

ES 1 P. 3

$$a) 3:20 = 45:x \quad x = \frac{20 \cdot 45}{3} = 300$$

$$b) 36:x = 5:15 \quad x = \frac{36 \cdot 15}{5} = 108$$

$$c) 360:18 = x:4 \quad x = \frac{360 \cdot 4}{18} = 80$$

$$d) x:30 = 10:50 \quad x = \frac{30 \cdot 10}{50} = 6$$

$$e) 6:24 = x:100 \quad x = \frac{6 \cdot 100}{24} = 25$$

ES 2 P. 3

$$a) 12,0:6,0 = 5,0:x \quad x = \frac{6,0 \cdot 5,0}{12,0} = 2,5$$

$$b) 3,2:x = 10,4:32,6 \quad x = \frac{3,2 \cdot 32,6}{10,4} = 10,0$$

$$c) x:20 = 50:200 \quad x = \frac{20 \cdot 50}{200} = 5$$

$$d) 3,5:8,9 = x:54,2 \quad x = \frac{3,5 \cdot 54,2}{8,9} = 21,3$$

ES 3 P. 3

$$m = 4 \quad m = 150g \quad m_1 = 6 \quad m_1 = ?$$
$$m:m = m_1:m_1 \quad m_1 = \frac{m \cdot m_1}{m} = \frac{150g \cdot 6}{4} = 225g$$

ES 4 P. 3

$$m_1 = 200g \quad m_2 = 60g \quad H_1 = 700g \quad H_2 = ?$$
$$m_1:m_2 = H_1:H_2 \quad H_2 = \frac{H_1 \cdot m_2}{m_1} = \frac{700g \cdot 60g}{200g} = 210g$$

ES 5 P. 3

$$d_1 = 1cm \quad l_1 = 2km \quad d_2 = ? \quad l_2 = 1,5km$$
$$d_1:l_1 = d_2:l_2 \quad d_2 = \frac{d_1 \cdot l_2}{l_1} = \frac{1cm \cdot 1,5km}{2km} = 0,75cm$$

ES 6 P. 3

$$\begin{array}{llll} 2000 & 2020 & 20 \text{ anni} & h = 6,8cm \\ 2020 & 2050 & 30 \text{ anni} & h_1 = ? \end{array}$$
$$20 \text{ anni} : 6,8cm = 30 \text{ anni} : h_1$$
$$h_1 = \frac{6,8cm \cdot 30 \text{ anni}}{20 \text{ anni}} = 10,2cm$$

ES 7 P. 3

$$m_1 = 12 \quad m_2 = 8 \quad N_1 = 3 \quad N_2 = ? \quad m_1:m_2 = N_1:N_2 \quad N_2 = \frac{m_2 \cdot N_1}{m_1} = \frac{8 \cdot 3}{12} = 2 \text{ pizze}$$

ES 8 p.3

$$m = 250$$

$$m_1 = 150$$

$$t_1 = 9d$$

$t_2?$

$$m_2 = m - m_1 = 250 - 150 = 100$$

$$150 : 9d = 100 : t_2$$

$$t_2 = \frac{3 \cdot 9d \cdot 100}{150} = 6d$$

ES 9 p.3

$$d = 40 \text{ cm}$$

$$d_1 = 1 \text{ cm}$$

$$D_1 = 4 \text{ km}$$

$D?$

$$d : D = d_1 : D_1$$

$$D = \frac{d \cdot D_1}{d_1} = \frac{40 \text{ cm} \cdot 4 \text{ km}}{1 \text{ cm}} = 160 \text{ km}$$

ES 10 p.3

$$l = 275 \text{ cm}$$

$$h = 153 \text{ cm}$$

$$L = 110 \text{ cm}$$

$$H = 612 \text{ cm}$$

$x?$

$$L : l = 1 \text{ cm} : x$$

$$x = \frac{1 \cdot l}{L} = \frac{1 \text{ cm} \cdot 275 \text{ cm}}{110 \text{ cm}} = 2,5 \text{ cm}$$

$$1 : 2,5$$

ES 1 P. 5

3% di 500

$$\cancel{500}^5 \cdot \frac{3}{\cancel{100}} = 15$$

ES 2 P. 5

30% di 170

$$170 \cdot \frac{30}{100} = 51$$

ES 3 P. 5

44 58%

$$\cancel{44}^{11} \cdot \frac{\cancel{58}^2}{\cancel{100}^{25}} = 25,52$$

$$44 + 25,52 = 69,52$$

ES 4 P. 5

8 25%

$$\cancel{8}^2 \cdot \frac{\cancel{25}^1}{\cancel{100}^4} = 2$$

$$8 + 2 = 10$$

ES 5 P. 5

50 20%

$$50 \cdot \frac{20}{100} = 10$$

$$50 - 10 = 40$$

ES 6 P. 5

275€ 20%

$$275€ \cdot \frac{\cancel{20}^2}{\cancel{100}^{50}} = 55€$$

$$275€ - 55€ = 220€$$

oppure

$$275€ \cdot \frac{20}{100} = 220€$$

ES 7 P. 5 $\frac{48}{60}$

$$48 : 60 = x : 100$$

$$x = \frac{48 \cdot \cancel{100}^8}{\cancel{60}^8} = 80 \quad \frac{80}{100} \quad 80\%$$

ES 8 P. 5

8% 1846

$$m \cdot \frac{8}{100} = 1846$$

$$\cancel{100} \cdot m \cdot \frac{\cancel{8}}{\cancel{100}} = 1846 \cdot \frac{100}{8}$$

$$m = \frac{1846 \cdot 100}{8} = 23075$$

ES 9 P. 5

50g 4,6g zuccheri

$$4,6g : 50g = x : 100$$

$$x = \frac{4,6g \cdot \cancel{100}^2}{\cancel{50}^2} = 9,2$$

9,2%

ES 10 P. 5

16 50%

$$16 \cdot \frac{\cancel{50}^1}{\cancel{100}^2} = 8$$

50 16%

$$\cancel{50}^1 \cdot \frac{16}{\cancel{100}^2} = 8$$

ES 11 p.5

415 ppm

$$415 : 1000000 = x : 100$$

$$90415\%$$

$$x = \frac{415 \cdot 100}{1000000} = 90415$$

ES 12 p.5

300000 €

15%

10%

$$300000 \text{ €} \cdot \frac{15}{100} = 45000 \text{ €}$$

$$300000 \text{ €} - 45000 \text{ €} = 255000 \text{ €}$$

$$255000 \text{ €} \cdot \frac{10}{100} = 25500 \text{ €}$$

$$255000 \text{ €} - 25500 \text{ €} = 229500 \text{ €}$$

ES 13 p.5

$$635 - 229 = 406$$

$$406 : 229 = x : 100$$

$$x = \frac{406 \cdot 100}{229} = 177$$

$$3221 - 1404 = 1817$$

$$1817 : 1404 = x : 100$$

$$x = \frac{1817 \cdot 100}{1404} = 1299$$

$$722 - 549 = 173$$

$$173 : 549 = x : 100$$

$$x = \frac{173 \cdot 100}{549} = 32$$

$$446 - 169 = 277$$

$$277 : 169 = x : 100$$

$$x = \frac{277 \cdot 100}{169} = 164$$

$$280 - 173 = 107$$

$$107 : 173 = x : 100$$

$$x = \frac{107 \cdot 100}{173} = 62$$

$$27 - 13 = 14$$

$$14 : 13 = x : 100$$

$$x = \frac{14 \cdot 100}{13} = 108$$

$$1288 - 635 = 653$$

$$653 : 635 = x : 100$$

$$x = \frac{653 \cdot 100}{635} = 103$$

$$4545 - 3221 = 1324$$

$$1324 : 3221 = x : 100$$

$$x = \frac{1324 \cdot 100}{3221} = 41$$

$$743 - 722 = 21$$

$$21 : 722 = x : 100$$

$$x = \frac{21 \cdot 100}{722} = 3$$

$$652 - 446 = 206$$

$$206 : 446 = x : 100$$

$$x = \frac{206 \cdot 100}{446} = 46$$

$$364 - 280 = 84$$

$$84 : 280 = x : 100$$

$$x = \frac{84 \cdot 100}{280} = 30$$

$$41 - 27 = 14$$

$$14 : 27 = x : 100$$

$$x = \frac{14 \cdot 100}{27} = 52$$

$$1288 - 229 = 1059$$

$$1059 : 229 = x : 100$$

$$x = \frac{1059 \cdot 100}{229} = 46$$

$$4545 - 1404 = 3141$$

$$3141 : 1404 = x : 100$$

$$x = \frac{3141 \cdot 100}{1404} = 224$$

$$743 - 549 = 194$$

$$194 : 549 = x : 100$$

$$x = \frac{194 \cdot 100}{549} = 35$$

$$652 - 169 = 483$$

$$483 : 169 = x : 100$$

$$x = \frac{483 \cdot 100}{169} = 28$$

$$364 - 173 = 191$$

$$191 : 173 = x : 100$$

$$x = \frac{191 \cdot 100}{173} = 110$$

$$41 - 13 = 28$$

$$28 : 13 = x : 100$$

$$x = \frac{28 \cdot 100}{13} = 215$$

ES 1 P. 7

$$10^4 = 10000 \quad 10^{-5} = 0,00001 \quad 10^6 = 1000000 \quad 10^{-3} = 0,001$$

ES 2 P. 7

$$0,00000001 = 10^{-7} \quad 0,0001 = 10^{-4} \quad 10000 = 10^4 \quad 10000000 = 10^7$$

ES 3 P. 7

$$0,75 = 7,5 \cdot 10^{-1} \quad 160000 = 1,6 \cdot 10^5 \quad 2000000 = 2 \cdot 10^6$$

$$0,000023 = 2,3 \cdot 10^{-5}$$

ES 4 P. 7

$$10^6 \cdot 10^{12} = 10^{6+12} = 10^{18}$$

$$10^2 : 10^3 = 10^{2-3} = 10^{-1}$$

$$10^{-5} \cdot 10^{11} = 10^{-5+11} = 10^6$$

$$10^7 : 10^8 = 10^{7-8} = 10^{-1}$$

$$10^0 \cdot 10^0 = 10^{0+0} = 10^0 = 1$$

ES 5 P. 7

$$10^0 \cdot 10^2 = 10^{0+2} = 10^2$$

$$5 \cdot 10^6 \cdot 6 \cdot 10^{-3} = 5 \cdot 6 \cdot 10^6 \cdot 10^{-3} = 30 \cdot 10^{6-3} = 30 \cdot 10^3$$

$$10^6 \cdot 10^{-3} = 10^{6-3} = 10^3$$

$$3 \cdot 10^{18} : 10^4 = 3 \cdot 10^{18-4} = 3 \cdot 10^{14}$$

$$2 \cdot 10^3 : (4 \cdot 10^7) = (2 : 4) \cdot (10^3 : 10^7) = 0,5 \cdot 10^{3-7} = 0,5 \cdot 10^{-4}$$

