



Pearson Edexcel International Sciences

Laboratory Setup Guide



Introduction

- The purpose of this pack is to provide teachers and technicians with guidance on how to set up laboratories.
- Whilst many references have been made to UK regulations and guidelines, it is imperative that local government building regulations and health and safety regulations are checked and followed.
- Note that local regulations supersede any guidance provided in this laboratory setup guide. It is your responsibility to check that your local regulations are adhered to.
- If you have any enquiries regarding these materials or have any other questions about the course, please contact our Science subject advisor on teachingscience@pearson.com.



Contents

Pearson Edexcel International Sciences	1
Laboratory Setup Guide	1
Introduction	2
Guide to laboratory design for science teaching	4
Services	5
Safety	8
Preparation Areas	12
Number and type of laboratories	15
Fume cupboards (Local exhaust ventilation [LEV] systems)	20
Teacher area	21
Laminar flow cabinets	22
Refurbishing existing laboratories.....	23
Some useful websites:.....	25



Guide to laboratory design for science teaching

This booklet is a guide to planning new laboratories and adapting existing facilities.

Science teaching needs a variety of areas including laboratories, stores, technician workshops or preparation rooms, resource areas and office space for teachers.

Siting all the science accommodation in one area is usually more economical in terms of both teachers' and technicians' time. This can also result in more efficient use of preparation and storage space and reduce the overall equipment needs for science.

The following is a general guide to help you adapt existing laboratories and plan for new laboratory facilities that are fit for purpose, compliant with legislation and flexible to meet a range of learning needs; this includes supporting the thinking of students, to raise their expectations and achievements and encourage them to participate in the learning process.

Students should be able to carry out practical work but the teacher also needs to demonstrate techniques. There also need to be adequate preparation facilities and storage areas.

Ideally there should also be a greenhouse and potting shed and a lockable store for dangerous chemicals and radioactive materials. The potting shed could have a living roof.

The internal décor of the laboratories should also be considered to give a stimulating atmosphere conducive to learning.

So modern school science laboratories are not just spaces for carrying out experiments but should incorporate modern technology, foster collaboration and creativity, be accessible and pay attention to safety.

Schools are required to;

- Provide a safe environment
- Assess and control risks
- Use appropriate equipment and facilities

There are many things to consider such as

- How the labs will fit with a modern approach to teaching and facilitating student learning
- Making the learning space comfortable and stimulating
- Use of colour
- Heating
- Lighting
- Ventilation



- Acoustics
- Safety
- Procedure for accidents
- Coats and bags
- Fume cupboards and laminar flow cabinets
- Incubators and ovens
- Refrigerators
- Accessibility
- Services
- Worktops and surfaces
- Flooring
- Preparation areas
- Storage spaces
- Teacher area
- Getting the maximum use from the labs
- Integration of technology such as whiteboards and projectors and digital workstations
- Cutting edge tools and equipment such as equipment for DNA electrophoresis, genetically modifying bacteria, 3D printers and scanners
- Interactive displays
- Collaborative spaces
- Green spaces

Services

All laboratories need to be equipped with the basic services – gas, electricity and water and all need to adhere to health and safety standards.

Under floor cabling and ducting is best as leads dangling from the ceiling can be hazardous and also look very untidy. All the ducts must be easily accessible and well ventilated, especially those carrying gas pipes. All cables and pipes need to be well supported or fixed to the walls, especially where the servicing system is flexible. Electrical earthing regulations must be followed.

Sinks should be resistant to chemicals and heat.

There should also be facilities for students to use IT in the lesson when necessary.

Service bollards will ideally need to be permanent, but they can be used in conjunction with mobile benches for added flexibility



Water

Each laboratory should have a manual shut-off valve for its water supply. Easy access to sink waste traps should be included at each sink. Also consider the insulation of water pipes.

