

Guidance for school Science & Technology coming out of lockdown

Version 5.0- 17th February 2021.

Introduction

This document focusses on Science and Technology. More detail, particularly about wider school issues can be found in the official Scottish Government advice which can be found here (<https://www.gov.scot/publications/coronavirus-covid-19-guidance-on-schools-reopening/>) and for colleges here (<https://www.gov.scot/publications/coronavirus-covid-19-universities-colleges-and-student-accommodation-providers/>)

While most schools have not been fully shut, there will be much preparation that will be needed as part of a careful, phased reintroduction of learners into the school environment, particularly for practical subjects such as science and technology.

This guidance focusses specifically on Science and Technology in schools and colleges but obviously any changes in these areas can only be made as part of a whole school approach and Heads of Department should make sure they liaise with other parts of the school.

The situation will vary significantly across the country: learner rolls, numbers and location of teaching rooms, their dimensions and arrangements will all differ not just from Authority to Authority but from school to school. The advice in this document, therefore, is necessarily general in nature but SSERC will be happy to provide specific advice to schools and colleges if needed.

It is important to emphasise that the whole procedure for making arrangements for re-opening to learners should be led by risk assessment - this risk assessment should directly address any risks associated with coronavirus so that sensible measures can be put in place to minimise those risks for children, young people and staff.



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Differences from previous versions

- 2.0 In consultation with the Scottish Government, sections offering more general advice for schools have been removed as these are dealt with by government publications. The document now focusses more narrowly on science and technology.
- Reformatting and branding.
 - Some changes to phrasing in a few places to increase clarity.
 - More guidance (in section on Hygiene) on the cleaning of equipment such as tools and computers.
 - New short section with information on other help SSERC can provide.
- 3.0 In light of the revision of guidance regarding returning to school (30th July). Substantial changes in the sections regarding social distancing. Minor alterations elsewhere that reflect this. FAQ section now included.
- Further details, as they come, will mainly be addressed via a FAQ section which will be placed at the end of the document.
Latest FAQ update – 10th November 2020
- 4.0 Changes in the section regarding sanitizing of equipment in light of revised government guidance.
- 5.0 Reinstated guidance on measuring for 2m separation and some minor changes in emphasis for the re-opening in spring 2021. [Changes since last edition shown in blue.](#)

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A holistic approach

The measures outlined in this and other documents are none of them exclusive of others: they are part of a whole.

Good hand hygiene in your school does not mean that there is no need to maintain spacing. A reduction in interactions does not mean that you can neglect the cleaning of surfaces.

We all of us need to implement as many of these measures as far as we possibly can. It is the combination of approaches that will help us in our fight to keep the coronavirus under control.

Prior to Returning

When returning to school there are some important things to consider before 'normal' activities begin again. Most though not all of these are activities for technicians:

- **Taps and Sinks:** - The HSE has recently issued guidance regarding Legionella in workplaces that have been in lockdown. The school/Local Authority should have procedures in place for managing this risk. Consult them before using any water supplies. If they are content that all appropriate measures have been taken, then run the water for 5 to 10 minutes through the system to ensure it is working. This will refill any drain traps which have evaporated.
(<https://www.hse.gov.uk/coronavirus/legionella-risks-during-coronavirus-outbreak.htm>)
- **Chemical Store:** - Check that the store is secure and has not been tampered with in any way. Chemicals that exist on the latest stocklist are all present and accounted for. There may be specific chemicals that required attention due to shelf life, such as potassium. Look for any distortions in bottles that may indicate pressure build up. If there are any signs of leakage, or any unusual smells, seek guidance immediately. If there is no one on site who can help, contact SSERC.
- **Radioactive Store:** - Check that the store is secure, and all radioactive sources are present and accounted for. Check that the sources are still within their leak test period. If there are any overdue tests or checks, these should be carried out **before** practical work resumes with sources.
- **Electrical Safety:** - It may be that some electrical items are outwith their PAT test period. Check all electrical equipment before use and label and remove any items that fall into this category to be tested. If the testing is done inhouse, then items can be tested on a rolling basis as they need to be used. If it is done externally, contact the company as soon as possible to arrange a test before the start of term – if possible. If testing cannot be done in time, make sure the teachers know so they can plan their lessons accordingly.
- **Equipment yearly checks:** - Fume cupboards, autoclaves, extraction systems, steam engines, and other bits of equipment may be out of their yearly test period. If so, they must be fully tested and comply with all relevant regulations before being used. As with PAT testing, if it is not being done inhouse then contact the testing company as soon as possible to ensure it can be done before the start of term. Again, if there is a delay, let the teachers know to inform their planning.
- **Gas Supply:** - Check all rooms with a gas supply for full functionality. It may have been switched off at the building's main gas valve. Immediately report any gas smells as this may indicate a leak.
- **Electrical systems:** - If any of the rooms have an emergency shut down system, check that it is still fully operational, and all buttons function correctly. Report any faults immediately.
- **Eyewash:** - If you have eyewash bottles in labs/workshops, check they are not out of date. If, as is better, you have an eyewash station, ensure the tubing is sterilised and replaced above the tap. (A plumbed in station will only need to be cleaned and run for a while – once Legionella tests have been carried out.

