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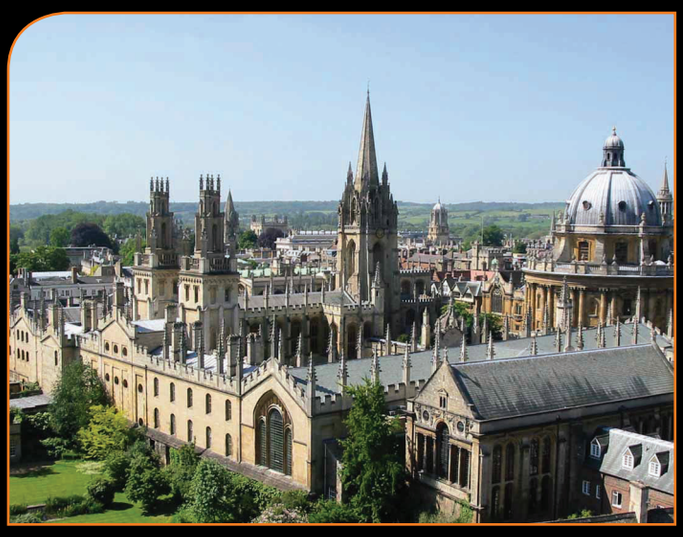
Getting into the top universities



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Student Conference

Some ideas for further reading and research

Lots of extra work? Not really.

The following is meant to be a selection box of ideas to choose from and consult. It is not suggested that you try to read all of them in any subject, but that you select what you think might be interesting. That's the point really – dip in, experiment and see what grabs you. Hopefully some of them will inspire your interest even more. A while ago the Russell Group universities published a list of skills that they wanted to see in students, who applied to them. They included –

1. evidence of being an independent learner
2. evidence of an ability to do research
3. evidence of an ability to write a clear and coherent essay
4. evidence of an ability to think critically and solve problems
5. evidence of an ability to contribute ideas to a discussion or debate.

Following up on the suggestions below will be evidence of independent research and will give you plenty of ideas. Above all, it should show you whether your interest in a particular subject is great enough to want to study it to a much higher level. The lists are by no means definitive. Talk to your teachers at school and get ideas from them. Talk to students who are taking your subjects at a higher level. If there are former students from the school, who are up at university doing courses you think you would be interested in, arrange to be put in touch with them. Meet up with them when they come home and look at some of their notes. When you come to apply for university, admissions tutors will be very impressed if you can say that you have already looked over first year undergraduate work.

Biology

Biology covers all of human biology, zoology and botany so you need to decide whether you want to study all aspects of it or just some of it. You might also want to experiment with finding out about specialist areas such as virology, microbiology, marine biology and genetics to see whether you'd like to specialise from the beginning or study more generally before deciding on any more specialist options.

Books to look at – *The Chemistry of Life* (Steven Rose), anything by the geneticist Steve Jones (note particularly *Language of the Genes* and *Almost Like a Whale*), *Genome* (Matt Ridley), *The Wisdom of the Genes* (Wills), *Darwin's Dangerous Idea* (Daniel Dennett), *The Selfish Gene* and *The Extended Phenotype* (Dawkins), *Virolution* (Ryan), *Life Ascending* (Nick Lane), *The Revenge of Gaia* (Lovelock), *50 Genetic Ideas You Really Need To Know* (Henderson), *Zoobiquity* (Horowitz & Bowers), *Creation: The Origin of Life* (Rutherford).

Read journals such as *Nature* and *New Scientist* in particular, but all scientific journals will have biological items in them. For Biochemistry a good Handbook of Biochemistry/Principles of Biochemistry textbook is useful for back-up reading as you do topics at A level. For Genetics familiarise yourself with sex-linked conditions, genetic ratios and for population genetics the Hardy-Weinberg equilibrium and find out about case studies. For Zoology look at Taxonomy (the science of classification – what do 'species' and 'genus' mean?) and at such things as the place of primates within it. TV programmes by David Attenborough and George McGavin are always of interest.

For web sites try *www.arkive.org*, *www.ted.com*, *www.thenakedscientists.com*.

Go to Biology web sites on *Wikipedia* and Google 'Hot' Biology web sites. There are loads on all sorts of topics.

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Physics

Books to read – anything by John Gribben (note particularly *In Search of Schrodinger's Cat* and *In Search of the Multiverse*), John Polkinghorne on the quantum world (he is an astrophysicist who is also a theologian), *The Physics of the Impossible* (Kaku), *Hyperspace* (Khan), *QED* and *Surely You're Joking* (Feynman), *The Trouble with Physics* (Smolin), *Chaos* (Gleich), *Quantum* (Kumar), *How to teach Quantum Physics to your Dog* (Orzel), *50 Physics Ideas You Really Need To Know* (Baker), *The Elegant Universe* (Greene), *Just Six Numbers* (Rees), *About Time* (Frank), *The Wonders of the Solar System* (Brian Cox - anything by him is good). Also anything by Jim Al-Khalili and the *Short Introduction* series has a very good one on Chaos Theory. The *Infinite Monkey Cage* is an excellent radio programme (on Radio 4 and iPlayer) featuring Brian Cox and Robin Ince and combining theoretical physics with stand up comedy (podcasts are available of all their programmes).

Read *New Scientist* and *Scientific American*, if you can get hold of it. For web sites look at *www.ted.com*, *www.thenakedscientists.com*, *www.galaxyzoo.com*, Google Physics web sites including *The Physics Classroom*, *The Student Room* etc and the web site of the Institute of Physics.

