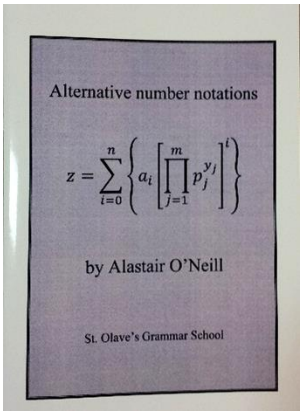
The Mathematics and Computing Faculty at St. Olave's Grammar School

Mathematics is the first and second most popular subject at A2 at St. Olave's, with massive numbers opting for both Mathematics and Further Mathematics in the Sixth Form and a real buzz of enthusiasm for the subject. Outstanding academic results are consistently amongst the best in this very high performing school. In fact, HMI described St. Olave's as: 'The best Further Mathematics School in the country!'



Students are encouraged to produce scholarly works with a strong emphasis on STEM subject topic through the Extended and Higher Project Qualifications, and our own Academic Journal. Erudite examples that will inspire and engage the reader include an investigation into *Alternative Number Systems* and *To What Extent Does Infinity Exist?* Staff in the Faculty possess talent, skills, enthusiasm and imagination; their energy is rewarded by the satisfaction of working with some of the nation's best and keenest young mathematicians.

Enrichment and extension is a key feature of our provision. In addition to special STEP and MAT tuition, there has been regular success in National competitions with large numbers of Gold certificates in the Junior, Intermediate and Senior Mathematical Challenges, UKMT. A large number of students are normally invited to participate in the later rounds, with considerable success at a nationally significant level in the Olympiad competitions. St. Olave's is also a regional venue for the UKMT Team Challenge Competition, winning the Junior Competition in 2007 and regularly competing for the top prize in the National Finals of the Junior and Senior competitions. A student team also runs the very successful Maths in Motion Club.

Higher Education progression in Mathematics

The huge student interest in Mathematics and related subject areas translates into the highest aspirations for progression into most of the top universities, including Oxbridge, as shown below:

	2009	2010	2011	2012	2013	2014	2015	2016	2017
Mathematics	14	13	18	13	8	11	12	18	21
Physics	7	3	1	6	8	8	9	7	7
Engineering	22	15	22	16	21	18	33	25	27
Computing	4	5	2	3	2	2	6	4	7
Economics	21	21	15	25	33	23	26	28	18
Total	**58**	**57**	**58**	**63**	**72**	**62**	**86**	**82**	**80**
Oxbridge in these areas	6	15	14	10	14	14	13	13	11

Computing operates within the Mathematics Faculty with a strong focus on higher order skills, particularly programming, through extended projects that enable our students to develop analytical and problem solving skills. All students in KS3 have a Computing lesson once a week to develop their capability, knowledge of computer science and computational thinking creativity. An extremely popular option at GCSE, Computing is also offered at AS and A2 where recent results show St. Olave's as one of the highest ranking schools for adding value at KS5. We enable students to understand how changes in technology affect safety, including protecting their own online privacy and identity. We encourage them to be able to use and express themselves and develop their ideas through information and communication technology at a level suitable for the future workplace and as active participants in a digital world.

Meet the staff:

Meera Lawrence	Head of Faculty	M.A. M.Eng., Newnham College, University of Cambridge
Polina Vasileva	Second in Faculty (i/c KS4 Mathematics)	B.Sc., University of Sussex
Rabia Zeshan	HoD Computing	B.Sc., FAST- National University of Computer & Emerging Sciences
Scott Li	i/c KS5 Mathematics	B.Sc., University of Warwick
Andrew Mowll	i/c KS3 Mathematics	M.Maths/Comp Sci, University of Oxford
Matthew Ashford	Schools Direct trainee	M.A., PhD, St Hilda's College, University of Oxford
Peter Bassett		B.Sc., University of Exeter
James Davis		B.Sc., University of Wales, Cardiff
Neil Maltman		M.A., Pembroke College, University of Cambridge
Tim McCurrach		M.Math., Magdalen College, University of Oxford
Joanna Munday		M.A., Christ's College, University of Cambridge
Janine Penny		B.Sc., Royal Holloway, University of London
Esmat Pourjam		M.Sc., Tehran University
Ian Sanderson		B.Sc., University College Rhodesia, University of London
Patricia Sanderson		B.Ed. University of Southern Queensland
Sadinie Senaratne		B.Sc., Royal Holloway, University of London

General organisation

In Years 7 and 8 pupils are taught Mathematics in form groups. They follow a standardised scheme of work beginning at around Level 5 of the National Curriculum, using resources designed for the most able students. By the end of Year 8, staff are able to accurately assess pupils' relative ability and hence Year 9 is divided into two parallel higher and two parallel lower classes. At the end of Year 9, most students have reached Level 8. At the beginning of Year 10, the four forms are rearranged into five teaching sets of two parallel top, one middle, and two parallel lower sets.

