

Question 12**(5 marks)**

Exchange particles (gauge bosons) mediate interactions between elementary particles such as quarks and leptons. The gauge bosons (see the Formulae and Data Booklet) have different fundamental properties.

- (a) Choose the appropriate combination of relevant fundamental force and property from the table below that corresponds to the gauge bosons listed. Place the number of your choice in the spaces provided. (4 marks)

Number	Fundamental forces	Properties
1	strong nuclear	massless
2	strong nuclear	has mass
3	weak nuclear	massless
4	weak nuclear	has mass
5	electromagnetic	massless
6	electromagnetic	has mass

i. Gluon Answer: _____

ii. Photon Answer: _____

iii. Z Boson Answer: _____

iv. W Boson Answer: _____

- (b) Which of the fundamental forces below has the longest range of interaction? (1 mark)

- i. weak nuclear
- ii. electromagnetic
- iii. strong nuclear

Answer: _____