}{2}\left[\left(\frac{1}{4}\pm\frac{24}{6}\right)\div\frac{3}{4}*\sqrt[3]{\frac{27}{8}}\pm\frac{2}{3}\div\frac{2}{3}\right]=$

$$-\frac{5}{2}\left[\left(\frac{1}{4}\pm 4\right)\div\frac{3}{4}*\frac{3}{2}+-\frac{6}{6}\right]=$$

$$-\frac{5}{2}\left[\frac{1 \pm 4 * 4}{4} \div \frac{3}{4} * \frac{3}{2} + -1\right] =$$
$$-\frac{5}{2}\left[-\frac{15}{4} \div \frac{3}{4} * \frac{3}{2} - 1\right] =$$
$$-\frac{5}{2}\left[-\frac{60}{12} * \frac{3}{2} - 1\right] =$$
$$-\frac{5}{2}\left[-5 * \frac{3}{2} - 1\right] =$$
$$-\frac{5}{2}\left[-\frac{15}{2} - 1\right] = -\frac{15}{2} * -\frac{15 - 2 * 1}{2} = -\frac{5}{2} * -\frac{17}{2} = \frac{85}{4}$$

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$$\frac{5}{2} + \left\{4\frac{2}{3} - \left[\left(\frac{6}{4} - \frac{2}{5}\right) \div \left(\frac{3}{8} - 2\right)\right] - \left(\frac{1}{5}\right)^0\right\} - \frac{1}{9} =$$
$$\frac{5}{2} + \left\{\frac{14}{3} - \left[\frac{30 - 8}{20} \div \frac{3 - 16}{8}\right] - 1\right\} - \frac{1}{9} =$$
$$\frac{5}{2} + \left\{\frac{14}{3} - \frac{11}{10} \div -\frac{13}{8} - 1\right\} - \frac{1}{9} =$$
$$\frac{5}{2} + \left\{\frac{14}{3} - \frac{88}{-130} - 1\right\} - \frac{1}{9} =$$
$$\frac{5}{2} + \left\{\frac{14}{3} + \frac{44}{65} - 1\right\} - \frac{1}{9} =$$
$$\frac{5}{2} + \left\{\frac{14 * 65 + 44 * 3 - 1 * 195}{195}\right\} - \frac{1}{9} =$$
$$\frac{5}{2} + \frac{847}{195} - \frac{1}{9} =$$
$$\frac{5 * 1755 + 847 * 18 - 1 * 390}{3510} =$$
$$\frac{23631}{3510} = \frac{7877}{1170}$$

$$\left\{\frac{8}{7} + \left[4 - \left(2 - \frac{1}{7}\right) * \left(\frac{1}{7} + 1\frac{2}{8}\right) + 4\right] - \left(\frac{1}{2}\right)^4\right\} + 1\frac{1}{9} =$$
$$\left\{\frac{8}{7} + \left[4 - \frac{14 - 1}{7} * \left(\frac{1}{7} + \frac{10}{8}\right) + 4\right] - \frac{1}{16}\right\} + \frac{10}{9} =$$
$$\left\{\frac{8}{7} + \left[4 - \frac{13}{7} * \frac{8 + 70}{56} + 4\right] - \frac{1}{16}\right\} + \frac{10}{9} =$$
$$\left\{\frac{8}{7} + \left[4 - \frac{13}{7} * \frac{39}{28} + 4\right] - \frac{1}{16}\right\} + \frac{10}{9} =$$
$$\left\{\frac{8}{7} + \left[4 - \frac{507}{196} + 4\right] - \frac{1}{16}\right\} + \frac{10}{9} =$$

$$\left\{\frac{8}{7}+\frac{4*196-507+4*196}{196}-\frac{1}{16}\right\}+\frac{10}{9}=$$
$$\left\{\frac{8}{7}+\frac{1061}{196}-\frac{1}{16}\right\}+\frac{10}{9}=$$
$$\frac{8*112+1061*4-1*49}{784}+\frac{10}{9}=$$
$$\frac{5091}{784}+\frac{10}{9}=\frac{45819+7840}{7056}=\frac{53659}{7056}$$

$$\left(\frac{5}{2}\right)^2-\left\{\frac{10}{3}+\left[\left(\frac{1}{4}-\frac{1}{5}\right)-\left(\frac{1}{8}-\frac{2}{3}\right)\right]+\left(\frac{1}{5}\right)^2\right\}-\frac{5}{10}=$$
$$\frac{25}{4}-\left\{\frac{10}{3}+\left[\frac{5-4}{20}-\frac{3-16}{24}\right]+\frac{1}{25}\right\}-\frac{1}{2}=$$
$$\frac{25}{4}-\left\{\frac{10}{3}+\left[\frac{1}{20}-\frac{13}{24}\right]+\frac{1}{25}\right\}-\frac{1}{2}=$$
$$\frac{25}{4}-\left\{\frac{10}{3}+\frac{1*6+13*5}{120}+\frac{1}{25}\right\}-\frac{1}{2}=$$
$$\frac{25}{4}-\left\{\frac{10}{3}+\frac{71}{120}+\frac{1}{25}\right\}-\frac{1}{2}=$$
$$\frac{25}{4}-\frac{10*200+71*5+24*1}{600}-\frac{1}{2}=$$
$$\frac{25}{4}-\frac{2379}{600}-\frac{1}{2}=$$
$$\frac{25*150-2379-1*300}{600}=\frac{1071}{600}=\frac{357}{200}$$

$$\left\{\left(-\frac{1}{3}\right)^2-\left[\left(\frac{4}{3}\right)^2+\left(5\frac{2}{7}+6\frac{1}{8}\right)\div\left(7\frac{8}{7}-\frac{2}{8}\right)-8\right]-\left(\frac{1}{7}\right)^2\right\}+1\frac{1}{9}=$$
$$\left\{\frac{1}{9}-\left[\frac{16}{9}+\left(\frac{37}{7}+\frac{49}{8}\right)\div\left(\frac{57}{7}-\frac{1}{4}\right)-8\right]-\frac{1}{49}\right\}+\frac{10}{9}=$$
$$\left\{\frac{1}{9}-\left[\frac{16}{9}+\frac{37*8+49*7}{56}\div\frac{57*4-1*7}{28}-8\right]-\frac{1}{49}\right\}+\frac{10}{9}=$$
$$\left\{\frac{1}{9}-\left[\frac{16}{9}+\frac{639}{56}\div\frac{221}{28}-8\right]-\frac{1}{49}\right\}+\frac{10}{9}=$$
$$\left\{\frac{1}{9}-\left[\frac{16}{9}+\frac{639*28}{56*221}-8\right]-\frac{1}{49}\right\}+\frac{10}{9}=$$
$$\left\{\frac{1}{9}-\left[\frac{16}{9}+\frac{639}{442}-8\right]-\frac{1}{49}\right\}+\frac{10}{9}=$$
$$\left\{\frac{1}{9}-\left[\frac{16*442+639*9-8*3978}{3978}\right]-\frac{1}{49}\right\}+\frac{10}{9}=$$
$$\left\{\frac{1}{9}--\frac{19001}{3978}-\frac{1}{49}\right\}+\frac{10}{9}=$$

$$\frac{1 * 21658 + 19001 * 49 - 1 * 3978}{194922} + \frac{10}{9} =$$
$$\frac{948729}{194922} + \frac{10}{9} = \frac{948729 + 10 * 21658}{194922} = \frac{1165309}{194922}$$

Página 102

a) **K:** $\frac{3}{12} * 2400 = 600$

M: $\frac{5}{10} * 2400 = 1200$

P: $\frac{1}{6} * 2400 = 400$

S: $2400 - [600 + 1200 + 400] = 2400 - 2200 = 200$

Respuesta: **K** tuvo 600 votos; **M**, 1200 votos; **P**, 400 votos y **S**, 200 Votos

b) **Mayor:** $\frac{4}{9} * 18 = 8$

Mediano: $\frac{1}{3} * 18 = 6$

Menor: $18 - (8 + 6) = 18 - 14 = 4$

Fracción: $\frac{4}{18} = \frac{2}{9}$

Respuesta: El mayor recibió 8 millones; el mediano 6 millones y el menor 2/9 del dinero es decir, 4 millones

c) **Azules:** $\frac{1}{3} * 210 = 70; sobran\ 140$

Negros: $\frac{2}{7} * 140 = 40; sobran\ 100$

Verdes: $\frac{1}{5} * 100 = 20; sobran\ 80$

Rojos: los 80 restantes

Pago: $70 * 130 + 40 * 100 + 110 * 80 + 120 * 20 = 9100 + 4000 + 8800 + 2400 = 24300$

Respuesta: Pagué ¢24300 por todos los bolígrafos

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d) Inglés: $\mathbf{3150} * \frac{\mathbf{2}}{\mathbf{5}} = \mathbf{1260}; \boldsymbol{sobran}\ \mathbf{1890}$

Frances: $\frac{\mathbf{2}}{\mathbf{7}} * \mathbf{1890} = \mathbf{540}; \boldsymbol{Sobran}\ \mathbf{1350}$

Italiano: $\frac{\mathbf{4}}{\mathbf{9}} * \mathbf{1350} = \mathbf{600}; \boldsymbol{Sobran}\ \mathbf{750}$

Chino: Los 750 restantes

Respuesta: En el instituto, 1260 personas estudian inglés, 540 estudian francés, 600 italiano y 750 chino

e)

Tipo de música	Cantidad	Costo	Ganancia
Rock	$\frac{\mathbf{1}}{\mathbf{5}} * \mathbf{2520} = \mathbf{504}$	$\mathbf{8700}$	$\mathbf{504} * \mathbf{8700} = \mathbf{4384800}$
New Age	$\frac{\mathbf{3}}{\mathbf{7}} * \mathbf{2520} = \mathbf{1080}$	$\mathbf{12500}$	$\mathbf{1080} * \mathbf{12500} = \mathbf{13500000}$
Reggae	$\frac{\mathbf{1}}{\mathbf{8}} * \mathbf{2520} = \mathbf{315}$	$\mathbf{9500}$	$\mathbf{315} * \mathbf{9500} = \mathbf{2992500}$
Instrumental	$\mathbf{2520} - (\mathbf{504} + \mathbf{1080} + \mathbf{315} + \mathbf{280}) = \mathbf{341}$	$\mathbf{5300}$	$\mathbf{341} * \mathbf{5300} = \mathbf{1807300}$
Rancheras	$\frac{\mathbf{1}}{\mathbf{9}} * \mathbf{2520} = \mathbf{280}$	$\mathbf{5300}$	$\mathbf{280} * \mathbf{5300} = \mathbf{1484000}$

Ganancias: $\mathbf{4384800} + \mathbf{13500000} + \mathbf{2992500} + \mathbf{1807300} + \mathbf{1484000} = \mathbf{24168600}$

Respuesta: Se recaudaron ¢24 168 600 con la venta de todos los discos

f) Cabras: $\frac{\mathbf{1}}{\mathbf{3}} * \mathbf{3465} = \mathbf{1155}$

Caballos: $\frac{\mathbf{4}}{\mathbf{7}} * \mathbf{3465} = \mathbf{1980} \begin{cases} \boldsymbol{Total}: \mathbf{3135} \\ \boldsymbol{Sobran}: \mathbf{330} \end{cases}$

Ovejas: $\mathbf{330} * \frac{\mathbf{1}}{\mathbf{10}} = \mathbf{33}; \boldsymbol{sobran}\ \mathbf{297}$

Cerdos: Los 297 animales que sobran

Respuesta: En la granja hay 1155 cabras, 1980 caballos, 33 ovejas y 297 cerdos.

g) **Tirrases:** $\frac{5}{8} * 1200 = 750; sobran\ 450$

Cipreses: $\frac{1}{9} * 450 = 50; sobran\ 400$

La Lía: $\frac{1}{5} * 400 = 80; sobran\ 320$

Barrio San José: $\frac{1}{5} * 320 = 64; sobran\ 256$

Curridabat centro: $los\ 256\ restantes$

Respuesta: Hay 750 estudiantes de Tirrases, 50 de Cipreses, 80 de La Lía, 64 de Barrio San José y 256 del centro de Curridabat

8° Capítulo II Geometría

Página 117

1)

a) $\overline{MT}$

b) N

c) $\measuredangle MTQ$

d) $K < -1$

Página 118

a) $\overline{MT}$
b) M
c) $\measuredangle MRT$
d) O<K<1
a) $\overline{VH}$
b) V
c) $\measuredangle VHJ$
d) K=-1

2)

a) $\overline{UF}$

b) A

c) U

d) $\overline{AR}$

3) ***Solo C***

4) ***Solo C***

5) ***Opción C***

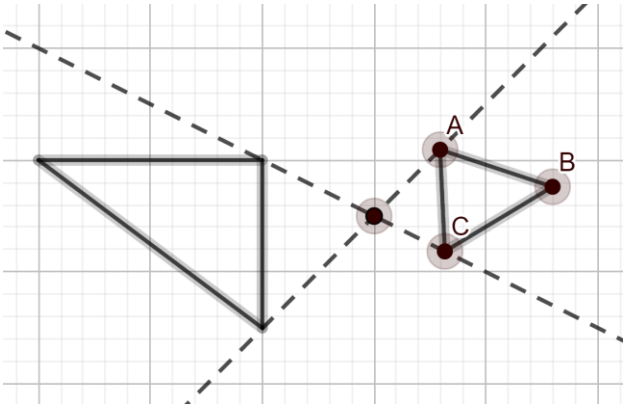
Página 120

6)

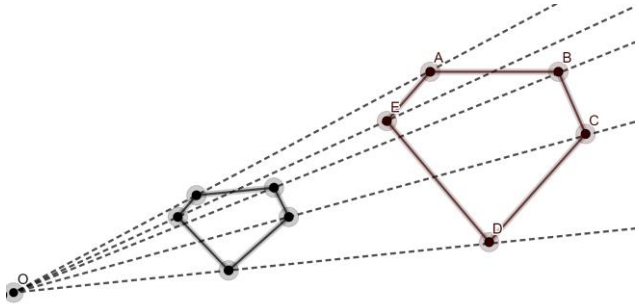
1) **La forma, la medida de los ángulos.**
2) **El tamaño, las coordenadas de los vértices, la medida de los lados.**
3) **Congruentes**
4) $\boldsymbol{K = 3}$

Página 121

7)

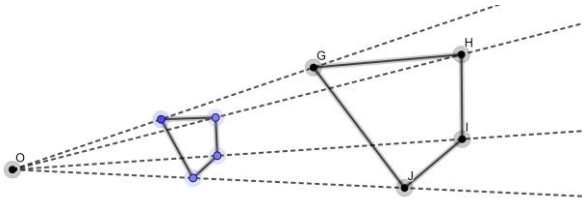


8) $\left.\begin{matrix} \boldsymbol{a}) \\ \boldsymbol{b}) \end{matrix}\right\} [\boldsymbol{Dibujos}]$



a)

b)



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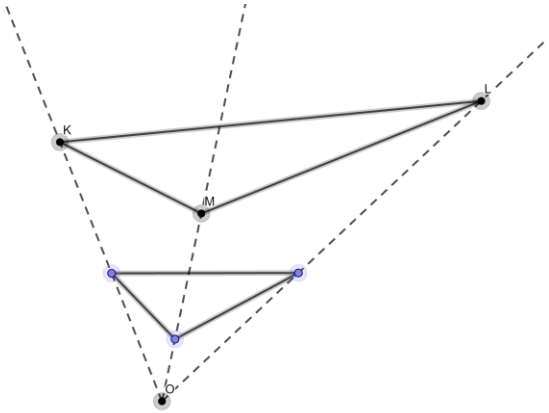

$c)$

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9)

1) **La forma y las medidas de los ángulos.**
2) **Los lados son proporcionales y los ángulos congruentes.**
3) **Son proporcionales (K)**
4) **Es proporcionales $(\boldsymbol{K^2})$**

10)

1) $\boldsymbol{OC = 18}$
2) $\boldsymbol{OB' = 6, BB' = 10}$
3)

$$\frac{\boldsymbol{A'O}}{\boldsymbol{AO}} = \frac{\boldsymbol{3}}{\boldsymbol{2}}$$
$$\boldsymbol{A'O} = \frac{\boldsymbol{3AO}}{\boldsymbol{2}}$$

$$AO + A'O = 35$$
$$\frac{5AO}{2} = 35$$
$$AO = \frac{35}{\frac{5}{2}} = 14$$

4)

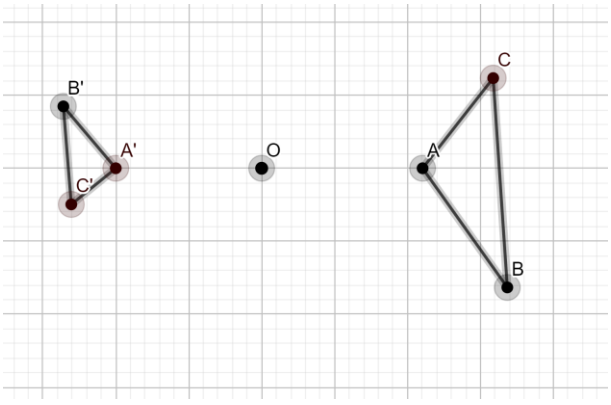
$$\frac{A'B'}{A} = \frac{3}{2}$$
$$\frac{A'B'}{8} = \frac{3}{2}$$
$$A'B' = 8 * \frac{3}{2} = 12$$

5)

$$\frac{A_{\Delta}A'B'C'}{A_{\Delta}ABC} = \left(-\frac{3}{2}\right)^2$$
$$A_{\Delta}A'B'C' = \frac{9}{4} * A_{\Delta}ABC$$
$$A_{\Delta}A'B'C' = \frac{9}{4} * 12 = 27CM^2$$

11)

1)



2) **Inversa. Porque el centro queda en medio de las dos figuras.**

3) $K = -\frac{1,55}{3,1} = -\frac{1}{2}$ ***Por ser Inversa***

4)

$$\frac{OA'}{1,75} = \frac{1}{2}$$

$$OA' = \frac{1}{2} * 1,75 = \frac{7}{8}$$
$$\frac{5,6}{OC} = \frac{1}{2}$$
$$OC = \frac{5,6}{\frac{1}{2}} = 11,2$$

5)

$\measuredangle A \rightarrow \measuredangle A'$

$\measuredangle B \rightarrow B'$

$\measuredangle C \rightarrow \measuredangle C'$

6)