- **Fridges and Freezers:** - Check that these have not been tampered with or switched off. If they have, they will need to be emptied and cleared out – this should be done carefully particularly if there was organic material inside that might have rotted.
- **Microbiology** – Dispose of all sub-cultures and plates. Check the master culture is still in date. Disinfect “Clean Room” surfaces and all storage fridges. While Virkon is a common ‘go to’ disinfectant, any surfactant disinfectant, including a dilute solution of bleach, is suitable. If microbiology work is being undertaken, new cultures might need to be obtained.
- **Machinery** – If there is machinery in technology (or other areas) that needs regular checks, these should be carried out before any use of the machinery.
- **Ventilation:** - It is a good idea to open all windows and let rooms ventilate for at least 5 minutes.
- **PPE:** - It should be noted that advice from Health Protection Scotland and the Scottish Government is that there is no need for any PPE to be used other than for the Health and Safety purposes that existed previously as a result of risk assessment.
- Any PPE should be checked by a competent employee that it is fully functional and has no damage **before** use.
N.B. It may be that your school has donated some of their PPE as a result of COVID-19. If this is the case, no activities that require the use of this PPE should take place until it has been restocked. Each member of staff should have personal eye protection and should be provided with suitable antiviral wipes for cleaning through the day.
- **Social Distancing** – The latest government guidance is that there is no requirement for social distancing among learners in school. Distance should, however, be encouraged where possible and close interactions minimised as far as possible.
However, the current distance of 2m should be adhered to wherever possible between adults and between adults and learners who are not family members.
- **Equipment and ordering** – Given that practical work will be carried out by individual learners now rather than groups, some readjustment will be needed. Having learners working individually (or in smaller groups) is still a preference and so there may be a case for purchasing extra equipment, where this is feasible.
- **Setting out and clearing up** - The best option remains for equipment to be set out for each learner (or small group) in trays as this will reduce interactions while they collect their own. More trays may be needed.
In addition, the setting out and clearing up of practical classes may take longer than before so technicians should be consulted about feasibility when any new timetabling arrangements are drawn up. The time taken and the practicalities of cleaning and sterilising equipment between uses will also need to be considered.

Consultation

As mentioned in a couple of places above, there are likely to be all sorts of changes needed to how teaching in general and practical science and technology in particular are managed. Extended time needed for setting up and clearing away may affect timetabling. Changes may be needed to experiments. Some equipment will need to be disinfected on a regular basis. More individual kits may be needed which may have purchasing as well as preparation implications etc.

It is important that technicians are consulted fully before these changes are implemented to avoid the risk of measures being put in place that turn out to be impractical.

Positioning learners in labs/workshops:

For the moment, **remote learning should be the norm**. Senior phase learners, however, may attend school to carry out practical activities related to national qualifications. (At the time of writing, decisions are still to be taken as to whether this will also apply to students in colleges.)

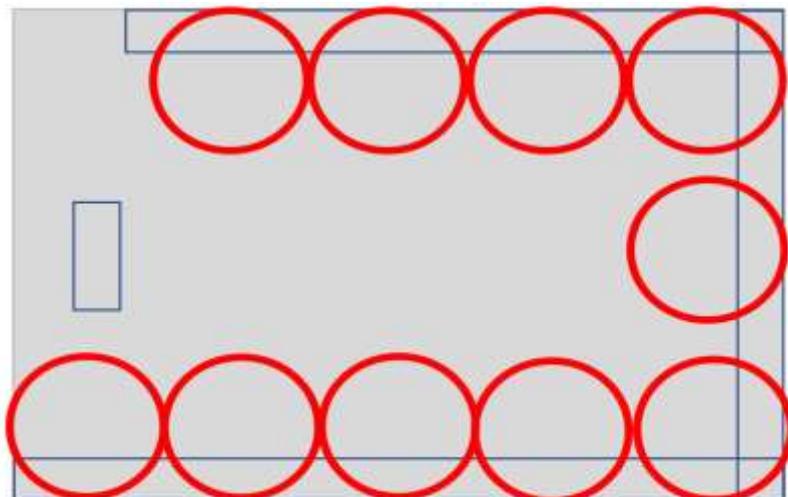
In light of the higher infectivity of new strains, the government has placed renewed emphasis on a 2m physical distancing in class for learners and adults. In the short term, the relatively small numbers actually in school should make this not too demanding to achieve.

If, however, a whole class needs to attend to carry out a piece of practical work, it may be necessary to timetable them to attend in two groups rather than one to achieve the separation. There will certainly need to be co-ordination across subjects as the latest guidance says *Schools must ensure that the number of senior phase learners timetabled in school to undertake practical work at any one time does not exceed 5-8% of the secondary school roll.*

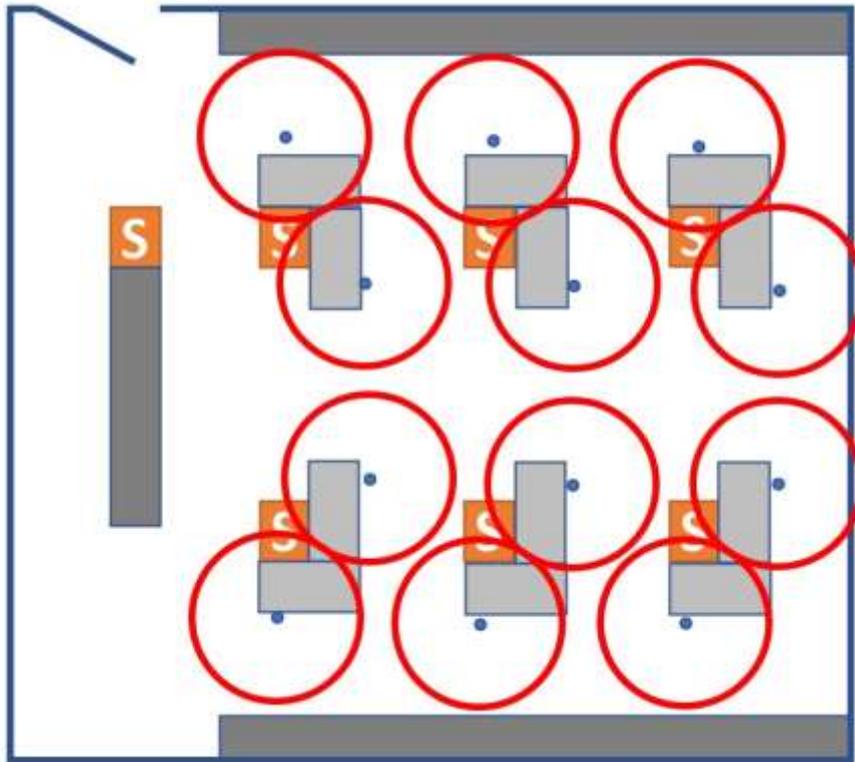
Determining spacing

If there are only small numbers in the classroom then 2m distancing will be fairly straightforward to achieve but as numbers increase, some more careful planning and measurement may be needed to achieve this. Any teaching spaces (labs/workshops and other rooms) will need to be assessed in terms of the current 2.0 m separation.

