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**REMOTE LEARNING LESSON PLANS**

The Remote Learning Lesson Plans are adapted from the IQWST Teacher Edition to support continuous learning. Each plan condenses what is taught with specific teaching recommendations and identifies the digital resources, print resources, and materials needed to teach and learn IQWST at home.

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| **UNIT TITLE** | **IC1** |
| **DRIVING QUESTION** | How can I smell things from a distance? |
| **UNIT STORYLINE** | [IC1 Storyline](https://d16dnhlej6sizh.cloudfront.net/assets/portal/1571332263-ic1-3.0-storyline-with-appendix.pdf) |
| **IQWST OVERVIEW** | [IQWST 3.0 Overview](https://d16dnhlej6sizh.cloudfront.net/assets/portal/1534960182-iqwst-3-0-overview.pdf) |
| **TEACHER EDITION** (PDF) | [IC1 Teacher Edition (PDF)](https://d16dnhlej6sizh.cloudfront.net/assets/portal/1533059564-san-ic1smellv3-te.pdf) |
| **STUDENT EDITION** (PDF) | [IC1 Student Edition (PDF)](https://d16dnhlej6sizh.cloudfront.net/assets/portal/1538741808-san-ic1smellv3-se-color.pdf) |
| **LESSON PLAN OVERVIEW** | [Remote Learning Overview](http://activatelearning.com/wp-content/uploads/2020/05/remote-lesson-plans-overview.pdf) |

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| **STUDENT MATERIALS:** Each student will need the following materials. Teachers can modify lessons based on which materials the students have access to. For Blended Learning options, teachers may draw from a combination of digital and print resources. | | |
| **DIGITAL RESOURCES** | **PRINT RESOURCES** | **MATERIALS NEEDED** (FOR EACH STUDENT) |
| * Access to Interactive Student Edition * Access to teacher-led lesson or video * Access to IQWST lesson videos * Audio recordings of readings   **Access from any device with a web browser.**   * For PCs and Chromebooks, we recommend using **Chrome** as the browser * For Macs and iOS, we recommend using **Safari** as the browser * Internet Explorer is NOT supported * Read the full Technical Requirements [here](https://s3.amazonaws.com/al.general/website/pages/ALDP+Requirements.pdf)   **Login:** <http://activatelearning.com/digital-resources/>   * Select your program * Enter the Username and/or Password provided by your teacher | * IC1 Student Edition * Hard copies of selected Projected Images (PIs)   *Print student editions are necessary for students who do not have internet access (or reliable access).* | **IQWST Equipment (from kit)\***  1 - extra large syringe w/o needle  1 - indicator paper  1 - inflatable object (e.g., beach ball)  10 - white or clear beads  1 - large paper clip  1 - clear drinking glass (glass or plastic)  30mL - vinegar  1 - Latex balloon  1 - color of food coloring  4 - markers, crayons, or colored pencils (different colors)  **Household Items**  1 - marker (to write on glass)  2-3 - sheets of paper towel  1 - sponge  1 - narrow container  1 - scented tealight in metal cup, source of flame  1 - grain of rice  1 - rubber band  1 - empty, dry, clear plastic water or soda bottle  2 - containers that the bottle can fit inside when they are filled with water  1 -can of soda or ice-filled glass of liquid  - Objects that smell minty (e.g., toothpaste, gum, mouthwash, scented candle, hard candies)  - means to boil water (pan and stove; microwave)  - Water  - Ice  **Students may also need the following General Classroom Supplies (if not using the IDE):**  Pencils and sharpener  Colored pencils  Black marker and/or ink pen  Plain paper for drawing (10-20 sheets)  Glue stick or transparent tape  Pad of sticky notes  Scissors  *\* If kits have been purchased, they include enough equipment for 8 groups of 4 students. You will need additional equipment if you opt to provide materials to each student.* |

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| **Learning Set 1: How Does an Odor Get from the Source to My Nose?** | | | | |
| **Lesson 1**  **(1-2 sessions)** | **Can You Smell What I Smell?** | [Download Lesson 1 Teaching Slides](https://d16dnhlej6sizh.cloudfront.net/assets/portal/1592911352-IC1%20Lesson%201%20.pptx) | | |
| **ACTIVITY** | **TEACHING RECOMMENDATIONS** | **DIGITAL RESOURCES** | **PRINT RESOURCES** | **MATERIALS**  **FOR EACH STUDENT** |
| Activity 1.1  *Can You Smell What I Smell?* | **Anchoring Phenomenon:** Teachers are unable to launch the anchoring phenomenon as described in the Teacher Edition (TE) remotely. As an alternative, ask students (Ss) to walk around indoors or outdoors, and make a list of everything they smell. This activity will serve as the anchoring phenomenon that will be revisited throughout the unit (we smell odors even when we are nowhere near them). Smelling odors is the context for learning concepts related to the particle nature of all matter. (Described in detail in the TE.)  Ss should use *Procedure* space in the SE to record the list of odors they smell.  Select discussion prompts in the TE that engage Ss in this and other experiences with odors, and that highlight the anchoring phenomenon.  As described in the TE, discuss the “Special Instrument” view and modeling used in this unit.  Ss should answer Making Sense Q#1 & #2 (Draw a model.)  Introduce the Driving Question Board (DQB): Throughout the unit, Ss record their own, original questions as they arise. See *IQWST Overview* for more information on how to use and manage the DQB.  Key: Odors somehow move from a starting point (a source) into people’s noses. | Access to Student Edition (SE) in Interactive Digital Edition (IDE) Act 1.1& 1.2  Teacher-created DQB (e.g., jamboard, padlet) or physical DQB to share during virtual lessons.  Ss will post their own original questions in the “Questions” tab of the IDE | Hard copy of the Student Edition (SE) to be used for all activities,  readings, writing tasks.  SE Act 1.1& 1.2  In addition, the readings in the SE connect in-class investigations of phenomena with other, everyday phenomena that Ss have either experienced or with which they are familiar.  Ss will write questions on sticky notes, and post at the front of their SEs on the *Driving Question Notes* pages. | Pad of sticky notes |
| Reading One | *Can You Smell What I Smell?*  See TE for Reading Intro and Followup.  Key: All odors travel in the same way. | SE Reading One | SE Reading One |  |
| Activity 1.2  *Developing an Initial Model* | Developing an Initial Model  If possible, share Ss models and discuss, using prompts in the TE.  Ss should answer Making Sense Q#3 (Use the model to explain) | SE Act 1.1 & 1.2 | SE Act 1.1 & 1.2 |  |
| Reading Two | *How Can Models Help Me Understand Odors?*  See TE for Reading Intro and Followup.  Key: Odors must move as part of the air in order for people to smell them.  Key: Different models work better for different purposes. | SE Reading Two | SE Reading Two |  |

