Un porcentaje es una manera resumida de escribir una fracción con denominador de 100.

$$27\% = \frac{27}{100} \qquad 59\% = \frac{59}{100}$$

$$200\% = \frac{200}{100} = 2 \qquad -50\% = \frac{-50}{100} = -\frac{1}{2}$$

En general, tenemos:

$$x\% = \frac{x}{100}$$

Usualmente usamos porcentajes para referirnos a una razón entre una cantidad y 100.

"El 37% de los adolescentes juega videojuegos"

Nos dice que 37 de cada 100 adolescentes juega videojuegos (37:100)

Problemas (Personal)

8.1)

(a) $19\% = \frac{19}{100}$ (b) $60\% = \frac{60}{100} = \frac{3}{5}$

(c) $350\% = \frac{350}{100} = \frac{7}{2} = 3\frac{1}{2}$

(d) $-95\% = \frac{-95}{100} = -\frac{19}{20}$

(e) $-250\% = \frac{-250}{100} = -\frac{5}{2} = -\frac{4}{2} - \frac{1}{2} = -2\frac{1}{2}$

(f) $100\% = \frac{100}{100} = 1$

8.2)

(a) $\frac{71}{100} = 71\%$ (b) $1 = 100\%$ (c) $\frac{3}{4} = 75\%$

(d) $\frac{8}{5} = 160\%$ (e) $-2\frac{1}{10} = -\frac{20}{10} - \frac{1}{10} = \frac{-21}{10} = \frac{-210}{100} = -210\%$

(f) $\frac{1}{3} = 33.\overline{3}\% = 33\frac{1}{3}\%$

8.3)

(a) $26\% = \frac{26}{100} = 0.26$ (b) $7\% = 0.07$

(c) $55.2\% = 0.552$ (d) $246\% = 2.46$

(e) $0.03\% = 0.0003$ (f) $0.34 = 34\%$

(g) $0.081 = \frac{8.1}{100} = 8.1\%$ (h) $-2.19 = -219\%$

8.4)

(a) $\frac{25}{100}(200) = 50$ (b) $22\frac{1}{2}\%(40) = \frac{45}{2}\%(40) = \frac{45}{2}\left(\frac{1}{100}\right) = 9$

(c) $300\%(15) = 45$ (d) $\frac{1}{4} \div 100 = \frac{1}{400}$ $\frac{1}{400}(1000) = \frac{5}{2} = 2\frac{1}{2}$

Idea: al preguntarnos cuanto es $x\%$ de a, estamos preguntandonos sobre una proporción de la forma

$$x : 100 = y : a$$

8.5)

(a) $\left(\frac{x}{100}\right)100 = 63$

63%

(b) $40 = x\%(200)$

$40 = \frac{x}{100}(200)$

$20\% = x$

(c) $2.47 = x\%(1000)$

$\frac{247}{100} = \frac{x}{100}(1000)$

$\frac{247}{1000} = x$

0.247%

(d) $-12 = x\%(3)$

$-12 = \frac{x}{100}(3)$

$\frac{-12 \cdot 100}{3} = x$

$-400 = x$

-400%

8.6)

(a) $80 = \frac{1}{\cancel{20}_{5}}(x)$

$400 = x$

(b) $2 = -50\%(x) = 2 = -\frac{1}{2}x$

$-4 = x$

$-50:100 = 2:x$

$-\frac{1}{2} = \frac{2}{x}$ $\quad x = -4$

(c) $\frac{1}{4} = \frac{5}{\cancel{250}_{2}}(x)$

$\frac{\cancel{2}^{1}}{\cancel{4}\cdot 5_{2}} = x$ $\quad x = \frac{1}{10}$

8.7)

$20\%(x) = y$

$\frac{1}{5}x = y$

$\frac{7/20}{1/5} = \frac{7\cdot\cancel{8}^{1}}{\cancel{20}_{4}} = \frac{7}{4}$.

$35\%(x) = \frac{\cancel{35}^{7}}{\cancel{100}_{20}}x$

$= \frac{7}{20}x$

$\frac{7}{20}x$ es $\frac{7}{4}$ de $\frac{1}{5}x$.

$\frac{7}{20}x = \frac{7}{4}\left(\frac{1}{5}x\right)$

$\frac{7}{20}x = \frac{7}{4}y$

- 35% de x es 175% de y.