- This will need to be done for each room. In a normal sized classroom/lab/workshop, you can probably expect to fit around 7 – 10 learners, depending on the layout, and still maintain the 2m safe zone.
- It might be useful to try to get an idea before you go into school. If you know the dimensions of your classroom, on a powerpoint slide make a rectangle to scale. To make it easy, just substitute 1 m of the classroom for 1cm on the diagram – it will be small but you can just zoom in to get it to fill the screen.
- Now make a circle 2cm across (to represent 2m) and make copies. Now you can move them around to see how many you can fit in and where they might be. This will save time before you actually attempt measurements 'on the ground'.
- Here is an example for a 7x10m room with wall mounted services
- Obviously, the presence or absence of service points will make a big difference .



- Here is another example for a 10 x 9 m laboratory containing service bollards (Labelled S)



It is important to remember though that this will only give you a rough idea. There is no substitute for actually being in the room and measuring.

- Once you are in the classroom you will need to do some actual measuring. We have seen suggestions to make a cross out of 4 metre rulers joined in the middle. By all means do this but it is probably simpler to just tape two together with roughly a 50 cm overlap, this will give you roughly 2.0 m (see below*). So, if you stand at a learner position and hold out your ruler, the end of it will be where the next workstation is. If you aren't quite sure whether there is room, you can measure more carefully but most of the time the separation will be clear.

** your arm span is usually very close to your height. If you are 1m 60 tall, your arm span will be about 80 cm and if you hold out the two-ruler assembly then that's a theoretical 2m 30 – but given that you will be holding it in the palm of your hand that takes it down to just over 2.0 m*
- Then by marking on benches and the floor (electrical tape or duct tape is useful for this), you can determine and position workstations within the room. (If you have two people, they can just have a metre rule each). Once this is done you can soon see how many learners the room will safely hold with the learners roughly staying in their allocated seat.
- At this date, we would not recommend actually marking out the workstations and their separation just yet in case you can come up with new ideas that may enable a different, better, arrangement. But this exercise will give you a 'worst-case' scenario with the smallest classes you can have which will be useful for planning.
- In technology workshops, the presence of fixed machinery may make this exercise more difficult. It may be that in the case of fixed machinery that is less than 2.0 m apart, it **could** be possible to erect barriers between them. We are currently seeking guidance and clarification about this. But unless specific advice is received, you should assume that the 2.0 m separation is applicable.
- There may be other areas where judicious use of barriers could enable workstations to be closer (eg in IT suites) but, as above, unless there is specific advice from the Scottish Government that this is acceptable, 2.0 m is the separation that should be assumed.

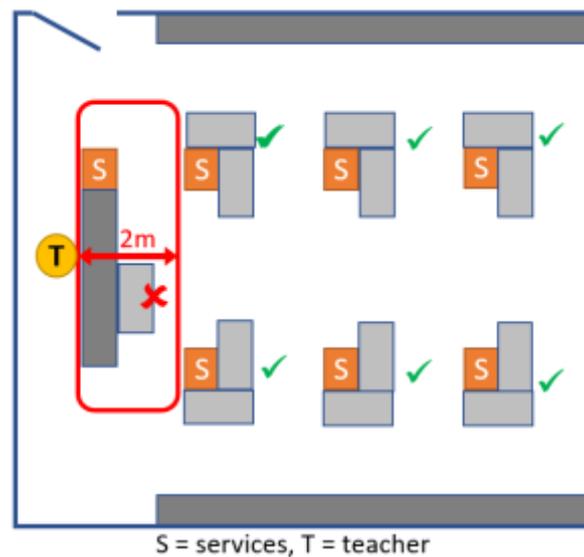
- If your room has moveable tables, you can try out different configurations to ensure the best layout. The presence of fixed bollards with services will give some limitations but there will still be some degree of flexibility.
- Teacher/technician movement around the room will need planning in advance, though given the greater separation that will be in place, this should not prove difficult. You will need to make sure, though, that good access is maintained to doors, emergency equipment etc as well as to all the learner workstations in case of an emergency.
- It will be helpful if each workstation should be clearly labelled with a number, No.1 being furthest from the entry point, No.2 the next furthest and so on ending with the workstation closest to the entry point. (This will help with entry into the room).
- Remember to assign a teacher workstation as well – though this does not need numbering.
- A similar process will be needed for prep rooms. Where there is more than one technician, they should have suitably distanced and marked out workstations. Chemical and other stores should only be used by one person at a time (most can only accommodate one person at a time anyway!).

It is also necessary to ensure a 2m spacing between the teacher's desk (the rear side where the teacher will sit) to the nearest desk or workstation.

In particular there cannot be a learner positioned directly in front of the desk as shown in the diagram (right).

It is also important to arrange as far as possible that learners are not seated across from each other but side by side.

The table arrangement shown in the diagram would not have all learners face to face but they would be at right-angles. This is less bad but still not ideal. An option might be, where possible, to use any side benches for some student seating – this would also help with further distancing.



While more recent research has suggested that transmission from surfaces is less of a risk than had been thought, transmission by droplets and aerosols seems more of a concern. One of the most important measures for mitigating this is distance. Schools and colleges should still be trying to ensure that as great a distance as possible is maintained between learners and between them and adults.

Permanent groupings

Given that close interactions are a risk and the more different people an individual interacts with the higher the risk, limiting these interactions is a sensible option where possible.

Particularly in the earlier years of secondary education, it may be feasible to have students in fairly static groupings.

In these cases, it may also be the case that a decision is taken that a class remains in one room and the teachers move. In this case, you may find that science or technology is having to be taught in a room not designed for it. In such a situation contact SSERC to find out what practical work you can and cannot safely do in this situation.

