



# Trailing the Snail

By Barbara S. Hoffman

## Focus

UGH! SLIME! and WHAT A BEAUTIFUL SHELL! are common reactions to snails. In cartoons, snails are featured as SLUGgish of movement and lowly of intellect.

## Background

Snails are **mollusks**, or soft-bodied nonsegmented invertebrates. All mollusks have a large muscle commonly called a **foot** that is used for locomotion. Tissue called a **mantle** covers the internal organs, and in most mollusk species the mantle secretes a calcium shell to cover the soft body. This shell protects the mollusk from predators and helps to keep the body moist. Mollusk shells provide no body support. Slugs are frequently described as snails without shells.

Many mollusks, including snails, have a **radula**, an organ in the throat with rows of sharp teeth that rasp off bits of food. The radula can also be used to bore holes in the shells of prey for feeding. Mollusks have either gills or lungs for breathing.

The largest group of mollusks, Class Gastropoda, includes over 80,000 species of snails and slugs. The word gastropoda means "stomach-foot". Snails and slugs move through the use of the foot, over a mucus trail that they secrete. In addition to other mollusk features, a gastropod has a head with eyes, and one or two pairs of **tentacles** for feeling and smelling. Snails live in a variety of marine and land habitats. Snails may be herbivores, carnivores, scavengers, deposit feeders, or suspension feeders.

Sea snails have eyes at the base of their one pair of tentacles and they breathe through gills. Freshwater snails have similar tentacle and eye configurations, but most

With the aid of the Scope-on-a-Rope, the magical world of snail behavior and characteristics becomes easily accessible to the most reluctant learner.

species have lungs and must surface to breathe. Land snails, also lung breathers, have two sets of tentacles with their eyes at the top of the rear pair. The eye tips on the tentacles can be retracted for protection.

Sea snails and some freshwater snails have an **operculum**, or horny plate, on the back of the foot, which serves as a closure to the shell opening when the snail withdraws into the shell. The popular food snails, known as *escargot*, are land snails of the species *Helix pomatia*.

Snail shells are **univalves**, coiled in a clockwise spiral. The shells grow periodically rather than continually. Color pattern is in part dependent on food (for pigment) and on growth activity. Snails' shells are the chief means of species identification.

The eggs of snails are often found in gelatinous masses in water and on plants, or just below the surface of the soil. Initially they appear as a blob of jelly with small light-colored dots. Viewed under magnification at this stage, the outlines of the eggs may be seen, with the dot off to one side in each egg. At a later stage, the eggs may appear more opaque, with the dot larger and more irregular in shape. Shortly before hatching, you may see the snail shape, including shell, in the egg, with its beating heart.

Land snails are hermaphrodites but must mate with other snails for the exchange of sperm.

Grade Level	Subject Areas	Process Skills	Vocabulary
Intermediate (4-6)	Life Science	Observing, Describing, Measuring, Predicting	Mollusk, Apex, Foot, Radula, Tentacle, Operculum

A cooperative project between the Undergraduate Biological Sciences Education Program Grant from the Howard Hughes Medical Institute to Louisiana State University and the Louisiana Sea Grant College Program. ©Louisiana Sea Grant, September 2000.

## Finding, Caring For, and Feeding Your Classroom Aquarium Snails

Your local pet store or aquarium supply store is the best source for snails for classroom investigations.

Make friends with the store manager, and request that he or she notify you when a clump of snail eggs is sighted on the side of an aquarium tank. You can probably have these free.

Bring home the eggs in a bag of aquarium water, along with a bunch of aquatic plants such as elodea. NOW is the time to “scope” the eggs for the students to view, videotaping of course. Put the eggs in a small petri dish for viewing, keeping the mass intact.

Set up one or more classroom “tanks” (small aquariums, five-gallon food

jars, two- or three-liter soft-drink bottles with the tops cut off) as homes for the snails as they hatch.

Use water that has been dechlorinated or use distilled water. No aeration is needed to keep the plants, snails, and eggs alive.

Put the egg mass gently into one tank, trying to get it to adhere to the side of the tank just above the water line. Add the plants, and as the snails hatch, begin your activities.

Student groups may have their own small tanks for “their” snails—that way, they will be sure to be viewing the same snail over time.

### Species

Two snails suited to aquariums include the Red Ramshorn (*Planorbis corneus*) and the Malayan snails (*Melanoides tuberculata*).



