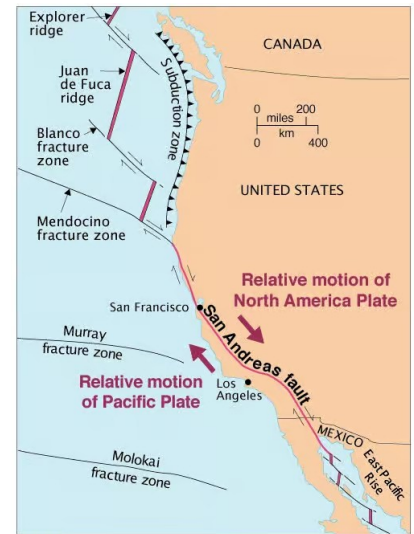


Please, do not write on the exam paper and do not forget to give it back at the end of the test.



(sources FUTURA)



The San Andreas Fault* is certainly the most famous active fault. It marks the boundary between two major tectonic plates: the Pacific Plate and the North American Plate. It stretches from northern California and runs for around 1,200 kilometres southwards, ending at Bombay Beach.

Although the San Andreas fault had been known about since 1895, it wasn't until 1906 that the general public really became aware of its existence. On 18 April, the north coast of California was shaken by a very violent earthquake. Its magnitude was estimated at 7.9. The damage was considerable, particularly in the city of San Francisco, where numerous fires broke out. Some 80% of the city was destroyed, and more than 3,000 people lost their lives.

In 1935, Charles Richter developed a scale (now known as the RICHTER SCALE) to measure the magnitude of an **earthquake**. The magnitude **M** of an earthquake on the Richter scale is related logarithmically to the energy **E** released. The formula often used is: $M = \frac{2}{3} \log(E) - 2.88$ where E is the energy released (in joules) and M is the earthquake magnitude. Reminder For $x > 0$: $\log(x) = \frac{\ln(x)}{\ln(10)}$

Question 1 : An earthquake releases 2×10^{14} J (Joules) of energy.

- (a) Compute its magnitude.
- (b) If another earthquake has a magnitude of 4.5, what is its energy release?
- (c) Compare the energy release of the two earthquakes.

Question 2: Does a large difference in magnitude correspond to a small difference in energy, or the reverse?

Question 3 : Consider one earthquake with magnitude R on the Richter scale and a second earthquake with magnitude 10R. Compare the two earthquakes.

If you have time : have you ever heard of famous earthquakes ?

*A fault = une faille