Entry and Exit

Into the school

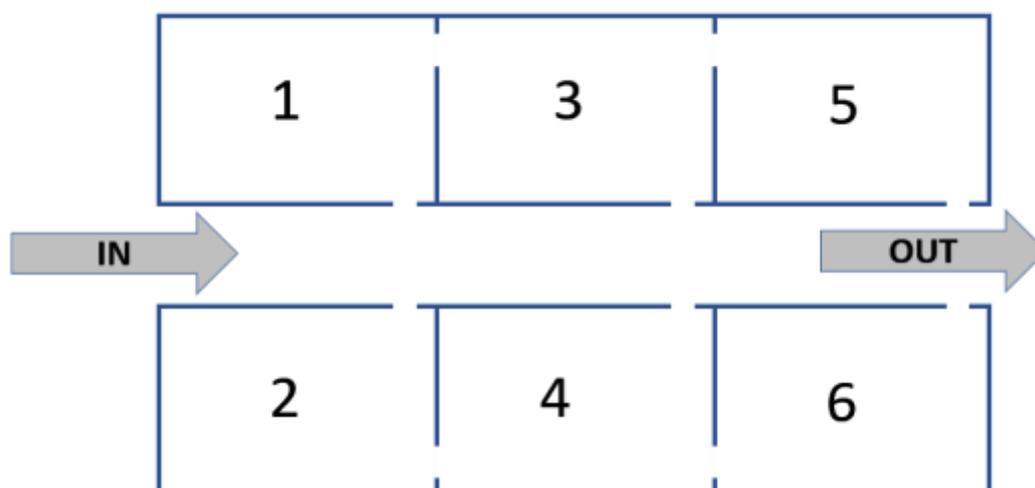
Advice on this is more general and thus outwith the scope of this document. Guidance has been provided by the Scottish government and can be downloaded from here

[\(https://www.gov.scot/publications/coronavirus-covid-19-guidance-on-reducing-the-risks-in-schools/\)](https://www.gov.scot/publications/coronavirus-covid-19-guidance-on-reducing-the-risks-in-schools/).

Entering/leaving the Lab/Workshop

- While brief interactions such as might happen while entering/leaving are generally an insignificant risk, every little helps. If it is feasible to arrange a one-way system, or to control entry and exit to minimise interactions then you should do so.

e.g.



- If doors are not fire doors, then leaving them open will aid ventilation and more importantly reduce touching of them. However, **fire doors must not be left open**. Check before having any open doors.

Managing practical activities

For more details, see the section on cleaning equipment.

It suggests that the need for disinfecting equipment is much less important than previously thought. That said, where possible, it is still preferable to have learners working on their own and not sharing equipment.

The risk of infection from the equipment itself does indeed seem to be very low but learners working together are inevitably going to be working in quite close proximity and it remains the case that distance between learners should be maximised.

Ways to reduce sharing of equipment

E.g. Using microscopes. If there are, say, 10 microscopes for a class of 20, it could be possible for the lesson to be split so that one half uses the microscopes while the other half of the class does other work, then they swap. Ideally the two sessions would be in different lessons but even if it involves swapping halfway through a single period that is only the one change and will be safer than any constant common usage.

Using a belt-sander (or other fixed machinery). Avoid learners gathering in line, waiting for their turn to use the equipment. They should stay at their workstations doing other tasks until the teacher tells them it is their turn.

- Practical lessons may still take longer than normal to complete; this is likely to be a particular problem if your school has short lessons. The Head of Department (in consultation with the technician team and senior management) should ensure that the timetable is changed in such a manner as to make the preparation and clearing away of any practical equipment feasible.
- As with other subjects, having longer lessons, having very long blocks of individual subjects, might be a good way to minimise movement of groups around the school. In the sciences this may well have implications for preparation and clearing away of practical work.
- Teachers (in discussion with technicians) will have to plan and take into account requirements for each practical (e.g. available equipment) and decide whether it can be safely managed as a class activity (learners working individually not in groups) or needs to become a teacher demonstration.
- Long and complex multi-step practicals are still best kept to a minimum except for with very experienced learners. It may be helpful to alter learner instruction materials to try to maximise the autonomy with which they can work.
 - It may be useful to have the instructions appearing one step at a time on the teacher's board (one step per PowerPoint slide for instance). And learners simply have to wait for the next step.
 - Another option might be in some cases to adapt the 'integrated instruction sheets' as developed by many educators. See this RSC article for more information: <https://edu.rsc.org/feature/improving-practical-work-with-integrated-instructions/3009798.article>
 - An extension of this is to use PowerPoint to animate the steps in the integrated instructions – an example can be found [here](#).
- Learners should work individually wherever possible rather than in pairs or groups. For instance, there should be no need for simple chemistry experiment using test tubes to be carried out in pairs or groups. But this does not totally preclude group work though. For instance, different individuals

could investigate different factors affecting the rate of reaction and then share their results (electronically).

- With learners working individually, some practicals may take longer to complete, but time can be saved by
 - Having reagents pre-weighed or measured.
 - Using a 'flipped classroom' approach so that learners familiarise themselves with the experiment before coming into class to carry it out.
 - Learners can also share their data after the practical if required.
- Time must be allocated at the start and end of lesson for setting up/clearing up. This will need to be allowed for in the timetable.
- Once the practical has finished, learners should tidy up their equipment, wash / sanitise their hands then leave the room in an orderly fashion similar to their entry. (See later section on hygiene). The dismissal of classes, like their arrival, should if possible be coordinated to minimise mixing.
- If teacher demonstrations are being carried out, it is important there is still at least a 2m distance between the teacher/demonstrator and any learners. (This should be the case for most hazardous chemistry demonstrations anyway. However, the nature of a demonstration means that learners will inevitably be crowding quite close together in order to see; so, using AV equipment to project the demonstration is a good way to prevent this and should be the preferred approach.

An important part of many demonstrations, particularly chemistry ones, is their multisensory nature. It is better for the demonstration to be carried out live in class rather than just watched on video – that way the learners will experience the sounds and smells as well.

- Teachers must try to keep the 2m distance when observing the learners as they work through the practical activity. This may raise H&S concerns, as well as issues around the competency of the learner to carry out the task without the intervention of the teacher. The teacher should risk assess the activity prior to the session and take into consideration the competency of the learners.

However, **brief** interactions between teachers and learners closer than 2m are allowed where they are strictly necessary.