Electricity

All installations should comply with the latest local legislation. Some questions to ask are:

- Is the system correctly wired and protected?
- Are all electrical items earthed properly?
- Is portable electrical equipment inspected and tested at intervals in line with current best practice and recommendations from the government or local authorities responsible for health and safety issues?
- Is a residual current device (RCD) used to protect the supply in each laboratory?
- Is this device easily accessible to the teacher, for example near the main entrance?

It may be appropriate to include extra electrical switching. For example, a single switch at the teacher's desk may control a ring supplying all the low-voltage power supplies to the laboratory, so assisting in the control of experimental work. As with the installation and safe use of fume cupboards, you may decide to seek local advice.

Gas

Each laboratory with piped gas should have a manual shut-off valve at the pipe entry to the laboratory. An automatic shut-off system can be used – this is activated in the event of a gas leak if the manual valve is not easily accessible. Gas pipes should be installed in accordance with local legislation. If gas bottles/cylinders are used, these should be fitted in a secure cage outside the building. The use of portable Bunsen burners is acceptable as long as safe storage is provided. The use of spirit burners as a replacement for Bunsen burners is **not** acceptable as the temperature generated is insufficient for many experiments.

Heating

A recommended temperature to be maintained is 18°C. Suitable air conditioning and heating should be installed and maintained.



Lighting

A minimum of 300 lux is recommended. Adequate windows (about 20% of exterior walls) need to be incorporated, and blinds fitted to reduce glare and reduce excessive heat during hot weather.

For microscopy work if the microscopes do not have integral light sources, portable lamps will be required, as they will for some optics or photosynthesis experiments.

Ventilation

School science labs should be ventilated to a minimum of 8 L s⁻¹ fresh air per person. This is to limit carbon dioxide build up so that it does not exceed 1500 ppm. Air changes per hour can be used, especially if Bunsen burners are in use. Windows must be maintained so that they can be opened.

Acoustics

Outside noise such as from busy roads should be kept to a minimum as it is distracting and disruptive to learning. The ideal background noise level for a lab is 40 db. Reverberation time between 0.5s and 0.8 s is optimum to allow teachers and students to speak at a suitable volume. Window blinds and acoustic panels can reduce reverberation time. However, acoustic panels should not be used in the ceiling as this can restrict the range of a teacher's voice.



Safety

Centres are responsible for safety matters. Below are some UK associations, publications and regulations which give guidance on UK regulations.

Associations:

CLEAPSS is an advisory service providing support in practical science and technology.

www.cleapss.org.uk

The Association for Science Education promotes excellence in science teaching and learning. www.ase.org.uk

Publications:

Safeguards in the School Laboratory, ASE, 12th edition January 2020

Topics in Safety, ASE, 3rd edition, 2001

CLEAPSS Laboratory Handbook, updated annually (available to CLEAPSS members only)

CLEAPSS Hazcards, updated annually (available to CLEAPSS members only)

Hazardous Chemicals, an interactive manual for science education, SSERC, 2002 (CD)

UK Regulations: Control of Substances Hazardous to Health Regulations (COSHH) 2002
www.legislation.gov.uk/uksi/2002/2677/contents/made

You can find a brief guide at: www.hse.gov.uk/pubns/indg136.pdf

European Regulations

The European Chemicals Agency, ECHA, publishes a 'candidate list' of chemicals that are scheduled to require authorisation under EU chemicals legislation and are therefore unsuitable for use in schools: www.echa.europa.eu/web/guest/candidate-list-table



All laboratories should have

- a sand bucket
- fire blankets
- two carbon dioxide fire extinguishers
- first aid kit and details of the school's qualified first aider(s)
- disinfectant sprays
- absorbent paper
- eyewash kit
- hand sterilisers
- hand-washing facilities
- spillages kits and information as to how to deal with different types of spillages
- eye goggles for use by all students
- other PPE as needed – e.g. lab coats or disposable aprons and gloves
- Sharps bins for disposal of broken glassware, needles and scalpels
- The ability to shut off gas, electricity and water from a central point

All staff should know the procedures for dealing with an emergency such as a fire or a serious accident and there should be a procedure for recording incidents, including those that appear to be minor.

