Aurora Ingredients: A Kinesthetic Activity

Discover how the solar wind, Earth's magnetic field, and Earth's atmosphere interact to create the aurora.

Materials Needed: 24 colored silks, a large open space.

This activity is best done in a gym, large room, or outside. See the layout map for suggested placement of students.

Split students into 3 groups: solar wind, magnetic field, and atmosphere. Each student receives a colored silk and represents one of the three ingredients for the aurora:

1. **SOLAR WIND** students (*up to 8*) hold **orange** or **yellow** silks on one side of the space.

2. **MAGNETIC FIELD** students (*up to 4*) wave **blue** silks in the middle of the space.

3. **ATMOSPHERE** students (*up to 12*) stand on the opposite side of the space. They hold **green**, **red**, or **purple** silks balled up in their hand (inactive atmospheric atoms) that will unfurl to make the aurora when excited. For smaller groups, students can hold a different colored silk in each hand.
    - **Red** silks represent **oxygen, high** in the atmosphere
    - **Green** silks represent **oxygen** in the **middle** atmosphere
    - **Purple** silks represent **nitrogen, low** in the atmosphere

An illustration of the Sun interacting with Earth's magnetosphere.
Credits: NASA's Goddard Space Flight Center/Mary Pat Hrybyk-Keith

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RULES of PLAY:

Note: All tagging is done with silks, not with hands.

SOLAR WIND students run from one end of the gym/area, through space, waving their silks.

Once close to Earth's magnetic field, MAGNETIC FIELD students tag SOLAR WIND students with their **blue** silks. After being tagged, the magnetic field and solar wind students travel together as a team.

MAGNETIC FIELD students lead the SOLAR WIND students to the **closest** ATMOSPHERE student and tag them with the **orange** & **yellow** silks to activate the aurora.

If an ATMOSPHERE student is tagged, they unfurl their balled **green**, **red**, or **purple** aurora silk and wave it in the air, dancing in place. If tagged multiple times, the student can dance more vigorously each time and take up more room (more active aurora).

Let students switch places to take turns enacting the different parts of the aurora.

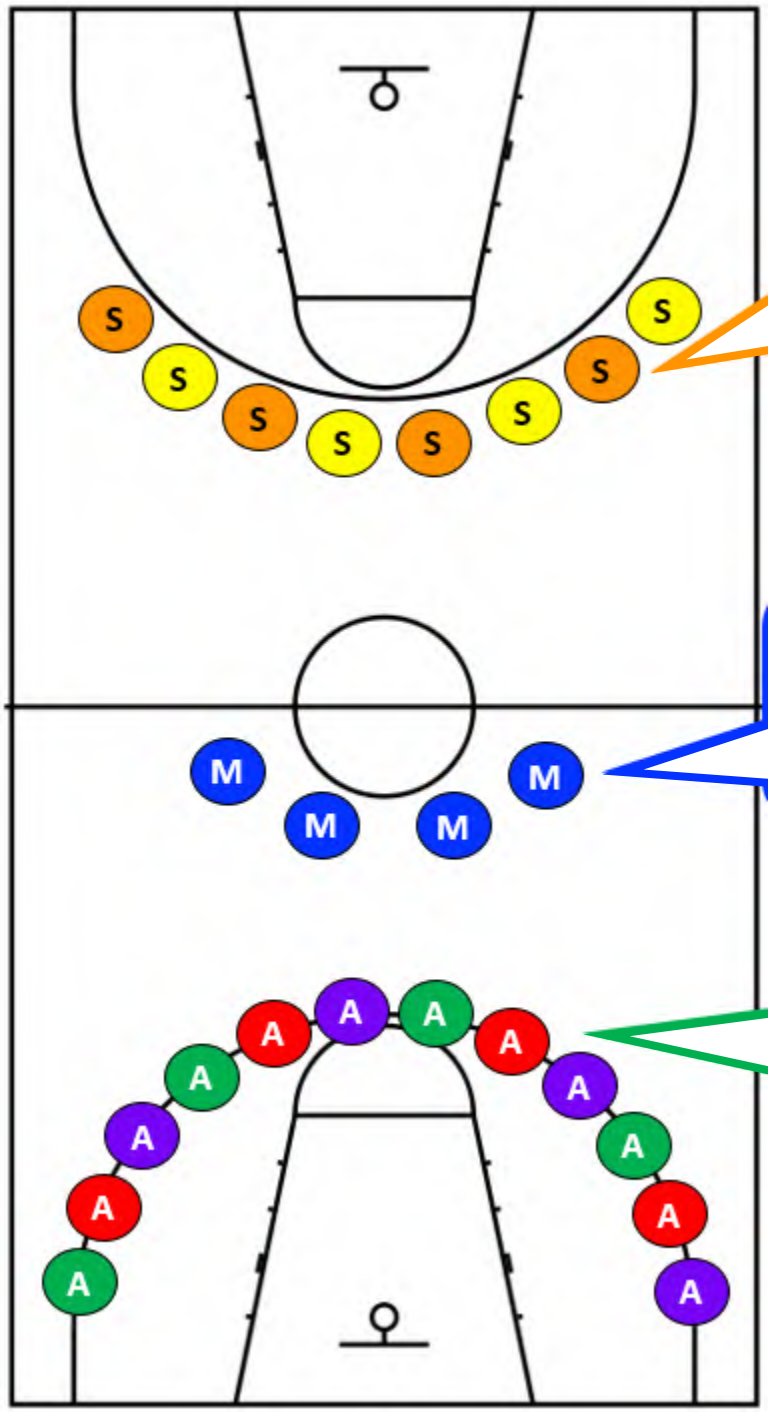
Notes:

