Year 12 Science: Zonation on a rocky shore: investigating a community pattern

Name: _____ Date: _____

Try these without your notes first, then check the answer key.

Practice

1. Three transects gave 3, 6 and 3 lined whelks in their Q5 quadrats. Find the mean per quadrat.

2. Turn that mean into a density per m², using 0.25 m² quadrats.

3. Using the class's table, describe where Neptune's necklace is found and where it is most abundant.

4. What kind of factor most likely sets the lower limit of the barnacle band?

5. Periwinkles crowd into crevices at low tide. Is that a structural, behavioural or physiological adaptation?

6. Write an Achieved sentence describing the periwinkle pattern, quoting data.

7. Give one reason, using an adaptation, why periwinkles can live at Q1 where barnacles cannot.

8. Lined whelks were absent from Q1 to Q3. Explain why, for a Merit answer.

Fix the mistake

9. Correct this statement: "The barnacles live in the mid shore because they like it there."

10. Correct this statement: "Periwinkles have adapted to the high shore so they can survive there."

11. Correct this statement: "There were 42 periwinkles at Q1, so the density is 42 per m²."

12. Correct this statement: "I chose where to put my transect so it went through the best rock pools."

Answer key (for parents and tutors)

1. Three transects gave 3, 6 and 3 lined whelks in their Q5 quadrats. Find the mean per quadrat.
   (3 + 6 + 3) ÷ 3 = 12 ÷ 3 = 4 whelks per quadrat.
2. Turn that mean into a density per m², using 0.25 m² quadrats.
   4 × 4 = 16 whelks per m².
3. Using the class's table, describe where Neptune's necklace is found and where it is most abundant.
   From Q3 down to Q6, most abundant at Q5 (70% cover): a band in the mid to low shore.
4. What kind of factor most likely sets the lower limit of the barnacle band?
   Biotic factors: competition for space with Neptune's necklace and predation by lined whelks.
5. Periwinkles crowd into crevices at low tide. Is that a structural, behavioural or physiological adaptation?
   Behavioural, because it is something the snail does; the crevice keeps it cooler and damper.
6. Write an Achieved sentence describing the periwinkle pattern, quoting data.
   Periwinkles are most abundant at the top of the shore (42 per quadrat at Q1) and decrease down the shore until none are found at Q5 and Q6.
7. Give one reason, using an adaptation, why periwinkles can live at Q1 where barnacles cannot.
   Periwinkles can survive losing a lot of body water and seal themselves in with an operculum, and they graze the film of algae on damp rock, while barnacles can only filter-feed under water.
8. Lined whelks were absent from Q1 to Q3. Explain why, for a Merit answer.
   Whelks hunt only when covered by the tide and cannot tolerate long spells in air, so the high quadrats, out of the water for most of the tide, give them too little feeding time and dry them out.
9. Correct this statement: "The barnacles live in the mid shore because they like it there."
   Name the factor and the mechanism: at the top they dry out and cannot feed; lower down they lose space to seaweed and are eaten by whelks.
10. Correct this statement: "Periwinkles have adapted to the high shore so they can survive there."
    Adaptations evolved over generations by natural selection; an individual snail does not adapt on purpose, it already has the features.
11. Correct this statement: "There were 42 periwinkles at Q1, so the density is 42 per m²."
    That count is per 0.25 m² quadrat, so the density is 42 × 4 = 168 per m².
12. Correct this statement: "I chose where to put my transect so it went through the best rock pools."
    Choose the starting point at random so the sample represents the shore and is not biased by what looks interesting.