Tree Diagrams

Independents events: replacement. When one-step does not affect the other.
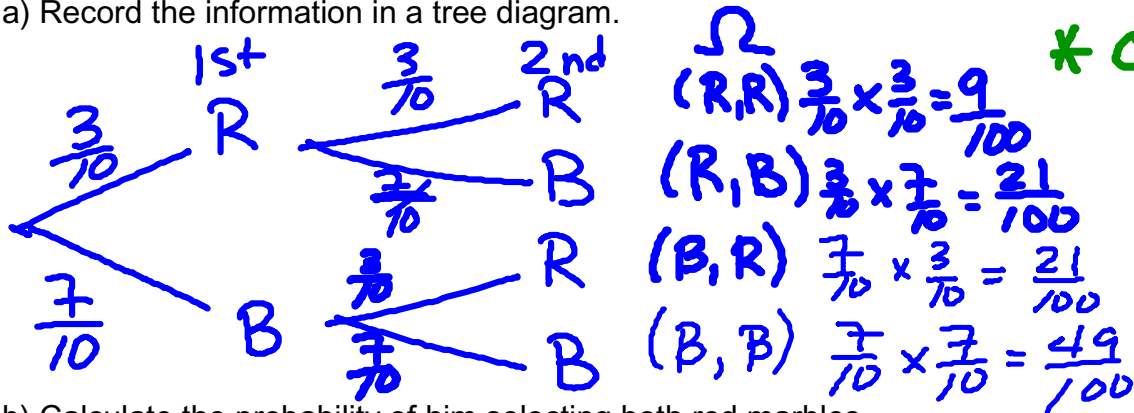
INDEPENDENT EVENTS: **3**

Daniel has ten coloured marbles in a bag. Three of the marbles are red and 7 are blue.
He removes a marble at random from the bag and notes the colour before replacing it.
He then chooses a second marble at random.

Total 3 + 7 = 10

a) Record the information in a tree diagram.

1st $\frac{3}{10}$ 2nd Ω

$\frac{3}{10}$ R

R $\frac{3}{10}$ R   (R,R) $\frac{3}{10} \times \frac{3}{10} = \frac{9}{100}$

$\frac{7}{10}$ B   (R,B) $\frac{3}{10} \times \frac{7}{10} = \frac{21}{100}$

$\frac{7}{10}$ B $\frac{3}{10}$ R   (B,R) $\frac{7}{10} \times \frac{3}{10} = \frac{21}{100}$

$\frac{7}{10}$ B   (B,B) $\frac{7}{10} \times \frac{7}{10} = \frac{49}{100}$

On the tree we multiply

b) Calculate the probability of him selecting both red marbles

$$P(R,R) \quad \frac{3}{10} \times \frac{3}{10} = \frac{9}{100}$$

c) Calculate the probability of him selecting a red marble followed by a blue marble.

$$P(R,B) = \frac{3}{10} \times \frac{7}{10} = \frac{21}{100}$$

d) Calculate the probability of him selecting different colour marbles.

off the tree add

$$P(\text{different colours}) = \frac{21}{100} + \frac{21}{100} = \frac{42}{100} = \frac{21}{50}$$
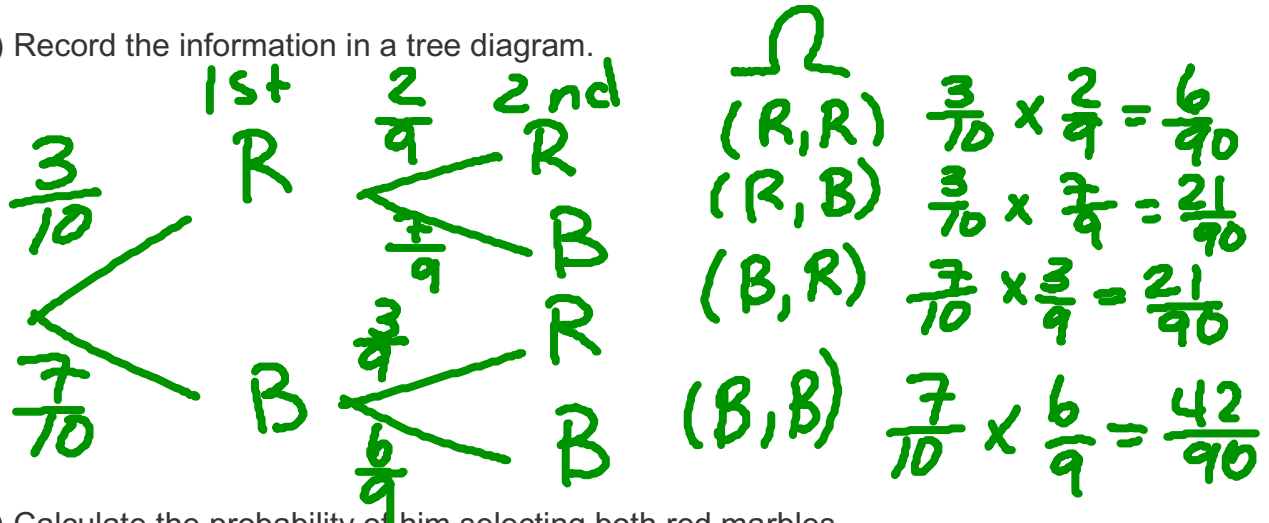
$P(R,B)$ $P(B,R)$

Dependent events: occurs when the first step affects the other steps. No replacement.

DEPENDENT EVENTS:

3

Dante has ten coloured marbles in a bag. ~~Three~~ of the marbles are red and 7 are blue. He removes a marble at random from the bag, notes the colour and **DOES NOT** replace it. He then chooses a second marble at random.

a) Record the information in a tree diagram.

$$\frac{3}{10} \begin{array}{c} 1st \\ R \end{array} \overset{\frac{2}{9}}{\underset{\frac{7}{9}}{\diagdown}} \begin{array}{c} 2nd \\ R \\ B \end{array}$$

$$\frac{7}{10} \quad B \overset{\frac{3}{9}}{\underset{\frac{6}{9}}{\diagup}} \begin{array}{c} R \\ B \end{array}$$

$(R,R) \quad \frac{3}{10} \times \frac{2}{9} = \frac{6}{90}$

$(R,B) \quad \frac{3}{10} \times \frac{7}{9} = \frac{21}{90}$

$(B,R) \quad \frac{7}{10} \times \frac{3}{9} = \frac{21}{90}$

$(B,B) \quad \frac{7}{10} \times \frac{6}{9} = \frac{42}{90}$

b) Calculate the probability of him selecting both red marbles

$$P(R,R) = \frac{3}{10} \times \frac{2}{9} = \frac{6}{90} = \frac{1}{15}$$

c) Calculate the probability of him selecting a red marble followed by a blue marble.

$$P(R,B) = \frac{3}{10} \times \frac{7}{9} = \frac{21}{90} = \frac{7}{30}$$

d) Calculate the probability of him selecting different colour marbles.

$$P(\text{different colour}) = \frac{21}{90} + \frac{21}{90} = \frac{42}{90} = \frac{7}{15}$$

$$\qquad\qquad\qquad\qquad P(R,B) \quad P(B,R)$$