Sample questions for the Chi-square goodness-of-fit test

Question 1

We want to see whether a dice is fair or not. We roll the dice 60 times and we obtain the following frequencies:

Number	Frequency
1	8
2	11
3	6
4	9
5	12
6	14

Should we reject the null hypothesis that the dice lands on each number with equal probability ($p_1 = p_2 = p_3 = p_4 = p_5 = p_6$)?

Question 2

A nut factory produces a nut mix that's supposed to be 50% peanuts, 30% cashews, and 20% almonds. To check that the nut mix proportions are acceptable, we randomly sample 1000 nuts and find the following frequencies:

Nut	Frequency
Peanuts	621
Cashew	189
Almonds	190

Should we reject the null hypothesis that the nut mix has the desired proportions of nuts?

Question 3

You're hired by a dog food company to help them test three new dog food flavors. You recruit a random sample of 75 dogs and offer each dog a choice between the three flavors by placing bowls in front of them. You expect that the flavors will be equally popular among the dogs, with about 25 dogs choosing each flavor.

Flavor	Observed	Expected
With beef	22	25
With chicken	30	25
With fish	23	25

Should we reject the null hypothesis that all flavors are equally preferred?