ES 6 P. 7

$$(10^3)^2 = 10^{3 \cdot 2} = 10^6 \quad (10^4)^3 = 10^{4 \cdot 3} = 10^{12} \quad (10^{-2})^2 = 10^{-2 \cdot 2} = 10^{-4}$$

$$(10^{-3})^{-2} = 10^{-3 \cdot (-2)} = 10^6$$

$$(10^4)^{-3} = 10^{4 \cdot (-3)} = 10^{-12}$$

ES 7 P. 7

$$500^2 = (5 \cdot 10^2)^2 = 5^2 \cdot (10^2)^2 = 25 \cdot 10^{2 \cdot 2} = 25 \cdot 10^4$$

$$34000^3 = (3,4 \cdot 10^4)^3 = 3,4^3 \cdot (10^4)^3 = 39,304 \cdot 10^{4 \cdot 3} = 39,304 \cdot 10^{12}$$

$$300^{-2} = \frac{1}{300^2} = \frac{1}{(3 \cdot 10^2)^2} = \frac{1}{3^2 \cdot (10^2)^2} = \frac{1}{9 \cdot 10^{2 \cdot 2}} = \frac{1}{9 \cdot 10^4} = \frac{1}{9} \cdot \frac{1}{10^4} = \frac{1}{9} \cdot 10^{-4}$$

$$\begin{aligned} (-6100)^{-3} &= \frac{1}{(-6100)^3} = \frac{1}{(-61 \cdot 10^2)^3} = \frac{1}{-61^3 \cdot (10^2)^3} = \frac{1}{-61^3 \cdot 10^{2 \cdot 3}} = \frac{1}{-226,981 \cdot 10^6} = \\ &= -\frac{1}{226,981} \cdot 10^{-6} \end{aligned}$$

ES 8 P. 7

$$10^2 \cdot 10^3 \cdot 10^{-2} = 10^{2+3-2} = 10^3 \quad 10^{-2} \cdot 10^{-3} \cdot 10^5 = 10^{-2-3+5} = 10^0 = 1$$

$$\frac{10^{-3} \cdot 10^5}{10^6} = 10^{-3} \cdot 10^5 : 10^6 = 10^{-3+5-6} = 10^{-4}$$

$$\frac{10^3 \cdot 10^2}{10^{-2}} = 10^3 \cdot 10^2 : 10^{-2} = 10^{3+2-(-2)} = 10^{3+2+2} = 10^7$$

$$\frac{10^{-3} \cdot 10^{-5}}{10^{-12}} = 10^{-3} \cdot 10^{-5} : 10^{-12} = 10^{-3-5-(-12)} = 10^{-3-5+12} = 10^4$$

ES 9 P. 7

$$\frac{10^3 \cdot 10^{-2}}{10^2 \cdot 10^3} = 10^3 \cdot 10^{-2} : (10^2 \cdot 10^3) = 10^{3-2} : (10^{2+3}) = 10^1 : 10^5 = 10^{1-5} = 10^{-4}$$

$$\frac{10^2 \cdot 10^3}{10^{-3} \cdot 10^{-2}} = 10^2 \cdot 10^3 : (10^{-3} \cdot 10^{-2}) = 10^{2+3} : (10^{-3-2}) = 10^5 : 10^{-5} = 10^{5-(-5)} = 10^{5+5} = 10^{10}$$

$$\frac{1}{10^2 \cdot 10^3} = \frac{1}{10^{2+3}} = \frac{1}{10^5} = 10^{-5}$$

$$\frac{10^{-4} \cdot 10^{-2}}{10^{-2} \cdot 10^{-3}} = 10^{-4} \cdot 10^{-2} : (10^{-2} \cdot 10^{-3}) = 10^{-4-2} : (10^{-2-3}) = 10^{-6} : 10^{-5} = 10^{-6-(-5)} = 10^{-6+5} = 10^{-1}$$

$$\frac{10^3}{10^{12} \cdot 10^{-9}} = 10^3 : (10^{12} \cdot 10^{-9}) = 10^3 : (10^{12-9}) = 10^3 : 10^3 = 10^{3-3} = 10^0 = 1$$

ES 10 P. 7

$$5 \cdot 10^3 \cdot 2 \cdot 10^{-2} = 10 \cdot 10^{3-2} = 10 \cdot 10 = 10^2$$

$$\frac{3 \cdot 10^{-3}}{9 \cdot 10^5} = \frac{1}{3} 10^{-3} : 10^5 = \frac{1}{3} 10^{-3-5} = \frac{1}{3} 10^{-8}$$

$$5,1 \cdot 10^2 \cdot 3,4 \cdot 10^{-3} = 17,34 \cdot 10^{2-3} = 17,34 \cdot 10^{-1} = 1,734$$

$$\frac{3 \cdot 10^5 \cdot 2 \cdot 10^2}{8 \cdot 10^{-2} \cdot 4 \cdot 10^3} = \frac{3}{8} \cdot 10^{5+2} : (10^{-2} \cdot 10^3) = \frac{3}{8} 10^7 : (10^{-2+3}) = \frac{3}{8} 10^7 : 10^1 = \frac{3}{8} 10^{7-1} = \frac{3}{8} 10^6$$

$$\frac{5 \cdot 10^3}{3 \cdot 10^7 \cdot 4 \cdot 10^{-9}} = \frac{5}{12} \cdot 10^3 : (10^7 \cdot 10^{-9}) = \frac{5}{12} \cdot 10^3 : 10^{7-9} = \frac{5}{12} \cdot 10^3 : 10^{-2} = \frac{5}{12} 10^{3-(-2)} = \frac{5}{12} 10^{3+2} = \frac{5}{12} 10^5$$

ES 1 P. 9

$$C = 2\pi r$$

- a) $r = 53 \text{ cm}$ $C = 2 \cdot 3,14 \cdot 53 \text{ cm} = 333,3 \text{ cm} \approx 3,3 \cdot 10^1 \text{ cm}$
 b) $r = 23 \cdot 10^2 \text{ mm}$ $C = 2 \cdot 3,14 \cdot 23 \cdot 10^2 \text{ mm} = 14 \cdot 10^2 \text{ mm} = 1,4 \cdot 10^3 \text{ mm}$
 c) $r = 54 \text{ dm}$ $C = 2 \cdot 3,14 \cdot 54 \text{ dm} = 339 \text{ dm} \approx 3,4 \cdot 10^2 \text{ dm}$
 d) $r = 2,5 \cdot 10^{-2} \text{ m}$ $C = 2 \cdot 3,14 \cdot 2,5 \cdot 10^{-2} \text{ m} = 15,7 \cdot 10^{-2} \text{ m} \approx 1,6 \cdot 10^{-1} \text{ m}$
 e) $r = 12 \cdot 10^2 \text{ m}$ $C = 2 \cdot 3,14 \cdot 12 \cdot 10^2 \text{ m} = 753 \cdot 10^2 \text{ m} \approx 7,5 \cdot 10^2 \text{ m}$

ES 2 P. 9

$$V = \frac{1}{3}\pi r^2 h$$

- a) $r = 5 \text{ cm}$ $h = 10 \text{ cm}$ $V = \frac{1}{3} \cdot 3,14 \cdot 5^2 \text{ cm}^2 \cdot 10 \text{ cm} = 262,10 \text{ cm}^3 = 262 \text{ cm}^3$
 b) $r = 2 \text{ mm}$ $h = 5 \text{ mm}$ $V = \frac{1}{3} \cdot 3,14 \cdot 2^2 \text{ mm}^2 \cdot 5 \text{ mm} = 21 \text{ mm}^3$
 c) $r = 0,54 \text{ m}$ $h = 1,1 \text{ m}$ $V = \frac{1}{3} \cdot 3,14 \cdot 0,54^2 \text{ m}^2 \cdot 1,1 \text{ m} = 0,34 \text{ m}^3$
 d) $r = 25 \text{ dm}$ $h = 4,3 \text{ dm}$ $V = \frac{1}{3} \cdot 3,14 \cdot 25^2 \text{ dm}^2 \cdot 4,3 \text{ dm} = 28,1 \text{ dm}^3$
 e) $r = 12 \text{ m}$ $h = 28 \text{ m}$ $V = \frac{1}{3} \cdot 3,14 \cdot 12^2 \text{ m}^2 \cdot 28 \text{ m} = 4,2 \text{ m}^3$

ES 3 P. 9

$$d = \frac{m}{V}$$

- a) $m = 5 \text{ g}$ $V = 10 \text{ cm}^3$ $d = \frac{5 \text{ g}}{10 \text{ cm}^3} = 0,5 \frac{\text{g}}{\text{cm}^3}$
 b) $m = 3,5 \text{ kg}$ $V = 12 \text{ m}^3$ $d = \frac{3,5 \text{ kg}}{12 \text{ m}^3} = 2,9 \frac{\text{kg}}{\text{m}^3}$
 c) $m = 26 \text{ g}$ $V = 13 \text{ cm}^3$ $d = \frac{26 \text{ g}}{13 \text{ cm}^3} = 2,0 \frac{\text{g}}{\text{cm}^3}$
 d) $m = 15 \cdot 10^3 \text{ kg}$ $V = 22 \cdot 10^2 \text{ m}^3$ $d = \frac{15 \cdot 10^3 \text{ kg}}{22 \cdot 10^2 \text{ m}^3} = 0,68 \cdot 10^{3-2} = 0,68 \cdot 10^1 = 6,8 \frac{\text{kg}}{\text{m}^3}$
 e) $m = 72 \text{ g}$ $V = 15 \text{ cm}^3$ $d = \frac{72 \text{ g}}{15 \text{ cm}^3} = 4,8 \frac{\text{g}}{\text{cm}^3}$

