

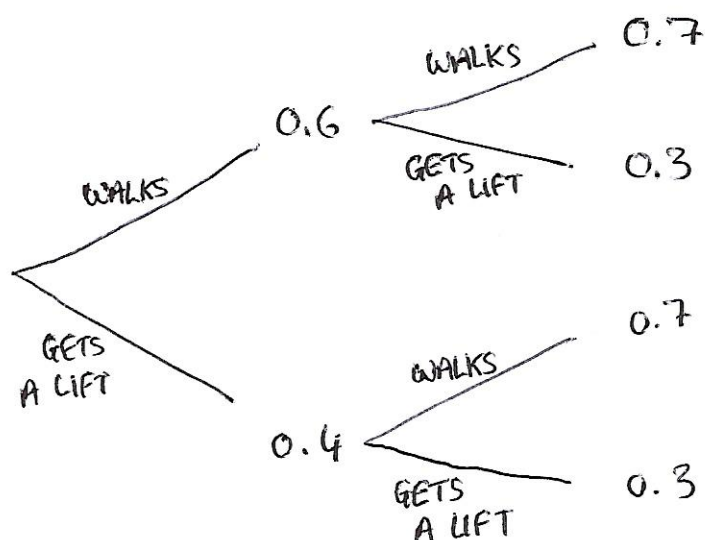
Probability Questions

(28) (a)

TO COLLEGE

FROM COLLEGE

Probabilities of each fork must add up to 1.



(b) So if he doesn't get a lift to or from that means he walks to college and walks home from college.

$$\begin{aligned}\text{Probability of both} &= \text{Probability of walking to college} \times \text{Probability of walking from college} \\ &= 0.6 \times 0.7 \\ &= \underline{\underline{0.42}}\end{aligned}$$

(29) We have an unknown number of red and blue marbles so for simplicity let us say we start with:

'r' red marbles and 'b' blue marbles

We are told the probability she takes a red one from the bag is $\frac{1}{5}$.

If we were calculating the probability she takes a red marble out of the bag we'd say:

$$P(\text{red marble}) = \frac{\text{number of red marbles}}{\text{total number of marbles}} = \frac{r}{r+b} = \frac{1}{5}$$

So we know $\frac{r}{r+b} = \frac{1}{5}$ (1)

We are also told that Yasmine then adds 5 more red marbles to the bag so we now have $r+5$ red marbles. We are told the probability of picking a red is now $\frac{1}{3}$ (we are more likely to pick a red now because there are more in there now).

So as above

$$\frac{r+5}{r+5+b} = \frac{1}{3} \quad (2)$$

We now have two simultaneous equations so we solve for r and b :

$$\begin{aligned} (1) \quad \frac{r}{r+b} &= \frac{1}{5} && \xrightarrow{\text{cross multiply}} 5r = r+b && \xrightarrow{-r \text{ from both sides}} 4r = b \end{aligned}$$

$$\begin{aligned} (2) \quad \frac{r+5}{r+5+b} &= \frac{1}{3} && \xrightarrow{\text{cross multiply}} 3(r+5) = r+5+b \\ &&& \xrightarrow{\text{simplify LHS}} 3r+15 = r+5+b \\ &&& \xrightarrow{-r \text{ and } -5 \text{ from both sides}} 2r+10 = b \end{aligned}$$

Sub in $b=4r$ into other equation: $2r+10 = 4r$
 $\hookrightarrow 10 = 2r \Rightarrow \underline{\underline{r=5}}$

Now find b , $b=4r = 4 \times 5 = \underline{\underline{20}}$

So there were 5 red and 20 blue marbles at the start.