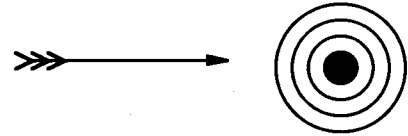
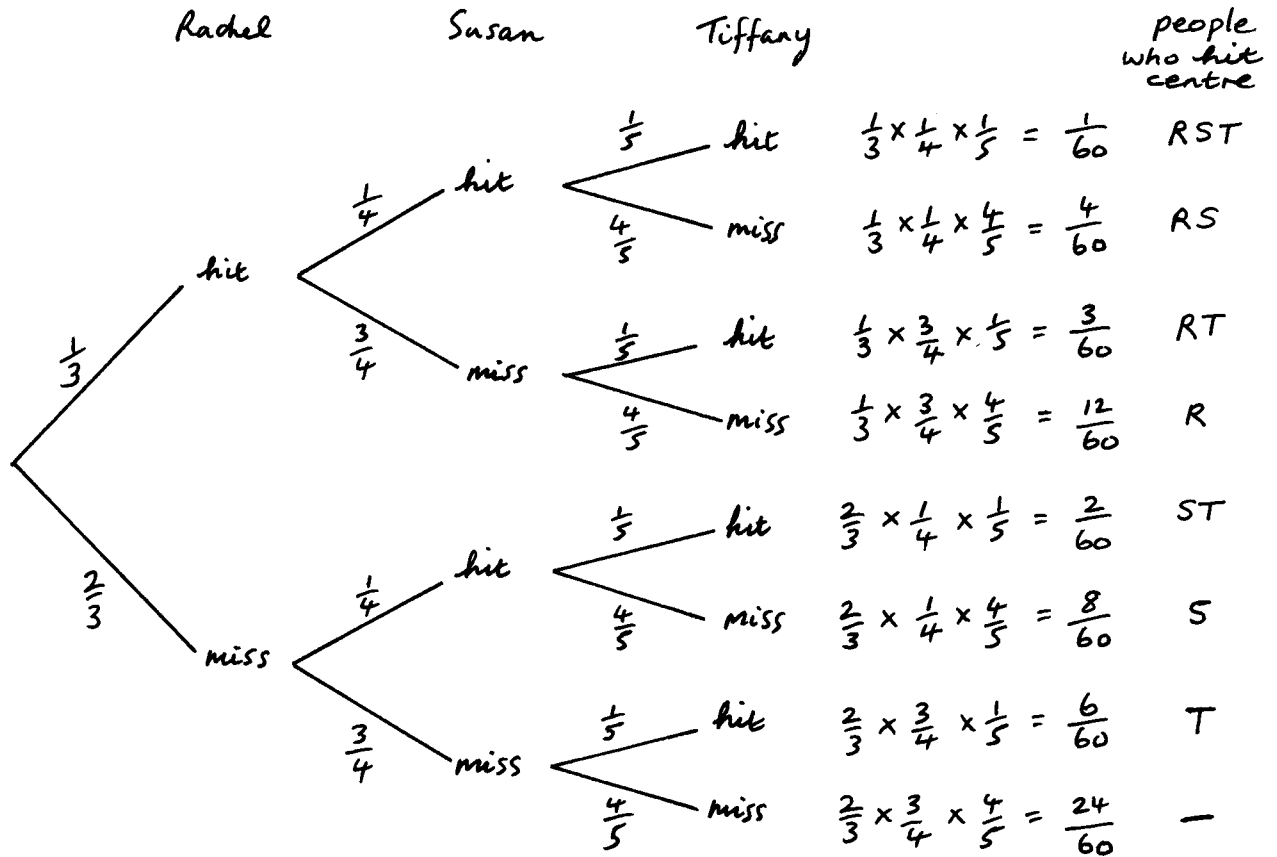


Rachel, Susan and Tiffany are shooting at a target in archery.
 With each arrow, the probability of hitting the centre is:

Rachel $\frac{1}{3}$ Susan $\frac{1}{4}$ Tiffany $\frac{1}{5}$



1. What is the probability that Rachel hits the centre given that exactly two girls hit the centre?
2. What is the probability that exactly two girls hit the centre given that Rachel hits the centre?
3. What is the probability that Susan hits the centre given that at least two girls hit the centre?
4. What is the probability that at least two girls hit the centre given that Susan hits the centre?



(i) Let $A = \{ \text{Rachel hits} \}$
 $B = \{ \text{exactly two girls hit} \}$

We need to find $P(A|B)$.

$$P(B) = \frac{4}{60} + \frac{3}{60} + \frac{2}{60} = \frac{9}{60}$$

$$P(A \cap B) = \frac{4}{60} + \frac{3}{60} = \frac{7}{60}$$

$$P(A|B) = \frac{P(A \cap B)}{P(B)} = \frac{\frac{7}{60}}{\frac{9}{60}} = \frac{7}{9}$$

(2) We need to find $P(B|A)$.

$$\begin{aligned} P(B|A) &= \frac{P(A \cap B)}{P(A)} \\ &= \frac{7/60}{1/3} \\ &= \frac{7}{20} \end{aligned}$$

(3) Let $C = \{ \text{Susan hits} \}$
 $D = \{ \text{at least two girls hit} \}$
We need to find $P(C|D)$.

$$\begin{aligned} P(D) &= \frac{1}{60} + \frac{4}{60} + \frac{3}{60} + \frac{2}{60} \\ &= \frac{10}{60} \end{aligned}$$

$$\begin{aligned} P(C \cap D) &= \frac{1}{60} + \frac{4}{60} + \frac{2}{60} \\ &= \frac{7}{60} \end{aligned}$$

$$\begin{aligned} P(C|D) &= \frac{P(C \cap D)}{P(D)} \\ &= \frac{7/60}{10/60} \\ &= \frac{7}{10} \end{aligned}$$

(4) We need to find $P(D|C)$

$$\begin{aligned} P(D|C) &= \frac{P(C \cap D)}{P(C)} \\ &= \frac{7/60}{1/4} \\ &= \frac{7}{15} \end{aligned}$$