ES 4 P. 9

$$v = \frac{\Delta s}{\Delta t}$$

- a) $\Delta s = 10 \text{ km}$ $\Delta t = 2 \text{ h}$ $v = \frac{10 \text{ km}}{2 \text{ h}} = 5 \frac{\text{km}}{\text{h}}$
 b) $\Delta s = 30 \text{ km}$ $\Delta t = 0,5 \text{ h}$ $v = \frac{30 \text{ km}}{0,5 \text{ h}} = 60 \frac{\text{km}}{\text{h}}$

$$c) \Delta s = 100 \text{ km} \quad \Delta t = 2 \text{ h}$$

$$v = \frac{100 \text{ km}}{2 \text{ h}} = 50 \frac{\text{km}}{\text{h}}$$

$$d) \Delta s = 100 \text{ m} \quad \Delta t = 12 \text{ s}$$

$$v = \frac{100 \text{ m}}{12 \text{ s}} = 8,3 \frac{\text{m}}{\text{s}}$$

$$e) \Delta s = 1500 \text{ m} \quad \Delta t = 120 \text{ s}$$

$$v = \frac{1500 \text{ m}}{120 \text{ s}} = 12,5 \frac{\text{m}}{\text{s}}$$

ES 5 P. 9

$$V_A = V_B$$

$$m_A = 2m_B \Rightarrow m_B = \frac{m_A}{2} \quad d_B = \frac{m_B}{V_B} \quad \ominus$$

$$d_A = 6 \frac{\text{g}}{\text{cm}^3}$$

$d_B?$

$$\begin{aligned} \ominus \frac{m_A}{2} &= \frac{m_A}{2} : V_B = \frac{m_A}{2} \cdot \frac{1}{V_B} = \frac{m_A}{2V_B} = \frac{m_A}{2V_A} = \\ &= \frac{1}{2} \cdot \frac{m_A}{V_A} = \frac{1}{2} d_A = \frac{1}{2} \cdot 6 \frac{\text{g}}{\text{cm}^3} = 3 \frac{\text{g}}{\text{cm}^3} \end{aligned}$$

ES 6 P. 9

$$m_A = m_B$$

$$V_A = 2V_B \Rightarrow V_B = \frac{V_A}{2}$$

$$d_A = 4 \frac{\text{g}}{\text{cm}^3}$$

$d_B?$

$$\begin{aligned} d_B &= \frac{m_B}{V_B} = \frac{m_A}{\frac{V_A}{2}} = \frac{m_A}{V_A} \cdot 2 = m_A : \frac{V_A}{2} = m_A \cdot \frac{2}{V_A} = \\ &= \frac{m_A}{V_A} \cdot 2 = d_A \cdot 2 = 2 \cdot 4 \frac{\text{g}}{\text{cm}^3} = 8 \frac{\text{g}}{\text{cm}^3} \end{aligned}$$

ES 1 P. 11

$$a) -5x = -25 \quad \frac{-5x}{-5} = \frac{-25}{-5} \quad x = +5$$

$$b) 4x + 6x = 1 \quad 10x = 1 \quad \frac{10x}{10} = \frac{1}{10} \quad x = \frac{1}{10} = 10^{-1}$$

$$c) 40 - 2x = x \quad 40 - 2x + 2x = x + 2x \quad 40 = 3x \quad \frac{3x}{3} = \frac{40}{3} \\ x = 13$$

$$d) 3x - \frac{1}{4}x = 12 \quad \frac{12x - x}{4} = 12 \quad \frac{11}{4}x = 12 \quad \frac{4}{11} \cdot \frac{11}{4}x = 12 \cdot \frac{4}{11} \\ x = 4,4$$

ES 2 P. 11

$$a) F = mx \quad \frac{F}{m} = x \quad x = \frac{F}{m}$$

$$b) xe^2 = E \quad \frac{xe^2}{e^2} = \frac{E}{e^2} \quad x = \frac{E}{e^2}$$

$$c) \frac{m}{x} = d \quad \frac{m}{x} = d \cdot x \quad m = dx \quad \frac{m}{d} = x$$

$$d) \frac{1}{2}xh = A \quad \frac{1}{2}xh = A \cdot 2 \quad xh = 2A \quad \frac{xh}{h} = \frac{2A}{h} \quad x = \frac{2A}{h}$$

ES 3 P. 11

$$(x+4) \cdot 4 = 40 \quad \frac{(x+4) \cdot 4}{4} = \frac{40}{4} \quad x+4 = 10 \quad x + 4 - 4 = 10 - 4 \\ x = 6$$

ES 4 P. 11

$$3x + 3 = 24 \quad 3x + 3 - 3 = 24 - 3 \quad 3x = 21 \quad \frac{3x}{3} = \frac{21}{3} \\ x = 7$$

ES 5 P. 11

Quando vinci una partita guadagni 3pt, quando perdi 1pt

$$x + 3 \cdot 3 + 1 = 35 \quad x + 9 + 1 = 35 \quad x + 10 = 35$$

$$x + 10 - 10 = 35 - 10 \quad x = 25$$

ES 6 P. 11

$x_G + 7$ età Francesca

$$x_G + 7 + x_G = 45$$

$$2x_G + 7 = 45$$

x_G età Giulia

$$2x_G + 7 - 7 = 45 - 7$$

$$2x_G = 38$$

$$\frac{2x_G}{2} = \frac{38}{2}$$

$$x_G = 19 \quad \text{Giulia}$$

$$19 + 7 = 26 \quad \text{Francesca}$$

ES 7 P. 11

$$x - \frac{1}{4}x = 30 \text{ €}$$

$$\frac{\cancel{4}}{\cancel{3}} \cdot \frac{3x}{\cancel{4}} = 30 \cdot \frac{\cancel{4}}{\cancel{3}}$$

$$\frac{4x - x}{4} = 30$$

$$x = 40 \text{ €}$$

$$\frac{3x}{4} = 30$$

ES 8 P. 11

$$2x + \frac{x}{3} + 100 \text{ g} = 1500 \text{ g}$$

$$1,5 \text{ kg} = 1500 \text{ g}$$

$$2x + \frac{x}{3} + \cancel{100} - \cancel{100} = 1500 - 100$$

$$2x + \frac{x}{3} = 1400$$

$$\frac{6x + x}{3} = 1400$$

$$\frac{7x}{3} = 1400$$

$$\frac{\cancel{3}}{\cancel{7}} \cdot \frac{7x}{\cancel{3}} = 1400 \cdot \frac{\cancel{3}}{\cancel{7}} \quad x = 600 \text{ g}$$

ES 1 P. 13

$$C = 2\pi r$$

$$C = \frac{2\pi r}{2\pi}$$

$$\frac{C}{2\pi} = r \quad r = \frac{C}{2\pi}$$

ES 2 P. 13

$$A = l^2$$

$$\sqrt{A} = \sqrt{l^2}$$

$$\sqrt{A} = l \quad l = \sqrt{A}$$

ES 3 P. 13

$$V = \pi r^2 h$$

$$\frac{V}{\pi r^2} = \frac{\pi r^2 h}{\pi r^2}$$

$$\frac{V}{\pi r^2} = h \quad h = \frac{V}{\pi r^2}$$

ES 4 P. 13

$$A = \pi r^2$$

$$\frac{A}{\pi} = \frac{\pi r^2}{\pi}$$

$$\frac{A}{\pi} = r^2$$

$$\sqrt{\frac{A}{\pi}} = \sqrt{r^2}$$

$$\sqrt{\frac{A}{\pi}} = r \quad r = \sqrt{\frac{A}{\pi}}$$

ES 5 P. 13

$$V = \frac{4}{3} \pi r^3$$

$$\frac{3}{4\pi} V = \frac{4}{3} \pi r^3 \cdot \frac{3}{4\pi}$$

$$\frac{3 \cdot V}{4\pi} = r^3$$

$$\sqrt[3]{\frac{3V}{4\pi}} = \sqrt[3]{r^3}$$

$$\sqrt[3]{\frac{3V}{4\pi}} = r \quad r = \sqrt[3]{\frac{3V}{4\pi}}$$

ES 6 P. 13

$$d = \frac{m}{V}$$

$$V \cdot d = \frac{m}{V} \cdot V$$

$$V \cdot d = m \quad m = V \cdot d$$

ES 7 P. 13

$$k = \frac{1}{2} m v^2$$

$$\frac{2}{m} k = \frac{1}{2} m v^2 \cdot \frac{2}{m}$$

$$\frac{2k}{m} = v^2$$

$$\sqrt{\frac{2k}{m}} = \sqrt{v^2}$$

$$\sqrt{\frac{2k}{m}} = v \quad v = \sqrt{\frac{2k}{m}}$$

ES 8 P. 13

$$v = 4 \text{ m/s}$$

$$\Delta t = 20 \text{ s}$$

$$\Delta s = ?$$

$$v = \frac{\Delta s}{\Delta t}$$

$$\Delta t \cdot v = \frac{\Delta s}{\Delta t} \cdot \Delta t$$

$$\Delta t \cdot v = \Delta s$$

$$\Delta s = \Delta t \cdot v$$

$$\Delta s = 4 \frac{\text{m}}{\text{s}} \cdot 20 \text{ s} = 80 \text{ m}$$

ES 9 P. 13

$$d = 11,34 \text{ g/cc}$$

$$V = 39,7 \text{ cm}^3$$

$$m = ?$$

$$d = \frac{m}{V}$$

$$V \cdot d = \frac{m}{V} \cdot V$$

$$\text{cc} = \text{cm}^3$$

(centimetri cubici)

$$V \cdot d = m$$

$$m = d \cdot V = 11,34 \frac{\text{g}}{\text{cc}} \cdot 39,7 \text{ cc} = 450 \text{ g}$$

ES 10 P. 13

$$d = 9789 \frac{\text{g}}{\text{cm}^3}$$

$$m = 600 \text{g}$$

V?

$$d = \frac{m}{V}$$

$$V \cdot d = \frac{m}{V} \cdot V$$

$$V \cdot d = m$$

$$\frac{V \cdot d}{d} = \frac{m}{d}$$

$$V = \frac{m}{d}$$

$$V = \frac{600 \text{g}}{9789 \frac{\text{g}}{\text{cm}^3}} = 760 \text{ cm}^3$$

$$\frac{\text{g}}{\text{g/cm}^3} = \text{g} : \frac{\text{g}}{\text{cm}^3} = \text{g} \cdot \frac{\text{cm}^3}{\text{g}} = \text{cm}^3$$