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| **Lesson 2**  **(1 session)** | **What Is Similar among an Odor, Sugar, and Milk​?** | [Download Lesson 2 Teaching Slides](https://d16dnhlej6sizh.cloudfront.net/assets/portal/1589925788-IC1%20Lesson%202%20.pptx) | | |
| **ACTIVITY** | **TEACHING RECOMMENDATIONS** | **DIGITAL RESOURCES** | **PRINT RESOURCES** | **MATERIALS**  **FOR EACH STUDENT** |
| Activity 2.1  *Can Something Have Mass Even if I Cannot Feel It?* | Demo the activity--or--Share the video so that Ss are able to observe the phenomenon that air can be pumped into (added to) a ball, and that air has mass.  Given the likelihood of reduced time for remote learning, Activities 2.1, 2.2, and 2.3 could be combined so that mass and volume are addressed in only 1 session.  Discussion Prompts: Throughout the unit, teachers should: 1) choose discussion prompts applicable to remote learning and ability to discuss with Ss, or 2) have Ss write answers to teacher-selected prompts that can be added to the slide deck, if discussion is not possible, or 3) choose questions in take-home format for Ss to discuss at home, perhaps writing responses that are then submitted.  Questions in the SEs: Throughout the unit, teachers should decide on the method by which the lesson will be delivered, and then have Ss ignore any questions in their SEs that do not fit the way in which the lesson needed to be enacted remotely. Teachers may provide a handout for print-only Ss who cannot access the curriculum remotely, so that they know which questions in their SEs they should respond to.  Key: Air has mass. | SE Activity 2.1  [Activity Video 2.1 Does Air Have Mass? Basketball Demo](https://s3.amazonaws.com/s3-static.iwqst.com/assets/media/iqwstv3/remote-lesson-videos/IC1/IC1+-+2.1.2+-+Does+Air+Have+Mass.mp4) | SE Activity 2.1 |  |
| Reading One | *Can Something Have Mass Even if I Cannot Feel It?*  Ss are better able to understand measurements in grams if they are able to handle a large paper clip whose mass is approximately 1 gram.  Key: The importance of precise measurement in science. | SE Reading One | SE Reading One | (1) large paper clip |
| Activity 2.2  *Measuring Volume* | Demo the activity--or--share the video and review (measuring volume in two ways), so Ss can observe the phenomenon of displacement​.  Key: ​Volume​ as the space something takes up. Volume can be measured in two ways. | SE Activity 2.2  [Video: Measuring Volume 2 Ways](https://youtu.be/rOs3acfnLww) | SE Activity 2.2 |  |
| Activity 2.3  *What Happens to My Lungs When I Breathe In Air?* | Demo the activity--or--Share the Setup Video for this activity.  Key: Air and odors have ​volume​ and ​mass​, thus are both ​matter​. | SE Activity 2.3  [Activity 2.3 Setup Video](https://d16dnhlej6sizh.cloudfront.net/assets/portal/Teacher-Portal-Resources/IC1_se_v2_0_5_video-lesson_2-36.mp4) | SE Activity 2.3 |  |
| Reading Two | *What Happens to My Lungs When I Breathe in Air?*  If Ss are able to have the equipment, they could do the activity in the Reading remotely.  Key: Determine which characteristics of matter in each phase are observable. | SE Reading Two | SE Reading Two | (1) See-through container or drinking glass, (1 sheet) paper towel |

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| **Lesson 3**  **(1 session)** | **What Must Happen to Matter so I Can Smell It?** | [Download Lesson 3 Teaching Slides](https://d16dnhlej6sizh.cloudfront.net/assets/portal/1589925905-IC1%20Lesson%203%20.pptx) | | |
| **ACTIVITY** | **TEACHING RECOMMENDATIONS** | **DIGITAL RESOURCES** | **PRINT RESOURCES** | **MATERIALS**  **FOR EACH STUDENT** |
| Activity 3.1  *Investigating Matter* | Demo the activity--or--Share the Setup Video for this activity and observe the phenomena of phase change involving crystalline menthol.  Before starting to demo or watch the video, point out that menthol starts out as crystals. Be sure Ss see \*after\* heating and then cooling again that the inside of the flask is covered with white material. The bottom of the watch glass is covered with crystals (solidified menthol after it has cooled). These observations are evidence that menthol was a gas that filled the flask--even though it can't be seen in gaseous form. The evidence of it is everywhere in the lask after the gas cools. The crystals are important because they are similar to menthol’s original form at room temperature.  Key: Menthol, as it is heated and cooled, can exist as solid, liquid, and gas. | SE Activity 3.1  [Setup Video 3.1](https://d16dnhlej6sizh.cloudfront.net/assets/portal/Teacher-Portal-Resources/IC1_se_v2_0_5_video-lesson_3-29.mp4)  Activity Video  [Investigating Matter - Menthol](https://s3.amazonaws.com/s3-static.iwqst.com/assets/media/iqwstv3/remote-lesson-videos/IC1/ic1-3.1-menthol-melting.mp4) | SE Reading One |  |
| Reading One | *Three Forms of Matter: Solid, Liquid, and Gas*  Key: Everyday examples of matter in various states. | SE Reading One | SE Reading One |  |
| Activity 3.2  *Why Does Water Have Many Names?* | Demo the activity--or--Share the video so that Ss can observe the phenomena of phase change of water. Or, given the likelihood of reduced time for remote learning, Ss may be able to do the water investigation remotely, and the teacher could do only the menthol investigation as a demo (or via video).  **\*An adult could potentially do this at home,** heating ice in a pan or in a microwave oven.  Key: To develop the Scientific Principle: Matter can exist as solid, liquid, or gas at room temperature. | SE Activity 3.2  [Video: changing water - states of matter](https://youtu.be/tuE1LePDZ4Y)  *Activity Video*  [States of water](https://s3.amazonaws.com/s3-static.iwqst.com/assets/media/iqwstv3/remote-lesson-videos/IC1/ic1-3.2-why-does-water-have-many-names.mp4) | SE Activity 3.2 | (1) see-through container or drinking glass, ice, marker to write on glass |
| Reading Two | *What Needs to Happen to a Material so that I Can Smell It?*  Key: Determine observable characteristics of matter in each phase. | SE Reading One | SE Reading One |  |

