

DOT POINT

NSW BIOLOGY MODULES 5 TO 8

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Words to Watch

account, account for State reasons for, report on, give an account of, narrate a series of events or transactions.

analyse Interpret data to reach conclusions.

annotate Add brief notes to a diagram or graph.

apply Put to use in a particular situation.

assess Make a judgement about the value of something.

calculate Find a numerical answer.

clarify Make clear or plain.

classify Arrange into classes, groups or categories.

comment Give a judgement based on a given statement or result of a calculation.

compare Estimate, measure or note how things are similar or different.

construct Represent or develop in graphical form.

contrast Show how things are different or opposite.

create Originate or bring into existence.

deduce Reach a conclusion from given information.

define Give the precise meaning of a word, phrase or physical quantity.

demonstrate Show by example.

derive Manipulate a mathematical relationship(s) to give a new equation or relationship.

describe Give a detailed account.

design Produce a plan, simulation or model.

determine Find the only possible answer.

discuss Talk or write about a topic, taking into account different issues or ideas.

distinguish Give differences between two or more different items.

draw Represent by means of pencil lines.

estimate Find an approximate value for an unknown quantity.

evaluate Assess the implications and limitations.

examine Inquire into.

explain Make something clear or easy to understand.

extract Choose relevant and/or appropriate details.

extrapolate Infer from what is known.

hypothesise Suggest an explanation for a group of facts or phenomena.

identify Recognise and name.

interpret Draw meaning from.

investigate Plan, inquire into and draw conclusions about.

justify Support an argument or conclusion.

label Add labels to a diagram.

list Give a sequence of names or other brief answers.

measure Find a value for a quantity.

outline Give a brief account or summary.

plan Use strategies to develop a series of steps or processes.

predict Give an expected result.

propose Put forward a plan or suggestion for consideration or action.

recall Present remembered ideas, facts or experiences.

relate Tell or report about happenings, events or circumstances.

represent Use words, images or symbols to convey meaning.

select Choose in preference to another or others.

sequence Arrange in order.

show Give the steps in a calculation or derivation.

sketch Make a quick, rough drawing of something.

solve Work out the answer to a problem.

state Give a specific name, value or other brief answer.

suggest Put forward an idea for consideration.

summarise Give a brief statement of the main points.

synthesise Combine various elements to make a whole.

Introduction

What the book includes

This book provides questions and answers for each dot point in the NSW Biology Stage 6 Syllabus for each module in the Year 12 Biology course:

- Module 5 Heredity
- Module 6 Genetic Change
- Module 7 Infectious Disease
- Module 8 Non-Infectious Disease and Disorders

Format of the book

The book has been formatted in the following way:

1.1 Subtopic from syllabus.

1.1.1 Assessment statement from syllabus.

1.1.1.1 First question for this assessment statement.

1.1.1.2 Second question for this assessment statement.

The number of lines provided for each answer gives an indication of how many marks the question might be worth in an examination. As a rough rule, every two lines of answer might be worth 1 mark.

How to use the book

Completing all questions will provide you with a summary of all the work you need to know from the syllabus. You may have done work in addition to this with your teacher as extension work. Obviously this is not covered, but you may need to know this additional work for your school exams.

When working through the questions, write the answers you have to look up in a different colour to those you know without having to research the work. This will provide you with a quick reference for work needing further revision.

Dot Points

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Dot Points

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MODULE 5

Heredity



In this module you will:

- ⦿ Understand that life continues through the processes of reproduction and heredity.
- ⦿ Expand your knowledge of evolution by exploring the cellular processes involved in increasing genetic diversity.
- ⦿ Investigate reproduction and inheritance patterns in both plants and animals.
- ⦿ Examine the role of DNA in polypeptide synthesis and the uses of technologies in the study of inheritance patterns.
- ⦿ Learn about contemporary research and the work of geneticists across a variety of industries, including medical applications and agriculture.
- ⦿ Explore the effects of genetic research on society and the environment.
- ⦿ Engage with all the Working Scientifically skills for practical investigations involving the focus content to collect, process and analyse data and identify trends, patterns and relationships related to heredity.

