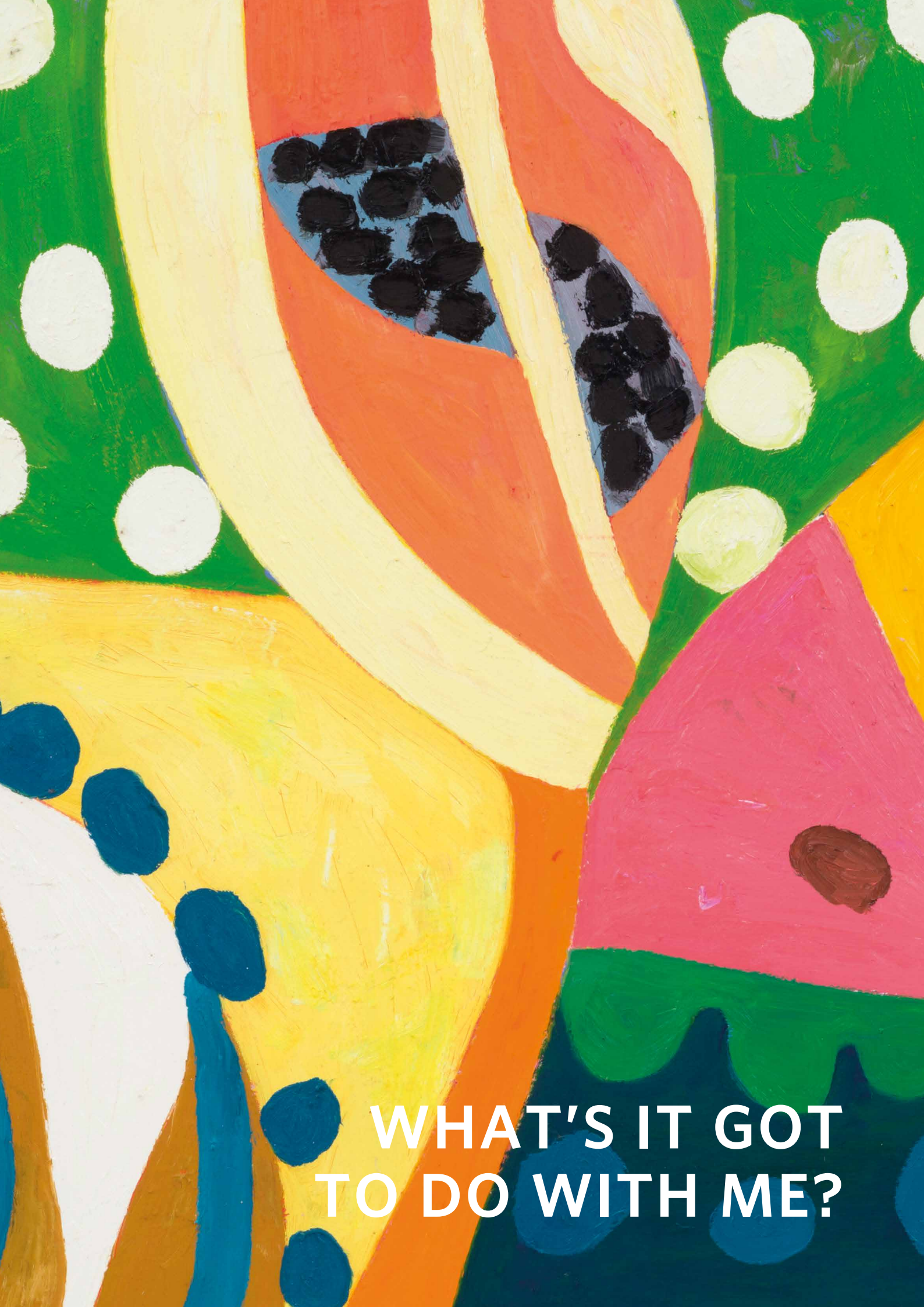
WHAT'S IT GOT
TO DO WITH ME?

# WHAT'S IT GOT TO DO WITH ME?

## Primary research into attitudes to maths of Year 9 (13–14 year olds) and Year 12 (16–17 year olds)

**Diane Carrington, M.Sc. Psych. PGCE**

A survey commissioned by MATHS ACTION

Survey organised by Head Teacher, Dr Anne Hudson, PhD,
Langley Park School for Girls, Bromley, Kent

Statistical analysis by Rosemary Tross

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## About the author

**Diane Carrington M.Sc. Psych. PGCE**

Diane Carrington specialises in helping people to achieve their potential in all situations. As a coach, she designs and delivers bespoke programmes for individuals and organisations worldwide. A former teacher, Diane now mainly works for multi-national financial organisations, and also with colleges and schools. She is the author of *Future Directions; Improving Emotional Intelligence and Confidence in Young People*.

Diane is the Chair of Governors of Langley Park School for Girls, a large Secondary Academy in South London.

## Acknowledgements

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# Contents

# Executive summary

This paper explores why British girls don't continue to study Mathematics – maths – in the 6th Form after the compulsory GCSE exam, and their often negative attitude towards maths; thus instigating the title, 'What's it go to do with me?' The paper refers to primary research conducted in 2015 with 400 students from Year 9 and Year 12 at a secondary academy in South London, using questionnaires, focus groups and a Maths Teachers Discussion Group.

While analysing the research, it is evident that the girls in the 6th Form believe that maths is a very difficult subject, beyond the capabilities of most of them. Because the school in the research project restricts the studying of Maths AS level to students who gained an A* or an A pass at GCSE, this reinforces both the perception and the reality of this belief. It is clear that while this situation continues to exist, many girls will be deterred from studying maths in the 6th Form.

It was also evident that both the students and the maths staff are aware of negative attitudes towards maths from other students and also from adults, often including their parents and teachers of other subjects. The maths teachers struggled to understand this, as obviously maths was their chosen subject to study and they love it.

The maths teachers felt that they need whole school support to try to rectify the negative attitudes towards maths. They believe that all staff, regardless of their personal subject area, should actively promote the importance of maths to everyone's future life, as soon as the girls enter the school in Year 7. They felt that this would help to maintain the positive attitude that most students have towards maths in Primary school in Year 6.

The maths teachers also felt that they need both up-to-date statistics of the number of girls studying maths at college, and in maths related careers, and information about career opportunities for girls who study maths related subjects, as their knowledge in both of these areas is limited.

Langley Park Girls' School has already instigated several initiatives to begin to rectify this situation. A Year 9 Maths Evening Event was held for girls, parents and staff to emphasise the crucial importance of maths in everyday life. The questions raised by the audience, Year 9 girls and parents and carers were answered by a Panel and are available in Appendix v. The feedback from this evening was very positive, with everyone agreeing that it helped both girls and parents to appreciate the importance of maths in all careers. The school has also developed their own internal Careers Academy, which supports both staff and students, and focuses on helping girls to pursue careers in maths related areas.