Ejercicios

8.1.1)

(a) $37\% = \frac{37}{100}$ (b) $80\% = \frac{4}{5}$ (c) $250\% = \frac{5}{2} = 2\frac{1}{2}$

(d) $-25\% = -\frac{1}{4}$ (e) $-200\% = -2$ (f) $1810\% = 18\frac{1}{10}$

8.1.2]

(a) $\frac{33}{50} = \frac{66}{100} = 66\%$ (b) $\frac{2}{5} = 40\%$ (c) $3\frac{1}{4} = \frac{13}{4} = 325\%$

(d) $-2\frac{3}{8} = -\frac{16}{8} - \frac{3}{8} = -\frac{19}{8} = -\frac{19\cdot 5^{3}}{1000} = -237.5\%$ (e) $= 0\%$

(f) $-192.5 = -\frac{19250}{100} = -19250\,\%$

(g) $\frac{2}{7} = \frac{2 \cdot 100}{7 \cdot 100} = \frac{200}{7 \cdot 100} = \frac{200\,\%}{7} = 28\frac{4}{7}\,\%$

(h) $0.319 = \frac{31.9}{100} = 31.9\,\%$

8.1.3)

(a) $30\,\%\,(200) = 60$

(b) $55\,\%\,(120) = \frac{11}{\cancel{55}\ \cancel{100}_{2_1}}\left(\overset{6}{\cancel{120}}\right) = 66$

(c) $225\,\%\,(16) = \frac{\overset{9}{\cancel{225}}}{\cancel{100}_{4_1}}\left(\overset{4}{\cancel{16}}\right) = 36$

(d) $-80\,\%\,(35) = -\frac{\overset{4}{\cancel{80}}}{\cancel{100}_{2_1}}\left(\overset{7}{\cancel{35}}\right) = -28$

(e) $15\,\%\,(380) = \frac{\overset{3}{\cancel{15}}}{\cancel{10}_{2_1}}\left(\overset{19}{\cancel{38}0}\right) = 57$

(f) $-100\,\%\,(617) = -617$

(g) $0\,\%\,(2,827,192) = 0$

(h) $\frac{1}{5}\,\%\,(2000) = 4$

8.1.4)

(a) $x\,\%\,80 = 20$

$25\,\%$

(b) $x\,\%\,30 = -60$

$-200\,\%$

(c) $x\,\%\,17 = 51$

$300\,\%$

(d) $x\,\%\,(5) = \frac{1}{2}$

$\frac{x}{100} = \frac{10}{100}$

$x = 10\,\%$

(e) $x\,\%\,\frac{5}{6} = \frac{2}{3}$

$\frac{x}{100} = \frac{2 \cdot \overset{2}{\cancel{6}}}{\cancel{3}_1 \cdot 5} = \frac{x}{100} = \frac{4 \cdot 20}{5 \cdot 20} = \frac{80}{100}$

$80\,\%$

(f) $x\%\,(-35) = 7$

$\frac{x}{100}(-35) = 7$ $\quad x = -\frac{1 \cdot 100^{20}}{35_7}$

$-20\,\%$ $\quad x = -20$

8.1.5)

(a) $11 = 20\%\,(x)$

55

(b) $\frac{2}{3} = 30\%\,x$

$\frac{2}{3} = \frac{3}{10}x$

$x = \frac{2 \cdot 10}{3 \cdot 3} = \frac{20}{9} = 2\frac{2}{9}$

(c) $3 = -40\%\,(x)$

$-\frac{15}{2} = -7\frac{1}{2}$

(d) $\frac{1}{7} = \frac{1}{2}\%\,x$

$\frac{1}{7} = \frac{1}{200}(x)$

$\frac{200}{7} = x$ $\quad x = 28\frac{4}{7}$

8.1.6)

$\frac{7}{1}\left(\frac{20}{180}\right)$ $\quad \frac{3}{1}\left(\frac{50}{200}\right)$

$140 < 150$

75% de 200

8.1.7)

$60\%\,(75) + 75\%\,(60) = \frac{3}{1}\left(\frac{15}{75}\right) + \frac{3}{1}\left(\frac{15}{60}\right)$

$45 + 45 = 90$

8.1.8)

$70\%\,(10) = 7$ $\quad \frac{2}{5}(7) = \frac{14}{5} = 2\frac{4}{5}$

8.1.9)

$5 = 2\%\left(\frac{x}{2}\right)$

$5 = \frac{1}{50} \cdot \left(\frac{x}{2}\right)$ $\quad 500 = x$