PROBABILITY: INDEPENDENT EVENTS

Mastery Worksheet

I DO

There are 5 red counters and 4 blue counters in a bag.
A counter is taken at random, its colour noted, and it is replaced.
A second counter is then taken.
Work out the probability that both counters are the same colour.

WE DO

There are 7 green counters and 3 yellow counters in a bag.
A counter is taken at random, its colour noted, and it is replaced.
A second counter is then taken.
Work out the probability that both counters are the same colour.

YOU DO 1

There are 6 black counters and 2 white counters in a bag.
A counter is taken at random, its colour noted, and it is replaced.
A second counter is then taken.
Work out the probability that both counters are the same colour.

YOU DO 2 (DIFFERENT COLOURS)

There are 4 purple counters and 8 orange counters in a bag.
A counter is taken at random, its colour noted, and it is replaced.
A second counter is then taken.
Work out the probability that both counters are **different** colours.

CHALLENGE 1 (NO REPLACEMENT)

There are 5 red counters and 4 blue counters in a bag.

A counter is taken at random and **not replaced**.

A second counter is then taken.

Work out the probability that both counters are the same colour.

CHALLENGE 2 (ALGEBRAIC PROBABILITY)

There are x red counters and 3 blue counters in a bag.

A counter is taken at random, replaced, and a second counter is taken.

The probability that both counters are blue is $^{9}/_{64}$.

Work out the value of x.

ANSWERS & WORKED SOLUTIONS

I Do

Step 1: P(Red, Red) = $^{5}/_{9} \times {}^{5}/_{9} = {}^{25}/_{81}$

Step 2: P(Blue, Blue) = $^{4}/_{9} \times {}^{4}/_{9} = {}^{16}/_{81}$

Step 3: P(Same) = $^{25}/_{81} + {}^{16}/_{81} = {}^{41}/_{81}$

Answer: $^{41}/_{81}$

We Do

Step 1: P(Green, Green) = $^{7}/_{10} \times {}^{7}/_{10} = {}^{49}/_{100}$

Step 2: P(Yellow, Yellow) = $^{3}/_{10} \times {}^{3}/_{10} = {}^{9}/_{100}$

Step 3: P(Same) = $^{49}/_{100} + {}^{9}/_{100} = {}^{58}/_{100}$

Answer: $^{29}/_{50}$

You Do 1

Step 1: P(Black, Black) = $^{6}/_{8} \times {}^{6}/_{8} = {}^{36}/_{64}$

Step 2: P(White, White) = $^{2}/_{8} \times {}^{2}/_{8} = {}^{4}/_{64}$

Step 3: P(Same) = $^{36}/_{64} + {}^{4}/_{64} = {}^{40}/_{64}$

Answer: $^{5}/_{8}$

You Do 2

Step 1: P(Purple, Orange) = $^{4}/_{12} \times {}^{8}/_{12} = {}^{32}/_{144}$

Step 2: P(Orange, Purple) = $^{8}/_{12} \times {}^{4}/_{12} = {}^{32}/_{144}$

Step 3: P(Different) = $^{32}/_{144} + {}^{32}/_{144} = {}^{64}/_{144}$

Answer: $^{4}/_{9}$

Challenge 1

Step 1: P(Red, Red) = $^{5}/_{9} \times {}^{4}/_{8} = {}^{20}/_{72}$

Step 2: P(Blue, Blue) = $^{4}/_{9} \times {}^{3}/_{8} = {}^{12}/_{72}$

Step 3: P(Same) = $^{20}/_{72} + {}^{12}/_{72} = {}^{32}/_{72}$

Answer: $^{4}/_{9}$

Challenge 2

Step 1: $P(\text{Blue, Blue}) = \left(\frac{3}{(x+3)}\right)^2 = \frac{9}{64}$

Step 2: $\frac{9}{(x+3)^2} = \frac{9}{64}$

Step 3: $(x + 3)^2 = 64 \Rightarrow x + 3 = 8$

Answer: 5