During KS4 all five sets are prepared for the Edexcel GCSE papers. The department is justly proud of its consistently excellent results at this level (99% grades 9-7 in 2017, 99% A*/A in 2016; with the overwhelming majority of students securing the top grade). In 2017 the top two sets sat the Free Standing Unit in Additional Mathematics in June.

The Mathematics department has experienced significant expansion in recent years due to the popularity of the subject: Mathematics and Further Mathematics are now the first and second most popular subjects at A level. At present, there are 12 classes, with 175 out of the total 204 students in Year 13, studying at least A Level Mathematics. Similarly, there are 12 sets, with 214 out of the total 235 Year 12 students, taking at least AS Level Mathematics. The department follows the OCR MEI specification at KS5. The AS Level sets are each taught by two staff members, with both sharing the pure content and each focusing on statistics or mechanics. At A2, approximately a third of the cohort achieve Grade A*, with around 95% achieving a Grade A*-B. Very large numbers of students undertake the Further Mathematics course (currently 69 A2 and 47 AS in Year 13, and 129 in Year 12) with the key metrics being similar to those achieved in the standard A-Level. Candidates are prepared for STEP and MAT papers in twice weekly twilight sessions, and each year a significant number of students leave St. Olave's to study Mathematics solely or as an integral part of their degree at university.

The Faculty is very well resourced and boasts a dedicated IT suite, interactive whiteboards in every room, class sets of graphical calculators and a generous amount of specialist computer software. Staff are encouraged to use IT where appropriate and training is provided in the use of such materials. St. Olave's Grammar School was a Specialist Mathematics and Computing School and the Faculty benefited enormously from Specialist Status. Specialist status funding enabled the Faculty to run an extensive programme of revision sessions which have been sustained until the present. It also facilitated the development of the Faculty's impressive Virtual Learning Environment. Maths Clinics and the Maths Buddying programme provide additional support.

Wider activity

The Mathematics Faculty is widely known for its weekly STEP and MAT classes. Here students, including those from other schools, are challenged to the boundaries of their understanding as they prepare for the Cambridge Entrance examinations or for entrance to Oxford or other top Russell Group universities.

Outreach

We have provided support for local Secondary schools through INSET on specialised software, including Autograph and Derive; developed GCSE revision guides and classes for Mathematics staff; delivered a series of seminars for The Prince's Teaching Institute, and invited parents and students from other schools to the Olavian Lecture Series. Our ICT training for Silver Surfers and Year 5 Computer Club have been very popular. Involvement with local Primary schools has helped Mathematics to flourish through an annual Year 5 Mathematics Day. Several members of the team are work with able students at local primary schools on a fortnightly basis.

We work closely with the Further Mathematics Support Programme, delivering a programme of INSET to develop excellence in teaching Mathematics, STEP and Olympiads as well as hosting competitions such as *Maths Feast*. Links with schools in India, a programme of Lectures, a team of ambassadors and a series of high profile events supported students making Russell Group and Oxbridge applications.

Chess

The associated Chess Club has thriving membership with players operating at National Championship level and specialist weekly coaching. The team has successfully retained the Kent Junior Chess Association's prize as a result of excellent performances at their highly competitive Grand Prix events; won the Bob Wade Memorial Tournament; and secured a top 3 place every year for the last decade at the Millfield International Competition, confirming our reputation as one of the best schools in the county. Old Olavian, Callum Kilpatrick has now achieved one of three Grandmaster norms as well as a FIDE Master title; Anantha Anilkumar finished top in the England Under-11 Team Squad Trials, and represented the country in the World Youth Chess Championships. Three of our players were members of the Kent squad which won the National Championship last year.

