GUIDANCE ON SCIENCE DEPARTMENT PLANNING FOR SAFETY & COMPLIANCE (K-12)

FLINN SCIENTIFIC

A curated resource document for science education professionals

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Best Practices in the Science Department during COVID-19 and the various instructional models being used:

There are many teachers and science supervisors asking about overall school and prep room safety strategies while their schools are transitioning or being closed for months longer than the traditional summer vacation, during the school year.

FLINN understands the situation that you are in currently and we have compiled a listing of common concerns and remedies for them which you can use. During this challenging time, we know that you are doing your best to provide authentic remote learning experiences and may not be thinking about the science department in the school, but there are some things to be mindful of back in your prep area and lab. We also want to give you the resources that will allow you to safely operate remotely and offer a robust science & STEM program regardless of the instructional modality in your school district.

OVERVIEW OF THIS SESSION

1. Science Lab Activities Selection in Covid-19
2. Assessment during F2F / Cohort / Remote learning for students
3. Standard School Safety Protocols in COVID-19
4. Remote Safety Guidance for STEM/Science
5. Guidance on Prep Room & Department best-practices if schools are closed again
6. Proper Chemical Storage & Common Incompatible Chemicals
7. Chemical Waste Concerns
8. Live Plants, Animals & Cultures at School
9. Biological Jar Specimens
10. Chemical Storeroom Ventilation
11. Storage and Prep Room Organizations
12. End-of-Year Science Department Checklist

James Palcik, Director of Education, Safety and Compliance at FLINN Scientific Inc.

James Palcik, has spent his entire career within the science education market. During that time, he has been conducting science safety PD sessions and making trusted recommendations to schools and districts on their science, STEM and safety resources (including manuals, standard operating procedures, PD programming, new teacher induction programs, etc.)

James has been immersed in the field of laboratory safety, regulatory and compliance as well as professional learning across all K-12 grades. He has also advised on product placement and blended-learning approaches to teaching and learning science. He uses his educational background as a ‘master science teacher and a health and safety expert,‘ along with his extensive commercial background, to bridge these gaps in instruction, compliance and best practices in instructional models.

James is passionate about providing students with hands-on, engaging activities in the lab to inspire future innovation, especially when these actions manage to engage student learning and facilitate teacher instruction simultaneously.

The activities you choose are based on providing the fundamentals and necessary activities to your students in science and STEM

You need to choose the most relevant and impactful lab experiences for the students in your science and STEM programs.

State DOE and local jurisdictional school district policy will prevail here in determining these 'essential activities' for your students based on pre-requisites for post-secondary and advancement through the K-12 curricular framework.

The instructional modality will be a limiting factor here, as many lab investigations require specialized apparatus or instruments in order to provide the authentic learning experiences to the students. **Being creative and using some digital content can bridge the gaps and maintain the learning continuum for your students.**

There are some 'critical' activities in each local curriculum that are well-known among the educators and the students alike. If we have learned anything it is that science and STEM educators are very creative and resourceful people during this pandemic.

Instructional Models Being Discussed for Safe School Re-Entry planning

A best-fit universal instructional model does not exist. Period. This will be the result of multiple factors across the spectrum and there is not one state or area that has a uniform model – by that I mean that among states, there will be localized areas of higher community spread of COVID-19 and areas of lower transmission…. The instructional models will be different to reflect that. The most popular models being discussed are as follows:

1. **Return to School with a full contingent of students and staff (this is the ultimate goal)**
2. **Continuation of a complete remote/distance learning environment for students and staff**
3. **Blended Learning (Hybrid of Cohorting / Staggered Entry / Offset instruction) involving partial in-person and on-line instruction on a rigid schedule of assigned students each day**

1. CDC Considerations for Schools

POLL # 1

What is the instructional modality in your school district today and into the foreseeable future?

1. Face to Face General Instruction
2. Blended (partial classes in cohorts changing on a schedule)
3. Remote / Distance Education
4. Other (may need to explain in the Q&A box)

Synchronous vs Asynchronous Learning Applications

We recognize that there are some communities that do not have the digital delivery mechanisms readily available. Because there is no live internet connection or access to tablets, there are options to provide students continuing learning opportunities being developed that will allow for as much understanding as possible.

Synchronous learning also presents some privacy concerns that are addressed by school districts and by teacher unions…

Teacher / student training and access to the technology can be limiting factors to this style of e-live online education.

Providing worksheets will be part of the overall solution for students but are not necessarily the only format to provide comprehension in an asynchronous learning environment. **Worksheets alone are not a solution but integrated properly they will benefit student learning and comprehension. Many districts, publishers, school suppliers, and corporations are working towards curating genuine solutions to enhance student learning and facilitate teacher instruction.**[1]

1. Flinn Scientific Inc. Professional Learning Series Summer 2020

How to Incorporate Asynchronous Learning in 2020 Science Classrooms?

Many science teachers are currently recording lessons and having them accessible online to their classes. This is a great way to transfer the knowledge and provide a platform for students to learn at their own pace.

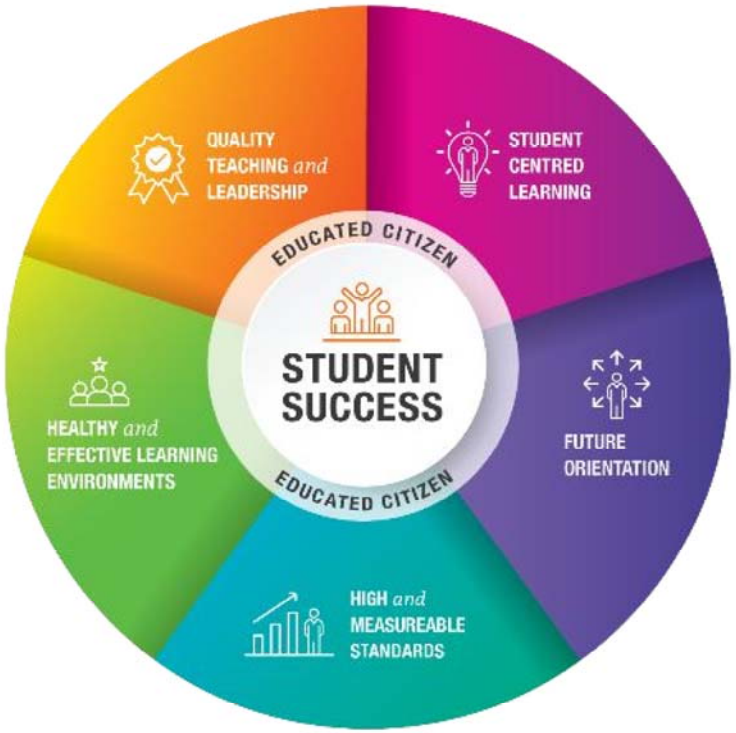
Many are performing activities for their students or showcasing key pieces of their curricular objectives for their classes.

This asynchronous method works best when the teacher posts lessons and then has ‘office hours’ for students combined with some personal video or interaction with students.

Asynchronous learning does not imply that there is no collaboration or communication between student – student or student –teacher but that it is not always in ‘real-time’. Delivering content is not the sole focus of asynchronous learning. It should involve reinforcement of prior learning and prepare for the upcoming lessons.

1. Flinn Scientific Inc. Professional Learning Series Summer 2020

British Columbia Student Success Wheel



Student Success and Continuity of Learning Relationship

The 'Student Success Wheel' from the Province of British Columbia serves as a decision tree for ensuring that multiple factors are involved with a student-centric focus towards a well-rounded, educated, critical thinking active citizen ready for the digital world.

- Quality Teaching and Leadership
- Student Centered Learning
- Future Orientation
- High and Measurable Standards
- Healthy & Effective Learning Environments

This is a very progressive approach to teaching and learning in any environment but especially today.

1. https://www2.gov.bc.ca/gov/content/education-training/k-12/administration/program-management/vision-for-student-success

What Will Teaching Science Look Like Now?

There is not going to be ‘right’ way and a ‘wrong’ way to teach science going forward. There will be established protocols from the DOE and local school districts that must be strictly followed. Science teachers will find a modality and a rhythm once they get back into their labs again.[1]

- **What instructional model is my school going to use to maintain the continuity of learning for our students?**
- **How can I teach “X” without all of my class present? Do I need to teach the same lesson multiple times to different students in my class?**
- **Do I need to do the labs myself and record them digitally and share with my classes? I need to have someone else with me in the lab for safety.**
- **Do I need to sanitize everything in the lab before and after each class? Do we have the PPE needed at school?**

1. CDC Considerations for Schools

3 main modes of instruction

1. **In-person learning with new safety requirements: The objective is to get as many students as possible back into schools for in-person learning—safely**. In this model, all students return in person to school settings that are appropriately modified to accommodate the health and safety requirements outlined above. Examples of modifications could include altered classroom configurations, setting up additional learning spaces, and schedule changes.
2. **Hybrid learning:** In addition, all districts/schools must create a plan for a hybrid model in the event they are unable to bring all students back to school under the health and safety requirements despite their best efforts, or in case of COVID-19 related circumstances. **A hybrid model means that students would alternate between in-person and remote learning. For instance, students could switch between in-person and remote learning on alternating weeks or days of the week.**
3. **Remote learning:** All districts and schools are required to have a plan for operating a remote learning program. This model must be available for individual students who cannot yet return in-person, and for all students in the event of future classroom or school closures due to 13 COVID-19. Additional guidance on statewide support and resources for remote learning will be provided in the coming weeks.

1. http://www.doe.mass.edu/covid19/return-to-school/guidance.pdf

Model 1: Returning to School Brick and Mortar Buildings With All Staff and Students

Return to school physical buildings with the full contingent of students and staff with some additional sanitation and hygiene protocols in place.

There would be modifications to timetabling and the layout and flow of the school and restrictions in place but the overall model is face-to-face instruction where possible. The increased use of disinfection and prevention must be done in tandem with the use of education and communication to all stakeholders in the school system so that it is cohesive, combined effort to minimize the spread of COVID-19.

Population density plays a large role here, and affects mostly urban areas… And there is still research being performed about how students could be vectors in the COVID-19 transmission.

Many school districts are planning on a return to school for elementary students on a full in-person schedule despite parent and teacher federation concerns about class sizes….

1. http://www.oecd.org/coronavirus/policy-responses/youth-and-covid-19-response-recovery-and-resilience-c40e61c6/

Model 2: Remote/Distance Learning For All

Complete Remote/Distance Learning (like what occurred since March in much of the country where students are at home and incorporating some aspect of collaborative learning using some form of technology such as Zoom, MS Teams, or other **programs that allow for real-time synchronous learning and teaching while providing a virtual social stimulus for students.**

Some versions of the remote learning instruction involve having teachers in their actual classroom streaming their coursework to their classes… **but there is a technology and access inequity that exists which is a major hurdle to overcome in certain areas.**

1. http://www.oecd.org/coronavirus/policy-responses/youth-and-covid-19-response-recovery-and-resilience-c40e61c6/

Model 3: Blended Learning/Cohorting/ Offset Instruction/Adapted Day

Blended Learning / Cohorting models that have a reduced number of students such as a Day 1 half-class vs a Day 2 half class on alternating days with students learning at school and doing asynchronous learning when they are not in-school.

There are many hybrid models of this format or a variation on it – and it tends to work better at the middle school and the secondary level, but educators are exceptionally creative, and they will devise a program that covers the essentials in the curricular framework for each grade and course.

