ANSWERS → REVIEW: Independent & Dependent Events.

1. $P(M) = \frac{1}{5}$, $P(N) = \frac{3}{5}$, $P(Q) = \frac{4}{15}$.

a) $P(M \text{ and } N)$
$= P(M) \times P(N)$
$= \frac{1}{5} \times \frac{3}{5}$
$= \frac{3}{25}$

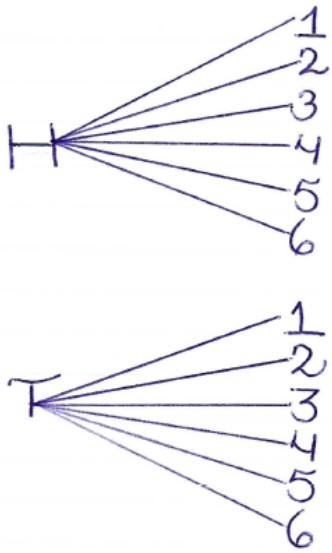
b) $P(M \text{ and } Q)$
$= P(M) \times P(Q)$
$= \frac{1}{5} \times \frac{4}{15}$
$= \frac{4}{75}$

c) $P(M \text{ and } N \text{ and } Q)$
$= P(M) \times P(N) \times P(Q)$
$= \frac{1}{5} \times \frac{3}{5} \times \frac{4}{15}$
$= \frac{12}{375}$
$= \frac{4}{125}$

d) $P(\text{not } M)$
$= 1 - P(M)$
$= 1 - \frac{1}{5}$
$= \frac{5}{5} - \frac{1}{5}$
$= \frac{4}{5}$

2. $P(\text{Edmonton and Hamilton})$
$= P(E) \times P(H)$
$= \frac{3}{7} \times \frac{2}{9}$
$= \frac{6}{63}$
$= \frac{2}{21}$

3a)



Outcomes (Sample Space)

H1
H2
H3
H4
H5
H6

T1
T2
T3
T4
T5
T6

b) i) $P(T,3)$

$= P(T) \times P(3)$

$= \frac{1}{2} \times \frac{1}{6}$

$= \frac{1}{12}$ (Check Tree Diagram)

ii) $P(H,2)$

$= P(H) \times P(2)$

$= \frac{1}{2} \times \frac{1}{6}$

$= \frac{1}{12}$

iii) $P(H,7)$

$= P(H) \times P(7)$

$= \frac{1}{2} \times \frac{0}{6}$

$= \frac{0}{12}$

$= 0 \rightsquigarrow$ IMPOSSIBLE!

4.a) P(King)

$= \frac{4}{52}$

$= \frac{1}{13}$

b) P(Jack)

$= \frac{4}{52}$

$= \frac{1}{13}$

c) P(K and J) (Indep.)

$= P(K) \times P(J)$

$= \frac{4}{52} \times \frac{4}{52}$

$= \frac{1}{13} \times \frac{1}{13}$

$= \frac{1}{169}$

d) P(K and J) (Dep.)

$= P(K) \times P(J|K)$

$= \frac{4}{52} \times \frac{4}{51}$

$= \frac{1}{13} \times \frac{4}{51}$

$= \frac{4}{663}$

5a) P(defective and defective)

$= P(\text{def}) \times P(\text{def}|\text{def})$

$= \frac{5}{50} \times \frac{4}{49}$

$= \frac{1}{10} \times \frac{4}{49}$

$= \frac{4}{490}$

$= \frac{2}{245}$

b) P(working and working)

$= P(W) \times P(W|W)$

$= \frac{45}{50} \times \frac{44}{49}$

$= \frac{9}{10} \times \frac{44}{49}$

$= \frac{396}{490}$

$= \frac{198}{245}$

6. P(red and then blue)

$= P(\text{red}) \times P(\text{blue})$

$= \frac{4}{9} \times \frac{5}{9}$

$= \frac{20}{81}$

7. a) Flipping a coin three times ⇝ Independent

b) Removing coloured marbles from a bag, without replacement ⇝ Dependent

c) Getting two strikes in a row in baseball ⇝ Dependent/Independent (can be either)

8. Having a flat tire replaced on a car does not affect the probability of having a flat on any one of the three remaining original tires on the return trip - the events are independent.

9. a) $P(\text{convertible}) = \frac{2}{20} = \frac{1}{10}$

b) $P(\text{convertible} \mid \text{convertible}) = \frac{1}{19}$