ES 11 P. 13

$$p = 2q^2 - 1$$

a) $p = 1$

$$1 = 2q^2 - 1$$

$$1 + 1 = 2q^2 - 1 + 1$$

$$2 = 2q^2 \quad 2q^2 = 2$$

$$\frac{2q^2}{2} = \frac{2}{2}$$

$$q^2 = 1$$

$$\sqrt{q^2} = \sqrt{1}$$

$$q = \sqrt{1} = 1$$

b) $p = 2$

$$2 = 2q^2 - 1$$

$$2 = 2q^2 - 1$$

$$2 + 1 = 2q^2 \quad 3 = 2q^2$$

$$2q^2 = 3$$

$$\frac{2q^2}{2} = \frac{3}{2}$$

$$q^2 = \frac{3}{2}$$

$$\sqrt{q^2} = \sqrt{\frac{3}{2}}$$

$$q = \sqrt{\frac{3}{2}}$$

c) $p = 0$

$$0 = 2q^2 - 1$$

$$0 = 2q^2 - 1$$

$$+1 = 2q^2 \quad 2q^2 = 1$$

$$\frac{2q^2}{2} = \frac{1}{2}$$

$$q^2 = \frac{1}{2}$$

$$\sqrt{q^2} = \sqrt{\frac{1}{2}}$$

$$q = \sqrt{\frac{1}{2}} = 0,71$$

d) $p = -1$

$$-1 = 2q^2 - 1$$

$$-1 = 2q^2 - 1$$

$$0 = 2q^2 \quad 2q^2 = 0$$

$$\frac{2q^2}{2} = \frac{0}{2}$$

$$q^2 = 0$$

$$\sqrt{q^2} = \sqrt{0}$$

$$q = \sqrt{0} = 0$$

ES 12 P. 13

$$n = 0,5 \text{ mol}$$

M?

$$M_A = 6022 \cdot 10^{23} \text{ molecule}$$

$$n = \frac{M}{M_A} \quad N_A \cdot n = \frac{M}{M_A} \cdot N_A$$

$$N_A \cdot n = M \quad M = N_A \cdot n = 6022 \cdot 10^{23} \cdot 0,5 = 3,01 \cdot 10^{23}$$

ES 13 P. 13

$$A = 50 \text{ cm}^2$$

$$b = 10 \text{ cm}$$

h?

$$A = \frac{b \cdot h}{2}$$

$$\frac{2}{b} A = \frac{b \cdot h}{2} \cdot \frac{2}{b}$$

$$\frac{2A}{b} = h$$

$$h = \frac{2 \cdot A}{b} = \frac{2 \cdot 50 \text{ cm}^2}{10 \text{ cm}} = 10 \text{ cm}$$

ES 14 P. 13

$b = 5 \text{ mm}$

$c = 3 \text{ mm}$

$a?$

$c^2 + a^2 = b^2$

$c^2 + a^2 = b^2$

$a^2 = b^2 - c^2$

$a^2 = (5 \text{ mm})^2 - (3 \text{ mm})^2 = 25 \text{ mm}^2 - 9 \text{ mm}^2 = 16 \text{ mm}^2$

$a^2 = 16 \text{ mm}^2 \quad \sqrt{a^2} = \sqrt{16 \text{ mm}^2} \quad a = 4 \text{ mm}$

ES 15 P. 13

$A = 225 \text{ cm}^2$

$2p?$

$2p = 4 \cdot l \text{ (E)}$

$A = l^2$

$\sqrt{A} = \sqrt{l^2}$

$\sqrt{A} = l \quad l = \sqrt{A}$

$l = \sqrt{225 \text{ cm}^2} = 15 \text{ cm}$

$\text{(E)} \quad 4 \cdot 15 \text{ cm} = 60 \text{ cm}$

ES 16 P. 13

$C = 2,5 \text{ m}$

$A?$

$A = \pi r^2 \text{ (E)}$

$C = 2\pi r$

$\frac{C}{2\pi} = \frac{2\pi r}{2\pi}$

$\frac{C}{2\pi} = r$

$r = \frac{C}{2\pi} = \frac{2,5 \text{ m}}{2 \cdot 3,14} = 0,398 \text{ m}$

$\text{(E)} \quad 3,14 \cdot (0,398 \text{ m})^2 = 0,50 \text{ m}^2$

ES 17 P. 13

$g = 9,81 \frac{\text{m}}{\text{s}^2}$

$h = 1 \text{ m}$

$t?$

$h = \frac{1}{2} \cdot g \cdot t^2$

~~$\frac{2}{g} h = \frac{1}{2} g t^2$~~

$\frac{2h}{g} = t^2$

$t^2 = \frac{2h}{g} = \frac{2 \cdot 1 \text{ m}}{9,81 \text{ m/s}^2} = 0,204 \text{ s}^2$

$\frac{\text{m}}{\text{m/s}^2} = \text{m} : \frac{\text{m}}{\text{s}^2} = \cancel{\text{m}} \cdot \frac{\text{s}^2}{\cancel{\text{m}}} = \text{s}^2$

$t^2 = 0,204 \text{ s}^2$

$\sqrt{t^2} = \sqrt{0,204 \text{ s}^2}$

$t = 0,45 \text{ s}$

$\sqrt{\text{s}^2} = \text{s}$

ES 18 P. 13

$F \rightarrow 2F$

$p \rightarrow p$

$A \rightarrow ?$

$p = \frac{F}{A}$

~~$A \cdot p = \frac{F}{A} \cdot A$~~

$A \cdot p = F$

~~$\frac{A \cdot p}{p} = \frac{F}{p}$~~

$A = \frac{F}{p}$

\Downarrow
 $A = \frac{F}{p}$

\Downarrow
 $A = \frac{2F}{p} = 2 \left(\frac{F}{p} \right) = 2 \cdot A = 2A$ - l'area raddoppia

ES 1 P. 15

$\alpha = 30^\circ$

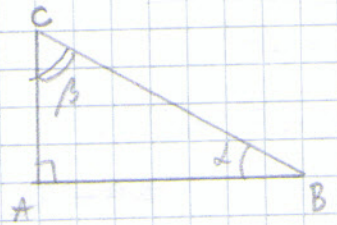
$\beta = 60^\circ$

$BC = 50 \text{ m}$

$AB? AC?$

COS e SEN/SIN

SONO TASTI DELLA CALCOLTRICCE SCIENTIFICA



$\cos \alpha = \frac{AB}{CB}$

$CB \cdot \cos \alpha = \frac{AB \cdot CB}{CB}$

$CB \cdot \cos \alpha = AB$

$AB = CB \cdot \cos \alpha = 50 \text{ m} \cdot \cos 30^\circ = 43 \text{ m}$

oppure

$\sin \beta = \frac{AB}{CB}$

$CB \cdot \sin \beta = \frac{AB \cdot CB}{CB}$

$CB \cdot \sin \beta = AB$

$AB = CB \cdot \sin \beta = 50 \text{ m} \cdot \sin 60^\circ = 43 \text{ m}$

$\cos \beta = \frac{AC}{CB}$

$CB \cdot \cos \beta = \frac{AC \cdot CB}{CB}$

$CB \cdot \cos \beta = AC$

$AC = CB \cdot \cos \beta = 50 \text{ m} \cdot \cos 60^\circ = 25 \text{ m}$

oppure

$\sin \alpha = \frac{AC}{CB}$

$CB \cdot \sin \alpha = \frac{AC \cdot CB}{CB}$

$CB \cdot \sin \alpha = AC$

$AC = CB \cdot \sin \alpha = 50 \text{ m} \cdot \sin 30^\circ = 25 \text{ m}$

ES 2 P. 15

$\alpha = 45^\circ$

$BC = 10 \text{ cm}$

$AB = AC ?$

$\cos 45^\circ = \sin 45^\circ = 0,71$

$\cos \alpha = \frac{AB}{CB}$

$CB \cdot \cos \alpha = \frac{AB \cdot CB}{CB}$

$CB \cdot \cos \alpha = AB \quad AB = CB \cdot \cos \alpha$

$AB = 10 \text{ cm} \cdot \cos 45^\circ = 7,1 \text{ cm}$

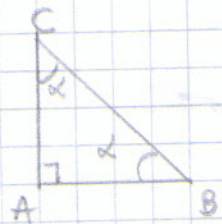
oppure

$\sin \alpha = \frac{AB}{CB}$

$CB \cdot \sin \alpha = \frac{AB \cdot CB}{CB}$

$CB \cdot \sin \alpha = AB$

$AB = CB \cdot \sin \alpha = 10 \text{ cm} \cdot \sin 45^\circ = 7,1 \text{ cm}$



ES 3 P. 15

$\alpha = 30^\circ$

$\beta = 60^\circ$

$AC = 5 \text{ cm}$

$CB?$

$\cos \beta = \frac{AC}{CB}$

$CB \cdot \cos \beta = \frac{AC \cdot CB}{CB}$

$CB \cdot \cos \beta = AC$

$CB \cdot \frac{\cos \beta}{\cos \beta} = \frac{AC \cdot CB}{\cos \beta}$

$CB = \frac{AC}{\cos \beta} = \frac{5 \text{ cm}}{\cos 60^\circ} = 10 \text{ m}$

oppure

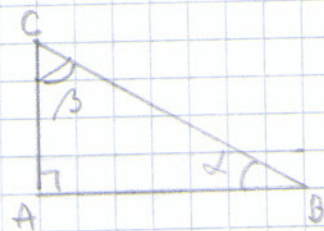
$\sin \alpha = \frac{AC}{CB}$

$CB \cdot \sin \alpha = \frac{AC \cdot CB}{CB}$

$CB \cdot \sin \alpha = AC$

$CB \cdot \frac{\sin \alpha}{\sin \alpha} = \frac{AC \cdot CB}{\sin \alpha}$

$CB = \frac{AC}{\sin \alpha} = \frac{5 \text{ cm}}{\sin 30^\circ} = 10 \text{ cm}$



ES 4 P. 15

$\alpha = 45^\circ$

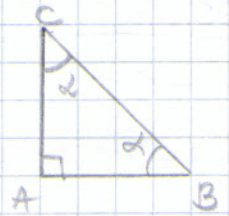
$AB = AC = 2,5 \text{ m}$

CB?

$$\cos \alpha = \frac{AC}{CB} \quad CB \cdot \cos \alpha = \frac{AC}{\cancel{CB}}$$

$$CB \cdot \cos \alpha = AC \quad CB \cdot \cos \alpha = \frac{AC}{\cancel{\cos \alpha}}$$

$$CB = \frac{AC}{\cos \alpha} = \frac{2,5 \text{ m}}{\cos 45^\circ} = 3,5 \text{ m}$$



ES 5 P. 15

$\alpha = 20^\circ$

$CB = 5,0 \text{ cm}$

AB?, AC?

