2. Observe and experience the real world; know how to problem solve in the world.

Make their science experience memorable so that it sticks with them for years to come.

1. Critical Thinking

Skills

- Searching out workable solutions
- Pausing to reflect on thinking/revising as needed

2. Students should develop a thirst for the knowledge of science.

Use the Scientific Method to build critical thinking skills for the purpose of making informed decisions to improve people's lives.

Goals for our Students in Science

1. Students should continue applying prior knowledge to something new, building critical thinking skills using evidence to support thinking that happens everywhere problem-solving.
Observations

✓ Heard popping sounds when balloon on heating pad. Why was balloon making popping sounds?
✓ When balloon on heating pad looked like it needed to be held down. Did it need to be held down?

✓ Helium on the ground hovering close to the ground. Why is the helium balloon on the ground?
✓ The balloon stood upright on ground and in air. Why?

✓ Balloon was flipped from one side to the other on the heating pad. What was the temp in the house? Would it make a difference with how fast the balloon went up or came back down?
Effects of temperature on air.

- Cold water
- Room temperature
- Hot water

- Arrows to show gas movement
- Soap movement
- Temperature colors
- Keys: titles to other colors to see movement, no particles in air, particle spec?
Effects of Temp. on Air Molecules

- **Soap Film**
- **Air molecules**
- **Energy flow**

**Bottle in HOT H$_2$O**

**Bottle in room temp H$_2$O**

**Bottle in COLD H$_2$O**
Effect of Temp on Volume

- Hot water
- Cold water
- Soap bubble
- Air molecules

Differences:
- Arrows
- Molecules
Observation after putting bottle in hot water
Room Temperature
Water
Air
Cold Water
Observation after putting bottle in water

Hot Water

Room Temperature

Cold Water

Water

Air

Thermometer

Energy
Ditch between center and HS
Sometimes has water scraped clean
OK flat, but inside the canyon, it looked like mts around you. Carved by a glacier??!
Grand Canyon layered like channeled scablands
River has some steep cliffs with layers that have fossils.

Aruba: some parts green, other parts dry.

Steve's driveway when it rains.

Water.

Weather: hot weather, climate hot/dry.
River has some steep cliffs with layers that have fossils.

Aruba some parts green, other parts dry.

Steven's driveway when it rains.

Water weather- hot weather/ climate hot/dry.
Ideas for Investigations

- Penny face up and face down
- Cup right side up and upside down
- Changing the mass of the coin
Effect of Horizontal Force on Penny Movement.

- The faster/greater the horizontal force, the lesser the penny movement on card.

- The slower/lesser the horizontal force on card, the greater the penny movement on the card.
The horizontal movement of the penny is inversely proportional to the (speed) rate of the push or pull of the card.
The faster the card is moving beneath the penny, the less horizontal movement the penny will experience.
The Initial Movement

The rate at which you change the motion of the card, has the greatest impact on the horizontal motion of the penny.
card
speed of the card
penny
horizontal movement of penny

\[ F \text{ (how long it lasts)} = \text{horizontal motion of penny} \]

card speed \uparrow \quad \text{horizontal/motion of penny} \downarrow

force
Card pulling/pushing

velocity
\quad \text{acceleration}

F \text{ (time it lasts)} = \text{horizontal motion of the penny}

\begin{align*}
\text{long} & \quad \text{short} \\
\text{lots of motion} & \quad \text{not much motion}
\end{align*}
Sensemaking

- Students doing an activity or investigation that involves them making observations
- Then using these observations, discussion, & logic to form a conclusion about a problem-question

Teacher - facilitate
- prompt
- guide

Student - discussing
- observing

sometime arguing
- directing encouraging thinking
- formulating ideas with evidence to support thinking

Students -
- asking questions
- making observations
- reflecting
Sensemaking...

**Students do:**
- group discussion → focus question
- using evidence to prove claims
  - using specific examples
- prior knowledge through investigation ... of phenomena
- students take ownership

**Teacher does:**
- summarizing
- facilitate learning
- teacher guided instruction
- Introduce lesson/unit with phenomena

How do we really do this and follow district pacing guides?
Can all 3rap standards by April?
Students -
making sense of observations
engaged
discussions/talking together
forming new ideas

Teacher –
asking probing questions
engaging students

Sensemaking –
continuing to ask more questions
making sense out of application
finding a workable solution from the data/observations