

MATHEMATICS COURSEWORK: STATISTICS

QUESTION: Do older students (September born) attain better results in KS3 maths than younger students (August born)?

PREDICTION: I hypothesize that older students do attain better results than younger students.

In order for me to complete the above investigation, I will first need to devise a plan for me to go with so that I can keep errors and irrelevant work to a bear minimum.

PLAN:

1. **COLLECTING DATA:** I will need to choose a suitable method of sampling to collect my data, in this case I will simply highlight the months September and August on my data sheet and use the information appropriately.
2. **RECORDING & PRESENTING DATA:** I will be required to use a clear and informative way of presenting my selected data.
3. **LOOKING FOR RELATIONSHIPS & MAKING COMPARISONS:** I need to use my statistical knowledge to describe and talk about any relationships that I can see, and also any comparisons I can make between different sets of results.
4. **EXPLANATION OF RESULTS:** I will need to describe and explain my results, stating their reliability and any apparent patterns.
5. **EXTENSION OF PROBLEM:** if there is enough time, and my investigation is correctly completed to a suitable standard, then I may think of extending the problem.
6. **CONCLUSION/EVALUATION:** I will need to write a summary of what I found out and maybe how I could have improved on it.

RECORD NUMBER	DATE OF BIRTH	KS3 MATHS RESULT
2	1-SEP-1986	7
3	5-SEP-1986	7
4	6-SEP-1986	5
5	9-SEP-1986	5
6	10-SEP-1986	4
7	13-SEP-1986	5
8	14-SEP-1986	7
9	20-SEP-1986	7
10	21-SEP-1986	4
11	26-SEP-1986	5
12	26-SEP-1986	6
13	27-SEP-1986	4
14	27-SEP-1986	5

As I have stated above, I will need to stick closely to my plan. Firstly I will need to gather my data and present my results in a table.

The above table displays the data that I will use for my 'older students'. These are the students whom are born in September 1986; those whom are amongst the oldest in the year. Whereas the table below displays the data that I will be using to compare with the information contained in the above table i.e. those that are born in August 1987, the younger students from the year.

RECORD	DATE OF BIRTH	KS3 MATHS RESULT
172	2-AUG-1987	6
173	7-AUG-1987	5
174	9-AUG-1987	5
175	10-AUG-1987	7
176	11-AUG-1987	7
177	12-AUG-1987	5
178	15-AUG-1987	6
179	19-AUG-1987	5
180	24-AUG-1987	6
181	25-AUG-1987	7
182	25-AUG-1987	5
183	26-AUG-1987	4
184	26-AUG-1987	6
185	31-AUG-1987	5

To display my data in the form of a graph, I will need to first draw up a scatter graph to see any connections between 'age' and 'result'.

VISUALISATIONS: from the scatter graph I have drawn, I can see that there is not any apparent relation that I can detect. What I do know though is that there are no results attained below a level 4, and I have detected that the results in August are wider spread than those of in September. I have gone from 0 to 32 on my x-axis because I knew from my data table that I had a result of 31 and I was going across in 2 days per centimetre.

I know that a scatter graph is not really a satisfactory way of presenting data, so as part of my investigation I have now decided to draw a histogram, because I can understand them well and am good at comparing them. I will first need to select suitable 'class-widths' and find data accordingly, from which I will have to find the frequency density.

Frequency density = frequency / class width
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2 tables from which I will construct my histogram.

The first is for those students born in September and the second for those who are born in August.

Groups	0-1	1-2	2-4	4-5	5-6	6-8
Frequency	0	0	3	5	1	4
Freq. density	0	0	1.5	5	1	2
Class width	1	1	2	1	1	2
Mid - point	0.5	1.5	3	4.5	5.5	7

Groups	0-1	1-2	2-4	4-5	5-6	6-8
Frequency	0	0	1	6	4	3
Freq. density	0	0	0.5	6	4	1.5
Class width	1	1	2	1	1	2
Mid - point	0.5	1.5	3	4.5	5.5	7

My 2 histograms are at the back of this sheet.

DISCOVERIES: Looking at the two graphs I have drawn besides each other, I can see straight away that the histogram representing the data for the students born in August has a 'Positive skew' and the other histogram relating to the results of those students who are born in September does not have much of a skew, but I will regard it as a symmetrical distribution, for arguments sake. This is simply because it is very close to the shape of a symmetrically distributed histogram.

Knowing that the August results have a positive skew, this means that the results are mainly below the average maths ks3 level for this month because I will prove this by working it out.

Record	Result
172	6
173	5
174	5
175	7
176	7
177	5
178	6
179	5
180	6
181	7
182	5
183	4
184	6
185	5
Total=	79

$$\text{Average} = \text{total} / \text{number of records}$$

Therefore $79/14 = 5.64$ (to 2d.p)

From this I can determine and prove that my point about the scores being below the average for the month.

Also, knowing that the results for the month of September being generally symmetrical in graph form, means that the modal results were in between 4 and 5, which is also below the average for the month of September. I have worked out the average ks3 maths result for the month of August and will now do the same for the month of September.

Record	Result
2	7
3	7
4	5
5	5
6	4
7	5
8	7
9	7
10	4
11	5
12	6
13	4
14	5
Total	71

Again, the method used to work out the average is the same, therefore

$$71/13 = 5.46$$

Consequently, I have proven my point of the modal result being lower than the month's average result. I have also observed that the August born students have a better and higher average than those of whom are born in September. This could be because there is one extra result in the month of August (i.e. 14) than in September, or because on a general basis, my prediction is incorrect.

Keeping with my plan, I need to now explain the reliability of my results. Really and truly, my results are generally quite reliable and trustworthy because I have only selected a small group of people and therefore the chance of error is highly unlikely.

CONCLUSION: Conclusively, I think that I have taken this investigation as far as I can in the little amount of time I had been allocated. I feel that if I did have more time then I would have extended my problem onto discussing and finding out if males attain better results than females in the two months and vice versa.

I could have maybe improved on my investigation by using my time wisely, but since I have wasted time I have only a small piece of work, that does not illustrate my true capability.