Year 13 Science: Biological rhythms: clocks, zeitgebers and photoperiodism

Name: _____ Date: _____

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

Practice

1. In constant darkness a hamster's activity onset moves 3 h later over 6 days. Calculate its free-running period.

2. A mouse has $\tau = 23.8$ h. In constant darkness, how much earlier will its onset be after 10 days?

3. Name the most common zeitgeber.

4. A short-day plant with a critical night length of 10 h gets 14 h of darkness, interrupted in the middle by a red flash. Will it flower?

5. Why do tidal animals need a clock period of about 12.4 h rather than 12 h?

Exam-style question: a shore crab in a tank

Shore crabs were collected from a beach and kept in a laboratory tank with no tides, in constant dim light and temperature. For the first four days they were most active at the times high tide occurred on their home beach; after that their peaks became later each day and less sharp.

6. Describe a circatidal rhythm and state what evidence shows the crabs' rhythm is endogenous.

7. Explain why the peaks drifted and became less sharp, and what would bring them back in time.

8. Discuss the selective advantage of an endogenous tidal rhythm for a crab on the shore.

Fix the mistake

9. Correct this statement: "Short-day plants flower when the days are short."

10. Correct this statement: "The rhythm stopped drifting when the lights came back, so it is exogenous."

11. Correct this statement: "Onset moved 2.5 h over days 5 to 10, so $\tau = 24 - 2.5 \div 6$."

12. Correct this statement: "Pfr builds up in the dark."