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| **Lesson 4**  **(1 session)** | **How Can We Model the Things Gases Do? Part 1** | [Download Lesson 4 Teaching Slides](https://d16dnhlej6sizh.cloudfront.net/assets/portal/1589925981-IC1%20Lesson%204.pptx) | | |
| **ACTIVITY** | **TEACHING RECOMMENDATIONS** | **DIGITAL RESOURCES** | **PRINT RESOURCES** | **MATERIALS**  **FOR EACH STUDENT** |
| Activity 4.1  *How Can I Model the Things Gases Do?* | Demo the activity--or--share the Setup Video for this activity.  If possible, have Ss share and discuss models. Or, develop sample models, share, and discuss. (See TE for possible models and what they reveal about Ss thinking.)  Key: Gases have no definite shape or volume. Gases can be added to an already “full” container, and can be subtracted from a container. | SE Activity 4.1  [Setup Video 4.1](https://d16dnhlej6sizh.cloudfront.net/assets/portal/Teacher-Portal-Resources/IC1_se_v2_0_5_video-lesson_4-39.mp4) | SE Activity 4.1 |  |
| Reading One | *How Can I Model the Things Gases Do?*  Key: Everyday examples to reinforce that gases can be added to and subtracted from containers. | SE Reading One | SE Reading One | (1) something inflatable (e.g., beach ball) |

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| **Lesson 5**  **(2 sessions)** | **How Can We Model the Things Gases Do? Part 2** | [Download Lesson 5 Teaching Slides](https://d16dnhlej6sizh.cloudfront.net/assets/portal/1589926289-IC1%20Lesson%205.pptx) | | |
| **ACTIVITY** | **TEACHING RECOMMENDATIONS** | **DIGITAL RESOURCES** | **PRINT RESOURCES** | **MATERIALS**  **FOR EACH STUDENT** |
| Activity 5.1 & 5.2  *What Else Can Gases Do?* | Demo the activity--or--share the video so Ss can observe the phenomenon of compression and expansion of air in a syringe.  The video shared here goes beyond the scope of the lesson; however, it does demonstrate that air in the syringe is compressed and gives a brief explanation. There is no need to show the rest of this video at this time.  If Ss are able to experience the phenomenon with the extra large syringes provided in the kits, use the discussion prompts in the TE to talk through what they are experiencing as they investigate pushing the plunger in and letting it go. Given the likelihood of reduced time for remote learning, all four behaviors of air could be addressed in a single session.  If possible, have Ss share and discuss models.  Key: This is the core lesson at which most Ss come to the understanding that there is such a thing as “empty space,” as there is no other explanation for the behaviors of gases that they have observed. | SE Activity 5.1, & SE Activity 5.2  [Video: Air compressed in a syringe](https://youtu.be/WrM5SQrRTMM)  Activity Video  [Behavior of air in a syringe](https://s3.amazonaws.com/s3-static.iwqst.com/assets/media/iqwstv3/remote-lesson-videos/IC1/ic1-5.1-what-else-can-gases-do.mp4) | SE Activity 5.1, & SE Activity 5.2 | (1) Extra large syringe (has no needle) |
| Reading One | *How Can I Model the Things Gases Do?*  Key: Compression (and pressure), expansion, and the particle model of all matter. | SE Reading One | SE Reading One | (1)sponge  (1) extra large syringe |
| Activity 5.3  *Developing and Using a Consensus Model* | If possible, support Ss in developing a consensus model of gases. As an alternative, draw a model and share it (or share both a correct and an incorrect model) for discussion.  Key: This is the core lesson at which most Ss come to the understanding that there is such a thing as “empty space,” as there is no other explanation for the behaviors of gases that they have observed. | SE Activity 5.3 | SE Activity 5.3  SE hard copy |  |
| Checkpoint: At this point, most Ss should understand that a particle matter of matter (all matter is made of particles with empty space between them) is the only model of matter that makes sense for the behaviors they have observed firsthand. That they can compress gas is key to learning that empty space exists (rather than that between particles is “more air”). Over the next lessons, Ss will have increasing evidence that particles are in constant motion. | | | | |