5.1 Reproduction.

INQUIRY QUESTION

How does reproduction ensure the continuity of a species?

5.1.1 Explain the mechanisms of reproduction that ensure the continuity of a species, by analysing sexual and asexual methods of reproduction in a variety of organisms, including but not limited to:


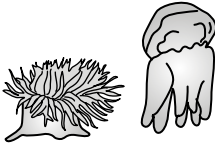
- **Animals: advantages of external and internal fertilisation.**
- **Plants: asexual and sexual reproduction.**
- **Fungi: budding, spores.**
- **Bacteria: binary fission.**
- **Protists: binary fission, budding.**



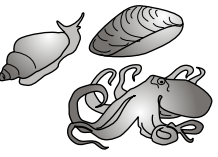
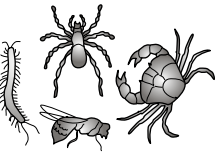
5.1.1.1 Distinguish between sexual and asexual reproduction.

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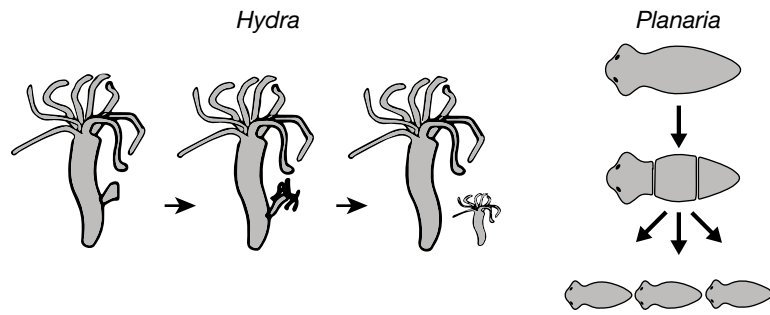
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5.1.1.2 Identify the distinguishing features of the major groups of invertebrates and their type of reproduction.

Animal phyla	Examples/diagram	Distinguishing features	Type of reproduction
Porifera	<p>Sponges</p> 		
Cnidaria	<p>Sea anemone, jellyfish, coral, hydra</p> 		

Animal phyla	Examples/diagram	Distinguishing features	Type of reproduction
Platyhelminth	<p>Planarians, liver flukes, tapeworms</p> 		
Annelid	<p>Earthworm, sandworm, leech</p> 		
Mollusc	<p>Oysters, clams, snails, nautilus, slugs, squid, octopus</p> 		
Arthropoda	<p>Crabs, shrimp, millipede, centipede, insects, spiders</p> 		

5.1.1.3 The diagram shows two types of reproduction found in the animal kingdom.



Identify the phylum to which each animal belongs and the type of reproduction shown in the diagram.

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5.1.1.4 The diagram shows parthenogenesis in aphids.

(a) What is parthenogenesis?

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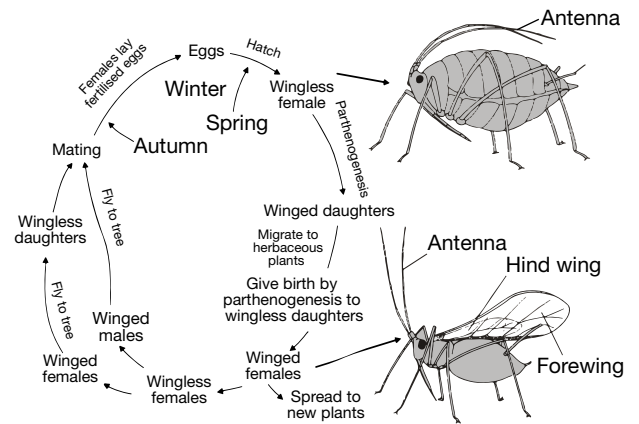
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(b) Outline the adaptive advantage of parthenogenesis for the continuity of the species.

