

# King's College London Mathematics School

16–19 academy

**Inspection dates**

25–27 April 2017

| <b>Overall effectiveness</b>                 |                    |                           | <b>Outstanding</b>       |
|--|--------------------|---------------------------|--------------------------|
| Effectiveness of leadership and management   | <b>Outstanding</b> | 16 to 19 study programmes | <b>Outstanding</b>       |
| Quality of teaching, learning and assessment | <b>Outstanding</b> |                           |                          |
| Personal development, behaviour and welfare  | <b>Outstanding</b> |                           |                          |
| Outcomes for learners                        | <b>Outstanding</b> |                           |                          |
| Overall effectiveness at previous inspection |                    |                           | Not previously inspected |

## Summary of key findings

### This is an outstanding provider

- Governors and senior leaders have set a clear vision and secured a well-planned curriculum, which provides excellent learning opportunities for talented young mathematicians.
- The proportion of learners who complete their qualifications successfully is exceptionally high. Learners make outstanding progress when compared to the grades they achieved previously at GCSE level.
- Learners benefit from the excellent partnership with King's College London University. As a result, learners are prepared very well for entry into the most prestigious universities, with almost all learners gaining places, including to Oxford and Cambridge.
- Learners make excellent progress in their learning and become highly accomplished scholars. Their work is of the highest standard.
- Governors monitor the performance of learners assiduously and hold senior leaders to account, expecting them to take rapid action to make any required improvements.
- Teachers have the highest expectations for their learners to be successful and ensure that learning is fast paced and stimulating.
- Learners are highly accomplished; they develop strong mental resilience as a result of using their excellent mathematical skills to solve complex problems.
- Learners benefit from a very broad range of clubs and societies that extend their learning and knowledge of the world around them exceptionally well. Learners have a good understanding of how to contribute effectively to life in a cosmopolitan society.
- Teachers ensure that learners are well informed on current affairs. Learners debate topical subjects in a vigorous and persuasive manner and develop excellent skills of oracy.
- Learners' behaviour is exceptionally good. Their positive attitudes and collaborative teamwork both inside and outside lessons are outstanding.

## Full report

### Information about the provider

- King's College London Mathematics School (KCLMS), run in partnership with King's College London, opened in 2014 to provide high-quality mathematics education in the heart of London. The provision combines mathematics with physics, economics and computing to give learners the key understanding and skills they will need to study mathematical courses at university. Learners take a GCE AS level in either computer science or economics at the end of the first year and GCE A levels in mathematics, further mathematics and physics at the end of their second year.
- Approximately 140 learners study at KCLMS, divided equally between each year group. The provision has a selective admissions policy and attracts highly gifted mathematicians aged 16 to 19 from a wide range of backgrounds across London and the Home Counties. The proportion of learners from a Black or other minority ethnic heritage is similar to that of other sixth-form centres in London.

### What does the provider need to do to improve further?

- Senior leaders need to implement planned strategies to:
  - improve further the progress that female learners make relative to their male peers
  - track learners' progress into university and into the highest echelons of commerce and academia.
- Senior leaders need to extend further their existing links with industry partners to provide greater opportunities for learners to collaborate and practise their problem-solving skills through industry project briefs.

