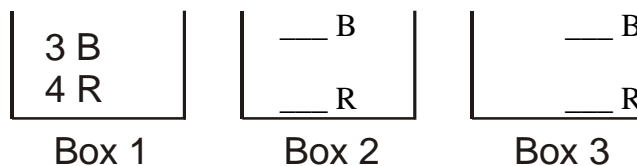


Last Name _____ First Name _____ UIN _____ 141- _____

You perform a three-step experiment with three boxes containing red and blue marbles.

- Box 1 has 3 blue and 4 red marbles.
- Box 2 has 4 blue and 1 red marble.
- Box 3 has 2 blue and 7 red marbles.

1. What do these three boxes look like before the experiment begins?



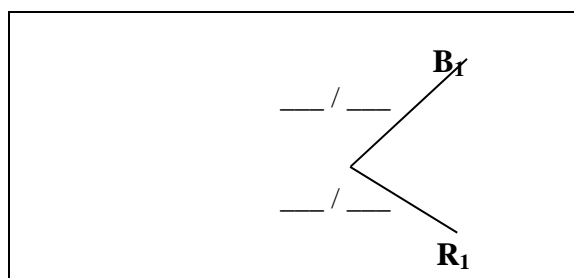
STEP 1 OF THE EXPERIMENT: You choose a marble from Box 1.

2. a. Represent Step 1 in a tree diagram. Be sure to include the probability of each outcome on the branches of the diagram.

Hint: Use B_1 and R_1 as your two possible outcomes where

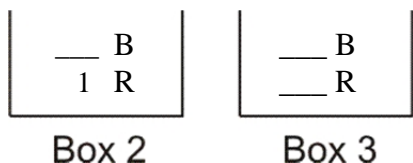
B_1 = blue marble is chosen from Box 1

R_1 = red marble is chosen from Box 1

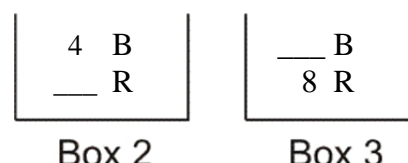


If the chosen marble is blue, place it in Box 2, otherwise place the marble in Box 3.

b. What would Boxes 2 and 3 look like, given a blue marble was picked from Box 1?



c. What would Boxes 2 and 3 look like, given a red marble was picked from Box 1?



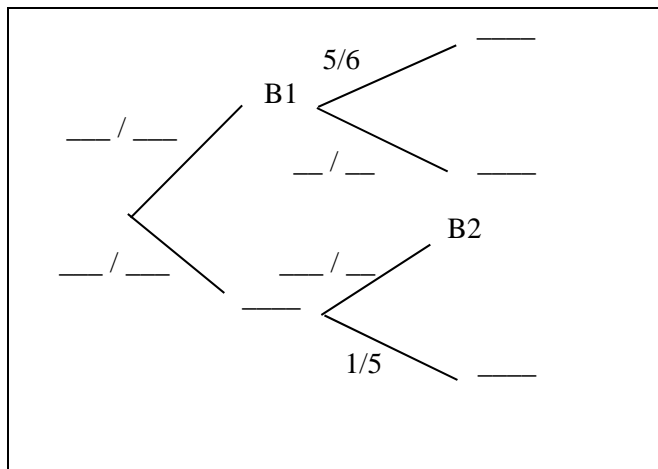
STEP 2 OF THE EXPERIMENT: You then choose a marble from Box 2.

3. a. How can the experiment, thus far, be represented in a tree diagram?

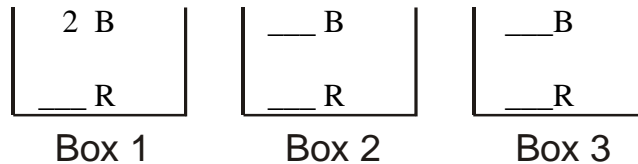
Hint: Begin by copying your diagram from 2. here. Continue with the next step of the experiment using B_2 and R_2 as outcomes.

B_2 = blue marble is chosen from Box 2

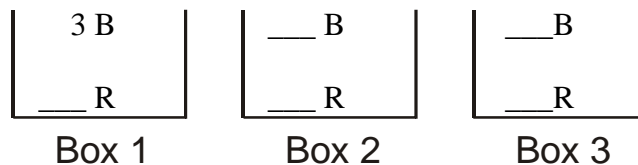
R_2 = red marble is chosen from Box 2



b. What would Boxes 1, 2 and 3 look like, given a blue marble was picked from Box 1 in the first step? Hint – see the answer to 2b.



c. What would Boxes 1, 2 and 3 look like, given a red marble was picked from Box 1 in the first step? Hint – see the answer to 2c.



4 a. Given that the marble transferred from Box 1 was blue (B_1), what is the probability that a blue marble was picked from Box 2 (B_2)?

$P(\text{___} | \text{___}) = \text{___} / \text{___}$

b. What is the probability that a red marble is chosen from Box 2? $P(R_2) = \text{___} / \text{___}$

c. What is the probability that the marble chosen from Box 1 was red, given that a blue marble was picked from Box 2?

$P(\text{___} | \text{___}) = \text{___} / \text{___}$

If the marble selected from Box 2 is blue, you place it into Box 3, otherwise you put it in Box 1.

5. What is now in **Box 3**, if:

- a. A blue marble was selected from both Box 1 and Box 2? ___ blue marbles & ___ red marbles.
- b. A blue marble was selected from Box 1 and a red from Box 2? ___ blue marbles & ___ red marbles.
- c. A red marble was selected from Box 1 and a blue from Box 2? ___ blue marbles & ___ red marbles.
- d. A red marble was selected from both Box 1 and Box 2? ___ blue marbles & ___ red marbles.

STEP 3 OF THE EXPERIMENT: *You choose a marble from Box 3.*

How can the entire experiment be represented in a tree diagram? *Hint:* Begin by copying your diagram from 3. to your scratch paper. Continue with the next step of the experiment using B_3 and R_3 as outcomes. Sketch this on your scratch paper.

6. What is the probability (to 4 decimal places) that the final marble you choose is blue? $P(B_3) = \text{_____}$

7. What is the probability the first marble you chose was **green**, given that the last marble chosen was blue?

$P(G_1 | B_3) = \text{_____}$