- SOLAR WIND students cannot tag an ATMOSPHERE student directly, they must be tagged and guided by a MAGNETIC FIELD student first.
- MAGNETIC FIELD students stay in place until they tag the moving SOLAR WIND students. Once they form a team, both students move together.
- If an ATMOSPHERE student is not tagged, they keep their aurora silk in a ball in their hand and stand still (the aurora is not active).

Advanced options for older students:

- MAGNETIC FIELD students (after tagging a SOLAR WIND student) can choose to:
  - ***Lead*** the SOLAR WIND student to the closest ATMOSPHERE student, or
  - ***Deflect*** the SOLAR WIND student back into space, to protect Earth's atmosphere
- ATMOSPHERE students can position their colored silks based on which gas is present at different altitudes in the atmosphere:
  - **RED** silks represent **oxygen high** in the atmosphere (*hold silk above head*)
  - **GREEN** silks represent **oxygen** in the **middle** atmosphere (*hold silk to side at shoulder*)
  - **PURPLE** silks represent **nitrogen low** in the atmosphere (*hold silk to side at waist*)

Aurora Ingredients: Layout Map



Optional Cheers

Who are we?

SOLAR WIND!

What do we do?

FLARE! EXCITE! CHARGE!

Who are we?

MAGNETIC FIELD!

What do we do?

GUIDE! DEFLECT! PROTECT!

Who are we?

ATMOSPHERE!

What do we do?

GLOW! DANCE! ENERGIZE!

S S **Solar Wind** students

M **Magnetic Field** students

A A A **Atmosphere** students

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OPTIONAL VARIATIONS to further teach students about the aurora recipe:

- **Remove atmosphere students:** Is there an aurora? (*No, you need an atmosphere with gases that interact with energetic particles from the solar wind to create an aurora.*)

- **Inactive solar wind:** Have solar wind students stay close to the far side of the room and not approach magnetic field students. The solar wind is always occurring, but without high-energy solar flares from the sun, the magnetic field deflects most of the solar wind, and no energized particles enter Earth's atmosphere to create the aurora. (*No active solar wind = weak or inactive aurora.*)

- **Active solar wind:** Have solar wind students be very active and energetically approach magnetic field students and then tag the atmosphere students multiple times. The atmosphere students can rapidly wave their silks and spin around in a vibrant aurora display. Solar flares send out high-energy particles into the solar wind that get trapped in the earth's magnetic field and interact with Earth's atmosphere. (*The aurora will become stronger and more active with increased solar activity.*)

culturalconnections.gi.alaska.edu/gallery/aurora