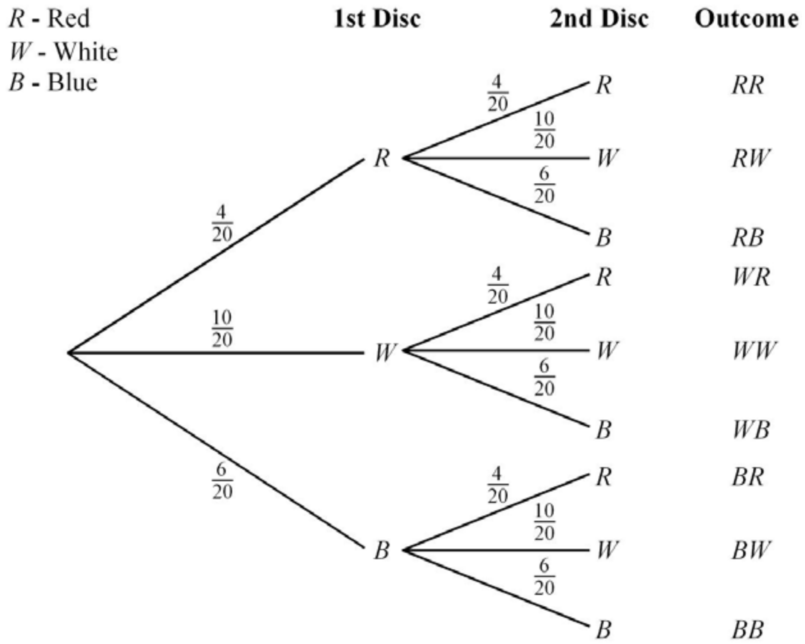
Solutions

Q1 (a)



(b) (i) P(selecting red disc first and blue disc next) $= \mathrm{P}(RB)$

$$= \frac{4}{20} \times \frac{6}{20}$$

$$= \frac{3}{50}$$

(ii) P(selecting a red disc and a blue disc) $= \mathrm{P}(RB) + \mathrm{P}(BR)$

$$= \frac{4}{20} \times \frac{6}{20} + \frac{6}{20} \times \frac{4}{20}$$

$$= \frac{3}{25}$$

(iii) P(selecting two discs of the same colour)

$= \mathrm{P}(RR) + \mathrm{P}(WW) + \mathrm{P}(BB)$

$$= \frac{4}{20} \times \frac{4}{20} + \frac{10}{20} \times \frac{10}{20} + \frac{6}{20} \times \frac{6}{20}$$

$$= \frac{19}{50}$$

(iv) P(selecting two discs of different colours)

= 1 − P(selecting two discs of the same colour)

$$= 1 - \frac{19}{50}$$

$$= \frac{31}{50}$$

Q2(a) P(drawing a ten-cent coin) $= \dfrac{8}{8+10+x}$

$= \dfrac{8}{18+x}$

$\therefore \dfrac{8}{18+x} = \dfrac{2}{5}$

$40 = 2(18+x)$

$18 + x = 20$

$x = 2$

Total number of coins $= 2+8+10$

$= 20$

(i) P(drawing 2 ten-cent coins) $= \dfrac{8}{20} \times \dfrac{8}{20}$

$= \dfrac{4}{25}$

(ii) P(drawing a fifty-cent coin and a one-dollar coin)

= P(drawing a fifty-cent coin first and then a one-dollar coin) +
P(drawing a a one-dollar coin first and then a fifty-cent coin)

$= \dfrac{10}{20} \times \dfrac{2}{20} + \dfrac{2}{20} \times \dfrac{10}{20}$

$= \dfrac{1}{10}$

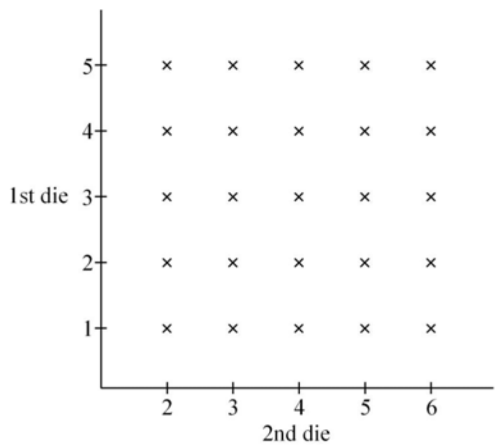
(iii) P(drawing 2 coins that add up to at least \$1.50)