Safety sheets

Student safety sheets should be accessible and visible to students so that they can carry out risk assessments before beginning their practical work.

Coats and bags

There should be sufficient storage near the entrance of the room for students to store coats and bags, without blocking the exit. There should be no bags or books or other obstacles in gangways or near workstations as these pose a trip hazard and could also be damaged because of any spillages. Open fronted lockers and coat hooks near to the entrance can be a solution.

Procedure for accidents and spillages

Accidents such as spillages and damage to equipment do rarely occur and usually, they are minor. The teacher should assess the situation and deal with it if they feel able to do so. In the case of a more serious incident, then the lesson should be stopped and help sought from the qualified first aider or other colleagues.



Immediate remedial measures

This details the remedial measures that staff may carry out while waiting for first aid or professional remedial treatment. The following advice covers common laboratory accidents.

Chemical splashes in the eye

Immediately wash the eye under running water from a tap for at least 10 minutes. The flow should be slow and eyelids should be held back. Afterwards, take the casualty to the school first aid representative.

Chemical splashes on the skin

Wash the skin for 5 minutes or until all traces of the chemical have disappeared. Remove clothing as necessary. If the chemical adheres to the skin, wash gently with soap.

Chemicals in the mouth, perhaps swallowed

Do no more than wash out the casualty's mouth with water. After any treatment take the casualty to the school first aid representative. Do not make any attempt to apply an antidote.

Burns

Cool the burn under gently running water until first aid arrives. The casualty should then go to the school first aid representative.

Toxic gas

Sit the casualty down in the fresh air.

Fire

All staff must know how to deal with hair or clothing on fire and must also be aware of the evacuation procedure. Details of this and assembly points should be displayed in each lab.

Hair on fire

Smother fire with a damp cloth.

Clothing on fire

Smother fire by pushing the casualty to the ground, flames underneath. Spread a thick cloth or garment on top if necessary. A fire blanket is ideal in labs but only use if very close by.



Electric shock

Take care for your own safety. Break contact by switching off or pulling out the plug. If you need to move the casualty clear while the supply is still on, use a broom handle or some such implement, or wear rubber gloves.

Bad cuts

There are gloves in all first aid kits; wear these. Apply pressure on or as close to the cut as possible, using fingers or a pad of cloth. Leave any embedded large bodies and press around them. Lower the casualty to a chair or the floor and raise the wound as high as possible.

Splinters

These are best removed by the school first aid representative.

First Aid equipment

First aid boxes and travelling first aid kits should contain enough suitable first aid materials and nothing else. The contents of the boxes and kits should be replenished as soon as possible after use so there is always an adequate supply of all materials. Items should not be used after the expiry date shown on packets. First aid equipment must be checked frequently to make sure there are enough items and that all are usable.

The first aid equipment should be kept in a labelled, damp-proof, dust-proof, container, which is used exclusively and specifically for the purpose of first aid in the workplace.

The standard first aid box should contain only the following materials:

- a card giving general first aid guidance
- sterile (unmedicated) dressings of various sizes (e.g. six 12 cm x 12 cm and two 18 cm x 18 cm dressings)
- individually wrapped adhesive dressings (minimum of 20)
- two sterile eye pads, preferably with attachments
- a minimum of four individually wrapped triangular bandages
- six safety pins
- several pairs of disposable gloves.

The quantities of each type of first aid material will depend upon the workplace and number of students and staff.



Important advice

In places where mains water is not readily available for eye irrigation, sterile water or sterile normal saline (0.9 per cent) in sealed, disposable containers should be provided. Each container should contain at least 300 mL and should not be re-used once the seal is broken. At least 900 mL should be available.

