National Qualifications 2019

X707/77/11

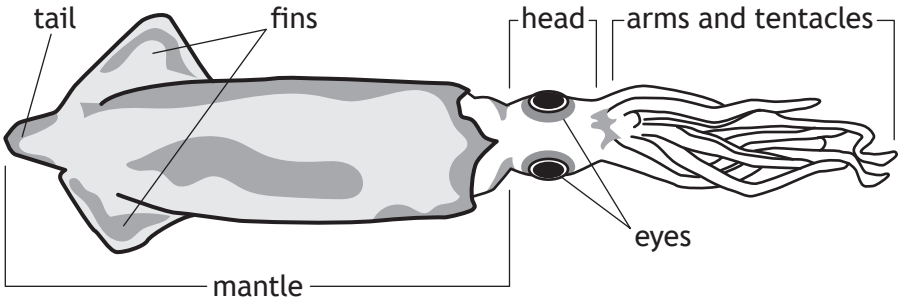
Biology
Supplementary sheet

TUESDAY, 30 APRIL
1:00 PM – 3:30 PM

Supplementary sheet for question 1

1. The veined squid, *Loligo forbesii*, is a mollusc species found off the west coast of Scotland. This species undergoes a daily vertical migration in the water, coming up to the surface to feed at night, and diving to deeper depths during the day. **Figure 1** shows the anatomical structure of a squid.

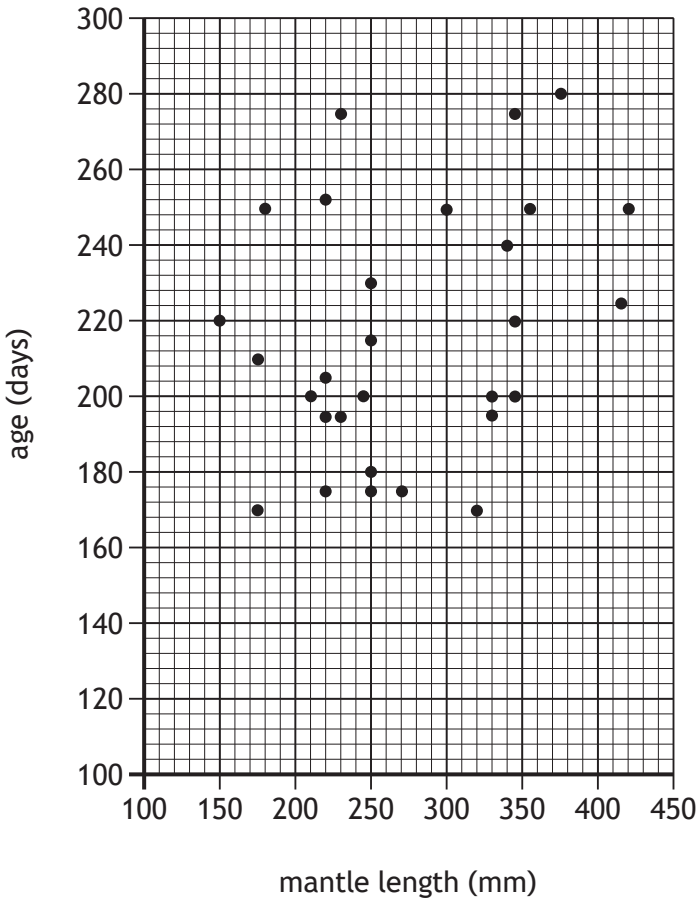
Figure 1



The relationship between size and age of squid was investigated. The size was determined by measuring the length of the mantle. As the squid migrate up and down in the water, the changes in pressure affect the formation of crystals in the squid balance organs, known as statoliths. These crystals show up as rings that can be counted to show the age of the squid in days.

Researchers collected data from squid caught off the west coast of Scotland over a number of weeks. The researchers measured mantle length and counted statolith growth rings for 29 squid. **Figure 2** shows age plotted against mantle length.

Figure 2



1. (continued)

Many marine organisms use external fertilisation. This process is slightly unusual in squid as male squid produce capsules of male gametes called spermatophores, which are transferred to the females during mating. One individual female squid can lay thousands of eggs.

The researchers analysed squid caught by commercial fishing boats. **Figures 3a and 3b** show the relationship between mantle length of male squid and the length and number of spermatophores produced in mature male squid.

Figure 3

Figure 3a

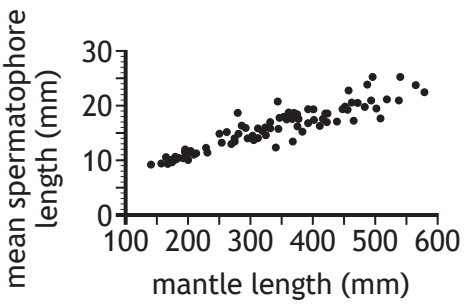
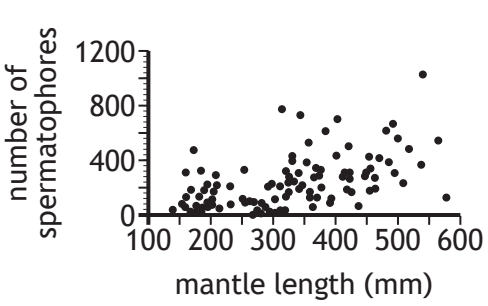


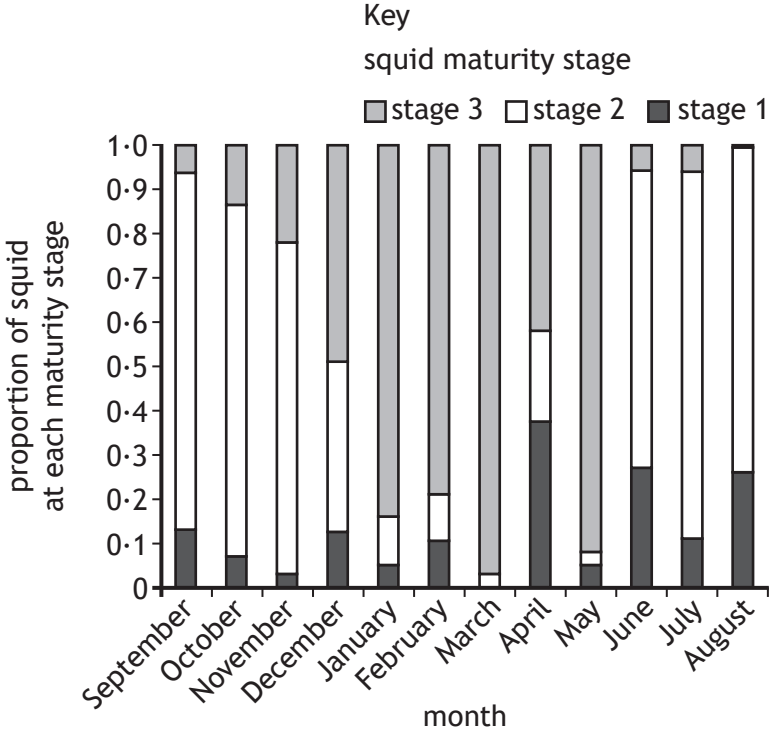
Figure 3b



The sexual maturity of individual squid was estimated using a scale of 1–3, where stage 1 was the most immature, and stage 3 the most mature. Squid in stage 3 reproduce actively.

Figure 4 shows the proportion of squid at each maturity stage, caught over the course of a year by commercial fishing boats.

Figure 4



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