= P(drawing 2 one-dollar coins) +
P(drawing a fifty-cent coin and a one-dollar coin)

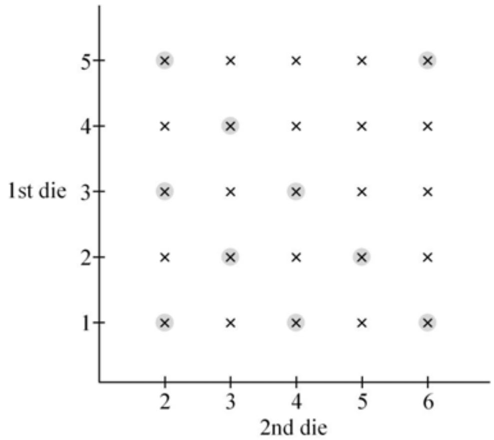
$= \dfrac{2}{20} \times \dfrac{2}{20} + \dfrac{1}{10}$

$= \dfrac{11}{100}$

Q3 (a)



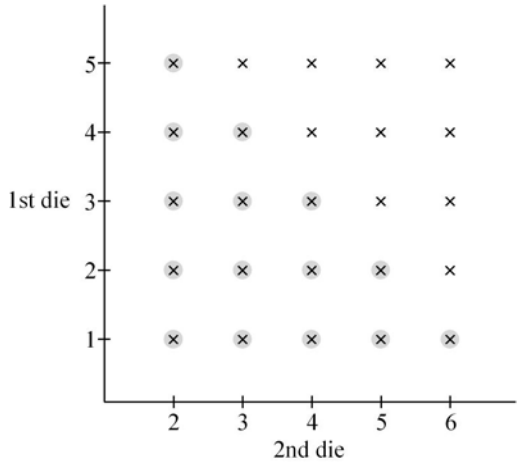
(b) (i)



P(sum of the two numbers is prime) $= \frac{10}{25}$

$= \frac{2}{5}$

(ii)

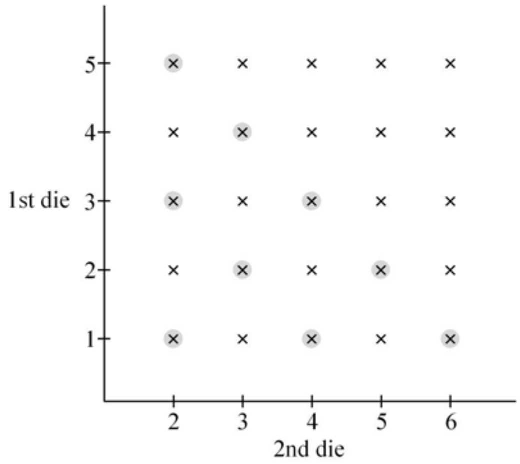


P(sum of the two numbers is at most 7)
= P(sum of the two numbers is ≤ 7)
= P(sum of the two numbers is equal to 3 or 4 or 5 or 6 or 7)

$= \frac{15}{25}$

$= \frac{3}{5}$

(iii)



P(sum of the two numbers is prime and at most 7) $= \frac{9}{25}$

Q4 (a) P(the two numbers are both even) $= \frac{5}{10} \times \frac{5}{10}$

$= \frac{1}{4}$

(b) P(the two numbers are multiples of 2 but not multiples of 4)
= P(the number on the card is 2, 6 or 10) ×
P(the number on the card is 2, 6 or 10)

