



Name	
Date	
Class	
Mark	

Teacher Comments/Notes:

A Level Further Maths

Further Stats 1 – Year 1

Introduction to Goodness of Fit

Instructions:

- Answer all questions.
- You may use a calculator.
- The booklet 'Mathematical Formulae and Statistical Tables' may be used.

Information:

- There are 7 questions within this worksheet.

Advice:

- Check your answers against the model solutions found on our website.
- You can find video examples for questions featured within this worksheet over on our website or by visiting our YouTube channel.



1.

Mark rolls a six-sided dice 180 times to establish whether it is fair. The results of the rolls are as follows:

n	1	2	3	4	5	6
Observed	35	30	23	28	35	29

(a) State suitable null and alternative hypotheses.

(b) Calculate X^2 for the observed data.

2.

A random sample of 600 students at a college is taken, and the course they are studying is recorded:

Course	Science	Arts	Business	Engineering
Observed (O_i)	180	140	130	150

A researcher wants to test whether students are equally distributed across the four courses.

(a) State suitable null and alternative hypotheses.

(b) Calculate the expected number of students in each course assuming your null hypothesis is true.

(c) Calculate X^2 for the observed data.



3.

A company claims that 70% of its customers renew their subscription each year. To test this claim, a sample of 150 customers is taken and it is recorded whether or not they renew their subscription.

The results are as follows:

Renewed	Yes	No
Observed (O_i)	96	54

- (a) Calculate the expected frequencies.
- (b) State the null and alternative hypotheses.
- (c) Calculate the goodness of fit of the data to the expected result.

4.

Find the following critical values:

- (a) $\chi^2_3(10\%)$
- (b) $\chi^2_8(5\%)$
- (c) $\chi^2_5(2.5\%)$



5.

With $\nu = 12$, find the value of χ^2 that is exceeded with probability 0.05.

6.

The random variable Y has a χ^2 distribution with 12 degrees of freedom.

Find y such that $P(Y > y) = 0.975$

7.

With $\nu = 6$, find the value of χ^2 that is exceeded with probability 0.1.