# Introduction

## What we're looking for

This paper attempts to understand why girls do not continue to study maths after GCSE level, and consequently fail to pursue careers in maths related areas. The most recent statistics show us that in 2014, of the A level papers taken by girls only 8.5% were in Maths A Level or Further Maths A Level, compared to 16.9% of boys.[1] When one considers the crucial need for maths in order to succeed in every-day life as well as in all workplaces, it is clear how this disadvantages women in their life.

However, as Elizabeth Truss, when Parliamentary Under Secretary of State for Education, said:

> *Getting girls to take an interest in maths and science isn't just about improving their earnings potential, as it's also about improving the country's economic and educational performance.*[2]

One can easily see the evidence of this loss of creativity and talent, for example in the fact that only 6% of the engineering workforce in the UK is female.[3]

The present study was designed to focus on one girls' secondary academy and to investigate why, even though at GCSE 90% of girls gained A*–C passes in maths, only 22% chose to study maths in Year 12.

1 JCQ (Joint Council for Qualifications) 'Cumulative percentages of Subject Results by Grade and by Gender'. 2014
2 Elizabeth Truss in the Guardian newspaper, 8th December 2014, 'A gender gap that simply doesn't add up'
3 Women in Engineering Statistics 2014, from Royal Academy of Engineering analysis of the Labour Force Survey, 2004–2010, quoted in Diversity data, RAEng, 20

# Method

3 pieces of research were undertaken:

1. **Questionnaire**
A questionnaire was circulated to 218 girls in Year 9 and 182 girls in Year 12.

2. **Focus groups**
Two focus groups were conducted with Year 12 girls who discussed girls' attitudes towards maths.

3. **Maths Teachers Discussion**
A discussion was held with a group of maths teachers to explore their opinions of why so few girls studied maths in the 6th Form.

## Participants

Langley Park School for Girls (LPGS) is a girls' secondary academy school in Beckenham, in the London Borough of Bromley, with a mixed 6th Form (Year 12). In 2015 it has 1,193 girls in Years 7–11 and a mixed-sex sixth Form of 498 students.

LPGS prides itself on the excellent results of its strong Maths Department, which contributes to the STEM programmes throughout the school. LPGS is well above the national average in girls' examination results in maths. In 2014 the GCSE results in maths were outstanding, with 90% of students gaining A*–C passes. This trend has continued in 2015 where 43% of 47 entries in Maths A Level gained A*–B grades.

However, despite such a strong emphasis on maths teaching, maths ability and good results in Year 11, LPGS conforms to the national trend of girls choosing not to study maths in the Sixth Form.

As the following table shows, in 2014, 100% of 234 girls took Maths GCSE. In 2015, when those girls went into Year 12, four more girls joined the class, making a total of 238 girls; only 52 of those girls continued to study maths, which is 22%. This is a dramatic decline, with 78% of girls not pursuing maths studies.

| Year | Number of girls in Year 11 100% studying Maths GCSE | Number of girls in Year 12 | Number of girls studying Maths AS Level and Further Maths in Year 12 |
|---|---|---|---|
| 2011 | 238 | 244 | 66 = 27% |
| 2012 | 238 | 210 | 73 = 35% |
| 2013 | 240 | 280 | 45 = 16% |
| 2014 | 234 | 301 | 54 = 18% |
| 2015 | 233 | 238 | 52 = 22% |

## Selection of participants

### 1. Questionnaire

It was decided to circulate questionnaires to all girls in Years 9 and 12.

A questionnaire was circulated to 218 girls in Year 9 and 182 in Year 12.

### 2. Focus groups

Two focus groups were conducted with Year 12 girls who discussed girls' attitudes towards maths.

Initially, it was decided to contact Year 12 students who had achieved an A or A* pass for maths GCSE to discuss why they had decided not to continue with maths – even though they had achieved the required grade. However, only 2 available students fitted this profile, so the sample was extended to all Year 12 students.

15 girls were selected at random by the Head of the 6th Form. This enabled the interviewers to discuss maths with girls undertaking maths AS Levels, as well as those who no longer studied maths.

### 3. Maths Teachers Discussion

A discussion was held with a group of maths teachers to explore their opinions of why so few girls studied maths in the 6th Form.

All teachers in the Maths Department were invited to attend, regardless of whether they currently taught A level. This was to try to gather as varied a perspective as possible.

## Materials

### 1. Questionnaire

A questionnaire (Appendix i) was circulated to 218 girls in Year 9 and 182 in Year 12.

The Questionnaire included both closed and open questions to elicit both statistical and analytical information about girls' attitudes towards maths.

### 2. Focus groups

Two focus groups were conducted with Year 12, girls who discussed girls' attitudes towards maths.

It was decided not to use formal questions for the discussion groups, as an informal conversational atmosphere was felt to be the most conducive to encourage participants to reflect in an honest and open way, when giving their opinions. A general list of questions was available to the person leading the discussion (Appendix ii), with guidance to allow the participants to introduce new topics where they felt these were relevant and informative to the aims of the research.

### 3. Maths Teachers Discussion

A discussion was held with a group of maths teachers to explore their opinions of why so few girls studied maths in the 6th Form.

Here again it was decided not to use a formal list of questions, but to pose open ended questions, to allow the participants to personally contribute to the discussion (see Appendix vi).

# Procedure

### 1. Questionnaire

A questionnaire was circulated to 218 girls in Year 9 and 182 in Year 12.

The paper questionnaires were distributed to the girls by their Form Tutors, who then sent out reminders and collected the completed questionnaires, after a 20 minute tutor period.

### 2. Focus groups

Two focus groups were conducted with Year 12 girls who discussed girls' attitudes towards maths.

The discussion groups were held during the lunch break, so that students were available and did not miss lesson time. They were held in a conference room, not usually used by students, in order to set a different tone to that of a normal lesson. The interviewers introduced themselves and asked if anyone had any objections to the discussions being taped, explaining that no names would be used in the reports. No one objected and the girls very quickly seemed to disregard the microphones.

Careful attempts were made not to ask any leading questions, in order not to influence the answers. Towards the end of each session the participants were asked to reflect on topics that had been covered in the discussion, and to consider if their attitudes had been changed after listening to other people's opinions. Participants in each group agreed that this had happened (see more of this in the Discussion Section).

### 3. Maths Teachers Discussion

A discussion was held with a group of maths teachers to explore their opinions as to why so few girls studied maths in the 6th Form.

The Teacher Discussion took place during the last session of a Staff Training Day, when all staff had grouped into Department meetings. In this way it was possible to meet with as many maths teachers as possible. However, this did not comprise the whole department because some staff had to attend other meetings.

