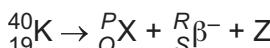


- 5 (a) Potassium-40 ( $^{40}_{19}\text{K}$ ) undergoes  $\beta^-$  decay to form a nuclide of element X. Particle Z is emitted during the decay. The equation for the decay is shown.



- (i) State the values of P, Q, R and S.

P = ..... R = .....

Q = ..... S = .....

[2]

- (ii) State the name of particle Z.

..... [1]

- (iii) State the name of the class of fundamental particle to which both the  $\beta^-$  particle and particle Z belong.

..... [1]

- (b) Determine the quark composition of an alpha-particle.

quark composition ..... [3]

[Total: 7]