$= \frac{3}{10} \times \frac{3}{10}$

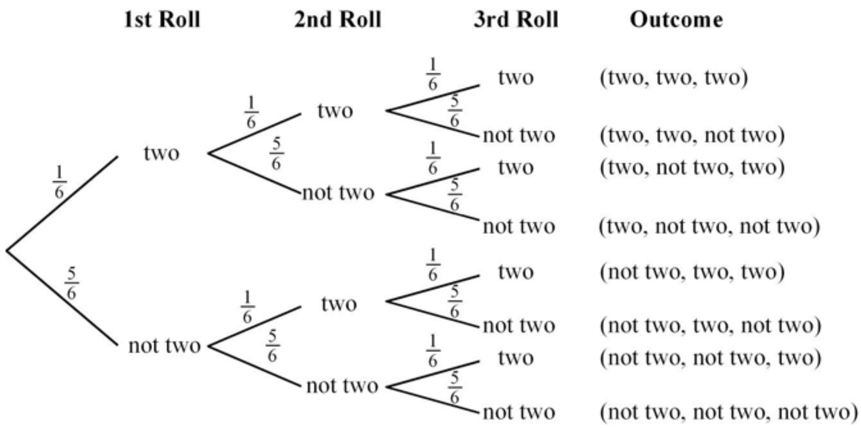
$= \frac{9}{100}$

(c) P(the two numbers on the card are even or prime)
= P(the number on the card is 2, 3, 4, 5, 6, 7, 8 or 10) ×
P(the number on the card is 2, 3, 4, 5, 6, 7, 8 or 10)

$= \frac{8}{10} \times \frac{8}{10}$

$= \frac{16}{25}$

Q5 (a)



(b) (i) P(getting 3 twos) $= \frac{1}{6} \times \frac{1}{6} \times \frac{1}{6}$

$= \frac{1}{216}$

(ii) P(getting a two)

= P(two, not two, not two) + P(not two, two, not two) + P(not two, not two, two)

$= \left(\frac{1}{6} \times \frac{5}{6} \times \frac{5}{6}\right) + \left(\frac{5}{6} \times \frac{1}{6} \times \frac{5}{6}\right) + \left(\frac{5}{6} \times \frac{5}{6} \times \frac{1}{6}\right)$

$= \frac{25}{72}$

(iii) P(getting at least a two) = 1 − P(getting no twos)

= 1 − P(not two, not two, not two)

$= 1 - \left(\frac{5}{6} \times \frac{5}{6} \times \frac{5}{6}\right)$

$= \frac{91}{216}$

Q6 (a) P(drawing 3 spades) $= \frac{13}{52} \times \frac{13}{52} \times \frac{13}{52}$

$= \frac{1}{64}$

(b) P(drawing a heart) $= \frac{13}{52} \times \frac{39}{52} \times \frac{39}{52} + \frac{39}{52} \times \frac{13}{52} \times \frac{39}{52} + \frac{39}{52} \times \frac{39}{52} \times \frac{13}{52}$

$= \frac{27}{64}$

(b) <u>Method 1</u>

P(drawing at least 2 clubs) = P(drawing 2 clubs) + P(drawing 3 clubs)

$= \left(\frac{13}{52} \times \frac{13}{52} \times \frac{39}{52} \times 3\right) + \left(\frac{13}{52} \times \frac{13}{52} \times \frac{13}{52}\right)$