Maths

Maths Departments seem to be interested only in the Maths you've done, so the more you do the better – further Maths, further further Maths, STEP level papers etc..

Books of interest however might include – *Fermat's Last Theorem* (Singh), *Does God Play Dice* and *Nature's Numbers* (Stewart), *Easy as Pi* (Ivanov), *The Music of the Primes* (du Sautoy), *Just Six Numbers* (Rees), *In Code* (Flannery), *Numbers, Sets and Axioms* (Hamilton), *The Universe and the Teacup – the Maths of Truth and Beauty* (K.C. Cole), *Algebra and Geometry* (Beardon), *Hidden Connections, Double Meanings* (Wells), Elastic Fishponds... The Maths that governs our World (Elwes), The Norm Chronicles (Blastland & Spitgethaltes).

For web sites look at *www.ted.com*, *www.nrich.maths.org/public*, *www.mathsnetalevel.com*, *www.planetmath.org*.

History

What you do by way of wider reading depends on the period(s)/topics you want to study or just want to dip into because they sound interesting. A good idea is to choose a couple of topics from your Year 12 work and go into them in more depth as 'specialist subjects'. Then do the same in Year 13. If both are very 20th century based, read up a few topics on other periods – admissions tutors are fed up with candidates who seem only to know about Hitler and Stalin and are unaware of anything before 1900.

Arrange with your subject teacher(s) to do one or two term time essays as 'extended essays' in preparation for possibly sending them up to university or to have referred to in your application. If you are interested in the Philosophy of History, look at a couple of the following titles - *The Aims of History* (Thomson), *The Death of the Past* (Plumb), *The Pleasures of the Past* (Cannadine). Look at political philosophy (Machiavelli, Marx, Mill – the '*Very Short Introduction to...* series' is very good) and/or one or two political biographies. General history books of interest are *Long Shadows* (Paris) a study of propaganda and attempts to subvert the historical record, *Voodoo Histories* (Aaronovitch) a look at conspiracy theories over the ages and *Virtual History* (Ferguson) a look at what might have happened if certain momentous events had turned out differently. Read book reviews – that way you hear what the book says and the views of the reviewer, two for the price of one!

The other key thing, if you are not already, is to become every parent's nightmare – awkward, argumentative and bolshie. It doesn't have to be at home – don't get kicked out! – but get involved in debating and public speaking, take every opportunity in class to argue and express opinions, taking nothing for granted. There is no such thing in History as 'received wisdom'.

There are loads of History web sites (just Google 'History web sites') and any topics you follow up, no matter how obscure, will have other links. *History Today* and the *BBC History* reviews are among a host of general, as well as specialised, magazines available.

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Geography

You need to decide whether you are a 'whole' geographer or interested more in either the physical side of the subject or the human. That will determine what you want to specialise in and read up about. Choose two or three topics from your work in Year 12 and go into greater depth in them. Arrange with your subject teacher(s) to write a couple of your Year 12 essays as 'extended essays' so that they can be sent or referred to in references for university.

Books that have been particularly recommended are – *Earth, An Intimate History* (Fortey), *Globalism and regionalism and Capitalism as if the Earth mattered* (Porritt) *Future Shock* (Tofler), *A Blueprint for Survival* (The Ecologist and Penguin books), *Population Geography* (Jones), *The Skeptical Environmentalist* (Lomberg – indeed anything by him), *Jungle: A Harrowing True Story of Survival* (Ghinsberg), *Surviving Extremes* (Middleton – he teaches Geog. at Oxford), *Earth From Space* (Johnston), *Belching Out the Devil: Global Adventures with Coca-Cola* (Thomas), anything by James Lovelock on Gaia and for the human and cultural side Tribe (Bruce Parry) or anything by the Prof. of Geog. at UCLA Jared Diamond.

Read *Geography Review* for case studies, become a junior member of the Royal Geographical Society and consult *www.mongabay.com* for environmental geography. Look at the web site of Danny Dorling for lots of excellent statistical material and his book *So You Think You About Britain*. You can get other ideas from *www.gapminder.org*, *www.facingthefuture.org*, *www.ted.com*, *www.gogeo.ac.uk*.

Chemistry

For wider reading try – *The Chemistry of Life* (Steven Rose), *Chemistry* (Brock), *Principles of Biochemistry* (White, Handler and Smith) as a backup to all your A level topics, *Chemistry for Changing Times* (Hill, McCreary and Kolb), *Materials Science* (Ramsden), *The Periodic Kingdom* (Atkins), *Mendeleyev's Dream – the search for the elements* (Strathern), *Periodic Tables – The Curious Life of the Elements* (Aldersty & Williams), *The Disappearing Spoon* (Kean).

Also check out the periodicals *New Scientist*, *Nature*, *Chemistry World* and *Education in Chemistry*. For web sites look at *www.ted.com*, *www.thenakedscientists.com*, Google 'Chemistry web sites' and there are several on different areas of chemistry and from a number of UK and US universities. Link up with other sites to do with Biology and Material Sciences.

Politics/PPE

You don't have to be politically committed but, if you are, use all the contacts you can to get work experience, work shadowing etc – of the local council, your local MP, even your Euro-MP. Political autobiographies are interesting, though biased – among recent ones those by Chris Mullin and Jack Straw are to be recommended. In more general terms *The Origins of Political Order* (Fukuyama), *The Dilemma of Democracy* (Hailsham), *The Third Way and its Critics* (Giddens), *Plato to Nato* (Redhead), *British Politics* (Madgwick), *Mind The Gap* (Mount), if you're into American politics Barack Obama's books and George Stephanopoulos' *All Too Human* is a study of Clinton's first election campaign. *Sophie's World* (Gaarder) is a general introduction to Philosophy and there is *What Philosophy Is* (O'Hear).

