



Grade

9

Sex in the Sea

Reproduction is essential if species are to survive. The type of reproduction employed by organisms is either asexual or sexual, although some can do both. Discover the weird and wonderful modes of reproduction utilised by marine animals at the Vancouver Aquarium!

Students Will Be Able To:
 [1] identify examples of asexual and sexual reproduction
 [2] compare different reproductive modes amongst species
 [3] make inferences about the reproductive strategies used by various organisms

LEARNING ENVIRONMENT
★ Individual, pair or group work

MATERIALS
★ Activity sheets (included below)
★ Pencil or Pen
★ Digital Camera (optional)
★ Clipboard or Binder

Steps

This activity works best as a review of scientific concepts explored in class prior to the Vancouver Aquarium visit. Students should be familiar with the concepts of asexual and sexual reproduction as well as internal and external fertilisation. Please see the section ,Helpful Information‘ for a link to background information on Aquarium animals.

- 1) Activity Sheet - Section One and Two (30 mins).**
 Individually, in pairs, or in small groups, have students explore the galleries and complete sections 1 and 2 of the activity sheet. **TIP:** a) To ease congestion at the different activity stations, have students start with different organisms and/or move through the assignment in different orders. b) If student choose to use digital cameras for section 1 please ensure you discuss their use beforehand. See ,Helpful Information‘ for further details.
- 2) Class Re-group (10 min).** In a pre-arranged meeting spot (see the section ,Helpful Information‘ for tips about meeting spots) discuss students‘ reactions to the assignment and address any

identified issues (i.e. if they can't find the animals, or determine reproductive characteristics etc). Have students share insights and/or troubleshoot together. Feel free to ask Aquarium staff for assistance.

- 3) Assignment completion – Section Three (30 – 45 min).** While students are completing the reproductive strategies table, have them keep an eye out for other interesting reproductive strategies utilised by various animals around the Aquarium. Have them make note of this information on the back on their worksheets. **TIP:** While students are exploring the Aquarium, take digital photographs of the select organisms in the assignment and use these back at school to reinforce learning.

4) Enjoy the rest of your visit!

Helpful Information

Using Cameras at the Aquarium: Please ensure cameras are used carefully around animal habitats. Use camera straps to avoid dropping devices into the water/habitats. When photographing in dark galleries, avoid use of the camera flash to avoid reflection and ensure good quality results. Consider taking photos on an angle (as opposed to directly facing glass habitats) even in well lit galleries.

Teacher Background Information: On the same page as you found this lesson ([link](#)), under the heading ,Lesson Enrichment‘ you will find a link to the Aquarium AquaFacts and a detailed ‘*Vancouver Aquarium Resource Guide*‘ which contain relevant background information pertaining to marine species. The Vancouver Aquarium recommends pre-teaching relevant content as means of making your class visit a more meaningful learning experience.

Aquarium Meeting Spot: The Vancouver Aquarium can be a busy place so locating a pre-arranged meeting space for your class is essential to reinforce learning during your visit. Some spots to consider include the Underwater Dolphin and Arctic Galleries, the Exploration Gallery, and outdoors, weather permitting.

Extension Activities

- Back at school, have students research the animals from the table in section 3 of the activity sheet and accept or reject the hypotheses they made. Consider researching the number of offspring produced by each animal as justification.
- Graph the various modes of reproduction used by animals at the Aquarium to compare and contrast which strategies are favoured. You might consider creating a large master list from the Teacher Background Information, or getting students to do so, as this will give you more to work with when graphing reproductive strategies.
- Explore a sea-star's reproductive profile and complete the following....

	Asexual Reproduction	Sexual Reproduction
Advantages		
Disadvantages		

- After learning more about the alternate modes of sexual reproduction, discuss their advantages and disadvantages with specific examples.

CURRICULUM CONNECTIONS/BRITISH COLUMBIA, CA.

**Grade 9
Science**

- Represent and interpret information in graphic form
- Compare sexual and asexual reproduction in terms of advantages and disadvantages

These Prescribed Learning Outcomes (PLOs) are related to sustainability & the environment as per the BC Ministry of Education Framework, Environmental Learning and Experience Curriculum Map: Complexity and Aesthetics.

SEX IN THE SEA

Name: _____

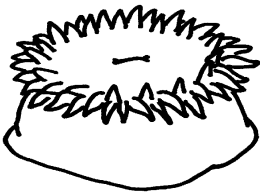
1) Asexual reproduction – Me, me and more of me!

Many plants and animals can grow new individuals from existing parts of their bodies. There is no need for a partner and the offspring are clones of their parents. This type of reproduction is called asexual reproduction. Asexual reproduction is a good choice for organisms that live in stable environments that have plenty of resources, such as food.