Sterile first aid dressings should be packaged to allow the user to apply the dressing without touching the part which is to come into direct contact with the wound. This part should be absorbent. There should be a bandage or other fixture attached to the dressings – there is therefore no reason to keep scissors in the first aid box. Dressings, including adhesive ones, should be of a design and type appropriate for their use.

Supplementary equipment

Disposable gloves, aprons and suitable protective equipment should be provided near the first aid materials and should be properly stored and checked regularly to make sure that they remain in good condition. Plastic disposable bags should be provided for soiled or used first aid dressings. Used dressings must be safely disposed of in sealed bags in accordance with any local regulations.

Preparation Areas

Sufficient preparation areas are essential. One prep room can serve four labs and ideally should be central to these labs. Apparatus can be moved from prep room to lab, or from one lab to another via trolleys. There should therefore be a trolley park to store trolleys safely.

Chemicals storage

There should be locked storage facilities for dangerous chemicals, and everything should be clearly labelled. The store should have adequate ventilation and be made from fire resistant materials. There should be enough shelving so that acids, alkalis, flammables and oxidisers are adequately separated from each other.

The store must also be isolated from teaching spaces and other areas frequented by students, and from escape routes but be as near as possible to technician work areas.

Refrigerators will be needed for the storage of ice, many biological stock solutions and microbiological living specimens.

Prep rooms should also have an **incubator** for microbiological experiments, although an incubator can also be situated in the biology lab.



An **autoclave** will be needed for preparing sterile nutrient media for microbiological experiments and for safely disposing of microbiological samples.

Prep rooms should also have a **distillation unit**, **fume cupboard** and a **sharps disposal box** and room for carrying out **electrical repairs** and **soldering**.

A system of **stacked and labelled trays** is very useful and an efficient way to store a lot of equipment and to move equipment to laboratories.



(Illustration generated using MS Co-Pilot)

There should be adequate fully serviced workspace for technicians to work, including when

- diluting and dispensing chemicals
- washing glassware – a dishwasher should be provided
- preparing agar plates
- assembling sets of apparatus and reagents for specific practical investigations
- repairing equipment and apparatus
- constructing new apparatus

There should be a system in place for staff to pre-order equipment for the following weeks' experiments.



Worktop space should have chemical-resistant finishes and be able to be easily cleaned and sterilised. Sinks should be large enough to handle trays, glassware and spoil management. There should be waste segregation points.

Technicians should always show how many sets of equipment and apparatus are supplied for each lesson so that the teacher can check that all the items are returned by students at the end of the lesson.

Technicians should have access to and use HAZ cards, student safety sheets and the Laboratory Handbook (available from CLEAPPS).

The Head of science is responsible for ensuring safe culture and practice and to ensure that the laboratories are equipped to allow a full range of practical work to support the teaching of science.

On-going practices to ensure this include;

- Staff training for science teachers and technicians
- Annual safety and equipment checks
- Fume cupboard maintenance
- Updating of records and risk assessment
- Chemical storage audits
- Application of CLEAPPS

Senior leadership teams and governors of the school are legally responsible for making sure that the school is following good safety practice.

Radioactive materials

The teaching of most combined science, co-ordinated science and physics courses is enhanced by demonstrations using radioactive sources. As with chemicals, it is essential to comply with all local regulations.

The sources need to be stored in a locked, labelled cupboard away from the labs or prep rooms. Access to the cupboard and its keys should be controlled and a log kept of all movements of the radioactive sources. The sources need careful maintenance, and only properly trained staff should be allowed to use the sources.

Stock taking

Lab technicians should keep an accurate inventory list of chemicals in stock, together with their locations, and advise the Head of Subject when items need to be reordered. They should also make sure that all chemicals are stored according to the latest COSHH regulations and that all chemicals can be always accounted for.