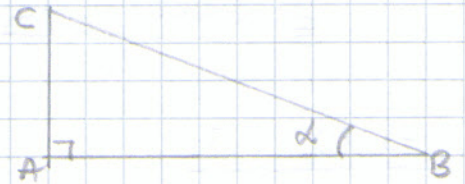
$\cos \alpha = \frac{AC}{CB}$

$$\cos \alpha = \frac{AB}{CB} \quad CB \cdot \cos \alpha = \frac{AB}{\cancel{CB}}$$

$$CB \cdot \cos \alpha = AB \quad AB = CB \cdot \cos \alpha$$

$$AB = 5,0 \text{ cm} \cdot \cos 20^\circ = 4,7 \text{ cm}$$

$$CB \cdot \sin \alpha = \frac{AC}{\cancel{CB}} \quad CB \cdot \sin \alpha = AC \quad AC = CB \cdot \sin \alpha = 5,0 \text{ cm} \cdot \sin 20^\circ = 1,7 \text{ cm}$$



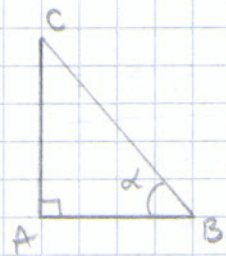
ES 6 P. 15

$CB = 20 \text{ cm}$

$AB = 13 \text{ cm}$

$\cos \alpha$?

$$\cos \alpha = \frac{AC}{CB} = \frac{13 \text{ cm}}{20 \text{ cm}} = 0,65$$



ES 7 P. 15

$CB = 8,0 \text{ cm}$

$AB = 6,5 \text{ cm}$

$\sin \alpha$?

$$\sin \alpha = \frac{AB}{CB} = \frac{6,5 \text{ cm}}{8,0 \text{ cm}} = 0,81$$



ES 8 P. 15

$AC = CB = 5,8 \text{ m}$

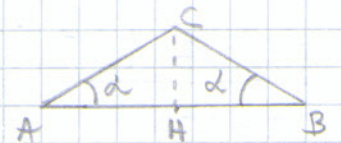
$A = \frac{AB \cdot CH}{2} \text{ (E)}$

$\alpha = 30^\circ$

A?

$$\sin \alpha = \frac{CH}{CB} \quad CB \cdot \sin \alpha = \frac{CH}{\cancel{CB}} \quad CB \cdot \sin \alpha = CH$$

$$CH = CB \cdot \sin \alpha = 5,8 \text{ m} \cdot \sin 30^\circ = 2,9 \text{ m}$$



$$\cos \alpha = \frac{HB}{CB} \quad CB \cdot \cos \alpha = \frac{HB}{\cancel{CB}} \quad CB \cdot \cos \alpha = HB \quad HB = CB \cdot \cos \alpha = 5,8 \text{ m} \cdot \cos 30^\circ = 5,0 \text{ m}$$

$$AB = 2 \cdot HB = 2 \cdot 5,0 \text{ m} = 10 \text{ m}$$

$$\text{(E)} \quad \frac{10 \text{ m} \cdot 2,9 \text{ m}}{2} = 15 \text{ m}^2$$

ES 9 P. 15

$\alpha = 60^\circ$

$A = \frac{AB \cdot CH}{2} \text{ (E)}$

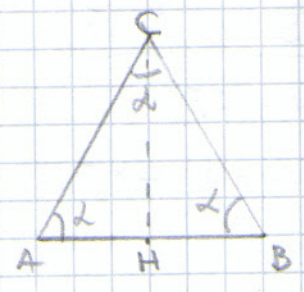
$AB = BC = AC = 2,4 \text{ cm}$

A?

$\sin \alpha = \frac{CH}{CB}$ $CB \sin \alpha = \frac{CH}{CB} \cdot CB$ $CB \cdot \sin \alpha = CH$

$CH = CB \cdot \sin \alpha = 2,4 \text{ cm} \cdot \sin 60^\circ = 2,1 \text{ cm}$

$\text{(E)} \frac{2,4 \text{ cm} \cdot 2,1 \text{ cm}}{2} = 2,5 \text{ cm}^2$



ES 10 P. 15

$DB = 24,5 \text{ mm}$

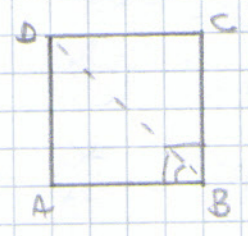
$A = AB^2 \text{ (E)}$

A?

$\cos \alpha = \frac{AB}{DB}$ $DB \cdot \cos \alpha = \frac{AB}{DB} \cdot DB$ $DB \cdot \cos \alpha = AB$

$AB = DB \cdot \cos \alpha = 24,5 \text{ mm} \cdot \cos 45^\circ = 17,3 \text{ mm}$

$\text{(E)} 17,3^2 \text{ mm}^2 = 300 \text{ mm}^2$



ES 11 P. 15

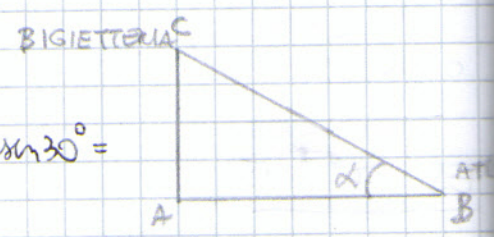
$CB = 18 \text{ m}$

$\alpha = 30^\circ$

AC?

$\sin \alpha = \frac{AC}{CB}$ $CB \sin \alpha = \frac{AC}{CB} \cdot CB$

$CB \cdot \sin \alpha = AC$ $AC = CB \cdot \sin \alpha = 18 \text{ m} \cdot \sin 30^\circ = 9,0 \text{ m}$



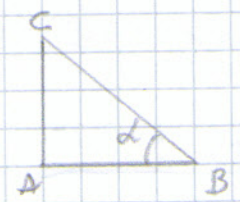
ES 12 P. 15

$CB = 2,5 \text{ m}$

$AC = 2,0 \text{ m}$

$\sin \alpha$?

$\sin \alpha = \frac{AC}{CB} = \frac{2,0 \text{ m}}{2,5 \text{ m}} = 0,8$



ES 13 P. 15

$CB = 3,3 \text{ cm}$

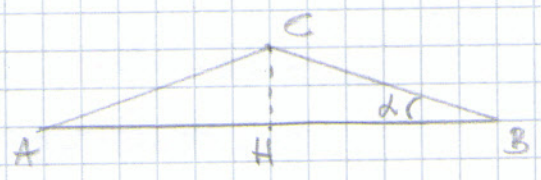
$CH = 1,1 \text{ cm}$

$HB = 3,0 \text{ cm}$

$\sin \alpha$, $\cos \alpha$?

$\sin \alpha = \frac{CH}{CB} = \frac{1,1 \text{ cm}}{3,3 \text{ cm}} = 0,33$

$\cos \alpha = \frac{HB}{CB} = \frac{3,0 \text{ cm}}{3,3 \text{ cm}} = 0,91$



ES 14 P. 15

$$AB = 20\text{m}$$

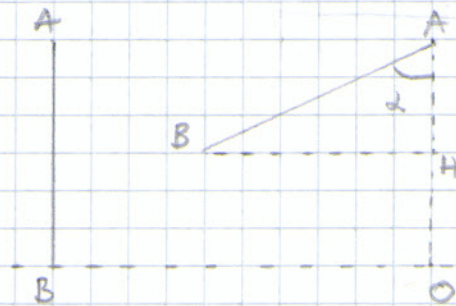
$$\alpha = 70^\circ$$

OH ?

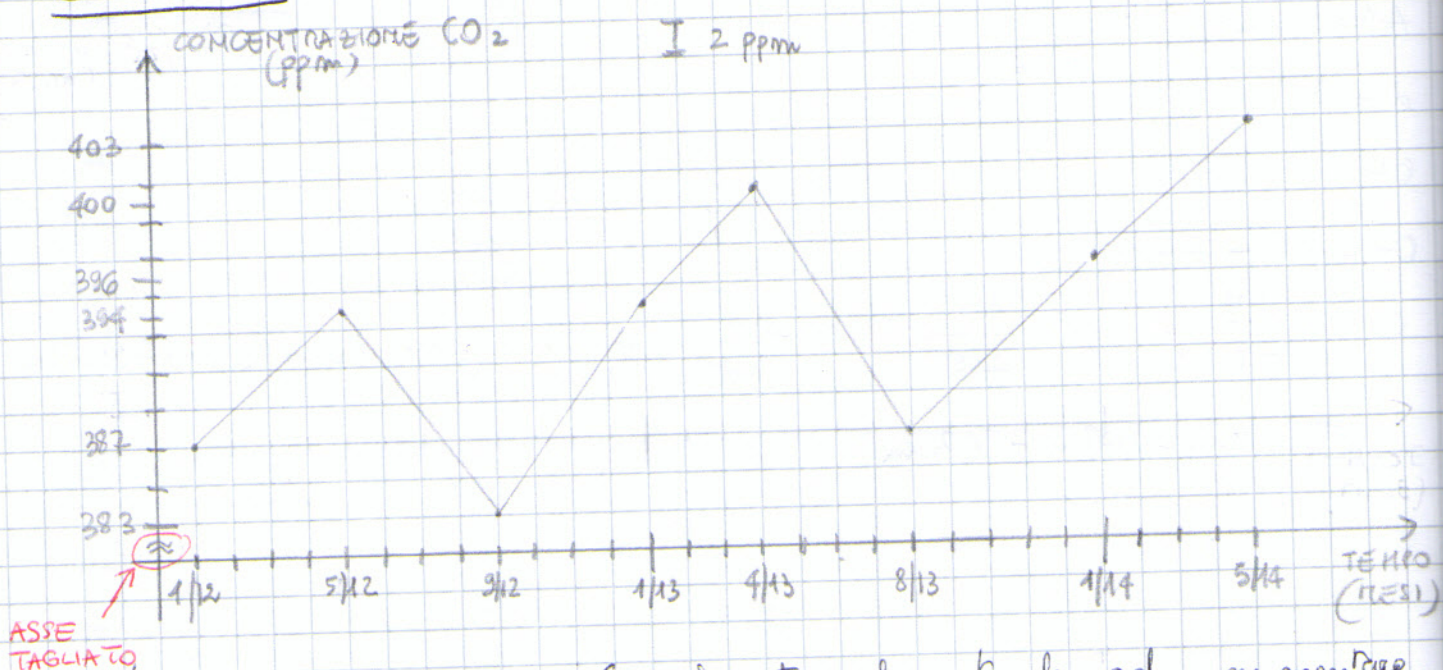
$$OH = AB - AH \Leftrightarrow$$

$$\cos \alpha = \frac{AH}{AB} \quad AB \cos \alpha = \frac{AH}{AB} \cdot AB \quad AB \cdot \cos \alpha = AH \quad AH = AB \cdot \cos \alpha = 20\text{m} \cdot \cos 70^\circ = 6,98\text{m}$$