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(c) Outline a disadvantage of parthenogenesis for the continuity of the species.

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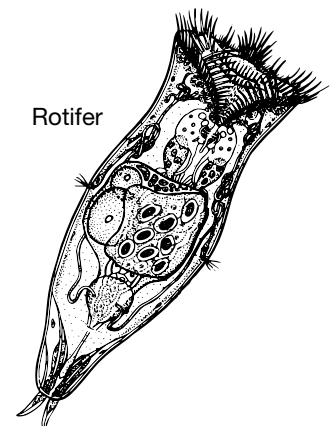
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5.1.1.5 Rotifers are very small animals ranging from 50 μm to 2 mm that live in fresh water, the ocean and the soil. Some species only consist of females that produce more females from unfertilised eggs. Studies of fossilised rotifers in amber dated 35 mya show the same female form with no evidence of males. Explain why the survival of rotifers goes against the general rule for continuity of a species.

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5.1.1.6 Explain why sexual reproduction needs to involve both meiosis and fertilisation.

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5.1.1.7 Define each of the following terms that relate to sexual reproduction.

Term	Definition
Diploid	
Embryo	
Fertilisation	
Gamete	
Gonad	
Haploid	
Hermaphrodite	
Isogamete	
Oogenesis	
Ova (egg)	
Ovary	
Sperm	
Spermatogenesis	
Testes	
Zygote	

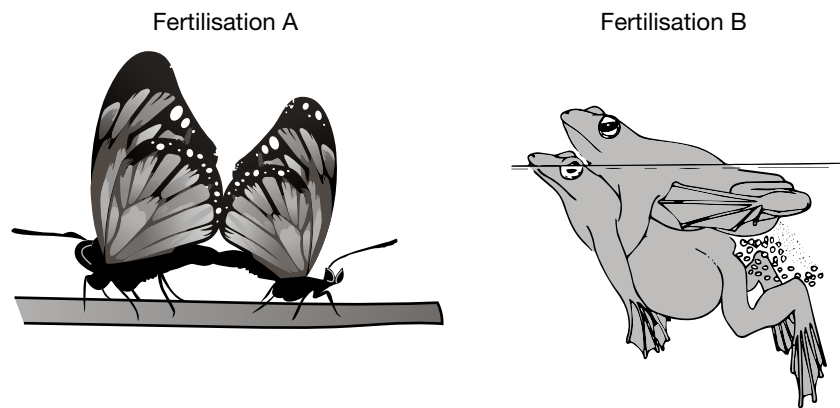
5.1.1.8 Complete the table to compare the advantages and disadvantages of sexual reproduction and asexual reproduction.

Feature	Asexual reproduction	Sexual reproduction
Advantage		
Disadvantage		

5.1.1.9 Complete the following table to compare external and internal fertilisation.

Feature	External fertilisation	Internal fertilisation
Definition		
How male gamete reaches female gamete		
Copulation		
Number of gametes produced		
Chance of fertilisation and reason		
Zygote development		
Organisms involved		