$= \frac{5}{32}$

<u>Method 2</u>

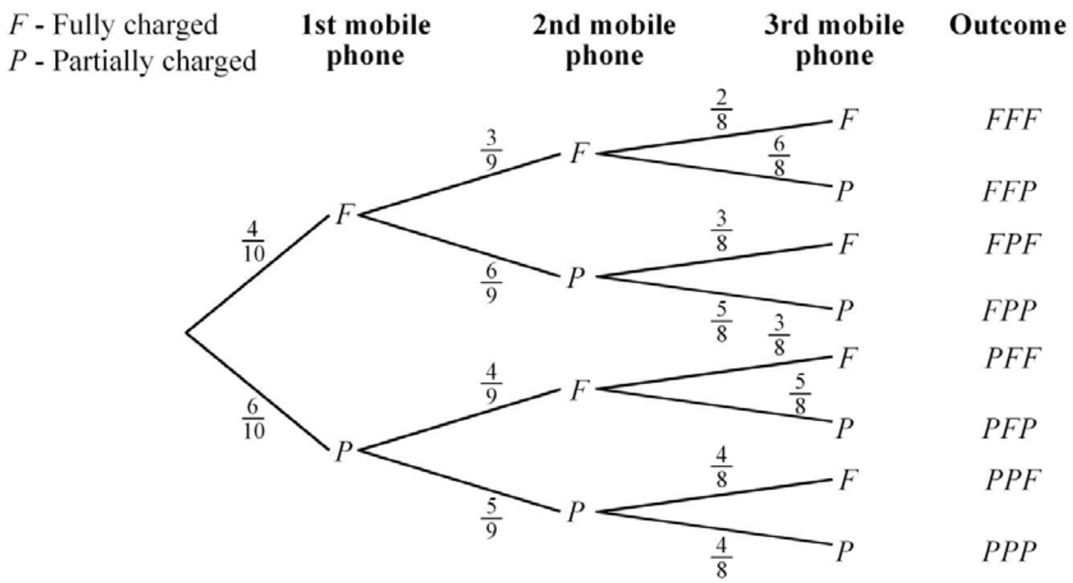
P(drawing at least 2 clubs)

= 1 − P(drawing no clubs) − P(drawing 1 club)

$= 1 - \left(\frac{39}{52} \times \frac{39}{52} \times \frac{39}{52}\right) - \left(\frac{13}{52} \times \frac{39}{52} \times \frac{39}{52} \times 3\right)$

$= \frac{5}{32}$

Q7 (a)



(b) (i) P(3 fully charged mobile phones are selected)

$$= \frac{4}{10} \times \frac{3}{9} \times \frac{2}{8}$$

$$= \frac{1}{30}$$

(ii) P(none of the fully charged mobile phones is selected)

= P(3 partially charged mobile phones are selected)

$$= \frac{6}{10} \times \frac{5}{9} \times \frac{4}{8}$$

$$= \frac{1}{6}$$

(iii) P(at least 2 fully charged mobile phones are selected)

= P(2 or 3 fully charged mobile phones are selected)

$$= \left(\frac{4}{10} \times \frac{3}{9} \times \frac{6}{8} \times 3\right) + \frac{1}{30}$$

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

(iv) P(a fully charged mobile phone selected only on the 3rd selection) $= \frac{6}{10} \times \frac{5}{9} \times \frac{4}{8}$

$$= \frac{1}{6}$$

Q8 P(the students found lying) = 1 − P(same tyre chosen by the 3 students)

$$= 1 - \left(\frac{1}{4} \times \frac{1}{4} \times \frac{1}{4} \times 4\right)$$

$$= 1 - \frac{1}{16}$$

$$= \frac{15}{16}$$

Q9 (a) P(not winning or losing a particular match) = P(a draw)
= 1 − 0.4 − 0.25
= 0.35

(b) P(winning only one of two consecutive matches)
= P(win, lose) + P(lose, win)
= $0.4 \times 0.6 \times 2$
= 0.48

(c) P(first winning only at the third match) = P(lose, lose, win)
= $0.6 \times 0.6 \times 0.4$
= 0.144

Q10 (a) P(none of the 3 teams will win the World Cup)
= 1 − P(Brazil or Germany or France winning)

$$= 1 - \left(\frac{1}{3} + \frac{1}{4} + \frac{1}{6}\right)$$

$$= \frac{1}{4}$$

(b) P(neither Brazil nor Germany will win the World Cup)
= 1 − P(Brazil or Germany winning)

$$= 1 - \left(\frac{1}{3} + \frac{1}{4}\right)$$

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

(c) P(Germany or any other unlisted countries will win the World Cup)
= 1 − P(Brazil or France wins)

$$= 1 - \left(\frac{1}{3} + \frac{1}{6}\right)$$

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

Q11 (a) (i) P(first defective bulb is drawn in the 3rd draw) $= \frac{9}{15} \times \frac{8}{14} \times \frac{6}{13}$

$$= \frac{72}{455}$$

(ii) P(first defective bulb is drawn in the 8th draw)

$$= \frac{9}{15} \times \frac{8}{14} \times \frac{7}{13} \times \frac{6}{12} \times \frac{5}{11} \times \frac{4}{10} \times \frac{3}{9} \times \frac{6}{8}$$

$$= \frac{3}{715}$$

(iii) P((first defective bulb is drawn in the 11th draw) = 0

A defective bulb will be drawn by the 10th draw as there are only 9 non-defective bulbs.