$\overline{AB} \rightarrow \overline{A'B'}$

$\overline{AC} \rightarrow \overline{A'C'}$

$\overline{BC} \rightarrow \overline{B'C'}$

Página 124

1) **No tiene respuesta**
   - I. **Verdadera**
   - II. **No hay medidas para afirmarlo**

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2) **Opción C**
3) $K = \frac{15}{5} = 3$

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1)

1)

Ángulos	Lados
ΔEDF	$\overline{ED}$
ΔFDE	$\overline{EF}$
ΔFDE	$\overline{DF}$

2)

Ángulos	Lados
$\measuredangle GJI \cong \measuredangle KON$	$\overline{JG} \cong \overline{KO}$
$\measuredangle JGH \cong \measuredangle OKM$	$\overline{GH} \cong \overline{KM}$
$\measuredangle GHI \cong \measuredangle KMN$	$\overline{HI} \cong \measuredangle \overline{MN}$
$\measuredangle HIJ \cong \measuredangle MNO$	$\overline{IJ} \cong \overline{NO}$

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3) **Opción E**

4) **Opción B**

6) $\measuredangle CTO = 30°$

$\measuredangle RMB = 110°$

$\measuredangle TOC = 40°$

$\measuredangle BMR = 110°$

$\overline{OT} = 5$

$\overline{MB} = 4$

7)

a)

Cuando los 3 lados y los 3 angulos son congruentes en ambos triangulos

b)

$$\overline{AB} \cong \overline{MN}$$

$$\overline{BC} \cong \overline{NR}$$

$$\overline{AC} \cong \overline{MR}$$

$$\measuredangle A \cong \measuredangle M$$
$$\measuredangle B \cong \measuredangle N$$
$$\measuredangle C \cong \measuredangle R$$

c)

$$ALA$$
$$LAL$$
$$LLL$$

d) Sí

e) $No, pueden\ ser\ de\ diferente\ tamaño$

f) $No, \measuredangle NMC \cong ERS$

g) $No, MN = RE$

h) Sí

i) Sí

j) $No, AB = CD$

k) $AB = BC$, Sí $es\ isóseles$

8)

a) LAL

b) ALA

c) LLL

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9) LAL

Página 147

1)

a)

$$\frac{6}{4} = \frac{9}{x} = \frac{12}{y}$$

$\frac{6}{4} = \frac{9}{x} \rightarrow \frac{36}{6} = 6$

$\frac{6}{4} = \frac{12}{y} \rightarrow x = \frac{48}{6} = 8$

b)

$m\measuredangle A + 50° + 42° = 180°$

$m\measuredangle A = 180° - 92° = 88°$

c)

$$k = \frac{6+9+12}{4+6+8} = \frac{27}{18} = \frac{3}{2}$$

2)

$\frac{AB}{CN} = \frac{BC}{NM}$

$\frac{24}{6} = \frac{x}{8}$

$x = \frac{24*8}{6} = 32$

3)

a) $m\measuredangle B = 23°$

b) $m\measuredangle S = 121°$

c) $m\measuredangle w = 36°$

d) $m\measuredangle Q = 36°$

4)

$P = 9 + 12 + 18 = 39$

$K = \frac{39}{26} = \frac{3}{2}$

$\frac{3}{2} = \frac{9}{x} = \frac{12}{y} = \frac{18}{z}$

$\frac{3}{2} = \frac{9}{x} \rightarrow x = \frac{18}{3} = 6cm$

$\frac{3}{2} = \frac{12}{y} \rightarrow y = \frac{24}{3} = 8cm$

$\frac{3}{2} = \frac{18}{z} \rightarrow z = \frac{36}{3} = 12cm$

5)

$$\frac{6}{x} = \frac{5}{y} = \frac{4}{8}$$

$$\frac{6}{x} = \frac{4}{8} \rightarrow x = \frac{48}{4} = 12cm$$

$$\frac{5}{y} = \frac{4}{8} \rightarrow y = \frac{40}{4} = 10cm$$

6)

$$P = 4 + 8 + 6 = 18$$

$$\frac{Pmayor}{P=18} = \frac{5}{2}$$

$$Pmayor = \frac{90}{2} = 45m$$

7)

$$k = \frac{12}{6} = \frac{8}{4} \neq \frac{10}{8}$$

$$No\ son\ semejantes$$

8)

$$\frac{AS}{AC} = \frac{AR}{AB} = \frac{RS}{BC}$$

$$AS = 100 - 60 = 40m$$

$$\frac{40}{100} = \frac{AR}{110} = \frac{RS}{45}$$

$$\frac{40}{100} = \frac{AR}{110} \rightarrow AR = \frac{4400}{100} = 44$$

$$\frac{40}{100} = \frac{RS}{45} \rightarrow RS = \frac{1800}{100} = 18$$

$$m\measuredangle\emptyset + 90° + 39° = 180°$$

$$m\measuredangle\emptyset = 180° - 129° = 51°$$

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9)

$$\frac{HE}{HD} = \frac{HF}{HP} = \frac{EF}{DP}$$

$$HD = 18 + 6 = 24$$

$$\frac{18}{24} = \frac{HF}{19} = \frac{12}{DP}$$

$\frac{18}{24} = \frac{HF}{19} \rightarrow HF = \frac{342}{24} = \frac{57}{4}$

$\frac{18}{24} = \frac{12}{DP} \rightarrow DP = \frac{288}{18} = 16$

10)

$25cm$

11)

$\frac{9}{4} = \frac{7}{X}$

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12)

$1,3m$

13)

a) $K = \frac{7}{5}$

b) $\frac{7}{5} = \frac{9}{AC} \rightarrow AC = \frac{45}{7}$

c) $\frac{7}{5} = \frac{6}{BC} \rightarrow BC = \frac{30}{7}$

d) $\frac{BC}{MR} = \frac{30}{\frac{7}{6}} = \frac{5}{7}$

e) $\frac{NM}{AB} = \frac{7}{5}$

14)

1) Sí

2) Sí

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3) No

4) Sí

15)

No hay figuras (no tiene respuesta)

16)

a) $\Delta ABC \begin{cases} \rightarrow P = 10 + 8 + 6 = 24 \\ \rightarrow A = \frac{6*8}{2} = 24 \end{cases}$

$\Delta DEF \begin{cases} \rightarrow P = 3 + 4 + 5 = 12 \\ \rightarrow A = \frac{3*4}{2} = 6 \end{cases}$

$Perímetros: K = \frac{24}{12} = 2$

$Áreas: K = \frac{24}{6} = 4$

b)

$\Delta ACE \begin{cases} \rightarrow P = 12 + 5 + 13 = 30 \\ \rightarrow A = \frac{12*5}{2} = 30 \end{cases}$

$\Delta EFG \begin{cases} \rightarrow P = 2,5 + 6,5 + 6 = 15 \\ \rightarrow A = \frac{2,5*6}{2} = \frac{15}{2} \end{cases}$

$Perímetros: K = \frac{30}{15} = 2$

$Áreas: K = \frac{30}{\frac{15}{2}} = 4$

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18)

a) $\frac{y}{6} = \frac{x}{4,5} = \frac{4,5}{3}$

$\frac{y}{6} = \frac{4,5}{3} \rightarrow y = \frac{27}{3} = 9$

$\frac{x}{4,5} = \frac{4,5}{3} \rightarrow x = \frac{20,25}{3} = \frac{27}{4}$

b) $\frac{5}{2} = \frac{x}{3} = \frac{y}{4}$

$\frac{5}{2} = \frac{x}{3} \rightarrow x = \frac{15}{2}$

$\frac{5}{2} = \frac{y}{4} \rightarrow x = \frac{20}{2} = 10$

c) $\frac{63}{7} = \frac{54}{x} = \frac{y}{12}$

$\frac{63}{7} = \frac{54}{x} \rightarrow x = \frac{378}{63} = 6$

$\frac{63}{7} = \frac{y}{12} \rightarrow y = \frac{756}{7} = 108$

d) $\frac{y}{10} = \frac{45}{x}$

$x + 27 = 45 \rightarrow x = 18$

$\frac{y}{10} = \frac{45}{18} \rightarrow y = \frac{450}{18} = 25$

e) $\frac{x}{12} = \frac{23}{y}$

$23 + y = 32$

$y = 9$

$\frac{x}{12} = \frac{23}{9} \rightarrow \frac{276}{9} = \frac{92}{3}$

f) $\frac{32}{36} = \frac{8}{x} = \frac{31}{y}$

$\frac{32}{36} = \frac{8}{x} \rightarrow x = \frac{288}{32} = 9$

$$\frac{32}{36} = \frac{31}{y} \rightarrow \frac{1116}{32} = \frac{279}{8}$$

g) $\frac{BE}{CD} = \frac{EA}{DA} = \frac{BA}{CA}$

$$\frac{\frac{5}{2}}{\frac{3}{2}} = \frac{6}{CD} \rightarrow CD = \frac{9}{\frac{5}{2}} = \frac{18}{5}$$

h) $\frac{AB}{CE} = \frac{BD}{EB} = \frac{AB}{CB}$

$$\frac{21}{7} = \frac{BD}{8} = \frac{30}{10}$$

$$\frac{BD}{8} = \frac{30}{10} \rightarrow BD = \frac{240}{10} = 24$$

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19)

1) $\measuredangle A \cong \measuredangle R$

2) $\overline{AB} \sim \overline{RV}$

3) $\measuredangle B \cong \measuredangle V$

4) $\overline{BD} \sim \overline{VM}$

5) $\measuredangle C \cong \measuredangle T$

6) $\overline{DE} \sim \overline{MH}$

7) $\measuredangle D \cong \measuredangle M$

8) $\overline{CE} \sim \overline{TH}$

9) $\measuredangle E \cong \measuredangle H$

10) $\overline{AC} \sim \overline{RT}$

11) $\frac{AB}{RV} = \frac{BD}{VM} = \frac{DE}{MH} = \frac{CE}{TH} = \frac{AC}{RT}$

18)

$$\frac{9}{15} = \frac{x}{4}$$

$$x = \frac{36}{15} = \frac{12}{5} = 1,4m$$

19)

$$\frac{20}{10} = \frac{x}{6}$$

$$x = \frac{120}{6} = 12$$

Página 154

20)

a)

1) $\measuredangle A \cong \measuredangle A$

2) $\measuredangle B \cong \measuredangle D$

3) $\measuredangle C \cong \measuredangle E$

4) $\overline{AD} \sim \overline{AB}$

5) $\overline{EA} \sim \overline{CA}$

6) $\overline{DE} \sim \overline{BC}$

b)

1) $\measuredangle BAE \cong \measuredangle CDE$

2) $\measuredangle DEC \cong \measuredangle AEB$

3) $\frac{DE}{AE} = \frac{EC}{EB} = \frac{DC}{AB}$

4) $\frac{AB}{DC} = \frac{AE}{DE} = \frac{EB}{EC}$

c)

1) $\measuredangle L \cong \measuredangle R$

2) $\measuredangle M \cong \measuredangle T$

3) $\measuredangle N \cong \measuredangle N$

4) $\overline{LM} \sim \overline{RT}$

5) $\overline{NT} \sim \overline{MN}$

6) $\overline{RT} \sim \overline{LM}$

21)

a) $\frac{24}{x} = \frac{7}{y} = \frac{25}{5}$

$\frac{24}{x} = \frac{25}{5} \rightarrow x = \frac{120}{25} = \frac{24}{5}$

$\frac{7}{y} = \frac{25}{5} \rightarrow y = \frac{35}{25} = \frac{7}{5}$

b) $\frac{27}{y} = \frac{x}{9} = \frac{18}{6}$

$\frac{27}{y} = \frac{18}{6} \rightarrow y = \frac{162}{18} = 9$

$\frac{x}{9} = \frac{18}{6} \rightarrow x = \frac{162}{6} = 27$

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22)

a) $m\measuredangle Q = 40°$

b) $\frac{20}{4} = \frac{MP}{6} \rightarrow MP = \frac{120}{4} = 30$

c) $\frac{20}{4} = \frac{NP}{8} \rightarrow NP = \frac{160}{4} = 40$

d) $P\Delta MNP = 20 + 30 + 40 = 90$

e) $P\Delta RQS = 4 + 6 + 8 = 18$

f) $K = \frac{20}{4} = 5$

23)

a) $m\measuredangle Q = 40°$

b) $\frac{20}{4} = \frac{MP}{6} \rightarrow MP = \frac{120}{4} = 30$

c) $\frac{20}{4} = \frac{NP}{8} \rightarrow NP = \frac{160}{4} = 40$

d) $P\Delta MNP = 20 + 30 + 40 = 90$

e) $P\Delta RQS = 4 + 6 + 8 = 18$

f) $K = \frac{20}{4} = 5$

1)

a) $\frac{6}{x} = \frac{5}{y} = \frac{4}{8}$

$\frac{6}{x} = \frac{4}{8} \rightarrow \frac{48}{4} = 12cm$

$\frac{5}{y} = \frac{4}{8} \rightarrow y = \frac{40}{4} = 10cm$

b) $\frac{12}{x} = \frac{18}{y} = \frac{24}{8}$

$\frac{12}{x} = \frac{24}{8} \rightarrow x = \frac{96}{24} = 4cm$

$\frac{18}{y} = \frac{24}{8} \rightarrow x = \frac{144}{24} = 6cm$

c) $k = \frac{12}{x} = \frac{16}{y} = \frac{20}{z} = \frac{p}{36}$

$p = 12 + 16 + 20 = 48$

$k = \frac{48}{36} = \frac{4}{3}$

$\frac{4}{3} = \frac{12}{x} \rightarrow x = \frac{36}{4} = 9cm$

$\frac{4}{3} = \frac{16}{y} \rightarrow \frac{48}{4} = 12cm$

$\frac{4}{3} = \frac{20}{z} \rightarrow z = \frac{60}{4} = 15cm$

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d) $\frac{8}{6} = \frac{x}{42}$

$x = \frac{336}{6} = 56m$

e) $\frac{86}{129} = \frac{x}{1{,}29}$

$x = \frac{110,94}{129} = 0,86m$

f) $\frac{14}{2} = \frac{x}{1{,}75}$

$x = \frac{24,5}{2} = 12,25m$

g) $\frac{40}{x} = \frac{8}{13}$

$$x = \frac{520}{8} = 65m$$

h) $\frac{1,8}{1,35} = \frac{1,2}{x}$

$$x = \frac{1,62}{1,8} = 0,9m$$

i) $\frac{14}{25} = \frac{x}{18}$

$$x = \frac{252}{25} = 10,08m$$

j) $\frac{10}{8} = \frac{12}{x}$

$$x = \frac{96}{10} = 9,6m$$

k) $\frac{9}{14,5} = \frac{x}{2,85}$

l) $\frac{25,65}{14,5} = 1,77m$

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1)

$$\frac{10}{5} = \frac{8}{x}$$

$$x = \frac{40}{10} = 4$$

2) $\frac{8}{5} = \frac{24}{PN}$

$$PN = \frac{120}{8} = 15cm$$

$$MP = 24 - 15 = 9cm$$

3)

$$AC = 12$$

$$\frac{12}{9} = \frac{x}{5}$$

$$x = \frac{60}{9} = \frac{20}{3} \quad (Opción\ D)$$

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5)

$$\frac{15}{5} = \frac{x}{4}$$

$$x = \frac{60}{5} = 12 \quad (\textbf{Opción A})$$

6)

$$\frac{7}{12} = \frac{x}{8}$$

$$x = \frac{56}{12} = \frac{14}{3} \quad (\textbf{Opción D})$$

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7)

$$\frac{20}{14} = \frac{18}{x}$$

$$x = \frac{252}{20} = \frac{63}{5} \quad (\textbf{Opción C})$$

8) $\textbf{Opción C}$

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9)

$$\frac{5}{8} = \frac{4}{x}$$

$$x = \frac{32}{5}$$

$(\textbf{Opción C})$

10)

$$\frac{3}{6} = \frac{x}{5}$$

$$x = \frac{15}{6} = \frac{5}{2}$$

$(\textbf{Opción A})$

11) $\textbf{Opción B}$

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10)

$$\frac{18}{8} = \frac{x}{6}$$

$$x = \frac{108}{8} = \frac{27}{2} = 13,5$$

$$(Opción\ D)$$

12)

$$\frac{50}{15} = \frac{x}{18}$$

$$x = \frac{900}{15} = 60$$

Opción B

13)

$$\frac{12}{36} = \frac{1}{3}$$

$$\frac{17}{51} = \frac{1}{3}$$

$$\frac{12}{36} = \frac{1}{3} = \frac{17}{51}, \textbf{\textit{Por lo que sí son proporcionales}}$$

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14)

a) $\frac{12}{30} = \frac{x}{24}$

$$x = \frac{288}{30} = \frac{48}{5}$$

b) $\frac{10}{15} = \frac{x}{5}$

$$x = \frac{50}{15} = \frac{10}{3}$$

c) $\frac{9}{12} = \frac{4}{x}$

$$x = \frac{48}{9} = \frac{16}{3}$$

15)

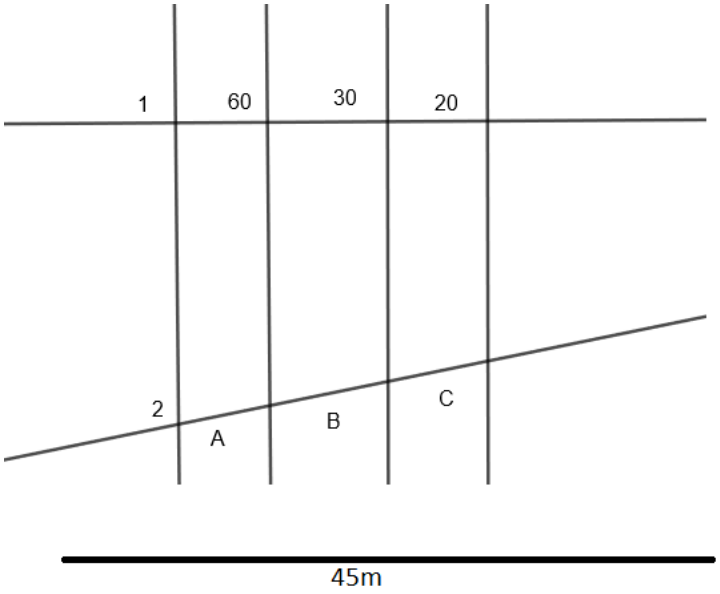
a) $\frac{20}{52} = \frac{x}{4}$

$$x = \frac{80}{52} = \frac{20}{13} = 1,54m$$

b) $\frac{6}{5} = \frac{1,75}{x}$

$$x = \frac{8,75}{6} = \frac{35}{24} = 1,46m$$

c)



$$\boldsymbol{Largo\ de\ la\ avenida\ 1 : 110m}$$

$$\frac{\mathbf{110}}{\mathbf{45}} = \frac{\mathbf{60}}{\boldsymbol{A}}$$

$$\boldsymbol{A} = \frac{\mathbf{2700}}{\mathbf{110}} = \frac{\mathbf{270}}{\mathbf{11}} = \mathbf{24,55}\boldsymbol{m}$$

$$\frac{\mathbf{110}}{\mathbf{45}} = \frac{\mathbf{30}}{\boldsymbol{B}}$$

$$\boldsymbol{B} = \frac{\mathbf{1350}}{\mathbf{110}} = \frac{\mathbf{135}}{\mathbf{11}} = \mathbf{12,27}\boldsymbol{m}$$

$$\frac{\mathbf{110}}{\mathbf{45}} = \frac{\mathbf{20}}{\boldsymbol{C}}$$

$$\boldsymbol{C} = \frac{\mathbf{900}}{\mathbf{110}} = \frac{\mathbf{90}}{\mathbf{11}} = \mathbf{8,18}\boldsymbol{m}$$