The questions were open ended in order to gain as much insight as possible into why staff felt that not many girls studied maths in the 6th form. The form was a general discussion. It was felt that recording the discussion would have hindered people's contributions, and so only hand notes were taken during the meeting.

# The discussion

1. Questionnaire

A questionnaire was circulated to 218 girls in Year 9 and 182 in Year 12. A statistical ranking of the relevant responses (questions 8, 9A, 9B, 17, 19) analysed by percentage, can be found in Appendix iii.

A detailed analysis of the results:

1. Year 9 Results
2. Year 12 Results
3. A comparison of the Year 9 and the Year 12 responses

## 1. Year 9 results

### Quantitative questions

| Year 9 quantitative questions | Total | Yes/ Strongly believe | No/ Strongly disagree | Sometimes/ No opinion |
|---|---|---|---|---|
| Q1. Do you have a weekly allowance? | 217 | 39% | 36% | 24% |
| Q2. Do you do household jobs at home? | 218 | 45% | 15% | 39% |
| Q3. Do you get money from your parents for doing your household jobs? | 218 | 21% | 49% | 30% |
| Q4. Do you have a paying after-school job? | 218 | 4% | 94% | 1% |
| Q12A. Do you, yourself, save money every week? | 212 | 67% | 32% | 1% |
| Q13. Do you believe that maths is an inherited ability? | 216 | 16% | 32% | 52% |
| Q14. My parent/carer is a great help with my maths homework | 217 | 39% | 24% | 37% |

**Q1.** The statistics tell us that only 39% of Year 9 have a regular weekly allowance. This is regrettable, because girls do not learn how to budget, manage and save money.

**We recommend** a weekly allowance, to instil good habits.

**Q2 + Q3.** Only 45% of Year 9 girls undertake regular household jobs at home. This is a pity because regular household tasks incorporate a girl into the home system-support work.

**We recommend** one daily and one weekly task, to be linked to pocket money payments. Girls may then appreciate that beds don't make themselves, that dull work is a part of any job, and that housework should be a family team effort.

**Q4.** Jobs for girls of 13 and 14 are legally forbidden.

**Q12A.** 67% of girls save regularly, which is excellent.

**Q13.** 52% of girls don't know, 16% of girls believe that maths is an inherited ability. The answers show there is confusion, which might lead to self-limiting beliefs ('Mum was no good at maths, so I won't be.') There should be certainty that maths ability is *not* inherited. About 5% of children have dyscalculia, which briefly means that figures on a page may jump around, and otherwise hinder the ability to carry out simple mathematical calculations.[4]

**Q14.** The main two reasons for homework are for reinforcement of a lesson learned, and for the student to learn to work alone. We believe that parents need to see that homework is prepared on time and tidy. Parents are not qualified to teach maths.

## Qualitative questions

### Attitudes to the subject of maths

(Questions: 13, 14, 15)

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**Question 15: Do you think that maths will be useful to you after you leave school? Please give your reasons.**

The large majority of girls said that they do think that maths will be useful after school. There were many comments about the importance of maths including:

- 'Yes because numbers are in lots of things',
- 'When you are an athlete you need to know how many calories to eat and to burn'.

4 Professor Steve Chinn gave this figure to the British Dyslexia Association, sent by letter from BDA to Shirley Conran on 13 August 2015.

Some commented on the reputation that maths has, as a difficult subject:

- 'Yes, because it means that you are clever'

However there were a minority of girls who failed to see how they would use maths after leaving school:

- 'Not really, I just need a good grade for Uni'
- 'No because algebra won't help you in a job interview'
- 'I don't think that it will be very useful, but it could come in handy'

There were a few girls who were obviously confused about the demands of their chosen profession, as in:

- 'No because I want to be a vet'

Clearly careers advice is needed here.

## Attitude to money

(Questions: 1, 3, 5, 7, 9, 12, 16, 17, 18, 19, 20)

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**Question 9A: What are the benefits of having a lot of money when you grow up?**

***This shows belief about the importance of money.***

The majority of comments referred to shopping and a better life style. Many girls made comments referring to financial problems, reflecting the recent financial crisis and the pressure that it has placed on families:

- 'You don't have to worry about losing everything'
- 'You won't be in debt'
- You can pay off debt'
- 'Not worrying about bills'
- 'Not having financial stress'
- 'You are not hungry and if you have a child they won't be hungry'
- 'You can pay rent and live in a stable home'
- 'You don't have to worry about losing everything'
- 'You don't need to worry about taxes'
- 'Better living conditions'

Although many expressed the traditional view of married life:

- 'I can have a nice house for me and my hubby'

And of caring for others:

- 'You can help other, mainly parents'

Some expressed their personal desires:

- 'You can get motor bikes and nice things'

Overall, the list of answers reads like a burst of joy, imagined. These are some of them, summarised by, 'Big house, no debt, nice life' and, 'You can buy anything you want'.

There were many variations of: 'A nice house [it was always a house], a healthy family, better living conditions, a car, clothes, lots of cats'.

- 'You can get more opportunities, do more and have a better life'
- 'You can take care of yourself'
- 'You can be independent'
- 'Have more freedom'
- One response read, 'Money is worthless to me.'

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**Question 9B: What are the possible difficulties of having a lot of money when you grow up?**

Girls obviously appreciate that there are some negative aspects to money. Drawbacks to wealth included envy:

- 'You get called spoilt'
- 'People may not like you'
- 'You will have spoilt children'
- 'You might become spoilt'
- 'You might become big headed'

Having no spare time because you work too much:

- 'Not much family time'
- 'Wasting it'
- 'You might spend it on wrong things'
- 'People only like you because you're rich'
- 'Fake friends'
- 'You could waste it all on drugs'
- 'The money could make you forget you still need to save it'

**Question 17: If you get married or have a long-term partner, who do you think will pay the household bills?**

*This shows financial responsibility.*

The majority of respondents said that they would split the bills, meaning equally.

- 'Whoever works'
- 'Whoever earns the most money'

But many were considering traditional roles:

- 'He pays bills, I'll do childcare'
- 'Husband'
- 'Boyfriend'

**Question 18: Do you want to have children? If so, how many?**

*This shows realistic attitudes to cost of children.*

The majority of respondents wanted children, but a couple wanted to adopt and one replied:

- 'None, I want dogs'

Some were specific, for example:

- 'Yes, four including a pair of twins'

Some were even more specific:

- 'Four boys – Hunter, Cirtus, Desmond and Ike'

**Question 19: How much do you reckon a child costs, on average, per week?**

In January 2015 it was calculated that the cost of raising a child from birth to 21 years in the UK was £230,000, not including private school fees but including educations-related costs, such as uniforms and lunch; university fees are included.

