6 Freddie has two bags of marbles.

Bag *X* contains 7 red marbles and 3 blue marbles.

Bag *Y* contains 4 red marbles and 1 blue marble.

Freddie chooses one of the bags at random. A marble is removed at random from that bag and not replaced. A new red marble is now added to each bag. A second marble is then removed at random from the same bag that the first marble had been removed from.

(a) Draw a tree diagram to represent this information, showing the probability on each of the branches. [3]

(b) Find the probability that both of the marbles removed from the bag are the same colour. [4]

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(c) Find the probability that bag Y is chosen given that the marbles removed are **not** both the same colour. [2]

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