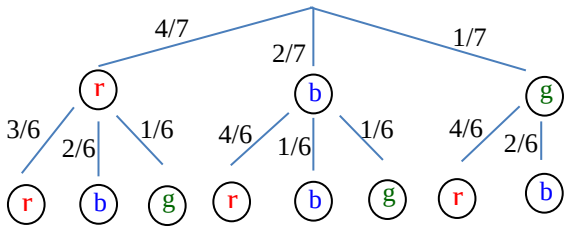
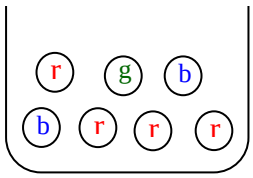
4. Schulaufgabe aus der Mathematik * Klasse 9d * 25.06.2018 * Gruppe A

Lösungen

1. Es gibt $\binom{3}{1}\cdot\binom{8}{4}\cdot\binom{7}{3}\cdot\binom{5}{3} = 3\cdot 70\cdot 35\cdot 10 = 73500$ Möglichkeiten

2.





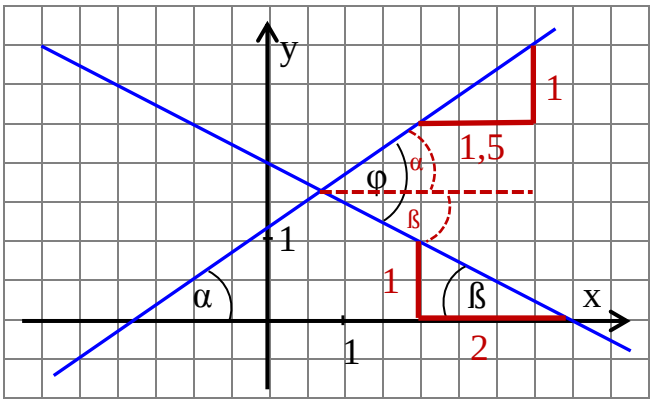
$$P(\text{"unterschiedliche Farben"}) = 1 - P(\text{"gleiche Farbe"}) = 1 - \left(\frac{4}{7}\cdot\frac{3}{6} + \frac{2}{7}\cdot\frac{1}{6}\right) =$$

$$1 - \left(\frac{12+2}{42}\right) = 1 - \frac{14}{42} = \frac{2}{3} \approx 66{,}7\%$$

3. a) $\tan\alpha = \frac{1}{1{,}5} \Rightarrow \alpha = \tan^{-1}\left(\frac{1}{1{,}5}\right) \approx 33{,}7^\circ$

$\tan ß = \frac{1}{2} \Rightarrow ß = \tan^{-1}\left(\frac{1}{2}\right) \approx 26{,}6^\circ$

b) $\varphi = \alpha + ß \approx 60{,}3^\circ$



4. Querschnittsfläche A

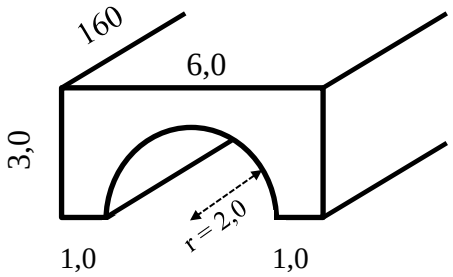
$$A = 3{,}0\text{cm}\cdot 6{,}0\text{cm} - \frac{1}{2}\cdot(2{,}0\text{cm})^2\cdot\pi \approx 11{,}72\,\text{cm}^2$$

$$V = 11{,}72\text{cm}^2\cdot 160\text{cm} \approx 1875\,\text{cm}^2$$

$$m = \rho\cdot V = 2{,}70\frac{\text{g}}{\text{cm}^3}\cdot 1875\,\text{cm}^3 =$$

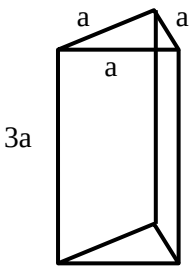
$$5062{,}5\,\text{g} \approx 5{,}1\text{kg}$$

