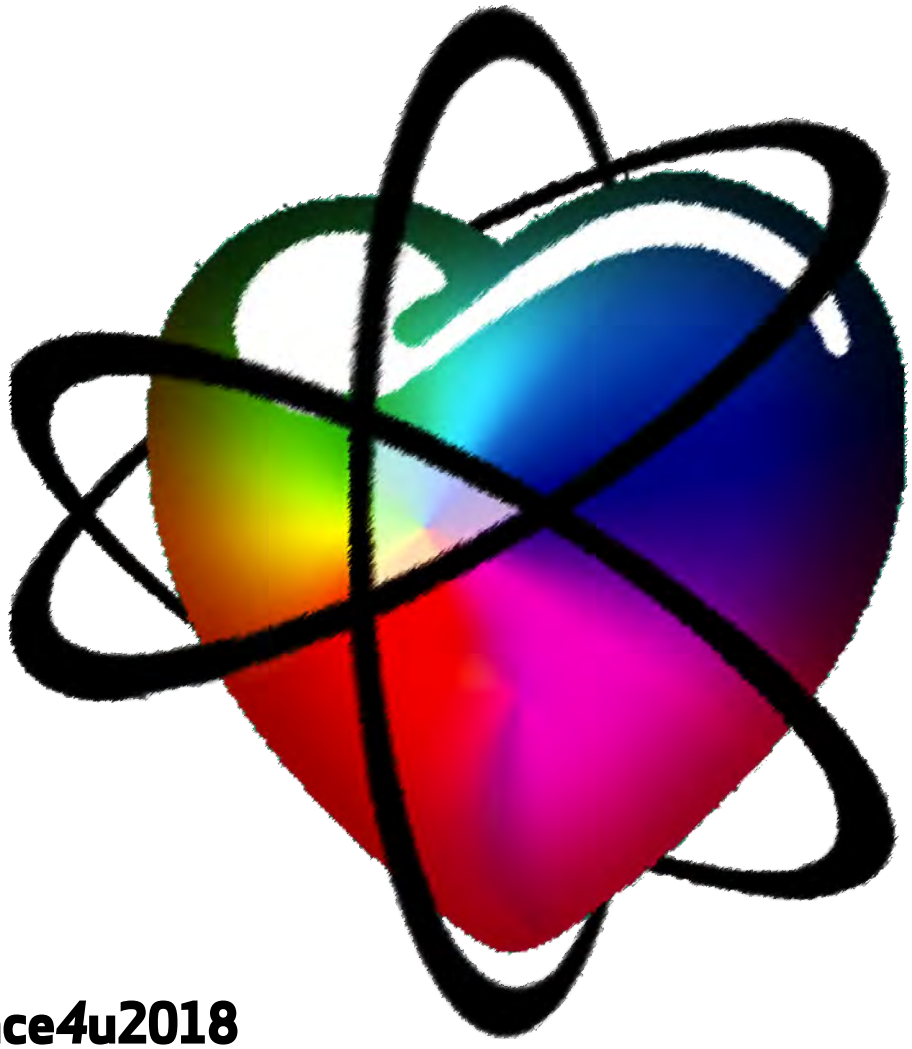
CELEBRATING 15 YEARS!

science4 Discovery

showcasing exciting careers in science



#science4u2018

The 15th Annual Schools Science Conference
Presented by science4u.info
in collaboration with University of Westminster

Science for Discovery

The 15th Annual Schools Science Conference | Presented by science4u.info in collaboration with University of Westminster 18th April 2018

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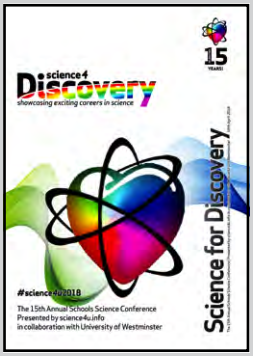
Welcome!