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1)

a) $\boldsymbol{Si}$

b) $\boldsymbol{Un\ triangulo\ y\ un\ punto}$

2)

a) $\boldsymbol{NO}$

b) $\boldsymbol{S}$í

c) $\boldsymbol{No}$

d) $\boldsymbol{Un\ rectangulo\ y\ un\ punto}$

3)

a) $\boldsymbol{Si}$

b) $\boldsymbol{No}$

c) $\boldsymbol{No}$

d) $\boldsymbol{S}$ólo $\boldsymbol{un\ triangulo}$

4)

a) $\boldsymbol{No}$

b) $\boldsymbol{No}$

c) $\boldsymbol{S}$í

d) $\boldsymbol{S}$ólo $\boldsymbol{un\ cuadrado}$

5)

$$\boldsymbol{\ell^2 = 36}$$

$$\boldsymbol{\ell = \sqrt{36} = 6}$$

$$\boldsymbol{BD = \frac{6}{2} = 3}$$

$$\boldsymbol{P = 3 + 3 + 3 + 3 = 12}$$

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6)

$$\boldsymbol{2(x + x + 2) = 28}$$

$$\boldsymbol{2(2x + 2) = 28}$$

$$4x + 4 = 28$$

$$4x = 24$$

$$x = 6$$

$$a = 6; \ell = 8$$

$$A = 6 * 8 = 48$$

7)

$$9 + 18 + DF = 39$$

$$DF = 12$$

$$\frac{4}{12} = \frac{AB}{9} = \frac{BC}{18}$$

$$\frac{4}{12} = \frac{AB}{9}$$

$$AB = \frac{36}{12} = 3$$

$$\frac{4}{12} = \frac{BC}{18}$$

$$BC = \frac{72}{12} = 6$$

$$P_{\Delta ABC} = 4 + 3 + 6 = 13cm$$

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8)

Nombre	Cantidad de caras	Cantidad de vértices	Cantidad de bases	Cantidad de aristas
Prisma hexagonal	8	12	2	18
Cubo	6	8	2	12
Prisma triangular	5	6	2	9
Prisma cuadrangular	6	8	2	12
Pirámide pentagonal	6	6	1	10
Pirámide triangular	4	4	1	6

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Pirámide cuadrangular	5	5	1	8
Pirámide hexagonal	7	7	1	12

9)

Nombre del prisma	Polígono de sus bases	Número de caras	Número de aristas
Pentagonal	**Pentágono**	**7**	**15**
Octagonal	**Octágono**	**10**	**24**

Nombre de la pirámide	Base	Caras laterales	Vértices	Aristas	Cúspide
Cuadrangular	**Cuadrado**	**4**	**5**	**8**	**1**
Heptagonal	**Heptágono**	**7**	**8**	**14**	**1**
Octagonal	**Octágono**	**8**	**9**	**16**	**1**
Hexagonal	**Hexágono**	**6**	**7**	**12**	**1**

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10)

Hexagonal

Arista

Base **Altura**

Cara Lateral **Vértice**

Triangular

Arista **Altura**

Cara Lateral

Vértice

Base

11)

Pirámide	Base	Caras laterales	Altura	Apotema	Ápice o cuspide
1)	ΔBCD	ΔABC ΔACD ΔABD	$\overline{AE}$	$\overline{AF}$	A
2)	$\square ABCD$	ΔECD ΔAED ΔAEB ΔECB	$\overline{EF}$	$\overline{E6}$	E
3)	$\square DEFG$	ΔBEF ΔFGB	$\overline{AB}$	$\overline{BC}$	B

		ΔDEB			

12)

Prisma	1	2	3
Caras laterales	$\square ABDE$ $\square ABCF$ $\square FCDE$	$\square EFGH$ $\square FDCG$ $\square ABCD$ $\square ABHE$	$\square ABCG$ $\square ABHF$ $\square HFED$ $\square DEGC$
Bases	ΔAEF ΔBCD	$\square BCGH$ $\square ADFE$	$AFEG$ $BCDH$
Alturas	$\overline{AB}$ $\overline{FC}$ $\overline{DE}$	$\overline{FG}$ $\overline{EH}$ $\overline{AB}$ $\overline{DC}$	$\overline{AB}$ $\overline{CG}$ $\overline{DE}$ $\overline{FH}$

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13)

I. (1)

(4)

(3)

(2)

(5)

II.

$Prisma\ Hexagonal$ $Prisma\ Cuadrangular$
$Prisma\ Pentagonal$ $Prisma\ Triangular$

III.

1) **Pirámide triangular**
2) **6**

3) 4
4) 3
1) Pirámide cuadrangular
2) 8
3) 5
4) 4

II.

	Ápice o cúspide
Base	**Arista**
	Cara lateral

8° Capítulo III Relaciones y algebra

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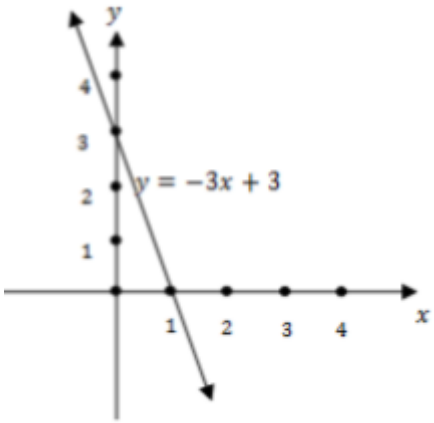

1)

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2)

1. $y = 2x - 2$
2. $y = -\frac{1}{2}x \mid y = -\frac{x}{2}$
3. $y = \sqrt{2}x + 1$

3)

1. $f(x) = 3x - 2$

2. $f(x) = 7x - 4$
3. $f(x) = 24 - 4x$
4. $f(x) = 12 - 5x$

4)

1. $f(x) = 2x + 3$
2. $f(x) = 6x - 5$
3. $d(x) = 4t$

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5)

1. $f(x) = 2x + 1$
2. $f(x) = -2x + 5$

6)

1. $k = 5$
2. $k = -2$

7)

y	m	$(-\frac{b}{m}, 0)$	$(0,6)$	6
1	9	$(\frac{1}{9}, 0)$	$(0,-1)$	-1
2	-1	$(0,0)$	$(0,0)$	0
3	$\frac{1}{2}$	$(-6,0)$	$(0,-3)$	-3
4	$-\frac{4}{3}$	$(\frac{32}{15}, 0)$	$(0,-\frac{5}{8})$	$-\frac{5}{8}$

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1.

Ejercicio	Signo	C. numérico	F. Literal	Grado

$-5{,}9a^2b^3c$	Menos	5,9	a^2b^3c	2+3+1=6
$-\frac{\sqrt{3}}{3}h^4k^5$	Menos	$\frac{\sqrt{3}}{3}$	h^4k^5	4+5=9
abc	Más	1	abc	1+1+1=3
$\frac{xy^2}{4}$	Más	$\frac{1}{4}$	xy^2	1+2=3
$-8a^4c^2d^3$	Menos	8	$a^4c^2d^3$	4+2+3=9

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1.

$\rightarrow\ a=2, b=5, c=-3, d=-1, f=0$

$5a^2-2bc-3d=$

$5*2^2-2*5-3*-1=$

$5*4+30+3=53$

$\rightarrow 4ab-3bc-15d$

$4*2*5-3*5*-3-15*-1=$

$40+45+15=100$

$\rightarrow 6a^3f=6*2^3*0=6*8*0=0$

$\rightarrow 2a^2-b^3-c^3-d^5=2*2^2-5^3-(-3)^3-(-1)^5=$

$2*4-125—27—1=8-125+27+1=-89$

$\rightarrow 3(a-b)+2(c-d)=$

$3(2-5)+2(-3—1)=$

$3*-3+2*-2=-9-4=-13$

$\rightarrow \frac{c}{3}+\frac{b}{5}-\frac{a}{2}=$

$-\frac{3}{3}+\frac{5}{5}-\frac{2}{2}=-1+1-1=-1$

$\rightarrow (b+c)^2=(5+\ -3)^2=2^2=4$

2)

a) $m^2 - 3m + 5 = (-1)^2 - 3 * -1 + 5 =$

$1 + 3 + 5 = 9$

b) $2x^2 + 5xy - 4xy^2 = 2 * 2^2 + 5 * 2 * 1 - 4 * 1^2 =$

$2 * 4 + 10 - 4 * 1 = 8 + 10 - 4 = 14$

c) $(m - n)^2 - (m - ñ)^2 + (n - ñ)^2 =$

$(4 - 3)^2 - (4 - 2)^2 + (3 - 2)^2 =$

$1^2 - 2^2 + 1^2 = 1 + 4 + 1 = -2$

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d)

$-4b^3 - 2ab^2 + 3 - 5a^2b = -4(-2)^3 - 2 * -2 * \frac{1}{3} - 5 * (-2)^2 * \frac{1}{3} =$

$-4 * -8 + \frac{4}{3} - \frac{5*4}{3} = 32 + \frac{4}{3} - \frac{20}{3} = \frac{80}{3}$

e)

$3c + 5(a - 2d) = 3 * -1 + 5(2 - 2 * -3) =$

$-6 + 5(2 + 6) = -6 + 5 * 8 =$

$-6 + 40 = 34$

f)

$$(b+x)(c-x)+2x^2bc=(-1+3)\left(-\frac{2}{3}-3\right)+2*3^2*-1*-\frac{2}{3}=$$

$$2*-\frac{8}{3}+2*9*\frac{2}{3}=-\frac{16}{3}+\frac{36}{3}=\frac{20}{3}$$

g)

$$3m+4^c-5c^2=3*-2+4^2-5*2^2=$$

$$-6+16-5*4=-6+16-20=-10$$

h)

$$\frac{2m-2m}{4m^3+\frac{3n}{m}}=\frac{2*-1-2*2}{4*(-1)^3+\frac{3*2}{-1}}=-\frac{2-4}{4*-1+\frac{6}{-1}}=$$

$$-\frac{2-2}{-4-6}=-\frac{6}{-10}=\frac{3}{5}$$

2)

a) $\boldsymbol{A=3^2=9cm^2}$

$P=4*3=12cm$

b)

$$V=\frac{4*3{,}14*2^3}{3}=\frac{4*3{,}14*8}{\frac{100}{3}}=\frac{10048}{300}=$$

$$\frac{2512}{75}U^3$$

c)

$$A_t=6*4^2=6*16=96U^2$$

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$$(\quad)\ -11xy, 29x2y, 15xy2$$

$$(x)\ u^2v^3, -v^3u^2, 7u2v3$$

$$(x)\frac{3}{4}m^2n^3p, \sqrt{3}pm^2n^3, -2n^3pm^2, 12m2pn3$$

$$(\ )-\frac{u^3vw^2}{7}, \frac{1}{4}vw^2u^3, 24vu3$$

$$(x)\ 7a^4b^2c^3, -9b^2a^4c^3, \frac{11}{8}c^3a^4b^2$$

$$(\quad)-\sqrt{2}\ a^4xy^2, \frac{5}{3}y^4xa^2, -10xy^4, 35a^4y^2$$

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Expresión algebraica	Grado de la expresión	Número de términos
$2x-5y^3$	$1; 3=3$	$2: binomio$
$\frac{x^2y^3}{4}$	$2+3=5$	$1: monomio$
$a-b+c-2d$	$1; 1; 1; 1=1$	$4: polinomio$
m^2+mn+n^2	$2; 2; 2=2$	$3: trinomio$
$x+y^2+z^3-xy^2z^3$	$1; 2; 3; 6=6$	$4: polinomio$

Ejercicios finales

1.

a) $5x^2y-xy^2=5*(-4)^2*7—4*7^2=$

$5*16*7+4*49=560+196=756$

b)

$$ab^2 - c^3 + 2y = -2 * 9^2 - 5^3 + 2 * 63 =$$

$$-2 * 81 - 125 + 126 = -162 - 125 + 126 = -161$$

c)

$$\frac{2xy^5}{bc^3} = \frac{2*-1*(-2)^5}{16*(-3)^3} = \frac{2*-1(-2)^5}{16*(-3)^3} = \frac{2*-1*-32}{16*-27} =$$

$$\frac{64}{-432} = -\frac{4}{27}$$

d)

$$6 * (3w^3)^2 - 5(8v^2w)^3 = 6 * (3 * (-2)^3)^2 - 5 * (8 * (-1)^2 * -2)^3 =$$

$$6 * (3 * -8)^2 - 5 * (8 * 1 * -2)^3 =$$

$$6 * (-24)^2 - 5 * (-16)^3 =$$

$$6 * 576 - 5 * -4096 =$$

$$3456 + 20480 = 23936$$

e)

$$(a^3b^2c)^3 + (4ab^3)^5 =$$

$$((-2)^3 * 1^2 * 5)^3 + (4 * -2 * 1^3)^5 =$$

$$(-8 * 1 * 5)^3 + (4 * -2 * 1)^5 =$$

$$(-40)^3 + \ -8^5 =$$

$$-64000 + \ -32768 = -96768$$

f)

$$5xy^2 + 4y^3 = 5 * \frac{1}{2} * \left(-\frac{2}{3}\right)^2 + 4 * \left(-\frac{2}{3}\right)^3 =$$

$$5 * \frac{1}{2} * \frac{4}{9} + 4 * -\frac{8}{27} =$$

$$\frac{10}{9} - \frac{32}{27} = -\frac{2}{27}$$

g)

$$-8m^2n - mn^2 =$$

$$-8 * \left(-\frac{1}{4}\right)^2 * \frac{3}{5} - \left(-\frac{1}{4}\right) * \left(\frac{3}{5}\right)^2 =$$

$$-8 * \frac{1}{16} * \frac{3}{5} - \ -\frac{1}{4} * \frac{9}{25} = -\frac{3}{10} + \frac{9}{100} = -\frac{21}{100}$$

h)

$$3c + \frac{ay^2}{b} = 3 * -1 + \frac{4*(-5)^2}{-2} =$$

$$-3 + \frac{4*25}{-2} = -3 - 50 = -53$$

i)

$$\frac{3uv^2w}{x^2} = \frac{3*\frac{4}{9}*\left(\frac{5}{2}\right)^2 * -\frac{1}{5}}{\left(\frac{10}{3}\right)^2} = \frac{\cancel{3}*\frac{4}{\cancel{9}}*\frac{\cancel{25}}{\cancel{4}}*-\frac{1}{8}}{100}$$

$$-\frac{3}{\frac{\cancel{100}}{\cancel{9}}} = -\frac{45}{100} = -\frac{3}{20}$$

j)

$$\frac{m^2 - n^3r^2}{22n^2r} = \frac{\left(\frac{4}{3}\right)^2 - \left(-\frac{1}{2}\right)^3 \left(-\frac{2}{3}\right)^2}{22\left(-\frac{1}{2}\right)^2 * -\frac{2}{3}}$$

$$\frac{\frac{16}{9} - \frac{1}{8} * \frac{4}{9}}{22 * \frac{1}{4} * -\frac{2}{3}} = \frac{\frac{16}{9} + \frac{1}{18}}{-\frac{11}{3}} = \frac{\frac{33}{18}}{-\frac{11}{3}} = -\frac{99}{198} = -\frac{1}{2}$$

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2)

Monomio	Coeficiente numérico	Factor literal
$24v^5wz^2$	24	v^5wz^2
$-ab^3c$	-1	ab^3c
-20	-20	No tiene
$\frac{m^6n}{4}$	$\frac{1}{4}$	m^6n
$-\frac{3x^2y^4w^3}{11}$	$-\frac{3}{11}$	$x^2y^4w^3$

3)

$(x) -\frac{1}{8}$ $\quad$ $(\ \ ) 5x3y^{-3}$ $\quad$ $(x)\frac{6u^9m^6}{5}$

$(x)u^2w$ $\quad$ $(\ \ )\frac{4m^5n^3}{2ab^2}$ $\quad$ $(\ \ ) 10x2y - 4xy^2$

$(\ \ )x^2 + 1$ $\quad$ $(x) - 9x^6y^3z$

4)

( ) $18u^3v^2, -4v^2u^3, 12wu3v2$ $(x)9x2yz4, \frac{yx^2z^4}{3}, -z^4yz^2$

$(x)\frac{2}{5}\ m^4n^2p^5, -6p^5n^2m^4, -n^2m^4p^5$ $(x)u^3v^6w^9, -\frac{v^6w^9u^3}{5}, -8w^9v^6u^3$

( ) $5a^8b^7c^5, \frac{1}{3}a^8b^7c, \frac{2}{7}b^7c^2a^8$ ( ) $7xy6z8, -xy^8z^6, 4xy6$

5)

( ) $\frac{1}{x}$ ( ) $4 + y^{-2}$

(x) $5x^3 - 6x - 3$ $(x) - 47$

(x) $7 + 6x^2$ (x) $h3 - 3h^2 - 5$

( ) $15p^2q^{\frac{1}{5}}$ ( ) $-q^2 - \frac{2r}{p} + 8$

( ) $-4m^5 + \frac{1}{m} - 1$ (x) $5x5y3 + 10x^3y^2 - 1$

(x) $a^2 + ab + b^3$ $(x)\frac{r^3}{4}$

$(x) - 12ab^7 - 12$ ( ) $\frac{4}{r^3}$

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A.