In terms of actual works of Philosophy, you need to be careful not to dive in at the deep end and put yourself off the subject for life. Plato's *Gorgias* is a very good starting point as it's short and examines two just key themes, 'oratory is deceit' and 'might is right'. It does so very clearly and is a good introduction to the 'Socratic method'. You might like to take a theme such as 'truth' and look at how different philosophers have viewed it – *What is Good?* by A.C. Grayling is a very good starting point). You might be interested in taking a look at such 'isms' as Fascism, Communism, Totalitarianism etc – this would particularly link with an interest in History. Peter Cave has just produced *How to outwit Aristotle* and Julian Baggini's *Do you think what you think you think?* is excellent.

For web sites look at *www.ted.com*, *www.politicsinspires.com*, Google 'Philosophy web sites' and you may be interested in *The Philosophers' Magazine* or *Philosophy Today*. There are hundreds of politics sites, depending on your interests. For Economics see the separate section. Get involved in debating and public speaking and, of course, keep up to date with current political issues. Know who the key members of the Cabinet and Opposition are and what they are proposing. For foreign political awareness choose an area such as US or European politics or the politics of another area that really interests you such as Africa, Asia or South America and familiarise yourself with the key issues there.

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Medicine

The key thing with Medicine is to show that you have the personal qualities they are looking for as well the academic ones. That means getting as much experience as you can of working with others, who are in some way or other requiring help. Your school may have a Special Needs Department, in which case offer to help with younger students who may be on the autism/ Asperger's spectrum or who have other specific conditions. Use that experience to learn more about how to identify the condition, treat it (if possible) or at least alleviate it. Help with one to one mentoring work to show you have good inter-personal skills. Apply to your local NHS Trust to get experience at a local hospital, clinic or GP's practice. Ideally get all three and, when you do, milk it for all it's worth in terms of letting people know that you want to learn and experience as much as possible. Keep a portfolio of all your experiences and follow up on all you see by researching the various conditions you come across and learn more about them. If you are finding it difficult to get contacts within the local NHS Trust, contact your local Rotary Club. It will have practising and retired medics among its members, who will have contacts and be willing to help.

For reading you might like to try – *Hippocratic Oaths* (Tallis), A very short introduction to *Medical Ethics* (Short intro' series), *The Rise and Fall of Modern Medicine* (Le Fanu), *NHS Plc* – the privatisation of health care (Pollock), *Betraying the NHS* (Mandelstram), *NHS SOS* (Davis & Tullis), *The Political Economy of Health Care* (Tudor Hart), *Complications: A surgeon's notes on an imperfect science* (Gawande), *Causing Death and Saving Lives* (Glover), *How doctors think* (Groopman), *Diagnosis; Dispatches from the Frontlines of Medical Mysteries* (Sanders). Keep up to date with and follow up any news items on new medical discoveries and break-throughs. Join the junior BMA and read the *BMJ* (*British Medical Journal*), look at *www.ted.com*,

For **Veterinary Science** get as much experience with animals as you can. Contact local vets, farms, wildlife parks, sanctuaries, zoos etc to get experience with more than just domestic pets.

For **Pharmacy** get experience with at least one pharmacy practice and, if possible, with a pharmaceutical company. Read anything by Ben Goldacre and check out his web site as well as *www.ted.com*.

For **Dentistry** get experience with a dental practice and, if you can, a hospital department which deals with more complicated surgery. Things that show you have good manual dexterity also help. Running a dental practice also involves business skills so involvement in something like a Young Enterprise company would be useful.

Law

Most Law books are very intimidating and full of jargon so go easy to start with – *The Justice Game* by Robertson is an excellent and very readable book by someone who has been involved in some of the leading human rights trials of the last 50 years, *Getting into Law* (ed. Lygo), *The Search for Justice* (Rozenburg), *Understanding Law* (Adams and Brownsword), *Law and Modern Society* (Atiyah), *On Evidence* (Murphy – just dip into this), *The Rule of Law* (Bingham), *Bonfire of the Liberties: New Labour*, *Human Rights* (Ewing) – look at general introductions to different areas of law such as Human Rights Law, Contract Law, Tort, Criminal , Land Law etc. and see which areas you find more interesting. Also very good is the *Very Short Introduction To...* series e.g. *...to Human Rights* (Clapham), *... to the Philosophy of Law* (Wacks) and the *New Penguin Guide to the Law*.

Spend a morning or day at the local Magistrates' Court and tell the ushers why you're there – they may be able to arrange for you to meet the magistrates. Spend a day at a nearby Crown Court – if you live near London, visit the Old Bailey where there are 18 courts – you will find the ushers very helpful in telling you what's on and where. Get work experience with a solicitor and/ or barrister if you can – get in touch with your local Rotary Club for contacts if neither you nor the school have contacts you can use. Get involved in public speaking and debating and mock trial competitions – if your school only has them for junior students, volunteer to help coach them.

There are two radio programmes that are very good and there are pod casts of them on iPlayer – they are *Law in Action* and *Unreliable Evidence*. Useful web sites are *www.ted.com*, *www.lawstudent.tv*,*www.lawcom.gov.uk* (for Law Commission reports) and *theguardian.com/law/studying-law*.

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Modern Languages

This is a bit tricky as there isn't much literature in the A level course these days. Do some literature though, mostly in translation, but as much as you can in the original.