(b) P(drawing at least one good bulb in the first 5 draws)
= 1 − P(drawing a defective bulb in the first 5 draws)

$$=1-\left(\frac{6}{15}\times\frac{5}{14}\times\frac{4}{13}\times\frac{3}{12}\times\frac{2}{11}\right)$$

$$=\frac{999}{1001}$$

Q12 (a)

$$2w^\circ+4w^\circ+3w^\circ+w^\circ=360^\circ$$
$$10w=360$$
$$w=36$$

(b) (i) P(two numbers have the same value)
= P(2,2) + P(3,3) + P(4,4) + P(0,0)

$$=\left(\frac{36\times 2}{360}\right)^2+\left(\frac{3\times 36}{360}\right)^2+\left(\frac{36}{360}\right)^2+\left(\frac{4\times 36}{360}\right)^2$$

$$=\left(\frac{1}{5}\right)^2+\left(\frac{3}{10}\right)^2+\left(\frac{1}{10}\right)^2+\left(\frac{2}{5}\right)^2$$

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

(ii) P(two numbers have a sum of at least 7)
= P(3,4) + P(4,3) + P(4,4)

$$=\left(\frac{3}{10}\times\frac{1}{10}\right)+\left(\frac{1}{10}\times\frac{3}{10}\right)+\left(\frac{1}{10}\times\frac{1}{10}\right)$$

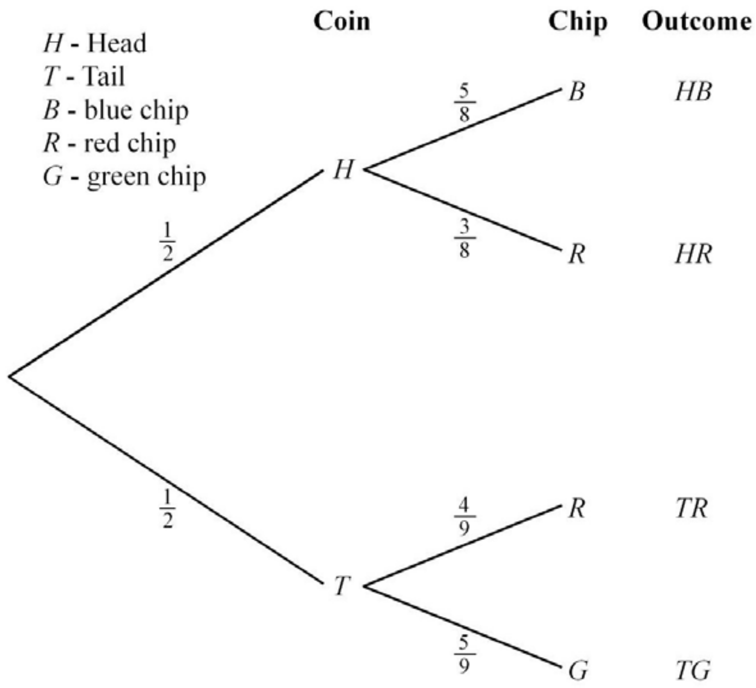
$$=\frac{7}{100}$$

(iii) P(product of the two numbers is 0)
= P(0,2) + P(2,0) + P(0,3) + P(3,0) + P(0,4) + P(4,0) + P(0,0)

$$=\left(\frac{2}{5}\times\frac{1}{5}\times 2\right)+\left(\frac{2}{5}\times\frac{3}{10}\times 2\right)+\left(\frac{2}{5}\times\frac{1}{10}\times 2\right)+\left(\frac{2}{5}\right)^2$$

$$=\frac{16}{25}$$

Q13 (a)