Operación	Resultado	Coeficiente numérico	Factor literal	Grado
a	X	1	X	1
b	O_y	O	Y	1
c	$-11b$	-11	b	1
f	$4ab$	4	ab	2
g	$\frac{107}{12}x$	$\frac{107}{12}$	X	1
h	$4{,}22a$	$4{,}22$	a	1

B.

a) $5x + y$ d) $-5x - y - 2z$

b) $-17x^{2y} - xy$ e) $-1{,}85x - 0{,}82y - 0{,}23z$

c) $-2b^2 - b^2a$

f) $\frac{3}{2}x + \frac{4}{3}y - \frac{5}{4}z$

E.

Operación	Resultado	Coeficiente numérico	Factor Literal	Grado
a	$8x$	8	x	1
b	$-2y^2$	-2	y^2	2
c	$-2b$	-2	b	1
f	$-0{,}38ab$	$-0{,}38$	ab	2
g	$\frac{59}{12}x$	$\frac{59}{12}$	x	1
h	$0{,}15a$	$0{,}15$	a	1

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F.

a) $-5x + 21y + 9z$

b) $x^2y - 8x^2$

c) $-\frac{25}{4}b^2a + 4{,}4ba^2$

d) $-21cx - 9y + 8z$

e) $-\frac{x}{2} + \frac{16}{15}y - \frac{11}{4}z$

f) $-3{,}3x - 5{,}6y + 3z$

G.

a) $(2x + 3y) - (-x - 2y + 1) = 2x + 3y - 1 =$
$3x + 5y - 1$

b) $(5a^3 - 2b^2 + 1) + (2a^2 - 3b + 3) - (2a^2 + 4) =$

$5a^3 - 2b^2 + 1 + 2a^2 - 3b + 3 + 2a^2 - 4 =$

$5a^3 + 4a^2 - 2b^2 - 3b$

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

$\frac{x^2}{2} + \frac{3x}{4} - 1 - 2x - \frac{2x^2}{3} - 3 =$

$-\frac{x^2}{6} - \frac{5x}{4} - 4$

d)

$$(3x^2 - 5xy + 2y^2) + (4y^2 7x^2 + 4xy) - (x^2 - yx) =$$

$$3x^2 - 5xy + 2y^2 + 4y^2 + 7x^2 + 4xy - x^2 + yx =$$

$$9x^2 + 6y^2$$

H.

a) $A + B = (x^3 + 4x^2 + 3x + 1) + (2x^3 - 5x^2 - 2x + 3) =$

$$x^3 + 4x^2 + 2y^2 + 4y^2 + 7x^2 + 4xy - x^2 + yx =$$

$$9x^2 + 6y^2$$

b) $A + B + C = (x^3 + 4x^2 + 3x + 1) + (2x^3 - 5x^2 - 2x + 3) + (4x^3 + x^2 - x - 2) =$

$$x^3 + 4x^2 + 3x + 1 + 2x^3 - 5x^2 - 2x + 3 + 4x^3 + x^2 - x - 2 =$$

$$7x^3 + 2$$

c) $A - B = (x^3 + 4x^2 + 3x + 1) - (2x^3 5x^2 - 2x + 3) =$

$$x^3 + 4x^2 + 3x + 1 - 2x^3 5x^2 - 2x + 3 =$$

$$-x^3 + 9x^2 + 5x - 2$$

d) $A - B + C = (x^3 + 4x^2 + 3x + 1) - (2x^3 - 5x^2 - 2x + 3) + (4x^3 + x^2 - x - 2) =$

$$x^3 + 4x^2 + 3x + 1 - 2x^3 + 5x^2 + 2x - 3 + 4x^3 + x^2 - x - 2 =$$

$$3x^3 + 10x^2 + 4x - 4$$

e) $A - B - C = (x^3 + 4x^2 + 3x + 1) - (2x^3 - 5x^2 - 2x + 3) - (4x^3 + x^2 - x - 2) =$

$$x^3 + 4x^2 + 3x + 1 - 2x^3 + 5x^2 + 2x - 3 - 4x^3 - x^2 + x + 2 =$$

$$-6x^3 + 8x^2 + 6x$$

f) $-C - A - B = -(4x^3 + x^2 - x - 2) - (x^3 + 4x^2 + 3x + 1) - (2x^3 - 5x^2 - 2x - 3) =$

$$-4x^3 - x^2 + x + 2 - x^3 - 4x^2 - 3x - 1 - 2x^3 + 5x^2 + 2x - 3 =$$

$$-7x^3 - 2$$

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1.

a) $8y^6 + 10xy^2 - 2y^2x^3 + 8x^2y^2 + 6y^2$

b) $35t^7 + 7t^6 - 84t^5 + 42t^4 - 21t^3 + 7t^2$

c) $4h^6 + 8h^7 + 2h^8 - h^9 - 3h^{10} + 6h^{11}$

d) $-6x^8 + 30x^7 + 18x^6 - 48x^5 + 24x^4 - 12x^3$

e) $20n^2\, m^6 + 35m^5n^3 - 45m^4n^4 + 5m^3n^5 - 10m^2n^6 + 30mn^7$

f) $\frac{m^4}{4} - \frac{3m^3}{5} + \frac{6m^2}{25} - \frac{2m}{35}$

g) $48x^7 + 12x^4 - 72x^2 + 84x^6 - 36x^3 + 24x^5$

h) $2b^6 + \frac{20b^4}{3} - \frac{10b^5}{3} + 3b^3$

2.

a) $A + C = (3y^2 - 5y + 3) + \left(\frac{4y^2}{3} - \frac{y}{2} + 5\right) =$

$3y^2 - 5y + 3 + \frac{4^2}{3} - \frac{y}{2} + 5 = \frac{13y^2}{3} - \frac{11y}{2} + 8$

b) $B - A = (y^2 + 3y + 5) - (3y^2 - 5y + 3) =$

$y^2 + 3y + 5 - 3y^2 + 5y - 3 = -y^2 + 8y + 2$

c) $A + B - C = (3y^2 - 5y + 3) + (y^2 + 3y + 5) - \left(\frac{4y^2}{3} - \frac{y}{2} + 5\right) =$

$3y^2 - 5y + 3 + y^2 + 3y + 5 - \frac{4y^2}{3} + \frac{y}{2} - 5 = \frac{8y^2}{3} - \frac{3y}{2} + 3$

d) $-C - C + A = -\left(\frac{4y^2}{3} - \frac{y}{2} + 5\right) - \left(\frac{4y^2}{3} - \frac{y}{2} + 5\right) + (3y^25y + 3) =$

$-\frac{4y^2}{3} + \frac{y}{2} - 5 - \frac{4y^2}{3} + \frac{y}{2} - 5 + 3y^2 - 5y + 3 =$

$\frac{y^2}{3} - 4y - 7$

e) $B + C = (y^2 + 3y + 5) + \left(\frac{4y^2}{3} - \frac{y}{2} + 5\right) =$

$y^2 + 3y + 5 + \frac{4y^2}{3} - \frac{y}{2} + 5 = \frac{7y^2}{3} + \frac{5y}{2} + 10$

3.

a) $5c^6 + 20c^3 - 15c^5 + 20c^4 - 10c^2$

b) $10r^7 - 10r^6 - 35r^5 + 30r^4 - 45r^3 - 55r^2$

e) $4v^2w^6 - 28v^3w^5 - 20w^4v^4 + 12w^3v^5 + 20w^2v^6 + 32v^7w$

f) $\frac{q^4}{9} - q^3 + \frac{q^2}{4} - \frac{2q}{5}$

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1.

a) $63v^4v^5xw$

b) $12a^3b^4$

c) $-3x^3y^5z^4w$

d) $-24x^2y^5$

e) $-\frac{a^5b^4}{15}$

f) $-\frac{3}{2}x^4y^5z^2$

g) $-27x^{4a}$

h) x^{m+n}

i) 5^{6v-1}

k) $-84x^3w^{4b-5}$

k) $4n^2m^{-2a+3}$

l) $4x^3y^3 - 2xy^3z^4 - 6x^4y^2 + 10xy^2$

m) $x^2y^2 - 2x^3y^2 - 3x^2y^3 - x^2y + xy^4$

n) $-3x^6 + 6x^5 - 3x^4 + 3x^3 - 3x^2$

o) $x^4y^3 - \frac{6}{5}x^8y^2 + \frac{3}{2}x^4y^5$

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

q) $-\frac{2a^2b^2}{3} + a^3b^4 - \frac{a^4b^3}{3}$

r) $x^2 + x - x^2 + 2x = 3x$

s) $x^3 - x^2y - xy^3 - y^4$

t) $3x^3 - 6x^2 + 3x - x - 1 = 3x^3 - 6x^2 + 2x - 1$

u) $a^2b - b^3a + ba^2 - ab^3 = 2a^{2b} - 2b^3a$

v) $4a^2 + 4a^2b + 4ab^2 - 3a^2b - 3ab^2 = 4a^2 + a^2b + ab^2$

w) $2x^2 + 2x + x^2 - 2x = 3x^2$

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2.

a) $A = (2x^3)^2 = 4x^6$

b) $A = 7x * 3x^2 = 21x^3$

c) $A = 5x(12x - 2) = 60x^2 - 10x$

d) $A = 8x^2 * 9x^2 = 72x^4$

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a) $(x + 7)(x + 5) = x^2 + 5x + 7x + 35 = x^2 + 12x + 35$
b) $(4x - 6\ )(x + 4) = 4x^2 + 16x - 6x - 24 = 4x^2 + 10x - 24$
c) $(x + 8)(x + 5) = x^2 + 5x + 8x + 40 = x^2 + 13x + 40$
d) $(3x - 3)(2x - 2) = 6x^2 - 6x + 6 = 6x^2 - 12x + 6$
e) $(x + 4)(x^2 + 6x - 2\ ) = x^3 + 6x^2 - 2x + 4x^2 + 24x - 8 = x^3 + 10x^2 + 22x - 8$
f) $(5x + 7)(3x^2 - 3x - 6) = 15x^3 - 15x^2 - 30x + 21x^2 - 21x - 42 = 15x^3 + 6x^2 - 51x - 42$
g) $(6x - 5)(4x^2 + x - 5) = 24x^3 + 6x^2 - 30x - 20x2 - 5x + 25 = 24x^3 - 14x^2 - 35x + 25$
h) $(x^2 - 5x + 2)(3x^2 + 2x - 7) =$
$x^4 + 2x^3 - 7x^2 - 15x^3 - 10x^2 + 35x + 6x^2 + 4x - 14 =$
$x^4 - 13x^3 - 11x^2 + 39x - 14$
i) $(2x^2 - 3x - 9)(x^2 - 4x - 1) =$
$2x^4 - 8x^3 - 2x^2 - 3x^3 + 12x^2 + 3x - 9x^2 + 36x + 9 =$
$2x^4 - 11x^3 + x^2 + 39x + 9$
j) $(4x^2 - 2x - 3)(2x^2 - 7x - 3) =$
$8x^4 - 28x^3 - 12x^2 - 4x^3 + 14x^2 + 6x - 6x^2 + 21x + 9$
$8x^4 - 32x^3 - 4x^2 + 27x + 9$

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1) $(9v^3 - 1)(8v^3 + 7) = 72v^6 + 63v^3 - 8v^3 - 7 = 72v^6 + 55v^3 - 7$
2) $(4p + p^2)(3p - p^2) = 12p^2 - 4p^3 + 3p^3 - p^4 = 12p^2 - p^3 - p^4$

3) $(2x-8)(2x^2-3x+3) = 4x^3-6x^2+6x-16x^2+24x-24 =$
$4x^3-22x^2+30x-24$

4) $(6n^4-m^2)(36n^8+6n^4m^2+m^4) =$
$216n^{12}+36n^8m^2+6n^4m^4-36m^2n^8-6n^4m^2-m^6 =$
$216m^{12}+6n^4m^4-6n^4m^2-m^6$

5) $2x^2y(2x+y)(x-y) = 2x^2y(2x^2-2xy+xy-y^2) =$
$2x^{2y}(2x^2-xy-y^2) = 4x^4y-2x^3y^2-2x^2y^3$

6) $\left(\frac{1}{2}a^2-\frac{2}{3}a\right)\left(\frac{1}{4}a^4+\frac{1}{3}a^3+\frac{4}{9}a^2\right) =$
$\frac{1}{8}a^6+\frac{1}{6}a^5+\frac{2}{9}a^4-\frac{1}{6}a^5-\frac{2}{9}a^4-\frac{8}{27}a^3 =$
$\frac{a^6}{8}-\frac{8a^3}{27}$

7) $5xy^2\left(2x-\frac{1}{3}\right)(6x^2-15x+3) =$
$5xy^2(12x^3-30x^2+6x-2x^2+5x-1) =$
$5xy^2(12x^3-32x^2+11x-1) =$
$60x^4y^2-160x^3y^2+55x^2y^2-5xy^2$

8) $\frac{x^5}{x^7} = \frac{1}{x^2}$

9) $\frac{a^9b^4}{b^5a^6} = \frac{a^3}{b}$

10) $-\frac{4a^4b^2c}{-8a^2bc} = \frac{a^2b}{2}$

11) $\frac{48x^2y^6}{-18xy^2z} = -\frac{8xy^4}{3z}$

12) $\frac{2}{5}ab^3c^0 \div -\frac{4}{3}a^4bc = \frac{-2ab^3*3}{5*4a^4bc} = -\frac{3b^2}{10a^3c}$

13) $\frac{12v^3v^{4m}}{8vv^{m-1}} = \frac{3v^2v^{3m+1}}{2}$

14) $\frac{15x^{7n}y^{-n+2}}{-3x^{5n}y^{7-4n}} = -5x^{2n}y^{3n-5}$

2.

a) $(2y^4z^7-12z^2y^3) \div 2x^2z^2 = \frac{2y^4z^7}{2x^2z^2}-\frac{12z^2y^3}{2x^2z^2} = \frac{y^4z^5}{x^2}-\frac{6y^3}{x^2}$

b) $(-18t^3r^2-9r^2t^3+r^2t^2) \div (-3t^2r^2) =$
$(-27t^3r^2+r^2t^2) \div (-3t^2r^2) =$
$-\frac{27t^3r^2}{-3t^2r^2}+\frac{r^2t^2}{-3t^2r^2} = 9t-\frac{1}{3}$

c) $(28x^3y^6z^4-49x^2y^5z^3-7xy^3z^2) \div -21xy^3z^2 =$
$\frac{28x^3y^6z^4}{-21xy^3z^2}-\frac{49x^2y^5z^3}{-21xy^3z^2}-\frac{7xy^3z^2}{-21xy^3z^2} =$

$$-\frac{4x^2y^3z^2}{3}+\frac{7xy^2z}{3}+\frac{1}{3}$$

d) $\left(\frac{5x^4}{4}-\frac{3x^7}{6}\right)\div\left(\frac{3x^5}{8}\right)=\frac{10}{3x}-\frac{4x^2}{3}$

e) $\left(\frac{2x^2y^3}{3}-\frac{3xy^3}{4}-\frac{5x^2y^2}{6}\right)\div\left(\frac{5xy}{12}\right)=$

$$\frac{2x^2y^2}{3}\div\frac{5xy}{12}-\frac{3xy^3}{4}\div\frac{5xy}{12}-\frac{5x^2y^2}{6}\div\frac{5xy}{12}=$$

$$\frac{8xy^2}{5}-\frac{9y^2}{5}-2xy$$

f) $(2ab^2c-4a^2bc^3+2abc)\div 2ab=$

$$\frac{2ab^2c}{2ab}-\frac{4a^2bc^3}{2ab}+\frac{2abc}{2ab}=bc-2ac^3+c$$

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1) $(x+5)^2=(x)^2+2*x*5+(5)^2=x^2+10x+25$
2) $(x^3-11)^2=(x^3)^2-2*x^3*11+(11)^2=x^6-22x^3+121$
3) $(x-7)^2=(x)^2-2*x*7+(7)^2=x^2-14x+49$
4) $(6x^4+3x)^3=(6x^4)^2+2*6x^4*3x+(3x)^2=36x^8+36x^5+9x^2$
5) $\left(\frac{2}{5}+5x\right)^2=\left(\frac{2}{5}\right)^2+2*\frac{2}{5}*5x+(5x)^2=\frac{4}{25}+4x+25x^2$
6) $(x^3y^4-1)^2=(x^3y^4)^2-2*x^3y^4*1+(1)^2=x^6y^8-2x^3y^4+1$
7) $\left(\frac{3t^3}{5}+9\right)^2=\left(\frac{3t^3}{5}\right)^2+2*\frac{3t^3}{5}*9+(9)^2=\frac{9t^6}{25}+\frac{54t^3}{5}+81$
8) $(2x^5v+x^4v^7)^2=(2x^5v)^2+2*2x^5v*x^4v^7+(x^4v^7)^2=$
$4x^{10}v^2+4x^9v^8+x^8v^{14}$
9) $(x-3)(x+3)=(x)^2-(3)^2=x^2-9$
10) $(7+6x)(7+6x)=(7+6x)^2=7^2+2*7*6x+(6x)^2=$
$49+84x+36x^2$
11) $(2m^2-9n^5)(2m^2-9n^5)^2=(2m^2)^2-2*2m^2*9n^5+(9n^5)^2=$
$4m^4-36m^2n^5+81n^{10}$
12) $(4+x)(-4+x)=-(4)^2+(x)^2=-16+x^2$
13) $\left(\frac{2r}{7}-7\right)\left(\frac{2r}{7}+7\right)=\left(\frac{2r}{7}\right)^2-(7)^2=\frac{4r^2}{49}-49$
14) $\left(\sqrt{2}m^2-9n^5\right)^2=\left(\sqrt{2}\,m^2\right)^2-2*\sqrt{2}\,m^2*9n^5+(9n^5)^2=$
$2m^4-18\sqrt{2}\,m^2n^5+81n^{10}$
15) $\left(\frac{y^5}{9}x-4\frac{3}{5}\right)\left(\frac{y^5}{9}x+4\frac{3}{5}\right)=\left(\frac{y^5}{9}-\frac{23}{5}\right)\left(\frac{y^5}{9}-\frac{23}{5}\right)=$
$\left(\frac{y^5x}{9}\right)^2-\left(\frac{23}{5}\right)^2=\frac{y^{10}x^2}{81}-\frac{529}{25}$
16) $\left(6x\sqrt{x}-7\right)\left(6x\sqrt{x}+7\right)=\left(6x\sqrt{x}\right)^2-(7)^2=$

