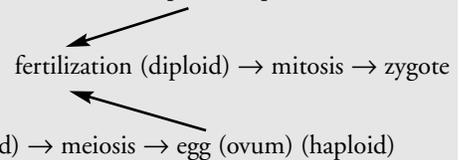


## Section 16.4 Review Answers

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1. Examples include binary fission, budding, vegetative reproduction, fragmentation, parthenogenesis, and, in some cases, spore formation.
2. Conjugation is shown in the image. You would expect to see conjugation in bacteria, as well as in some types of algae and fungi.
3. Budding and fragmentation are similar in that the offspring produced are genetically identical to the parent. Both develop from a portion of the parent. Budding and fragmentation are different in that the bud forms from the parent and remains attached to the parent until it is mature, at which point it separates. In fragmentation, a piece of mature tissue from the parent separates and begins to grow into a new, complete organism on its own.
4. (a) Parthenogenesis  
(b) None of the offspring would be male, as the female parent fish would not have any copies of the Y chromosome and male fish have not fertilized the eggs.
5. Student diagrams should include the following:  
male (diploid) → meiosis → sperm (haploid)



6. The life cycles of the moss and the pine tree both involve alternation of gametophyte and sporophyte generations. They differ in that the gametophyte generation of the moss is dominant and the sporophyte generation is dependent on the adult moss. Whereas in the pine, the sporophyte generation is the tree and is dominant, and the gametophyte generation is part of the male and female pine cones.
7. The reproductive advantage of a spore is that it is small and can easily be dispersed by wind and water. Therefore, it has a greater chance of finding a new location with favourable environmental conditions where it will not

compete with the parent organism. Vegetative reproduction does not typically allow for such motility. Offspring produced by vegetative reproduction usually grow close to the parent plant and may have to compete for space and nutrients. Further, spores may be formed by sexual or asexual reproduction. Sexual reproduction allows for the generation of genetic variation in the offspring, thus increasing the population's ability to adapt to a changing environment. Vegetative reproduction is asexual and does not allow for such variation.

- 8.** Advantages of sexual reproduction include the following: genetic variability offers a population a way to adapt to a changing environment; competition among siblings may be reduced if they are genetically diverse; pairing of homologous chromosomes and crossing over offer opportunities to replace or repair damaged chromosomes. Disadvantages of sexual reproduction include: the process is slower than asexual reproduction, which may not allow the offspring to take advantage of favourable environmental conditions; a male and female organism are required to produce gametes; the process requires more energy than asexual reproduction; and offspring are completely separate from their parents at birth and cannot always rely on them for survival.
- 9.** Sexual reproduction could help a population of sea anemones overcome a toxic-waste spill because the free swimming larvae could disperse and avoid the toxins in the water. Genetic variation among the larvae could also enable some organisms to be better able to withstand the toxic effects of the spill.