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| **Learning Set 2: What Makes One Odor Different from Another?** | | | | |
| **Lesson 6**  **(1 session)** | **What Makes Paper Change Color?** | [Download Lesson 6 Teaching Slides](https://d16dnhlej6sizh.cloudfront.net/assets/portal/1595176847-ic1lesson-6.pptx) | | |
| **ACTIVITY** | **TEACHING RECOMMENDATIONS** | **DIGITAL RESOURCES** | **PRINT RESOURCES** | **MATERIALS**  **FOR EACH STUDENT** |
| Activity 6.1  *Comparing Two Clear Liquids* | Demo the activity--or--Share the Setup Video for this activity.  Search the internet for video using search terms : “diffusion,” “model of diffusion,” or “diffusion simulation.”  Given the likelihood of reduced time for remote learning, Activities 6.1 and 6.2 could be investigated in a single session.  If Ss are able to have the materials, they could do Activity 6.1 remotely.  Key: This lesson provides evidence that particles of matter are in constant motion, as indicator paper detects evidence of a liquid without touching the liquid and without heating the liquid. | [Setup Video 6.1](https://d16dnhlej6sizh.cloudfront.net/assets/portal/Teacher-Portal-Resources/IC1_se_v2_0_5_video-lesson_11-37.mp4)  SE Activity 6.1 | SE Activity 6.1 | (2) pieces indicator paper, narrow container, vinegar, water |
| Reading One | *In What Ways Do People Use Detectors?*  Key: To connect in-class science to everyday contexts in which scientists have used their knowledge that particles are in constant motion to keep people safe. | SE Reading One | SE Reading One |  |
| Activity 6.2  *How Does the Odor Get to My Nose?* | Share the virtual gas simulation so that Ss can observe a simulation of the phenomena of behavior of gas particles under different situations.  Have Ss make a flip book (see TE note in apple box)  Key: Revise consensus model to include movement for any type of matter: solid, liquid, or gas. All models have strengths and limitations, and different models can be used to explain the same phenomenon. | [Simulation: Virtual gas](https://phet.colorado.edu/sims/html/gas-properties/latest/gas-properties_en.html)  SE Activity 6.2 | SE Activity 6.2 | pad of sticky notes, pencil |
| Reading Two | *Are All Types of Matter Made of Particles?*  Key: Solids, liquids, and gases are all made up of particles. | SE Reading Two | SE Reading Two |  |
| Checkpoint: The question at the end of Reading Two requires Ss to explain how a beverage (a liquid) is smelled (as an odor in air). It is a good opportunity to assess Ss understanding of the fact that liquid particles must get into the air, as gaseous particles, in order to be detected/smelled by the nose. | | | | |

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| **Lesson 7**  **(1 session)** | **How Do I Know Whether Things that Look the Same Are Really the Same?** | [Download Lesson 7 Teaching Slides](https://d16dnhlej6sizh.cloudfront.net/assets/portal/1589926420-IC1%20Lesson%207.pptx) | | |
| **ACTIVITY** | **TEACHING RECOMMENDATIONS** | **DIGITAL RESOURCES** | **PRINT RESOURCES** | **MATERIALS**  **FOR EACH STUDENT** |
| Activity 7.1  *Gases All Look the Same to Me* | Share PI: Gas Particles  Share the Setup Video for this activity.  Share the video of the atomic spectrum so that Ss can observe that properties are unique to each substance.  Key: Materials have different properties because they are made up of different particles.  Key: Properties of materials do not depend on the amount of the material. | SE Activity 7.1  [Setup Video 7.1](https://d16dnhlej6sizh.cloudfront.net/assets/portal/Teacher-Portal-Resources/IC1_se_v2_0_5_video-lesson_9-26.mp4)  Video: [*Spectrum*](https://www.youtube.com/watch?v=oae5fa-f0S0)  [*Demo: Continuous and Emission*](https://www.youtube.com/watch?v=oae5fa-f0S0) | SE Activity 7.1  Hard copy of PI: Gas Particles |  |
| Reading One | *How Can I Tell Whether Things that Look the Same Really Are the Same?*  Use the Intro to the Reading in the TE as a demo. (Cover the labels on a regular and a diet soda of the same type. Pour into clear containers as Ss watch. Ask how to determine which is which. Discuss ideas.)  Key: Reinforces the concept of properties using everyday examples. | SE Reading One | SE Reading One |  |
| Reading Two | *Detectors Work because of Properties*  Given the likelihood of reduced time for remote learning, this reading may be skipped or perhaps recommended for only some Ss.  Key: Reinforces the concept of properties of substances. | SE Reading Two | SE Reading Two |  |