Red Ramshorn



Malayan

## Extending Learning... Snail's Trail Block Quilt

The Snail's Trail Block is made of several sizes of triangles (called half-square triangles) and squares. To cut the half-square triangles, simply cut a square of the given size and cut diagonally to create two equal triangles. When cutting fabric pieces, the sides of the squares should be on the straight of the grain of the fabric.

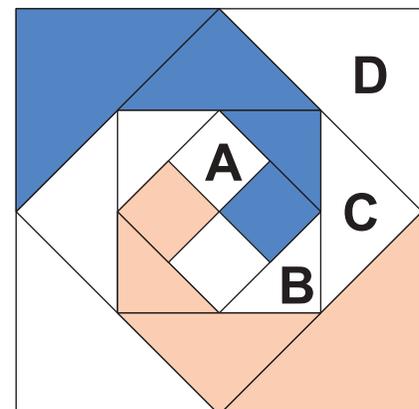
For a 10 1/2 in. block (10 in. when pieced with other blocks), sewn with 1/4 in. seams, cut the following templates (seam allowance is included). **CUT TWO SETS**, using two fabrics of high contrast.

Piece A, cut two squares, 2 1/4" on a side

Piece B, cut one square, 3 3/8" on a side, then cut diagonally for two triangles

Piece C, cut a square, 4 3/8" on a side, then cut diagonally for two triangles

Piece D, cut a square, 5 7/8" on a side, then cut diagonally for two triangles.



Sew the **A** squares together first. Sew **B** triangles, adding two of one color first, on opposite sides of the four-patch square, then adding the **B**'s of the other color. Repeat for the **C** triangles, and then the **D**'s.

### AMAZING SNAIL FACTS...

The smallest known adult snail shell is from *Ammonicera rota*, 0.02 inches in diameter. Fifty of them laid end-to-end would measure one inch.

*Helix aspersa*, a common garden snail, can travel about two feet in three minutes. At that rate, it would travel one mile in 5 1/2 days. Ninety-nine percent of all snail

species have shell whorls that coil in a clockwise direction.

From the **Conchologists of America** website, <http://coa.acnatsci.org/conchnet/facts.html#pace>

# Trailing the Snail

## Pre-lab preparation

**Practice the procedure** for developing a monitor ruler for use with the SOAR lenses you will use (1X, 30X).

**Prepare a class chart** or an overhead transparency that demonstrates basic snail features (see Objectives).

**Collect snail eggs** a few weeks prior to the labs, or set up a class aquarium with some snails, and watch for snail eggs. As a class, view the snail eggs using the 1X, 30X, and the 200X lenses. Begin the lab activities as soon as the snail eggs hatch.



## SOAR set-up (see SOAR How-To Book)

Use INVERT AND VIEW Set-up #6 and Set-up #7.  
Alternative: use STAND AND VIEW set-ups for viewing snail eggs and snails.

## Procedure

- (1) Discuss with students what they already know about snails.
- (2) View the snail eggs as a whole class and discuss observations.
- (3) Display the previously prepared class chart of the parts of a snail; pronounce and discuss the vocabulary.  
Discuss concepts of physical characteristics and behavior.  
Anticipate snail behaviors that may be observed: locomotion, eating, eliminating, etc.
- (4) Divide the class into lab groups of two-to-four students each for the two lab activities.
- (5) Conduct the labs. Groups may need to take turns using the SOAR, so plan for other activities for students to pursue when they are not at the SOAR. Related activities could include centers based on the extensions suggested in this folio, Internet or library research on snails, or activities in other subjects. Students should observe their snails without magnification before using the SOAR.

(If possible, offer the students the opportunity to videotape the images they see while using the SOAR.)

**Grade Level:**  
Intermediate, Middle

**Group Size:**  
Whole group and small group

**Summary:**  
Using SOAR, the world of snail characteristics and behavior becomes easily observed for all learners.

**Objectives:**

- To observe, measure, and describe physical features of a snail
- To observe and describe snail behavior
- To observe changes over time
- To measure distance and compute a rate (here called the Snail's Pace)
- To predict from data

**Materials:**

- The Scope-On-A-Rope
- Snail eggs and young freshwater snails (collected from aquarium store)
- Plastic petri dishes
- Pipettes and forceps
- Transparency paper
- Markers
- String

**Duration:**

- One 45 min. introductory session (viewing snail eggs and making monitor ruler)
- Two lab sessions, which may be set up as center activities

**Subject Area:** Life Science

**Extensions:**  
Art, Social Studies, Language Arts

**Process Skills:**  
Observe, measure, describe, predict

**Vocabulary:**  
Apex, gastropod, mollusk, operculum, radula, tentacle

**National Science Standards:**

*Content Standard (K-12)*

- Students will develop an understanding of change, constancy, and measurement

*Content Standard D (5-8)*

- Students will investigate structure and function of living systems (the snail)

# Activity 1 - Growing at a Snail's Pace

Have students use the 1X lens first to view the snail. The snail should be placed in a small amount of aquarium water in the base of a small petri dish. Use STAND AND VIEW and INVERT AND VIEW set-ups.



