1. Modify the following text so that the statement is true.

When an electron meets a hole, it falls into a lower energy level, and releases energy in the form of a photon. When the electron can undergo the down-ward transition by itself, the photon emission process is called ( **spontaneous** / ~~stimulated~~ ) emission.

1. Modify the following text so that the statement is true.

A photon is absorbed by a semiconductor if the photon energy is ( **greater /** ~~lower~~) than the band gap of the material, Eg.

1. Calculate the NA (numerical aperture) of an optical fibre formed by a core with a refractive index *n1* = 1.45 and a cladding with a refractive index *n2* = 1.42. Indicate the acceptance angle of the fibre, *φmax*, to air. The refractive index of air: *n* = 1.000293.





1. Fill the table indicating the color of light emitted by LEDs made from the following semiconductor materials.

|  |  |
| --- | --- |
| Semiconductor material | LED color |
| GaN | Blue |
| InGaN | Green |
| GaAsP | Yellow |

1. List three different types of optical amplifiers (OAs).

1. EDFAs (erbium-doped fibre amplifiers)

2. SOAs ( semiconductor optical amplifiers)

3. Raman and Brillouin amplifiers

1. A fibre optic has a core of Si3N4 with a refractive index: *n* = 2.72 for wavelengths of 0.4 µm. Calculate the time required to send data at that wavelength along 1 km of that fibre optic.





1. List three different applications of Laser diodes.

1. CD readers

2. Radar

3. Optical data storage

1. Write the Planck–Einstein relation.



1. Modify the following text so that the statement is true.

Human eyes can detect lights of wavelength in the range of (~~250 nm to 820 nm~~ / **450 nm to 650 nm**).

1. Could you describe the meaning of *φ*1c in the following equation:  ?

*φ*1c: Critical Angle for total internal reflection (TIR)