Listen to radio broadcasts, use newspapers and get as much feel as you can for the cultures, politics, economics, social issues and dip into the history as well. For France it would be odd not to be able to appreciate its contribution to world history via such as the French Revolution or in the case of Spain the impact of the Spanish Civil War or Meso-American conquests. Where there has been a significant impact on philosophy as well, an introduction to that would be good e.g in French Descartes, Voltaire, Rousseau, Sartre or in German Kant, Hegel, Nietzsche etc.. The *Very Short Introduction* series is a very good starting point. You might also want to dip into Linguistics and see whether that is an option you would like to take up at university.

Architecture

Build up your own portfolio of art work, drawings etc and your reading will be dictated by your own tastes. What buildings in the world do most for you and why? Then read around their history and who designed them. There are a number of works comparing English cathedrals for instance – a good place to start because of the design issues that were faced and overcome by builders of a much earlier age. If there are National Trust properties near you, look at their architecture and find out about restoration work and how that is undertaken. Familiarise yourself with different architectural styles and the work of different architects (whose work most inspires you and why?).

Work experience with a couple of different architects would be useful, particularly if they do very different types of work. Contact your local council's planning department and see if you can do some work shadowing there. If your school is having any building work done, ask to be introduced to the architects and site managers and monitor what goes on. You might even want to design a better school or sixth form centre and submit your own ideas. Do some research on materials science too, sustainability projects and some of the latest research on energy saving and even buildings that have self-regulating and self-correcting control mechanisms. Architects are not people who just work at desks by themselves so any evidence of working with a team and taking a lead role would be useful. The local Rotary Club will have contacts with architects if your school doesn't.

Useful web sites are – *www.ted.com*, the 'best architecture' web sites, *www.architecture.com* (the Royal institute of British Architects site) and keep abreast of the Stirling awards, the top prize for architecture in the UK.

English

It very much depends on what you are interested in. Ideally choose one or two novelists, one or two poets (admissions tutors are always complaining that too few candidates have much knowledge of poetry), one or two playwrights and literature from more than one period of history (so that it's not all 20th century or all Shakespeare).

Experiment and dip in to different genres of literature and find out what really excites you to read more. Reading other works by the authors you have for GCSE or for A level will give you different perspectives on their work and allow you to make interesting comparisons. If you are interested in creative writing, build up a portfolio of your own work. If you are thinking about journalism as a career, write for your school magazine or newspaper – if there isn't one, why not start one?

Local newspapers are usually very pleased to accept copy about events, sports fixtures and things going on in schools so write reports and send them in. Unsurprisingly for English, the advice is 'read, read, read' but make it for pleasure rather than it become a burden.

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Engineering

Maths and Physics are the two important subjects here so you need to protect those. You then need to decide whether you want to specialise in one particular area of engineering (civil, mechanical, electrical, aeronautical etc.) or whether you'd prefer to do 'general engineering' with an introduction to all of them before deciding how to specialise. Visits to university engineering departments should help that decision and in Jan/Feb of Year 12 sign up for one of the Headstart courses that operate each summer and that give you the chance to go to a top Engineering Department for a whole week in the summer and work on an engineering project. It is a brilliant introduction to what the subject would be like at university, it really tests out whether it's what you want and it looks really good on an application form.

You may also want to consider the option of a gap year and gaining a placement with a major engineering company for six to nine months between school and college. The Year in Industry scheme helps to organise these and, if they go well, you will probably end up with the offer of a job during college vacations or even a guaranteed job at the end of your course. It's even been known for companies to be so impressed with the work that was done on a placement that they sponsored some students through university altogether.

For further research check out *www.ted.com*, w*ww.discoverengineering.org*, *www.raeng.org.uk* (the Royal Academy of Engineering site) and there are lots associated with the different disciplines within engineering.

Economics

The Victorian historian, Thomas Carlyle, called Economics 'the dismal science' and that leads to the debate as to whether it is a science or a discipline. The further Economics is taken, the more mathematical it becomes so you need to protect your Maths and not taking it for A level will prove a big disadvantage for any top university.

You need to keep up to date with current economic issues and debates – not difficult these days with the emphasis on the problems with the global economy and this will overlap with politics and debates on taxation, welfare, borrowing, public spending, currency crises etc. If you are taking the subject at A level, pick two or three topics (a combination of macro- and micro- economics) and study them in depth. Arrange for a couple of essays to be done as 'extended essays' and marked accordingly and get involved in such as the Bank of England Challenge on controlling inflation. If you are planning to go into Finance or banking, work experience with a bank or finance institution will be important. Give yourself a notional £20,000 each year and see how you would invest it and (hopefully) make a profit – best to make this 'notional' just in case!

Good reads are – *Freakonomics* (Levitt and Dubner), *The Lexus and the Olive Tree* (a study of globalisation) (Friedman), *Small is Beautiful* (Schumacher), *The Ascent of Money* (Ferguson), *The Price of Inequality* (Stiglitz), *End This Depression Now* (Krugman), *How the West Was Lost* (Mayo), *22 Things They Didn't tell You About Capitalism* (Chang). *The Undercover Economist* (Harford), *The End of Poverty* (Sachs). *The Very Short Introduction to Marx* is a good study and look at the ideas of current leading thinkers in economics such as Amartya Sen (his theories on foreign aid creating dependency) and Joseph Stiglitz and of presenters such as Robert Peston and Stephanie Flanders.

Look at web sites such as *www.ted.com*, *www.economist.com*, *www.CNNMoney.com*, *www.econtalk.com*, *www.ft.com* (*Financial Times* site).

and some final advice...