1. http://www.oecd.org/coronavirus/policy-responses/youth-and-covid-19-response-recovery-and-resilience-c40e61c6/

Evaluation and Assessment in Science & STEM

Regardless of your instructional environment (remote, cohorted/blended, face-to-face instruction) there is NO CHANGE TO THE ASSESMENT or the EVALUATION of the student work produced. Consistency is critical and those routines are necessary for student success.

Many educators would like to make the E&A dependent on the environment, but the evidence in this area is clearly demonstrating that the student perform better and have a higher engagement rate when the routines and the schedules are the same (regardless of the F2F, cohorted, or remote environment)

Many State DOE and local school districts have mandated that there will NOT be formal exams during the pandemic, and that alternative 'Culminating Activities' can be used for students to demonstrate competency.

Many authorities in Remote/Distance learning are suggesting that using 'big ideas' which are cross-curricular or inquiry-based provide the collaborative approach to meeting curricular expectations within your framework. Use an approach that is aligned with the expectations and the reality of the teaching and learning environment.

1. https://www.nsta.org/resources/freebies-science-teachers-december-8-2020

Schools including Science Classrooms and labs will look much different from the way we remember them…

Many new routines and protocols are in place already for schools . Most schools will have a variation of the following hygiene, safety disinfection and prevention protocols in place:

Health Check at Main Entrance potentially or home assessment prior to arrival at school / school bus

Hand Hygiene (washing and sanitizer use)

Directional arrows & messaging to encourage circulation and hygiene protocol reminders

Acrylic partition dividers in office and some teacher desks

Possibility of face masks (Grades 4-12 & Staff)

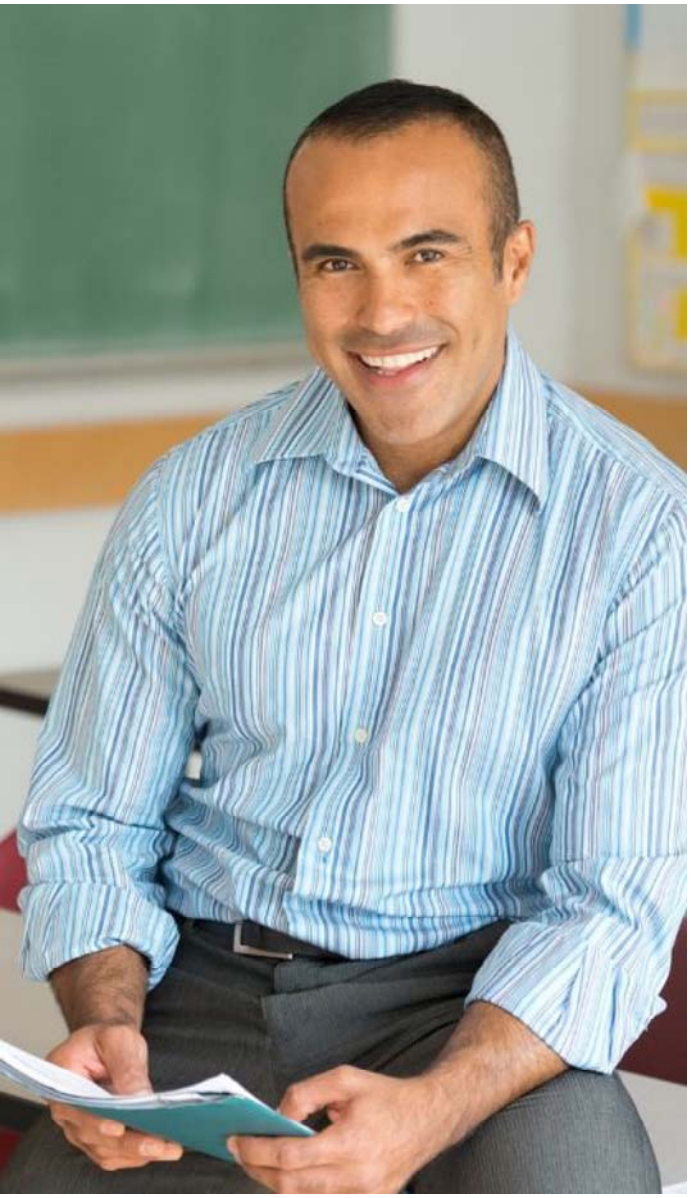
Possibility of nitrile gloves used

Possibility of isolation gowns used

Possibility of face shields for teachers / support workers

Possibility of REMOTE / DISTANCE learning for K12

1. https://www2.gov.bc.ca/gov/content/education-training/k-12/administration/program-management/safe-caring-and-orderly-schools

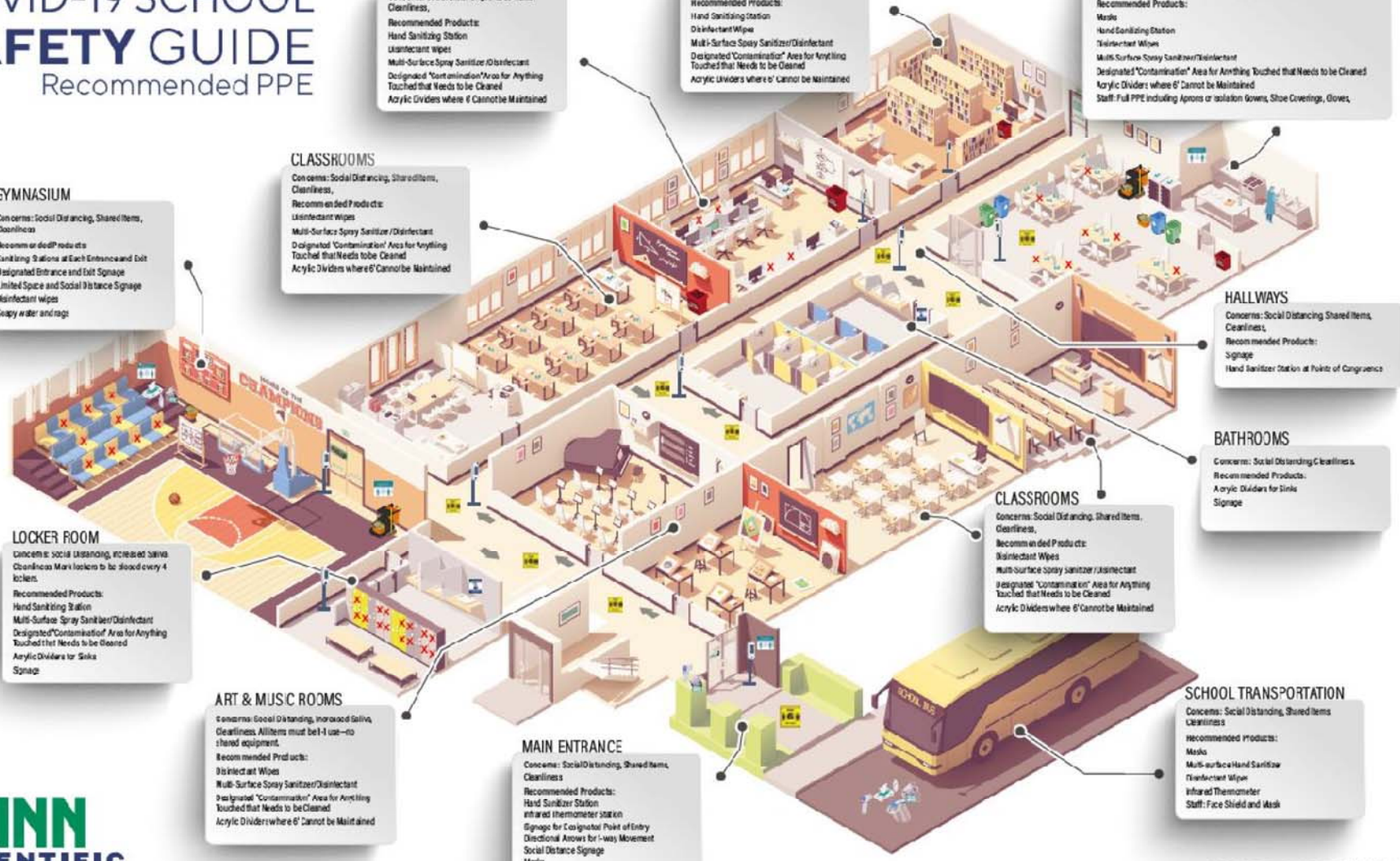


New Safety Protocols in Schools to minimize the spread of COVID-19

• **Health Self-Assessment Tool** • Outbreak Protocol for students or staff that test positive for COVID-19 • **Managing Students or Staff that display COVID-19 symptoms during the school day** • Attendance • School Signage and Physical Distance Markings • Playgrounds and Play Structures • **Requirements for Personal Protective Equipment (PPE)** • **Use of Hand Sanitizer and Disinfectant Wipes** • **Use of Sinks and water refill stations** • Community Use of Schools • Outdoor Space for Recess • **Sharing of Classroom Resources** • Privacy of Information • Use and Deployment of Technology • Use of Lockers and Cubbies • **Board wide Classes** • Transportation Protocol • **Classroom Setup** • Entry and Dismissal Requirements • **Use of Washrooms** • Extracurricular Activities, Clubs and Sports • Visitors, Volunteers and Parent Access to Schools • Emergency Evacuation and Lockdown Drills • **Use of Lunchroom/Cafeteria and Breakfast Programs** • Contactless Payments • **Cleaning Protocols**

1. https://www3.dpcdsb.org/Documents/Community%20Information%20Bulletin%20DPCDSB%20Return%20to%20School%20Plan%20Overview%20for%20September%202020%20July%2023%202020.pdf

COVID-19 SCHOOL **SAFETY** GUIDE
Recommended PPE



SHARED RESOURCE ROOM
Concerns: Social Distancing, Shared Items Cleanliness,
Recommended Products:
Hand Sanitizing Station
Disinfectant Wipes
Multi-Surface Spray Sanitizer/Disinfectant
Designated "Contamination" Area for Anything Touched that Needs to be Cleaned
Acrylic Dividers where 6' Cannot be Maintained

LIBRARY MEDIA CENTER
Concerns: Social Distancing, Shared Items, Cleanliness,
Recommended Products:
Hand Sanitizing Station
Disinfectant Wipes
Multi-Surface Spray Sanitizer/Disinfectant
Designated "Contamination" Area for Anything Touched that Needs to be Cleaned
Acrylic Dividers where 6' Cannot be Maintained

CAFETERIA
Concerns: Social Distancing, Shared Items, Cleanliness, Increased Spread of Saliva. Students should be encouraged to bring food from home, and disposable materials and pre-packaged food items used. Rigid cleaning protocols must be enforced.
Recommended Products:
Masks
Hand Sanitizing Station
Disinfectant Wipes
Multi-Surface Spray Sanitizer/Disinfectant
Designated "Contamination" Area for Anything Touched that Needs to be Cleaned
Acrylic Dividers where 6' Cannot be Maintained
Staff: Full PPE including Aprons or Isolation Gowns, Shoe Coverings, Gloves,

CLASSROOMS
Concerns: Social Distancing, Shared Items, Cleanliness,
Recommended Products:
Disinfectant Wipes
Multi-Surface Spray Sanitizer /Disinfectant
Designated 'Contamination' Area for Anything Touched that Needs to be Cleaned
Acrylic Dividers where 6' Cannot be Maintained