We are delighted to see you at our 15th Annual Schools Science Conference

Science for Discovery

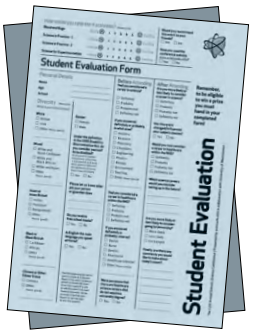
On behalf of the organising group we hope that you find this conference an exciting and informative day. Scientists and Healthcare Professionals from all over London have put together an exciting programme of interactive displays, talks and workshops about what they do. Each one of them is keen to share with you what they find fascinating about science and their profession. Make sure you ask them lots of questions. We want you to leave the conference with a better understanding about some of the many varied and interesting science based careers so that you can begin to plan for your own future and, hopefully, you might want to join us!

We are grateful to the **University of Westminster** who have again graciously offered to host the **science4u** schools day. They have lent us the use of their facilities, many of their staff are participating in the programme and the secondary school students will experience what a university environment is like. We are again thankful to **The Royal College of Pathologists (RCPath)** for again supporting this event and are delighted they are running the **Organ Workshop**. We would also like to thank all our programme volunteers, sponsors and supporters who enable us to provide this event.

The theme, **Science for Discovery**, was chosen as science has always played a vital role in new developments in the **NHS**; cutting-edge treatments such as gene therapy, new diagnostic tests, among others.
The **NHS** turns 70 this year. With the current financial constraints, future needs have to consider how essential science and scientific development can be delivered in a cost effective manner.

Throughout the day, please refer to the programme, paying particular reference to start times for each of the events. Sticking to the programme times will help the day run smoothly. There will be lots of things for you to collect as you go around the exhibits and a number of prizes are given out throughout the day. However, please ask before taking anything – as not everything on display is for you to take away.

Enter the prize draw!
Remember to hand in your completed evaluation form (grey form) before the Keynote Speech to enable you to enter the Prize Draw.



After the event, see the conference website science4u.info:

- Tour the **Virtual Laboratory** and learn more about science
- Take part in the **Battle of the Devices** workshop:
  Which device is the most innovative technology in healthcare today?
- Access **The Big Quiz** to test yourself on how much you learnt at the event!
- See pictures taken at the conference

Finally, this year we celebrate our 15th Anniversary. **science4u** raises funds in order to be able to hold this conference and we hope that you find the day both enjoyable and worthwhile!

Best wishes

Kimberly Gilmour & Stuart Adams

Kimberly Gilmour & Stuart Adams
Chairmen of the Organising Committee

Introduction

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Acknowledgements & thanks

Mark Baldwin

We are very excited about the theme of this year's conference: **Science for Discovery**.

The world has transformed radically since 1838, when the **University of Westminster** first opened as a place where discoveries can take place, technologies are showcased and scientists are educated for careers that can improve the world we live in.

The very nature of science and related disciplines fosters creativity and innovation that can lead to new and exciting discoveries. Examples include the growth in biotechnology and its applications in medical fields such as tissue engineering, medical implants, novel drug development and controlled drug delivery.

There is also discovery through collaboration – The **University of Westminster**'s ***Breast Cancer Research Unit*** has contributed to a major study on the genetics of breast cancer providing clues to the mechanisms behind the disease.

We hope that you will discover many exciting facts and careers from the event.

Please enjoy the day and keep in touch.

Mark Baldwin
Acting Dean
Faculty of Science and Technology
The University of Westminster

UNIVERSITY OF WESTMINSTER

Science for Discovery was made possible thanks to the very generous support of our key sponsors

Funding

Gold

C A Redfern Charitable Foundation

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Silver

sfam society for applied microbiology

Westminster Almshouses Foundation

Thanks also to the following organisations for their generous support

BioConnections

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Public Health England

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SARSTEDT

The Association for Clinical Biochemistry & Laboratory Medicine

The Royal College of Pathologists Pathology: the science behind the cure

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Organising Group 2018

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Founder

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Co-Chair
Great Ormond Street Hospital For Children NHS Foundation Trust

Stuart Adams
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Great Ormond Street Hospital For Children NHS Foundation Trust

Sue Alexander
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Imperial College Healthcare NHS Trust

Sarah Armstrong
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Mike Carter
Public Health England

Paul Hampson
University of Westminster

Penny Fletcher
The Royal College of Pathologists

Ayuen Lual
Public Health England

Maria Rossini
British Science Association

Sharon Gage
Event Organiser
SRG Project Management

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Programme

science4 Interaction

Interactive workshop
Presented by the Royal College of Pathologists

Organ Workshop

Do you know where your liver is and what job it does? What about your pancreas? Would you donate a kidney? These are all questions you'll explore at this lively organ-themed workshop. Our friendly team of pathologists will first challenge you to work out where each organ is found in the body; then you'll have fun trying to match the organ to the fruit to guess its weight. You'll also take part in a group activity about organ donation.