- Where possible, it might be helpful to have learners able to carry out **some** practical work at home. This could either be a part of catching up with missed work due to self-isolation (or conceivably if there is a rise in cases causing schools to be closed again at some point in the future).

If it is simple, then kits can be sent out and learners can have a 'cook-along' approach or work autonomously. It will help break up the routine of home working for learners as well. Details of some possible activities (particularly for chemistry) can be found on the SSERC Home Learning pages.

Hygiene

A vital part of removing distancing requirements for learners is enhancing hygiene procedures in the school.

Hand washing & personal hygiene

By far the best way of ensuring clean hands is washing with soap and water. Obviously, there will be issues with access to sinks for a class of learners (even a small class) but there are other possibilities.

- If soap and water is not available, a suitable hand-sanitiser is the next best option.
- Ideally, each learner should be provided with a personal bottle of hand sanitiser by the school, which they can use to clean their hands before and after practical work. If this is not possible, hand sanitiser should be provided at least in each laboratory/workshop, particularly where there is equipment that may need to be shared.
- There should be a supply of tissues in each laboratory (in addition to supplies for individuals). Used tissues should be placed in bins that are emptied regularly.

Hand Sanitisers

These are less effective than soap and water but better than nothing.

They do tend to be less effective where hands are dirty or greasy – which may be problematic in some school situations.

Alcohol-free sanitisers are less effective. Aim for ones containing at least 60% alcohol. **Some** alcohol-free sanitisers may work but check carefully before ordering them.

N.B. If alcohol-based hand sanitisers are used, the bottles should be kept well away from any sources of ignition and no naked flames should be used for several minutes to avoid possible ignition and burns.

PPE

As mentioned earlier in this document, this is guidance specifically for the use of PPE in standard Science/Technology activities. There is no need for PPE to be worn more generally (but see 'Face-coverings').

For detailed advice on this sort of PPE and Covid-19 see the Health Protection Scotland and Scottish Government websites.

- We know many schools have donated all of their PPE to the NHS. You can expect demand for PPE to be very high, so it will take time and money to restock supplies.
- **Face-coverings** – Revised guidance has been issued by the Scottish Government

In all schools, face coverings should be worn in communal areas such as staff common-rooms and in corridors. In dining rooms and other areas where food and drink might be consumed, they should be worn while moving around but may be removed when seated.

In classrooms, while the guidance has not changed since issued in the Autumn, as all areas are now in the higher tiers, the more stringent measures apply.

- *All pupils in the senior phase (S4 - 6) and their teachers should wear face coverings in classrooms, as well as when they are moving around the school and in communal areas.*
- *Anyone else (whether child, young person or adult) wishing to wear a face covering in school should be enabled to do so.*

- Schools should raise awareness amongst children, young people, and staff about the correct way to remove and store face coverings. This can be done well in biology lessons. It could be helpful to adapt some common microbiology experiments so that they highlight potential transmission from face coverings such as SSERC's 'Beat Those Bugs' or 'Toilet-tissue Challenge'.

- **Eye protection**

More extensive details about the use and cleaning of eye equipment can be found in a separate document here (<https://www.sserc.org.uk/wp-content/uploads/2020/09/Eye-Protection-and-Practical-Work.docx>)

Teachers should not attempt practicals where appropriate eye protection is required but is not available in school. This may initially limit the practical work that schools can do.

- This can be mitigated to an extent in some cases by changing the experiments, reducing concentrations for instance, such that eye protection is no longer needed.
- The safest arrangement is for each learner to have their own, labelled, set of eye protection. That way, there is no risk of cross contamination.
- In many, if not most, schools this is not likely to be the case. If spectacles or goggles are shared between learners these will need sanitising between each use.
- When leaving the lab/workshop, learners should place their used PPE in a washing up bowl (or two) of sterilising solution (have enough solution to cover all PPE). This then starts the sanitising process.

To sanitise goggles/safety specs, they should be fully immersed in a sterilising solution for at least 15 minutes. The eye protection should then be rinsed off with water and allowed to air dry. (This can be speeded up if needed using fans) Once dry check for any damage and then return to use. Avoid drying with towels as this can lead to scratching.

Suitable sterilising solutions are:

- Milton's solution (follow Milton instructions* for how to make this up, tablets or *fluid is fine*)
**Miltons have revised the required concentrations on their website. Use these rather than the concentrations given on the packet.*
- dilute bleach (20-100:1, depending on formulation) or
- Virkon (solutions prepared according to manufacturer's instructions).

The best option is to do this at the end of each day and leave to dry overnight. If they are needed earlier, fans can be used to speed up the drying. Do not wipe dry it if at all possible – this raises the possibility of contamination.

If time really is of the essence, antiviral wipes can be used to wipe down the goggles (or other equipment).

- Learners should be reminded to wash their hands before putting on eye protection.
- **Gloves** – Gloves are rarely required by learners doing practical work. However, where we advise the use of gloves then the correct type should be worn.

- **Lab coats** –as these are not PPE they are not **required** for most practical work, although if anyone wishes to wear their own lab coat there is no problem. The exception to this is that lab coats are required for level 3 microbiology, though this is only relevant for senior phase students. Shared or department-based lab coats, however, should be removed from use. Staff clothing, including lab coats should be washed as normal.
- **Staff** will also need access to their own PPE, each member of staff should have personal eye protection and should be provided with suitable antiviral wipes for cleaning through the day. At the end of the day they should be sanitised in the same fashion as that for learners.

Laboratories/Workshops

- **Ventilation:** where it is possible to open windows and doors (not fire doors) this should be done. Science and technology departments should already have suitable extractions systems to comply with their duties under COSHH. However, if it is possible to adjust the systems so the ‘makeup’ air comes either directly from outside or contains a greater proportion of fresh air, this should be done.
- **Benches** will need cleaning as per the guidelines for all classrooms in the rest of your school. Door handles and plates in particular (as well as any other frequently touched items) should be cleaned down on a regular basis.
- Appropriate cleaning supplies should be in each laboratory to enable learners to wipe down their own desk/chair/surfaces before leaving and, especially, on entering the room.

Cleaning of equipment

(The previous extensive information on how to clean laboratory equipment has been removed from here but that does not mean it is of no relevance. It has instead been placed into a separate document).