Use local universities and their departments which often have public lectures, go to Open Days and ask for ideas. Hearing from them what current research is going on will always be useful and good to follow up on and show awareness about in your personal statement and, if you get the chance, at interview. The colleges of London University put on taster days and courses each June and July. They are usually free and will give you really useful insights into what studying certain subjects at university will be like. If your school does the Extended Project Qualification, have a go at it – it is brilliant evidence of being an independent learner, researcher and of being able to write an extended essay. The Sutton Trust offers excellent summer schools at a number of universities and is a non-profit making organisation so keeping the costs down and there are scholarships if the cost is beyond your means.

If you are serious about wanting to aim for one of our top universities (and why not?) ...the challenge I am setting you is this. Get the best results you can in the courses you are currently taking and alongside do three extra things each month that are specific towards reading round and researching what you think you might want to apply for. Over time that will build up to be a really strong body of evidence that you should be given a place. Remember it is a competitive business, but with the right preparation and enthusiasm (that's hugely important), you should be in with a very good chance. Hopefully I am only asking you to discover things that you will enjoy doing so it won't seem like much extra work at all!

Enjoy the journey and best of luck.

Peter Rawling
PiXL6

If you want ideas on subjects I've not included here or more on those that are, your Head of Sixth will know how to contact me for any further help.

Science and Geography students in particular have recommended that I mention Bill Bryson's *A Short History of Nearly Everything* as an excellent general read and Ken Robinson's *The Element – How Finding Your Passion Changes Everything* has inspired a number of my students. It says it all really – find your passion and go with it and may that passion always be with you!

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Appendix

Further details on subject specialisms

When thinking about preparing the personal statement on your UCAS form, look at it from the perspective of an admissions tutor. If you are going to get a lot more applications than you have places, what criteria are you going to adopt to decide who gets an offer and who doesn't? What qualities would you be looking for in the successful candidates?

The following are used in subject-specific breakout groups, when we have them. They refer to the qualities being looked for and also raise the sorts of question, problems and scenarios that are often asked at interviews.

English, History, Geography and PPE Specialists

What do you think are the qualities a good English specialist/ Historian/ Geographer/ Philosopher/ Economist needs to have?

What evidence do you think you have to show you have those qualities?

How do you think you could demonstrate those qualities?

In the specialist area you are interested in name any four major controversies/ differences in interpretation you are aware of and quote two arguments that support each side of the dispute.

English

If you had to nominate 1 Shakespeare play, 1 other play, 2 novels, 1 modern poet, 1 poet from an earlier age and 1 foreign author to be studied at A level, what would you choose and why?

What is the point of a degree in English?

History

If you had to nominate 2 historical figures, 2 historical events and 2 historical documents (a) in the 20th Century (b) from earlier times to study, what would you choose and why?

"The study of history is fruitless. We can learn nothing from it because no two sets of events are ever the same." Is that true?

What is the point of a degree in history?

Geography

What evidence is there that global warming is no more than seasonal variation written large?

"All talk of conservation is pointless until or unless we tackle population control. Do you agree?

What is of particular interest geographical interest in your home area?

What is the point of a degree in geography?

Philosophy, Politics or Economics

Are 'practical philosophy', 'ethical foreign policy' and 'green economics' contradictions in terms?

What is 'free will'? Philosophically can it ever be right to kill?

Should we hold more referenda? Should 16 year olds have the vote?

What are the arguments for and against having fixed term parliaments?

What is the point of privatisation?

What are the consequences of charging interest rates?

These are the sorts of question that interviewers at top universities will expect you to be interested in. Apart from a good knowledge of your A level work they will expect you to have taken an interest in the world around you and in current issues. All of these subjects are ones that require you to argue and form (and justify) your own views. The more experience you can get of that, the better. Look for arguments and debates, accumulate ideas on both sides and decide with which side you agree and then defend that view. In interviews at university you are likely to be asked for your views and they will then argue the opposite (even if they privately agree with you) just to see how far you can hold your ground. For PPE you do not have to be politically committed but, if you are, that should give you contacts and you should use them to get as much experience and as many ideas as possible.

Qualities

You need to be keen a reader, analytical and critical, someone who can take in a lot of information, but quickly differentiate between what's important and what isn't, able to spot bias and appreciate the context within which things are said, done or written. Take nothing for granted, don't be a passive acceptor of 'received wisdom', question everything and be very argumentative. The ideal qualification is to be sceptical. You will need to be able to express ideas clearly and concisely, so practise this both in your note-making and essays and in any creative writing. If you write short stories, poems, press articles etc, keep a portfolio and take it with you to any interview. For more ideas as to how to demonstrate these qualities, follow the instructions in the main handout.

Ideas and argument are the life-blood of these subjects so really seek to get into as many debates and discussions as you can.

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Medics

What do you think are the qualities a good doctor needs to have?
What evidence do you think you have to show that you have those qualities?
How do you think you can acquire such evidence?
What are the biggest issues facing the Health Service at the moment?
What are the biggest issues likely to be facing the health service in the future?

Ethics

1 You have 5 organs for transplant but 20 potential recipients. Among them are a drug addict, three who smoke, two who are alcoholics, two who are obese and two who pursue extreme sports. Should any of those factors matter? How would you decide which patients received the organs?

2 There is a proposal to set up a free needle exchange scheme in your local area for injector drug users. Basically the users would be able to exchange used needles for new, sterile ones on a strictly one for one basis. It would cost £150,000 per year to run such a scheme. What do you think are the arguments for and against such an idea?

3 You are being given £1 million with the instruction to use it to fund a health initiative in your local area. What might you choose to do and why?