As well as getting to work with pathologists and other medics and scientists, you'll also get to take away info about careers in pathology plus other Royal College of Pathologists freebies!

The Royal College of Pathologists
Pathology: the science behind the cure

Interactive exhibits
Exploring how the body works

Science in Practice

Three hands-on interactive sessions where you meet scientists, try out some scientific equipment, undertake scientific assessments, answer questions for prizes and learn how science is applied to healthcare. AND don't forget to ask scientists what they do and why they love their jobs.

See the **Big Quiz** on subsequent pages and ask these questions as you meet appropriate experts.

Incorporating:

The Science of You
Presented by University of Westminster

Whether you know if or not, you are a living, breathing work of science. **The Science of You** will demonstrate, through a number of interactive stands, how each of us is a product of the science that is constantly occurring within and around us. Increasing our understanding of nutrition, health, materials, biology and medicine will help us know more about ourselves.

UNIVERSITY OF WESTMINSTER

Programme

As most people are aware, the NHS is stretched financially more than ever before. So there is even more necessity for the science of discovery to address how we can treat more patients with better treatments for less money. Scientists must choose wisely when pursuing pathways for research to ensure that the outcomes will be cost-effective.

Keynote Speech

Dr Dominic King MD PhD - Clinical Lead, DeepMind

How artificial intelligence can be used in healthcare

In his talk, Dr King will discuss his time as a surgeon and how the work currently being carried out by DeepMind is aimed at using AI to transform the healthcare sector - from building algorithms to detect eye disease, to designing technology that detects patient deterioration.

DeepMind is the world leader in artificial intelligence research and its application for real world impact. DeepMind Health was launched in February 2016 to build mobile tools and use AI research to help get patients from test to treatment as quickly and accurately as possible. The clinical app company Dominic King co-founded out of Imperial College London, HARK, was acquired by DeepMind in 2016. Dominic is an Honorary Clinical Lecturer in Surgery at Imperial College London, where he worked for over a decade in the Academic Surgical Unit. Dominic's research interests lie in digital health, patient safety and behavioural economics.

science4 Experimentation
science project and presentation

Workshop

Young Scientists present their own work

Prior to today's event we asked you to undertake a research project that you will present to the other schools in your group. All presentations will be competing for **The Association for Clinical Biochemistry & Laboratory Medicine Trophy for the Don Henderson Award.** The award will be presented at the end of the day.

The Association for Clinical Biochemistry & Laboratory Medicine

Science for Discovery

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Programme Timetable

Smooth running

Please refer to the programme times to help the day run smoothly

A member of the organising group will accompany you around the venue and help direct you to the appropriate areas

Red Group

09:45 Welcome & Introduction
Large Lecture Theatre Level 2

10:00 Science in Practice - 1, 2 & The Science of You
Ground Floor
1.15 / 1.16 Level 1
Pavilion Level 1

11:30 Lunch
Lunch break - **The Refectory** Lower Ground

12:15 Organ Workshop
1.03 / 1.04 Level 1

13:15 Science for Experimentation
Large Lecture Theatre Level 2

14:15 Evaluation
Large Lecture Theatre Level 2

14:30 Keynote Speech
Large Lecture Theatre Level 2

14:45 Round-up & Prize Giving
Large Lecture Theatre Level 2

Green Group

10:15 Welcome & Introduction
Large Lecture Theatre Level 2

10:30 Organ Workshop
1.03 / 1.04 Level 1

11:30 Science for Experimentation
Large Lecture Theatre Level 2

12:30 Lunch
Lunch break - **The Refectory** Lower Ground

13:15 Evaluation
Please complete your evaluation as far as possible
The Refectory Lower Ground

13:30 Science in Practice - 1, 2 & The Science of You
Ground Floor
1.15 / 1.16 Level 1
Pavilion Level 1