From the beginning of the outbreak, quite an emphasis was placed on the cleaning/sanitising of hands and surfaces. This was for perfectly good reasons: more familiar viruses, especially flu, are definitely transmitted this way and some early research in April¹ showed that the virus could last for some considerable time on surfaces.

As a result, looking at this and other advice from the Scottish Government, we suggested that shared science equipment should be either disinfected between uses or, where that isn’t possible, left for 72h or longer to quarantine.

But science changes, particularly when dealing with something new.

In July, a paper in The Lancet Infectious Diseases² suggested that the previous research overstated the case as it had involved ‘infecting’ the surfaces with quantities of virus that were far larger than would be likely to occur in real-life situations. They did say, however, that no actual tests had been done to see if this was in fact the case.

Recently though, such a study has indeed been carried out and published in the same journal³. The researchers conclude that *“Our findings suggest that environmental contamination leading to SARS-CoV-2*

¹ [https://doi.org/10.1016/S2666-5247\(20\)30003-3](https://doi.org/10.1016/S2666-5247(20)30003-3)

² [https://doi.org/10.1016/S1473-3099\(20\)30561-2](https://doi.org/10.1016/S1473-3099(20)30561-2)

³ [https://doi.org/10.1016/S1473-3099\(20\)30561-2](https://doi.org/10.1016/S1473-3099(20)30561-2)

transmission is unlikely to occur in real-life conditions, provided that standard cleaning procedures and precautions are enforced.”

As a result of this, and other, research, the Scottish Government has changed some of its advice in the latest update to its guidance for schools. It says:

Careful hand washing with soap and warm water/use of alcohol-based hand sanitiser before and after handling text books, jotters (or other pieces of equipment) mitigates the need for quarantine for 72 hours before, and 72 hours after.

SSERC’s interpretation is that this can also be applied to equipment used in science and technology.

It is important to note that this does NOT mean a return to normality. The virus is still here and all possible measures should still be taken to prevent its spread.

In health and safety matters, we often use the concept of 'so far as is reasonably practicable'. This means that when we consider a safety measure, we weigh the possible gains against the costs, not just financial but also in terms of time and convenience weighed against possible impact on learning.

Given the increasing evidence that with good hand hygiene, the risk of picking up coronavirus from touching a surface is low, we think that in normal conditions there may not be an absolute requirement to disinfect/quarantine equipment between classes – provided that:

- a. Disinfecting/quarantining of the equipment is difficult or time-consuming to the point where practical activities are reduced or not taking place and learners’ education is affected. For example, whilst it is practicable to wipe down the rotary control on a physics power supply every time it is used, sanitising or quarantining connecting leads and small components is far less so.
- b. An effective system is in place for careful hand sanitising with soap and warm water/use of alcohol-based hand sanitiser before and after handling items.
- c. Users of such equipment, teachers as well as learners, should avoid touching their faces. If they do so then they should re-clean their hands before touching the equipment.
- d. If there is an event that could potentially lead to greater contamination – such as someone coughing or sneezing on equipment then the item should be cleaned or quarantined before another user touches it. (The chances of this being an issue are greatly lessened in situations where the user is wearing a face covering).
- e. Items that might come into direct contact with the face, such as microscope/spectroscope eyepieces should still be wiped with an antiseptic between users.

PPE such as eye protection should still continue to be disinfected in the same way as before as it is in direct contact with the face.

Note that this is **between classes** – sharing of equipment between individuals in the same class should still be kept to an absolute minimum.

In the same way that evidence suggests surface transmission is less important, it is also suggesting that transmission by droplets and aerosols is more important. The sharing of equipment at the same time in a group will inevitably mean they are in close proximity and maximising distance is thus an important factor in minimising the spread of the virus.

Organisation

- Staff training will be needed, for ancillary as well as teaching/support staff to ensure they are familiar any new procedures, particularly those relating the new hygiene regime.
- Unless there is advice from government that states otherwise, physical distancing between adults and between adults and children will remain at the current distance of 2.0 m.
- Preparation and clear up time may take longer so the timetabling may need to consider this.
- Where possible movement of individuals between workstations should be minimised and where workspaces are shared there is cleaning between use (e.g. each individual has a designated desk/workstation).
- Movement of children, young people and staff between classrooms / laboratories / workshops should be minimised wherever possible.
- One way of facilitating the two points above might be to reorganise timetabling so that subjects are taught in longer, but less frequent, blocks. This will be a matter for schools and their employers to determine.
- It may be that as a part of the protective arrangements, a system will be put in place where learners stay in one classroom and the teachers move around instead. This, of course, creates issues for practical work that will need to be addressed:

Practical work should only be done, as always, after an appropriate risk assessment. A non-lab/workshop space will limit the nature of practical work that can be done but not eliminate it. For instance, simple circuit work, use of microscopes or some microscale chemistry can, with a little preparation, readily be done in a non-lab setting. Workshop activities in technology may be rather trickier in a non-workshop setting though.

Revised lab/workshop rules.

There will probably need to be some revision of normal lab/workshop rules. No getting up and moving around. No sharing of e.g. pencils etc. These will need to be circulated to learners before they come into school and displayed prominently in each classroom.

Procedures will need to be put in place to deal with learners who fail to observe the new protocols (e.g. will not keep their distance, will not wash hands/wipe equipment etc.).

Procedures will also be needed for issues like illness in class, dealing with accidents.

There will also need to be procedures in place, on a whole school basis, for toilets. When can learners go? Supervision to ensure no mixing etc.

- While the weather remains good, outdoor learning may be something worth looking at in more detail. While more particularly suitable for younger learners outdoor learning for older age-groups is certainly something that could be looked at. How learning and teaching is adapted for an outdoor environment should also be considered. The [Outdoor Learning Directory](#) provides links to a variety of resources that can be filtered by subject area and curriculum level.

Further advice about outdoors learning in science can be found here:

- https://www.ase.org.uk/system/files/Grimshaw%20et%20al_0.pdf
- <https://www.stem.org.uk/news-and-views/opinions/teaching-secondary-science-outside-classroom>
- <https://www.weareteachers.com/outdoor-science/>

Remote learning

This has become the default method for curriculum delivery and will remain so, at least for some pupils, for a while to come.