5.1.1.10 The diagrams show two types of fertilisation.



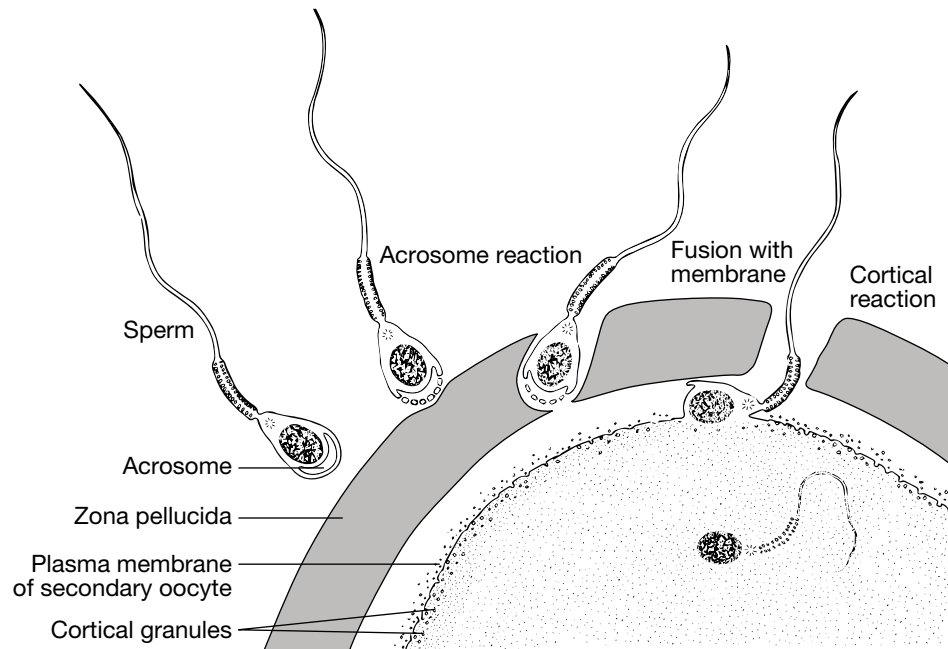
Identify each type of fertilisation and relate it to the type of habitat in which the given animal can live.

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5.1.1.11 The diagram shows the stages of fertilisation in mammals.



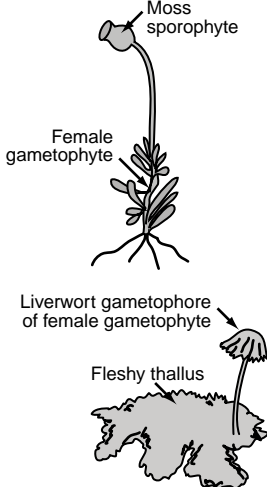
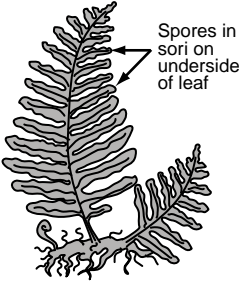
Outline the stages of fertilisation and the importance of the acrosome reaction and the cortical reaction in the continuity of a species.

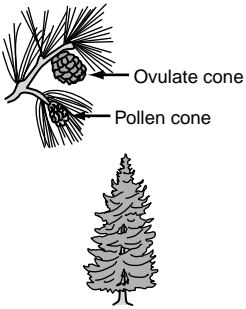

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5.1.1.12 Plants can be divided into the vascular plants and the non-vascular plants. Complete the table to summarise the features and reproduction of the main groups of plants

Group	Examples/diagram	Distinguishing features	Type of reproduction
Bryophytes	<p>Liverworts, hornworts, mosses</p>  <p>Moss sporophyte</p> <p>Female gametophyte</p> <p>Liverwort gametophore of female gametophyte</p> <p>Fleshy thallus</p>		
Ferns	<p>Ferns</p>  <p>Spores in sori on underside of leaf</p>		

Group	Examples/diagram	Distinguishing features	Type of reproduction
Gymnosperms	<p style="text-align: center;">Conifers and cycads</p>  <p style="text-align: center;">Ovulate cone Pollen cone</p>		
Angiosperms	<p style="text-align: center;">Flowering plants</p> 		

5.1.1.13 For flowering plants distinguish between pollination and fertilisation.

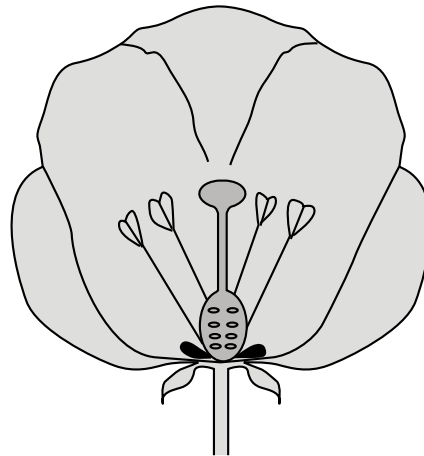
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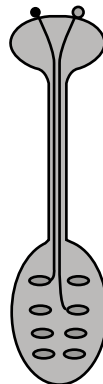
5.1.1.14 The diagram shows the flower of a dicotyledon. Annotate the diagram to show features that indicate it is likely to be animal pollinated.