## Inspection judgements

### Effectiveness of leadership and management

### Outstanding

- Senior staff at King's College London have established a specialist school in the centre of London influenced by the approach originally taken by the Kolmogorov Physics and Mathematics School in Moscow. Their aim is to provide opportunities for students with an aptitude and enthusiasm for mathematics, and thereby widen participation in mathematical degrees and careers at the very best universities and institutions.
- The governors and the headteacher have set a highly ambitious vision to provide an education for the best young mathematicians in London, and in particular, for those learners who may not otherwise have access to high-quality mathematics teaching. This vision is well communicated to, and shared by, staff across the school. As a result, expectations for, and the achievements of, learners are exceptionally high.
- Learners, staff and managers benefit from the highly effective partnership with King's College London. Learners have access to the library and gym facilities of the university, together with visits to understand better what life at university means. Teachers benefit from the opportunity to develop their teaching practice and further mathematical knowledge. Managers benefit from the help and services provided from university managers in areas such as finance and information and communication technology.
- Leaders have successfully recruited talented learners who have the curiosity and motivation to learn and develop further their existing high-level mathematical skills. Managers very successfully promote mathematics to learners in London schools and support them effectively to achieve the highly competitive entry criteria demanded by KCLMS. As a result, the proportion of learners from disadvantaged backgrounds is high.
- Managers' oversight of the quality of teaching, learning and assessment is thorough and detailed. They accurately judge the quality to be outstanding and ensure that the resulting staff development following observations of learning maintains the high calibre of skills demanded of their teachers. Managers ensure that teachers regularly meet to share good practice and make very effective use of peer working to develop their skills and deepen their subject knowledge. Teachers are skilled in taking responsibility for their own development and do this with enthusiasm.
- Managers have a thorough understanding of the strengths and areas for improvement required. Their own evaluation of provision is accurate and the resulting quality improvement actions are rapid and have a positive impact.
- Leaders and managers make excellent use of the views and opinions of learners to shape and improve further the curriculum offer at KCLMS. For example, many of the extra clubs and sporting activities provided are in a direct response to requests from learners to have more opportunity to keep fit and active. Leaders and learners collaborated to agree and set the five core values pertaining to studying successfully at KCLMS.

## The governance of the provider

- Governors have highly relevant experience and skills, which they use very effectively to provide excellent support to the leadership team. They are instrumental in maintaining a clear focus on providing high-quality teaching and learning to the widest possible range of learners who have an exceptional mathematical ability.
- Governors make excellent use of detailed management reports and the data presented to them to challenge the work of senior leaders. Their contribution to shaping the curriculum, and in particular the pastoral curriculum, is outstanding and ensures that learners leave as highly accomplished, socially adept individuals.

## Safeguarding

- The arrangements for safeguarding are effective. Leaders and managers ensure that the well-thought-through and detailed safeguarding arrangements protect and secure the well-being and safety of learners. Learners benefit from high-quality care through the extensive links to external agencies, including those for the provision of good mental well-being.
- Leaders and governors have ensured that they meet fully their obligation under the 'Prevent' duty. In doing so, they have established a philosophy where learners and staff discuss and debate frequently democracy and the rule of law. Managers and staff use personal development lessons and the weekly school assemblies effectively to celebrate the strengths of life in modern Britain, while also valuing the beliefs and values of other societies and cultures.

## Quality of teaching, learning and assessment

## Outstanding

- Teachers have the highest expectations for their learners and plan learning that is highly challenging. Teachers know the abilities of individual learners very well and plan a range of tasks and activities accordingly. As a result, lessons progress at an appropriately rapid pace, while allowing time for learners to think about the mathematical problems set and to reflect on accurate solutions.
- Learners' work is of a very high standard and they enjoy all aspects of their studies. They work hard in lessons, and maintain consistently their effort and enthusiasm to complete the tasks and activities that teachers set for them. Learners are persistent and adept when solving complex problems and benefit from discrete lessons to develop and extend further their problem-solving and mental resilience skills.
- The collaborative teamworking skills that learners develop are exceptional. Teachers set high volumes of work to be completed outside the taught lessons and expect learners to work together in communal areas to conclude the tasks using the large white boards available. Learners value this approach and will often join in and contribute to the work of others as they walk by, with all learners benefiting from the ensuing discussions.