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| **Lesson 8**  **(1 session)** | **What Makes Materials Different?** | [Download Lesson 8 Teaching Slides](https://d16dnhlej6sizh.cloudfront.net/assets/portal/1589926455-IC1%20Lesson%208.pptx) | | |
| **ACTIVITY** | **TEACHING RECOMMENDATIONS** | **DIGITAL RESOURCES** | **PRINT RESOURCES** | **MATERIALS**  **FOR EACH STUDENT** |
| Activity 8.1  *Investigating Elements* | Given the likelihood of reduced time for remote learning, teachers may choose to combine Activities 8.1, 8.2, and 8.3 into a condensed lesson that addresses the periodic table, atoms, and what it means for something to be an *element*.  Demo the activity--or--Share the video so that Ss can observe the phenomenon that each metal has a different hardness and malleability.  Share the video of the malleability test  Key: Hardness and malleability are properties. Materials can have some properties in common, but in order to be different materials, they must have at least one property that is different. | SE Activity 8.1  Activity Videos  [Malleability of metals](https://s3.amazonaws.com/s3-static.iwqst.com/assets/media/iqwstv3/remote-lesson-videos/IC1/ic1-8.1-malleability.mp4)  [Hardness of Metals](https://s3.amazonaws.com/s3-static.iwqst.com/assets/media/iqwstv3/remote-lesson-videos/IC1/ic1-8.1-hardness.mp4)  [Video: hardness test](https://youtu.be/R-bw7_u3gSQ)  [Video: malleability test](https://youtu.be/Cu8r0icQUAo) | SE Activity 8.1 |  |
| Reading One | *Why Do Properties of Materials Matter?*  Key: Properties of materials determine what they are used for. | SE Reading One | SE Reading One |  |
| Activity 8.2  *What Are Elements Made Up Of?* | Demo or direct Ss to tear a piece of paper as directed in the TE.  SE Activity 8.2 is available for notetaking if desired--perhaps notetaking about elements if 8.1 and 8.3 are combined into a single remote learning session.  Key: Each element is made up of only one type of atom. Atoms are extremely small/not visible. | SE Activity 8.2 | SE Activity 8.2 | 1 sticky note |
| Activity 8.3  *Elements and Atoms* | This activity involves discussion only to support Ss in learning more about elements.  SE Activity 8.3 is available for notetaking if desired; otherwise, it does not need to be used.    Key: Elements are different from one another *because* they are made up of different types of atoms. | SE Activity 8.3 | SE Activity 8.3 |  |
| Reading Two | *Why Is the Periodic Table of Elements Important?*  Teachers may want to share the video describing the Periodic Table of elements. (This video very briefly addresses compounds, which is not a learning goal until high school; therefore, it is not necessary to focus on this aspect of the video.)  Discuss the organization of a grocery store (or any type of store): How is the store organized? Why is organization important? The TE has ideas for linking this discussion to the periodic table of the elements.  Key: Atoms are arranged in ways that Ss will continue to learn more about. | SE Reading Two  [Video: Elements, Symbols, Molecules, Compounds](https://youtu.be/yWelTP-zOpY) | SE Reading Two |  |
| Reading Three | *What Makes Elements Different from One Another?*  Key: Reinforces elements and differences between them, and addresses the size of atoms. | SE Reading One | SE Reading One  Hard copy of periodic table in color |  |

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| **Lesson 9**  **(1 session)** | **What Does It Mean that “Odors Are in the Air”?** | [Download Lesson 9 Teaching Slides](https://d16dnhlej6sizh.cloudfront.net/assets/portal/1589926529-IC1%20Lesson%209.pptx) | | |
| **ACTIVITY** | **TEACHING RECOMMENDATIONS** | **DIGITAL RESOURCES** | **PRINT RESOURCES** | **MATERIALS**  **FOR EACH STUDENT** |
| Activity 9.1  *Comparing Models in Two- and Three- Dimensions* | Teachers may want to construct with Ss or share the chart in the TE *Preparation* section related to pure substances.  Share: Relationships Concept map  <https://docs.google.com/document/d/1VvWeiXcS7JoSD3uqeDfZ-gxKT9C1YT3b2VTuXrhoIKI/edit?usp=sharing>  Share the video of “Powers of Ten” (or another similar video).  Share PI: Atoms and Molecules  Invite Ss to search the Internet for elements, compounds, or items they are interested in learning more about.  Create gumdrop models to share and discuss with Ss. Or, Ss could build or draw ball-and-stick models.  Key: The difference between substances and mixtures. Air is a mixture. | SE Activity 9.1  Activity Video [Ammonia Model](https://s3.amazonaws.com/s3-static.iwqst.com/assets/media/iqwstv3/remote-lesson-videos/IC1/ic1-9.1-ammonia-molecule.mp4)  [Models of Molecules](https://s3.amazonaws.com/s3-static.iwqst.com/assets/media/iqwstv3/remote-lesson-videos/IC1/ic1-9.1-student-molecule.mp4)  [Video: Powers of Ten](https://video.search.yahoo.com/yhs/search;_ylt=AwrC_C1Om_teggsAqhQPxQt.;_ylu=X3oDMTByMjB0aG5zBGNvbG8DYmYxBHBvcwMxBHZ0aWQDBHNlYwNzYw--?p=youtube+video+powers+of+ten&fr=yhs-pty-pty_converter&turl=https%3A%2F%2Ftse2.mm.bing.net%2Fth%3Fid%3DOVP.Y2ePBVpq-HSpm8I9iG9uyAEsDh%26amp%3Bpid%3DApi%26w%3D144%26h%3D77%26c%3D7&rurl=https%3A%2F%2Fwww.youtube.com%2Fwatch%3Fv%3DWw4gYNrOkkg&tit=Powers+of+Ten%E2%84%A2+1977+YouTube&w=144&h=78&pos=2&vid=7d81bd4b414e0d8bc9e2d6f55c3ef463&sigr=kq_vBQWnrPCW&sigt=qThUiyDUT4v8&sigi=lwfXeSeNpJYb&hspart=pty&hsimp=yhs-pty_converter) | SE Activity 9.1  Hard copy of relationships concept map  PI: Atoms and Molecules | grain of rice  4 different colors of markers, crayons, or colored pencils |
| Reading One | *What Kinds of Particles Do I Breathe, and What Are They Made Of?*  Key: Reinforces atoms, molecules, substances and mixtures in air, water, food. | SE Reading One | SE Reading One |  |
| Activity 9.2  *Summarizing the Idea of “Odors in the Air”* | The focus is on models and modeling, revisiting and comparing different types of models, and discussing advantages and disadvantages. Given the likelihood of reduced time for remote learning, teachers may choose to skip this activity.  SE Activity 9.2 is available for notetaking if desired; otherwise, it does not need to be used. | SE Activity 9.2 | SE Activity 9.2 |  |
| Checkpoint: Have Ss use their models to explain what is happening when they smell a weak odor vs a strong odor of the same material. Perhaps provide a familiar scenario (e.g., a skunk, rotten food, a pizza restaurant or bakery). (The odor, whether weak or strong, is made up of the same atoms and molecules, but the number of molecules in the air differs. The stronger the odor, the more molecules of the odor present.) See TE Assessing Learning for a suggestion focused on Reading One and the water example. This is an opportunity for a Claim-Evidence-Reading (CER) explanation. | | | | |