For our purposes in this document, we do not include the average total cost of university fees at £53,000, so our calculation of the total cost of raising a child is £177,000.

This means that the average yearly cost of raising a child is £8,340 (rounded). The average weekly cost of raising a child is £162 (rounded), not including private school fees and not including university fees.[5]

5 The Guardian and The Telegraph, 22 January 2015. Reporting on a study carried out by the Centre for Economics and Business Research (CEBR) for the insurer, Liverpool Victoria (also known as LV).
In 2014, The Centre for Social Justice quoted the average cost of going to university at £53,000. (Letter to Shirley Conran of 11 April 2014.)

*This shows knowledge of family finances and costs.*

Answers ranged from £20 to £1,000.
One girl mentioned child benefits at £80 a month; this is inaccurate.

One respondent said that she did not think children should be priced.
Other responses included:

- 'Well I cost a lot, so a lot!'
- 'I don't want to know'

- 50 answered £100 a week
- 28 answered £200 a week
- 25 estimated over £200 a week

Some girls wrote correctly that the weekly cost of a child depended on its age.

## Attitudes to future life ambitions

**Question 8: What work would you like to do after you leave school?**

*This shows aspiration.*

The broad range of jobs referred to by the girls varied from 'in a shop', and 'work with children', to 'lawyer', and 'UN ambassador'.

The answers reflect the true comprehensive range of abilities at the school surveyed.

Choice of career answers varied from hairdresser, detective and fire-fighter, to film director. The most popular choices varied from working with animals, doctor or teacher to the most popular choice: lawyer.

Four girls were unspecific about the job but clear about the rewards:

- 'Get a well-paid job'
- 'Something that makes you rich'

These girls do not have the Cinderella complex: the illusion that someone else will always pay for her.

### Attitudes to leisure and fame

(Questions: 6, 10)

Most girls in the survey say they are not old enough to go on a date, but if they do, the expenses are split, or the girl's parents pay.

Most girls had a favourite celebrity. For Year 9, the most popular celebrities are singer Ariana Grande (9%) and actress Jennifer Lawrence (9%).

The difficulties of fame are clearly recognised as intrusion and harassment by paparazzi, the media and fans. Some cited no privacy, but a few stated envy.

## 2. Year 12 results

### Quantitative questions

| Year 12 quantitative questions | Total | Yes/ Strongly believe | No/ Strongly disagree | Sometimes/ No opinion |
|---|---|---|---|---|
| Q1. Do you have a weekly allowance? | 181 | 43% | 40% | 17% |
| Q2. Do you do household jobs at home? | 182 | 54% | 15% | 31% |
| Q3. Do you get money from your parents for doing your household jobs? | 181 | 18% | 64% | 18% |
| Q4. Do you have a paying after-school job? | 182 | 44% | 54% | 2% |
| Q12A. Do you, yourself, save money every week? | 175 | 66% | 30% | 4% |
| Q13. Do you believe that maths is an inherited ability? | 180 | 18% | 31% | 51% |
| Q14. My parent/carer is a great help with my maths homework | 176 | 18% | 32% | 50% |

**Q1.** As before, we recommend a weekly allowance.

**Q2.** 54% do household jobs at home. It is understandable that girls of this age are studying hard – which may be why 31% help at home only occasionally.

**Q13.** As with Year 9, it needs to be made clear to all girls that maths is *not* an inherited ability.

**Q14.** It is unsurprising that only 18% of girls are helped with maths homework by parents, because a lot of parents might have been taught using methods which have been discarded nationally, so muddle might result. As with Year 9, we do not believe that parents should help with homework.

## Qualitative questions

### Attitudes to the subject of maths

(Questions: 13, 14, 15)

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**Question 15: Do you think that maths will be useful to you after you leave school? Please give your reasons.**

Although a large percentage of the respondents, 76% answered, 'Yes', that maths would be useful; after school, there was still a significant percentage, 26% who answered that 'No', maths would not be useful after school. Most of these replies qualified their answers, referring to trigonometry or algebra, implying that basic maths would be useful:

- 'No, you do not need to know the value of X in your life time'
- 'Certain aspects are always useful but the advanced maths from GCSE no. I am not using trigonometry to do my weekly shop'

One girl explained the commonly held view very succinctly:

- 'No. The maths we do in school is completely different to what you'd need on a daily basis'

Considering that these girls will be choosing a career in the very near future, it is worrying that there was still the perception that some jobs don't use maths in any way:

- 'No, I want to be a drama teacher, or something like that'
- 'No, I want to be a TV presenter, no maths involved'
- 'No I'm going to be an artist, maths is unimportant'

Again, career advice is clearly needed to dispel this myth.

Unusually, one respondent said that it was her father who led her to believe that maths is never used after school:

- 'No, my dad did it and he has never used any maths at all'

Amongst the respondents answering 'Yes', many qualified their answers by describing how they feel that they would be using maths after school:

- 'Yes because it gives you a better chance of getting a qualified job'
- 'Yes, it helps with everyday life and is incorporated in many different subjects'

Many girls expressed a belief that maths is only useful when money is involved:

- 'Yes, when trying to figure out if I was being ripped off in a store or working out a sale'
- 'Only in everyday life eg working out bills'

- 'Yes because maths is used when you deal with finances'
- 'Yes, without it I can't keep track of my money'

One respondent asked for a particular curriculum:

- 'Algebra is pointless, only maths you use is money based, so do more maths to do with money'

Many respondents found it difficult to answer 'Yes' or 'No', which is explained in this comment:

- 'Yes and no, mental maths will be but not complex things such as trigonometry'

## Attitude to money

(Questions: 1, 3, 5, 7, 9, 12, 16, 17, 18, 19, 20)

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**Question 9A: What are the benefits of having a lot of money when you grow up?**

Year 12 gave similar responses to those of Year 9. Other responses are summarised by:

- 'Everything is better; life in general'
- 'Flexibility'
- 'Stability'
- 'Security'
- 'Lets you spend on your wants as well as your needs'
- 'Do what you want, get what you want'

In addition, financial independence was included: …

- 'Can pay own way'
- 'You can support yourself'

… together with a prudent eye to the future:

- 'Being able to save up and protect yourself for a rainy day'

What was not mentioned by Year 9 but by Year 12, was expenditure on travel, on self-maintenance and clothes. Year 12 also mentioned saving for the future, probably because they have started to think about university, and the enormous amount of money this will cost them.

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**Question 9B: What are the possible difficulties of having a lot of money when you grow up?**

The Year 9 replies were quite shrewd, the Year 12 replies more so.

