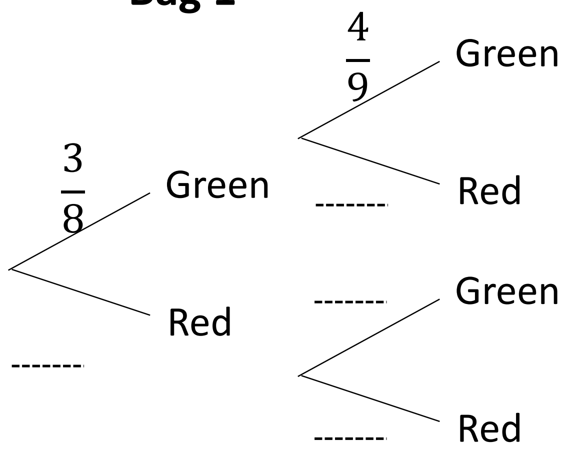
Probability of Independent Events

Abbas has two bags. The first bag contains **3 green counters** and **5 red counters**. The second bag contains **4 green counters** and **5 red counters.**

1) Complete the probability tree diagram.

Bag 1 **Bag 2**



/2

2) Calculate the probability that two greens will be selected.

/2

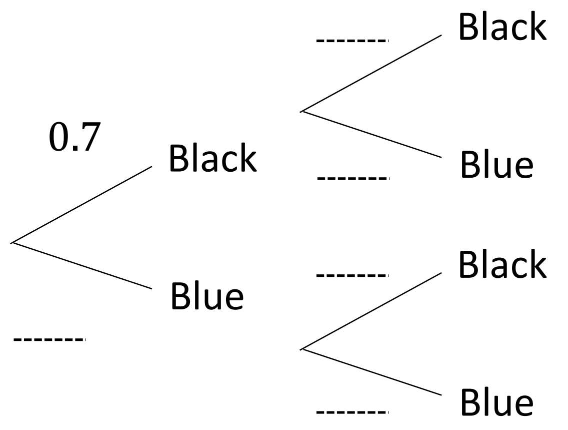
3) Calculate the probability that a green and a red will be selected in either order.

/3

Millie checks her pencil case for her exam in a rush. Seven out of ten of the pens Millie chooses from are black. The rest of the pens are blue. Millie chooses a pen and then places it back in the pencil case ready for her exam.

4) Complete the probability tree diagram.

Choice 1 **Choice 2**



/2

5) Calculate the probability that Millie selects two black pens.

/2

6) The probability that Danielle will be late for school tomorrow is 0.04
The probability that Ben will be late for school tomorrow is 0.07.
The probability that both Danielle and Ben will be late for school tomorrow is 0.02.
Zane says that the events ‘Danielle will be late tomorrow’ and ‘Ben will be late tomorrow’ are independent.

Justify whether Zane is correct or not.

/2

7) There are n sweets in a bag. The bag has both blue and green sweets in. There are 6 blue sweets in the bag. Adam takes a sweet out of the bag and **replaces it**. **Show that** the probability of getting a blue and a green sweet in either order is

$$P(blue\ or\ green\ in\ any\ order) = \frac{12n - 72}{n^2}$$

/3

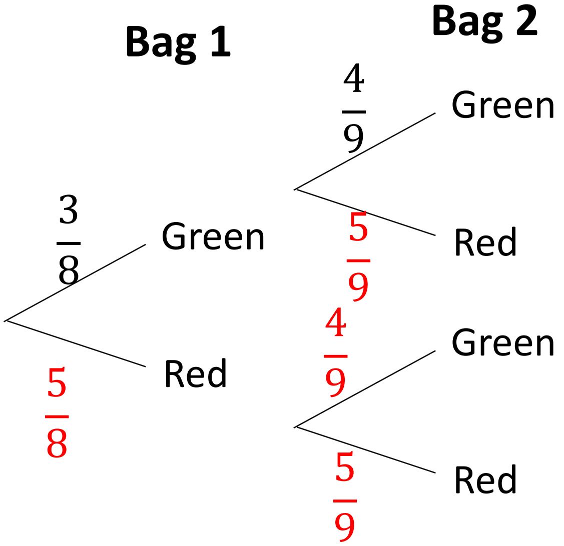
Skill	Questions	Score	Available Marks
Completing a probability tree diagram for independent events.	1,4		**4**
Calculate the probability of independent events.	2,3,5		**7**
Problem solving and reasoning with independent events	6,7		**5**
	Total Marks		**16**

Answers

Probability of Independent Events

Abbas has two bags. The first bag contains **3 green counters** and **5 red counters.**
The second bag contains **4 green counters** and **5 red counters.**

1) Complete the probability tree diagram.



