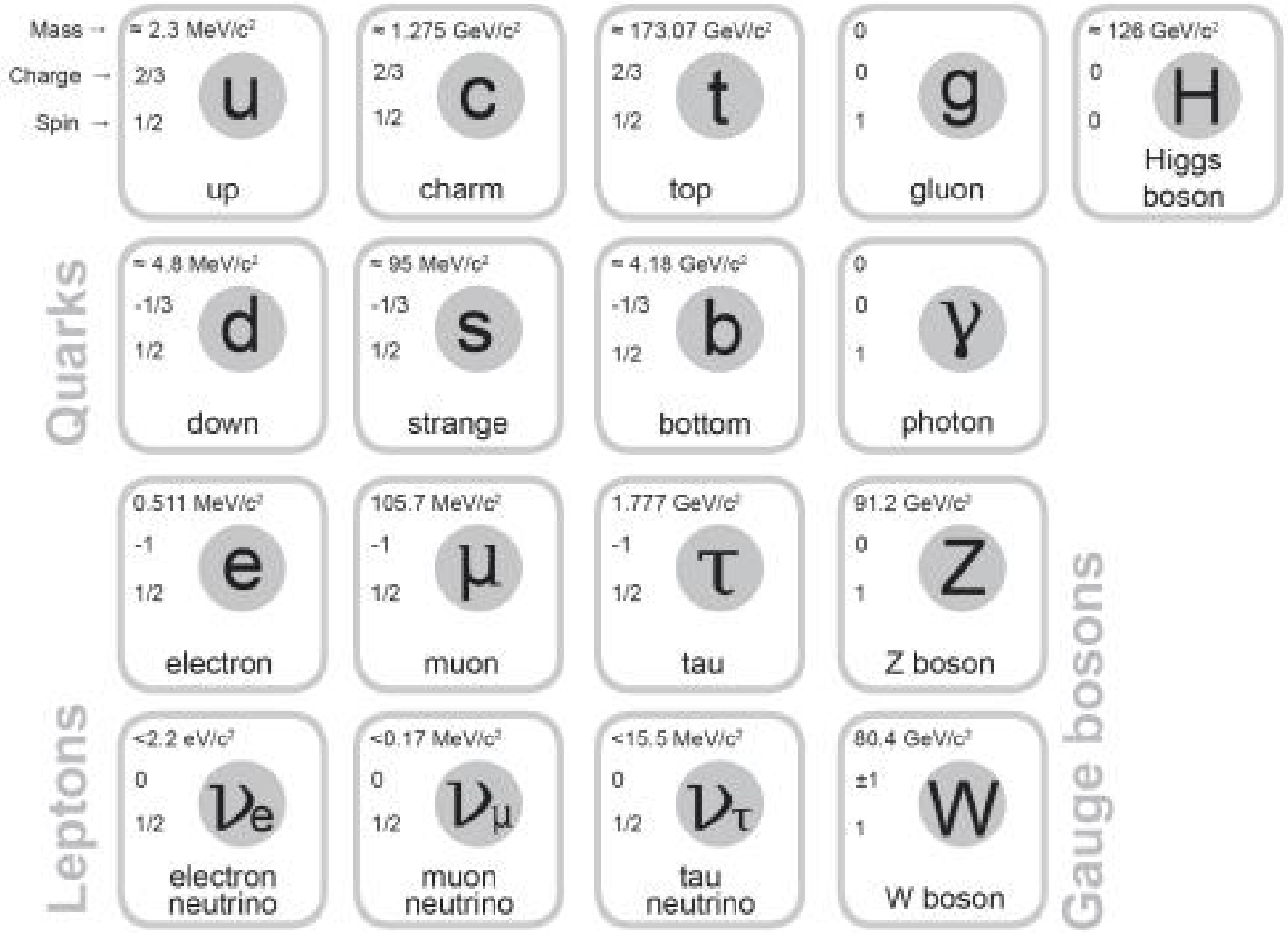
**Question 17** **(8 marks)**

The elementary particles of the Standard Model are shown below.




(a) If up (u) and down (d) quarks are the building blocks of nucleons, suggest a combination of three quarks that would produce a

(i) proton: _____ _____ _____ (1 mark)

(ii) neutron: _____ _____ _____ (1 mark)

(b) Identify **one** type of gauge boson and describe its role in the nucleus. (2 marks)

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(c) Muons and taus are created in a particle accelerator and accelerated to the same velocity. Sketch their paths if the two particles were directed into a magnetic field as shown in the diagram below. (4 marks)