

# Answers to Workbook exercises

## Chapter 16

### Exercise 16.1 Grass pollen

- a Little or no pollen is emitted at night, between about 22 and 7 hours. Pollen emission rises sharply during the morning, peaking at around 11 hours, then falling sharply to 15 hours, then remaining low during the late afternoon and evening.
- b dull or no petals; anthers dangling outside flower; feathery stigma outside flower; large quantities of pollen
- c
  - i pathogen: an organism that causes disease  
immune system: the white blood cells (lymphocytes) that defend the body against disease; lymphocytes produce specific antibodies to destroy antigens
  - ii There is much more of it, and it is more easily carried in the air, so it can be breathed in.

### Exercise 16.2 Pollination in forests of different shapes and sizes

- a The most fruits per flower were produced in Area A, the set of patches of forest that were connected to each other by corridors. Here, there was an average of 0.5 fruits per flower. The least fruits per flower developed in the set of unconnected forest patches, Area B, and the set of smaller patches of forest came in between, Area C.
- b Pollination leaves the pollen grains on the stigma. The grains then grow pollen tubes down through the style. The male nuclei (gametes) travel down the tubes into the ovule, where a male nucleus

fuses with a female nucleus to produce a zygote. This develops into an embryo plant, inside a seed. The ovary becomes a fruit.

- c Fruits will only develop after a flower has been pollinated. This is done by butterflies that prefer the edges of forests. So flowers near the edges of forests were more likely to produce fruits than ones deep inside. The small patches of forests had a larger edge (surface) to volume ratio than the large patches, and the patches joined by corridors had even more edges.
- d There are many different suggestions students could put forward. For example, the researchers could make different patches of forest that were all identical in volume, but had different lengths of edges, and compare the mean number of fruits per flower in each one.
- e There are many possible answers to this question, and students are likely to put forward a range of ideas. In this particular case, it does appear that many small patches of forest are 'better' than a few big ones, but this is unusual because these particular butterflies happen to need forest edges. There will be many more animals and plants that need large areas of deep forest to survive, and they will do better in large patches, preferably connected. Some animals need large territories in which to hunt. Some only need small areas, but there needs to be a large population to be sure they will not become extinct. Students may also refer to the importance of forests in the carbon cycle and in the production of oxygen.