$36x^2 * x - 49 = 36x^3 - 49$

17) $(0{,}2m^2 - 9{,}4n^5)^2 = (0{,}2m^2)^2 - 2 * 0{,}2m^2 * 9{,}4n^5 + (9{,}4n^5)^2 =$
$0{,}04m^4 - 3{,}76m^2n^5 + 88{,}36n^{10}$

18) $\left(\frac{h^2}{2} - \sqrt{3}\right)^2 = \left(\frac{h^2}{2}\right)^2 - 2 * \frac{h^2}{2} * \sqrt{3} + \left(\sqrt{3}\right)^2 = \frac{h^4}{4} - h^2\sqrt{3} + 3$

19) $\left(12 + \sqrt{5}\right)\left(\sqrt{5} - 12\right) = \left(\sqrt{5}\right)^2 - (12)^2 = 5 - 144 = -139$

20) $\left(\frac{x^2}{3} + \frac{3}{x}\right)^2 = \left(\frac{x^2}{3}\right)^2 + 2 * \frac{x^2}{3} * \frac{3}{x} + \left(\frac{3}{x}\right)^2 = \frac{x^4}{9} + 2x + \frac{9}{x^2}$

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1) $b^4 * b * b^5 = b^{10}$
2) $e * e = e^2$
3) $g^{-2} * g^2 = g^0 = 1$
4) $c^{-1} * c^{-3} = c^{-4} = \frac{1}{c^4}$
5) $a^{-2} * b^{-5} * a^3 = ab^{-5} = \frac{a}{b^5}$
6) $\frac{x*^4}{x^3} = \frac{x^5}{x^3} = x^2$
7) $\left(\frac{3^2*5}{15}\right)^3 = \left(\frac{3^2*5}{3*5}\right)^5 = 3^3 = 27$

17) $\left(\frac{4a^3b^2c^4}{6ab^3c}\right)^2 = \left(\frac{2a^2c^3}{3b}\right)^2 = \frac{2^2(a^2)^2(c^3)^2}{3^2b^2} = \frac{4a^4c^6}{9b^2}$

8) $\frac{(8x)^2(3y)^3}{24xy^5} = \frac{(2^3)^2(x)^2(3)^3y^3}{2^3*3xy^5} = \frac{2^6x^23^3y^3}{2^3*3xy^5} = \frac{2^3x*3^2}{y^2} = \frac{72x}{y^2}$

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7) $\frac{x^3}{x^4} * \frac{x^2}{x^5} = \frac{1}{x} * \frac{1}{x^3} = \frac{1}{x^4}$

8) $\frac{(-5)^3}{(-5)^2} * \frac{(-5)^4}{(-5)^5} = (-5)^1 * \frac{1}{(-5)^1} = 1$

9) $(-6a^3b^2c^4)(-2bc^3d^2) = 12a^3b^3c^7d^2$

10) $(3m^{-2}pq^{-1})(2m^2p^{-1}q) = 6m^0p^0q^0 = 6$

11) $\left(-\frac{3}{4}m^{-2}p^4q^{-1}\right)\left(-\frac{2}{3}mp^2q\right) = -\frac{3p^4}{4m^2q} * -\frac{2mp^2q}{3} = \frac{6mp^6q}{12m^2q} = \frac{p^6}{2m}$

12) $(x^2)^3 * x = x^6 * x = x^7$

13) $\frac{2(x^2)^4}{(6x^3)^2} = \frac{2x^8}{36x^6} = \frac{x^2}{18}$

14) $(-2a^3b^2c)^4 = (-2)^4(a^3)^4(b^3)^4(c^4) = 16a^{12}b^8c^4$

15) $(4a^{-3}b^4c^{-1})^3 = \left(\frac{4b^4}{a^3c}\right)^3 = \frac{4^3(b^4)^3}{(a^3)^3(c)^3} = \frac{64b^{12}}{a^9c^3}$

19) $\left(-\frac{10m^3n^2p^4}{20m^4n^2p^3}\right)^{-3} = \left(-\frac{p}{2m}\right)^{-3} = \left(-\frac{2m}{p}\right)^3 = \frac{(-2)^3(m)^3}{p^3} = -\frac{8m^3}{p^3}$

20) $\frac{8x^{-2}y^3}{4x^{-4}y^{-2}} = \frac{2y^3y^2x^4}{x^2} = 2y^5x^2$

21) $\left(\frac{2uv^3}{5u^{-4}v}\right)^{-4} = \left(\frac{2v^5v^2}{5}\right)^{-4} = \left(\frac{5}{2v^5v^2}\right)^4 = \frac{5^4}{2^4(v^5)^4(v^2)^4} = \frac{625}{16v^{20}v^8}$

22) $\left(-\frac{12b^{-1}c^{-3}a^2}{3a^{-1}b^{-5}}\right)^2 = \left(-\frac{4a^2ab^5}{bc^3}\right)^{-2} = \left(-\frac{4a^3b^4}{c^3}\right)^{-2} = \left(-\frac{c^3}{4a^3b^4}\right)^2 = \frac{(-c^3)^2}{4^2(a^3)^2(b^4)^2} = \frac{c^6}{16a^6b^8}$

23) $(m^4)^{\frac{5}{2}} = m^{4*\frac{5}{2}} = m^{10}$

24) $\left(m^{-\frac{3}{4}}\right)^8 = \left(\frac{1}{m^{\frac{3}{4}}}\right)^8 = \frac{1^8}{\left(m^{\frac{3}{4}}\right)^8} = \frac{1}{m^{\frac{3}{4}*8}} = 1/m^6$

25) $\left(m^{-\frac{1}{2}}p^{\frac{1}{3}}q^{\frac{1}{4}}\right)^{12} = \left(\frac{p^{\frac{1}{3}}}{m^{\frac{1}{2}}q^{\frac{1}{4}}}\right)^{12} = \frac{\left(p^{\frac{1}{3}}\right)^{12}}{\left(m^{\frac{1}{2}}\right)^{12}\left(q^{\frac{1}{4}}\right)^{.12}} = \frac{p^4}{m^6q^3}$

26) $(u^{24}v^{-42}w^{60})^{\frac{5}{6}} = \left(\frac{u^{24}w^{60}}{v^{42}}\right)^{\frac{5}{6}} =$

$\frac{(u^{24})^{\frac{5}{6}}(w^{60})^{\frac{5}{6}}}{(v^{42})^{\frac{5}{6}}} = \frac{u^{\frac{24*5}{6}}w^{\frac{60*5}{6}}}{v^{\frac{42*5}{6}}} = \frac{v^{20}w^{50}}{v35}$

Página 242

$X = -1$:

$9x + 5 = -13$

$9 * -1 + 5 = -13$

$-4 = -13$

$\therefore x = -1$ No es la solución de la ecuación

$x = -2$:

$9x + 5 = -13$

$9 * -2 + 5 = -13$

$-13 = -13$

$\therefore x = -2$ *Si es la solución de la ecuación*

La solucion de la ecuación es $x = -2$. *Por lo tanto, el conjunto solución es* $S = \{-2\}$

2.

$x = \frac{3}{4}$ $x = \frac{1}{2}$ *Solución*:

$12x - 1 = 8$ $12x - 1 = 8$ $x = \frac{3}{4}$

$12 * \frac{3}{4} - 1 = 8$ $12 * \frac{1}{2} - 1 = 8$ *Conjunto solución*:

$9 - 1 = 8$ $6 - 1 = 8$ $S = \left\{\frac{3}{4}\right\}$

$8 = 8$ $5 = 8$

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a)

$$x + 13 = 8$$

$$x = 8 - 13$$

$$x = -5$$

$$S = \{-5\}$$

b)

$$x - 34 = -7$$

$$x = -7 + 34$$

$$x = 27$$

$$S = \{27\}$$

c)

$$x + \frac{3}{5} = -\frac{4}{7}$$

$$x = -\frac{4}{7} - \frac{3}{5}$$

$$x = -\frac{41}{35}$$

$$S = \left\{-\frac{41}{35}\right\}$$

d)

$$-8 + x = 21$$

$$x = 21 + 8$$

$$x = 29$$

$$S = \{29\}$$

e)

$$6x = -3$$

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

$$x = -\frac{1}{2}$$

$$S = \left\{-\frac{1}{2}\right\}$$

f)

$$-2x = -18$$

$$x = -\frac{18}{-2}$$

$$x = 9$$

$$S = \{9\}$$

g)

$$-x = 1$$

$$x = -1$$

$$S = \{-1\}$$

h)

$$\frac{x}{13} = -3$$

$$x = -3 * 13$$

$$x = -39$$

$$S = \{-39\}$$

i)

$$-\frac{x}{4} = -4$$

$$-x = -4 * 4$$

$$x = -(-4 * 4)$$

$$x = 16$$

$$S = \{16\}$$

j)

$$\frac{3x}{5} = 6$$

$$3x = 6 * 5$$

$$3x = 30$$

$$x = \frac{30}{3}$$

$$x = 10$$

$$S = \{10\}$$

k)

$$-\frac{4x}{7} = -5$$

$$-4x = -5 * 7$$

$$-4x = -35$$

$$x = -\frac{35}{-4}$$

$$S = \left\{\frac{35}{4}\right\}$$

l)

$$\frac{2x}{3} = -\frac{5}{3}$$

$$x = -\frac{5}{3} \div \frac{2}{3}$$

$$x = -\frac{15}{6}$$

$$x = -\frac{5}{2}$$

$$S = \left\{-\frac{5}{2}\right\}$$

Página 244

1.

a) $x - 5 = 21$

$x = 21 + 5$

$x = 26$

$S = \{26\}$

b) $x + 12 = 3$

$x = 3 - 12$

$x = -9$

$S = \{-9\}$

c) $x - 0{,}3 = 1{,}23$

$x = 1{,}23 + 0{,}3$

$x = 1{,}53$

$S = \{1{,}53\}$

d) $\frac{x}{5} = -3$

$x = -3 * 5$

$x = -15$

$S = \{-15\}$

e) $6x = -17$

$x = -\frac{17}{6}$

$s = \left\{-\frac{17}{6}\right\}$

f) $-\frac{3x}{5} = 4$

$-3x = 4 * 5$

$-3x = 20$

$x = \frac{20}{-3}$

$S = \left\{-\frac{20}{3}\right\}$

g) $26x + 1 = 8$

$26x = 8 - 1$

$26x = 7$

$x = \frac{7}{26}$

$S = \left\{\frac{7}{26}\right\}$

h) $17 + 2x = 7$

$2x = 7 - 17$

$2x = -10$

$x = -\frac{10}{2}$

$x = -5$

$S = \{-5\}$

i) $7x + 11 = 4$

$7x = 4 - 11$

$7x = -7$

$x = -\frac{7}{7}$

$x = -1$

$S = \{-1\}$

j) $11x - 6 = 27$

$11x = 27 + 6$

$11x = 33$

$x = \frac{33}{11}$

$x = 3$

$S = \{3\}$

k) $9 - 4x = -3$

$-4x = -3 - 9$

$-4x = -12$

$x = -\frac{12}{-4}$

$x = 3$

$S = \{3\}$

l) $8x - 1 = 1$

$8x = 1 + 1$

$8x = 2$

$x = \frac{2}{8}$

m)

$2x - 9 = -11$

$2x = -11 + 9$

$2x = -2$

$x = -\frac{2}{2}$

$x = -1$

$x = -1$

$S = \{-1\}$

n) $3x - 8 = -20$

$3x = -20 + 8$

$3x = -12$

$x = -\frac{12}{3}$

$x = -4$

$S = \{-4\}$

ñ) $7 + 6x = -20$

$6x = -20 - 7$

$6x = -27$

$x = -\frac{27}{6}$

$x = -\frac{9}{2}$

$S = \left\{-\frac{9}{2}\right\}$

Página 245

2.

2) $x - 4 = -6$

$x = -6 + 4$

$x = -2$

$S = \{-2\}$

4) $-14x = 21$

$x = \frac{21}{-14}$

$x = -\frac{3}{2}$

$S = \left\{-\frac{3}{2}\right\}$

6) $\frac{5x}{4} = 60$

$5x = 60 * 4$

$5x = 240$

$x = \frac{240}{5}$

$x = 48$

$S = \{48\}$

8) $-2{,}2x = -0{,}11$

$x = -\frac{0{,}11}{-2{,}2}$

$x = \frac{1}{20}$

$S = \left\{\frac{1}{20}\right\}$

10)

$4x - 3 = 23$

$4x = 23 + 3$

$4x = 26$

$x = \frac{26}{4}$

$x = \frac{13}{2}$

$S = \left\{\frac{13}{2}\right\}$

12)

$10 - 9x = 7$

$-9x = 7 - 10$

$-9x = -3$

$x = -\frac{3}{-9}$

$x = \frac{1}{3}$

$$S = \left\{\frac{1}{3}\right\}$$

Página 248

a) $x + 2(4 - 3x) = 5(1 - x) + 3$
$x + 8 - 6x = 5 - 5x + 3$
$x - 6x + 5x = 5 + 3 - 8$
$0x = 0$
$S = \mathbb{Q}$

b) $7(2x - 3) + 2(3x - 1) = 17$
$14x - 21 + 6x - 2 = 17$
$14x + 6x = 17 + 21 + 2$
$20x = 40$
$x = \frac{40}{20}$
$x = 2$
$S = \{2\}$

c) $6(5x - 2) + 7(2 - 3x) = 5$
$30x - 12 + 14 - 21x = 5$
$30x - 21x = 5 + 12 - 14$
$9x = 3$
$x = \frac{3}{9}$
$x = \frac{1}{3}$
$S = \left\{\frac{1}{3}\right\}$

d) $4(2 - x) + 3(x - 1) = 15$
$8 - 4x + 3x - 3 = 15$
$-4x + 3x = 15 - 8 + 3$
$-x = 10$
$x = -10$
$S = \{-10\}$

e) $6(x - 1) + 2(1 - x) = 12$
$6x - 6 + 2 - 2x = 12$
$6x - 2x = 12 + 6 - 2$
$4x = 16$
$x = \frac{16}{4}$
$x = 4$
$S = \{4\}$

f) $3(5 - 2x) = 8 + 7(1 - 2x)$

$15 - 6x = 8 + 7 - 14x$
$-6x + 14x = 8 + 7 - 15$
$8x = 0$
$x = \frac{0}{8}$
$x = 0$
$S = \{0\}$

g) $2(3 - x) = 4 + 3(4 - x)$
$6 - 2x = 4 + 12 - 3x$
$-2x + 3x = 4 + 12 - 6$
$x = \{10\}$
$s = \{10\}$

h) $5(8x - 3) = 3 - 2(4x - 3)$
$40x - 15 = 3 - 8x + 6$
$40x + 8x = 3 + 6 + 15$
$48x = 24$
$x = \frac{24}{48}$
$x = \frac{1}{2}$
$s = \left\{\frac{1}{2}\right\}$

i) $2(x - 1) + 3(x + 1) + x + 3 = 6(x + 1)$
$2x - 2 + 3x + 3 + x + 3 = 6x + 6$
$2x + 3x + x - 6x = 6 + 2 - 3 - 3$
$0x = 2$
$0 = 2$
$s = \emptyset$

j) $3(2x - 4) + x^2 + 6(5x + 2) = x(x - 8) - (x - 6)$
$6x - 12 + x^2 + 30x + 12 = x^2 - 8x - x + 6$
$6x + x^2 + 30x - x^2 + 8x + x = 6 + 12 - 12$
$45x = 6$
$x = \frac{6}{45} \rightarrow x = \frac{2}{15}$
$s = \left\{\frac{2}{15}\right\}$

2.

1) $7(x - 1) - 2(x + 1) = 4x$
$7x - 7 - 2x - 2 = 4x$
$7x - 2x - 4x = 7 + 2$

$x = 9$
$s = \{9\}$

2) $5(8x - 3) = 3 - 2(4x - 3)$
$40x - 15 = 3 - 8x + 6$
$40x + 8x = 6 + 3 + 15$
$48x = 24$
$x = \frac{24}{48}$
$x = \frac{1}{2}$
$s = \left\{\frac{1}{2}\right\}$

3) $2(x - 1) - 3(x + 1) + x + 3 = -6(x - 1)$
$2x - 2 - 3x - 3 + x + 3 = -6x + 6$
$2x - 3x + x + 6x = 6 + 2 + 3 - 3$
$6x = 8$
$x = \frac{8}{6}$
$x = \frac{4}{3}$
$s = \left\{\frac{4}{3}\right\}$

4) $2 - 3(x - 1) = 3x - 2(4x - 3)$
$2 - 3x + 3 = 3x - 8x + 6$
$-3x - 3x + 8x = 6 - 2 - 3$
$2x = 1$
$x = \frac{1}{2}$
$s = \left\{\frac{1}{2}\right\}$