Think about these before looking at the answers and advice that follow.

Qualities

The Dean of Medicine at Cardiff once said he looked for six key things-

1. The potential for high academic achievement
2. Evidence of a caring and committed attitude
3. An understanding of the demands of being a doctor
4. An ability to communicate effectively (be approachable and be good at listening and explaining)
5. A willingness to accept responsibility
6. A broad range of other interests

You might well have chosen other good ones such as dedication, persistence, patience, optimism, the ability to inspire others' trust and confidence etc. Ideas for showing that you have them – help at a local care home, at a special unit for the handicapped, with a local charity such as Mencap, some local care teams have young people working with stroke victims helping recover their mobility or powers of speech or at school help out with mentoring or literacy schemes, with special needs etc. If there are young students with spechandicaps or on the autism/asperger's spectrum, work with them and via that gain insights into their condition and care, how it can be treated etc.

What problems are facing, and will face, the health service?

Answers – there are sweeping reforms in how the NHS is being run (look up The Health and Social Care Act), there's the problem of financial limits on resources (the health budget isn't being cut but it is not rising as fast as it used to) and there are the problems of an ageing population (dementia, alzheimer's, certain types of cancer etc). In the future these problems will increase, certain diseases will become more drug resistant, there will be rapidly changing technology (look at the recent advances in prosthetic surgery for instance as a result of the Iraq and Afghan Wars) and there will be an increased expectation of the availability of replacement organs, gene therapy etc.

Answers to the Ethics questions...

There isn't a right answer for **No 1**, but "I'd put all the names in a hat" probably would be regarded as a wrong one! A 'taxi rank' view, saying that whoever had been waiting the longest also wouldn't go down well. The main factor would be clinical need. The next would be whether the patient would be able to live an independent life (that would be difficult for the addicts). You'd also take wider health and welfare factors into account – eg if one of the patients was a single mother with two dependent young children.

No 2 – arguments against are cost, appearing to encourage drug use etc, but if you can stop just six people contracting HIV which becomes full blown AIDS, you will save more than £150,000 a year on treatment costs. You can also offer all who come along the chance to go into rehab and programmes to come off the drugs and at the same time be able to monitor local use as to whether it was stable, decreasing or getting worse.

No 3 - £1 million is not a lot, but they would like to hear you investing it into a campaign of preventive medicine eg getting expectant and young mothers to eat well so that babies are born healthier and stronger or an education campaign on smoking or drinking or STDs.

Get familiar with your local NHS Trust– there should be a report on how good it is and whether it has specialist units and services and how good they are. Are there any particular health issues in your area? If so, are the services to treat them adequate?

Lawyers

What do you think are the qualities a good lawyer needs to have?
What evidence do you think you have to show that you have those qualities?
How do you think you can acquire such evidence?
What current legal issues are you aware of?
Is law there to restrict freedom or to protect it?
"Good law reflects the will of the majority." Is that true?

Take a look at the accompanying scenarios and consider the legal issues. (ie what you think are questions in law – you are not expected to have the knowledge of what the law actually says.)

Dip into one or two areas of law to see what you think of them – criminal law, contract law, human rights law, tort and business and consumer law are good starting points. Land law, constitutional, family law etc are rather heavier going.

Law scenarios

1. A and B, living in the topmost flat of a house, wish to commit suicide. They soak all the carpets and furnishings in petrol and set light to them. The floor collapses and debris sets fire to C's flat below and C is killed. Firemen are unable to save the house or B but A is dragged out alive. Two firemen are killed trying to put out the blaze. What legal issues do you think arise here?

2. Jim and three friends decide to celebrate the end of their GCSE exams by holding a secret party in the school library, which looks out over a main road. Between them they knock back three bottles of wine, which they proceed to throw out of the library windows at passing motorists. One of the motorists phones the police and a squad car arrives. In the meantime, Jim has accepted a £20 bet that he will run naked around the running track alongside the library building. The police interrupt him in the middle of this and PC Coshem gets hold of Jim saying, "I am arresting you for an act of public nuisance likely to corrupt and deprave old ladies." Jim says, "there's no such charge," and struggles free, in the course of which PC Coshem is kneed in the groin. Jim is arrested for assault and taken back inside the school to collect his clothes. "Whilst we're here we might as well check your locker for drugs", say the police and they march Jim off to his locker in which they find three items of cutlery from the school kitchen. Jim is immediately accused by them of theft. One of his three friends, Ben, is told to open his locker. He refuses and is arrested. Jim and Ben are then bundled into the squad car, but instead of being taken to the police station directly they are driven to a nearby lay-by and questioned for an hour before being taken to a station. There they are left in separate cells for two hours until they are brought out to make statements and then their parents are phoned to come and pick them up. The police say that they'll probably call them back for a police warning. The two boys say they won't accept one.

What legal issues do you think arise here? (Please don't try to act out this scenario in your school!)
Have a go at these before looking at the answers that follow.

These are the sorts of scenario you could get at a university interview. They do not test legal knowledge but your ability to spot what would be a legal issue, eg in the first one whether trying to commit suicide is a legal offence. You are not expected to know that in law now it is not an offence, although aiding someone else to commit suicide is. In early Victorian times it was an offence to try to commit suicide – oddly enough an offence that was punishable by death!

1. Whether trying to commit suicide is an offence.
Whether assisting someone else to commit suicide is an offence.
Whether setting fire to your own property can be considered an offence.
If they were renting the flat, clearly there would be an offence against someone else's property. What offence?
Are they responsible for the death of C? If so, what offence is it?
Are they responsible for the deaths of the two firemen? If so, what is the offence?
Clearly there would also be legal issues over A's defence and degree of responsibility for his own actions and whether he has any sort of recognised defence.