GYMNASIUM
Concerns: Social Distancing, Shared Items, Cleanliness
Recommended Products
Sanitizing Stations at Each Entrance and Exit
Designated Entrance and Exit Signage
Limited Space and Social Distance Signage
Disinfectant wipes
Soapy water and rags

HALLWAYS
Concerns: Social Distancing, Shared Items, Cleanliness,
Recommended Products:
Signage
Hand Sanitizer Station at Points of Congruence

BATHROOMS
Concerns: Social Distancing, Cleanliness,
Recommended Products:
Acrylic Dividers for Sinks
Signage

CLASSROOMS
Concerns: Social Distancing, Shared Items, Cleanliness,
Recommended Products:
Disinfectant Wipes
Multi-surface spray sanitizer / disinfectant
Designated "Contamination" Area for Anything Touched that Needs to be Cleaned
Acrylic Dividers where 6' Cannot be Maintained

LOCKER ROOM
Concerns: Social Distancing, Increased Saliva, Cleanliness Mark lockers to be sliced every 4 lockers
Recommended Products:
Hand Sanitizing Station
Multi-Surface Spray Sanitizer/Disinfectant
Designated "Contamination" Area for Anything Touched that Needs to be Cleaned
Acrylic Dividers for Sinks
Signage

ART & MUSIC ROOMS
Concerns: Social Distancing, Increased Saliva, Cleanliness. All items must be 1-1 use—no shared equipment.
Recommended Products:
Disinfectant Wipes
Multi-Surface Spray Sanitizer/Disinfectant
Designated "Contamination" Area for Anything Touched that Needs to be Cleaned
Acrylic Dividers where 6' Cannot be Maintained

MAIN ENTRANCE
Concerns: Social Distancing, Shared Items, Cleanliness
Recommended Products:
Hand Sanitizer Station
Infrared thermometer station
Signage for Designated Point of Entry
Directional Arrows for 1-way Movement
Social Distance Signage
Masks

SCHOOL TRANSPORTATION
Concerns: Social Distancing, Shared Items Cleanliness
Recommended Products:
Masks
Multi-surface Hand Sanitizer
Disinfectant Wipes
Infrared Thermometer
Staff: Face Shield and Mask

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1. CDC: Public Health Guidance for Community-Related Exposure
2. https://www.tvo.org/article/back-to-school-part-1-an-infectious-disease-expert-on-reopening-safely
3. https://www.tvo.org/article/back-to-school-part-2-a-teacher-on-reopening-safely

Screening Questionnaire

PARENTS/GUARDIANS/STUDENTS MUST USE THIS QUESTIONNAIRE DAILY TO DECIDE IF THE STUDENT SHOULD ATTEND SCHOOL

ALL STAFF MUST USE THIS QUESTIONNAIRE DAILY TO SELF-SCREEN

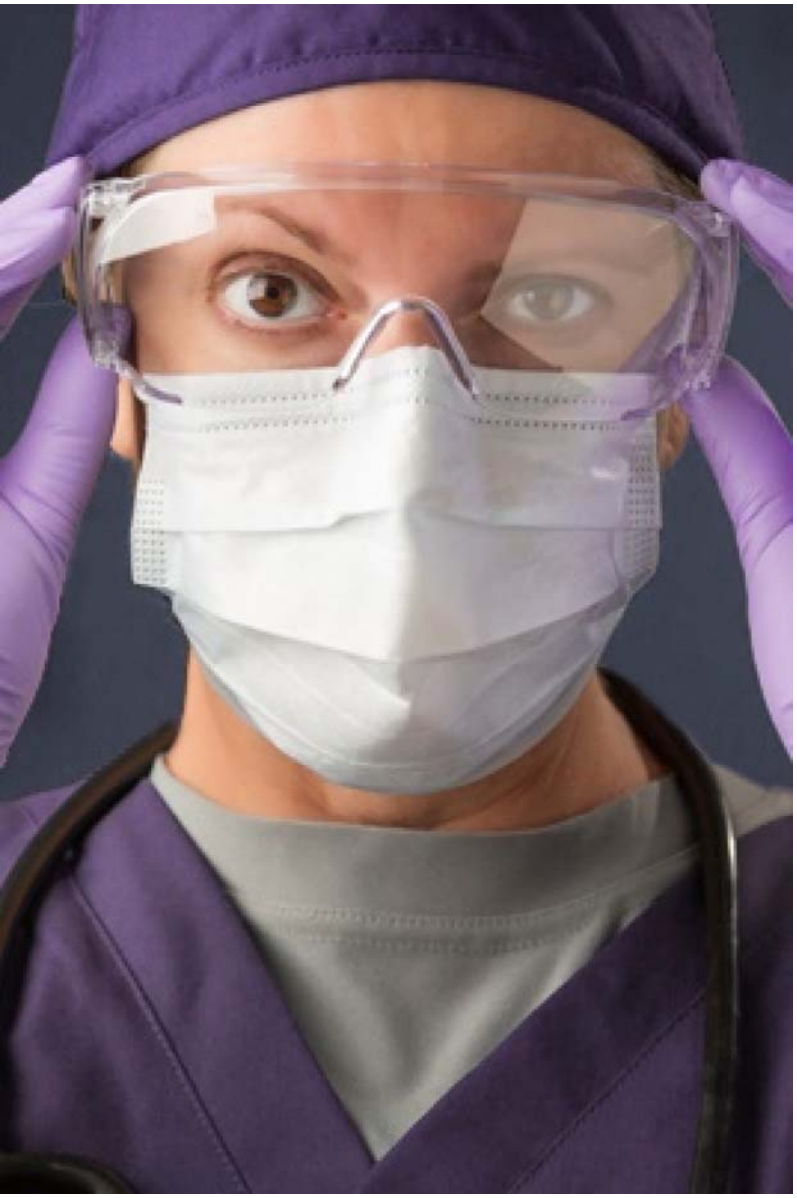
Risk Assessment: Initial Screening Questions

1.	Do you, or your child attending the program, have any of the below symptoms:	CIRCLE ONE	
	• Fever	YES	NO
	• Cough	YES	NO
	• Shortness of Breath / Difficulty Breathing	YES	NO
	• Sore throat	YES	NO
	• Chills	YES	NO
	• Painful swallowing	YES	NO
	• Runny Nose / Nasal Congestion	YES	NO
	• Feeling unwell / Fatigued	YES	NO
	• Nausea / Vomiting / Diarrhea	YES	NO
	• Unexplained loss of appetite	YES	NO
	• Loss of sense of taste or smell	YES	NO
	• Muscle/ Joint aches	YES	NO
	• Headache	YES	NO
	• Conjunctivitis (Pink Eye)	YES	NO
2.	Have you, or anyone in your household, returned from travel outside of Canada in the last 14 days?	YES	NO
3.	Have you or your children attending the program had close unprotected* contact (face-to-face contact within 2 metres) with someone who is ill with cough and/or fever?	YES	NO
4.	Have you or anyone in your household been in close unprotected contact in the last 14 days with someone who is being investigated or confirmed to be a case of COVID-19?	YES	NO

* "unprotected" means close contact without appropriate personal protective equipment (PPE).

If you have answered "**Yes**" to any of the above questions, please **DO NOT** enter the school at this time. You should stay home and use the COVID-19 Self-Assessment Tool to determine whether you need to be tested for COVID-19.

If you have answered "**No**" to all the above questions, you may attend school.



Suggestions for PPE usage in Science Labs

The OH&S laws are very clear that ‘every person in the lab must have appropriate PPE accessible to them and they must wear it properly when conducting science activities…’

With an emphasis on PPE due to the COVID-19 outbreak, there is likely going to be an increase in the use and consumption of many items including masks, gloves, and safety eyewear.

The frequent use of a UV goggle sanitation cabinet is a trusted disinfection method used in healthcare facilities to sanitize eyewear after use. (*UV-C wavelength bulbs*) Used in tandem with the Lysol Dip method, this eliminates any possibility of the virus surviving on a surface of a shared objects like goggles.

Having more than the traditional amounts of gloves on hand is recommended for the increased frequency of use and disposal after handling science equipment and apparatus.

Face coverings have been mandated in MA and these must be available to students and teachers in the school. Grades 2-12 as well as staff are mandated to have face coverings in school. *students encouraged to use one from home and wash it daily*

Hand hygiene behaviors including the use of trusted soap and water, hand sanitizers, and wipes will likely become mainstream events with scheduled hand hygiene reminders and times.

1. https://www.osha.gov/laws-regs/regulations/standardnumber/1910/1910.1450

Increased Disinfection of Surfaces and Apparatus in the Science Lab

Make sure that ALL LAB EQUIPMENT such as microscopes, hot plates, digital balances, autoclaves, dissection tools and other apparatus are cleaned vigilantly before and after each use.

PPE including goggles should be cleaned appropriately after use with an approved liquid disinfectant solution and/or UV sterilizer.

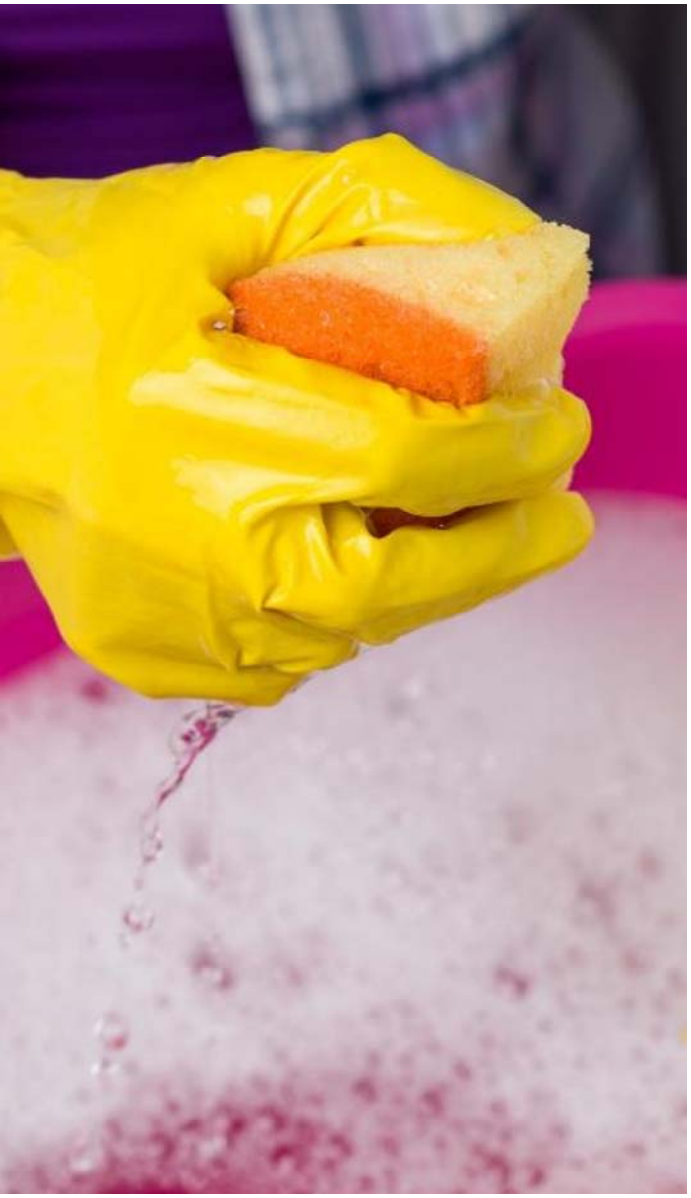
Disposable gloves are for one-time use only and follow procedures to remove them safely – and ensure they are discarded appropriately according to local protocols.

