

# 3

## Sample project

This Maths Studies project has been graded by a moderator. As you read through it, you will see comments from the moderator in boxes like this:

**Moderator's comment:**

At the end of the sample project is a summary of the moderator's grades, showing how the project has been graded against all the criteria A to G. These criteria are explained in detail in chapter 13 of the Mathematical Studies textbook.

Reading projects and the moderator's comments will help you to see where marks are gained and lost, and will give you helpful tips in writing your own project.

### Is there a relationship between social networking and mock examination results?

**Moderator's comment:**  
The project has a title

#### Introduction

For my Math Studies project I am going to find out if there is a relationship between the time spent on social networks such as Facebook and the results of the IB mock examinations in my school.

I made a questionnaire and gave it to 15 boys and 15 girls in my year. I asked them their age, gender, the amount of time they spend on Social networks each week and the total score for their mock examinations.

I will find the average time spent on Social networks and the average score for the mock examinations. I will plot the points on a scatter graph, find the correlation coefficient and do a  $X^2$  test to find out if the number of hours spent on social networks and mock examination grades are independent or not.

**Moderator's comment:**  
There is a task and a vague plan. The number of students answering the questionnaire is too few and the notation for chi-squared is incorrect.

## Data collection

Gender	Age	Hours social network	Exam total
M	18	12	31
M	18	6	33
M	17	7	25
M	19	15	18
M	18	13	28
M	18	8	35
M	19	3	42
M	20	0	28
M	19	21	22
M	18	30	24
M	18	5	40
M	19	3	38
M	17	15	39
M	19	12	26
M	20	9	31
F	18	35	24
F	18	21	27
F	19	6	44
F	19	11	40
F	17	14	38
F	18	5	39
F	18	0	26
F	18	15	21
F	20	12	32
F	19	7	35
F	18	22	26
F	18	12	25
F	18	10	30
F	17	8	29
F	20	15	31

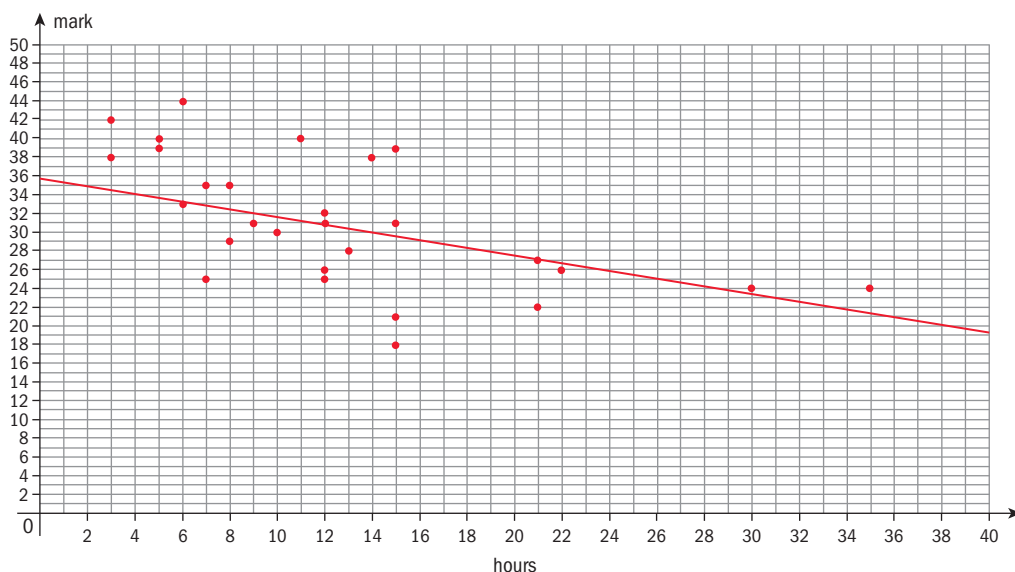
**Moderator's comment:**  
Data collection is relevant but not sufficient in quality or quantity. It is set up for use in the chi-squared test.

## Mathematical processes

The mean number of hours on social networks is  $\frac{352}{30} = 11.7$

The mean score for the mock exams =  $\frac{927}{30} = 30.9$

Now I will put the data into a scatter graph.



The correlation coefficient is  $-0.484$  showing that there is a weak negative correlation between the number of hours on social networks and the mark on the mock examinations.

The equation of the line of best fit is  $y = -0.411x + 35.7$ .

**Moderator's comment:**  
This is irrelevant.

Now I want to see if there is any other connection between the number of hours on social networks and the mark in the mock examinations. So, I will set up a  $X^2$  test at the 5% significance level.

Hours/marks	15–25	26–35	36–45
0 – 10	0	9	5
11 – 20	3	5	3
> 20	3	2	0

### Expected values

Hours/marks	15–25	26–35	37–45
0 – 10	2.8	7.5	3.7
11 – 20	2.2	5.9	2.9
> 20	1	2.7	1.3

**Moderator's comment:**  
Expected values are less than 5 so the test is invalid.

Dof = 4

$X^2 = 9.47$

$9.47 < 9.488$  so we accept the null hypothesis.

So, the two are independent of each other.

**Moderator's comment:**  
The student should have stated that Dof means "degrees of freedom".  
 $X^2$  is not correct mathematical notation.

## Conclusion

For the data that I collected it was shown that there is not much relationship between the number of hours that a person spends on social networks and their mark in the mock examinations. This was a surprise to me because I had expected that there would be a relationship between these two things because if you are spending time on social networks then you are spending less time studying. Also the result of the  $X^2$  test showed that the time spent on social networking is independent of mock examination grades.

Perhaps if I had a bigger number of people then there might have been a relationship between them and I only picked 30 students out of my class.

### Moderator's comment:

The project is a very simple one that does not reflect 25 hours of school work plus homework. The conclusion is consistent with the results.

## Summary of moderator's comments

Criterion	Grade	Comment
A	2	The project does have a title, a statement of the task and a description of the plan. The plan is not detailed. The student needs to explain clearly how they are going to collect the data, any selection processes in order to ensure that the data is random, explain all the mathematical processes that they will use and why they are using them. (2 marks awarded, out of a possible 3.)
B	2	Relevant data has been collected. The data is not sufficient in quality or quantity. However, it has been set up for the chi-squared test. If the student had collected much more data then it would have been possible to carry out more tests involving age and gender and the entries in the chi-squared expected values would have been larger than 5. This would all have had to have been mentioned in the plan though. (2 marks awarded, out of a possible 3.)
C	2	As the equation of the regression line is not relevant then this project cannot receive any more than 2 marks for this criterion. This shows how important it is NOT to include irrelevant mathematical processes in the project. Note also that most of the expected values in the chi-squared test are less than 5, so it is invalid. As mentioned above, if much more data had been collected then many more relevant processes could have been carried out and the student could have made sure that the expected values in the chi-squared test were bigger than 5. (2 marks awarded, out of a possible 5.)
D	2	The interpretations are consistent with the processes used but there is no meaningful discussion because the project is too simple. (2 marks awarded, out of a possible 3.)
E	0	There is no attempt made to discuss validity. For example, the student could have commented on the expected entries in the chi-squared test or on the reliability of their data collection. (0 marks awarded, out of a possible 1.)
F	1	The project has been structured but it is a very simple project and does not reflect the time allocated for this coursework. (1 mark awarded, out of a possible 3.)
G	1	Some of the notation is correct but the notation for chi-squared is wrong and $x^2$ is used in one place instead of $\chi^2$ . (1 mark awarded, out of a possible 2.)
<b>Total grade</b>	<b>10</b>	