Alle Längen in cm

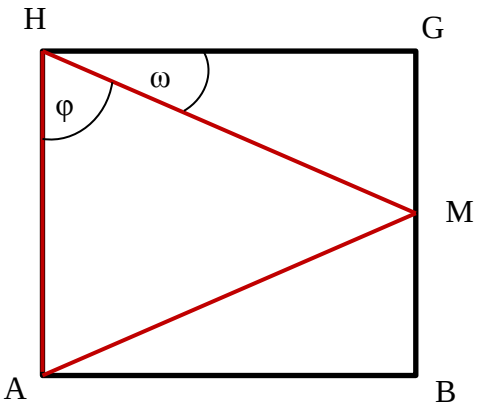


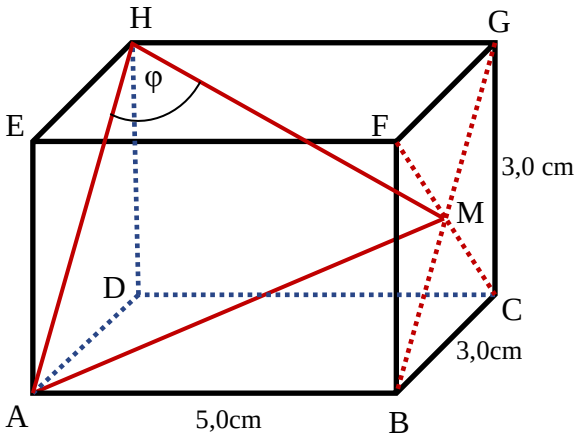
5. $V = G\cdot h = \frac{1}{2}\cdot a\cdot\frac{\sqrt{3}}{2}a\cdot 3a = \frac{3\cdot\sqrt{3}}{4}a^3$ und $V = 18{,}0\,\text{cm}^3 \Rightarrow$

$$\frac{3\cdot\sqrt{3}}{4}a^3 = 18{,}0\,\text{cm}^3 \Rightarrow a^3 = \frac{24}{\sqrt{3}}\,\text{cm}^3 = 8\sqrt{3}\,\text{cm}^3 \Rightarrow a = \sqrt[3]{8\sqrt{3}\,\text{cm}^3} \approx 2{,}4\text{cm}$$



6.





$\overline{BM} = \overline{MG} = \frac{1}{2} \cdot \sqrt{2} \cdot \overline{BC} = \frac{1}{2} \cdot \sqrt{2} \cdot 3{,}0\,\text{cm}$

$\overline{HM}^2 = \overline{HG}^2 + \overline{MG}^2 = 25\,\text{cm}^2 + (\frac{1}{2} \cdot \sqrt{2} \cdot 3{,}0\,\text{cm})^2 = 25\,\text{cm}^2 + 4{,}5\,\text{cm}^2 = 29{,}5\,\text{cm}^2 \Rightarrow$

$\overline{HM} = \sqrt{29{,}5\,\text{cm}^2} = 5{,}431...\,\text{cm} \approx 5{,}4\,\text{cm}$

$\tan\omega = \frac{\overline{MG}}{\overline{HG}} = \frac{\frac{1}{2} \cdot \sqrt{2} \cdot 3{,}0\,\text{cm}}{5{,}0\,\text{cm}} = \frac{3 \cdot \sqrt{2}}{10} \Rightarrow \omega = \tan^{-1}(\frac{3 \cdot \sqrt{2}}{10}) = 22{,}98...^\circ \approx 23{,}0^\circ$

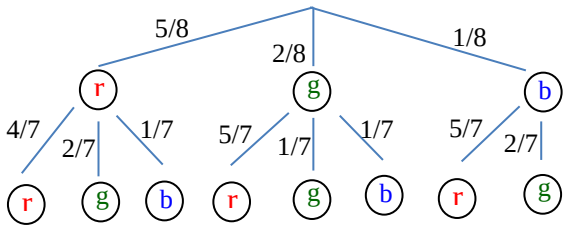
und $\varphi = 90^\circ - \omega \approx 67{,}0^\circ$

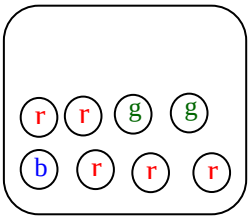
4. Schulaufgabe aus der Mathematik * Klasse 9d * 25.06.2018 * Gruppe B

Lösungen

1. Es gibt $\binom{3}{1}\cdot\binom{8}{5}\cdot\binom{7}{3}\cdot\binom{5}{2} = 3\cdot 56\cdot 35\cdot 10 = 58800$ Möglichkeiten

2.





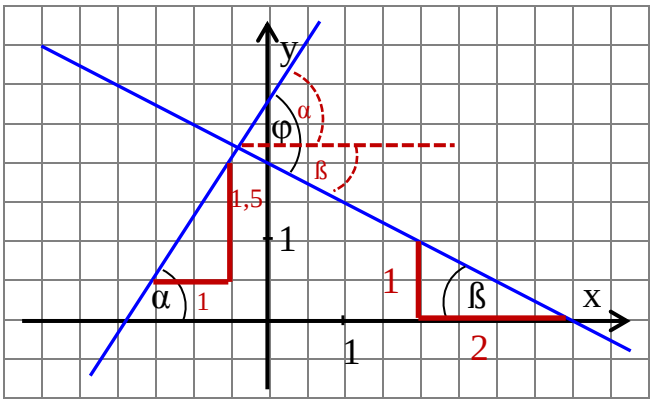
$$P(\text{"unterschiedliche Farben"}) = 1 - P(\text{"gleiche Farbe"}) = 1 - \left(\frac{5}{8}\cdot\frac{4}{7} + \frac{2}{8}\cdot\frac{1}{7}\right) =$$

$$1 - \left(\frac{20+2}{56}\right) = 1 - \frac{22}{56} = \frac{17}{28} \approx 60,7\%$$