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| **Learning Set 3: How Can a Material Change so You Can Smell It?** | | | | |
| **Lesson 10**  **(1 session)** | **Why Do Substances Have Different Odors?** | [Download Lesson 10 Teaching Slides](https://d16dnhlej6sizh.cloudfront.net/assets/portal/1589926579-IC1%20Lesson%2010.pptx) | | |
| **ACTIVITY** | **TEACHING RECOMMENDATIONS** | **DIGITAL RESOURCES** | **PRINT RESOURCES** | **MATERIALS**  **FOR EACH STUDENT** |
| Activity 10.1  *Why Do Substances Have Different Odors?* | This activity cannot be done remotely. We suggest having Ss brainstorm and talk about items in a category that smell different: Do they know some types of flowers--they’re all “flowers,” but they don’t all smell the same. Different fruits? Different things that smell minty? Focus on what would make one [item/material/object] smell different from another. A material’s odor depends on what the material is made up of---its atoms and molecules.  Use the smell cards (in the kit, or see URL) to show that three different types of flowers, fruits, and minty things all smell different because they are made up of the same atoms, but those atoms differ in number or arrangement.  For remote learning, teachers can show the cards as they discuss, or could add screenshots of the selected cards to the Activity 10.1 slide deck.  For print-only Ss without access, hard copies of the cards should be sent home in order for Ss to be able to do this activity.  Key: It is the particular combination of the type, number, and arrangement of atoms that gives a substance its properties. | SE Activity 10.1  **In kit and on Teacher Portal:**  [Smell Cards A](https://d16dnhlej6sizh.cloudfront.net/assets/portal/Teacher-Portal-Resources/IC1_te_v2_0_5-smell_cards_a-392.doc)  [Smell Cards B](https://d16dnhlej6sizh.cloudfront.net/assets/portal/Teacher-Portal-Resources/IC1_te_v2_0_5-smell_cards_b-393.docx) | SE Activity 10.1    Hard copies of smell cards  A and B | Objects that smell minty: toothpaste, gum,  mouthwash, scented candle, red/white and green/white mint hard candies |
| Reading One | *Why Does One Odor Smell Different from Another Odor?*  This reading is intended as a teacher-supported reading. Consider reading orally as a think-aloud: Stopping, questioning, making sense, re-reading a sentence, etc.  Key: Reinforces type, number, and arrangement of atoms that gives substances their properties. | SE Reading One | SE Reading One |  |
| Checkpoint: Spend time, as needed, with this lesson, as the concepts stated as “key” above--central to understanding the particle nature of all matter--are needed for other units and in future grades. (The concept of sub-atomic particles is not to be introduced until high school.) | | | | |

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| **Lesson 11**  **(1 session)** | **How Can I Make Molecules Move Faster?** | [Download Lesson 11 Teaching Slides](https://d16dnhlej6sizh.cloudfront.net/assets/portal/1589926617-IC1%20Lesson%2011.pptx) | | |
| **ACTIVITY** | **TEACHING RECOMMENDATIONS** | **DIGITAL RESOURCES** | **PRINT RESOURCES** | **MATERIALS**  **FOR EACH STUDENT** |
| Activity 11.1  *How Can I Make Molecules Move Faster?* | Demo the activity--or--share the Setup Video for this activity.  Teachers may also choose to share the video showing the relationship between temperature and molecular movement, addressing both matter and energy, and cause and effect.  Given the likelihood of reduced time for remotely learning, Activity 11.1 and 11.2 could be combined into a single session.  Key: See the DCIs in the TE for this activity, as several are addressed. Key is the relationship between energy, temperature, and molecular movement. | SE Activity 11.1  [Setup Video 11.1](https://d16dnhlej6sizh.cloudfront.net/assets/portal/Teacher-Portal-Resources/IC1_se_v2_0_5_video-lesson_11-37.mp4)  Activity Video  [Hot and Cold Diffusion](https://s3.amazonaws.com/s3-static.iwqst.com/assets/media/iqwstv3/remote-lesson-videos/IC1/ic1-11.1-hot-cold-diffusion.mp4)  [Video: temperature molecular mov](https://youtu.be/7fqf7t-fOHI)e | SE Activity 11.1 |  |
| Activity 11.2  *How Else Can I Model Odor Moving?* | This activity requires use of the simulation.  Key: The relationship between temperature and molecular motion. | SE Activity 11.2  [Simulation: Virtual gas](https://phet.colorado.edu/sims/html/gas-properties/latest/gas-properties_en.html) | SE Activity 11.2 |  |
| Reading One | *How Can I Make Particles Move Faster?*  As described in the TE for this reading, use an analogy to support Ss in thinking about the speed of molecules/collisions.  Key: Harder collisions mean molecules “bounce” farther apart. | SE Reading One | SE Reading One |  |

