

**BACCALAURÉAT GÉNÉRAL  
ÉPREUVE SPÉCIFIQUE DES SECTIONS EUROPÉENNES  
MATHÉMATIQUES – ANGLAIS**

**SUJET 17**

**Forensic probabilities  
Probabilities**

Ce sujet comporte deux pages. L'usage de tout modèle de calculatrice, avec ou sans mode examen, est autorisé.

What's the use of math? Why should we learn it? A forensic scientist could answer that virtually all the mathematics we learn at school is used to solve crimes.

Forensic sciences consider physical evidence relating to criminal activity and practitioners need various competences in mathematics: trigonometry is used in the analysis of blood spatter or in ballistics calculations, for instance to compute the ricochet angle of a bullet bouncing off a solid surface.

Probability and statistics are of growing importance in law enforcement throughout the world. Quantitative statistical analysis is used to compare sets of experimental measurements, to determine whether they are similar or distinct. This applies to glass fragments, drug samples, hairs and fibers, pollen grains or DNA sequences...

Conditional probabilities are of vital importance in forensic context, to determine whether two events relating to a crime are linked or independent. But failure to understand conditional probability has led to some tragic miscarriages of justice.

*Adapted from Craig Adam, Essential Mathematics and Statistics for Forensic Science, 2012*

**I. Explain what the text deals with and comment on it.**

**II. Exercise:**

A crime has been committed, and there are only 4 suspects. We assume that there is only one guilty person amongst them, and we consider that, at the beginning of the trial, each one of them has the same probability to be guilty. Forensics experts state that if someone is guilty, the probability for matching fingerprints to be found on a crime scene is equal to 90%, but if someone is innocent, the probability to find matching fingerprints is equal to 4%.

Vous devez restituer le sujet à la fin de l'épreuve

Let's call  $G$  the event "*the suspect is guilty*" and  $F$  the event "*matching fingerprints have been found on the crime scene*".

1. Find in the text the values of  $P(G)$ ,  $P(F|G)$  and  $P(F|\text{not } G)$
2. Compute  $P(F)$
3. Compute  $P(G|F)$  and  $P(G|\text{not } F)$ .
4. Compare those values to  $P(G)$ . What conclusion can you draw?

*Reminder: " $P(F|G)$ " is the English notation for the French " $P_G(F)$ "*