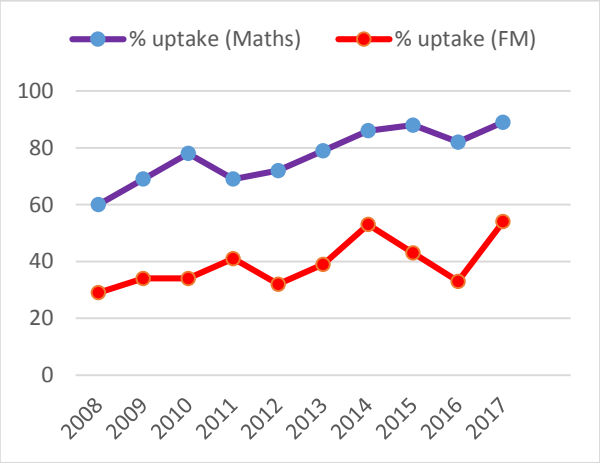
Visiting speakers

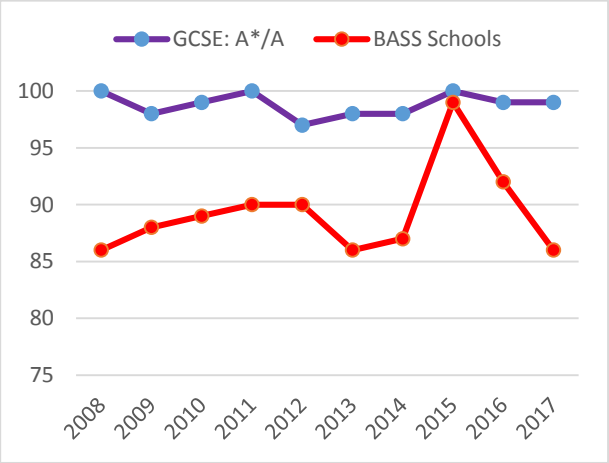
A range of eminent speakers, particularly those based in university Mathematics, Science and Economics Faculties, visit the school and speak to audiences of students and parents, including those from other schools. Recent visitors have included:

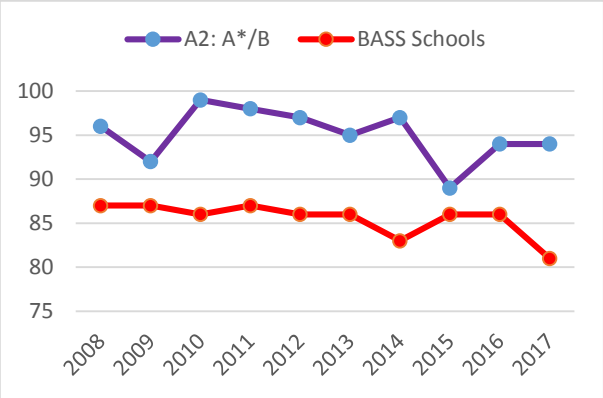
○ Matt Parker		Maths in action
○ Marcus Du Sautoy	*Oxford*	Prime numbers
○ Zubin Siganporia	*Oxford*	Elliptic curve cryptography
○ Dr Acheson	*Oxford*	1089 and all that
○ Dr Lobb	*Harvard*	The circle
○ Prof Berkshire	*Imperial*	Fermat's last rollercoaster
○ Prof Körner	*Cambridge*	How to hunt a submarine
○ Dr Waalkens	*Bristol*	Sectio Divina
○ Dr Cooley	*Cambridge*	The four-colour theorem
○ Dr Silvester	*Kings*, *London*	Primes and polygons
○ Luke Abraham	*Cambridge*	½! & other nonsensical expressions
○ Thomas Hudson	*Oxford*	The Banach-Tarski paradox
○ McClintock	*Cambridge*	The mathematics of really good shuffling
○ James Munro	*Cambridge*	Proof and transfinite cardinals
○ Niko Laaksonen	*UCL*	Prime number theory
○ Prof Budd	*Bath*	101 uses for quadratic equations

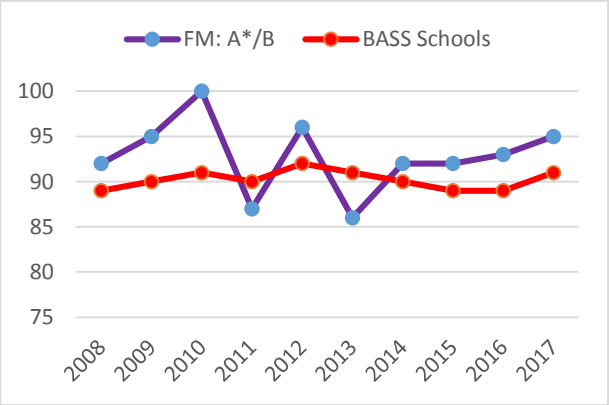
Appendix 1: Academic results and comparison with other BASS (Boys' Academically Selective Schools)