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| **Lesson 12**  **(1 session)** | **What Happens When Gases Are Cooled and Heated?** | [Download Lesson 12 Teaching Slides](https://d16dnhlej6sizh.cloudfront.net/assets/portal/1589926653-IC1%20Lesson%2012.pptx) | | |
| **ACTIVITY** | **TEACHING RECOMMENDATIONS** | **DIGITAL RESOURCES** | **PRINT RESOURCES** | **MATERIALS**  **FOR EACH STUDENT** |
| Activity 12.1  *What Happens When Gases Are Cooled and Heated?* | Demo this investigation, if possible--or--share the video. Teachers may need to repeat demo or video multiple times for Ss observations.  [Ss may not be familiar with dry ice, the term used for frozen (solid) carbon dioxide.]  Ss are likely familiar with some collisions on the macro level— bumper cars, race car games, billiards (pool), and the baseball example from the Lesson 11 reading—giving them an intuitive understanding of how speed relates to the intensity of collision*.*  Pressure is not a learning goal of this unit although Ss may bring it up here, and as it was addressed with the syringe activities*.*  Given the likelihood of reduced time for remote learning, teachers may choose to combine Activity 12.1 and 12.2.  Key: The relationship between temperature and molecular motion. Molecules are in constant motion and collide changing their direction and random motion | SE Activity 12.1  [Activity Video 12.1 Balloon and Dry Ice](https://s3.amazonaws.com/s3-static.iwqst.com/assets/media/iqwstv3/remote-lesson-videos/IC1/ic1-12.1-dry-ice.mp4) | SE Activity 12.1 | (1) Latex balloon and rubber band (if no one at home has latex allergies)  (1) empty and dry plastic water or soda bottle  (2) containers that the bottle can fit inside when they are filled with water. Hot water in one, cold water in the other. |
| Reading One | *How Can the Volume of a Balloon Change without Removing or Adding Air?*  Key: Reinforces the relationship between molecular motion and temperature (cause and effect, matter and energy). | SE Reading One | SE Reading One |  |
| Activity 12.2  *A Physical Model of Heating and Cooling a Gas* | Teachers may also choose to share the video showing how temperature affects molecular movement.  Key: Temperature affects the molecular movement. | SE Activity 12.2  [Simulation: Virtual gas](https://phet.colorado.edu/sims/html/gas-properties/latest/gas-properties_en.html) | SE Activity 12.2 |  |

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| **Lesson 13**  **(2 sessions)** | **How Does an Odor Get into the Air?** | [Download Lesson 13 Teaching Slides](https://d16dnhlej6sizh.cloudfront.net/assets/portal/1595176861-ic1lesson-13.pptx) | | |
| **ACTIVITY** | **TEACHING RECOMMENDATIONS** | **DIGITAL RESOURCES** | **PRINT RESOURCES** | **MATERIALS**  **FOR EACH STUDENT** |
| Activity 13.1  *What Happens to Bromine as It Is Cooled or Heated? &*  Activity 13.2  *Using the Model to Predict* | Share the videos for this activity so that Ss can observe the phenomenon: the phase change of the element Bromine.  If Ss have access to rubbing alcohol, they could investigate the difference between alcohol and water evaporation remotely.  This lesson can be done remotely as written, as it depends only on a Bromine video as an example of a substance (an element) that Ss can see in all 3 states of matter.  Key: Evaporation as a process of a liquid entering the gaseous phase. | SE Activity 13.1, 13.2  [Bromine Activity](https://d16dnhlej6sizh.cloudfront.net/assets/portal/Teacher-Portal-Resources/IC1_te_v2_0_5_video-ic1_lesson_13_bromine_activity-381.mp4)  Activity Video  [Evaporation of Alcohol and Water](https://s3.amazonaws.com/s3-static.iwqst.com/assets/media/iqwstv3/remote-lesson-videos/IC1/ic1-13.2-water-and-rubbing-alcohol-evaporation.mp4) | SE Activity 13.1, 13.2 |  |
| Reading One | *How Do Substances Become Part of the Air?*  Key: Reinforces boiling and evaporating in everyday contexts. | SE Reading One | SE Reading One |  |
| Activity 13.3 & Activity 13.4  *What Happens When Water Boils*? &  *Where Did the Water Come From?* | Share the Video for this activity so that Ss can observe the phenomena of properties of water during phase change.  Key: Using a particle model to explain every day observations of boiling and evaporating (and the difference between the two), and condensation. | SE Activity 13.3, 13.4  Activity Videos  [Temperature of Boiling Water](https://s3.amazonaws.com/s3-static.iwqst.com/assets/media/iqwstv3/remote-lesson-videos/IC1/ic1-13.2-water-and-rubbing-alcohol-evaporation.mp4)  [Condensation](https://s3.amazonaws.com/s3-static.iwqst.com/assets/media/iqwstv3/remote-lesson-videos/IC1/ic1-13.3-temp-of-boiling-water.mp4) | SE Activity 13.3, 13.4 | *Cold* can of soda or ice-filled glass of liquid that can be left sitting for awhile |
| Reading Two | *Where Do Drops of Water Come From?*  Key: Reinforces condensation in everyday contexts. | SE Reading Two | SE Reading Two |  |
| Checkpoint: The last question in Reading Two provides an opportunity to assess Ss understanding of the processes of boiling, evaporation, and condensation as they apply what they have learned to an everyday experience: Fog on a mirror. | | | | |

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| **Lesson 14**  **(2 sessions)** | **What Is the Difference between Hot and Cold Liquids?** | [Download Lesson 14 Teaching Slides](https://d16dnhlej6sizh.cloudfront.net/assets/portal/1589926745-IC1%20Lesson%2014.pptx) | | |
| **ACTIVITY** | **TEACHING RECOMMENDATIONS** | **DIGITAL RESOURCES** | **PRINT RESOURCES** | **MATERIALS**  **FOR EACH STUDENT** |
| Activity 14.1  *What Happens to Molecules of a Liquid at Higher Temperatures?* | Demo the activity--or--Share the video for this activity.  Demonstrate soda bottles and beads to model the increased motion and collision of molecules in water when it is heated (addresses matter and energy).  **\*An adult could potentially enact this activity at home,** so Ss can observe the phenomenon of water as it boils and expands.  Key: As it is heated water expands because the molecules move faster, have more frequent and harder collisions, and “bounce” further and further apart. | SE Activity 14.1  Activity Video  [Thermal Expansion of Water](https://s3.amazonaws.com/s3-static.iwqst.com/assets/media/iqwstv3/remote-lesson-videos/IC1/ic1-14.1-thermal-expansion-of-water.mp4) | SE Activity 14.1 | pan and water--and an adult to heat water to boiling |
| Reading One | *How Do Odor Molecules Move?*  Key: Reinforces content regarding molecular movement. | SE Reading One | SE Reading One |  |
| Activity 14.2  *Which Liquid Moves Faster?* | Share the Setup Video for this activity.  Teachers may also choose to share the video showing the relationship between temperature and the movement of molecules.  Ss use the model form A.14.1 to make and test predictions about movement of hot and cold water  \*Ss could potentially enact this activity at home to observe the phenomena that cold water sinks, and hot water rises.  Key: The relationship between molecular movement and temperature: Heat (cause) affects the movement of molecules (effect). | SE Activity 14.2  [Setup Video 14.2](https://d16dnhlej6sizh.cloudfront.net/assets/portal/Teacher-Portal-Resources/IC1_se_v2_0_5_video-lesson_14-27.mp4)  [Video: temperature molecular move](https://youtu.be/7fqf7t-fOHI) | SE Activity 14.2 | (1) clear plastic water bottle  (10) white or clear beads  (1) color of food coloring |
| Reading Two | *Which Liquid Moves Faster?*  Key: Heated molecules move faster and have more collisions, resulting in the molecules’ being further apart and the volume increasing. The energy of this motion is measured as a temperature change (addressing matter and energy). | SE Reading Two | SE Reading Two |  |