- Teachers are highly skilful when questioning learners to extend their understanding. They challenge learners continually and effectively to explain their answers in great detail. Teachers make excellent use of questions to sharpen learners' curiosity about, interest in, and understanding of, mathematical methodology and problems. They use a wide range of techniques to link new concepts to previous learning effectively. For example, in a statistics lesson, the teacher introduced the topic of standard deviation through linking it to work on averages. Teachers are highly effective when summarising learning and ensure that learners fully understand the topics covered.
- Staff and teachers provide excellent help for learners to improve further their skills in English. Teachers diligently ensure that learners develop and use good technical mathematical language. Learners are able to identify and correct grammatical errors well in their work.
- Teachers' monitoring of learners' progress is extremely good and ensures that both the academic and the wider social and personal skills required to be a successful scholar are developed fully. Teachers assess learners' work accurately and thoroughly, tracking their ongoing progress carefully. Feedback on assessed work is comprehensive and clearly indicates what learners need to do to improve their solutions to the problems posed by teachers. When learners do not demonstrate a thorough understanding of a topic, teachers act swiftly to ensure that learners complete additional tasks and activities until their learning is secure.
- Managers and teachers keep parents well informed of the progress learners are making. They ensure that parents understand the different stages of preparing for and accepting a university place and the financial help available to support university study. Parents report that teachers know their children well and value them as individuals.

## Personal development, behaviour and welfare

## Outstanding

- Learners relish their time at KCLMS. They excel in their personal and academic development because they study in an atmosphere where enjoyment of mathematics is the norm, and a personal love of mathematics and solving complex problems is celebrated. Learners attend punctually and their attendance is excellent.
- Managers and staff prepare learners extremely well for university. Learners receive excellent support from their tutors and teachers and through the partnership arrangements with King's College London. Aspirations set by managers and staff at the start of their programme motivates learners well to ensure that they gain entry into respected universities with exacting entry requirements. An extensive programme of university visits enables learners to select the university that best meets their individual preferences.
- The wide range of clubs and societies, mostly run by learners, are well attended and successfully raise learners' awareness of wider life and society. For example, the 'culture club' provides innovative opportunities for learners to explore and celebrate their own cultural background and to share this knowledge with their peers. Clubs and societies often complement learners' existing studies, for example, those devoted to robotics that enhance their understanding of how mathematics contributes to the programming of mechanised food-processing equipment.

- Learners have a detailed understanding of the wide range of career options available to them in science, engineering, technology and mathematics subjects and have high career aspirations. Learners benefit from a comprehensive programme of visits, short-term internships and work experience, which provides them with a good understanding of work and the expectations of employers. The highly effective programme of visiting speakers' lectures prompts learners to explore careers as varied as those in finances and banking, working for the United Nations, and in writing computer programs for artificial intelligence.
- Learners develop a comprehensive understanding of democratic values and what their own contribution to society should be. Frequent school assemblies, a well-structured personal development programme and subject classes provide rich and varied opportunities to discuss, debate and explore current affairs and topics such as the potential dilemmas posed by providing international humanitarian aid. Learners develop excellent skills in debating and oracy as a result.
- Pastoral support is extremely effective. Learners know their tutors care about their welfare and well-being and know to whom they should take any concerns they may have. Tutors focus on ensuring that learners develop good personal and social skills in addition to becoming confident and capable scholars. Less confident learners benefit from the close supervision of a like-minded older peer who shares their passion for mathematics and solving complex mathematical problems for fun. Those learners who act as mentors grow in confidence and self-esteem as a result of contributing to the development of a future mathematician.
- Learners benefit from a highly effective academic tutorial programme. They understand how well they are progressing and what they need to do to improve further. Targets for learning, including those for learners' wider personal skills development, are frequently set and carefully reviewed to ensure that learners develop high levels of personal confidence and self-esteem.
- Teachers provide good initial advice and guidance to potential learners, who understand well the requirements and rigour of the school's approach to studying mathematics. Ongoing advice on learners' next steps and career options post-university are well planned and effective.
- Learners understand how to keep themselves and their peers safe, including when working online and using social media. They understand the need to keep themselves healthy by creating time and space to relax away from mobile technology and the internet.

## Outcomes for learners

## Outstanding

- The proportion of learners who complete their qualifications successfully is exceptionally high. Learners make outstanding progress when compared with the grades they achieved previously at GCSE level; teachers prepare learners well for their external examinations. Learners who start their studies at KCLMS all continue into the second and final year of their A-level studies.