Dicotyledonous flower
– animal pollinated



5.1.1.15 The diagram shows pollen landing on the stigma and growing a pollen tube to the ovary. Annotate the diagram to show pollination and fertilisation.

Pollination and fertilisation



5.1.1.16 Discuss why flowering plants need to have internal fertilisation.

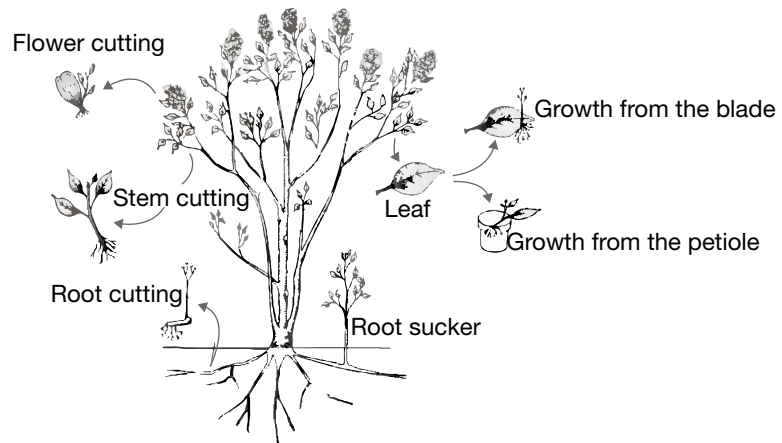
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5.1.1.17 The diagram shows how gardeners can use different parts of a plant.



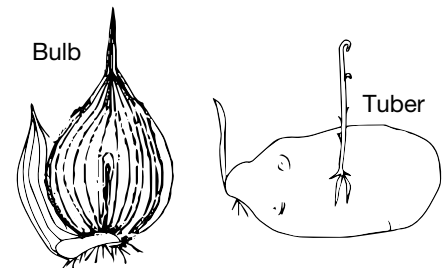
Name this type of reproduction and explain why many gardeners prefer to use these methods of reproduction.

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5.1.1.18 The diagram shows two types of vegetative reproduction. From which parts of the plant do the new plants arise?

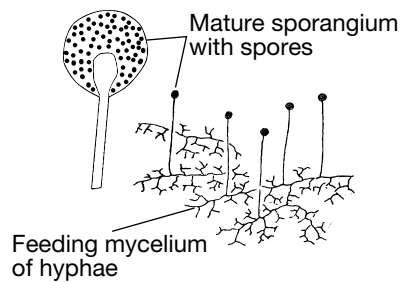


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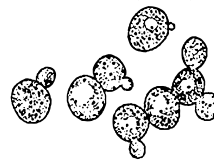
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5.1.1.19 The diagram shows three types of fungi.

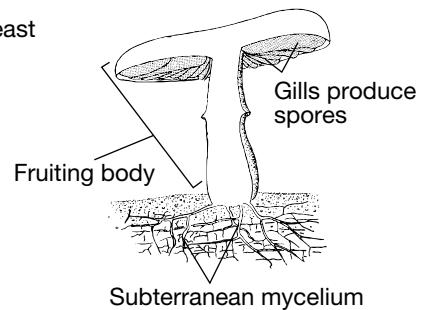
Saprophytic fungi, e.g. mould



Sac fungi, e.g. yeast



Multicellular fungi, e.g. mushroom



Outline the different types of reproduction shown in these fungi.

