

## Probability 1

- 1) A box contains 22 red apples and 3 green apples. Three apples are selected at random, one after the other, without replacement.

- (a) The first two apples are green. What is the probability that the third apple is red?  
(b) What is the probability that exactly two of the three apples are red?

- 2) For events  $A$  and  $B$ , the probabilities are  $P(A) = \frac{3}{11}$ ,  $P(B) = \frac{4}{11}$ .

Calculate the value of  $P(A \cap B)$  if

(a)  $P(A \cup B) = \frac{6}{11}$ ;

- (b) events  $A$  and  $B$  are independent.

- 3) Consider events  $A, B$  such that  $P(A) \neq 0$ ,  $P(A) \neq 1$ ,  $P(B) \neq 0$ , and  $P(B) \neq 1$ .

In each of the situations (a), (b), (c) below state whether  $A$  and  $B$  are

mutually exclusive (M);  
independent (I);  
neither (N).

(a)  $P(A|B) = P(A)$

(b)  $P(A \cap B) = 0$

(c)  $P(A \cap B) = P(A)$

- 4) A painter has 12 tins of paint. Seven tins are red and five tins are yellow. Two tins are chosen at random. Calculate the probability that both tins are the same colour.

- 5) Let  $A$  and  $B$  be events such that  $P(A) = \frac{1}{2}$ ,  $P(B) = \frac{3}{4}$  and  $P(A \cup B) = \frac{7}{8}$ .

(a) Calculate  $P(A \cap B)$ .

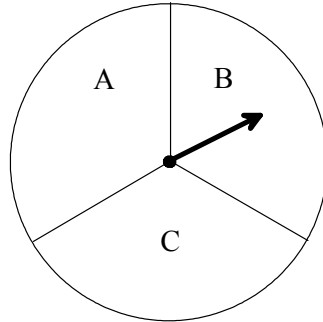
(b) Calculate  $P(A|B)$ .

- (c) Are the events  $A$  and  $B$  independent? Give a reason for your answer.

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6) [Maximum mark: 16]

- (i) A disc is divided into three equal sectors A, B and C as shown in the diagram. The arrow is spun. It cannot land on the lines between the sectors.



The arrow is spun twice. Each time, the letter of the sector that the arrow points to is recorded.

- (a) List the sample space. [1 mark]
- (b) Calculate the probability that
- (i) both letters are the same;
  - (ii) at least one letter is an A;
  - (iii) at least one letter is an A and both letters are the same;
  - (iv) at least one letter is an A or both letters are the same. [4 marks]

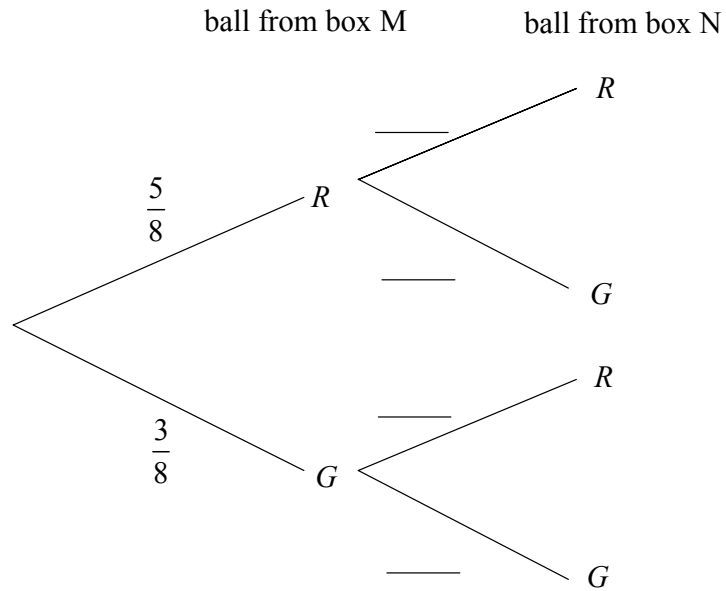
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- (ii) Two boxes M and N contain red ( $R$ ) and green ( $G$ ) balls.  
 Box M contains five red balls and three green balls.  
 Box N contains four red balls and six green balls.

A ball is taken at random from box M and moved into box N. A ball is then taken at random from box N.

- (a) Copy and complete the tree diagram.



[4 marks]

- (b) Calculate the probability that the ball taken from box N is green.

[3 marks]

- (c) Given that the ball taken from box N is green, find the probability that the ball taken from box M is red.

[4 marks]