Página 252

a) $\frac{x}{4} + \frac{x}{3} = \frac{7}{12}$
$\frac{3x + 4x}{12} = \frac{7}{12}$
$\frac{7x}{12} = \frac{7}{12}$
$x = \frac{\frac{7}{12}}{\frac{7}{12}}$
$x = 1$
$s = \{1\}$

b) $\frac{x}{2}+\frac{x}{3}+\frac{x}{4}=26$

$$\frac{6x+4x+3x}{12}=26$$

$$\frac{13x}{12}=26$$

$$13x=26*12$$

$$13x=312$$

$$x=\frac{312}{12}$$

$$x=24$$

$$s=\{24\}$$

c) $\frac{x}{2}+\frac{7x}{4}=9$

$$\frac{2x+7x}{4}=9$$

$$\frac{9x}{4}=9$$

$$9x=9*4$$

$$9x=36$$

$$x=\frac{36}{9}$$

$$x=4$$

$$s=\{4\}$$

d) $\frac{3x}{4}-\frac{2x}{3}=1$

$$\frac{9x-8x}{12}=1$$

$$\frac{x}{12}=1$$

$$x=12*1$$

$$x=12$$

$$s=\{12\}$$

e) $\frac{4x}{7}-\frac{x}{3}=2$

$$\frac{12x-7x}{21}=2$$

$$\frac{5x}{21}=2$$

$$5x=2*21$$

$$5x=42$$

$$x=\frac{42}{5}$$

$$s=\left\{\frac{42}{5}\right\}$$

f) $\frac{3x}{2}+\frac{1}{6}=\frac{2x}{3}-\frac{2}{3}$

$$\frac{9x+1}{6}=\frac{2x-2}{3}$$
$$3(9x+1)=6(2x-2)$$
$$27x+3=12x-12$$
$$27x-12x=+12-3$$
$$15x=-15$$
$$x=-\frac{15}{15}$$
$$x=-1$$
$$s=\{-1\}$$

g) $\frac{3x}{2}-2x=\frac{3}{8}$

$$\frac{3x-4x}{2}=\frac{3}{8}$$
$$-\frac{x}{2}=\frac{3}{8}$$
$$-x=\frac{3}{8}*2$$
$$-x=\frac{6}{8}$$
$$-x=\frac{3}{4}$$
$$x=-\frac{3}{4}$$
$$s=\left\{-\frac{3}{4}\right\}$$

h) $\frac{x}{3}-\frac{1}{4}=\frac{1}{3}-\frac{x}{4}$

$$\frac{4x-3}{12}=\frac{4-3x}{12}$$
$$\frac{4x-3}{12}=\frac{4-3x}{12}$$
$$4x-3=4-3x$$
$$4x+3x=4+3$$
$$7x=7$$
$$x=\frac{7}{7}$$
$$x=1$$
$$s=\{1\}$$

i) $\frac{x}{2}+\frac{x+3}{3}=6$

$$\frac{3x+21x+3}{6}=6$$
$$3x+2x+6=6*6$$
$$5x+6=36$$
$$5x=36-6$$

$5x = 30$

$x = \frac{30}{5}$

$x = 6$

$S = \{6\}$

j) $\frac{4x+1}{3} + \frac{2x-1}{4} = 1$

$\frac{4(4x+1)+3(2x-1)}{12} = 1$

$16x + 4 + 6x - 3 = 12 * 1$

$22x + 1 = 12$

$22x = 12 - 1$

$22x = 11$

$x = \frac{11}{22}$

$x = \frac{1}{2}$

$s = \left\{\frac{1}{2}\right\}$

k) $\frac{9x+1}{7} + \frac{3x-2}{3} = 1$

$\frac{3(9x+1)+7(3x-2)}{21} = 1$

$27x + 3 + 21x - 14 = 21 * 1$

$48x - 11 = 21$

$48x = 21 - 11$

$48x = 32$

$x = \frac{32}{48}$

$x = \frac{2}{3}$

$s = \left\{\frac{2}{3}\right\}$

l) $\frac{2x-3}{3} + \frac{x-2}{2} = \frac{1}{3}$

$\frac{2(2x-3)+3(x-2)}{6} = \frac{1}{3}$

$4x - 6 + 3x - 6 = \frac{1}{3} * 6$

$7x - 12 = 2$

$7x = 2 + 12$

$7x = 14$

$x = \frac{14}{7}$

$x = 2$

$s = \{2\}$

m) $x - \frac{2x-1}{3} = \frac{3x-5}{5}$

$\frac{3x-2x+1}{3} = \frac{3x-5}{5}$

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

$5(x+1) = 3(3x-5)$

$5x+5 = 9x-15$

$5x-9x = -15-5$

$-4x = -20$

$x = -\frac{20}{-4}$

$x = 5$

$s = \{5\}$

n) $x - \frac{5x-1}{3} = 4x - \frac{3}{5}$

$\frac{3x-(5x-1)}{3} = \frac{20x-3}{5}$

$\frac{3x-5x+1}{3} = \frac{20x-3}{5}$

$-\frac{2x+1}{3} = \frac{20x-3}{5}$

$5(-2x+1) = 3(20x-3)$

$-10x+5 = 60x-9$

$-10x-60x = -9-5$

$-70x = -14$

$x = -\frac{14}{-70}$

$x = \frac{1}{5}$

$s = \left\{\frac{1}{5}\right\}$

Ñ) $\frac{x-2}{3} - \frac{x-3}{4} = \frac{x-4}{5}$

$\frac{4(x-2)-3(x-3)}{12} = \frac{x-4}{5}$

$\frac{4x-8-3x+9}{12} = \frac{x-4}{5}$

$\frac{x+1}{12} = \frac{x-4}{5}$

$5(x+1) = 12(x-4)$

$5x+5 = 12x-48$

$5x-12x = -48-5$

$-7x = -53$

$$x = -\frac{53}{-7}$$
$$x = \frac{53}{7}$$
$$s = \left\{\frac{53}{7}\right\}$$

o) $\frac{3}{8}(2x-3) - \frac{4}{3}(x-2) = \frac{2}{3}$

$$\frac{9(2x-3) - 32(x-2)}{24} = \frac{2}{3}$$
$$18x - 27 - 32x + 64 = \frac{2}{3} * 24$$
$$-14x + 37 = 16$$
$$-14x = 16 - 37$$
$$-14x = -21$$
$$x = -\frac{21}{-14}$$
$$x = \frac{3}{2}$$
$$s = \left\{\frac{3}{2}\right\}$$

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2.

1) $\frac{x+3}{6} + \frac{x-2}{4} = \frac{4}{3}$

$\frac{2(x+3)+3(x-2)}{12} = \frac{4}{3}$

$\frac{2x+6+3x-6}{12} = \frac{4}{3}$

$\frac{5x}{12} = \frac{4}{3}$

$x = \frac{4}{3} \div \frac{5}{12}$

$x = \frac{48}{15}$

$x = \frac{16}{5}$

$s = \left\{\frac{16}{5}\right\}$

1) $\frac{x+3}{4} = \frac{2-x}{3} - \frac{x+1}{6}$

$$\frac{x+3}{4} = \frac{2(2-x) - (x+1)}{6}$$

$$\frac{(x+3)}{4} * 6 = 4 - 2x - x - 1$$
$$\frac{6x+18}{4} = 3 - 3x$$
$$6x + 18 = 4(3 - 3x)$$
$$6x + 18 = 12 - 12x$$
$$6x + 12x = 12 - 18$$
$$18x = -6$$
$$x = -\frac{6}{18}$$
$$x = -\frac{1}{3}$$
$$s = \left\{-\frac{1}{3}\right\}$$

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

$$\frac{4(x+1) - 9(5-x)}{18} = \frac{4 - (x-1)}{2}$$
$$\frac{4x + 4 - 45 + 9x}{18} = \frac{4 - x + 1}{2}$$
$$\frac{13x - 41}{18} = \frac{5 - x}{2}$$
$$2(13x - 41) = 18(5 - x)$$
$$26x - 82 = 90 - 18x$$
$$26x + 18x = 90 + 82$$
$$44x = 172$$
$$x = \frac{172}{44}$$
$$x = \frac{43}{11}$$
$$s = \left\{\frac{43}{11}\right\}$$

3) $\frac{3}{5}(x-3) - \frac{x+2}{15} = \frac{1}{3}$

$$\frac{9(x-3) - (x+2)}{15} = \frac{1}{3}$$
$$9x - 27 - x - 2 = \frac{1}{3} * 15$$
$$8x - 29 = 5$$
$$8x = 5 + 29$$
$$8x = 34$$
$$x = \frac{34}{8}$$
$$x = \frac{17}{4}$$

$s = \left\{\frac{17}{4}\right\}$

4) $14 - \frac{2x+7}{3} = 3x - \frac{3(5x-7)}{9}$

$\frac{42-(2x+7)}{3} = \frac{27x-3(5x-7)}{9}$

$\frac{42-2x-7}{3} = \frac{27x-15x+21}{9}$

$\frac{35-2x}{3} = \frac{12x+21}{9}$

$\frac{35-2x}{3} * 9 = 12x + 21$

$3(35-2x) = 12x + 21$

$105 - 6x = 12x + 21$

$-6x - 12x = 21 - 105$

$-18x = -84$

$x = -\frac{84}{-18}$

$x = \frac{14}{3}$

$s = \left\{\frac{14}{3}\right\}$

5) $\frac{x+1}{2} - \frac{2(x-1)}{12} = x - \frac{2(x-2)}{6}$

$\frac{x+1}{2} - \frac{x-1}{6} = x - \frac{x-2}{3}$

$\frac{3(x+1)-(x-1)}{6} = \frac{3x-(x-2)}{3}$

$\frac{3x+3-x+1}{6} = \frac{3x-x+2}{3}$

$\frac{2x+4}{6} = \frac{2x+2}{3}$

$2x + 4 = \frac{2x+2}{3} * 6$

$2x + 4 = 2(2x + 2)$

$2x + 4 = 4x + 4$

$2x - 4x = 4 - 4$

$-2x = 0$

$x = \frac{0}{-2}$

$x = 0$

$s = \{0\}$

Página 254

a) $7x + 2 + 9x = 6 + 4x - 3$
$7x - 9x - 4x = 6 - 3 - 2$
$-6x = 1$
$x = -\frac{1}{6}$
$s = \left\{-\frac{1}{6}\right\}$

b) $10x + 5 - 18x = 7 - 5x - 3$
$10x - 18x + 5x = 7 - 3 - 5$
$-3x = -1$
$x = -\frac{1}{-3}$
$x = \frac{1}{3}$
$s = \left\{\frac{1}{3}\right\}$

c) $2x - x - 3 = 10 + 7x - 4$
$2x - x - 7x = 10 - 4 + 3$
$-6x = 9$
$x = \frac{9}{-6}$
$x = -\frac{3}{2}$
$s = \left\{-\frac{3}{2}\right\}$

d) $11x - 6x - 6 = 20 - 8x$
$11x - 6x + 8x = 20 + 6$
$13x = 26$
$x = \frac{26}{13}$
$x = 2$
$s = \{2\}$

e) $y - 5 = 3y - 25$
$y - 3y = -25 + 5$
$-2y = -20$
$y = -\frac{20}{-2}$
$y = 10$
$s = \{10\}$

f) $11x + 5x - 1 = 65x - 36$
$11x + 5x - 65x = -36 + 1$
$-49x = -35$

$x = -\frac{35}{-49}$

$x = \frac{5}{7}$

$s = \left\{\frac{5}{7}\right\}$

g) $8x - 4 + 3x = 7x + x + 14$

$8x + 3x - 7x - x = 14 + 4$

$3x = 18$

$x = \frac{18}{3}$

$x = 6$

$s = \{6\}$

h) $8y + 9 - 12y = 4y - 13 - 5y$

$8y - 12y - 4y + 5y = -13 - 9$

$-3y = -22$

$y = -\frac{22}{-3}$

$y = \frac{22}{3}$

$s = \left\{\frac{22}{3}\right\}$

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1) $x + 21$
2) $x - 49$
3) $x^2 + 12$
4) $x^3 - 10$
5) $4x + 36$
6) $\frac{13}{100}x = 0{,}13x$
7) $x + (x + 1) + (x + 2) = 33$
8) $x + (x + 2)$
9) $x^2 - x$

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10) $a)\ 15 - x$

$b) 15 + x$

11) $A = x(2x)$

12) $50t$
13) $5x + 10y + 25z$
14) $y + 9 = 16$
15) $\frac{x}{3} = 8$
16) $x + (x + 1) = 47$
17) $\begin{cases} 4x = 40 \\ x + x + x + x = 40 \end{cases}$
18) $P = x + 2x + 6x$
19) $a) 29 - 10 = 19$
$b) 29 - 17 = 12$
$c) 29 - x$
20) $\frac{x+2}{5}$
21) $3(x - 6)$
22) $\frac{3x}{8} + 5$
23) $\begin{cases} \frac{28}{100}x = 420 \\ 0{,}28x = 420 \end{cases}$

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1) Pedro: $3x$
Juan: x
$x + 3x = 48$
$4x = 48$
$x = \frac{48}{4}$
$x = 12$
R/
$\begin{cases} Juan: 12\ naranjas \\ Pedro: 36\ naranjas \end{cases}$

2)
Padre: 5x
Hijo: x
$x + 5x = 60$
$6x = 60$
$x = \frac{60}{60}$
$x = 10$
$R/\ \begin{cases} Hijo: 10\ años \\ Padre: 50\ años \end{cases}$

3)
Números: $\begin{cases} x \\ x + 1 \end{cases}$
$x + (x + 1) = 51$
$x + x + x = 51$

$2x + 1 = 51$

$2x = 51 - 1$

$2x = 50$

$x = \frac{50}{2}$

$x = 25$

R/ $25\ y\ 26$

4)

Números: $\begin{cases} x \\ x + 1 \\ x + 2 \end{cases}$

$x + (x + 1) + (x + 2) = 63$

$x + x + 1 + x + 2 = 63$

$3x + 3 = 63$

$3x = 63 - 3$

$3x = 60$

$x = \frac{60}{3}$

$x = 20$

R/ $Números: 20, 21\ y\ 22$

5) $x + y = 27 \rightarrow y = 27 - x$

$y - x = 7$

$(27 - x) - x = 7$

$27 - x - x = 7$

$27 - 2x = 7$

$-2x = 7 - 27$

$-2x = -20$

$x = -\frac{20}{-2}$

$x = 10$

R/ $N\acute{u}meros: 10\ y\ 17$

6)

$x + y = 131$

$y = 131 - x$

$y - x = 63$

$(131 - x) - x = 63$

$131 - x - x = 63$

$131 - 2x = 63$

$-2x = 63 - 131$

$-2x = -68$

$x = -\frac{68}{-2}$

$x = 34$

R/ $N\acute{u}meros: 34\ y\ 97$

7)

A:x

B:$2x$

C:$4x$

$x + 2x + 4x = 3500000$

$7x = 3500000$

$x = \frac{3500000}{7}$

$x = 500000$

R/ Reciben

A: ¢500000

B: ¢1000000

C: ¢2000000

8)

Ida:$x + 12$

Regreso: x

$x + x + 12 = 100$
$2x + 12 = 100$
$2x = 100 - 12$
$2x = 88$
$x = \frac{88}{2}$
$x = 44$

R/
Ida: $56\ minutos$
Regreso: $44\ minutos$

9)

Aprobados: $4x$
No Aprobados: x

$4x + x = 80$
$5x = 80$
$x = \frac{80}{5}$
$x = 16$

R/
Aprobados: 64
No Aprobados: 16

10)

ancho:x
largo:$3x$

$2 * x + 2 * 3x = 56$
$2x + 6x = 56$
$8x = 56$
$x = \frac{56}{8}$
$x = 7$

R/
ancho: $7cm$
largo: $21cm$

11)

Corea: $x + 17$
Norteamérica:x

$x + (x + 17) = 25$
$x + x + 17 = 25$
$2x + 17 = 25$
$2x = 25 - 17$
$2x = 8$
$x = \frac{8}{2}$
$x = 4$

R/
Corea: 21 aviones
Norteamérica: 4 aviones

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12)

1°:x
2°:2x
3°4x
4°:8x

$x + 2x + 4x + 8x = 90$
$15x = 90$
$x = \frac{90}{15}$
$x = 6$

R/
Números: $6, 12, 24, 48$

13)

Números:$\begin{cases} x \\ x + 2 \\ x + 4 \end{cases}$

$x + x + 2 + x + 4 = 93$

$3x + 6 = 93$
$3x = 96 - 6$
$3x = 87$
$x = \frac{87}{3}$
$x = 29$

R/
Números: 29, 31 y 33

14)

Perro: 8x
Collar: x

$x + 8x = 54$
$9x = 54$
$x = \frac{54}{9}$
$x = 6$

R/
Perro: $48
Collar: $6

15)

Traje:$x + 25$
Libro:x
Sombrero:$x + 5$

$(x + 25) + x + (x + 5) = 87$
$x + 25 + x + x + 5 = 87$
$3x + 30 = 87$
$3x = 87 - 30$
$3x = 57$
$x = \frac{57}{3}$
$x = 19$

R/
Traje: $44
Libro: $19
Sombrero: $24

16)

$$x + \frac{5x}{6} = 3x - 14$$
$$x + \frac{5x}{6} - 3x = -14$$
$$\frac{6x + 5x - 18x}{6} = -14$$
$$-7x = -14 * 6$$
$$-7x = -84$$
$$x = -\frac{84}{-7}$$
$$x = 12$$

R/ Número: 12

17)

1° Piso: $2x$

2° Piso:x

$$x + 2x = 48$$
$$3x = 48$$
$$x = \frac{48}{3}$$
$$x = 16$$

R/

1° Piso: 32 habitaciones

2° Piso: 16 habitaciones

18)

Original: x

Gasté: $\frac{x}{2}$

Presté: $\frac{x}{4}$

Quedan: 21

$$\frac{x}{2} + \frac{x}{4} + 21 = x$$
$$\frac{x}{2} + \frac{x}{4} - x = -21$$
$$\frac{2x + x - 4x}{4} = -21$$
$$-x = -21 * 4$$
$$-x = -21 * 4$$
$$-x = -84$$
$$x = 84$$

R/ Tenía $84

19)

Tienen: x

Luis: $x - 20$

José: $\begin{cases} 2(x-20) \\ x+20 \end{cases}$

$2(x-20) = x+20$

$2x - 40 = x + 20$

$2x - x = 20 + 40$

$x = 60$

R/ Cada uno tiene ¢60

20)

Hoy: $\begin{cases} Padre: 4x \\ Hijo: x \end{cases}$

Dentro de 5 años:

Padre: $\begin{cases} 4x+5 \\ 3(x+5) \end{cases}$

Hijo: $x + 5$

$4x + 5 = 3(x+5)$

$4x + 5 = 3x + 15$

$4x + 3x = 15 - 5$

$x = 10$

R/

Padre: 40 años

Hijo: 10 años

21)

Tengo: x

Me pagan 7

$\frac{4}{5}(x+7) + 20 = x + 7$

$\frac{4(x+7)+100}{5} = x + 7$

$4x + 28 + 100 = 5(x + 7)$
$4x + 128 = 5x + 35$
$4x - 5x = 35 - 128$
$-x = -93$
$x = 93$

R/ Tengo $93

22) $\text{Ángulos}\begin{cases} 3x \\ 2x + 6 \\ x - 18 \end{cases}$
$3x + (2x + 6) + (x - 18) = 180$
$3x + 2x + 6 + x - 18 = 180$
$6x - 12 = 180$
$6x = 180 + 12$
$6x = 192$
$x = \frac{192}{6}$
$x = 32$

R/ $\text{Ángulos}: 96°, 70°, 14°$

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23) $5x + 1 = 2x + 13$
$5x - 2x = 13 - 1$
$3x = 12$
$x = \frac{12}{3}$
$x = 4$

$EG = 21$

24) $3x + 5 = 2x + 6$
$3x - 2x = 6 - 5$
$x = 1$
$R = \ m\measuredangle SNC = 8°$

25) $4x + 5 = 2x + 9$
$4x - 2x = 9 - 5$
$2x = 4$
$x = \frac{4}{2}$
$x = 2$

R/$DE = 13$

8° Capitulo IV Estadística y Probabilidad

Pagina 271

a) Recolección
b) Experimentación
c) Experimentación
d) Recolección
e) Experimentación
f) Experimentación

Página 281

Edades de los alumnos	Frecuencia absoluta fi
15	3
16	19
17	13
18	5
Frecuencia total (n)	40

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2.