Many responded with thoughtful comments such as:

- 'You might feel guilty'
- 'You might become materialistic'

Managing your money might mean:

- 'More money, more problems'

And some of these problems might be:

- 'A higher tax rate'
- 'Spoilt kids'

Also, the problems of:

- 'Children becoming too dependent'
- 'You might have long working hours'
- 'You may not have any aspirations'
- 'Too materialistic'

Two additional possibilities seen by Year 12 are:

- 'Tempting to show it off'

With a possible consequence of:

- 'Loneliness'

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**Question 17: If you get married or have a long-term partner, who do you think will pay the household bills?**

***This shows financial responsibility.***

88% of responses said that the bills would be shared equally.

Some respondents said that they did not want to get married:

- 'Not me'
- 'I won't get married'
- 'I don't want to get married ever. But if I did, I would'

A minority said 'Me'.

Conclusion: Almost no Cinderella complexes.

**Question 18: Do you want to have children? If so, how many?**

*This shows realistic attitudes to cost of children.*

Year 12

Although a few respondents were undecided, a large majority want to have children. One respondent specifically requires one Chinese girl baby (adopted).

**Question 19: How much do you reckon a child costs, on average, per week?**

*This shows knowledge of family finances and costs.*

The true answer is £162 a week, on average.[6] Again, some answers said the amount depended on the age of the child.

There were more underestimates than in Year 9, with **17** girls guessing well under £100 a week.

- 17 respondents said: 'A lot'
- 6 said: 'Too much'

It looks as though none of the girls had seriously considered how much a child costs, although these girls were old enough to consider having children, and nearly all of the girls had mentally decided how many children to have.

- 36 responded £100
- 17 responded £200
- 35 responded £200 to £500

Instead of an estimated sum, one respondent answered: 'Your life'.

## Attitudes to future life ambitions

(Question: 8)

*This shows aspiration.*

**Question 8: What work would you like to do after you leave school?**

A large number did not know what work they would do when they left school, more than the Year 9 group.

6 The Guardian and The Telegraph, 22 January 2015. Reporting on a study carried out by the Centre for Economics and Business Research (CEBR) for the insurer, Liverpool Victoria (also known as LV).
In 2014, The Centre for Social Justice quoted the average cost of going to university at £53,000. (Letter to Shirley Conran of 11 April 2014.)

Some choices were adventurous:

- 'Aeronautical engineering'
- 'Commodity trading'

There were no hairdressers and less interest in animals. A small percentage answered that they intended to go to university, but this decision would not have to be made for a few more months. Easily the most popular choice was "teacher" followed by lawyer, then doctor.

We feel that the number of girls who intend to be teachers is a compliment to the teaching at Langley Park. We are surprised that Langley Park is a hothouse for lawyers.

### Attitudes to leisure and fame

(Questions: 6, 10)

The majority of respondents said that they would split the bill when going on a date. The majority also seemed aware that, although fame is reassuring and financially rewarding, it can be overrated.

## 3. A comparison of Year 9 and Year 12 answers

### Attitudes to the subject of maths

It is interesting that both Year 9 and Year 12 have similar beliefs about whether maths is an inherited ability.

- 16% (Yr 9) vs 18% (Yr 12) believe that maths is an inherited ability,
- 32% (Yr 9) vs 30% (Yr 12) believe that maths ability is not inherited,
- 52% (Yr 9) vs 51% (Yr 12) do not know.

This clearly illustrates the need to explain to the girls that anyone is capable of being good at maths if they work hard. It also supports the reason that many mothers excuse daughters for not being good at maths, because they were never very good themselves. This is obviously a serious, self-limiting belief, which will help to maintain the status quo, with only a few girls studying maths after the compulsory GCSE in Year 11.

### Attitude to money

Although both groups expressed a desire to spend money, there was a much greater reference to saving in Year 12. This might be because the Year 12 respondents had already begun to consider university and were well aware of the great expense involved.

In the question referring to the benefits of having more money (Question 9) it was interesting that more Year 9 girls referred to being free of debt as the biggest advantage. This might be because in Year 9 girls are very involved with their family, and therefore very much aware of the problems. In Year 12, girls begin to become more self-sufficient, and see things more from their own perspective.

## Attitudes to future life ambitions

It is not surprising that more girls in Year 12 chose more serious professions, often requiring further study after school. Year 12 comes after the compulsory school leaving age, at the end of Year 11; therefore this group has already decided to study for higher qualifications and are aiming for professional careers.

It is not surprising that a large number of girls did not know what work they would do when they left school. Unlike Year 9 – which is a long way off from making a decision – many Year 12 seem to be struggling to decide exactly what career to aim for in the near future. This might explain why more girls answer that they are undecided in Year 12. However, the fact that more girls in Year 12 are undecided in their careers highlights the need for expert career advice.

### 2. Focus groups

Two focus groups were conducted with Year 12 girls, who discussed girls' attitudes towards maths.

During both focus groups, the participants made many interesting comments; these will be discussed, with verbatim examples, question by question.

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**Q1. What A levels are you studying and how did you select them?**

In Group One, most girls chose as their AS subjects, the subjects they had enjoyed at GCSE Level. Two of the four girls not studying maths said that they would like to have studied for a maths AS Level, but they had not achieved the required Grade and:

- 'My teacher told me that I would be unlikely to pass'

All girls agreed that they had received the impression from their teachers, that:

- 'Maths is really hard'

Girls in Group Two chose their A Level subjects in a similar way to Group One.

One girl said that she had achieved an A* and two further certificates in maths, and that she had wanted to study maths at AS Level but that it didn't fit in the school timetable with her chosen Dance, Drama and Physics, so she chose Psychology AS Level instead of maths.

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**Q2. What do you think Maths AS Level is like?**

In Group One there was general agreement that Maths AS Level is considered to be harder than other AS Levels.

- 'My teacher said that there is so much work involved, you have to be fully involved'

The girls not studying maths discussed the amount of work involved, plus the importance of keeping up to date and handing in all work on time.

The girls studying maths said that they were finding maths challenging, but not more so than other subjects.

The girl studying A Level mathematics and further mathematics said that she found that she did not get as much homework as some of her friends – although she was attending double the number of classes – because she was taking maths.

Group Two agreed that Maths AS Level is seen as:

- 'Really hard'
- One girl spoke of her sister: 'My sister took it, but they made her drop it early' (implying that the subject was too difficult).

Group Two were mainly studying Arts subjects, including Dance, Drama, Film and Media, and they initiated a discussion about the general perception of students who study maths:

- 'People who do more academic subjects make you feel stupid'
- 'Maths and Science are hard… if you don't choose them it makes you feel stupid'

When questioned, they unanimously agreed that some people view academic subjects differently from Arts subjects.

