

A scientist is investigating the numbers of a particular type of butterfly in a certain region. He claims that the numbers of these butterflies found per square metre can be modelled by a Poisson distribution with mean 2.5. He takes a random sample of 120 areas, each of one square metre, and counts the number of these butterflies in each of these areas. The following table shows the observed frequencies together with some of the expected frequencies using the scientist's Poisson distribution.

| | | | | | | | | |
|-------------------------|------|-------|-------|-------|-----|------|------|----------|
| Number per square metre | 0 | 1 | 2 | 3 | 4 | 5 | 6 | ≥ 7 |
| Observed frequency | 12 | 20 | 36 | 32 | 13 | 6 | 1 | 0 |
| Expected frequency | 9.85 | 24.63 | 30.78 | 25.65 | p | 8.02 | 3.34 | q |

- (a) Find the values of p and q , correct to 2 decimal places. [2]
- (b) Carry out a goodness of fit test, at the 10% significance level, to test the scientist's claim. [6]