

## Challenge Questions

1. **Using information from the seminar, explain how scientists believe animals detect magnetic fields and outline the evidence that suggests that this ability is used in navigation.**
2. **Animal navigation involves both timing and orientation behaviours in response to environmental cues. Discuss the relationship between timing and orientation in homing and migration behaviours.**
3. For an environmental cue to be of use to an animal in navigation, the cue must be:
  - consistent,
  - vary systematically in space to provide information about specific points on the Earth's surface,
  - be stable over time
  - provide enough accuracy to allow the animal to reach its specific goal destination.

Using named examples, discuss the adaptive advantage of the ability to use magnetic sense in comparison to other environmental cues.

## **Level 3 Achievement Standards linking to this seminar:**

AS 90716 Describe animal behaviour and plant responses in relation to environmental factors

## **Key Concepts from Level 3 Biology that link to this seminar:**

Below are selected objectives from the Y13 biology programme that link to this seminar. THESE ARE NOT A FULL LIST OF THE CONCEPTS IN YOUR COURSE. **You should review the bolded concepts before the seminar.**

- Distinguish between intraspecific and interspecific responses in animals and the relationship between these responses and ecological niche.
- **Distinguish between innate and learned behaviour.**
- Recognise and explain the purpose of the following types of intraspecific interactions: Fighting; territoriality; hierarchies; group formation; courtship and breeding; parental care.
- Recognise and explain the purpose of the following interspecific interactions: predator – prey; obtaining food; defensive behaviour; mutualism; commensalism.
- **Describe ways in which animals sense or detect environmental stimuli. To include photoreceptors, thermoreceptors, mechanoreceptors, chemoreceptors, auditory receptors, detection of electrical and magnetic fields.**
- **Describe the following biological orientation responses in animals – taxes, kineses, homing, migration including the triggers for these responses.**
- **Describe how the following environmental clues are used by animals for homing and migration: visual clues, solar navigation, magnetic fields, star navigation, chemical navigation, sound – sonar navigation.**
- **Define what a biological timing response is and give examples of timing responses.**
- **Define the following terms: Biological clock; circadian rhythm; circatidal rhythm; circannual rhythm, ciralunar rhythm.**
- Define and recognise the following daily cycles: Diurnal; nocturnal; crepuscular; arrhythmic.
- Analyse data to define the period of a biological rhythm; effect of a phase shift; free running period.
- Define the terms entrainment; zeitgeber, endogenous rhythm and exogenous rhythm.

