Phenology Bingo


Photo credit: USFWS Northeast Region

Grade Levels
6-8, 9-12

Overview
The following activity can be used as an introduction to the concept of phenology. The items on the phenology board are phenomena that participants have observed in nature, perhaps without even knowing their relationship to ecology, science, and climate, or their status as phenological events. Maybe they are fond childhood memories.

The activity increases science literacy by teaching about life-cycle events, encouraging students to recall experiences outdoors and spend more time observing things they may not yet have experienced.

Background
Phenology, or the study of the timing of life cycle events and their relationship to the environment, can be used to teach a number of scientific concepts in many grades from K through adult.

Real-world Connection
This activity is tied to observed plant and animal life cycles. It is also related to seasonal change because many of the events are associated with a particular season in a particular area. The concept of climate change may also be introduced, in the event that the timing has shifted since participants have been observing these events.

Citizen Science Connection
Nature's Notebook is not critical to completing the activity, rather can be used as an addendum to the activity.

Time Required
Ice-breaker: 20 mins

Traditional bingo game: 20 mins

PhenoBingo Relay Board Game: 40 mins

PhenoBingo Floor Game: 40 mins
Can be played indoors or outdoors with enough space for all purposes.

Learning Objectives
Participants will be able to:
- Define phenology
- Understand the influence of the changing seasons on life cycle events
- Understand the relationship between themselves and life cycle events in nature
- Make observations

Next Generation Science Standards

LS: Life Science			
Grades 6-8		Grades 9-12	
MS-LS1-4	Use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively.[1]	HS-LS2-6	Evaluate the claims, evidence, and reasoning that interactions in ecosystems are consistent in stable conditions, but changing conditions may result in a new ecosystem.[1]
MS-LS2-2	Construct an explanation that predicts patterns of interactions among organisms across mul-tiple ecosystems.[1]		
ESS: Earth and Space Systems			
MS-ESS3-5	Ask questions to clarify evidence of the factors that have caused the rise in global tempera-tures over the past century.		

[1] Can be elicited through the Explaining and Elaborating portion of the activity.

Conducting the Activity

Materials
Resources needed - depending upon the way you choose to present the activity
- PhenoBingo Worksheets
  NOTE: If you are not familiar with the items listed on the card, you may create your own events signifi cant to your local area. These items were created for the Tucson area. You probably know of many events such as these near you!
- Pencils/Pens (optional)
- Poster board (optional)
- 8.5 x 11 paper (optional)
- Laminating machine and paper (optional)
- Large Print out of PhenoBingo board (optional)
- Tokens to mark Bingo board (optional)
- 16 Beanbags (optional)

RESOURCES
Adapted from:

Nature Sleuths Scavenger Hunt by Alisa Hove and Sara Healey

NOTES ON ACTIVITY

Conducting the Activity

Experience

ENGAGE

1. Discuss the seasons. What do seasons bring to mind? Why do things occur when they do? How do seasons affect habitats and their inhabitants?

2. Definitions
   - Pheno- to show or appear
   - -ology-to study
   - Phenology- the science of reocurring plant and animal life cycle stages
   - Phenophase - An observable stage or phase in the annual life cycle of a plant or animal that can be defi ned by a start and end point.

3. Introduce the concept of phenology
   - All of the seasonal changes you talked about above are phenological events
   - What are some more examples you can think of? (migration, breeding, green-up, senescence)

Explore

OPTIONS FOR PLAY

Ice-breaker:

1. Using the included bingo card as a template, make enough copies for everyone. The second side is blank so participants can create their own events if necessary.

2. Instruct the participants to circulate the room and fi nd someone who has experienced one of the events on the sheet. When they fi nd someone, ask them to initial it.

3. The card is a conversation starter; the participants should circulate the room to fi nd someone who has experienced one of every item on the bingo card. As soon as a participant has found someone for each event, they are done.

Traditional Bingo Game:

1. Using the included bingo card as a template, create cards with the events in different orders.

2. Make enough copies of the bingo card for all participants.

3. Make a copy for yourself and cut the squares into individual cards. Place the cards into a bowl or a hat and begin by selecting one of the cards to read aloud.

4. Participants place a token on their card if they've experienced that event.

5. You may invite someone who has experienced that event to share a story related to it.

6. The first person to get 4 in a row, has bingo.

Conducting the Activity (continued)

PhenoBingo Relay Board Game:

1. Break the group into two teams.
2. Using two, poster board sized bingo boards and large tokens,create a relay race.
3. With a handful of token cards, the fi
4. rst participant in each grouphas to run to the table with the boards, read the board in front ofthem and select something that they have done. They place anitem on their selection.
5. The return to the line and hand the tokens to the next participantin line. Repeat this process until one of the teams has gotten 4 in a row.

PhenoBingo Floor Game:

1. Print out each event on an 8.5 x 11 sheet of paper. Laminate if you would like to reuse the event cards.
2. Lay the cards out in a grid with a little space between each card, depending upon the size of the area you have available.
3. The instructor stands near the grid, ready to read the cards when the beanbag lands on them.
4. The participants form a line some distance away from the grid. Far enough that they cannot easily read what is on the cards. The fi rst participant tosses a beanbag toward the grid.
5. The instructor reads aloud the event written on the card closest to the beanbag.
6. The participant who tossed the beanbag can choose to describe a time when they remember that event happening OR pass their turn to the next person in line.
7. The instructor can either leave the beanbag on the card where it landed and play until there are 4 in a row OR continue to play until all of the cards have been hit by a bean bag and all of the events have been described.

Share

EXPLAIN

1. Participants review the experience and reflect. Review ques tions can include:
   - Ask participants if they would like to join *Nature's Notebook* to collectobservations
   - What were the differences in our experiences?
   - Who had similar experiences?
   - Did anyone else want to share a time they experienced a similar event?
   - How did this activity demonstrate phenology, phenophases and seasonalchange?
2. This step may include a variety of sharing methods: verbal, illustrative, etc.

Process and Generalize

ELABORATE

How might we keep track of events like this? (e.g. nature journal, *Nature's Notebook*, photography, sketches, etc.).

Apply

EXTEND

1. Ask participants if they would like to join *Nature's Notebook* to collect observations
2. Host a *Nature's Notebook* workshop
3. Implement a long-term *Nature's Notebook* activity in your program

REFLECTION

1. Ask students to draw connections between this experience and other similar ones they have had.
2. Ask students about what they liked and disliked about this assignment. If they had to share the experience with someone else, what would they say?

Evaluate

The use of refl ective practice is critical to understanding. Examples of reflection questions include:

1. Share one new thing you learned from this experience.
2. Share one thing you still have a question about.
3. Share something that you learned which will be useful in the future.
4. Share something that I (the instructor) could have done differently, or will do differently in the future.
5. Share something that I (the instructor) learned from the participants.

NOTES ON ACTIVITY

Seen a saguaro bloom	Been a “leaf peeper”; seen leaves changing color in the fall	Seen a white winged dove visit a saguaro flower or fruit (pollination!)
Watched a monarch, swallowtail, or other butterfly or moth hatch	Watched bats emerge for an evening feeding session	Had an allergic reaction to mosquito bites
Smelled creosote bush after a rain	Suffered from seasonal allergies	Played with maple “helicopters” (seeds)
Made (or eaten) flour from mesquite beans	Seen a desert tortoise	Gone on a wildflower hike
Caught fireflies	Eaten food made from prickly pear fruits	Had a hummingbird visit a feeder in their yard