Storage in the laboratories

Each lab should have adequate a safe storage space for most often used equipment such as eye goggles, glassware, Bunsen burners, tripods, mats and gauzes, thermometers, microscopes and slides, thermostatically controlled water baths, circuit boards and accompanying equipment, burettes and volumetric pipettes. Bear in mind that each type of designated lab may be used for combined science for years 7-9.

Glass fronted cupboards are ideal for storage so that students can see the contents, but all cupboards should also be clearly labelled to show their contents.

Students should be able to stow their **chairs/stools** while carrying out practical work, so that these items do not present trip hazards.

Number and type of laboratories

The number and types of laboratories will depend upon your school or college's curriculum, class sizes, staffing and timetabling. When planning to adapt or design new laboratories you also need to consider the future – will the school/college increase in size? - and make sure that your plans are future-proofed. It may be necessary to have some labs adjacent to each other with partition walls between them that can be opened to give a larger lab, possibly with cooperative teaching, when needed.

Calculate the total number of science periods per week and divide by the number of teaching periods per week. This gives the minimum number (N) of science laboratories needed. Bearing in mind that each lab should be in use for only 80 to 90% of each week, to allow time for cleaning and servicing, multiply N by 1.25 and then round to the nearest whole number. This gives the number of laboratories needed.

Interchangeability

Ideally all laboratories should be so equipped that they can be used for any of the sciences (Biology, Environmental Science, Chemistry, Physics, Geology or Engineering Technology). However, this may be beyond the budget so you should consider which lab can perhaps be used for two of the science.

For example, Chemistry and Biology may often use a fume cupboard (which can also double as a laminar flow cabinet for microbiological practicals) but the other sciences will rarely, if at all, use a fume cupboard so not all of the labs need to be equipped with a fume cupboard.

Physics and Biology will often use blackout facilities for experiments with light and photosynthesis, but the other labs may not need blackout facilities.



Biology labs need space for plants. If you are fortunate enough to have a greenhouse it should be close to the labs but some plants in the lab create a pleasant atmosphere, as well as improving air quality and the presence of some plants in labs designated mostly for other sciences can also benefit students.

For teaching Biology, a pond in the school grounds is very useful, as are areas in the school grounds for carrying out ecological surveys.

Worktops and surfaces

Most practical investigations for all the science subjects may use chemicals at some time so particular attention needs to be paid to the type of work surfaces and flooring used.

Worktops should all be heat tolerant, resistant to chemicals and durable. They should be smooth (not made of wood) so they can be easily cleaned and sterilised and will not have cracks to harbour microbes. Solid-grade laminate or epoxy resin are good choices and particular attention should be paid around joints and splash zones.

Worktops and benches' should have rounded edges to avoid injuries. Bench height should be 900 mm.

Stools – *there should be sufficient stools that are comfortable and supportive*

Flooring should be slip-resistant, chemical-resistant and easy to clean. There should be no gaps as these can harbour residues and microbes.

Cupboard doors should be fitted with 270° hinges

Laboratory size, shape and layout

A minimum of 2 m² of working space is required per person. For science lessons, the class sizes should not exceed 30 students as adequate space is needed for safe practical work. There should also be space for students to store bags and coats, away from the practical working areas. So that they do not cause obstruction or present a possible hazard. There should be spaces at workstations for stools or chairs to be safely stowed.

A space of 85 m² will accommodate 30 secondary school-age students, for both theory and practical work. This should also provide enough storage space for basic or 'everyday' pieces of equipment. For Chemistry and Biology laboratories this includes all basic glassware, Bunsen burners, gauzes and heat-proof mats. Biology labs will also need to store microscopes and a slide cabinet of prepared slides, although these could be stored centrally in a prep room and moved to the labs on trolleys when needed. Physics labs will need circuit boards, ammeters, voltmeters, batteries and lamps.



At the front of the laboratory will be the teacher's area, providing space for electronic registration of students, demonstration practicals and the interactive whiteboard area and projection system for showing videos. From this vantage point the teacher should be able to see all students. If the laboratory is rectangular rather than square, then the teacher area on the long side of the room allows all students to clearly see the board.