$$\Leftrightarrow 20\text{m} - 6,98\text{m} = 13\text{m}$$



ES 1 P. 17



la concentrazione della CO₂ in atmosfera tende ad aumentare

ES 2 P. 17

1995 ~10 mm

2010 ~55 mm

2000 ~20 mm

2015 ~70 mm

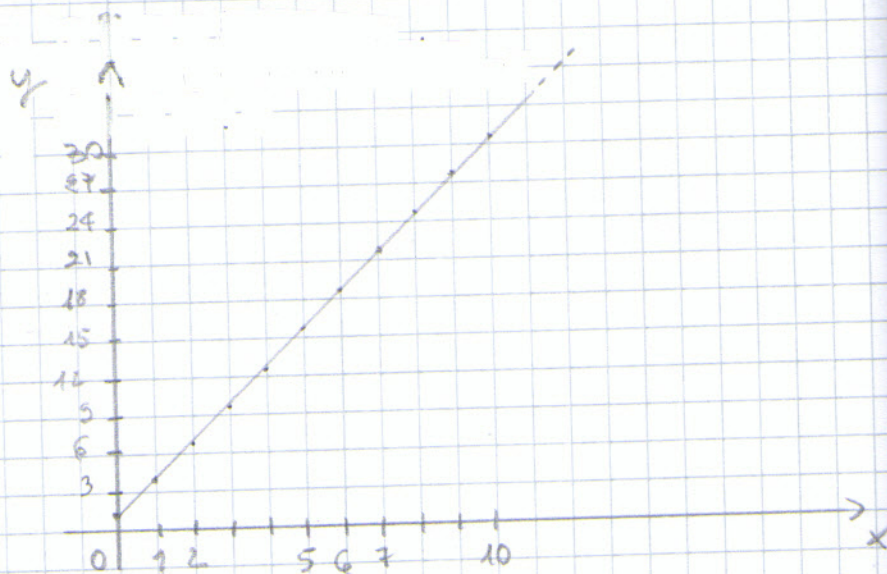
2005 ~40 mm

2020 ~95 mm

ES 3 P. 17

$$y = 3x + 1$$

x	y
0	$3 \cdot 0 + 1 = 1$
1	$3 \cdot 1 + 1 = 4$
2	$3 \cdot 2 + 1 = 7$
3	$3 \cdot 3 + 1 = 10$
4	$3 \cdot 4 + 1 = 13$
5	$3 \cdot 5 + 1 = 16$
6	$3 \cdot 6 + 1 = 19$
7	$3 \cdot 7 + 1 = 22$
8	$3 \cdot 8 + 1 = 25$
9	$3 \cdot 9 + 1 = 28$
10	$3 \cdot 10 + 1 = 31$

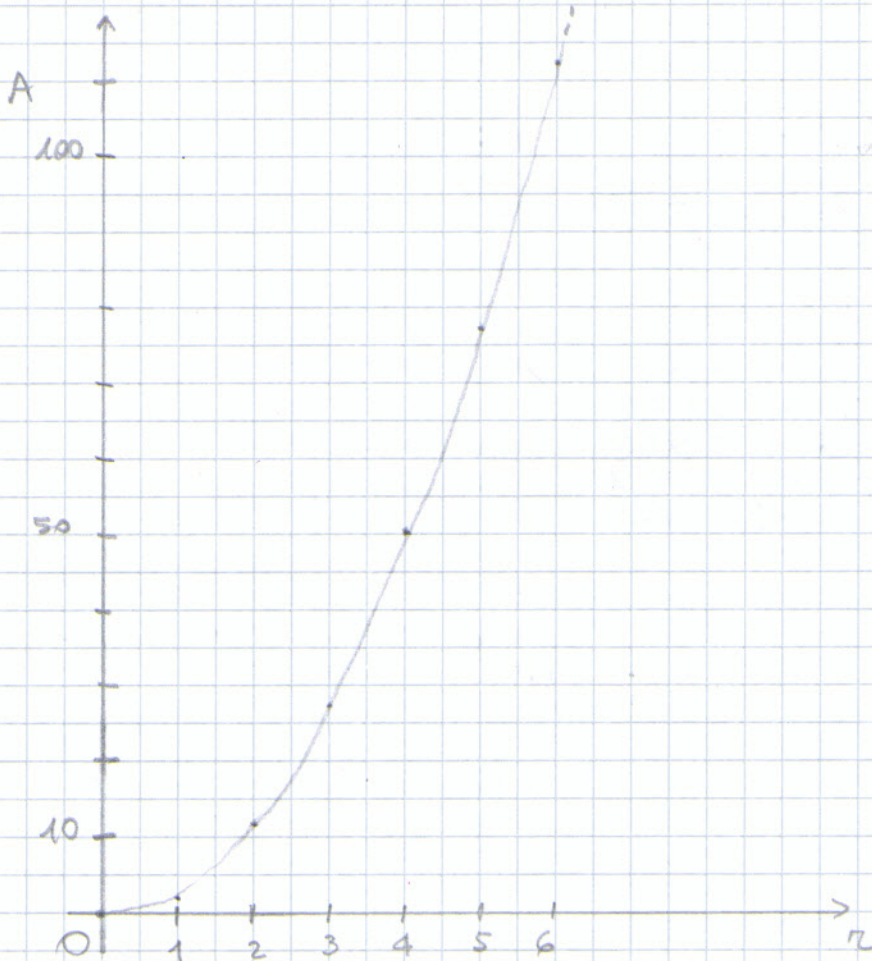


ES 4 P. 17

$$A = \overline{ur^2}$$

r	A
0	$3,14 \cdot 0^2 = 0$
1	$3,14 \cdot 1^2 = 3,14$
2	$3,14 \cdot 2^2 = 12,56$
3	$3,14 \cdot 3^2 = 28,26$

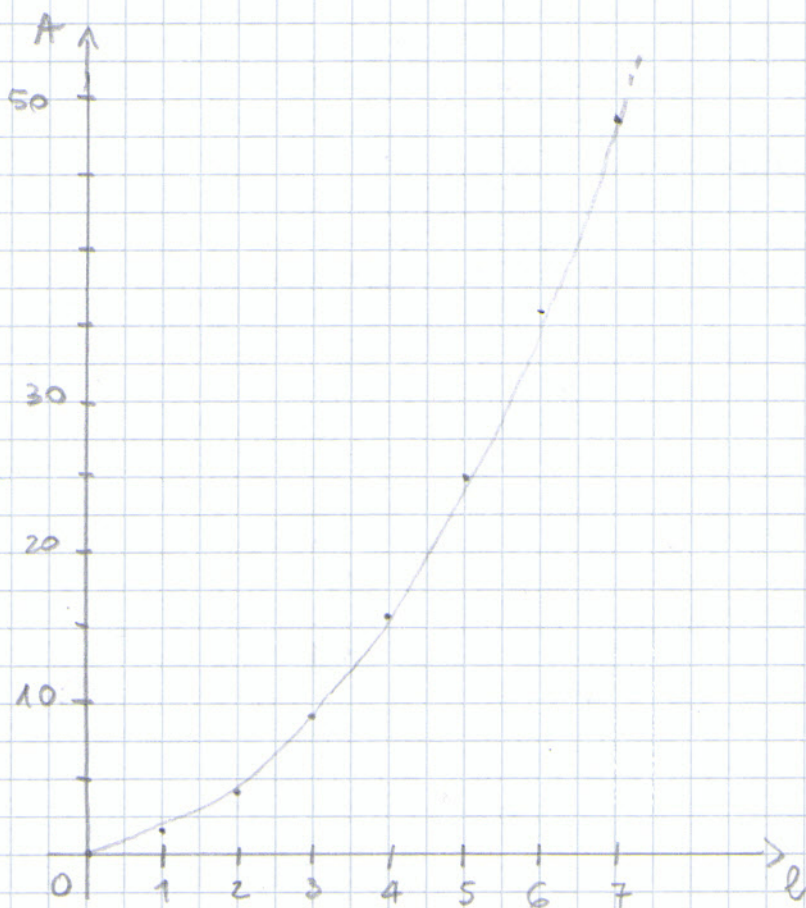
4	$3,14 \cdot 4^2 = 50,24$
5	$3,14 \cdot 5^2 = 78,5$
6	$3,14 \cdot 6^2 = 113,04$



ES 5 p. 17

$$A = l^2$$

l	A
0	$0^2 = 0$
1	$1^2 = 1$
2	$2^2 = 4$
3	$3^2 = 9$
4	$4^2 = 16$
5	$5^2 = 25$
6	$6^2 = 36$
7	$7^2 = 49$