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| **Lesson 15**  **(1 session)** | **What Happens to the Molecules as Ice Melts?** | [Download Lesson 15 Teaching Slides](https://d16dnhlej6sizh.cloudfront.net/assets/portal/1589926802-IC1%20Lesson%2015.pptx) | | |
| **ACTIVITY** | **TEACHING RECOMMENDATIONS** | **DIGITAL RESOURCES** | **PRINT RESOURCES** | **MATERIALS**  **FOR EACH STUDENT** |
| Activity 15.1  *What Happens to the Molecules as a Solid Melts?* | Demo the activity, if possible--or--share the Setup Video for this activity.  Activities 15.1 and 15.2 could be combined for remote learning purposes.  **\*An adult could potentially do this at home,** lighting a tea light in a container and noting that it begins as a solid, becomes liquid when heated, and after extinguishing the flame and letting the candle cool, it becomes solid again.  Key: As molecules are heated, their motion increases until they leave their organized arrangement (solid). The molecules move further apart (in continuous motion) and are now in a liquid state of matter. | SE Activity 15.1  [Setup Video 15.1](https://d16dnhlej6sizh.cloudfront.net/assets/portal/Teacher-Portal-Resources/IC1_se_v2_0_5_video-lesson_15-28.mp4)  Activity Video  [Melting Wax](https://s3.amazonaws.com/s3-static.iwqst.com/assets/media/iqwstv3/remote-lesson-videos/IC1/ic1-15.1-melting-wax.mp4) | SE Activity 15.1 | (1) scented tealight in metal cup, source of flame |
| Reading One | *What Happens to Molecules When a Substance Melts?*  Key: An increase in temperature of glaciers due to global warming could cause glaciers to shrink and recede. | SE Reading One | SE Reading One |  |
| Activity 15.2  *Does Menthol Have to Melt Before I Smell It?* | Demo the activity using dry ice or just the menthol  At home, Ss can smell the odor of the tealight, and focus on the observable phenomena that they can smell something in solid form without melting.  Key: Odors need to be in a gaseous state before we can smell them, some substances are able to go from a solid state to a gaseous state without melting (sublimation). | SE Activity 15.2 | SE Activity 15.2 | scented tealight from Activity 15.2 |
| Reading Two | *How Can I Smell Something that Is Solid?*  Key: Reinforces the concept of sublimation and why we can smell solids. | SE Reading Two | SE Reading Two |  |

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| **Lesson 16**  **(2 sessions)** | **What Happens to the Molecules as Ice Melts?** | [Download Lesson 16 Teaching Slides](https://d16dnhlej6sizh.cloudfront.net/assets/portal/1589926847-IC1%20Lesson%2016.pptx) | | |
| **ACTIVITY** | **TEACHING RECOMMENDATIONS** | **DIGITAL RESOURCES** | **PRINT RESOURCES** | **MATERIALS**  **FOR EACH STUDENT** |
| Activity 16.1  *Building a Consensus Model of Matter* | After completing “Step 3: Creating a Class Consensus Model,” teachers may choose to share 1) the class list of Scientific Principles and 2) the table in the TE at the end of Activity 16.1., 3) final consensus model. These ideas would be summarized on the DQB in the classroom, and should be consistent with the virtual DQB if used while teaching remotely. The information in the list and the table serves to summarize all that Ss have learned.  Ss at home could use the final consensus model and explain the model - completing Q#3 in part A: Constructing Individual Models  Key: Summarizing the learning from this unit to celebrate all that Ss have learned. | SE Activity 16.1 | SE Activity 16.1  Copy of final consensus model  List of Scientific Principles  Hard copy of table from Activity 16.1 |  |
| Reading One | *Summarizing This Unit: What Have I Learned about Matter?*  Ss could use the list of what they have learned from the beginning of the reading to help explain the consensus model in A.16.1 - (reverse the order for print only, read and then critique a completed consensus model)  Key: Helping Ss make connections among ideas related to the particle nature of all matter. | SE Reading One | SE Reading One |  |
| Activity 16.2  *What Else Can My Model Explain?* | The final, culminating activity addresses the anchoring phenomenon using four scenarios related to odors traveling and creative Ss projects as an artifact of the unit. See TE for alternatives for carrying out the project. (It may be helpful to do one scenario with Ss and discuss prior to independent work.)  Key: Application of learning throughout the unit to a creative project. | SE Activity 16.2 | SE Activity 16.2 |  |

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| **SUMMATIVE ASSESSMENT:** Activity 16.1 (Constructing Individual Models) might be used as a summative assessment of Ss ability to explain how they can smell things from a distance using a molecular model. Question #4 also asks how their model has changed, which can be used to assess Ss understanding of models and modeling, and of how scientific knowledge is constructed. |

***Teachers might choose to emphasize only a portion of this as a final assessment, given what they are able to teach and what Ss are actually able to do during this remotely taught unit.***