Make sure that hygiene protocols are followed from the CDC, WHO, UNESCO and the Federal, State/Provincial officers of health and safety.

EPA Disinfectants for Use Against SARS-CoV-2

CDC Considerations for Schools

https://www.cdc.gov/coronavirus/2019-ncov/community/disinfecting-building-facility.html



Recommendations to Sanitize Science Equipment & Safety Items in the Lab

The WHO, CDC, OECD, Unicef and other large authorities are **recommending that high-use items be sanitized pre and post usage. Lab equipment would be considered a high-touch item.** Others in this category are art supplies, math manipulatives, toys, sports equipment and other tactile learning products.

The recommendation is to use warm soapy water when possible, and to use disinfectant or sanitizer when appropriate such as on electronic and delicate instrumentation.

The Lysol Dip method will be used based on adding an amount of disinfectant to warm water, and then using that to clean the lab instruments or apparatus and letting it air dry.

Safety glasses disinfect in the Lysol solution (1-1/4 ounces Lysol with one gallon of soft or DI water) for 15 minutes, rinsed with water, and allow to air dry. There is absolutely no damage or discoloration to any of the products. Water spots remaining on the lenses are easily removed using lens paper or a paper towel and leave no scratches or marks.

1. EPA Disinfectants for Use Against SARS-CoV-2
2. CDC Considerations for Schools
3. https://www.cdc.gov/coronavirus/2019-ncov/community/disinfecting-building-facility.html

Cleaning and Disinfection – Continued

How should I clean?

- **Disinfect commonly used fixtures and equipment often, or when visibly soiled.**
- **Clean and disinfect other fixtures, furniture and equipment on a regular basis.**
- **Disinfect waste baskets as needed.**

An easy way to prepare a disinfectant solution is to mix 1 part bleach to 100 parts water (e.g., 10 ml bleach in 1 liter of water). It's better to prepare a solution with the disinfectant, dip your cloth or sponge into the solution, and then wipe it onto the surfaces you want to disinfect.

Spraying products may damage expensive furniture or expensive equipment, like computers. Some cleaning products will damage surfaces – when in doubt, check with a janitorial supply store. And always wear rubber gloves when handling disinfectants.

1. Public Health Authority of Canada Guidelines on Disinfection in the Workplace

Recommendations to Sanitize Science Equipment & Apparatus

The use of a disinfectant on a cloth which is then used to clean the surfaces is encouraged. Some people will prefer to use a disinfectant wipe and dispose of it accordingly after use.

Many recommendations are based on the use of a disinfectant wipe on science equipment both pre and post usage. Ensure that all products used for cleaning and disinfection are FDA / EPA approved. Only use 1 wipe per item – no cross-contamination from using it on multiple items.

Pump sprayer bottle tops allow for the alcohol-based sanitizer to be accurately aimed towards the surface being cleaned with minimal overspray or waste.

DO NOT spray alcohol-based sanitizer on any lab equipment that is hot or warm such as a hot plate, recently used Bunsen burner or soldering iron.

1. EPA Disinfectants for Use Against SARS-CoV-2
2. CDC Considerations for Schools
3. https://www.cdc.gov/coronavirus/2019-ncov/community/disinfecting-building-facility.html

Recommendations to Sanitize Science Equipment & Apparatus Continued

USE LYSOL DIP METHOD FOR THESE ITEMS:

Glassware including beakers, test tubes, cylinders, flasks, stirring rods, dissection instruments, goggles, safety glasses, metric weights, funnels, burets, etc.

SPRAY OR WIPE THESE ITEMS:

Microscopes, balances, instrumentation, hot plates, data loggers and probes, electronic equipment, VDG, physics apparatus, etc.

Only use ONE DISINFECTANT WIPE PER OBJECT OR WORK SURFACE AREA. Then dispose of it accordingly to eliminate the potential for cross-contamination.

1. EPA Disinfectants for Use Against SARS-CoV-2
2. CDC Considerations for Schools
3. https://www.cdc.gov/coronavirus/2019-ncov/community/disinfecting-building-facility.html

Overall Suggestions for Teaching Science

Having the teacher perform the activity and having it recorded for the class will provide a consistent platform for learning and for basing questions and inquiry activities if doing 'blended learning model'.

Doing the same activity more than once so that the students have the hands-on tactile learning appreciation from the lab activity if 'staggered day model'.

Collaborating with colleagues so that there is a combined framework or rubric used for teaching students with a digital element in combination with a sharing of resources and equipment to offer a safe and solid science program. Following guidance from the school district and Provincial Education Authorities on best-practices and tools to integrate this pedagogical style into the mainstream school systems.

Always model proper safety protocols in your lessons and wear your PPE to demonstrate expected behavior in the lab. NEVER work alone in the lab – have a partner with you for safety and compliance.

1. Flinn Scientific Inc. Professional Learning Series Summer 2020

Suggestions on Dealing with Physical Distancing in Science Laboratories

With the expectation that there is a 6 foot (2m) distance between students, this will be difficult to implement in schools and in science labs in particular. The small lab stations used cannot be used to accommodate more than one student. Elementary is being encouraged to use the 3 feet/1m rule from Sick Kids Hospital.

Lab work in science is typically a team effort, and without being able to have a lab partner physically present, the activities may need to be modified to suit the new single-person observation mode. You may be able to use PPE as a mechanism to allow for lab activities….

Offset seating, all facing in one direction, and with minimal social interaction can contribute to increased anxiety and stress while at school.

Traditional lab layouts are not conducive to this separation model and require considerable time and energy to devise a plan for student learning that provides a robust platform for growth.

1. http://www.oecd.org/coronavirus/policy-responses/youth-and-covid-19-response-recovery-and-resilience-c40e61c6/
2. http://www.sickkids.ca/AboutSickKids/Newsroom/Past-News/2020/joint-statement-school-reopening.html
3. http://www.sickkids.ca/PDFs/About-SickKids/81407-COVID19-Recommendations-for-School-Reopening-SickKid

Suggestions for Biology Lessons

Teaching biology concepts such as physiology and anatomy systems are greatly enhanced with dissections, the use of a microscope to investigate, and models to illustrate various biotic processes.

Having students perform lab investigations is essential to their overall understanding and application of these fundamental concepts.

Capturing the activity being performed from an angle and perspective from the student will increase their grasp of the activity (dissection, microscopy, anatomy, etc.)

The use of narration over the images can be valuable as a teaching tool for many students and allows for review of the concept.

Consider the application of some digital biology programs to enhance learning such as digital dissections and other solutions for teaching.

1. Flinn Scientific Inc. Professional Learning Series Summer 2020

Suggestions for Chemistry Lessons

Teaching chemistry involves the use of multiple chemicals, glassware, and apparatus in the science laboratory. Chemistry involves the observation and understanding of multiple chemical interactions, processes, and reactions in a controlled environment. This can be a challenge in a traditional school setting.

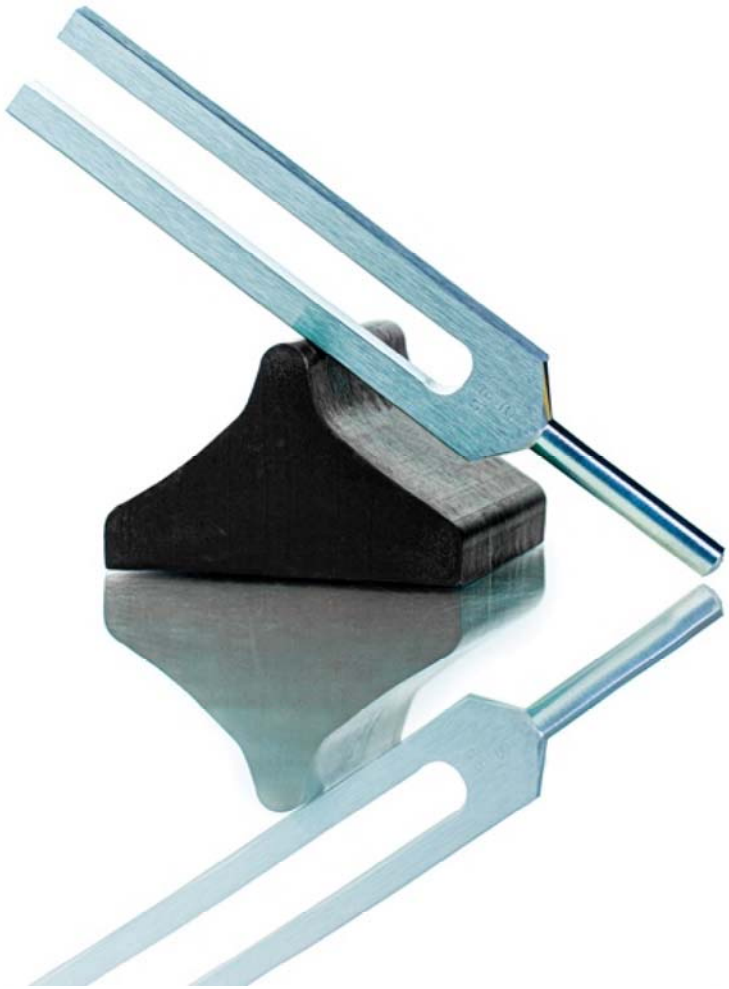
Having students perform lab investigations is essential to their overall understanding and application of these fundamental concepts.

Capturing the activity being performed from an angle and perspective from the student will increase their grasp of the activity (dilution, titrations, heating, mixing etc.)

The use of narration over the images can be valuable as a teaching tool for many students and allows for review of the concept.

Opportunity to engage some online learning solutions for chemistry such as digital labs, chemical interactions and periodic table interactions are possible.

1. Flinn Scientific Inc. Professional Learning Series Summer 2020



Suggestions for Physical Science Lessons

Teaching physics can be challenging in a traditional setting. The understanding from the combination of various scientific laws and their application to society are essential to engineering, technology and science advancement overall.

Having students perform lab investigations is essential to their overall understanding and application of these fundamental concepts.

Capturing the activity being performed from an angle and perspective from the student will increase their grasp of the activity (motion, magnetism, density, thermodynamics, optics, waves etc.)

The use of narration over the images can be valuable as a teaching tool for many students and allows for review of the concept.

Integration of some physics simulation software may be useful for demonstrating various models to students and benefit their learning continuum.

