

Some Practice Problems for Exam 2

Answers will be posted Monday

1. What is the probability of getting *only* 2 heads in 4 tosses of a coin?
2. What is the probability of getting *at least* 2 heads in 4 tosses of a coin?
3. Consider **4-sided dice**.
 - a. What is the probability of getting *exactly* 2 number 3's in 4 tosses?
 - b. What is the probability of getting *at least* 2 number 3's in 4 tosses?
 - c. In two rolls of the 4-sided die, what is the probability that the second roll will have a higher number than the first?
4. The sun is about 92 million miles or 150 million kilometers away from the earth. The peak wavelength of sunlight is about 5.1×10^{-7} m.
 - a. How long does it take for the sun's light to get to the earth?
 - b. Take the peak wavelength to be the average. At the earth sunlight imparts EM power of about 700 Watt/m^2 . How many photons fall on a square meter in 1 second?
5. Electrical wires connected to a wall plug (in the US) emit EM radiation of frequency 60 Hertz.
 - a. What is the wavelength of that radiation? Is it visible?
 - b. What is the energy of one photon emitted?
6. A proton travels at $(1/300)c$. What is its deBroglie wavelength? Mass of the proton is $1.67 \times 10^{-27} \text{ Kg}$.
7. A hydrogen atom undergoes a transition from the $n=5$ to the $n=2$ state. What is the wavelength of the photon emitted? Is it visible?
8. An electron is confined to a microscopic tube of length 10^{-8} m. What is the best precision, i.e. the smallest *uncertainty* with which its momentum and velocity can be measured? Mass of electron is $9.11 \times 10^{-31} \text{ Kg}$.
9. One day 2 inches of rain fell in the Boston area. How many gallons of water fell on the Tufts campus? (This is an estimation problem.)