Persona del grupo familiar	Hogares
1	1
2	2
3	6
4	12
5	11
6	8
7	6
8	2
9	1
10	1
Total	50

3.

Kilómetros	Vehículos
8	7
9	8
10	9

11	10
12	12
13	14
14	12
15	10
16	11
17	12
18	6
19	6
20	3
Total	120

4.

Edades	Frecuencia absoluta	Frecuencia relativa	Frecuencia relativa porcentual
19	1	0.025	2.5%
20	15	0.375	37.5%
21	8	0.2	20%
22	11	0.275	27.5%
23	4	0.1	10%
24	1	0.025	25%
Total	40	1	100%

5.

Velocidad	Frecuencia absoluta	Frecuencia Relativa	Frecuencia relativa porcentual
21	14	0.2545	25.45%
22	9	0.1636	16.36%
23	10	0.1818	18.18%
24	6	0.1091	10.91%
25	10	0.1818	18.18%
26	6	0.1091	10.91%
Total	55	0.9999	99.99%

Nota: NO dan 1 y 100% por redondeo

6.

a) Frecuencia absoluta de “julio”:18

b) Frecuencia relativa de “julio”:$\frac{18}{50} = 0.36$

c) Frecuencia Porcentual de “otros meses”: $\frac{50-18}{50} * 100 = \frac{32}{50} * 100 = 0.64 * 100 = 64\%$

7.

a)

Valor	Frec. Abs	Frec. Relat	Frec. Porc.
1	5	0.25	25%
3	8	0.4	40%
7	2	0.1	10%
9	5	0.25	25%
Suma	20	1	100%

b)

Cualidad	Frec. Abs.	Frec. Relat	Frec. Porc
Azul	6	0.15	15%
Rojo	15	0.375	37.5%
Blanco	10	0.25	25%
Negro	9	0.225	22.5%
Suma	40	1	100%

8.

a)

Valor	Frec. Abs	Frec. Relat	Frec. Porc
2.5	11	0.36	36%
3.5	6	0.20	20%
4.5	2	0.006	6%
5.5	1	0.04	4%
5.6	10	0.34	34%
Total	30	1	100%

b)

Valor	Frec. Abs	Frec. Relat	Frec. Porc
30	2	0.008	8%
40	6	0.24	24%
50	10	0.40	40%
60	2	0.08	8%
70	5	0.20	20%

	25	1	100%

9.

a)

Intervención	Frec. Abs	Frec. Relat	Frec. Porc
0	5	0.208	20.8%
1	6	0.25	25%
2	7	0.292	29.2%
3	4	0.167	16.7%
4	2	0.083	8.3%
Suma	24	1	100%

b) No hay respuestas

c) No hay respuestas

d) 3 intervención, 16.7%
1 intervención, 25%

2 intervención, 29,2%

e) $20.8\% \rightarrow no\ han\ hecho\ más\ de\ tres$
$8.3\% \rightarrow no\ han\ hecho\ más\ de\ tres$

Página 297

1) 1. $1991; 1992; 7.7\%$
2. 1.5%
3. $redujo; 2.4\%$

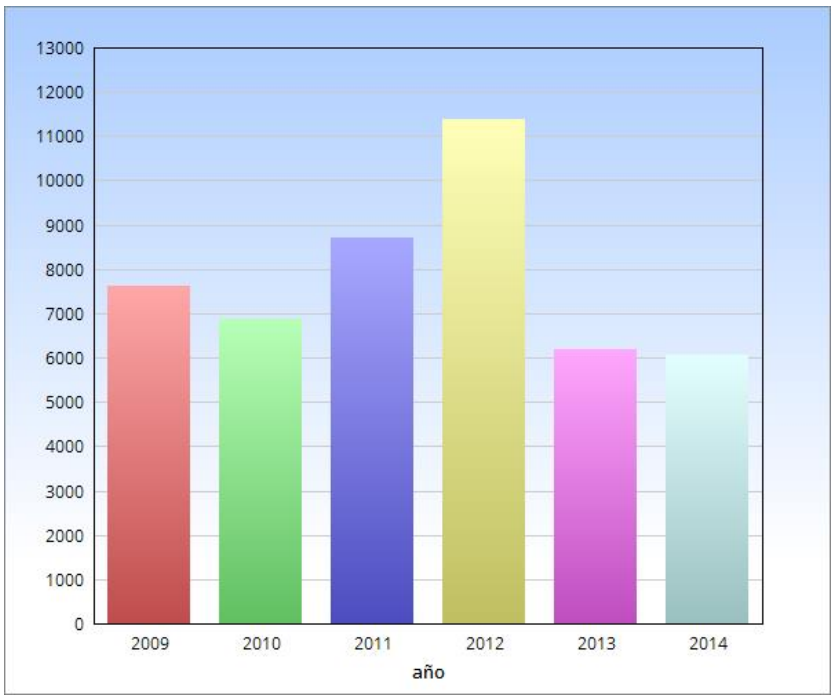
Página 298

2) 1)8700 4)7800
2)1200 5)4800
3)6900

Página 299

3) a) $Noviembre\ y\ tiene\ 30cm$
b) $50cm$

4)



a) Aproximadamente 4000
b) Aproximadamente 2000

Página 300

5)

a) 52% son 11 personas
   14% son 3 personas
   19% son 4 personas
   5% son 1 personas
   5% son 1 personas
b) No hay respuesta

6)

a) Asia
b) África
c) Asia es mayor a África por un 10%
d) África y Asia
e) 0.3125
f) Seria aproximadamente 148-57 millones de km^2

Página 301

7) - Desde 1985 al 2003 se ve una reducción de ventas de carros grandes
   - Se ve un aumento de ventas de carros de lujo
   - La venta de carros medianos se mantiene entre 45% al 49%
   - La venta de carros pequeños se mantiene entre 26% al 31%

8)

a) $9600
b) Se deprecia aproximadamente $14000
c) Seria aproximadamente $7000
d) Debe venderlo antes de 2 años de comprado

Página 302

9) Son datos de poblaciones cada 10 años. Ambas van creciendo con el paso del tiempo. Para el 2010, Alaska puede tener cerca de 700 mil habitantes y Hawaii aproximadamente 1400 miles de habitantes. La predicción se hace considerando que el crecimiento sea similar a los anteriores.

10)

a) El pollo
b) 10 millas/hora
c) Guepardo
d) Si, porque corre más rápido

Página 307

1) 1. $\bar{x} = \frac{25+27+32+32+28+30+30+32+24+24+22+20}{12} = 27.17°$
2. $M_o = 32°$
3. $M_e = \frac{27+28}{2} = 27.5°$

Página 308

2) 1. $\bar{x} = \frac{50+45+50+51+55+48+54+50+55+47+52+54+49+52+53+49+47+48+50+53+49+46+51+52}{25} = 48.32\ minutos$
2. $M_o = 50$
3. $M_e = 50$
3) $\bar{x} = \frac{10*1+11*2+12*3+13*6+14*7+15*11+16*12+17*13+18*15+19*18+20*9+21*2+22*1}{100} = 16.78$
$M_o = 19$
$M_e = 17$

Página 309

4) a) 2,8,7,8,5,8,10,5

$$\bar{x} = \frac{2 + 8 + 7 + 8 + 5 + 8 + 10 + 5}{8}$$

$$M_e = \frac{7 + 8}{2} = 7.5$$

$M_o = 8$

b) 10,12,12,14,20,16,12,14,11

$\bar{x} = \frac{10 + 12 + 12 + 14 + 20 + 16 + 12 + 14 + 11}{9}$

$M_e = 12$

$M_o = 12$

c)

18,22,22,17,30,18,12

$\bar{x} = \frac{18 + 22 + 22 + 17 + 30 + 18 + 12}{7} \approx 19.85$

$M_e = 18$

$M_o = 22.18$

5)

a) $\bar{x} = \frac{2*18000+4*22000+4*26000+3*35000+12*38000+8*44000+4*50000+2*80000+1*150000}{40} =$

$41275

b) $M_e = 38000$

c) $M_o = 38000$

6) $M_e = 68$
7) $M_e = 9$
8) $M_e = 20$
9) $M_o = 6$
10) $M_o = 4y5$

Página 310

11) $M_o = 11$
12) $\bar{x} \approx 8.63$
    $me = 10$
    $max = 16$
    $min = 0$
    $Mo = No\ tiene$
13) Tiempo promedio 52.916
    Moda:48
    Mediana: 52.5
    min:45
    max:64
14) $24 + 34 = 58\ años$
15) $90 = \frac{34+95+86+94+x}{5}$
    $90 * 5 = 359 + x$

$450 - 359 = x$

$91 = x$

16) Min:x

Max:$x + 6$

M_e: 90

$$\frac{x + x + 6 + 90}{3} = 92$$

$2x + 96 = 92 * 3 = 276$

$2x = 276 - 96 = 180$

$$x = \frac{180}{2} = 90$$

R/ $90y\ 96$

Página 311

17) 1. C

2. C

Página 312

3. B

3. C

5. B

Página 313

18) 1. $\bar{x} = 65.1$

$Mo = 65$

$Min = 56$

$Max = 72$

$R = 72 - 56 = 16$

19) $\bar{x} = 14.58$

$Mo = no\ hay$

$Min = 13.0$

$Max = 16.9$

$R = 16.9 - 13.0 = 3.9$

20) $\bar{x} = 8.73$

$Mo = 12$

$Min = 1$

$Max = 15$

$R = 15 - 1 = 4$

21) $\bar{x} = 18.27$

$Mo = 14$

$Min = 11$

$Max = 29$

$R = 29 - 11 = 18$

22) $\bar{x} = 23.07$

$Mo = 17\ y\ 19$
$Min = 11$
$Max = 35$
$R = 35 - 11 = 24$

23) $\bar{x} = 68.7$
$Mo = no\ tiene$
$Min = 4$
$Max = 92$
$R = 92 - 4 = 88$

Página 317

1.

Aleatoria
A C E F G
Determinista
B D

Página 318

2. Aleatorias
→ Ser el primer jugador de un partido de baloncesto que encesta
→ Ser el primer pasajero en bajar del tren
→ Lanzar una moneda al aire para elegir el orden de exposición de un trabajo

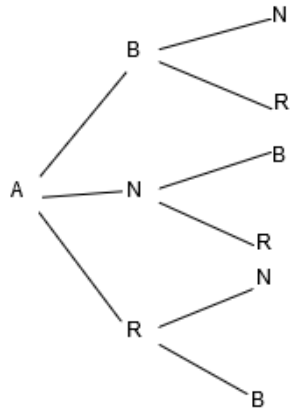
Deterministas
→ Si hoy es martes, mañana sea miércoles
→ Al lanzar un dado de 8 caras se obtiene un número menor que 10
→ Si se lanza hacia arriba una piedra, volverá a caer hacia abajo

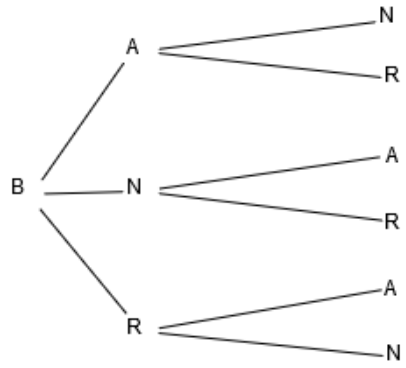
Página 323

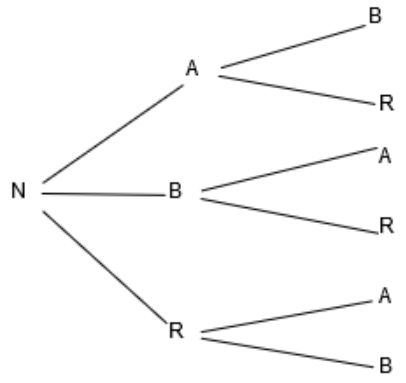
a) $\Omega = \{EE, EC, CE, CC\}$
b) $\Omega = \{demenino, masculino\}$
c) $\Omega = \{A, 1,2,3,4,5,6,7,8,9,10, J, Q, K\}$
d) $\Omega = \{EEE, EEC, ECE, ECC, CEE, CEC, CCE, CCC\}$
e) $\Omega = \{1,2,3,4,5,6,7,8,9,10,11,12,13,14,15\}$
f) $\Omega = \{todos\ los\ nombres\ de\ la\ lista\}$

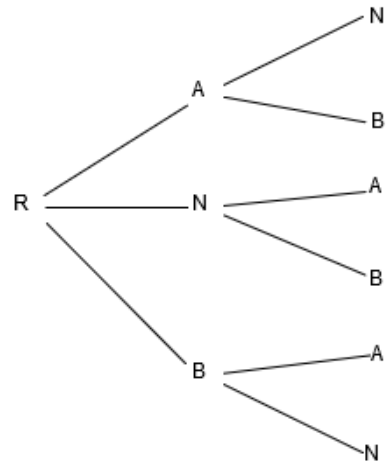
2.

a)


A
B
N
R
N
B
R
R
N
B

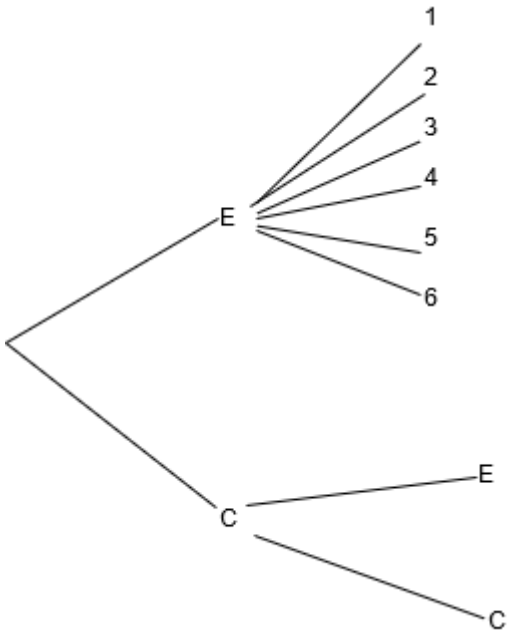

B
A
N
R
N
A
R
R
A
N


N
A
B
R
B
A
R
R
A
B


R
A
N
B
N
A
B
B
A
N

A: Azul
B: Blanco
N: Negro
R: Rojo

b)



Página 326

1) 1. Imposible
   2. Compuesto

Página 327

3. Seguro
4. Imposible
5. Seguro

1) A) Aleatoria
   b) Determinista
   c) Determinista
   d) Aleatoria
2) A) Aleatorio
   b) Determinista

c) Determinista

d) Aleatorio

2)

a)

$$\Omega = \begin{Bmatrix} IEC, IEE, ICE, ICC, 2EC, 2EE, 2CE, 2CC, 3EC, 3EE, 3CE, 3CC, 4EC, 4EE, 4CE, 4CC, 5EC, 5EE, 5CE, 5CC \\ 6EE, 6CE, 6CC \end{Bmatrix}$$

B)

$$\Omega = \begin{Bmatrix} Az, & RV, AzRAm, AzVAm, AzVR, AzAmR, AzAmV, RazV, \\ & RAzAm, RVAz, RVAm, RAmAz, RAmV, \\ & AmVAz, AmVR, AmAzV, AmAzR, AmRV, \\ & AmRAz, VAzAm, VAzR, VAmR, VAmAz, VRAm, VRAz \end{Bmatrix}$$

c)

$$\Omega = \begin{Bmatrix} (1,1), (1,2), (1,3), (1,4), (1,5), (1,6), \\ (2,1), (2,2), (2,3), (2,4), (2,5), (2,6), (3,1), \\ (3,2), (3,3), (3,4), (3,5), (3,6), (4,1), (4,2) \\ (4,3), (4,4), (4,5), (4,6), (5,1), (5,2), (5,3), \\ (5,4), (5,5), (5,6), (6,1), (6,2), (6,3), (6,4), \\ (6,5), (6,6) \end{Bmatrix}$$

d)

$$\Omega = \{AA, AB, AC, AD, BA, BB, BC, BD, CA, CB, CC, CD, DA, DB, DC, DD\}$$

Página 328

4) 1. Determinista
2. Determinista
3. Aleatorio, pueden enfermarse o sufrir un accidente de camino
4. Determinista
5. Aleatorio, no se sabe quien va a entrar
6. Determinista
7. Aleatorio, existen muchos
8. Aleatorio, puede caer en muchos lugares
9. Aleatorio, no se sabe cual cara va a caer
10. Determinista

11. Aleatorio; puede ganar empatar o perder
12.

    a) Determinista
    b) Aleatorio, todos los números son diferentes

13. Determinista
14. Aleatorio, no sabemos en cual banco
15. Determinista
16. Aleatorio, en un mismo día puede cambiar varias veces
17. Determinista
18. Determinista
19. Aleatorio, puede caer en cualquier lugar
20. Aleatorio, tiene dos caras
21. Determinista
22. Aleatorio, hay muchos
23. Aleatorio, se puede hacer a cualquier distancia
24. Determinista

5) A)

$$\Omega = \{JMV, JMN, JVN, MJN, MJV, MNV, VJM, VJN, VMN, NJM, NJV, NMV, JVM, JNM, JNV, MNJ, MVJ, MVN, VMJ, VNJ, VNM, NMJ, NVJ, NVM\}$$

$E = \emptyset; IMPOSIBLE$
$F = \{JMN, MJN, MNV, VMN, VMN, NJM, NMV, JNM, MNJ, MVN, VNM, NMJ, NVM\}; Compuesto$
$G = F; compuesto$
$H = \{JMN, MJN, NJM, JNM, MNJ, NMJ\}; Compuesto$

Página 329
b)

$\Omega = \{11,12,13,21,23,31,32\}$
$N = \{12\}; Simple$
$O = \{11,12,13,21,23,31,32\}; seguro$
$P = \{12,32\}; compuesto$