1. Flinn Scientific Inc. Professional Learning Series Summer 2020

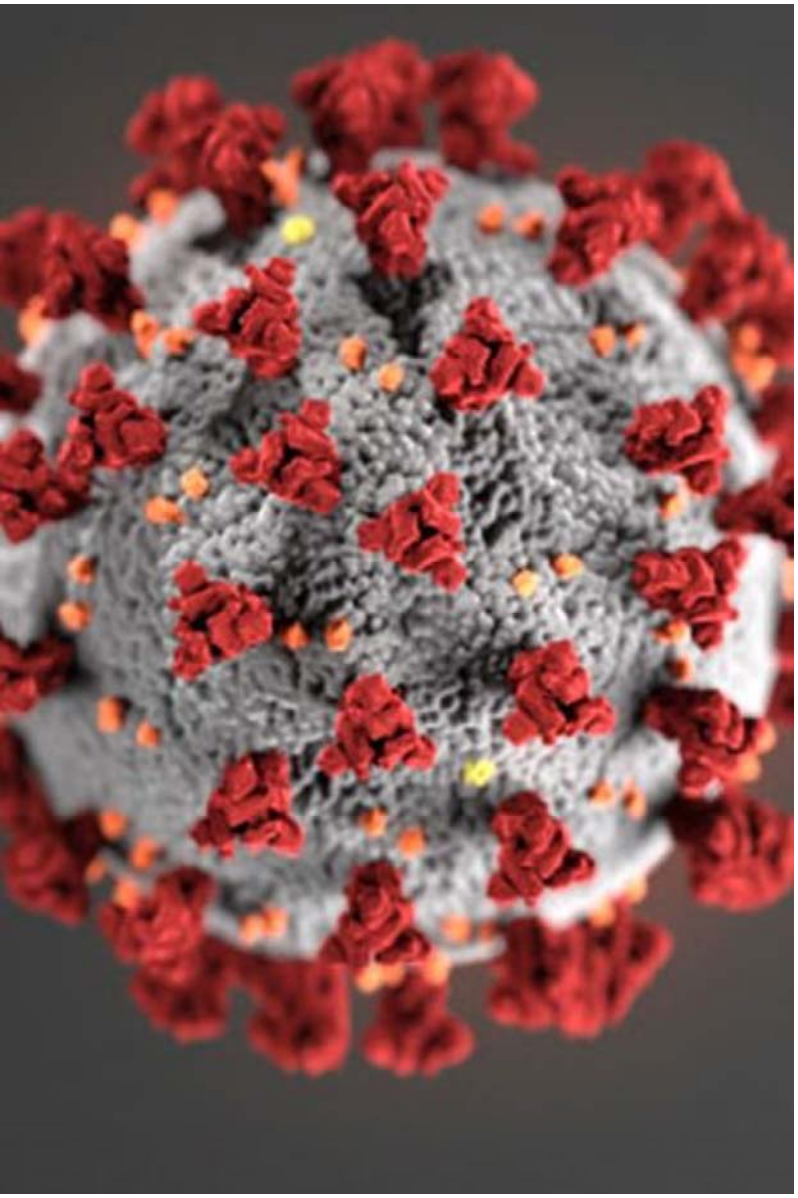
Basic Safety Protocols in Elementary School

Being proactive (prevention) is the best remedy to any situation. **Teachers modelling proper behaviors in the classroom (wearing goggles or gloves) is a solid foundation towards setting the culture in the classroom. Safety exists as a standard in the workplace – and so it should be the same standard in the school classroom.**

Additionally, teachers having an awareness of the potential hazards that exist with the use of tools, science equipment and apparatus, and especially with the use of chemicals is very important. Make sure that the students are washing hands often and that you sanitize all equipment and tools prior and post usage with the class. This is the new normal.

Teachers should be able to properly recognize safe procedures in the classroom and to identify areas of concern to minimize the risk of injury to students. This is often referred to as a '**Hazard Identification or Assessment' across various platforms of teaching.**

1. Flinn Scientific Inc. 2020 Elementary Science & STEM Safety Academy



K-8 Prevention – continued

Encourage students to not touch their face, eyes, ears, nose or mouth. Your hands are in contact with many surfaces and these are all potential sources of the Coronavirus or similar virus. By then touching your face and other organs, you increase the chance of contaminant transmission to your body and getting sick. It's amazing how often you touch your face in an average day. **This is why sanitizing your classroom is important and non-negotiable in the K-8 STEM environment including items used. Students are not always the most sterile people.**

Make sure you and your students cough or sneeze into your elbow or some tissues. Seems simple, but it minimizes the droplets being distributed and increasing the chance of viral spread. Employing common sense hygiene techniques are effective. The virus can survive on your hand, clothing smartphone and work area tools and utensils for hours and potentially days just waiting to be transmitted through touch. **Ensure your students follow your lead in this action.**

1. CDC Considerations for Schools

Poll # 2

What are you doing to maintain the continuity of learning for your students in these challenging times?

1. Carefully selected labs in-person
2. Employing some digital content for remote delivery
3. ALL digital delivery
4. It has been changing – but students are learning
5. It has been changing but I am concerned for my students learning

Safety Concerns When Students Are Working Remotely (At-home) Without Teacher Supervision

Having students learning remotely creates its own challenges from a classroom management, continuum of learning and a safety perspective. By recognizing that not every home will have the essential PPE items, access to common chemicals and items *(vinegar, baking soda, food dyes, sugars, salts, starch and straws, plastic cups, balances, coffee filters etc.)* **we need to be respectful and choose activities accordingly**.

There are safety concerns that result from the choice of student-managed science / STEM activity and there are ways to minimize these risks or hazards, but there is responsibility on the part of the student and the parents/guardians to cultivate and practice safe procedures and techniques in order to learn about the science being demonstrated. **The teachers will need to be especially safety conscious when selecting remote learning activities that use any potential hazards including consumer commodities listed in their procedures/instructions for each activity. The use of digital delivery reduces the safety risks.**

1. https://www.nsta.org/blog/safety-hands-science-home-instruction
2. https://www.nsta.org/science-teacher/science-teacher-julyaugust-2020/remote-learning-problem-or-opportunity

Safety at Home Concerns Continued

Teachers will need to over-communicate their expectations and ensure that the following guidance is adhered to with their students:

1. **Encourage parent/guardian supervision when doing science activities when possible / practical**
2. **Encourage students to follow the prescriptive lesson instructions sequentially**
3. **Have contingency safety protocols in place (In case of X, do Y…)**
4. **Choose age / grade / level appropriate activities**
5. **Choose readily available items typically located in a home**
6. **Have students watch a pre-recorded version from the teacher so that they have a better understanding of the possible outcome and procedures to follow when conducting the activity themselves**
7. **The development and use of a Remote Science Safety Contract**

1. Flinn Professional Learning Series 2020
2. https://www.nsta.org/science-teacher/science-teacher-julyaugust-2020/remote-learning-problem-or-opportunity

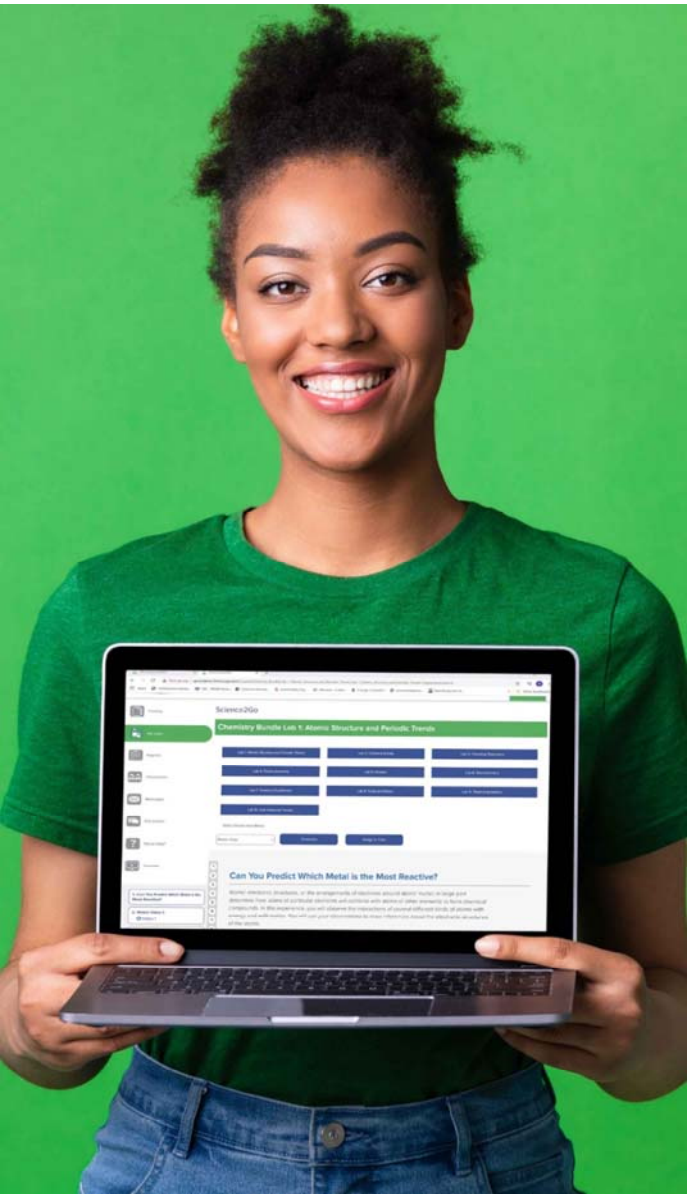
Providing Kits/Items To Students To Use In Their Science Investigations Remotely?

There has been some discussion regarding the use of student kits for use in a remote teaching/learning environment that provides the basic PPE, some basic plasticware, common reusable items and core product that will facilitate student learning.

There are risks associated with having students performing lab activities on their own, and by providing them with products, the liability question leans heavily on the school district…who ordered and delivered (provided) the products to the students. There would be an expectation for synchronous learning and that students demonstrated competency regarding the use of these kits prior to using them independently. Make sure these decisions are made in alignment with State DOE and local School District policy.

The use of alternative digital applications in a synchronous / asynchronous environment should be explored that can provide an authentic science learning experience while mitigating the science safety concerns. This could be a teacher recorded version of the lab activity or a publisher / supplier solution that could be used to supplement core learning and teaching strategies.

1. Flinn Professional Learning Series 2020



Science2Go Platform To Maintain The Continuum Of Learning For Students

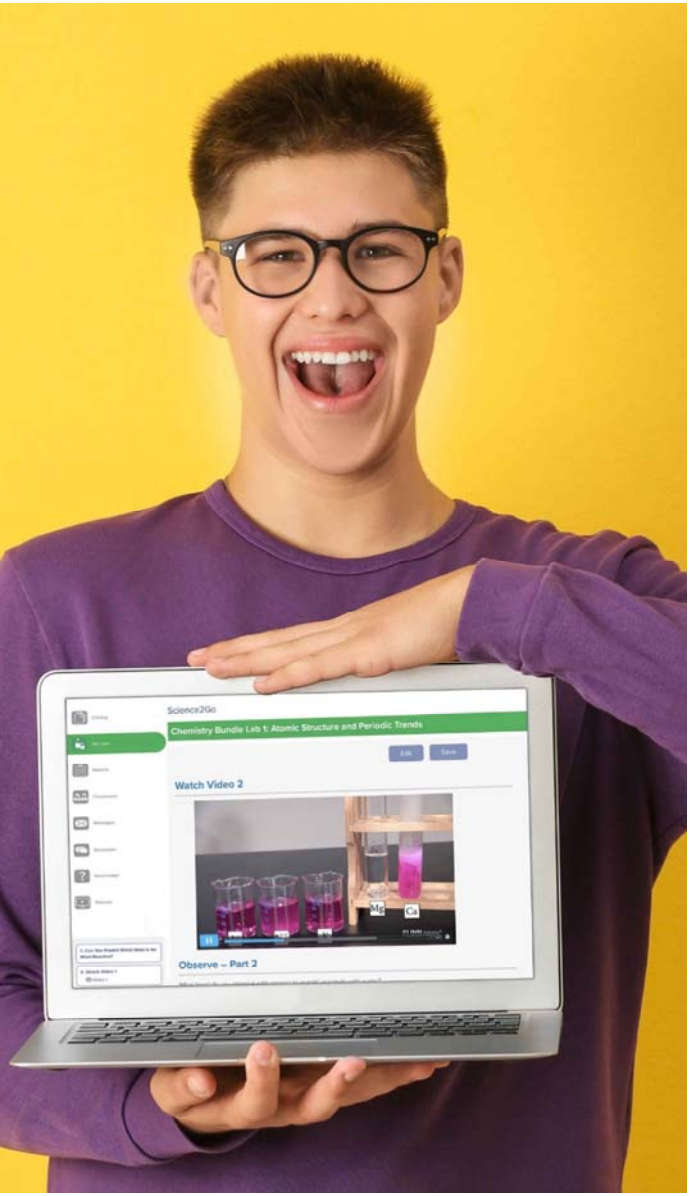
"Science2Go" is a digital solution that offers a new approach to lab education - allowing middle and high school students to "do science" whatever the learning environment - Remote, Blended, Flipped and In-School.

