

### 6.3 Trekken met en zonder terugleggen

#### Opgave 36:

a.  $\binom{7}{4} = 35$

b.  $\binom{8}{2} \cdot \binom{7}{2} = 588$

c.  $\binom{8}{3} \cdot \binom{12}{1} = 672$

#### Opgave 37:

a.  $\frac{\binom{6}{3} \binom{9}{2}}{\binom{15}{5}} = 0,240$

b.  $P(\text{minstens 1 wit}) = 1 - P(\text{geen wit}) = 1 - \frac{\binom{10}{5}}{\binom{15}{5}} = 0,916$

c.  $\frac{\binom{11}{5} + \binom{11}{4} \binom{4}{1}}{\binom{15}{5}} = 0,593$

d.  $\frac{\binom{9}{5}}{\binom{15}{5}} = 0,042$

#### Opgave 38:

a.  $P(\text{minstens 1 prijs}) = 1 - P(\text{geen prijs}) = 1 - \frac{\binom{84}{6}}{\binom{100}{6}} = 0,659$

b.  $\frac{\binom{16}{2} \binom{84}{4}}{\binom{100}{6}} = 0,194$

c.  $\frac{\binom{5}{1} \binom{10}{2} \binom{84}{3}}{\binom{100}{6}} = 0,018$

#### Opgave 39:

a.  $\frac{\binom{7}{2}}{\binom{28}{2}} = 0,056$

b. nee, want bij a kies je twee verschillende leerlingen, maar bij de schijf kun je twee keer dezelfde sector draaien, dus deze kans is  $0,25^2 = 0,0625$

#### Opgave 40:

a.  $\frac{\binom{16}{2} \binom{24}{1}}{\binom{40}{3}} = 0,291$

$$b. P(\text{minstens 1 blauwe}) = 1 - P(\text{geen blauw}) = 1 - \frac{\binom{16}{3}}{\binom{40}{3}} = 0,943$$

$$c. \left(\frac{16}{40}\right)^3 \cdot \frac{24}{40} \cdot \binom{3}{2} = 0,288$$

$$d. P(\text{minstens 1 blauwe}) = 1 - P(\text{geen blauw}) = 1 - \left(\frac{16}{40}\right)^3 = 0,936$$

**Opgave 41:**

$$a. \left(\frac{12}{22}\right)^4 = 0,089$$

$$b. \frac{\binom{12}{4}}{\binom{22}{4}} = 0,068$$

**Opgave 42:**

$$a. \frac{\binom{38}{3}}{\binom{60}{3}} = 0,247$$

$$b. \left(\frac{38}{60}\right)^3 = 0,254$$

**Opgave 43:**

$$a. \frac{\binom{3}{2} \binom{7}{3}}{\binom{10}{5}} = 0,417$$

$$b. \frac{\binom{30}{2} \binom{70}{3}}{\binom{100}{5}} = 0,316$$

$$c. \frac{\binom{300}{2} \binom{700}{3}}{\binom{1000}{5}} = 0,309$$

$$d. \frac{\binom{3000}{2} \binom{7000}{3}}{\binom{10000}{5}} = 0,309$$

e. alle kansen zijn gelijk, want  $P(\text{rood}) = 0,3$  en  $P(\text{wit}) = 0,7$

$$0,3^2 \cdot 0,7^3 \cdot \binom{5}{2} = 0,3087$$

**Opgave 44:**

$$a. 0,7^{15} = 0,0047$$

$$b. 0,3^2 \cdot 0,7^{13} \cdot \binom{15}{2} = 0,0916$$

$$c. \quad P(\text{minstens } 2) = 1 - P(0 \text{ of } 1) = 1 - (0,7^{15} + \binom{15}{1} \cdot 0,7^{14} \cdot 0,3) = 0,9647$$

**Opgave 45:**

$$a. \quad 0,85^{10} = 0,1969$$

$$b. \quad 0,6^8 \cdot 0,15^2 \cdot \binom{10}{8} = 0,0170$$

$$c. \quad 0,6^9 \cdot 0,4 \cdot \binom{10}{9} + 0,6^{10} = 0,0464$$

**Opgave 46:**

$$a. \quad 2 \cdot 0,18 \cdot 0,82 = 0,2952$$

$$b. \quad 0,82^5 + 0,82^4 \cdot 0,18 \cdot \binom{5}{1} = 0,7776$$

$$c. \quad P(\text{minstens } 1 \text{ linkshandig}) = 1 - P(\text{allemaal rechtshandig}) = 1 - 0,82^n > 0,99$$

$$-0,82^n > -0,01$$

$$0,82^n < 0,01$$

$$n > \frac{\log 0,01}{\log 0,82} = 23,2$$

dus minstens 24 personen

$$d. \quad \frac{\binom{9}{2}}{\binom{50}{2}} = 0,0294$$

**Opgave 47:**

$$a. \quad 0,94^{12} = 0,476$$

$$b. \quad 0,09^2 \cdot 0,91^{10} \cdot \binom{12}{2} = 0,208$$

$$c. \quad 0,06^2 \cdot 0,85^{10} \cdot \binom{12}{2} = 0,047$$

**Opgave 48:**

$$a. \quad 0,88^{11} = 0,245$$

$$b. \quad 0,88^{22} + 0,88^{21} \cdot 0,12 \cdot \binom{22}{1} + 0,88^{20} \cdot 0,12^2 \cdot \binom{22}{2} = 0,498$$

$$c. \quad \frac{\binom{5}{2} \binom{30}{4}}{\binom{35}{6}} = 0,169$$

**Opgave 49:**

$$a. \quad P(\text{minstens } 2 \text{ lopend}) = 1 - P(0 \text{ of } 1 \text{ lopend}) = 1 - 0,95^{18} - 0,95^{17} \cdot 0,05 \cdot \binom{18}{1} = 0,226$$

b.  $0,25^4 \cdot 0,75^{14} \cdot \binom{18}{4} + 0,25^5 \cdot 0,75^{13} \cdot \binom{18}{5} = 0,412$

c.  $0,6^{12} \cdot 0,25^6 \cdot \binom{18}{12} = 0,010$

d.  $0,3^4 \cdot 0,7^{14} \cdot \binom{18}{4} = 0,168$

e.  $40\% = 7,2$  en  $60\% = 10,8$

$$P(8, 9 \text{ of } 10 \text{ met de auto}) = 0,6^8 \cdot 0,4^{10} \cdot \binom{18}{8} + 0,6^9 \cdot 0,4^9 \cdot \binom{18}{9} + 0,6^{10} \cdot 0,4^8 \cdot \binom{18}{10} \\ = 0,379$$