3. a) $\tan\alpha = \frac{1,5}{1} \Rightarrow \alpha = \tan^{-1}(1,5) \approx 56,3^\circ$

$\tan ß = \frac{1}{2} \Rightarrow ß = \tan^{-1}\left(\frac{1}{2}\right) \approx 26,6^\circ$

b) $\varphi = \alpha + ß \approx 82,9^\circ$



4. Querschnittsfläche A

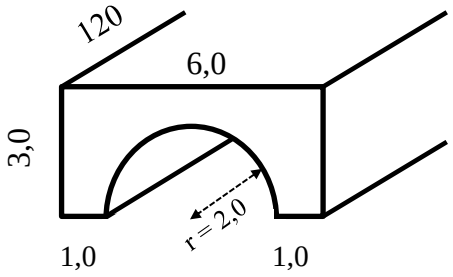
$$A = 3,0\text{cm}\cdot 6,0\text{cm} - \frac{1}{2}\cdot(2,0\text{cm})^2\cdot\pi \approx 11,72\,\text{cm}^2$$

$$V = 11,72\text{cm}^2\cdot 120\text{cm} \approx 1406\,\text{cm}^2$$

$$m = \rho\cdot V = 2,70\frac{\text{g}}{\text{cm}^3}\cdot 1406\,\text{cm}^3 =$$

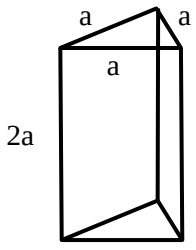
$$3796,2\,\text{g} \approx 3,8\,\text{kg}$$

Alle Längen in cm

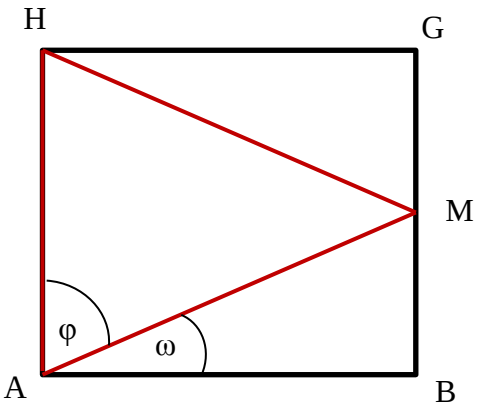


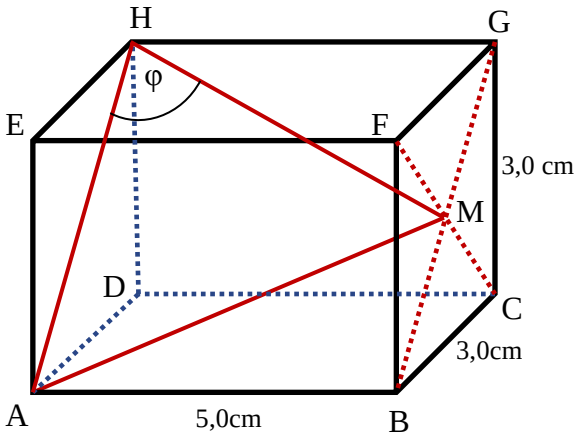
5. $V = G\cdot h = \frac{1}{2}\cdot a\cdot\frac{\sqrt{3}}{2}a\cdot 2a = \frac{\sqrt{3}}{2}a^3$ und $V = 12,0\,\text{cm}^3 \Rightarrow$

$$\frac{\sqrt{3}}{2}a^3 = 12,0\,\text{cm}^3 \Rightarrow a^3 = \frac{24}{\sqrt{3}}\,\text{cm}^3 = 8\sqrt{3}\,\text{cm}^3 \Rightarrow a = \sqrt[3]{8\sqrt{3}\,\text{cm}^3} \approx 2,4\text{cm}$$



6.





$\overline{BM} = \overline{MG} = \frac{1}{2} \cdot \sqrt{2} \cdot \overline{BC} = \frac{1}{2} \cdot \sqrt{2} \cdot 3{,}0\,cm$

$\overline{AM}^2 = \overline{AB}^2 + \overline{BM}^2 = 25\,cm^2 + (\frac{1}{2} \cdot \sqrt{2} \cdot 3{,}0\,cm)^2 = 25\,cm^2 + 4{,}5\,cm^2 = 29{,}5\,cm^2 \Rightarrow$

$\overline{AM} = \sqrt{29{,}5\,cm^2} = 5{,}431...\ cm \approx 5{,}4\,cm$

$\tan\omega = \frac{\overline{BM}}{\overline{AB}} = \frac{\frac{1}{2} \cdot \sqrt{2} \cdot 3{,}0\,cm}{5{,}0\,cm} = \frac{3 \cdot \sqrt{2}}{10} \Rightarrow \omega = \tan^{-1}(\frac{3 \cdot \sqrt{2}}{10}) = 22{,}98...^o \approx 23{,}0^o$

und $\varphi = 90^o - \omega \approx 67{,}0^o$