With **Science2Go**, students engage in the process of scientific thinking – without traditional labs and supplies.

Each lab begins with a guiding question to focus student thinking. Students watch videos that demonstrate real lab techniques and get access to real lab data so they can engage in scientific practices including observation and analyzing data to make predictions

Students are also encouraged to identify design flaws and refine their experiments just like they would in an in-class setting.

1. Science2Go



Science2Go Platform To Maintain The Continuum Of Learning For Students

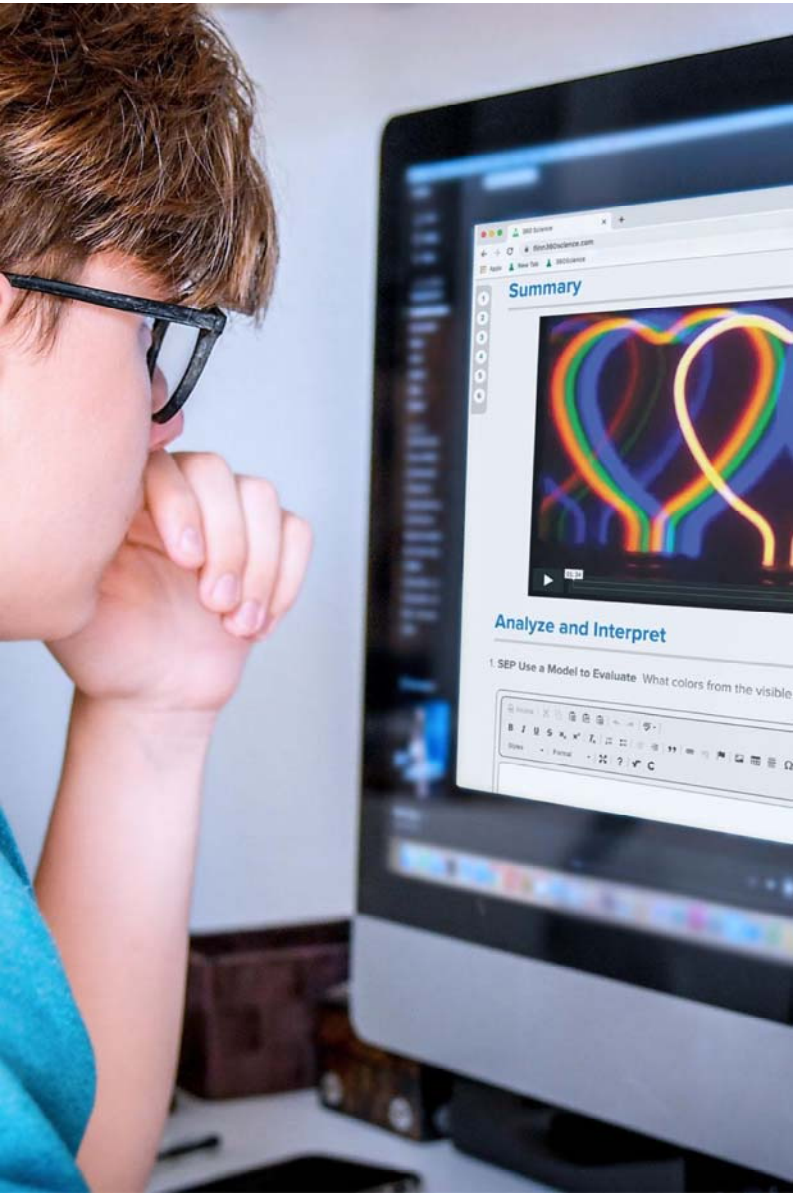
Scientific reasoning skills are covered as students connect what they learned in the lab to the natural world.

They can also go deeper with links to simulations, at-home activities and recommendations for hands-on kits.

Teachers using Science2Go can easily customize labs to best meet the needs of their students - by editing text and uploading videos, images or documents.

Developed with teachers detailing the challenges they face in teaching science in a COVID-19 school year, Science2Go is aligned to NGSS and other state standards. It includes lab activities for High School Biology, Chemistry, Environmental Science and Physics and for Middles School Life Science and Physical Science

1. Science2Go



360Science Builds On Science2go

What is 360Science?

Flinn's 360Science™ is a customizable lab learning solution that surrounds teachers with all they need to incorporate more hands-on learning into the classroom or lab with a unique combination of easily modified hands-on lab experiences that are complemented by robust digital activities.

360 Science was born out of Flinn's partnership with Pearson in the formation of their high school chemistry curriculum that includes a **unique instructional approach in that it begins each day with an inquiry lab** supported with written research in a traditional textbook format. This approach intensifies the need for hands -on learning in the classroom, supporting NGSS Standards and other state sciences standards. Every lab is aligned to NGSS and other science standards.

360Science consists of 200 individual labs across the subjects and grade levels ready right now.

NSTA Suggestions on Safely Teaching Science

Whether it is the adoption of the cohort model resulting from a viral or bacterial pandemic situation or scheduled renovations/new construction, advance planning is required and needs to directly involve science teachers, chemical hygiene officers, and science supervisors.

Also remember that if all legal safety standards (e.g., OSHA Lab Standard, etc.) and better professional safety practices (e.g., NSTA's recommended lab safety requirements) are not addressed and can't be met in total, no hands-on laboratory or demonstration work should be done; there are just too many potential hazards and resulting risks for injury and legal entanglement! **Dr. Ken Roy – NSTA Safety**

1. https://www.nsta.org/blog/planning-safety-temporary-science-instructional-space-hands-temporary-science-classroom

SCIENCE DEPARTMENT SAFETY CONCERNS IN A COVID-19 ENVIRONMENT

FLINN SCIENTIFIC

CONSIDERATIONS FOR CHEMICAL HYGIENE PLANS, SAFETY AND STRATEGIES FOR K-12 SCIENCE EDUCATORS FOR COMPLIANCE FOR STATE AND FEDERAL REGULATORY

Chemical Storage Concerns

Closed schools offer the perfect opportunity to do an audit of your chemical storage.

Here's what you need to do:

Yearly audits are recommended to ensure school labs and prep areas are safety compliant. Audits also offer the perfect opportunity for you to take stock of what your classroom will need and what you should dispose of before students arrive back in the classroom.

Incompatible chemical storage of chemicals typically results in odors, precipitates forming, or chemical bottle failures. Many chemicals when stored incorrectly will create tell-tale smells in the room and these are usually hydrocarbons from alcohols and solvents in the flammables cabinet; or corrosives that are mixing (vapors) creating a pungent smell.

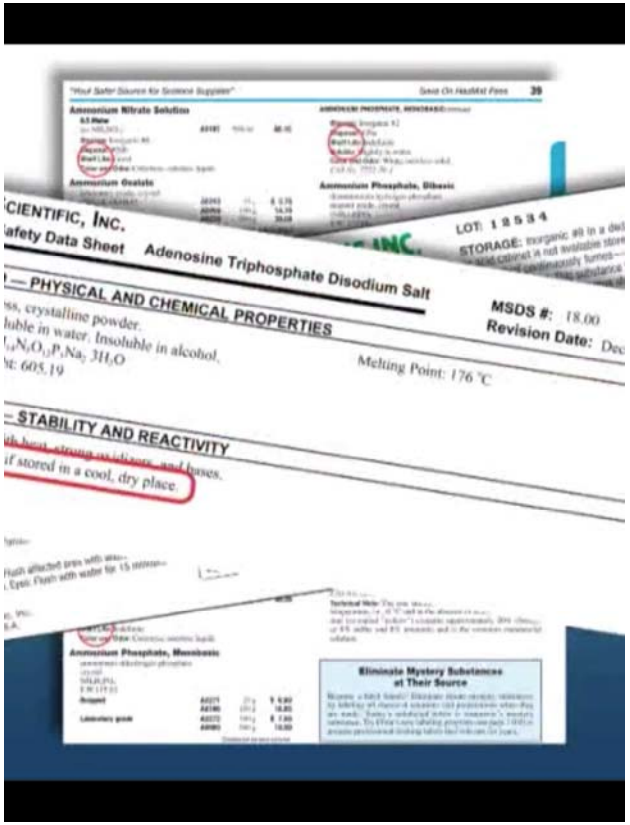
The fine white precipitate that forms in a corrosive cabinet that is storing both acids and bases (improper storage method) is the chemical result of an acid + base = salt + water.

Common Incompatible Chemicals

Many chemicals are incompatible and need to be stored separately from each other.

Here's a sample of what you need to know:

- Acetic acid with chromic acid, ethylene glycol, hydroxyl compounds, nitric acid, perchloric acid, permanganates, peroxides
- Acetone with concentrated sulfuric and nitric acid mixtures, hydrogen peroxide
- Acetylene with copper (tubing), bromine, chlorine, fluorine, iodine, silver, mercury and their compounds
- Alkali metals with carbon dioxide, carbon tetrachloride, chlorinated hydrocarbons, flammable liquids, oxidizers, salt, sulfur, water
- Ammonia (anhydrous) with mercury, halogens, calcium hypochlorite, hydrogen fluoride
- Ammonium nitrate with acids, metal powders, flammable fluids, chlorates, nitrates, sulfur, and finely divided organics or combustible materials