/2

2) Calculate the probability that two greens will be selected.

$$P(GG) = \frac{3}{8} \times \frac{4}{9} = \frac{12}{72}$$

/2

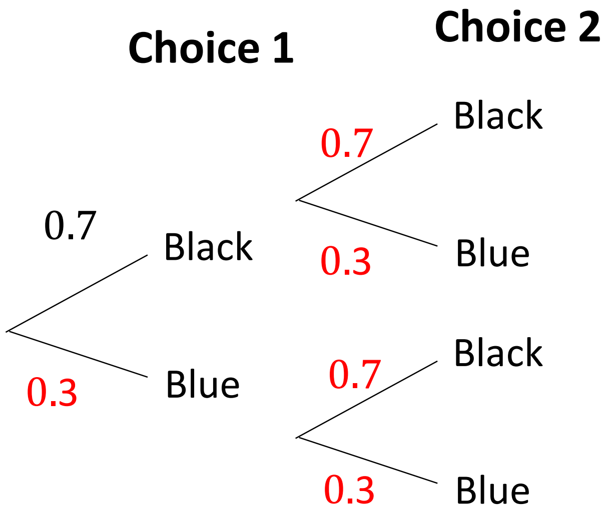
3) Calculate the probability that a green and a red will be selected in either order.

$$P(GR) = \frac{3}{8} \times \frac{5}{9} = \frac{15}{72} \quad P(RG) = \frac{5}{8} \times \frac{4}{9} = \frac{20}{72} \quad P(G \cap R) = \frac{20}{45} + \frac{15}{45} = \frac{35}{72}$$

/3

Millie checks her pencil case for her exam in a rush. Seven out of ten of the pens Millie chooses from are black. The rest of the pens are blue. Millie chooses a pen and then places it back in the pencil case ready for her exam.

4) Complete the probability tree diagram.



/2

5) Calculate the probability that Millie selects two black pens.

$$P(BB) = 0.7 \times 0.7 = 0.49$$

/2

Answers

6) The probability that Danielle will be late for school tomorrow is 0.04.
The probability that Ben will be late for school tomorrow is 0.07.
The probability that both Danielle and Ben will be late for school tomorrow is 0.02.
Zane says that the events ‘Danielle will be late tomorrow’ and ‘Ben will be late tomorrow’ are independent.

Justify whether Zane is correct or not.

$$P(L \cap L) = 0.07 \times 0.02 = 0.0014$$

No the events aren’t independent of each other because if they were the probability of both Danielle and Ben being late tomorrow is 0.0014. This suggests that the events are dependent on each other because the probability of them both being late tomorrow is 0.02.

/2

7) There are n sweets in a bag. The bag has both blue and green sweets in. There are 6 blue sweets in the bag. Adam takes a sweet out of the bag and **replaces it**. **Show that** the probability of getting a blue and a green sweet in either order is

$$P(blue\ or\ green\ in\ any\ order) = \frac{12n - 72}{n^2}$$

$$P(BG) = \frac{6}{n} \times \frac{n-6}{n} = \frac{6n - 36}{n^2}$$
$$P(GB) = \frac{n-6}{n} \times \frac{6}{n} = \frac{6n - 36}{n^2}$$

Hence

$$P(B \cap G) = \frac{6n - 36}{n^2} + \frac{6n - 36}{n^2} = \frac{12n - 72}{n^2}$$

/3

Skill	Questions	Score	Available Marks
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Calculate the probability of independent events.	2,3,5		**7**
Problem solving and reasoning with independent events	6,7		**5**
	Total Marks		**16**