Please complete the remainder of your evaluation

15:00 Keynote Speech
Large Lecture Theatre Level 2

15:10 Round-up & Prize Giving
Large Lecture Theatre Level 2

Timetable

science4u is grateful to the following organisations and

- Barking, Havering and Redbridge University Hospitals NHS Trust
- Barts Health NHS Trust
- British Science Association
- DeepMind
- East and North Hertfordshire NHS Trust
- Geogina's Science Tuition
- Great Ormond Street Hospital for Children NHS Foundation Trust
- Guy's and St Thomas' NHS Foundation Trust
- Imperial College Healthcare NHS Trust
- Imperial College London
- Institute of Biomedical Science
- London Ambulance Service NHS Trust
- National Infection Service, Public Health England
- NHS Blood and Transplant
- PharmaInclusion

An example of this can be found with the Newborn Screening program for babies. In the UK we currently screen newborn babies for a number of different diseases, including cystic fibrosis, sickle cell anaemia and some metabolic disorders. A new plan is underway to introduce screening for a rare, and fatal if untreated, disease called Severe Combined Immunodeficiency (SCID).

»

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Blue Group

10:45 Welcome & Introduction
Large Lecture Theatre Level 2

11:00 Science for Experimentation
Large Lecture Theatre Level 2

11:30 Science in Practice - 1, 2 & The Science of You
Ground Floor
1.15 / 1.16 Level 1
Pavilion Level 1

13:00 Lunch
Lunch break - **2.14 / 2.15** Level 2

14:00 Organ Workshop
1.03 / 1.04 Level 1

15:15 Evaluation
1.03 / 1.04 Level 1

15:30 Keynote Speech
Large Lecture Theatre Level 2

15:45 Round-up & Prize Giving
Large Lecture Theatre Level 2

Teachers' Workshop

12:15 Red Group

14:00 Green Group

14:00 Blue Group

C2.11 Level 2

STEM Learning

Presented by Robert Cooper
Senior Facilitator and Science Consultant with STEM Learning

STEM Learning is a not-for-profit organisation that delivers subject-specific, high impact professional development and resources, so teachers can teach effectively and inspire the young people with whom they work. All activities are grounded in appropriate education and scientific research and are supported by clear evidence of impact. Teachers' will learn what is available for face-to-face and online CPD for teachers in STEM subjects and a wide range of resources to help make lessons exciting and engaging for students.

CREST

Presented by Sharon Buckley
Primary Science Education Consultancy Ltd
Regional CREST Support Organisation, London

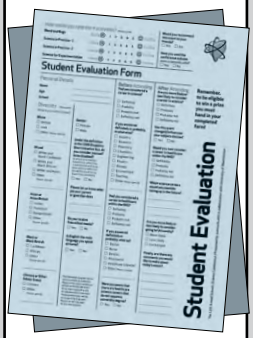
During the presentation the structure and benefits of the CREST award scheme will be shared and teachers will be guided to resources and how to apply online.

Prizes

Remember to hand in your completed evaluation form before the Keynote Speech

Feedback on the Conference is essential for us to improve future events and helps with funding.

As an incentive, we will put your completed evaluation form into a prize draw.



Students –
Light grey form

Teachers –
Dark grey form

their staff for their kind participation and enthusiasm

- Public Health England
- Queen Mary University of London
- Royal Brompton & Harefield NHS Foundation Trust
- Royal College of Anaesthetists
- St George's University Hospitals NHS Foundation Trust
- St George's University of London
- The Association for Clinical Biochemistry and Laboratory Medicine
- The Institute of Cancer Research Clinical Trials and Statistics Unit
- The Operational Research Society
- The Royal College of Pathologists
- The Royal Marsden NHS Foundation Trust
- University of Reading
- University of Westminster