Science and technology departments should try to make sure that they continue to develop their skills in this area as much as possible. In each department, there is likely to be at least one person who has developed quite high-level, relevant skills and it would be helpful if the department could arrange to share this expertise to upskill all.

This will remain important, though to a lesser degree, even once schools are fully open again.

- If learners are having to self-isolate after a positive test or a contact via Test and Protect. Or indeed if they are unable to attend school for other reasons.
- If teachers need to self-isolate for similar reasons to those above
- To enhance learning, assist learners catch-up etc.
- If extensive bad weather results in school closures

What else SSERC is doing?

- As well as issuing regular updates of guidance documents, we will be available to offer bespoke advice to schools and colleges to assist them with issues they have that may be particular to their establishments.
- All SSERC Professional Learning offerings have been reconfigured to use, where possible, an online or blended approach. Any training that still takes place at SSERC, face-to-face, will embed the Covid-19 protocols.
- Our reconfigured courses, in addition to offering the training that is core to them, will also seek to support home/remote learning by modelling good practice and offering advice based on our experiences with distance learning.

Wider School issues

Such issues are outwith the remit of this document.

The latest government guidance that covers schools in the wider context can be found here.

<https://www.gov.scot/publications/coronavirus-covid-19-re-opening-schools-guide/>

Here you will find advice on general school issues, including ones that will impact on science and technology such as:

- Cleaning
- Travel
- Potential infection
- and much more

Frequently Asked Questions

Newer FAQs will be added at the end of this section

What if staff need to break social distancing in case of accident / injury?

Is there a risk if you as a person if you start to rinse a learner's eye with an eyewash?

There will be times when teachers need to get closer to learners for first aid/Immediate Remedial Measures or to prevent an accident. But make the interaction as brief as is needed to address the problem.

The interaction will be brief and its importance would seem to take priority. We are dealing with the situation where there **will** be harmful consequences if we do not intervene, whereas there **might be** if we do.

If you are actually in contact as in the eye washing situation then yes there is a slight extra risk but I think that in all morality, you can't leave someone in that condition while you go searching for PPE. In labs/workshops first aid kits should be supplemented with appropriate PPE for use in incidents requiring first aid/IRM.

What about alcohol gel and practicals?

While they **can** be a fire risk in the lab, we have no problem as long as care is taken not to expose to any source of ignitions until all fumes have dispersed and there is no trace of anything left on the learners hands.

What about air conditioning? Is there a danger that moving the air around like this can spread the virus?

If the air conditioning is taking in air from outside there is little problem. If it is a self-contained system that is simply recirculating air within the same room then it does create a marginally higher risk but there will still be a significant level of dilution. For airborne infection proximity seems to be the most important factor.

HSE announced June 23rd. The risk of air conditioning spreading coronavirus (COVID-19) in the workplace is extremely low.

However, they do suggest that '*. . . if you use a centralised ventilations system that removes and circulates air to different rooms it is recommended that you turn off recirculation and use a fresh air supply.*'

In terms of PPE, how would you recommend keeping lab coats clean?

There is no need for lab coats for learners in most circumstances – technicians have their own and can keep them clean. However, lab coats are required by senior phase students carrying level 3 microbiology. There is no need for personal technician lab coats to be washed any more frequently than normal. In technology, aprons are useful for protecting clothing. Again, those belonging to teachers and technicians can be used and cleaned as normal. As with lab coats in science, there should be no sharing. If learners do not have their own, then they could perhaps bring in an old shirt or something.

Will safety glasses need washing after every class?

This is a balance between efficacy and practicability. Try to avoid the need for back to back lessons where goggles will need to be passed on. This is an area where adjusting the timetable to have fewer, longer sessions would be a help.

A good investment though would be to buy more so that learners can either have their own or the set can be left >72h between uses so no fiddly washing/wiping is needed.

What if we do not have sufficient hand-washing facilities?

- There are a few suggestions for DIY handwash stations – adapted from camping facilities – that could be easily adapted/implemented in schools and would be much more effective. Several of these could be positioned either in corridors or in the classrooms themselves.
- A fairly simple option would seem to be for there to be a class set (for the new current class size) of plastic washing up basins and bars of soap along with paper towels for drying. One at each workstation along with paper towel for drying.
 - If there is not a hot tap at the workstation, then before the lesson a 2-litre bottle of warm water from the tap can be placed at each workstation. If need be this can either be replaced or a second one issued near the end of the lesson. The arrangement of the room should allow for this with minimal risk to the teacher/technician issuing them.

After the lesson, the bowl can simply be emptied out and rinsed – the soap will be its own disinfectant. If the equipment is cleaned before learners use it and their hands are washed before using it, this should greatly reduce possible infection.

What about using perspex screens?

Screens are an option that could be looked at but with some caveats.

You will need to check to see what your employers' policy is. In Health and Safety matters such as this, the responsibility lies with them.

SSERC's view being that they may be a useful **addition** in some cases but that they should not be used as an **alternative** to other measures. Our feeling is that using screens to allow teachers to spend more than 15 minutes face to face with others closer than 2 meters would seem inappropriate (as well as largely unnecessary). However, as an additional measure for pupils who might be positioned face to face, they might be helpful if there is no other approach to be taken.

In Technology departments, most (if not all) schools have each workshop arranged with 5 work benches, each with 4 vices. 4 pupils are seated at each bench facing each other. Your guidance states that pupils should not face each other: what do we do?

In the guidance we say it is "important to arrange **as far as possible** that learners are not seated across from each other but side by side."

There are many situations where tables and/or seating can be moved to facilitate this. Clearly though, in the situation described, it **isn't** possible so you just carry on as normal - in that way at least.

The seating arrangement is just one approach: enhanced, sanitising, restrictions of students moving round, fixed groups if possible, keeping distances where possible etc will all contribute, along with the seating arrangements. So just do what you can, and don't worry too much about what you can't do. It is, after all, guidance, not instruction from the Government.

Most of the schools in our area have been issued with huge quantities of hand sanitiser - 1750 litres in my school! What are your recommendations for where we should be storing this?