	GCSE: A*/A	BASS		AS: A/B			A2: A*/B	BASS		FM: A*/B	BASS		% uptake Maths	% uptake FM
2008	100	86		80			96	87		92	89		60	29
2009	98	88		89			92	87		95	90		69	34
2010	99	89		89			99	86		100	91		78	34
2011	100	90		86			98	87		87	90		69	41
2012	97	90		90			97	86		96	92		72	32
2013	98	86		90	75		95	86		86	91		79	39
2014	98	87		92	72		97	83		92	90		86	53
2015	100	99		92	73		89	86		92	89		88	43
2016	99	92		83	73		94	86		93	89		82	33
2017	99	86		-	-		94	81		95	91		89	54









Appendix 2:

Junior Mathematical Challenge (Y7 & Y8)

Year	Entries	Gold Top 6%	Silver Next 14%	Bronze Next 21%	JMO
16-17	256	138	67	34	22
15-16	250	142	72	23	12
14-15	240	99	85	40	11
13-14	232	101	69	42	
12-13	226	74	74	50	10
11-12	230	72	78	45	9
10-11	238	102	66	40	6
09-10	235	75	86	40	9
08-09	232	82	65	49	6
07-08	236	90	66	55	9

Junior Mathematical Olympiad (Y7 & Y8)

Year	Entries	Medal, Top 200	Dist. Top 300
16-17	21	1 Gold, 3 Bronze	1
15-16	12	Gold 1, Silver 1	1
14-15	11	Gold 2, Silver 2	
13-14	13	Gold 1, Bronze 1	
12-13	10	Gold 1, Silver 1, Bronze 2	
11-12	9	Bronze : 3	
10-11	6	Silver 1, Bronze 1	1
09-10	9		1
08-09	6		
07-08	9		1

UKMT Team Mathematics Challenge (Y8-9)

Year	Regional	National
16-17	1st out of 32	**1st out of 88**
15-16	1st out of 33	3rd out of 88
14-15	2nd out of 37	25th out of 96
13-14	2nd out of 36	na
12-13	1st out of 36	8th out of 80
11-12	1st out of 30	10th out of 96
10-11	1st out of 28	24th out of 96
09-10	2nd out of 22	Did not qualify
08-09	1st out of 21	32nd out of 69
07-08	1st out of 20	3rd out of 60

Intermediate Mathematical Challenge (Y9 to Y11)

Year	Entries	Gold	Silver	Bronze	IMOK	Kangaroo
16-17	348	123	109	74	18	107
15-16	344	104	88	88	8	84
14-15	287	92	89	63	11	71
13-14	293	77	100	68	13	44
12-13	295	70	92	73	15	27
11-12	282	92	88	68	12	37
10-11	291	109	96	57	15	49
09-10	290	85	77	62	12	39
08-09	285	105	81	51	24	44
07-08	282	109	96	42	18	49

International Invitational IMOK (Y9 to Y11)

Year	Entries	Prize (Top 50)	Medal (Top 100)	Dist. (Top 150)
16-17	18	1	1	1
15-16	9		1	2
14-15	11			4
13-14	13	1	1	1
12-13	15			1
11-12	12	1	2	1
10-11	15	1	2	
09-10	12	2	2	1
08-09	23	4	4	1
07-08	22	2	4	1

Senior Kangaroo

Year	Entries	Merit Top25%
16-17	40	7
15-16	28	9
14-15	27	7
13-14	20	5
12-13	19	6

European Kangaroo

Year	Entries	Merit Top 300
16-17	101	41
15-16	81	36
14-15	68	20
13-14	41	16
12-13	27	7
11-12	36	10
10-11	45	13
09-10	35	9
08-09	40	21
07-08	41	10

Senior Mathematical Challenge (Y11 to Y13)

Year	Entries	Gold	Silver	Bronze	BMO
16-17	486	57	135	180	6
15-16	467	60	143	171	6
14-15	498	54	129	210	4
13-14	398	57	124	137	12
12-13	353	37	116	128	6
11-12	356	43	122	116	7
10-11	368	26	78	107	9
09-10	350	52	77	102	12
08-09	351	26	83	93	14
07-08	352	39	78	91	11

British Mathematical Olympiad

Year	Entries	Round 2 qualifiers
16-17	7	
15-16	9	
14-15	10	
13-14	8	1
12-13	7	2
11-12	10	2
10-11	14	2
09-10	14	1
08-09	14	2
07-08	7	2