Students should be able to face the teacher and see the whiteboard whenever possible.

The main teaching wall should be positioned at an angle of 90 degrees to the external wall so that glare from windows is minimised.

There should be a clear area where students can gather for demonstrations about the practical techniques to be used or about how to safely use the fume cupboard.

Island benches are preferable to long benches. They allow students to work better in small groups and enable the teacher to circulate and interact with all groups of students, during the practical sessions. Each island should have a central service area with gas, electricity and water. Mobile benching can support different teaching formats and accessibility. However, services and evacuation routes should always remain safe and not obstructed.

There should be safe working distance between groups of students and aisles should be wide enough to accommodate any students who use wheelchairs and to allow all students and the teacher to move easily between workstations.

The space for stowing bags and for hanging coats should be away from the exit routes and away from the fume cupboard.

There should be adequate wall space and pin boards for displays such as posters or students' work. There should also be space for items such as models made by students as well as commercially bought anatomical models or molecular models.

Plants on windowsills are useful and provide a food atmosphere.



A modern learning space should reflect the following elements

- **De-centredness** – instead of being front-focused, learning, spaces should encourage cooperative learning between students and between teacher and students
- **Comfort** – uncomfortable seating can not only be hazardous to students' spines but also distract from learning
- **Flexibility** – students should be able to move freely and switch easily from listening to the teacher to working in small groups to taking part in class discussions; the teacher should also be able to easily move between groups of students
- **Sensory stimulation** – this can be provided by use of appropriate colours, lighting, relevant posters and objects such as plants and anatomical models, and interesting furniture layout
- **IT support** – to help support learning

There are many possible layouts that meet the modern requirements, and two common examples are shown overleaf.

There are many more designs possible and you can view them at

<https://science.cleapss.org.uk/Resource/ASE-Lab-Design-Gallery.pdf> and
<https://www.brookhouse.com/education/school-laboratory-solutions>



Fixed service bollards and movable tables (Illustration generated using MS Co-Pilot)



Circles & a perimeter (Illustration generated using MS Co-Pilot)



Therefore, a well-designed laboratory will provide a setting for a wide range of activities including:

- teacher led tuition
- teacher demonstration of experiments
- discussion and note-taking
- students' practical investigations
- use of IT
- display

Fume cupboards (Local exhaust ventilation [LEV] systems)

Fume cupboards protect against the effects of any toxic gases produced in the lab. They can also be used in place of a laminar flow cabinet if the latter cannot be provided due to budget constraints.

Some fume cupboards are fixed and expel the toxic gases into the atmosphere through an external duct.

Mobile fume cupboards filter the toxic substances and then recirculate the clean air back into the room. The filters need to be regularly tested for saturation and changed.

Whichever system you choose, products should meet the British Standard (BS EBN 14175) and guidance that can be obtained from CLEAPPS via email science@cleapps.org.uk or visit the website at <https://science.cleapss.org.uk/resources/guides/> and view the relevant documents such as the Fume cupboard buying guide.

Fume cupboards when operating should be at 65 db. or less so that students can hear teachers.

Fume cupboards must, by law, be tested every 12 months.

Fume cupboards must be placed well away from exit routes.



Teacher area

Here are two examples of how the teacher area can be set up:



(Illustration generated using MS Co-Pilot)

This arrangement gives ample space for electronic registration and teacher IT use, such as data logging equipment for practical demonstrations, and use of the whiteboard.

Teaching wall with short throw projector is an alternative arrangement for the teacher space



(Illustration generated using MS Co-Pilot)



Laminar flow cabinets

Laminar flow cabinets provide a sterile working area for microbiology practicals and for practical work on tissue culture/micropropagation.