2. If the party is secret, have they permission or right to be there? If not, is that trespass? If at night, has there been any illegal entry?
Is it legal for them to drink alcohol under such circumstances?
Where did the wine come from? If it was bought, is there an issue of selling alcohol under-age? If it was taken without permission from home, does that constitute theft?
If passing motorists and their cars are being put at risk of damage and accidents, what offences arise?
Does running naked around the track represent any sort of offence? If so, is the bet an incitement to crime and therefore aiding and abetting it?
Is Jim being arrested legitimately – if not, has he the right to resist? Is the injury to PC Coshem assault or, if he's struggling free, is Jim being assaulted by being manhandled?
Is the locker search legitimate? What are the criteria for theft? Can it be theft if the cutlery hasn't left the premises?
Is the search of Ben's locker legitimate? Is his arrest legal?
Are the rules for the treatment and questioning of juveniles being breached in the treatment of the boys after they are taken from the school?
Is it right that they make statements before parents are contacted and there is no suggestion of legal representation?
Can a police warning be given, if the so-called offenders don't admit guilt?

Student Conference

Mathematicians and scientists

What do you think are the qualities a good mathematician/ scientist/ engineer needs to have?
What evidence do you think you have to show that you have those qualities?
How do you think you could develop those qualities?
How many current research projects in Maths, Science or Engineering do you think you could talk about for 3 minutes or more?

Two problems for you to have a go at.

1. "Drug use doubling in our schools" screamed the newspaper headline.
This was based on a survey of 9,000 schoolchildren aged 11-15 from 305 different schools. They had all been asked, among a host of other things, whether they had used cocaine during the past year. 2% were recorded as having said "Yes". This was compared to a survey done the previous year, where only 1% had been recorded as saying "Yes". All the other statistics quoted from the survey were quoted in whole numbers. *Is the newspaper headline necessarily justified?*

2. Companies selling olive oil used the following in a campaign to promote their product, claiming that olive oil could help prevent skin wrinkling. "An Australian study in 2001 found that olive oil (in combination with fruit, vegetables and pulses) offered measurable protection against skin wrinkling. Eat more olive oil by using it in salad dressings or dip bread in it rather than using butter". *How valid is the claim?*

(Both of these examples come from Ben Goldacre's book *Bad Science* – much to be recommended to all scientists.)
Think about these before looking at the answers further on.

What follows are typical of the questions you'd be expected to be interested in and to have tried to follow up.

3. **Maths:** is Maths invented or discovered? Is Maths a language? "Maths is mostly abstract and irrelevant" – is that true? Some people talk about 'the beauty of Maths' – what do they mean?
Physics: why does 'dark matter' matter? What is 'light'? What is the 'quantum' in 'quantum physics'? Can you explain why we only ever see one side of the moon? Is life possible without gravity? Explain Archimedes' principle.
Engineering: why does a boomerang come back? Compare the avionics of a jumbo jet and a microlight. How does a helicopter stay up in the air? Show the forces acting on a ladder. How does a microwave work? what is the difference between a petrol and a diesel engine in a car? what do you need to take into account when building a bridge?
Chemistry: why does the boiling point of water rise as salt is dissolved in it? What makes some chemicals explosive? What makes drugs physiologically active? Sketch the graph of what happens when a strong acid is titrated with a weak base. Explain the shape.
Biology: why is carbon so important in living systems? What are the arguments for preserving biodiversity? What effect do you think global warming could have on the evolution of species? How could you test to see if a disease such as schizophrenia is genetic? What are probiotic drinks and how do they work?

...that last question is typical of what interviewers at top universities will expect you to know. Apart from a good knowledge of your A level work they will expect you to have taken an interest in the world immediately around you and in things that are relevant to what you say you are interested in. Scientists are expected to be CURIOUS i.e. to want to know not just that things work but why and how they work. They'd also be interested in whether you can see practical implications and applications from this knowledge and possibly as a result be creative and discover or invent new things. Don't worry – you're not expected to be winning Nobel prizes whist still at school – just obviously keen to push both your own and the subject's boundaries.

Qualities

Need to be good analysts, to enjoy the challenge of problem-solving, be determined not to be beaten by things and have a keen desire to know/ find out things.

Engineers need to be good communicators and most engineers and scientists usually work in teams, therefore need to be good team members. Chemists in particular need good practical skills.

to develop them…..requires practice (especially true of mathematicians). Do wider reading and research, follow up on ideas and start seeing connections between different fields of research and how they might work together to push the boundaries of science. Interest in current research reflects how keen you are on science.

Answers to the two problems

1. A non-statistical point: the use might not necessarily have been in 'in school'.
Statistically: all results were quoted 'in whole numbers' i.e. rounded up or down, which could misrepresent the real figures. In fact the figure the previous year was 1.4% (rounded down to 1) and the next year was 1.9% (rounded up to 2). The difference therefore was only 0.5%. 0.5% of 900 = 45 students – not statistically significant.

2. 'Could help' is not the same as any sort of certainty, 'measurable' could be very little indeed and, as it's in combination with other things, it could just as easily be the fruit, veg and pulses that are having that measurable effect.
The rest are ideas/ questions of the sort to follow up on – not necessarily those same ones but equivalent ones. Note that in each subject there are specialist areas eg Chemistry (Organic/Inorganic), Physics (Astrophysics, Mechanics etc), Biology (Genetics, Zoology, Botany etc.) and in Engineering especially – there is a need to decide whether you'd prefer to do general engineering or specialise in one of the areas – Mechanical, Electrical, Civil, Aeronautical etc – straightaway.

