**Solar Storm Answer Key**

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| 1. | The Northern Lights occur so high up in the atmosphere that they don’t pose any threat to people watching them from the ground. The aurora itself is not harmful to humans but the electrically charged particles produced could have some potentially negative effects to infrastructure and technology. The particles produce an electrical current that reaches the ground. In very extreme circumstances, this could affect electric power lines, oil and gas pipelines, computer networks, and iCloud systems. There could also be a risk to airplanes flying at very high altitudes, however, very few aircraft fly high enough, and any aircraft that did, wouldn’t be there long enough for there to be any danger. |
| 2. | There are a total of 108 solar flares spotted. If 34 solar flares happen at the same time as CMEs directed towards Earth, then there are (108-34) = 74 solar flares that happen when CMEs are not detected. $$\frac{74}{108}×100≈68.5≈69\%$$So, approximately 69% of all the major solar flares do not produce CMEs. The odds of a solar flare not happening during a CME is 74:34. These odds indicate that most solar flares do not happen during a CME. |
| 3. | In the very few words that a reporter often uses to describe the scientific concepts, the reporter says that solar flares produce CMEs. This statement is only true about 31% of the time. This means that, actually, most flares do NOT produce CMEs. |
| 4. | Of the 55 CMEs directed towards Earth, 29 happen at the same time as the severemagnetic disturbances seen by the ACE satellite.$$\frac{29}{55}×100≈52.7≈53\%$$So, approximately 53% of the CMEs directed towards Earth happen at the same time as a severe magnetic disturbance. The odds of a CME happening at the same time as a severe magnetic disturbance are 29:26. This indicates that the likelihood that a CME and severe magnetic disturbance will happen at the same time is no better than the likelihood of a random experiment (50/50).  |
| 5. | Of the 56 magnetic storms detected by the ACE satellite, 31 produced bright aurora seen by the IMAGE satellite.$$\frac{31}{56}×100 ≈55.3 ≈55\%$$About 55% of the magnetic disturbances produce strong aurora. The odds of a magnetic disturbance producing a strong aurora is 31:25.This indicates that the likelihood that a magnetic disturbance will produce a strong aurora is no better than the likelihood of a random experiment (50/50).  |
| 6. | Of the 55 CME's that are detected heading towards Earth, 29 of these cause magnetic disturbances. But only 55% of the severe magnetic disturbances seen by the ACE satellite actually lead to strong aurora. This means that out of the CME's detected, only 29% caused strong aurora. $$\frac{29}{55}×\frac{55}{100}≈29\%$$This means that most CMEs do not produce disturbances near the Earth, and so the detection of CMEs headed towards Earth is not enough to help us reliably predict whether a strong aurora will be produced. |