ES 6 P.17

$$V = \pi r^2 h$$

$$h = 10 \text{ cm}$$

$$V = 10 \text{ cm} \cdot \pi \cdot r^2$$

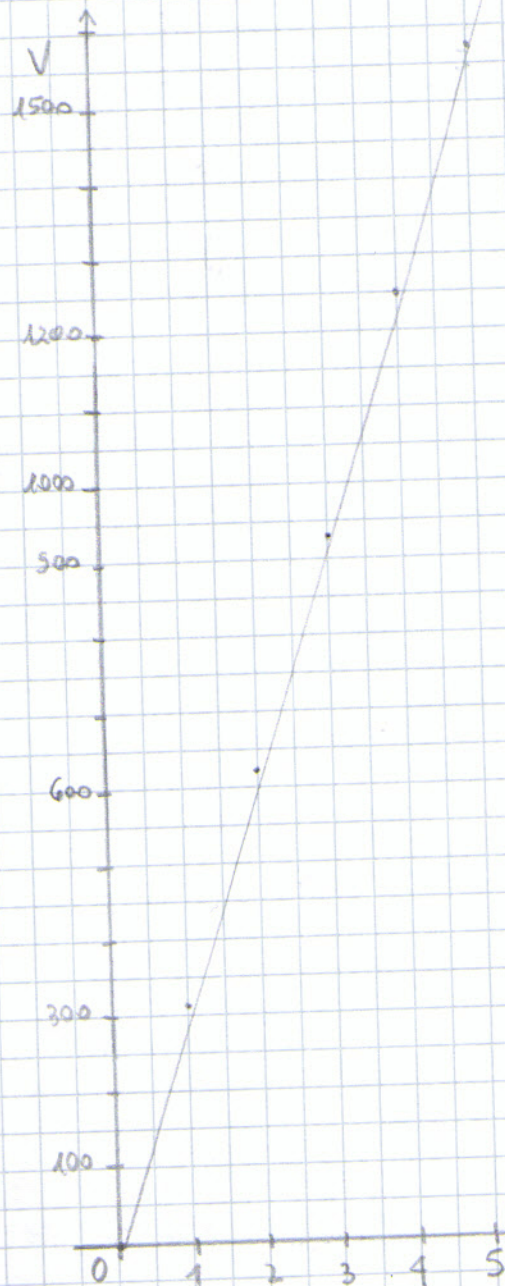
r	V
0	$10 \cdot 3,14 \cdot 0^2 = 0$
1	$10 \cdot 3,14 \cdot 1^2 = 31,4$
2	$10 \cdot 3,14 \cdot 2^2 = 125,6$
3	$10 \cdot 3,14 \cdot 3^2 = 282,6$
4	$10 \cdot 3,14 \cdot 4^2 = 502,4$
5	$10 \cdot 3,14 \cdot 5^2 = 785$



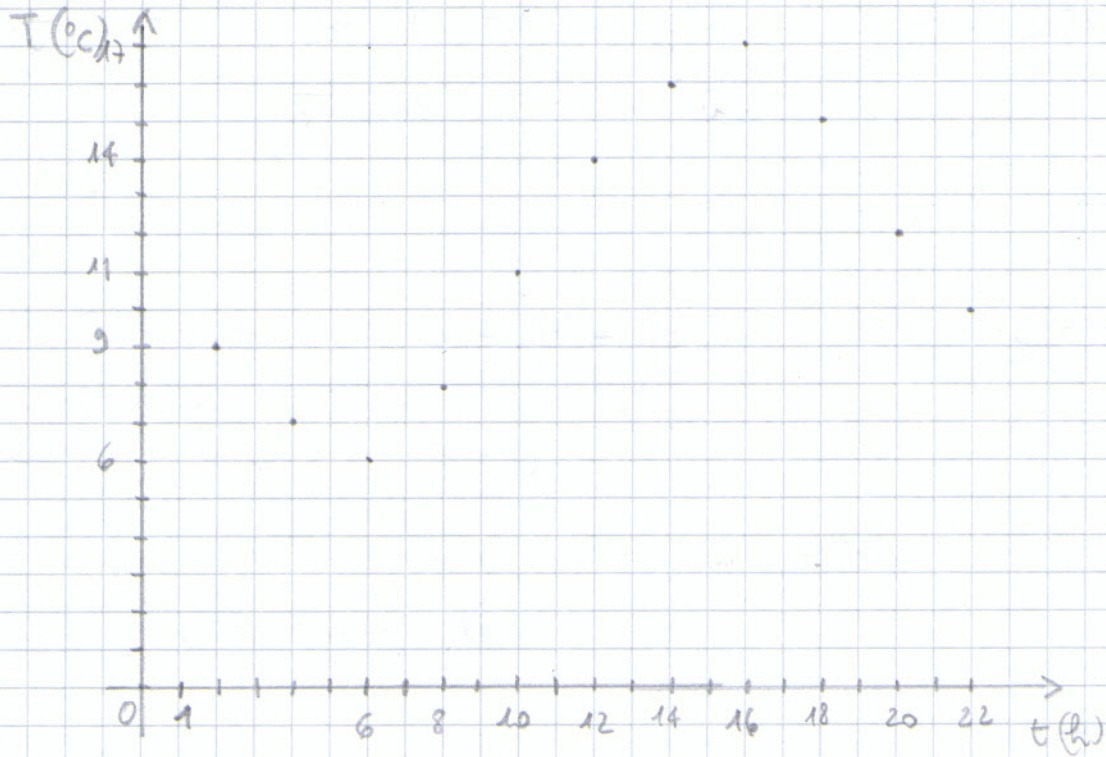
$$r = 10 \text{ cm}$$

$$V = 10 \text{ cm}^2 \pi h$$

h	V
0	$100 \cdot 3,14 \cdot 0 = 0$
1	$100 \cdot 3,14 \cdot 1 = 314$
2	$100 \cdot 3,14 \cdot 2 = 628$
3	$100 \cdot 3,14 \cdot 3 = 942$
4	$100 \cdot 3,14 \cdot 4 = 1256$
5	$100 \cdot 3,14 \cdot 5 = 1570$



ES 7 P. 17



ES 8 P. 17

circa 1700h

circa 8%

ES 1 P. 22

$$\frac{C}{r} = \frac{2\pi r}{r} = 2\pi$$

proporzionalità diretta, perché il rapporto tra y e x è costante

ES 2 P. 22

$$A = \frac{1}{2} b \cdot h$$

$$b = 2 \quad A = \frac{1}{2} \cdot 2 \cdot h = h$$

$$\frac{A}{h} = \frac{h}{h} = 1$$

proporzionalità diretta perché il rapporto tra y e x è costante

ES 3 P. 22

$$A = b \cdot h$$

$$A = 20 \text{ cm}^2$$

$$20 \text{ cm}^2 = b \cdot h$$

proporzionalità inversa, perché il prodotto di x e y è costante

ES 4 P. 22

$$P = 4 \cdot l$$

proporzionalità diretta

$$k = 4$$

$$y = k \cdot x$$

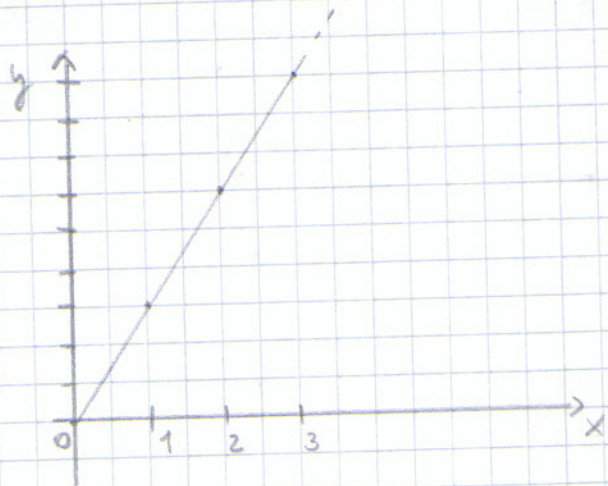
ES 5 P. 22

$$y = 3x$$

x	y
0	$3 \cdot 0 = 0$
1	$3 \cdot 1 = 3$
2	$3 \cdot 2 = 6$
3	$3 \cdot 3 = 9$

proporzionalità diretta perché

①



ES 6 P. 22

$$y = \frac{1}{2} x$$

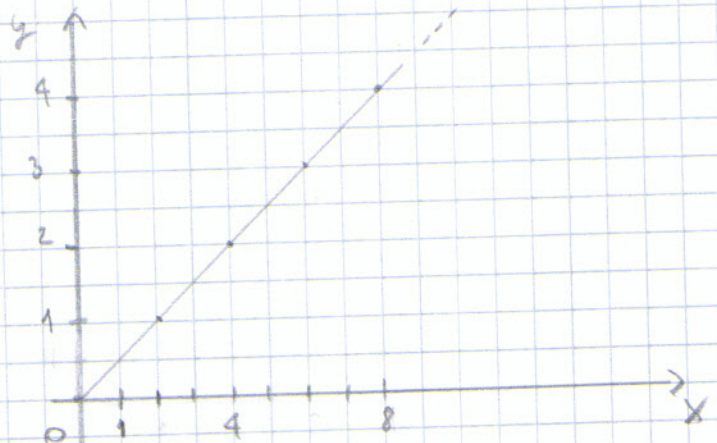
x	y
0	$\frac{1}{2} \cdot 0 = 0$
2	$\frac{1}{2} \cdot 2 = 1$
4	$\frac{1}{2} \cdot 4 = 2$
6	$\frac{1}{2} \cdot 6 = 3$
8	$\frac{1}{2} \cdot 8 = 4$

proporzionalità diretta perché

①

$y = kx$ oppure perché nel

grafico è rappresentata una retta che passa per l'origine degli assi



ES 7 P. 22

$$xy = 3$$

$$\frac{xy = 3}{\cancel{x} \quad \cancel{x}}$$

$$y = \frac{3}{x}$$

x	y
1	$\frac{3}{1} = 3$
2	$\frac{3}{2} = 1,5$
3	$\frac{3}{3} = 1$
1,5	$\frac{3}{1,5} = 2$
0,5	$\frac{3}{0,5} = 6$



proporzionalità inversa

(2)

perché $xy = k$ oppure perché

nel grafico è rappresentata

in iperbole

ES 8 P. 22

$$y = \frac{2}{x}$$

x	y
1	$\frac{2}{1} = 2$
2	$\frac{2}{2} = 1$
0,5	$\frac{2}{0,5} = 4$
4	$\frac{2}{4} = 0,5$
8	$\frac{2}{8} = 0,25$
0,25	$\frac{2}{0,25} = 8$



proporzionalità inversa perché

(2)

ES 9 P. 22

$$x = 4y$$

$$\frac{x = 4y}{\cancel{4} \quad \cancel{y}}$$

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

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

x	y
0	$\frac{0}{4} = 0$
4	$\frac{4}{4} = 1$
2	$\frac{2}{4} = 0,5$
6	$\frac{6}{4} = 1,5$
8	$\frac{8}{4} = 2$



proporzionalità diretta perché

(1)