- 'I've been turned down for jobs because I haven't taken it [maths]. Jobs want people who do maths and English'

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**Q3. What jobs do you think need maths?**

In Group One, initially the girls considered jobs which used maths all the time, like 'an accountant', and they gave examples of jobs where they thought that maths would not be required:

- '[Like in the] theatre and acting, I'm not sure how maths would apply, but if you don't want to be screwed over by your agent'… (Laughter) 'and when you sign a contract'.
- '(Like a nurse) but I'm not sure how maths would be relevant there. But I suppose you have to count people and do their pills, so maths would come in'.

When questioned if an English teacher needs to be good at maths:

- 'Counting the photocopying,' or 'counting words in an essay', were given as examples of using maths. The girls then recognised the use of maths in statistics to predict performance.

When asked if they would have carried on with maths in the 6th Form, had it been possible – even though they did not want to study maths at AS Level – the majority of girls agreed that they would have liked to do this.

In Group Two, most girls were considering working in the theatre, photography and/or teaching, and said they didn't think they would need maths. They discussed the relevance of the content of the maths that they had studied at GCSE:

- 'They don't teach you anything about mortgages or how to balance cheques'
- 'No stuff that would actually help you'.
- 'Percentages is an important thing, but stuff like triangles and Pythagoras…?'
- 'I don't understand why we have to find the meaning of X!'
- 'I wish they would teach me something useful'. (Meaning assumed to be maths related to daily life.)
- 'Yes they should have taught us that. I don't want to be sitting there with my tax form, I would have to pay someone to do that'.
- 'It is relevant in the industry [Performing Arts]. You've got an agent, you need to be able to work out how much they're charging you, or you'll get done' (meaning cheated).

After discussion, the girls finally agreed that all jobs need maths, but to a different extent. (What was indicated was maths for everyday use, as opposed to Pure Maths.)

When the Year 9 Maths Evening Event in March was explained to the girls, they all agreed with the student who said:

- 'If someone told me in Year 9, that I would need maths in everything I do, I would have taken it more seriously'.

It was surprising to the interviewers that, in just a 30 minutes discussion, the majority of the girls had reconsidered their attitudes towards the importance and relevance of maths.

In summary to the comments made during the interviews, all of the girls were convinced that maths is a very hard subject; nevertheless, the majority of them felt that they would like to have continued to study it in some way in the 6th Form.

**Perhaps a more accessible maths course might be taken in the Sixth Form, to enable students to continue to develop maths skills that would be useful in the future.**

Because the current AS Level Mathematics is viewed as being more demanding than other subjects, with only the top GCSE students having access to it, many girls – even if they wish to do so – are not able to continue with the study of maths, and so to progress their job opportunities.

The girls suggested that an explanation of the practical, everyday uses of maths, and a more practical content in the maths courses leading up to GCSE would be more useful and relevant to future students.

The girls all agreed that had they had been made aware of the life-long importance of maths when they had started secondary school, they would have viewed the subject differently.

Obviously, maths teachers try to impress on all students the importance of their subject, but before the girls select GCSEs, all teachers are advocating the importance of their particular subject – and so maths is seen as one among many. **A whole-school policy is needed, to emphasize the crucial earning and life-empowering relevance of maths to all girls. This needs to be in Year 8 or 9.**

### 3. Maths Teachers Discussion

A discussion was held with a group of maths teachers, to explore their opinions of why so few girls studied maths in the 6th Form.

Throughout the discussion, all of the teachers agreed that there are negative attitudes from girls towards maths. Teachers said that they couldn't understand these attitudes because they all love the subject, which is why they had chosen to teach it.

The teachers gave many specific examples of a negative attitude being reinforced by parents and by other teachers.

A maths teacher said that she had been told by a girl, substantiated by other girls, that a teacher taking the form class register asked what was their first subject of the day. When they replied, 'Double Maths', she answered, "Oh poor you!"

The maths teachers all recalled many examples of parents' evenings when mothers excused their daughters' lack of commitment in maths by responding that they, themselves, could not do maths.

The teachers felt that this attitude – that it is socially acceptable to dislike or to find maths hard – makes girls who like maths feel unusual and odd. They said that even the girls who voluntarily attend the maths clubs after school, display aspects of this pressure. On one occasion some teachers wanted to take photographs of girls who had won a prize at maths, to be printed in the school magazine, but the girls were very reluctant and some refused, as they didn't want to publically demonstrate their love of and aptitude for maths.

Possible solutions discussed by the teachers included their feeling that maths teachers alone cannot eliminate the existing negative attitudes. They discussed situations where they, themselves, had tried to emphasise the importance of maths over other subjects. Teachers who did not teach maths – and who often shared widespread negative attitudes to maths – complained that the maths teachers were belittling other subjects and telling girls that other subjects were not as important as maths. Obviously, people choose to teach the subjects that they love, but there needs to be an understanding of all staff in schools that maths is a cross-curricular subject and should be supported by all.

Therefore, the maths teachers felt that this discussion should be necessary for all of the teachers in the school, so that all staff could reinforce a positive attitude to maths.

The teachers also explained that the career path of many maths teachers leads them from school to college and then… back into schools. In this case, maths teachers are never exposed to the world of work, and are not aware of the career opportunities in maths. In fact, one teacher said in confidence, after the open discussion, that she had become a maths teacher because she loved maths and didn't know what else to do.

Therefore, the maths teachers acknowledged that they needed more support from other school staff to help girls to see the career opportunities related to maths. The maths teachers also felt that positive role models would be helpful.

One teacher warned that to reinforce a positive attitude to maths, it needs to be done sensitively. The teacher had seen a situation where a specific topic was linked to a particular job. Some of the students said that they definitely did not want to pursue that job, so they had refused to study the topic.

Some teachers were clearly not aware of the serious lack of women mathematicians in the UK, because so few girls are studying maths at A level standard and at university; or of the different ratios of men to women in certain maths-related careers in the UK. The maths teachers said that they would welcome some up-to-date statistics.

The maths teachers also discussed the new MAT (Multi Academy Trust) that Langley Park School for Girls has recently set up with a local Infants and a Junior School. The maths teachers felt that the enthusiasm for maths which girls in Year 6 experience at primary school, is soon reduced in Year 7, at the secondary school. As there will be close collaboration of staff between the two schools, maths teachers need to be able to see how maths is presented and discussed in the primary school, and perhaps adopt some of these techniques in Year 7 at the secondary school (LPGS).

# Appendices

I. The anonymous questionnaire (a blind survey) was titled 'Your opinion: a quiz for girl students'. Written by Shirley Conran and Rosemary Tross. (See following.)
II. Possible questions for the 6th Form focus groups. (See following.)
III. Statistical ranking of the relevant responses, by percentage, to the relevant Questionnaire numbers 8, 9A, 9B, 17, 19. (See following.)
IV. The speakers and the Panel at the school evening, 'Question Time at Langley Park', held on 18th March 2015. Also, the Programme of Events. (See following.)
V. The questions asked by about 300 Year 9 students and their parents, of the Panel at the school evening, "Question Time at Langley Park", held on 18th March 2015. (See following.)
VI. Questions for the discussions between maths teachers. (See following.)

