

## Answer on Question 59021, Physics, Electric Circuits

### Question:

A huge spark due to electric discharge in the atmosphere produces all of the following except:

- a) lightning
- b) rapid expansion of surrounding air
- c) shock waves
- d) gamma radiation

### Solution:

Lightning is a huge electrical discharge (a huge spark) either between one cloud and another or between a cloud and the ground. Lightning is formed because of a build up of electric charge in a cloud. In a storm there are enormous convection currents in a cloud, water droplets and ice particles going up and down within it. This movement causes friction between the particles when they collide which charges up the cloud. Positive and negative charges separate and an electric field is formed.

When the charge is big enough the electric field ionises the air. The electrical resistance of the air “breaks down”, it is no longer an insulator and the charge is discharged as a spark. The surrounding air is heated up by the lightning flash. It causes the rapid expansion of surrounding air creating a shock wave audible as thunder.

Also, we know that a number of observations by space-based telescopes have revealed higher energy gamma ray emissions caused by a lightning (so called terrestrial gamma ray flashes).

Let's make conclusions. A huge spark (the lightning) due to electric discharge in the atmosphere produces all of the following: rapid expansion of surrounding air, shock waves (the thunder) and even a gamma radiation. But the lightning is a huge spark! Therefore, the wrong answer is a) lightning.