**(1) Students will observe and describe the physical features of a freshwater snail.**

- Use the prepared chart or diagram of a snail to guide discussion of main external body parts. Challenge students to do independent research to learn more about snail characteristics.
- Guide SOAR discovery by asking students what colors and shapes they see. Can they match observed features to items of the diagram?

**(2) Students will observe and describe the behavior of a freshwater snail.**

- What is the snail doing? Is there a purpose to the locomotion or movement? Does the snail move sporadically or continuously?

**(3) Students will measure the diameter of a freshwater snail.**

- Direct students to gently remove the snail from the petri dish to place on a standard ruler to measure its diameter. Use forceps or a small plastic spoon. The students need never touch the snail directly.

**(4) Students will compare the data afforded by the different levels of magnification.**

**(5) Students will collect the above data on the snail over a period of two-three weeks and will compare the data, describing similarities and differences.**

- Make additional copies of the Activity One blackline master for follow-up lab records.

**Assessment Strategies:** Use the completed third viewing worksheet as the assessment tool.

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## Activity 2 - The Snail's Pace

**(1) Students will construct a monitor ruler (scale based on magnification image) to measure distance.**

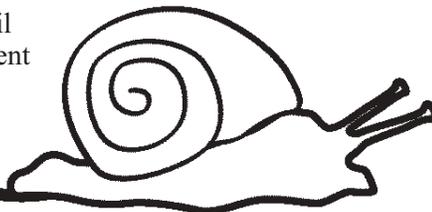
- Directions for creating a Monitor Ruler can be found in the *SOAR How-To Book*.

**(2) Students will observe and measure the distance a snail moves during a set interval.**

- Intervals of 30 seconds are suggested so that the students will be successful in collecting data before the snail moves beyond view of the screen.
- Caution students to wait until the snail acclimates to the petri dish environment and really begins to move before beginning the timing and tracing.

**(3) Students will calculate a rate, called THE SNAIL'S PACE, and predict distances to be traveled by the snail over longer periods.**

**Assessment Strategies:** Repeat Activity Two, using a different level of magnification (for example, use the 30X if the 1X was used the first time).



**TRAILING THE SNAIL - Activity One**  
**OBSERVING PHYSICAL FEATURES and BEHAVIOR**

**Name:** \_\_\_\_\_

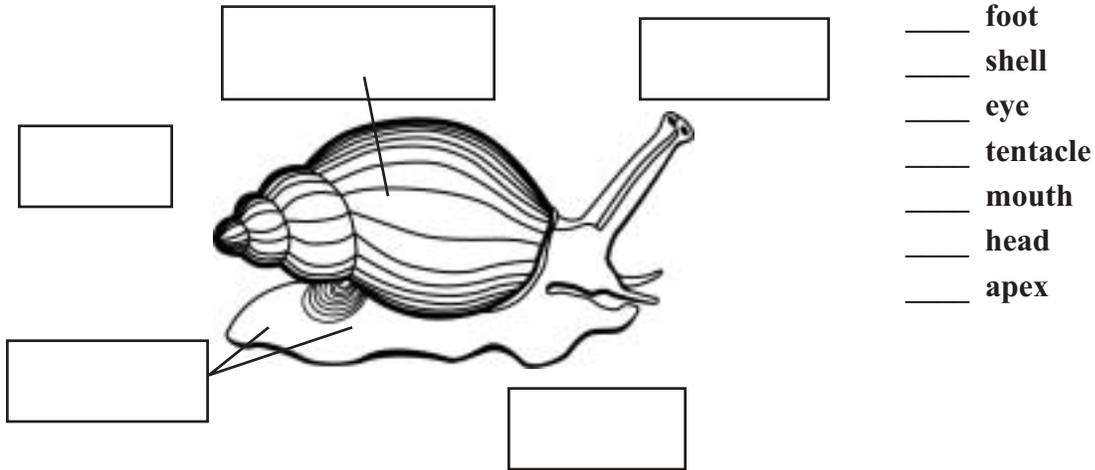
**Date:** \_\_\_\_\_

**Circle One:** 1st viewing    2nd viewing    3rd viewing

Viewing Time: \_\_\_\_\_ minutes

SOAR Lens(es) Used: \_\_\_\_\_

**Observe** the snail with the assigned lens (lenses) and check off the physical features you observe. Use words from the list to label the features you see.