(b) (i) P(selecting blue chip) = P(HB)

$$= \frac{1}{2} \times \frac{5}{8}$$

$$= \frac{5}{16}$$

(ii) P(selecting green chip) = P(TG)

$$= \frac{1}{2} \times \frac{5}{9}$$

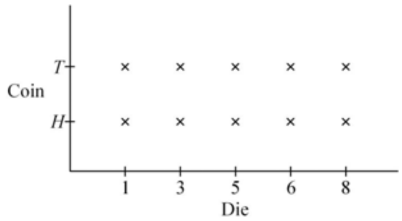
$$= \frac{5}{18}$$

(iii) P(selecting red chip) = P(HR) + P(TR)

$$= \frac{1}{2} \times \frac{3}{8} + \frac{1}{2} \times \frac{4}{9}$$

$$= \frac{59}{144}$$

Q14 (a)



(b) (i) P(resulting number is 0) = P(H, 3)

$$= \frac{1}{10}$$

(ii) P(resulting number is greater than 0)

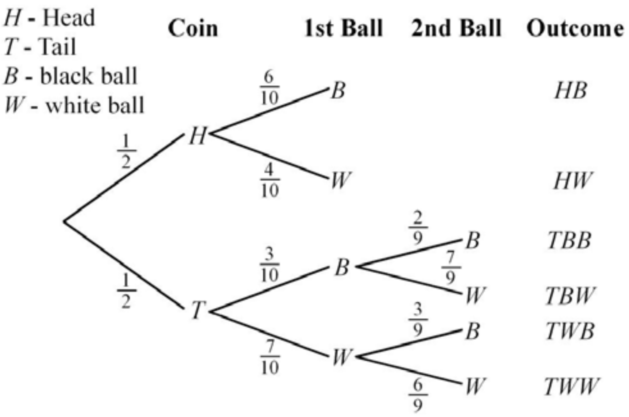
$= 1 - \text{P(resulting number is less than or equal to 0)}$
$= 1 - P(H, 3) - P(H, 1)$
$= 1 - \frac{1}{10} - \frac{1}{10}$
$= \frac{8}{10}$
$= \frac{4}{5}$

or

P(resulting number is greater than 0)
$= P(T, 1) + P(T, 3) + P(T, 5) + P(T, 6) + P(T, 8) + P(H, 5)$
$+ P(H, 6) + P(H, 8)$
$= \frac{8}{10}$
$= \frac{4}{5}$

(iii) P(resulting number is 3 or 5)
$= P(H, 8) + P(H,6) + P(T,3) + P(T,1)$
$= \frac{4}{10}$
$= \frac{2}{5}$

Q15 (a)



(b) (i) P(two black balls) $= \frac{1}{2} \times \frac{3}{10} \times \frac{2}{9}$
$= \frac{1}{30}$

(ii) P(two white balls) $= \frac{1}{2} \times \frac{7}{10} \times \frac{6}{9}$
$= \frac{7}{30}$

(iii) P(at least one black ball)

$= 1 - P(\text{no black balls})$

$$= 1 - \left(\frac{1}{2} \times \frac{4}{10}\right) - \left(\frac{1}{2} \times \frac{7}{10} \times \frac{6}{9}\right)$$

$$= \frac{17}{30}$$

(c) (i) P(two black balls) $= \frac{1}{2} \times \frac{3}{10} \times \frac{3}{10}$

$$= \frac{9}{200}$$

(ii) P(two white balls) $= \frac{1}{2} \times \frac{7}{10} \times \frac{7}{10}$

$$= \frac{49}{200}$$

(iii) P(at least one black ball)

$= 1 - P(\text{no black balls})$

$$= 1 - \left(\frac{1}{2} \times \frac{4}{10}\right) - \left(\frac{1}{2} \times \frac{7}{10} \times \frac{7}{10}\right)$$

$$= \frac{111}{200}$$