They are designed to produce a unidirectional, streamline flow of air carrying potentially hazardous particles such as microbes and aerosols, through a filter and away from the work area. There are no gaps, joints or crevices where bacteria or fungal spores can accumulate. A transparent front sash is made of glass or polycarbonate that allows the operator to see what they are doing, and the work surface is made of stainless steel that is

- very durable
- resists corrosion
- resist microbial colonisation and growth
- is easily cleaned and disinfected.

There is a fan that brings ambient air into the cabinet and forces it out through the filters.

The prefilter traps larger particles (5 microns or larger) such as dust or pollen and this protects the high efficiency P particulate air (HEPA) filter that filters out much smaller particles such as bacteria or fungal spores.

Some laminar flow cabinets also have a UV-C germicidal lamp that sterilises the equipment by destroying the nucleic acids of bacteria, fungi and viruses. This should only be used prior to students or teacher using the cabinet for microbiological practicals as this UV radiation is harmful to human skin and eyes.

A fluorescent /LED lamp in the cabinet can be used whilst working as it provides good illumination.

A control panel on the outside of the cabinet enable the user to operate the fan, lighting, UV-C lamp and there may be a pressure gauge to monitor the status of the HEPA filter.

For more information go to <https://www.hinotek.com/what-is-a-laminar-flow-cabinet/>

If laminar flow cabinets are beyond the budget a fume cupboard can be used. Aseptic technique should always also be used for microbiological practicals.

More information about safe use of microbes can be obtained from the Microbiology Society (previously the Society for general Microbiology) at <https://microbiologysociety.org/>



Refurbishing existing laboratories.

If the laboratories being refurbished were built before the year 2000, a specialist needs to carry out a refurbishment demolition survey. This is to find out if there are any asbestos-containing materials and to direct their safe removal before refurbishment begins.

All planning work carried out in England and Wales must comply with The Building regulations 2010.

School science labs are regulated by The Consortium of Local Education Authorities for the Provision of Science (CLEAPPS). Their advice and documentation is recognised by the HSE executive and the Department of Education.

COSHH (Control of Substances Hazardous to health) regulations also apply to some materials used in schools

For more information visit

<https://www.hse.gov.uk/lev/employers.htm>

<https://science.cleapss.org.uk/resources/guides/>



Incorporating technology

With adequate electrical sockets students may be able to use laptops for research or writing up their practical work.

Greenhouse and potting shed

These can be used to maintain stocks of plants such as geraniums for use in photosynthesis experiments or for investigations of asexual and sexual reproduction. Some examples of specially adapted plants can also be kept, such as xerophytes, epiphytes, parasitic plants, insectivorous plants, as well as ferns and bryophytes (mosses and liverworts).

Outside green area(s)

For a source of specimens and for ecological studies

Please see CLEAPSS guide L221 Developing and Using Environmental Areas in School Grounds

Science department office

A place for storing and accessing schemes of work and assessment records and for holding science staff meetings. This should be separate and not be in the prep room or one of the labs.

Student resource and study area

A room where students can work independently singly or in small groups. Or where students can participate in discussions.



Some useful websites:

<https://www.legislation.gov.uk/ukxi/2010/2214/contents>

<https://www.ase.org.uk/resources/health-and-safety-resources/>

<https://science.cleapss.org.uk/Resource-Info/G014-Designing-and-Planning-Laboratories.aspx>

<https://www.learningspacesolutions.com/school-science-lab-design/>

<https://www.innovadesigngroup.co.uk/news/modern-school-laboratory-design-guide/>

<https://klicktechnology.co.uk/school-science-lab-design/>

<https://www.brookhouse.com/post/school-science-lab-design>

<https://www.performanceservices.com/resources/tips-for-creating-safe-and-innovative-lab-spaces-for-schools/>

<https://www.arenaconsultants.net/blog/how-to-design-science-laboratories-for-schools/>

<https://envoplan.co.uk/education-news/how-to-design-the-perfect-school-science-lab/>