**Measure** the diameter of the snail shell to the nearest half centimeter: \_\_\_\_\_

**Describe** the behavior of the snail. Use specific verbs and adjectives.

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**SOAR:** What can you observe with the 30X lens or the 200X lens that cannot be seen with the 1X lens? Discuss physical features and behavior.

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**Compare** your observations, including the shell diameter, with previous ones if this is your second or third viewing. \_\_\_\_\_

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**Develop** a detailed drawing of the snail you observed. Use other paper.

# TRAILING THE SNAIL - Activity Two

## MEASURING A SNAIL'S PACE

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Viewing Time: \_\_\_\_\_ minutes

SOAR Lens(es) Used: \_\_\_\_\_

### Predict:

Guess how far a snail will move in one minute: \_\_\_\_\_ mm / 60 seconds

**Observe and Measure** the distance that a snail moves during a given time.

**Step 1:** Use the 1X lens (Set-up #3, Stand and View) or the 30X lens (Set-up #7, Invert and View).

**Step 2:** Prepare a SOAR monitor ruler according to standard guidelines. Remove from the monitor. Tape a clean transparency over the monitor.

**Step 3:** Place your snail in a small amount of aquarium water in the petri dish. Place the dish on the SOAR lens as described in the Set-up Guide.

**Step 4:** Use a pair of forceps or a pipette to gently center the snail in the dish. Wait for the snail to begin moving before starting the timing in Step 5.

**Step 5:** Begin timing 30-second intervals while tracing the snail's trail on the transparency taped to the monitor. One partner does the timing; one does the tracing. Begin tracing at the center (apex) of the shell, and trace the path that the shell center moves.

Every 30 seconds make a tick mark on the traced path, and continue tracing.

Stop after two minutes or when the snail goes off the screen, whichever comes first.



### Calculate the rate of snail locomotion.

**Step 6:** Remove the transparency from the monitor. Place a piece of string on the path you have traced. Mark the beginning and end of the traced path on the string.

Mark the 30-second intervals. Measure the lengths using the monitor ruler you prepared for the lens you used. SEE STEP 1.

#### STRING LENGTHS (as measured by monitor ruler)

1st interval \_\_\_\_\_  
 2nd interval \_\_\_\_\_  
 3rd interval \_\_\_\_\_  
 4th interval \_\_\_\_\_  
 Total Trail \_\_\_\_\_

#### MATH CALCULATIONS:

1. Average distance traveled during 30 seconds \_\_\_\_\_

2. PACE (Rate) traveled by snail \_\_\_\_\_  
 (Rate=distance/time)

3. Predictions:

My snail will go \_\_\_\_\_ in five minutes.

My snail will go \_\_\_\_\_ in one hour.

My snail will go \_\_\_\_\_ in one day

### HINTS FOR SUCCESS:

(1) Use a proportion to help you develop your predictions. Example: If a snail moves at the pace of 7mm in 30 seconds, how far would it go in five minutes?

$$\frac{7}{30} = \frac{x}{300} \qquad \frac{7}{30} = \frac{70}{300}$$

Since  $30 \times 10 = 300$ , multiply  $7 \times 10$  to calculate the new distance. The snail will go 70mm in 5 min., or 300 seconds.

(2) Remember 1 minute = 60 seconds  
 So 5 minutes =  $5 \times 60$  seconds  
 1 hour =  $60 \times 60$  seconds  
 1 day =  $24 \times 60 \times 60$  seconds  
 And 10 mm = 1 cm  
 100 cm = 1 m

# Extensions

- Students will develop individual quilt blocks using the traditional Snail's Trail pattern.
- Students will read, write, and illustrate original rhymed stories with snails as characters.
- Students will create a series of snail drawings to represent different points of view.

## Art/Math/Social Studies QUILT BLOCK

Select two contrasting colors of fabric or paper to create your Snail's Trail Block.