ES 10 P. 22

$$y = 2x + 1$$

x	y
0	$2 \cdot 0 + 1 = 1$
1	$2 \cdot 1 + 1 = 3$
2	$2 \cdot 2 + 1 = 5$
3	$2 \cdot 3 + 1 = 7$
4	$2 \cdot 4 + 1 = 9$

dipendenza lineare perché ³

$y = mx + q$ oppure perché

ES 11 P. 22

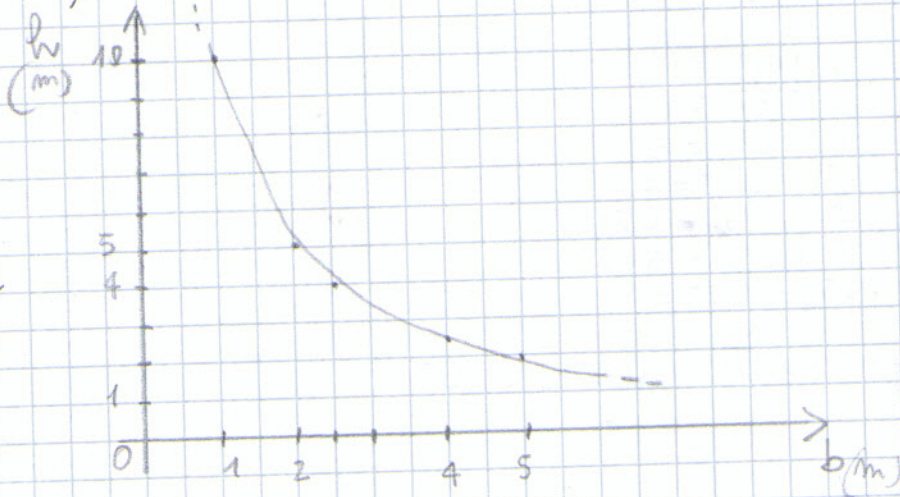
$$A = 10 \text{ m}^2$$

a) $10 \text{ m}^2 = b \cdot h$

b) $b \cdot h = 10$

b	h
1	$10/1 = 10$
2	$10/2 = 5$
4	$10/4 = 2,5$
5	$10/5 = 2$
2,5	$10/2,5 = 4$

$$\frac{b \cdot h}{b} = \frac{10}{b} \quad h = \frac{10}{b}$$



c) proporzionalità inversa

perché ²

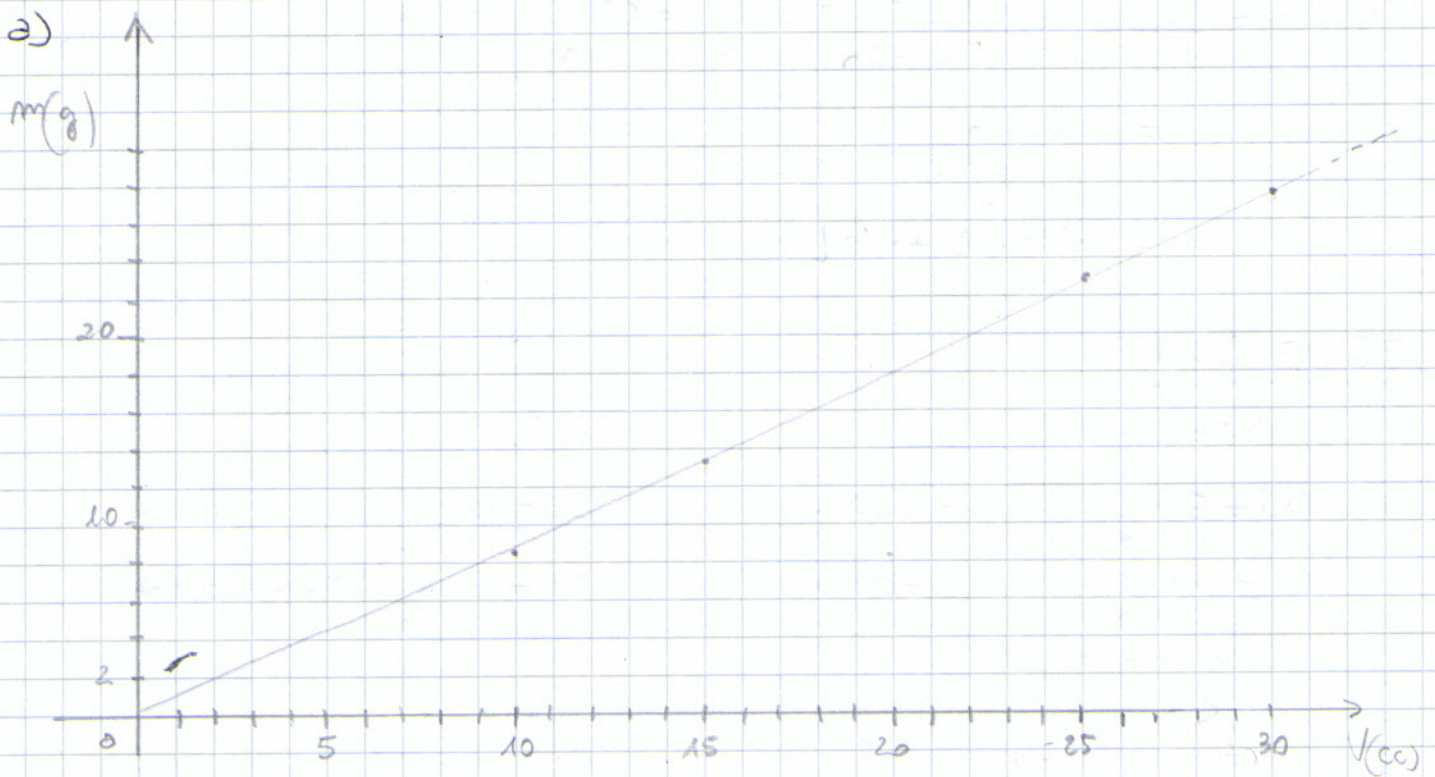
ES 12 P. 22

a) proporzionalità inversa perché nel grafico è rappresentata un'ip

b) $k = x \cdot y \quad x = 1 \quad y = 2 \quad k = 1 \cdot 2 = 2$

$$2 = x \cdot y$$

ES 13 P. 22

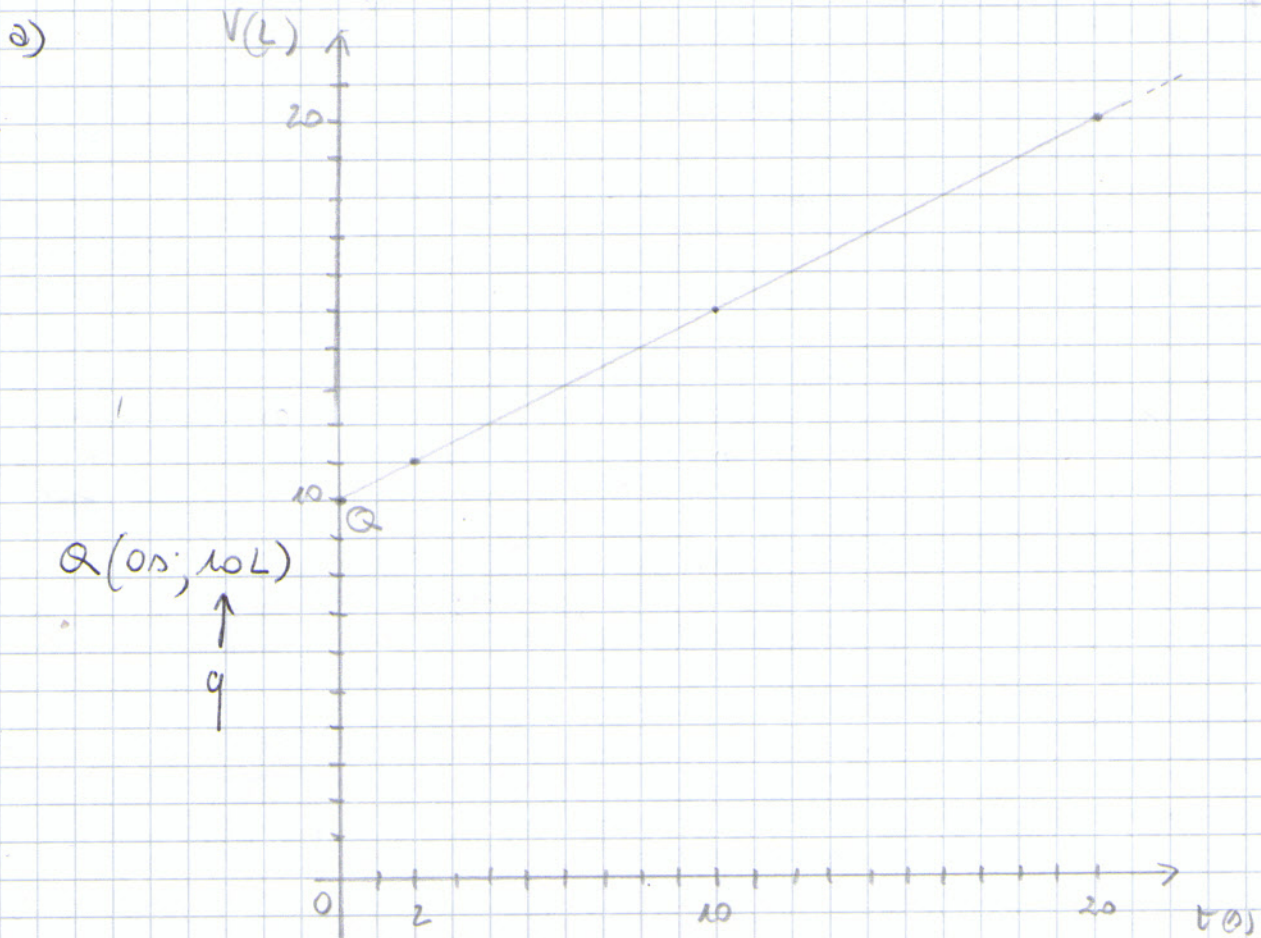


proporzionalità diretta perché $\textcircled{1}$

b) $k = \frac{y}{x} = \frac{9,2g}{10\text{cm}^3} = 9,2g/\text{cm}^3$

$$m = 9,2 \frac{g}{\text{cm}^3} \cdot V$$

ES 14 P. 22



$Q(0s; 10L)$

\uparrow
 q

dipendenza lineare perché ③

$$b) m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{11L - 2L}{2s - 0s} = \frac{9L}{2s} = 4,5 \frac{L}{s}$$

$$y = mx + q$$

$$V = 4,5 \frac{L}{s} \cdot t + 10L$$

ES 15 P. 22

$$\Delta S = v \cdot \Delta t$$

$$a) \Delta S = 5 \frac{m}{s} \cdot 120 s = 600 m$$

$$\Delta S = 20 \frac{m}{s} \cdot 30 s = 600 m$$

$$b) 300 m = v \cdot \Delta t$$

c)