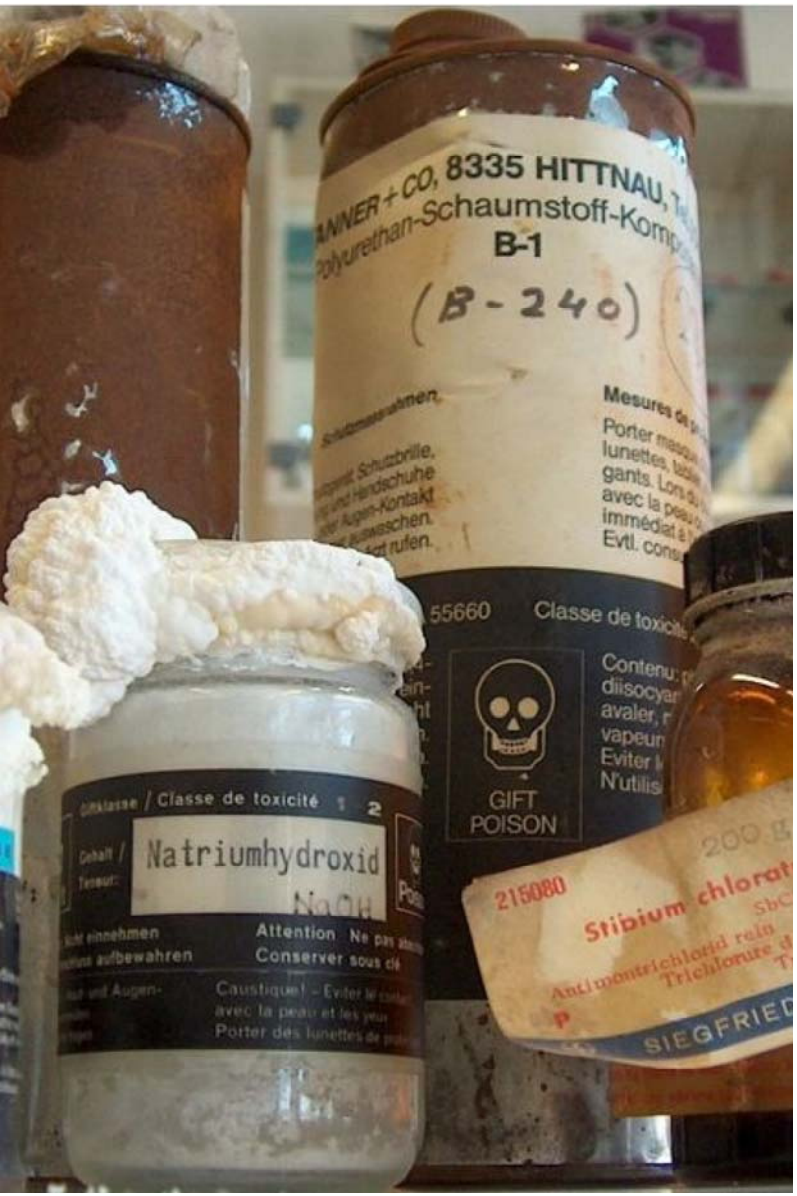
Watch our Shelf Life of Chemicals Video to see how Flinn provides information to help you safely manage your chemicals.

Common Incompatible Chemicals

- Aniline with nitric acid, hydrogen peroxide, inorganic acids, oxidizers
- Bromine with ammonia, acetylene, benzene, butadiene, butane, petroleum gases, hydrogen, sodium carbide, turpentine, and finely divided metals
- Chlorates with ammonium salts, acids, metal powders, sulfur, finely divided organics or combustible materials
- Chromic acid with acetic acid, naphthalene, camphor, alcohol, glycerol, turpentine, and other flammable liquids
- Chlorine with ammonia, acetylene, butadiene, benzene, and other petroleum fractions, hydrogen, sodium carbide, turpentine, and finely divided powdered metals
- Cyanides with acids
- Hydrocarbons, generally with fluorine, chlorine, bromine, chromic acid, sodium peroxide
- Hydrogen peroxide with copper, chromium, iron, most metals or their respective salts, flammable fluids, and other combustible materials, aniline, and nitromethane.

Common Incompatible Chemicals

- Hydrogen sulfide with nitric acid, oxidizing gases
- Iodine with acetylene, ammonia (anhydrous or aqueous)
- Mercury with acetylene, ammonia, fulminic acid, hydrogen
- Nitric acid with acetic, chromic, and hydrocyanic acids, aniline, hydrogen sulfide, flammable liquids or gases and substances which are readily nitrated
- Oxalic acid with silver, mercury and their salts
- Oxygen with oils, grease, hydrogen, flammable liquids, solids and gases
- Perchloric acid with acetic anhydride, bismuth and its alloys, alcohol, paper, wood and other organic materials
- Phosphorous pentoxide with water, alcohols, strong bases
- Potassium permanganate with glycerol, ethylene glycol, benzaldehyde, sulfuric acid
- Sodium peroxide with any oxidizable substances (e.g. ethanol, methanol, glacial acetic acid, acetic anhydride, benzaldehyde, carbon disulfide, glycerol, ethylene glycol, ethyl acetate, methyl acetate, furfural)
- Sulfuric acid with chlorates, perchlorates, permanganates, and water



Chemical Waste Concerns

Waste chemicals often find themselves taking up space in prep areas. Proper and timely disposal is paramount to a safe lab and learning environment.

Here's what you need to know:

If you will not be returning to on-site learning for the fall, try to get permission to go into your lab and go through your chemicals now.

If you are returning to onsite learning, we suggest putting a small dot sticker on the bottle every time you pull it out for use which will allow you to visualize how often that particular bottle is used during the year. You will find that there about 15-20 chemicals that are very commonly used – and 40 more that are used periodically.

ASK FLINN FOR THE LIST OF THE MOST COMMONLY USED CHEMICALS IN SCIENCE & STEM EDUCATION

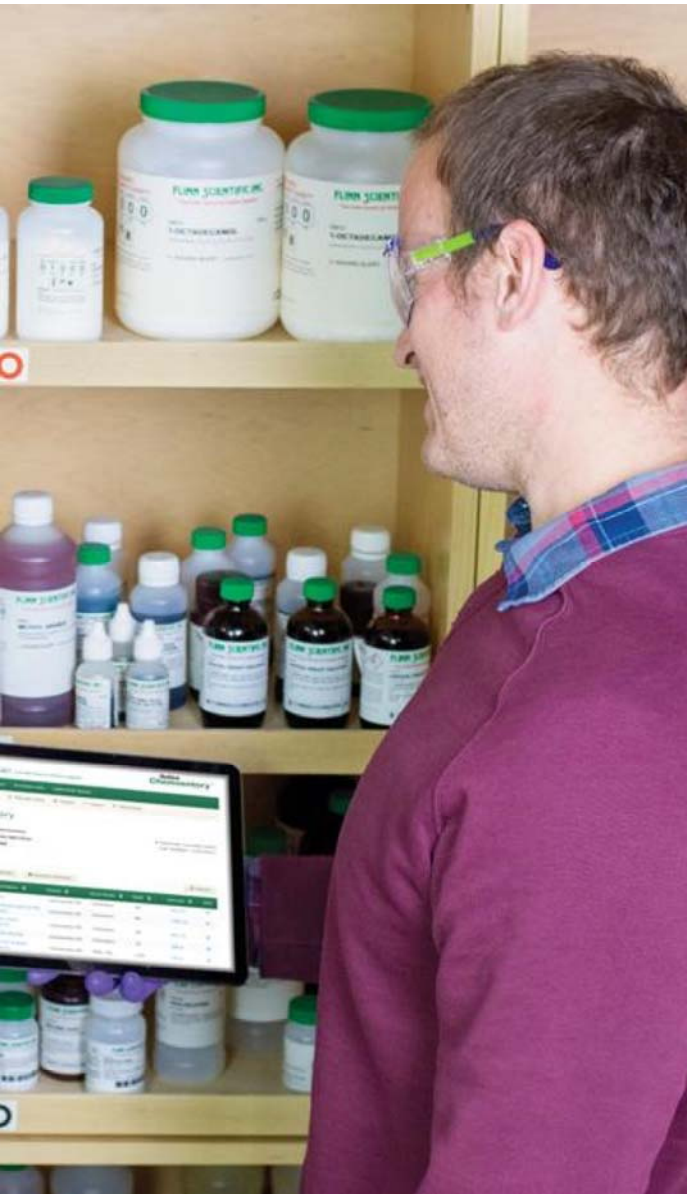
Chemical Waste Concerns

Having too many chemicals in the prep room – even common inert substances such as sugars, starch, salts, sodium bicarbonates etc., will contribute to the smells in the room.

Here's what you need to know:

Having too many chemicals in the prep room – even common inert substances such as sugars, starch, salts, sodium bicarbonates etc., will contribute to the smells in the room. **Going forward, teachers should be mindful of the volumes of the substances they procure and keep.**

We suggest putting a small dot sticker (*The kind from the Dollar Store that are red, blue, white, yellow….*) which will allow you to visualize how often that particular bottle is used during the year. You will find that there about 15-20 chemicals that are very commonly used – and 40 more that are used periodically. **Request your copy of the 'FLINN Commonly Used Chemicals Listing' and we will provide you with this great resource.**



Chemical Waste Concerns

Chemical security is important all year round, but especially when you aren't there to monitor things daily. Long stretches of time where labs are unused require special precautions.

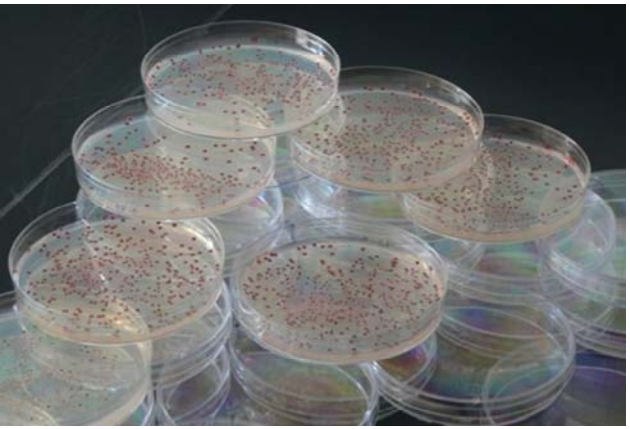
Here's what you need to know:

Please make sure that the prep room and the chemical cabinets are all LOCKED properly and that there are extra keys for the locks with administration and maintenance.

It is essential to have an updated inventory of chemicals in your school storage and prep rooms, and if often a requirement. Need help? The Flinn Online Chemventory™ is a cloud-based laboratory chemical inventory system that allows multiple users access to the database from multiple locations and devices! The program comes fully loaded with updated GHS pictograms, hazard codes, and signal word information for over 2,400 Flinn chemicals. **Learn more at Chemventory.flinnsci.com.**

Keep a print copy of our catalog with disposal information handy and easily accessible.

Are your locks broken or you don't have proper storage? We have cabinets especially designed for different school needs.



Live Plants, Animals & Cultures at School

Here's what you need to know:

Live plants and animals will need to be removed from school during the extended school closings and properly cared for if possible. Animals that are not native to your area or animals that have been purchased (even if they are thought to be native to your area) should not be released into the wild. They may suffer and die or they may become established and cause ecological damage

Are there any petri dish cultures at school? Were these dealt with prior to school closing or are these growing wildly on the lab bench / incubator oven in the prep area? Before disposing of dishes in the trash or cleaning for future use, the bacteria should be destroyed. **Pour a small amount of household bleach over the colonies while holding the dish over sink. Caution - do not allow bleach to touch your skin, eyes or clothes. Wash all petri dishes with quality lab detergent and dry thoroughly before storage.**

Biological Dissection & Survey ‘Jar’ Specimens

Here’s what you need to know:

Fetal pigs, rats, frogs, fish, grasshoppers and other common specimens need to be stored properly. Tight lids, unopened sealed vac-pacs, ideally in a climate-controlled space to minimize odors.

Make sure that any specimens that look bad, smell bad or you feel uncomfortable using are disposed of immediately. Follow your guidelines on safe specimen disposal from the CHP or Environmental Hygiene Plan in your area.

There should not be any homemade specimens in the prep area or science labs as these are unsafe and not recommended or approved. Only use commercially manufactured museum mounted specimens.