6) A) NO
    b) Si
    c) Si
    d) Si
    e) Si
    f) Si

7)

a)$\Omega = \{AmAmAmAmAm, AzAzAzAzAz, RRRRR, VVVVV, NNNNN\}$

b) $\Omega = \{IE, IC, 2E, 2C, 3E, 3C, 4E, 4C, 5E. 5C, 6E, 6C\}$

c) $\Omega =$
$\{NoNoNoNo, NoNoNoNa, NoNoNaNo, NoNoNaNa, NaNoNoNo, NaNoNoNa$
$NaNoNaNo, NaNoNaNa, NaNaNoNo, NaNaNoNa, NaNaNaNo, NaNaNaNa\}$

d) $\Omega =$
$\{11,12,13,14,15,16,21,22,23,24,25,26,31,32,33,34,35,36,41,42,43,44,45,46,51$
$52,53,54,55,56,61,62,63,64,65,66\}$

e) No se puede determinar, pues cada banco tiene restricciones como repetirlos o no se pueden usar en un conjunto determinado a todos del 0 al 9

f) $\Omega = \{auto\ comprado\}$

g) $\Omega = \{A, 2,3,4,5,6,7,8,9,10, J, Q, K\}$ *o* $\Omega =$
$\{Diamante, Trébol, Corazón, Espada\}$

h) $\Omega = \{crudo, cocinado\}$

i) $No\ se\ puede\ determinar, pues\ falta\ el\ dibujo\ de\ la\ ruleta$

Página 330

6)

a) $\{2,3,5\}$

b) $\{1\}$

c) $\{5,6\}$

d) $\{4\}$

e) $\{1,2,3,4,5,6\}$

f) $\{1,2,3,6\}$

g) $\{3,6\}$

7)

$\rightarrow Funciona\ bien$
$\rightarrow Falla\ la\ lámpara1$
$\rightarrow Falla\ la\ lámpara2$
$\rightarrow Fallan\ las\ dos\ lámparas$
$\rightarrow Falla\ una\ de\ las\ lámparas$

8)

$A = \{15,24,33,42,51\}$
$B = \{11,12,13,14,21,22,23,31,32,41\}$
$C = \emptyset$
$D = \{11\}$
E
$= \{11,12,13,14,15,16,21,22,23,24,25,26,31,32,33,34,35,36,41,42,43,44,45,46,51,52,53,54$
$, 55,56,61,62,63,64,65,66\}$

9)

1. $\Omega = \{E, C\}$
2. $\Omega = \{1,2,3,4,5,6\}$
3. $\Omega = \{1E, 1C, 2E, 2C, 3E, 3C, 4E, 4C, 5E, 5C, 6, E, 6C\}$
4. $\Omega = \{EEE, EEC, ECE, ECC, CEE, CEC, CCE, CCC\}$
5. $\Omega = \{MMM, MMH, MHM, MHH, HMM, HMH, HHM, HHH\}$

Página 331

10)

a) $\Omega = \{EEE, EEC, ECE, ECC, CEE, CEC, CCE, CCC\}$
b) $\Omega = \{3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18\}$
c) $\Omega = \{BB, BN, NB, NN\}$
d) $\Omega = \{LLL, LLN, LNL, LNN, NLL, NLN, NNL, NNN\}$

11) A

12) D

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13) C

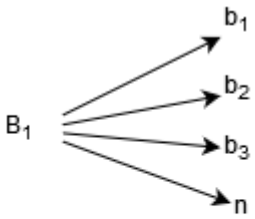
14)

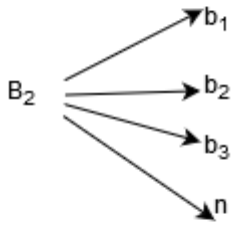
	1	2	3	4	5	6
1	2	3	4	5	6	7
2	3	4	5	6	7	8
3	4	5	6	7	8	9
4	5	6	7	8	9	10
5	6	7	8	9	10	11
6	7	8	9	10	11	12

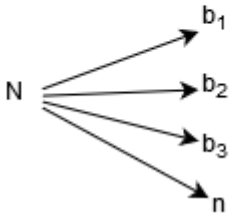
A B } → Cambiar el color de la letra o rellenar las celdas

15)

1.

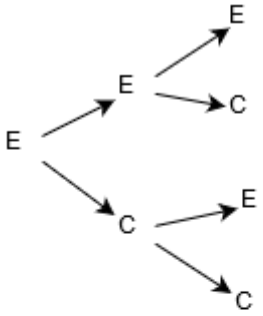


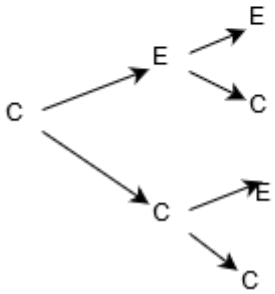




$E = \{B, b_1\ , B, b_2, B, b_3, B_2b_1, B_2b_2, B_2b_3, N_n\ \}$

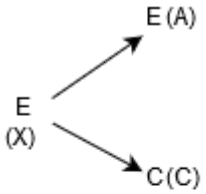
2.

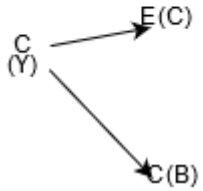




$A = \{EEE, EEC, ECE, ECC, CEE, CEC, CCE\}$

3.





$E = \emptyset$

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1.
   a) $P = \frac{0}{10} = 0$
   b) $P = \frac{6}{10} = \frac{3}{5}$
   c) $P = \frac{4}{10} = \frac{2}{5}$
   d) $P = \frac{10}{10} = 1$
2.
   a) $P = \frac{3}{6} = \frac{1}{2}$
   b) $P = \frac{3}{6} = \frac{1}{2}$
   c) $P = \frac{2}{6} = \frac{1}{3}$
   d) $P = \frac{1}{6}$
3.
   a) $P = \frac{4}{52} = \frac{1}{13}$
   b) $P = \frac{13}{52} = \frac{1}{4}$
   c) $P = \frac{1}{52}$
   d) $P = \frac{16}{52} = \frac{4}{13}$
4.
   a) $P = \frac{8}{52} = \frac{2}{13}$

b) $P = \frac{16}{52} = \frac{4}{13}$

c) $P = \frac{0}{52} = 0$

d) $P = \frac{1}{52}$

5.

a) $P = \frac{15}{20} = \frac{3}{4}$

b) $P = \frac{12}{20} = \frac{3}{5}$

c) $P = \frac{13}{20}$

6.

a) $P = \frac{3}{6} = \frac{1}{2}$

b) $P = \frac{2}{6} = \frac{1}{3}$

c) $P = \frac{6}{6} = 1$

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7.

1) D

2) B

3) D

Página 340

4) C

5) B

4) D

5) C

6) C

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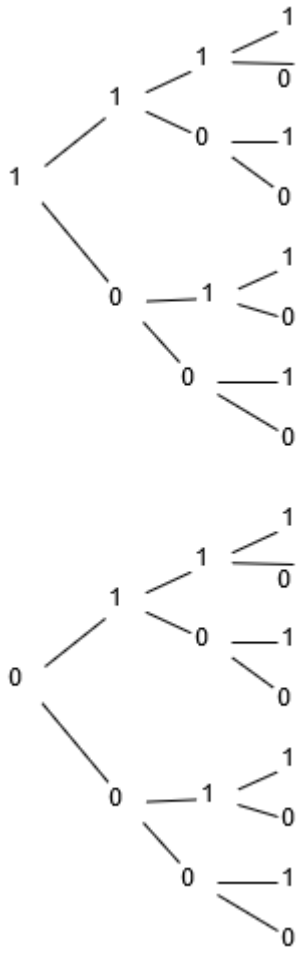
1.

a)

1: Escudo

0: Corona



b) 16

c) A: $\frac{8}{16} * 10 = 50\%$

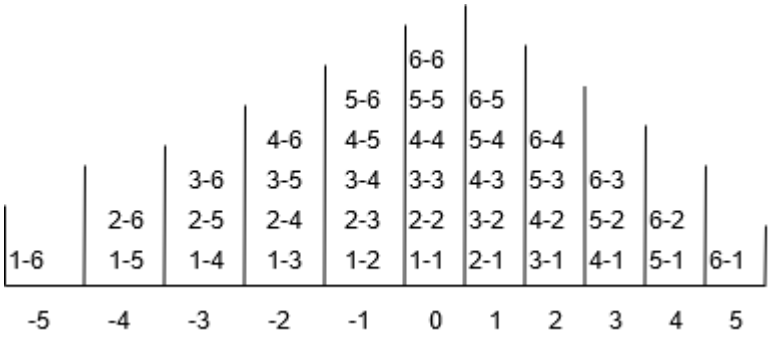
b) $\frac{2}{16} * 100 = 12.5\%$

c) $\frac{1}{16} * 100 = 6.25\%$

d) $\frac{14}{16} * 100 = 87.5\%$

2.

a)



Son 31 Puntos maestrales

b) M) $\frac{3}{31} * 100 = 9.67\%$

N) $\frac{15}{31} * 100 = 48.38\%$

P) $\frac{12}{31} * 100 = 40\%$

Q) $\frac{16}{31} * 100 = 51.61\%$

R) $\frac{26}{31} * 100 = 83.87\%$

3.

C.R, GN, CA, EN, PA

3.2=6

6.

a) $\frac{2}{6} * 100 = 33.3\%$

b) $\frac{2}{6} * 100 = 33.3\%$

c) $\frac{3}{6} * 100 = 50\%$

d) $\frac{1}{6} * 100 = 16.6\%$

e) $\frac{1}{6} * 100 = 16.6\%$

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4.

Pares $2, 4, 6, 8, 0$

No puede empezar con cero

$4 * 5 * 5 = 100$

$48\ escenarios\ distintos$

a)

$1 * 5 * 5 = 25$

$\frac{25}{100} * 100 = 25\%$

b)

i) ya el número es par

ii) Hay que ver cuando la suma de sus dígitos es múltiplo de 6 R/ $\frac{33}{100} * 100 = 33\%$

c)

$4 * 5 * 1 = 20$

R/20%

d)

$$\frac{100-18}{100} * 100 = 82\%$$

	0	2	4	6	8
2	200	220	240	260	280
4	400	420	440	460	480
6	600	620	640	660	680
8	800	820	840	860	880

	0	2	4	6	8
200	200	202	204	206	208
400	400	402	404	406	408
600	600	602	604	606	608
800	800	802	804	806	808
220	220	222	224	226	228
420	420	422	424	426	428
620	620	622	624	626	628
820	820	822	824	826	828
240	240	242	244	246	248
440	440	442	444	446	448
640	640	642	644	646	648
840	840	842	844	846	848
260	260	262	264	266	268
460	460	462	464	466	468
660	660	662	664	666	668
860	860	862	864	866	868
280	280	282	284	286	288
480	480	482	484	486	488
680	680	682	684	686	688
880	880	882	884	886	888

SUMA DE A+B+C

2	4	6	8	10	
4	6	8	10	12	
6	8	10	12	14	
8	10	12	14	16	
4	6	8	10	12	
6	8	10	12	14	
8	10	12	14	16	
10	12	14	16	18	
6	8	10	12	14	
8	10	12	14	16	
10	12	14	16	18	
12	14	16	18	20	
8	10	12	14	16	
10	12	14	16	18	
12	14	16	18	20	
14	16	18	20	22	
10	12	14	16	18	
12	14	16	18	20	
14	16	18	20	22	
16	18	20	22	24	

divido por 6

0.33333333	0.66666666	1	1.33333333	1.66666666
0.66666666	1	1.33333333	1.66666666	2
1	1.33333333	1.66666666	2	2.33333333
1.33333333	1.66666666	2	2.33333333	2.66666666
0.66666666	1	1.33333333	1.66666666	2
1	1.33333333	1.66666666	2	2.33333333
1.33333333	1.66666666	2	2.33333333	2.66666666
1.66666666	2	2.33333333	2.66666666	3
1	1.33333333	1.66666666	2	2.33333333
1.33333333	1.66666666	2	2.33333333	2.66666666
1.66666666	2	2.33333333	2.66666666	3
2	2.33333333	2.66666666	3	3.33333333
1.33333333	1.66666666	2	2.33333333	2.66666666
1.66666666	2	2.33333333	2.66666666	3
2	2.33333333	2.66666666	3	3.33333333
2.33333333	2.66666666	3	3.33333333	3.66666666
1.66666666	2	2.33333333	2.66666666	3
2	2.33333333	2.66666666	3	3.33333333
2.33333333	2.66666666	3	3.33333333	3.66666666
2.66666666	3	3.33333333	3.66666666	4

5.

a) $P = \frac{6}{12} = 0.5$

b) $P = \frac{2}{12} = \frac{1}{6}$

c) $P = \frac{6}{12} = 0.5$

6. $P = \frac{2}{10} = 0.20$

7.

a)$9 * 10 * 10 * 27 * 27 = 656100\ cartones\ diferentes$

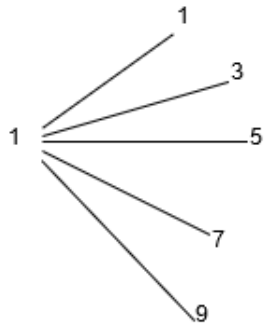
b) $P = \frac{9*10*5*27*27}{9*10*10*27*27} = \frac{1}{2} = 0.5$

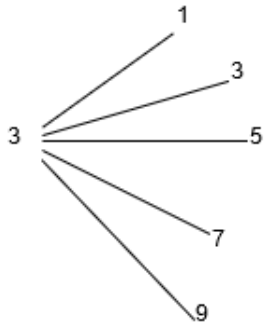
c) $\frac{168*5*27}{656100} = 0.03$

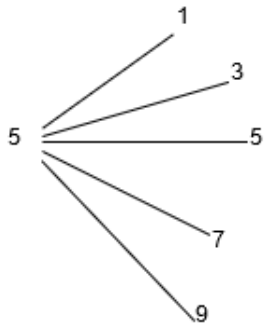
8.

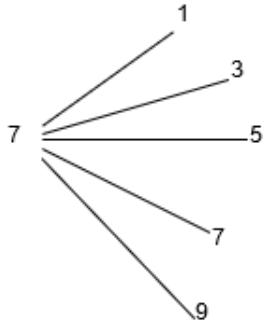
a) $5 * 5 = 25\ números\ diferentes$

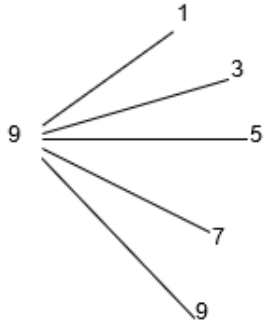
b)


1
1
3
5
7
9


3
1
3
5
7
9


5
1
3
5
7
9


7
1
3
5
7
9


9
1
3
5
7
9

c) $P = \frac{5}{25} = 0.2$

d) $P = \frac{15}{25} = \frac{3}{5}$

9.

	1	2	3	4	5	6
1	2	3	4	5	6	7
2	3	4	5	6	7	8
3	4	5	6	7	8	9
4	5	6	7	8	9	10
5	6	7	8	9	10	11
6	7	8	9	10	11	12

$$P = \frac{14}{36} = \frac{7}{18}$$

10.

	1	2	3	4	5	6
1	2	3	4	5	6	7
2	3	4	5	6	7	8
3	4	5	6	7	8	9
4	5	6	7	8	9	10
5	6	7	8	9	10	11
6	7	8	9	10	11	12

a) $P = \frac{6}{36} = \frac{1}{6}$

b) $P = \frac{18}{36} = \frac{1}{2}$

c) $P = \frac{12}{36} = \frac{1}{2}$

11.

a) $P = \frac{1}{216}$

b) $P = \frac{15}{216} = \frac{5}{72}$

12.

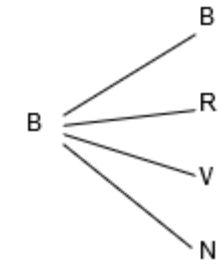
a) $P = \frac{3}{6} = \frac{1}{2}$

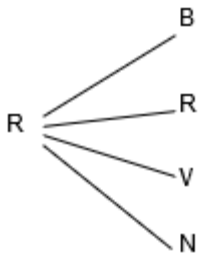
b) $P = \frac{2}{6} = \frac{1}{3}$

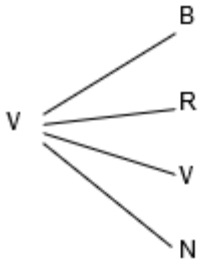
c) $P = \frac{2}{6} = \frac{1}{3}$

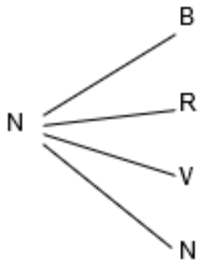
12.

a)

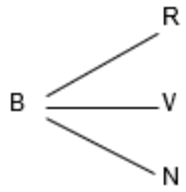


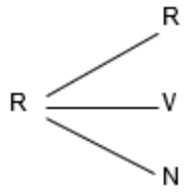


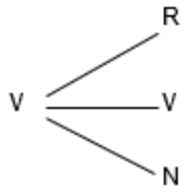


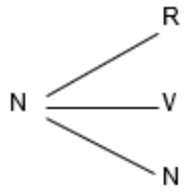


b)









13.

a) $P = \frac{8}{20} = \frac{2}{5}$

b) $P = \frac{7}{20}$

c) $P = \frac{5}{20} = \frac{1}{4}$

d) $P = \frac{12}{20} = \frac{3}{5}$

e) $P = \frac{15}{20} = \frac{3}{4}$

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14.

r	b	b	b	b	b	b	b
rr	rb	rb	rb	rb	rb	rb	rb
rr	rb	rb	rb	rb	rb	rb	rb
rr	rb	rb	rb	rb	rb	rb	rb
br	bb	bb	bb	bb	bb	bb	bb
br	bb	bb	bb	bb	bb	bb	bb

br	bb	bb	bb	bb	bb	bb	bb
br	bb	bb	bb	bb	bb	bb	bb
br	bb	bb	bb	bb	bb	bb	bb
br	bb	bb	bb	bb	bb	bb	bb
br	bb	bb	bb	bb	bb	bb	bb

15.

RRRR
bbbbb
nnnnn

a) $\frac{9}{15} * 100 = 60\%$
b) $\frac{10}{15} * 100 = 66.6\%$

16.

10 rubias
20 morenas
5 rubios
10 morenos

45 alumnos

a) $1\frac{15}{45} * 100 = 33.3\%$
b) $\frac{20}{45} * 100 = 44.4\%$
c) 100%

II parte

1) V
2) F
3) V
4) F
5) F
6) V
7) V
8) F
9) F