We are currently (7th August) investigating further but unless there has been an exemption put in place (possible but we are not aware of one) then if the hand sanitiser is alcohol based then it is a flammable

liquid and thus, under the requirements of DSEAR, need to be stored as such. These quantities obviously create problems for a school.

A better option would be for the council to see about storing it centrally – as they will be able to find suitable storage more easily – and send it out in smaller quantities.

Even so, there will still need to be suitable storage on site. So either a room will need to be converted to a flammable store (possibly a little used toilet could be adapted as it already has ventilation) or one or more flammable cabinets will need to be purchased and positioned in a suitable place. The details will depend on how much is stored on the premises at any one time.

This is, however, like all Health and Safety issues, a matter for the employer. So the school should contact their Local Authority and raise the issue with them.

What about use of Lab Coats in Microbiology?

In the first version(s) of this guidance, we overlooked that, unlike in many areas, lab coats are a requirement for senior phase students carrying out level 3 microbiology.

If each learner has their own lab coat, this is not a problem: no extra laundry is required.

If they need to be shared then procedures need to be put in place for disinfection. The virus does not survive for as long on fabric as on hard surfaces so leaving them for 24h before being used by a second individual should be fine. One issue is that of buttons or other fastenings of metal and plastic. The virus can last longer on these so they should be sprayed with ethanol, Milton's/dilute bleach, hydrogen peroxide or a commercial antiviral product. (or they could be wiped but that will be more time consuming. Alternatively, the coat can simply be left for 72h between uses.

How can we manage to sanitise eye protection? A full disinfection between each use would be incredibly difficult and time-consuming.

There are two approaches to be taken here: try to reduce sharing and try to sanitise where possible.

More details on ways you can keep your eye protection sanitised can be found in a separate document here: <https://www.sserc.org.uk/wp-content/uploads/2020/08/Disinfecting-Eye-Protection.docx>

Disinfectant concentration

There have been numerous questions about this:

Milton's

Milton have changed their guidance on dilution when their products are being used for disinfecting Covid-19. Rather than the general figures stated on the packet/bottle, you would use the following.

- Fluid: 60ml fluid per litre of cold water
- Tablets: 2 tablets per litre of cold water.

Milton on their website suggest a contact time of 15 minutes.

Bleach

The WHO recommends a 1:100 dilution of bleach that is 5%. Research published in the Lancet Microbe suggest that this concentration will 'kill' the virus in under 5 minutes. (The revised figures for Milton's fluid,

which is chemically similar, are about this concentration as well) However, it seems that many bleaches sold in the UK are a lower concentration, 1-1.5%.

So in order to get to the 0.05% dilution that is suitable you will need to dilute as follows

- 1 part 5% bleach + 99 parts cold water* OR
- 1 part 1% bleach + 19 parts cold water
- (for other concentrations, calculate as appropriate)

Contact time

Milton suggest 15 minutes for their product but the lancet paper suggests that a similar dilution of bleach will be effective in under 5. If there is time, it is probably prudent to leave for 15 but the evidence suggests that a shorter exposure will not be a problem.

Thick v Thin bleaches

There is no difference in effectiveness as far as the ingredients are concerned but the thick bleaches tend to be higher in sodium Hypochlorite.

- Thin Bleach £0.19 per litre – 1%
- Thick Bleach £0.52 per litre – 4.6%

* To be absolutely certain of having the right level of available chlorine, you should dilute a 4.5% bleach 1+89 rather than 1+99 but given that this will be a concentration of 0.046% rather than 0.05, very close, then leaving it for, say, 10 minutes rather than 5 should guarantee effectiveness.

Thick bleach has various additives, the main function of which is to help it stick to vertical surfaces like lavatory pans, for long enough to be effective This is not relevant for our purposes.

The thick bleach will work out more economical but be careful diluting it – as it contains surfactants, it is best to add the bleach to the water and stir gently rather than the other way round – that will result in less foam being produced.

Incompatibility

Do not mix bleach (or Milton's) with other products as toxic chlorine can be produced.

Be careful of using these, or any other chlorine-based disinfectants on coloured items, especially cloth as it can get bleached. Bleach can also corrode metals, even stainless steel over time so be careful with any metal items.

Are alcohol-based sanitisers permitted in laboratories?

We have heard suggestions that alcohol-based sanitisers should not ever be used in science labs because of their flammability. We disagree.

As long as they are not used next to a source of ignition and time is allowed for the alcohol to evaporate from hands, we think the risk is not significant. Experiments at SSERC with alcohol-based gel soaked into paper tissue showed that it was very difficult to get it to light without it being extremely close to the flame. Caution should be observed but, used sensibly, we see no significant risk. Once the stock has been exhausted, it would perhaps be prudent to make the next purchase an alcohol-free formula but there is no reason to withdraw your current stock from use.

Regarding alcohol -free formulations - there are now several on the market that seem to be active against coronaviruses: mostly ones based on quaternary ammonium compounds. When assessing the overall risk, it is worth bearing in mind that though these are not flammable, research suggests they need at least two minutes on the hand to provide the same level of protection you get from alcohol gels in 20-30 seconds.

Face coverings in practical science classes

Recent changes in guidance mean that in some areas of the country (Those in Tiers 3 & 4) face coverings will have to be worn by teachers and learners in some classrooms. This includes laboratories.

There do not seem to be any Health & Safety issues that would cause any problems.

Bunsen burners are OK. There is no realistic likelihood of a mask coming into contact with a flame while being worn even if they are combustible

Contamination isn't likely to be a problem either. While it is possible that the covering might absorb some fumes and allow their release later, all that will be happening is that, at worst, the same dose will be spread out over a longer period of time. Theoretically there might be minor issues with a build up of impurities leading to a long-term, low level but potentially problematic inhalation of contaminants. But normal mask hygiene should stop this anyway.

Masks should either be disposable or be washed on a daily basis, which should prevent this being an issue. Now we are of course dealing with children so it is quite likely this won't happen that regularly but it is not likely to be an issue unless something is actually spilled on the mask – in which case it will definitely need to be cleaned.