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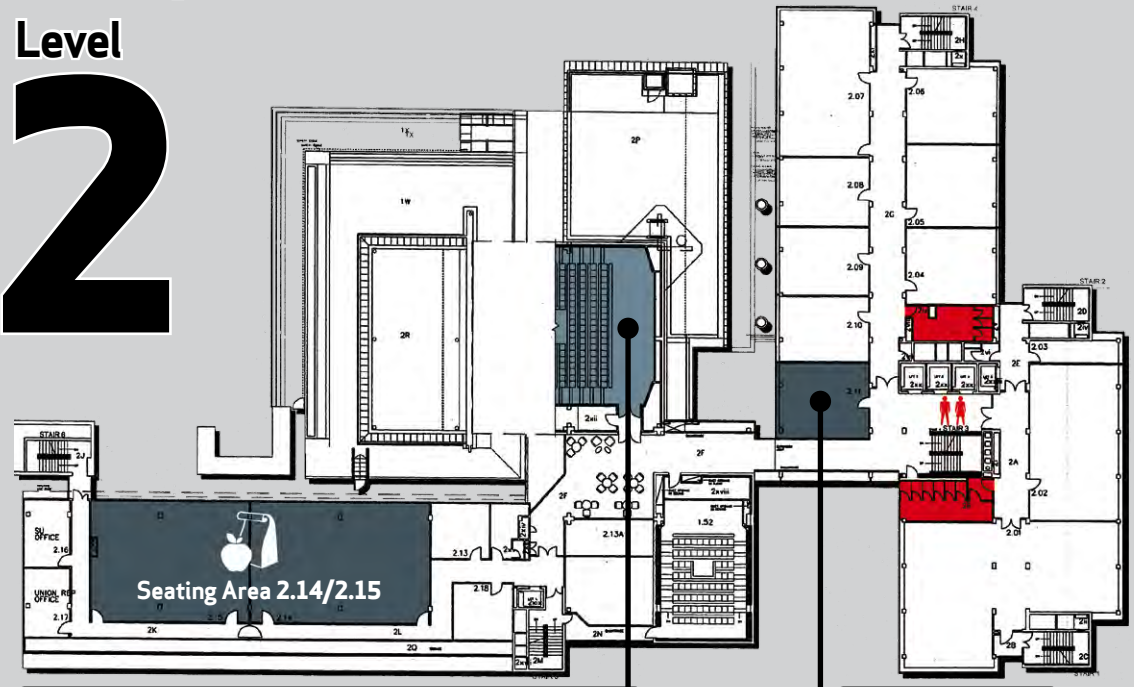
Floorplan