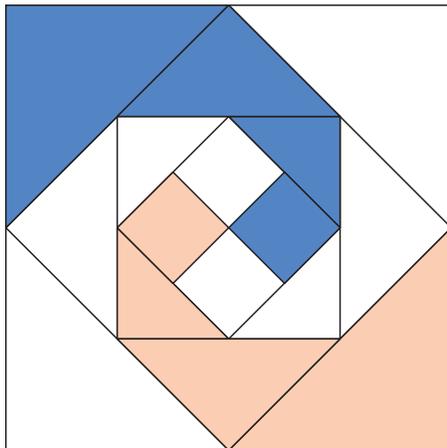
Prepare templates for students to trace onto fabric or paper for the pieces.

Sewn Block: use the dimensions given for Planning the Quilt.

Paper Block: Turn template-making into a math activity by giving the students graph paper from which to cut templates. Begin with any size square and divide according to the block design.

Copying 1/4" graph grids onto cardstock will provide sturdy templates.

Display by grouping the finished blocks, matching edges. WATCH the Snail's Trail come alive!



## Language Arts SNAIL TALES

Have students work with a reading/writing buddy for the following activities:

- Read aloud three "easy reader" books that have snails as characters. See tradebook list under "Resources".
- Research a particular species of snail in order to learn factual details about characteristics, habitat, and behavior.
- Write a story in rhymed verse with a snail as a character. Develop multiple verses to the poem.
- Make the story or poem realistic or fantasy, but be sure to include factual details from the research. GIVE THE SNAIL PERSONALITY, too.
- Publish the poem as a multi-page book with illustrations.

## Art/Science POINTS OF VIEW

View a large snail or snail shell from three points of view: top, side, and front.



Make detailed sketches of each view and label them as to point of view.

Create a fantasy scene placing the snail or shell in an unlikely setting. Select one of the points-of-view sketches to incorporate in the fantasy scene.

THINK WILD, FUTURISTIC, HISTORICAL, or WHIMSICAL for the setting.

Do not go where the path may lead,  
go instead where there is no path  
and leave a trail.

*Ralph Waldo Emerson (1803-1882)*



## Resources

### Educator References

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- Stotksy, Sandra. 1998. **Wading into Wetlands**. (Ranger Rick's Naturescope) Chelsea House Pub (Library), 96 pp. *A Ranger Rick NatureScope curriculum guide with background material and student activities.* Upper intermediate. [ISBN: 0791048373]
- Rheder, H.A. 1998. **Familiar Seashells of North America**. New York: Alfred A. Knopf, Inc., A National Audubon Society Pocket Guide. 191 pp. [ISBN 0-394-75795-5]
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### Tradebooks and Resources for Children

- Arthur, A. 1989. **Shell**. New York: Alfred A. Knopf, pp. 10-15, 40-43, 58-59. *Rich in photos and details; an Eyewitness Book. Intermediate grades.* [ISBN: 0394822560]
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- Fontenot, M.A. 1992. **Clovis Crawfish and Etienne Escargot**. Pelican Publishing Co., Inc., 32 pp. *Bayou animals rescue the snail's eggs when threatened by water.* [ISBN 0882898264]
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- Lindemann, E. 1967. **Water Animals for Your Microscope**. New York: Crowell-Collier Press, 119 pp. *Includes detailed black line drawings and descriptions of small and microscopic marine organisms.* [out-of-print]
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- Pascoe, E. 1998. **Snails and Slugs (Nature Close-Up)**. Blackbirch Marketing, 48 pp. *Upper elementary. A great resource that contains activities and background information.* [ISBN: 1567111815]
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- Stevenson, J. 1993. **The Pattaconk Brook**. New York: Greenwillow Books, 30 pp. *This fanciful story of frog and snail who travel along the brook to the seashore is punctuated with the sounds of the brook, as spelled by these two creatures. The watercolor and black ink drawings are enchanting. The story of the snail's choice to resettle at the sea shore could provide a springboard for research into authentic snail habitat and behavior.* [ISBN 0-688-11954-9]

### WWW Links

- Ast. 1999, July 19. **Snails** [WWW], <http://ast.leeds.ac.uk/~agg/snails.html>. *An interesting source of links.*
- Booth, G. 1999, July 19. **Snails** [WWW], <http://faq.thekrib.com/snails.html>. *Includes discussion of aquarium snails such as Ramshorn snail.*
- Department of Land and Water Conservation, 1999, July 19. **Snails (Fresh Water)** [WWW], <http://streamwatch.org.au/bugs/bugs/snails.htm>. *Simple fact list on gastropods, with data on Ramshorn snails. The homepage at <http://www.streamwatch.org> details an interesting school and community water quality monitoring and action program developed by the Department of Land and Water Conservation in Australia.*
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