## Appendix I

The anonymous questionnaire (a blind survey) was titled 'Your opinion: a quiz for girl students'. Written by Shirley Conran and Rosemary Tross.

### Your opinion: a quiz for girl students

(Please give age only, this is an anonymous quiz.) AGE _____
*(For questions 1–4, tick your answer below.)*

1. Do you have a weekly money allowance?
Yes ☐ No ☐ Sometimes ☐

2. Do you do household jobs at home?
Yes ☐ No ☐ Sometimes ☐

3. Do you get money from your parents for doing your household jobs?
Yes ☐ No ☐ Sometimes ☐

4. Do you have a paying after-school job?
Yes ☐ No ☐ Sometimes ☐

5. If you go out on a date, who pays?
Answer _____

6. What magazines do you read?
Answer _____

7. If you had a gift TOMORROW of £100, what would you spend it on?
Answer _____

8. What work would you like to do after you leave school?
Answer _____

9. a) What are the benefits of having a lot of money when you grow up?
Answer _____

b) What are the possible difficulties?
Answer _____

10. Who is your favourite female celebrity?
Answer _____

11. What do you think are the difficulties of being famous?
Answer _____

12. Do you, yourself, save money every week? If so, how do you plan to spend this money?
Answer _____

13. Do you believe that maths is an inherited ability? *(Please tick below.)*
Strongly believe ☐ Strongly don't believe ☐ No opinion ☐

14. My parent/carer is a great help with my maths homework. *(Please tick below.)*
Strongly believe ☐ Strongly don't believe ☐ No opinion ☐

15. Do you think maths will be useful to you after you leave school? Please give your reasons.
Answer _____

16. When you move away from home, what might be your first luxury purchase? (For example, a microwave, a TV, an iPad, a continental quilt.)
Answer _____

17. If you get married or have a long-term partner, who do you think will pay the household bills (to include energy bills, water bills, home-entertainment bills, drink bills, food bills, etc)?
Answer _____

18. Do you want to have children? If so, how many?
Answer _____

19. How much do you reckon a child costs, on average, per week?
Answer _____

20. Many adults spend part of their income on future protection: insurance, mortgage, pension.
Which seems the most important to you? *(Please tick below.)*
Insurance ☐ Mortgage ☐ Pension ☐ None of them ☐

21. Anything you want to say about these questions?
Answer _____

## Appendix II

***Maths Discussion Groups held on 11 February 2015***
**Possible questions, to be used as a guide only, for girls in the Sixth Form**

- What AS level subjects are you currently studying?
- Did you attend LPGS in year 11 or are you new to the school?
- How did you chose your AS level subjects?
- How did you do in your Maths GCSE?
- Did you enjoy studying maths? Why? Why not?
- Did you consider studying maths at AS level?
- Would you have liked to continue studying maths? Why? Why not?
- What do you think that maths at AS level is like?
- What do you think is the purpose of studying maths at A level?
- What type of jobs do you think people with maths A Level get?
- Do you know what type of job you would like?
- Do you think that you would use maths in this type of job?
- What type of life style would you want? What would be important to you in work?

# Appendix III

**Statistical ranking of the relevant responses, by percentage (rounded), to the Questionnaire numbers 8, 9A, 9B, 17, 19. As percentages are rounded, a set may not add up to exactly 100%.**

## Year 9 analysis

**Q8. What work would you like to do after you leave school?**

| | |
|---|---|
| 24% | Unusual job considered irrelevant to survey (ie "wedding planner", "game developer", "UN ambassador", etc.) |
| 15% | Don't know |
| 9% | Medical |
| 6% | Fashion |
| 6% | Lawyer |
| 5% | Animal care |
| 5% | University/6th Form/college (ie higher education) |
| 4% | Childcare |
| 4% | Teacher |
| 3% | Dance |
| 2% | Acting |
| 2% | Beautician |
| 2% | Dentist |
| 2% | Hairdresser |
| 2% | Journalism |
| 2% | Music |
| 2% | Photography |
| 1% | Police work |
| 1% | Retail |
| 1% | Social worker |
| 0% | Scientist |

**Q9A. What are the benefits of having a lot of money when you grow up?**

| | |
|---|---|
| 29% | Better living conditions/house |
| 26% | Buying stuff/material items (clothes, motorbike) |
| 11% | Provide for family |
| 10% | Better life experience |
| 6% | Be independent/support yourself |
| 5% | Don't have to worry |
| 3% | Help others in need |
| 3% | Don't go bankrupt/no debt |
| 2% | Paying bills |
| 2% | Travel |

1% Save money
1% Don't know
0% Money is worthless
0% Pay for college/university

---

**Q9B. What are the possible difficulties of having a lot of money when you grow up?**

22% Overspending/unwise investments/not knowing how to spend it all
15% Debt/losing it
11% Danger of burglary/easy target
11% Taxes/mortgage
10% Spoilt behaviour
9% People may take advantage
5% Greed
4% Don't know
3% Won't buy happiness
2% Envy
2% Overworked
2% Paparazzi
2% There are none
2% Unexpected expenditures
1% Be unhappy

---

**Q17. If you get married or have a long-term partner, who do you think will pay the household bills?**

87% Both/half and half/split
8% Other person/him/her/them
3% Whoever earns the most
1% Me
1% Don't know

---

**Q19. How much do you reckon a child costs, on average, per week?**

38% 105–300
26% 50–100
11% 0–50
8% A lot
7% 305–500
5% 505+
5% Don't know
1% Depends on age

## Year 12 analysis

**Q8. What work would you like to do after you leave school?**

| | |
|---|---|
| 25% | Don't know |
| 11% | Teacher (various subjects)/work with children |
| 10% | University |
| 9% | Nurse/medicine/midwife |
| 7% | Artist/actor/performer/photography |
| 5% | Law |
| 4% | Fashion/stylist |
| 3% | Science/scientist/forensics/engineering |
| 2% | Accountant/credit manager/actuary |
| 2% | Detective/police |
| 2% | Events manager |
| 2% | (Forensic) psychology |
| 2% | Writer |
| 2% | Programmer/ICT |
| 2% | Travel |
| 1% | Advertising |
| 1% | Animations |
| 1% | Banker/trader |
| 1% | Carpentry/prop making |
| 1% | Charity shop |
| 1% | Dental hygienist |
| 1% | Get rich |
| 1% | Makeup artist |
| 1% | Media |
| 1% | Office |
| 1% | RSPCA |
| 1% | Sales |
| 1% | Service |
| 1% | Veterinarian/animals |

