The Sleep-Wake Cycle

This activity will help you to:

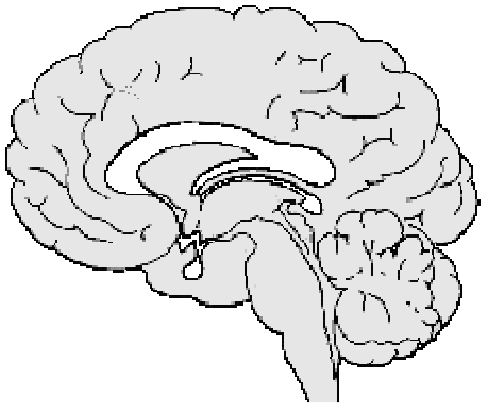
- ❑ *Understand and recall the processes that regulate the sleep-wake cycle*
- ❑ *Describe and comment on research into the sleep-wake cycle*
- ❑ *Outline the roles of pacemakers and zeitgebers in the sleep-wake cycle*

Brain Structures in the Sleep-Wake Cycle

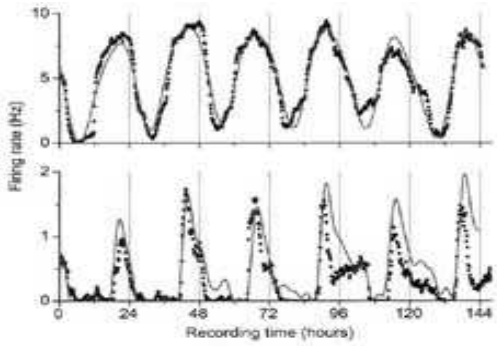
A number of different brain structures are involved in regulating sleeping and waking. Some of the most important are:

- ❑ The suprachiasmatic nucleus (SCN)
- ❑ The pineal gland
- ❑ The reticular formation
- ❑ The basal forebrain

Draw these areas into the diagram below. Label each of them, and make a short note of their functions.



The Suprachiasmatic Nucleus (SCN)



These graphs show the firing rates of neurons that have been removed from the SCN and kept alive in a growth medium. They are no longer connected to any other brain structures.

What is their activity pattern? What does this pattern suggest?

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Ralph et al (1990) **Aim:** to show that the SCN generates the circadian rhythm in mammals. **Sample:** hamsters, some with a genetic abnormality affecting their circadian cycle. **Design:** laboratory vivisection study. **Method:** a group of hamsters was identified with a genetic abnormality that resulted in a 20-hour circadian cycle, rather than a 24-hour one. Their SCNs were removed and placed in the brains of an experimental group of hamsters with a normal 24-hour cycle. **Result:** eventually, the experimental group shifted to a 20-hour cycle.	Comments & Criticisms

Melatonin

Melatonin is a hormone secreted by the pineal gland. Melatonin and sleeping are closel related. As melatonin levels rise in the brain, the person becomes sleepier. Melatonin levels in the brain are regulated by the activity of the SCN. On the graph below, sketch a line to show how you think melatonin levels would fluctuate over 24 hours in the average person.