- Almost all learners achieve high grades in their A-level studies. In mathematics, all achieve A\* or A, with the large majority of learners gaining an A grade in the remaining A-level subjects studied, those being further mathematics, physics and computing.
- Almost all learners progress to prestigious universities to study mathematics, natural sciences, engineering and computer science. A high proportion of learners gain places at Oxford or Cambridge. The very small proportion of learners who choose not to go to university progress into work, higher apprenticeships or paid internships.
- Learners develop their problem-solving and reasoning skills exceptionally well through class-based activities and a few through projects designed by employers, such as the recently completed project to design a suitable cooling system for a London Underground station. Teachers focus closely on developing and enhancing learners' exceptionally good analytical skills.
- Current learners are making very good progress in their learning. Learners studying physics, particularly female learners, are making better progress than in previous years as a result of the appropriate and targeted actions that managers and teachers have taken.
- A small difference exists between the progress of female learners when compared with those of their male peers. While female learners achieve very well and achieve a higher proportion of A\* grades at A level, they do not make as much progress as male learners do relative to their initial starting point. Learners from disadvantaged backgrounds outperform their peers.
- Until relatively recently, managers had not analysed or evaluated the university destinations for different groups of learners. Managers recognise that they need to focus more closely on the proportion of disadvantaged learners and those from a Black or minority ethnic heritage who progress to the most prestigious universities, including to Oxford and Cambridge.

## Provider details

|   |  |
|---|--|
| Unique reference number   | 140564   |
| Type of provider  | Academy  |
| Age range of learners   | 16+  |
| Approximate number of all learners over the previous full contract year | 140  |
| Principal   | Dan Abramson   |
| Telephone number  | 0207 8487346   |
| Website   | <a href="http://www.KCLMS.ac.uk/mathsschool">www.KCLMS.ac.uk/mathsschool</a> |

## Provider information at the time of the inspection

| Main course or learning programme level   | Level 1 or below         |     | Level 2  |     | Level 3 |     | Level 4 or above |     |
|---|--------------------------|-----|----------|-----|---------|-----|------------------|-----|
|   | 16–18                    | 19+ | 16–18    | 19+ | 16–18   | 19+ | 16–18            | 19+ |
| Total number of learners (excluding apprenticeships)                                      | 0                        | 0   | 0        | 0   | 140     | 0   | 0                | 0   |
| Number of apprentices by apprenticeship level and age                                     | Intermediate             |     | Advanced |     | Higher  |     |                  |     |
|   | 16–18                    | 19+ | 16–18    | 19+ | 16–18   | 19+ |                  |     |
|   | 0                        | 0   | 0        | 0   | 0       | 0   |                  |     |
| Number of traineeships  | 16–19                    |     | 19+      |     | Total   |     |                  |     |
|   | 0                        |     | 0        |     | 0       |     |                  |     |
| Number of learners aged 14 to 16  | 0                        |     |          |     |         |     |                  |     |
| Number of learners for which the provider receives high-needs funding                     | 1                        |     |          |     |         |     |                  |     |
| Funding received from   | Education Funding Agency |     |          |     |         |     |                  |     |
| At the time of inspection, the provider contracts with the following main subcontractors: | N/A                      |     |          |     |         |     |                  |     |



## Information about this inspection

The inspection team was assisted by the deputy headteacher, as nominee. Inspectors took account of the provider's most recent self-assessment report and development plans. Inspectors used group and individual interviews, and online questionnaires to gather the views of learners; these views are reflected within the report. They observed learning sessions, assessments and progress reviews. The inspection took into account all relevant provision at the provider.

## Inspection team

|                                       |                         |
|---------------------------------------|-------------------------|
| Jules Steele, lead inspector          | Her Majesty's Inspector |
| Jane Hughes, assistant lead inspector | Her Majesty's Inspector |
| Roger Pilgrim                         | Ofsted Inspector        |
| Penelope Horner                       | Ofsted Inspector        |

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### **Employer View**

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