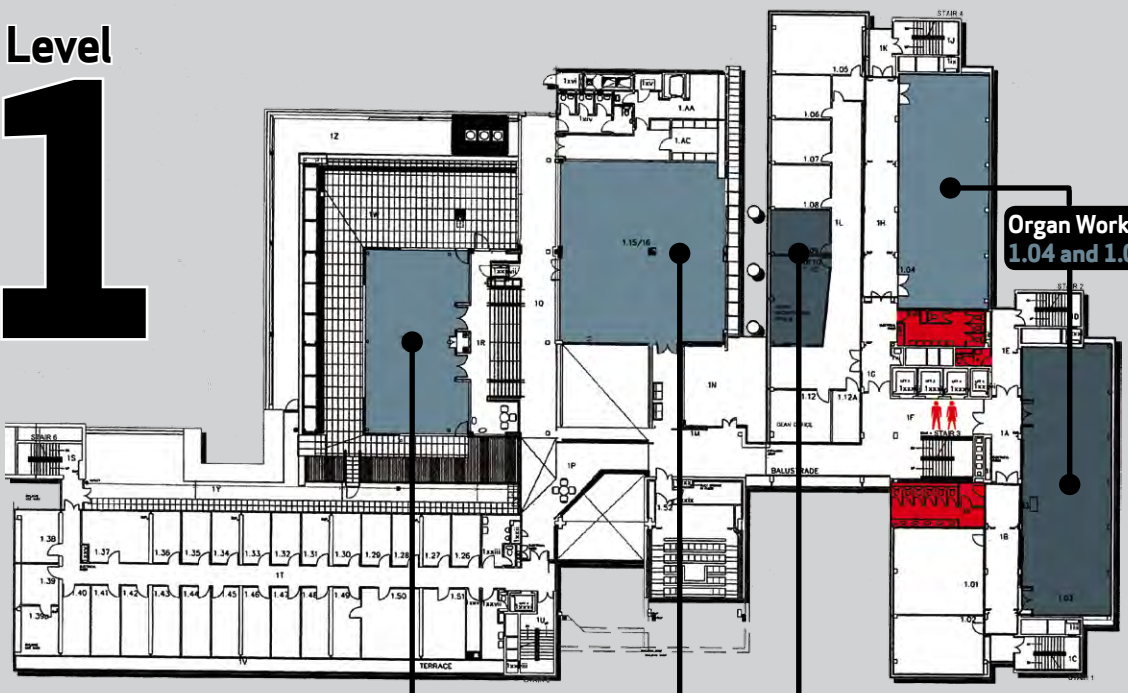
Level 2



Introduction, Science for Experimentation, Keynote speech
Large Lecture Theatre

Teachers' Workshop
C2.11

Level 1



Organ Workshop
1.04 and 1.03

Science of You
The Pavilion

Science in Practice - 2
1.15/1.16

Teachers'/Volunteers'
Tea & Coffee 1.09/1.10

Floorplan

Science for Discovery

This leads to babies having a highly defective immune system and around 60% of these babies end up in intensive care in hospitals for long periods before finally dying from infection. However when we know at birth the baby might have SCID (because an older brother or sister had SCID and it is a genetic condition) we save nearly all the babies using bone marrow transplants or gene therapy as a cure.

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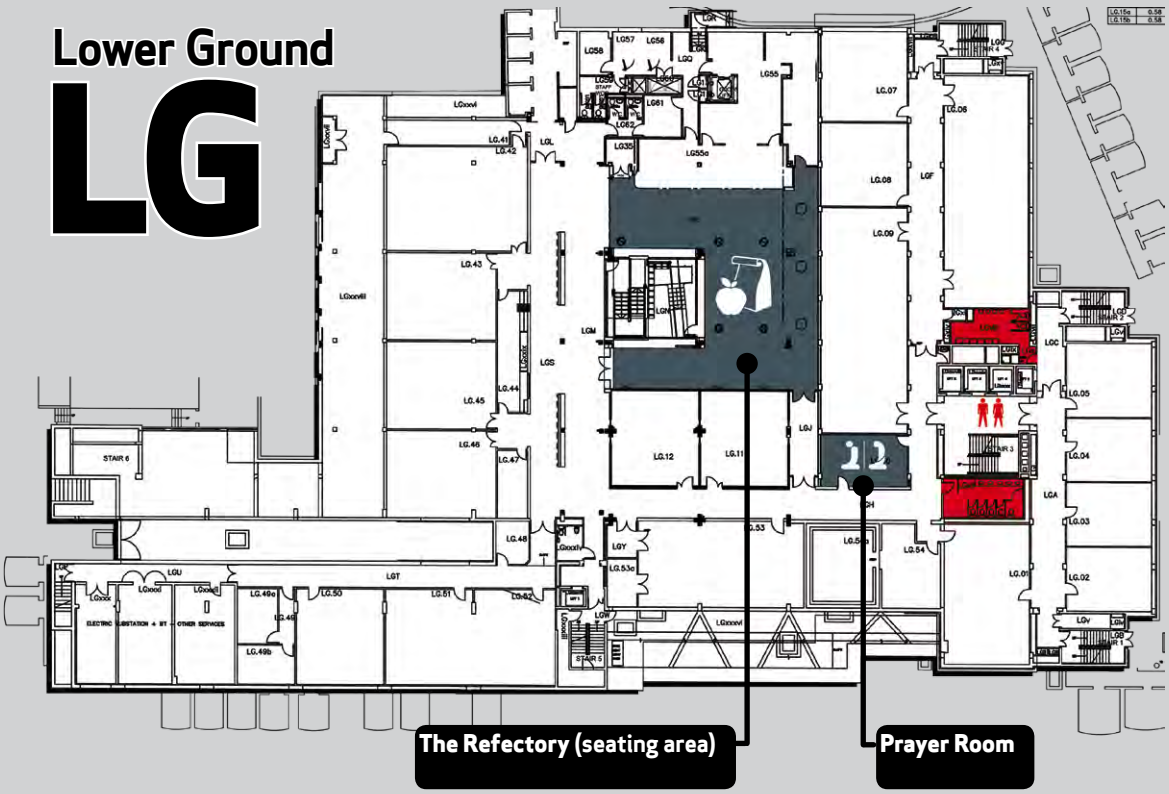
Ground G

Lower Ground LG



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The Big Quiz

Can you succeed in The Big Quiz?