Student Conference

For other specialisms...

What do you think are the qualities you need to have to do well in your chosen specialism?
What evidence do you think you have to show that you have those qualities?
How do you think you can acquire such evidence?

Psychology

Books to read – *Understand Psychology* (Hayes), *Games People Play* (Berne), *I'm OK, You're OK* (Thomas Harris), *The Serial Killers: the psychology of violence* (Wilson), *50 Psychology Ideas you really need to know* (Furnham), *Tricks of the Mind* (Derren brown).

For web sites google *The Encyclopaedia of Psychology*. Look at experimental work of such as Milgram and find out what research is being done at nearby universities and whether you can get involved in it in any way.

How do phobias arise? Why are people 'cruel'? Is there such a thing as a criminal mind?

Theology

Books to read –*A Very Short Introduction to Theology* (Ford), *The God Delusion* (Dawkins), *A History of God* (Armstrong), *The Case for God: what religion really means* (Armstrong), *50 Key Concepts in Theology* (Rayment-Pickard).

Can Theology and Science work together or are they fundamentally at odds? (interesting here is the work of John Polkinghorne, who is a theologian and an astro-physicist). Does Theology have a practical value?

Anthropology

Books to read – *The Third Chimpanzee* (Diamond), *Tribe* (Bruce Parry), *A Beginner's Guide to Anthropology* (Hendy), *The Book of Peoples* (National Geographic), *The Innocent Anthropologist* (Nigel Barley), *The Naked Ape* (Morris).

Anthropology is divided between Social or Cultural Anthropology and Physical or Biological Anthropology. There are courses specifically in the former and some overlap with Human Geography. The latter overlaps with Human Biology and Genetics. Do a study of the primates – what are prosimians, simians and apes? What makes man different and why/ how did he develop physical differences? Why are witchcraft and magic important in many tribal cultures? Voodoo makes for an interesting study – just don't start sacrificing chickens at home – it can upset your parents!

For those of you who are interested in Archaeology alongside, follow up on those areas you are interested in, whether that be British Roman and Anglo-Saxon, Egyptian, Central American or wherever. It would be a good idea to get in touch with a local Archaeological Society (or Dept. of Archaeology at a nearby university if it has one) and arrange to spend some time on a dig. There is more science to it than you might think and it would be very useful to familiarise yourself with it.

Music

It very much depends what type of music you are interested in, but it would be a good idea to dip into the music of at least a couple of different time periods. Consider such questions as – is it valid to talk of 'good' music?, Why do composers go in and out of fashion?, can jazz be properly explained?, can musical appreciation be taught?, is 'electronic music' a contradiction in terms?

Graphic Design/Communication

Books to read – *100 Ideas that Changed Graphic Design* (Heller and Vienne), *Know Your Onions* (De Soto), *How to be a Graphic Designer Without Losing Your Soul* (Shaughnessy), *Graphic Design Rules* (Bucher), *How to Create a Portfolio* (Fig Taylor), *Contemporary Graphic Design* (Fiell).

Obviously build up your own portfolio and try to get work experience in a couple of very different companies/environments.

Sports Science

Please note that this is very much 'science' based in sport rather than the chance to enhance your own sporting performance. There are other, very good courses too for such as sports coaching, sports psychology, sports management etc.

Books to read – *Complete Guide to Sports Nutrition* (Bean), *Periodisation Training for Sports* (Bompa and Carrera) and *Sport and Exercise Science: An Introduction* (Griffin and Watkins).

Get as much practical experience as you can working alongside coaches for at least a couple of different sports and working with different age groups. If there is a local Sports for the Disabled group, that can give extraordinary insights as well as their benefitting from your help.

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Business and Marketing

Books to read – *Brilliant Marketing* (Hall), *The Advertising Concept Book* (Barry), *Guerilla Marketing* (Levinson), *The Strategy Book* (McKeown), *Strategy* (Harvard Business Essentials), *Adventures of a Global Entrepreneur* (Branson), *Anyone Can Do It* (Bannatyne).

Get involved in Young Enterprise, get at least a couple of different work experience placements, advertise events at school, offer ideas of how to improve the school prospectus, get advertisers for the school magazine etc, offer your help to a local charity or volunteer bureau.

Food and Nutrition

Books to read – *Food and Nutrition* (Tull), *Understanding Food and Nutrition* (Webster-Gandy), *Deep Nutrition* (Shanahan).

Look at sport and nutrition and contact your local NHS Trust, who should have one or two specialists to work shadow. Look at particular topics such as nutrition during pregnancy or nutrition for the elderly (great projects for an extended project).

Drama

This is a really difficult one to advise on as it depends whether you are more interested in an academic course, which is like English Literatire but focused on plays, or want one that is hands on acting or musical theatre or one that gives you experience of theatre management and technical work as well as work on stage or indeed on camera.

Books to read – *So You Want To Go To Drama School* (Freeman) is very helpful. Obviously read a wide range of playwrights, experiment with different types of theatre and keep a portfolio of all you go to see, watch on TV, DVD etc. Be ready for questions on what you prefer and why, what plays you'd like to act in/ direct and why and, if you are a creative writer, have synopses of your work ready to show at interview/ audition.

If any subject has been overlooked, feel very welcome to ask!

All services provided by the universities are free.

We are grateful for their willing participation in our conferences and for the ongoing advice to students in our schools on all aspects of entry.

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