

Solutions

2.1 First probabilities are R:3/5, B:2/5. After R, the second probabilities are R:2/4, B:2/4. After B they are R:3/4, B:1/4. Terminal probabilities RR, RB, BR, BB are 6/20, 6/20, 6/20, 2/20 and sum to one. Different colours are the disjoint RB and BR paths, so probability is $6/20 + 6/20 = 3/5$. Multiplying stages follows a path; adding combines mutually exclusive paths. Replacement would change the model.

3.1 Both=15, art only=15, music only=10 and neither=10; their sum is 50. $P(M | A) = 15/30 = 1/2$ while $P(A | M) = 15/25 = 3/5$. The intersection probability is $15/50 = 3/10$, equal to $(30/50)(25/50) = 3/10$, so these events are independent in this finite model. Their unequal conditional probabilities do not contradict independence, since independence compares each condition with the matching unconditional probability: $P(M) = 1/2$ and $P(A) = 3/5$.

Local guidance: select and explain the relationship; calculate every requested result; check units, scope, conditions and completeness. These are authored classroom criteria.