**Three perspectives used in workshops, documenting similarities and differences in example observations and questions generated by learners, as well as related DCIs and potential investigations**.

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| **Perspective prompt** | **Example observations** | **Example questions** | **Related DCIs** | **Subsequent investigation ideas** |
| **Maintenance Team Member:** Shift your focus to the snow. From where does it need to be removed for people to move safely on the grounds? Look for *patterns* in how the snow moves and collects because of wind, structures, and other factors you observe. What is *causing* what you’re seeing?Recommend how you would remove snow and what you would do with it.  | * Keep fire hydrants/garbage clear
* Tree melt snow; ice may form
* West side → snow, ice; melts less BUT east-end has more ice (more ice melt)
* Hill→ lots of snow on north side but not south side
* South side has less snow and more wind exposure than north
* Put snow on west end (better drainage), BUT wind might drift snow back to parking lot
* Different colors of asphalt
 | * What building materials would insulate/melt snow?
* Why is there more snow on the north vs. the south side?
* Why would the snow be melted closer to the building?
* How does *ice melt* work?
* How do they move all that snow?
 | **ESS3.C**: Human Impacts on Earth Systems**ETS1.A:** Defining and Delimiting Engineering Problems**PS1.A:** Structure and Properties of Matter**PS2.B:** Types of Interactions | **Planning and carrying out an investigation:** Students hypothesize what might influence ice/snow melting, then identify and consider available materials and places around school where they can manipulate conditions. Devise observation and/or measurement investigation to gather evidence they will use to explain and make sense of ice melting. |
| **Student at recess**: Shift your focus to your body. You just ran around and are hot and sweaty, but are getting cold now that you're standing still. Make some observations about your surroundings. What might be *causing* different places on the playground to be warmer or cooler? Come up with a plan for where you can take a break from running next recess and not get cold. | * While the air temperature was cool, the sun had warmed up some of the brick. The brick was still very cold in the shade, though
* Shade under trees was cooler than the air in the sun
* The breeze blew to the right of the front door, but the air was still on the other side of the building
* There was no shade other than the trees right next to the building
 | * What playground features offer the best shade?
* Why do different materials have different temperatures?
* Why is it cooler in the shade? Why do I feel colder when it’s windy?
 | **ETS1.A**: Defining and Delimiting Engineering Problems**PS4.B**: Electromagnetic Radiation**PS1.A:** Structure and Properties of Matter**PS2.B**: Types of Interactions | **Designing solutions:** Groups of students design a solution for how their use of the playground might minimize getting cold by considering materials, shade, and wind. Groups jigsaw to get feedback on their solutions, and then test them out by gathering data (photos, written observation, weather measurements, etc.), and considering the benefits of their ideas.Alternatively, to answer the first question, students could gather data at different times of day on the amount of shade provided by several pieces of playground equipment and make claims about the materials’—their properties (translucence, opacity), size, and location—effect on solar radiation and warming. |
| **Rabbit:** Shift your focus to that of a rabbit on the grounds. Observe the area from a rabbit’s point of view. How do changes in the environment *affect* a rabbit’s movements and actions? Where should you go during the day? At night? To eat? Why?Outline a plan you'll follow to help you survive this freeze-thaw schoolyard. | * Alcoves on south and east side
* Protective bushes and shrubs near building
* South and east side are blocked from wind
* Sunnier on the south and west sides
* Grass for eating pokes through some on the south side
 | * What sorts of birds and other predators are around?
* Does season affect whether rabbits are here?
* Why is the grass showing in some places and not others? Does this change over during the winter?
* What do the rabbits eat?
 | **ESS3.C:** Human Impacts on Earth Systems**ETS1.A:** Defining and Delimiting Engineering Problems**PS1.A:** Structure and Properties of Matter**LS2.A:** Interdependent Relationships in Ecosystems | **Developing and using models:** To address the many different questions the class came up with, students create a class model recording their initial explanations for the rabbit’s interaction with its surroundings. They use this model to identify the gaps in understanding and make a plan to research that information (e.g., from data sets or maintenance people who make these observations each day), or to conduct investigations to obtain the information. Students revise models as they collect more evidence. |