

Mary chooses her outfit based on the weather. The probability that it will be sunny when Mary wakes up is 0.45. The probability that Mary will wear something yellow is 0.7 when it is sunny, or 0.2 if it isn't. If Mary wears yellow, there is a 25% chance that she will wear her favourite earrings, but only a 10% chance if she is not wearing yellow.

**What is the probability that Mary will be wearing yellow today, given that she is not wearing her favourite earrings?**

The five steps given below can be rearranged to show the workings needed to find the answer to the problem. Cut out, rearrange and complete the steps.



$$P(B) = P(\overline{\text{earrings}})$$

$$= 0.23625 + \underline{\hspace{2cm}} + \underline{\hspace{2cm}} + \underline{\hspace{2cm}}$$

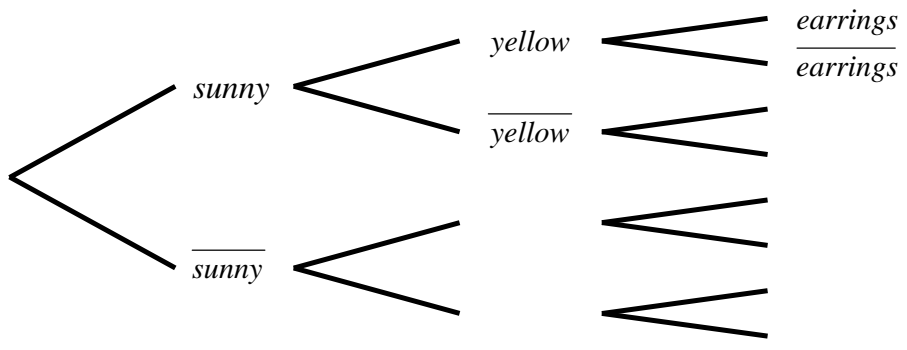
$$= \underline{\hspace{2cm}}$$

Probability of event A, given event B:  $P(A|B) = \frac{P(A \cap B)}{P(B)}$

$$P(A \cap B) = P(\text{yellow} \cap \overline{\text{earrings}})$$

$$= 0.23625 + \underline{\hspace{2cm}}$$

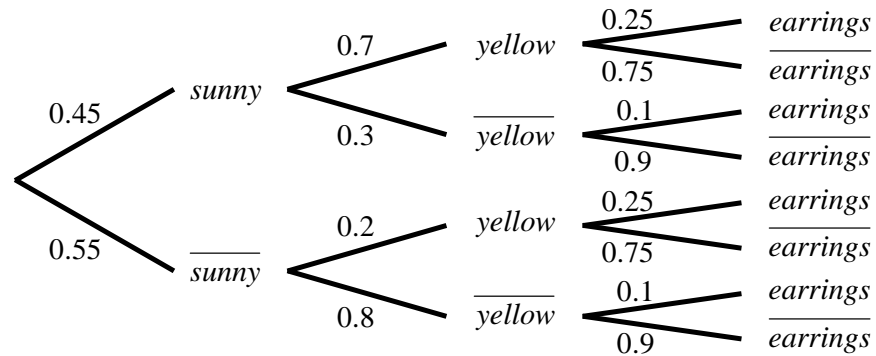
$$= \underline{\hspace{2cm}}$$



$$P(\text{yellow} | \overline{\text{earrings}}) = \frac{\underline{\hspace{2cm}}}{\underline{\hspace{2cm}}}$$

$$= \underline{\hspace{2cm}}$$

## Answer



Probability of event A, given event B:  $P(A | B) = \frac{P(A \cap B)}{P(B)}$

$$\begin{aligned}
 P(A \cap B) &= P(\text{sunny, yellow, } \overline{\text{earrings}}) + P(\text{sunny, yellow, earrings}) \\
 &= 0.23625 + 0.0825 \\
 &= 0.31875
 \end{aligned}$$

$$\begin{aligned}
 P(B) &= P(\overline{\text{earrings}}) \\
 &= 0.23625 + 0.1215 + 0.0825 + 0.396 \\
 &= 0.83625
 \end{aligned}$$

$$\begin{aligned}
 P(\text{yellow} | \overline{\text{earrings}}) &= \frac{0.31875}{0.83625} \\
 &= 0.38116\dots \\
 &= 0.381(3\text{s.f.})
 \end{aligned}$$