1 Which of the following technologies can be used for therapeutic drug monitoring?
- **A** Fluorescence immunoassay
- **B** Cellulose acetate electrophoresis
- **C** Ultracentrifugation

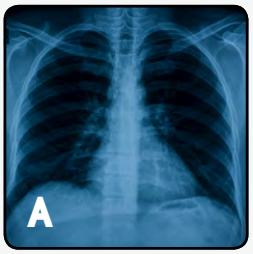
2 In February 1917 (during WW1), German U Boats were sinking 1 in 10 ships in Britain's Atlantic supply line. Using maths and science, 6 months later this figure was down to?
- **A** 1 in 10
- **B** 1 in 20
- **C** 1 in 200

3 In which year was the first monoclonal antibody generated?
- **A** 1995
- **B** 1985
- **C** 1975

4 Which of the following antibiotics requires monitoring?
- **A** Ampicillin
- **B** Gentamicin
- **C** Amoxicillin

5 Do a kidney transplant patient and donor need to be blood group compatible?
- **A** Yes
- **B** No
- **C** Sometimes

6 Which would give you the highest dose of radiation?
- **A** Chest X-Ray
- **B** A flight across the Atlantic
- **C** 1 kg of brazil nuts



7 What is OSA?
- **A** Obstructive Sleep Apnoea
- **B** Orignal Sleep Architecture
- **C** Only Stay Awake

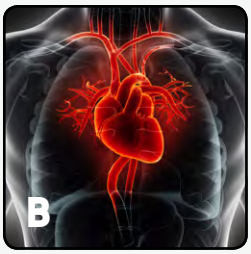
8 What is Operational Research?
- **A** Using maths, statistics and programming alongside logic and modelling to analyse complex situations and make predictions
- **B** Operational Research practitioners are people trained and experienced in finding effective approaches to real-world problems by using maths and science
- **C** Both of the above

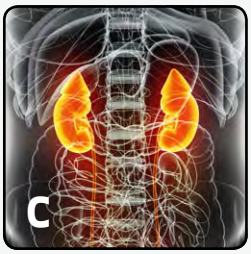
9 How many different types of registered Radiographer are there in the UK?
- **A** 1
- **B** 2
- **C** 3

10 Height is a factor that influences lung function, what factor doesn't influence lung function?
- **A** Age
- **B** Ethnicity
- **C** Weight

11 Registered nurses can deliver radiotherapy treatment to patients who have cancer?
- **A** True
- **B** False

12 What is a haemodialysis machine used to treat?
- **A** Liver failure
- **B** Heart failure
- **C** Kidney Failure





13 A combined kidney and pancreas transplant is used in the treatment of which of the following?
- **A** Chronic Pancreatitis
- **B** Diabetes Mellitus
- **C** Rheumatic Fever

Scientists have developed a SCID Newborn Screening test that can be carried out on all newborn babies to find the affected infants shortly after birth and before they become ill. In this way we hope to both ensure nearly all babies with SCID are treated and survive to become normal healthy adults, and also save the NHS money by avoiding the need for sick babies to have prolonged stays in intensive care units in specialist hospitals. Maybe you could be the scientist that develops the next test that saves lives...

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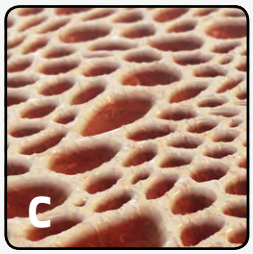
The Big Quiz

Ask the experts to find the answers. Over the next week, collate your best answers. Submit online - science4u.info. The school with the most correct answers will be sent a prize!