Chemical Storeroom Ventilation

Proper room ventilation with adequate air exchanges will eliminate most unsafe chemical vapors.

Here's what you need to know:

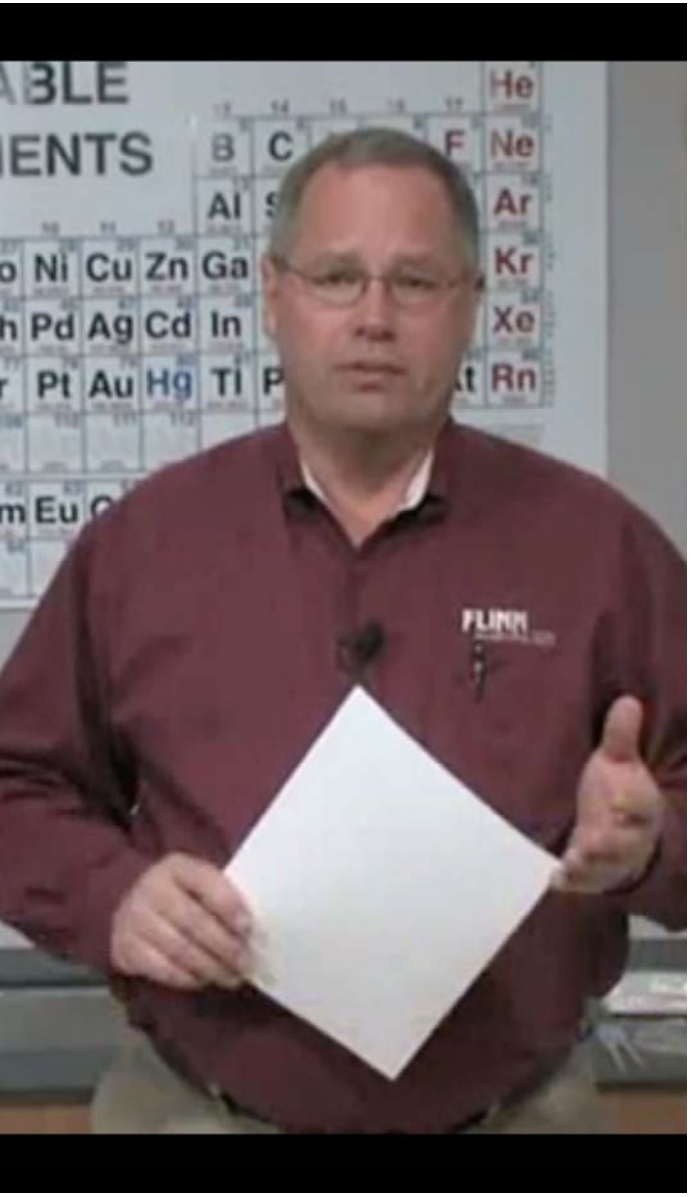
Many older school facilities do not have proper ventilation and are under the 'grandfathering' accepted rules from when the school was built. New schools and renovated science departments are required to have excellent ventilation into the rooms. This is a difficult thing to fix on existing schools, however, retrofit 'purge fans' do exist which can help.

If there is an exhaust fan in the prep area, if it can be fitted with a timer that allows the fan to come on and purge the air in the room often, that would be ideal. Every 10-15 minutes is the optimum cycle.

Chemical Storeroom Ventilation

Some older schools leave the fume hood operational 24/7. These fume hoods need to have at least a draw of 100 cfm (cubic feet per minute) of air being pulled into the hood and discharged outside the school through the roof or side wall depending on the design of the hood. **Remember that the optimum sash height is about 6” above the work surface or indicated with arrows on the side of the face.**

If possible, have the windows opened and the fans running to the best of their ability prior to having teachers or facilities personnel working in the area. Opening the chemical cabinets once teachers return to school will allow them to vent directly into the room which may be the only way to mitigate the concentrated odors—but do not have people stay in that immediate area when this is happening.



Proper Set-Up: Ventilation

Here's what you need to know:

Now is the perfect time to review your school's ventilation and ensure your school is set up for success. As the safer source for science, Flinn Scientific has numerous resources that help you address any ventilation questions you may have. Here are some FREE videos we recommend viewing:

Chemical Storeroom Ventilation discusses how and why chemical storerooms should be properly ventilated.

Critical Priority - Laboratory Ventilation discusses how purge fans and fume hoods function and how to present the need for proper ventilation in the lab.

Laboratory Ventilation and Use of Fume Hoods discusses how laboratory ventilation must be well-designed, meet specific criteria, and be regularly tested for proper functionality.

Natural Gas Lines & Burners

The natural gas lines, burners and tubing should be inspected.

Here's what you need to know:

Natural gas lines should be visually inspected at a minimum to ensure that there are no leaks or concerns from corrosion. Many schools have the Emergency Shut Off / Lock Out valve for gas lines at the instructor desk which need to be in the OFF position while the schools are closed indefinitely. Identify any defects and notify your school administration about gas line issues immediately.

Burners should be inspected yearly, as they may develop leaks at the gas adjustment valve or tubing connections. After visually inspecting the burner and tubing, burners can be tested in a shallow pan with a soap solution.

Watch our Chemistry Minute Video to learn how to inspect burners for leaks.

Plumbing Issues When Schools are Closed

Here's what you need to know:

The drains–if there are any present–in the floor may be dry inside the 'P' trap, which will allow for some sewer gases to find their way into the school science departments.

Usually over the summer, or on a set schedule the maintenance/janitorial staff add some water into these drains to freshen them up, and some add a few drops of vegetable oil to slow down the evaporation of the water and to keep the traps working as they should.

The drains in the lab benches and perimeter stations will also need to be topped up with the same liquid and maybe some oil drops seeing that the schools are going to be closed for months. This will prevent odors. If you have a dishwasher for glassware in the prep area, it will need to be run through a cycle to clean itself and remove odors.

Storage and Prep Room Organization

Keeping prep and storage rooms clean and organized is a never-ending task. Flinn has many helpful resources for you.

We recognize that in the unexpected school closures there are likely some levels of ‘messiness’ in the prep area as a result of not planning to be away for an extended period of time.It can be overwhelming to address organizing your prep room when a school closes abruptly, or if you only have limited time in your school.

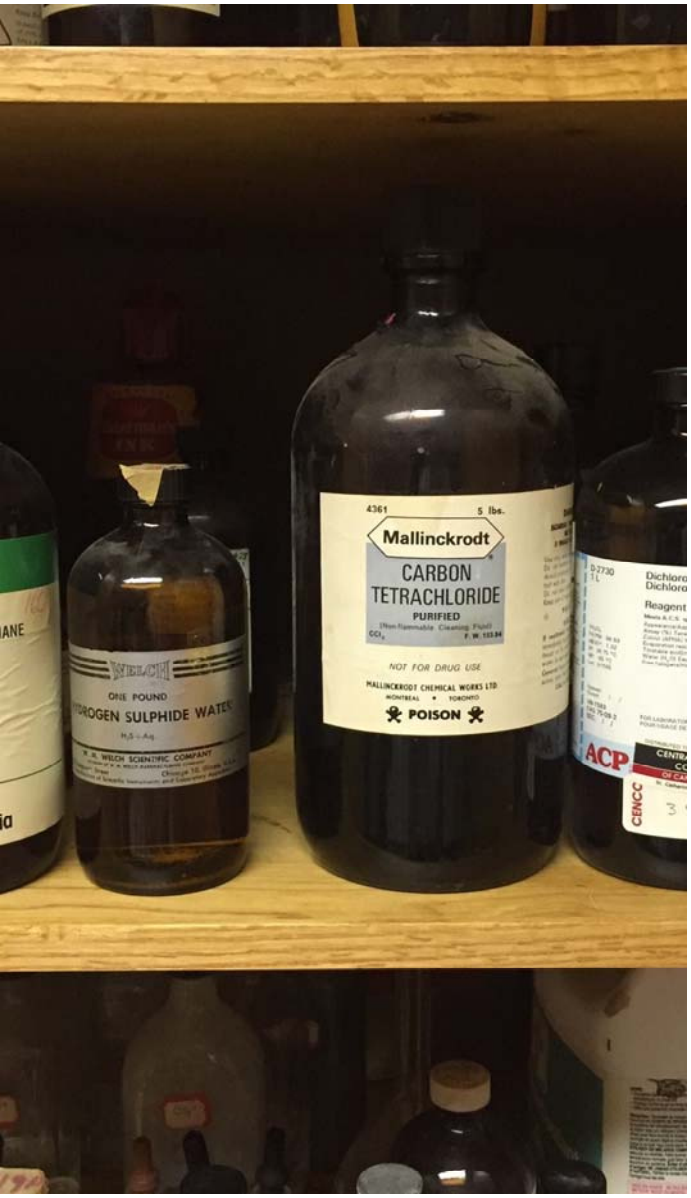
First, make sure all safety equipment is easily accessible including: Fire extinguisher; fire blanket; spill kit; PPE; UV goggle sanitizer; drench shower; eye wash station; first aid kit; master shut-off switches; smoke detectors. There needs to be clear access to these items.

Storage and Prep Room Organization

Keeping prep and storage rooms clean and organized is a never-ending task. Flinn has many helpful resources for you.

Many school science departments keep certain lab reagents and consumer commodities in there (including eggs used for lab activities which will expire and smell really bad…) or milk products used for dairy labs etc. These will need to be purged ASAP to minimize potential odors & bacterial growth. If you cannot get into the school, you should alert your principal and the janitor/maintenance people to remove any products/items from the fridge when they can.

Make it a priority to organize the prep area once you are back in the building and that may require the removal of clutter. Student projects, textbooks, lab activities, glassware, boxes, random science items and bottles of chemicals are the usual contributors to the disorganization.



Poll # 3

When was the last time that your science and STEM departments were audited properly for safety and compliance?

1. Within 1 year
2. In the past 2 years
3. Within the past 3 years
4. I'm not sure
5. Could you contact us for some assistance please?

Key Points for Prep Room Safety & Compliance during extended closures for OSHA and Compatible State Regulatory

Keep room and chemical cabinets locked	Make sure chemicals are stored properly	Empty the lab fridge ASAP	Unplug all electrical items for storage
Ensure there is adequate ventilation	Make sure biological specimens are stored properly	Shut off gas lines for duration and lock valve into ‘OFF’ position	Fill ‘P’traps for plumbing in sinks and floors to prevent odors
Remove any clutter & mess from the Prep Room	Generate a current chemical inventory of what is on-hand	Have a plan for live animals and plants in the science area	Communicate with your school administration

Should I be ordering my supplies for when I get back to school?

We are happy to accommodate any requests for orders and a future shipment date or even shipping to a secure location in the school district.

Flinn wants to ensure that you have the science equipment, apparatus, specimens, chemicals, glassware, PPE, and related materials when you get back to school.

Please let us know how we can work within your school district policies and help you deliver a solid, safe science program in your school.

FLINN will be selecting a random winner for the door prize!

FLINN SCIENTIFIC

Ask about our custom district solutions designed to support a safe return to school:

- Custom safety and professional development/learning proposals to ensure full school safety
- Full PPE for students, faculty, and support staff
- Blended science learning solutions that provide continuity of lab instruction for both onsite & remote learners

www.flinnsci.com | **1-800-452-1261**