GALLERY: Cannacord Gallery or Treasures of the BC Coast

a) Can you find an anemone that shows evidence of asexual reproduction?

{Take a photo and/or draw a sketch here!}



Hint: Look carefully at the anemones in various habitats within Treasures of the BC Coast - can you see any that appear to be splitting in two (particularly the green anemones)? Or any that have crawled away and left part of their base behind? Look for Giant Plumose Anemones that have lots of small anemones nearby!

b) Can you find an animal that is regenerating (growing) new arms by asexual reproduction?

Common name:

Latin name (*if available*):

Sketch:

HINT: These animals can do more than just regenerate their arms (for example, after an attack by a predator), but they can strongly attach an arm and part of their central disc (centre most part of their body) to the ground using their tube feet... then simply crawl the rest of their body away – detaching that part of their body, which will later regenerate into a clone of the original! Look for an arm that is smaller than the others on this animal.

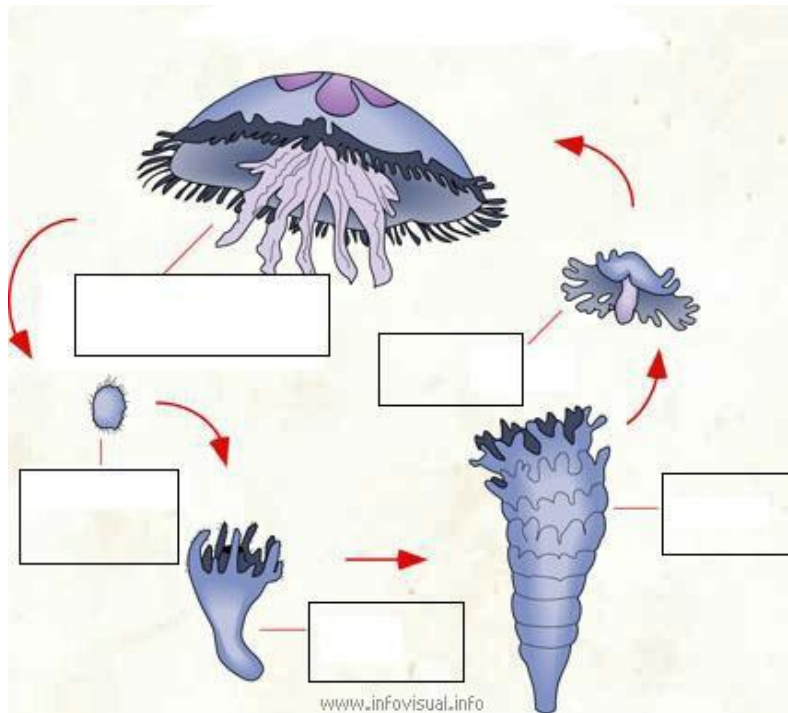
2) Sexual reproduction – it takes two, baby!

It is argued that sexual reproduction is the most effective way of creating variation within a population of a species. It requires two different sources (usually) of genetic material, which means there is a sharing of characteristics from the parents. Sexual reproduction allows organisms to adapt to changing conditions, playing a vital role in natural selection.

Gallery: Cannacord Gallery

Some animals use sexual reproduction and asexual reproduction to their advantage.

Label the life cycle of a Moon Jelly and place an (A) next to asexual phases and an (S) next to sexual phases.










Organisms living in water have an advantage over organisms living on land because gametes (eggs and sperm), in particular sperm, can propel themselves freely to their target. The downside? The vast distances and currents they have to overcome. Marine organisms have evolved two main external fertilisation strategies to help the fertilisation of eggs; these are broadcasting of enormous numbers of egg and sperm (spawning) or by brooding.

The alternate mode of sexual reproduction is internal fertilisation, as humans demonstrate, for example.

3) Putting it all together

While some organisms reproduce asexually, all organisms need to reproduce sexually for genetic diversity. Find the following animals: believe it or not, they all have the ability to reproduce sexually. Yes, even the kelp! Hypothesize which mode of fertilisation is predominantly used in the following animals – remember to observe the animal for clues and read the signage for hints. Also, consider whether parental care is involved. (Hint: Think about the number of offspring produced by each animal). Justify your reasoning and then research the results back at school! You might be surprised by what you discover...

Animal	Tick which mode of fertilisation you think is utilised by this animal...		Consider whether their offspring are looked after once they are born		Explain your choice...
	External	Internal	Parental Care	No parental care	
Treasures of BC Coast					
Sea Snail 					
Kelp 					
Barnacles 					
Tropics					
Seahorses 					
Sea Turtle 					
Pacific Canada					
Halibut 					
Frogs Forever?					
Frog 					
Wild Coast					
Beluga 