14 Where are blood cells produced?
- **A** Heart
- **B** Lungs
- **C** Bone Marrow



15 Name one reason an anaesthetist/doctor may use an ultrasound machine?
- **A** In order to visualise the patients' arteries and veins
- **B** In order to search patient blood results
- **C** In order to calculate the dose of drugs to give to patients

16 Which organs/ structures may be damaged when intubating a patient's airway?
- **A** Nose, heart, radial artery, appendix
- **B** Teeth, tongue, gums, vocal cords
- **C** Colon, teeth, gums, aortic valve

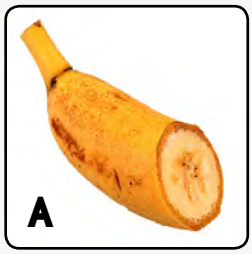
17 What is the instrument called that is used to intubate a patients airway?
- **A** Stethoscope
- **B** Forceps
- **C** Laryngoscope

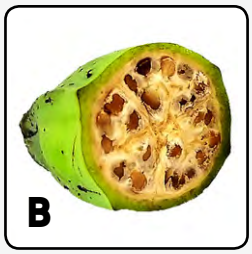
18 Are genetically modified organisms (GMO) bad?
- **A** Yes
- **B** No
- **C** It's complicated

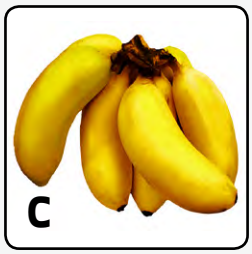
19 There are 5 million trillion trillion (5,000,000,000,000, 000,000,000,000,000, 000) bacteria in the world! What percentage is harmful to humans, plants and animals?
- **A** 10%
- **B** 49.7%
- **C** All of them

20 How much does it cost to develop one medicine?
- **A** £7,700
- **B** £77,000
- **C** £770,000,000

21 Which of these three bananas has been genetically modified?
- **A** Price Lookup Code 84011
- **B** Price Lookup Code 94011
- **C** Price Lookup Code 4011







22 What was Charles Darwin's book on the theory of evolution called?
- **A** On the Origin of Species
- **B** The Tree of Life
- **C** The Book of Life

23 How many experiments does it take to develop one medicine?
- **A** ~6,600
- **B** ~66
- **C** ~660

24 How many hours of work does it take to develop one medicine?
- **A** ~7,000,000
- **B** ~70,000
- **C** ~700

25 Which German physician and scientist discovered the organism that causes tuberculosis (TB) in 1882?
- **A** Rudolph Virchow
- **B** Robert Koch
- **C** Emanuel Klein

26 Which one of these activities does NOT involve the use of particle accelerators?
- **A** Radiotherapy
- **B** Physics research
- **C** Powering cars

?

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After the conference . . .

science4u.info

Visit the conference website

View photographs of the event, see how much you learned today by entering The Big Quiz, tour the Virtual Laboratory, and take part in *Battle of the Devices*.

Battle of the Devices
Each year, millions of patients find their lives are changed or saved by medical technology.
Our experts go head-to-head to try to convince you that their chosen medical device is the most innovative technology in healthcare today. Who deserves to win the **Battle of the Devices**? You decide.

Virtual Laboratory
If meeting and speaking with scientists has got you interested in a career in science then tour the Virtual Laboratory.

- Try your hand at diagnosis
- See a wide range of immunology tests
- Discover what it is it like to be a scientist in a number of video interviews!

westminster.ac.uk

UNIVERSITY OF WESTMINSTER

University of Westminster
Faculty of Science and Technology
It may be early days for you to decide about a career but not for developing your interests.

Opportunities change fast, particularly in London where business drives and is driven by technology - only a small number of professionals have job titles as recognisable as doctor or lawyer but there are many more which you may not be aware of. We can help you keep yourself informed about the many opportunities and possible career paths that there are, in the rapidly changing sciences.

Our central London site is dedicated to the teaching and research of Science and Technology where we offer a full range of professionally certified courses in:
Biomedical Sciences Biosciences
Business Information Systems
Complementary Medicine
Computer and Network Engineering
Computer Science and Software Engineering
Computer Systems and Robotics
Electronic Engineering
Multimedia and Games Computing
Nutrition **Pharmacology** Psychology

We aim to find the best ways for you to become effective in your chosen area: being able to think, communicate, innovate and influence positively with opportunities to work creatively with your colleagues in our technologically advanced spaces or, if you choose, in a relevant external organisation.

Check out our website: **www.westminster.ac.uk**, take the online virtual tour, come to an open day, and ask your teacher if you would like us to customise a visit for students in your school.