**Q9A. What are the benefits of having a lot of money when you grow up?**

| | |
|---|---|
| 32% | Buying stuff |
| 14% | Living life I want |
| 13% | House/better living conditions |
| 11% | Not worrying |
| 9% | Supporting family |
| 6% | Independent/look after myself |
| 6% | Security |
| 2% | Help others in need |

2% Paying bills
2% Travel
1% Flexibility
1% Happy
1% More opportunities
1% Not a lot
1% Studying

---

**Q9B. What are the possible difficulties of having a lot of money when you grow up?**

19% Fake friends/people using you
15% Spending it/losing it all
13% Greed/guilt/changing personality
10% Higher tax
6% None
5% Debt/bankruptcy
4% Arguments over money/trying to manage money
4% Danger of burglary/easy target
4% Unexpected expenditures
3% Be unhappy
3% Don't know
3% Spoilt (yourself/children)
3% Working hard to keep it
2% Not knowing what to do with it
1% Becoming ignorant
1% Being too busy/not spending enough time with family
1% Competition (at work, in life)
1% Getting divorced
1% Jealousy
1% Money brings problems

---

**Q17. If you get married or have a long-term partner, who do you think will pay the household bills?**

88% Both/split/shared
5% The man
4% Me
1% Don't know
1% I will not get married
1% Whoever earns more

**Q19. How much do you reckon a child costs, on average, per week?**

| | |
|---|---|
| 34% | 105–300 |
| 30% | 50–100 |
| 12% | A lot |
| 7% | 0–50 |
| 7% | 305–500 |
| 5% | Don't know |
| 2% | 505+ |
| 2% | Depends on age |

# Appendix IV

Here is the invitation and programme of events at the school evening for a discussion on maths 'Question Time' at Langley Park.

## Programme of events

| | |
|---|---|
| **7:00pm** | Welcome: Dr Anne Hudson and Shirley Conran OBE |
| **7:15pm** | Fashion film especially produced and directed by Liberty842 |
| **7:25pm** | A representative of the Department for Education |
| **7:35pm** | Diane Carrington, Chair, introduces the Panel |
| **7:35–8:25pm** | Panel discussion of Questions from Year 9 |
| | Questions from the audience |
| **8:30 pm** | Refreshments |
| | Guests meet the Panel |
| **9:00 pm** | Goodbye |

The speakers and the Panel at the school evening, 'Question Time at Langley Park', held on 18th March 2015.

## The speakers

**Dr Anne Hudson PhD,** Headteacher at Langley Park School for Girls, Kent (1,700 pupils). Dr Hudson has been Head of Langley Park school for Girls since 2011, following six and a half years as Head of Central Foundation Girls' School in Tower Hamlets. She has taught in six other schools, five of them in inner London. Dr Hudson who holds a doctorate in Education is deeply committed to empowering young women.

**Shirley Conran OBE,** writer, designer and social entrepreneur. Shirley was an editor on The Observer and on *The Daily Mail.* Her international best-selling books include *Superwoman*, *Lace* and *Money Stuff*, a FREE interactive ebook maths course for girls, that does not need a teacher. Voluntary projects include founding *Mothers in Management*, founding charity *The Work-Life Balance Trust,* and founding *MATHS ACTION*.

**A Representative for the Department for Education.**

## The panel

**Chair of Panel, Diane Carrington,** M.Sc. PGCE. Chair of the Board of Governors at LPGS. Diane is a former teacher who now runs a business that trains and coaches senior executives.

**Dr Samantha Callan,** MTh, PhD. A Cambridge-educated social anthropologist, Samantha is Associate Director for Families and Mental Health at the influential Westminster-based, think-tank, The Centre for Social Justice. She is also an Honorary Research Fellow at the University of Edinburgh. Samantha advises the Government, other politicians and policy-makers, and contributes to parliamentary and media debates (in person and in writing) on improving young people's chances in life.

**Megan Powell Vreeswijk,** is Senior Commercialisation Fellow at Loughborough University's Studio, Megan is also a Creative Enterprise trainer for the British Council. With extensive business start-up experience, intellectual property experience and entrepreneurial experience in the creative sector, Megan currently delivers support and training programmes to new, graduate businesses.

**Gemma Dawson** B.Sc, is a former student of LPGS, currently a Consultant Actuary – an insurance risk assessor – at Underwriting Management & Actuarial Consultancy Services. Gemma speaks at Career Events, to encourage girls to study Maths.

**Emma Mitchell** B.A. PGCE, is a science teacher at The Ravensbourne School, a large girls and boys Academy in Bromley. Having noticed an absence of female students taking A Level physics, Emma is conducting research at the University of Cambridge, seeking to understand if and why girls' attitudes to science alter with age, and what barriers they experience, in following scientific pathways at school.

# Appendix V

Questions asked by about 300 Year 9 students and their parents, of the Panel at the school evening, "Question Time at Langley Park", held on 18th March 2015.

**Questions from girls in Year 9**

Q1. Do you believe that being good at maths is an inherited ability?
Q2. What is the most important thing maths has helped you all with, in your life?
Q3. What information did you get, to say that girls don't enjoy maths?
Q4. a) Did you all have a positive experience of maths when you were at school?
b) If so, how did this affect your career?
Q5. a) Do boys enjoy maths more than girls?
b) If so, is this why they are thought to have better maths ability?

**Questions from parents**

Q6. What are we doing today to educate the educators to make maths more interesting?

A Representative from the Department for Education said that the government is seriously addressing this matter.

Q7. There's a lot of new evidence that in single gender environments, girls take more risk. Do you believe this?

**Some answers (shortened):**

*Dr Hudson:* Yes.

*The Department for Education Representative:* In a mixed class, boys do better and girls do worse.

Q8. How can you alter the negative maths perception of creative people?

**Some answers (shortened):**

*Dr Hudson:* With good maths grounding in primary school, when children are really little.

*The Department for Education Representative:* The trend in creative companies, such as Apple, is to recruit people with maths, plus creative ability.

*Megan:* At Loughborough University, we teach enterprise, which combines maths and creativity.

*Megan:* Make maths more fun! (Entire Panel agree.)

**Conclusion by audience and panel:**

Maths gives self-confidence to a girl.

## Appendix VI

Questions for the discussion between maths teachers:

1. What attitude do you perceive in the school towards maths?
2. Amongst the students?
3. Amongst the staff?
4. Amongst the parents?
5. Can you provide any examples of any of this?
6. How do you think that this makes the girls feel about maths?
7. Have you got any ideas of what could be done to improve the situation?
8. What other careers did you, yourself, consider?
9. How did you make your decision to become a maths teacher?
10. Is there anything that the school could do to help to improve the present situation?
11. Have you tried to do anything, yourself, to help girls have an improved attitude towards maths?
12. Is there anything else that you would like to add, about anything that we have touched on this session?

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