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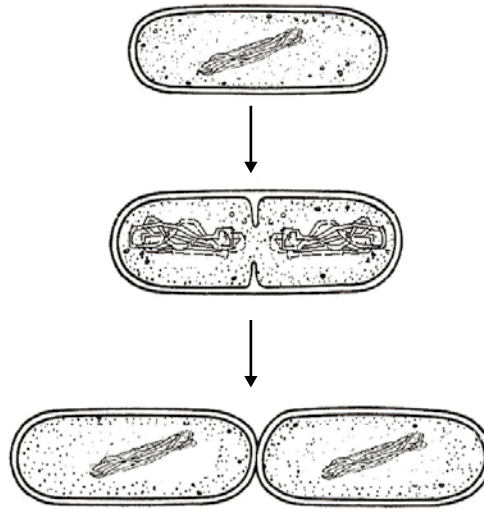
5.1.1.20 Draw and label the main features of a prokaryotic cell, e.g. bacteria.

5.1.1.21 Define binary fission.

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5.1.1.22 Label the diagram and write notes to explain what is occurring.



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5.1.1.23 Outline an advantage and a disadvantage of binary fission as a means of ensuring continuity of a species.

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5.1.1.24 List some factors that determine the rate of binary fission in prokaryotes.

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5.1.1.25 List the main features of protists.

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5.1.1.26 Outline the main difference between binary fission and budding in protists.

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5.1.1.27 Construct a table to show three examples of Australian organisms that use asexual reproduction to survive in their particular environment.

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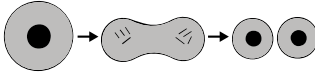
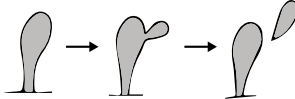
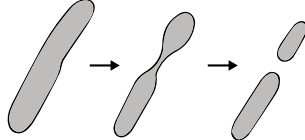
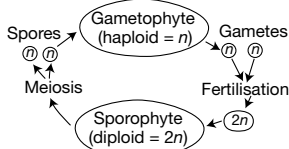
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5.1.1.28 Complete the table to summarise the basic features of different types of asexual reproduction.

Feature	Definition	Diagram	Examples
Binary fission			
Budding			
Vegetative propagation			
Spore formation			


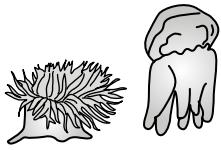
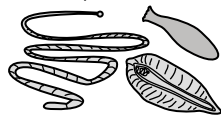

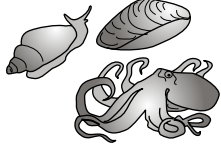

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Answers



Module 5 Heredity

5.1.1.1 Asexual reproduction involves the production of offspring from one parent only while sexual reproduction involves two parents with the union of a gamete from each parent.

Animal phyla	Examples/diagram	Distinguishing features	Type of reproduction
Porifera	Sponges 	Very simple structure with body covered in small holes which allow water to flow through the body so they can trap food particles (suspension feeders). Sessile and aquatic.	Sexual reproduction with many being hermaphrodites producing eggs and sperm at different times. Can reproduce asexually with buds or gemmules (packets of several cells).
Cnidaria	Sea anemone, jellyfish, coral, hydra 	Body is an attached polyp or floating bell-like medusa, radial symmetry, stinging cells on tentacles, single opening for digestive cavity.	Complex life cycle with both polyp and medusa stages. Polyps mainly reproduce asexually by budding while medusa produce eggs and sperm, some are hermaphrodites and produce both types of gametes. Polyp can develop into medusa by asexual strobilation.
Platyhelminthes	Planarians, liver flukes, tapeworms 	Flattened body, bilateral symmetry, single opening for digestive system.	Asexual reproduction by budding, parthenogenesis or transverse or longitudinal fission. Some are hermaphrodites and can self-fertilise or copulating mates can cross-fertilise each other.
Annelida	Earthworm, sandworm, leech 	Cylindrical segmented worm, bilateral symmetry, tube-like digestive system with two openings. Appendages not jointed or absent (no legs).	Sexual reproduction with some being hermaphrodites that can cross-fertilise. Some can reproduce asexually by fragmentation followed by regeneration.
Mollusca	Oysters, clams, snails, nautilus, slugs, squid, octopus 	Muscular foot, soft body, often with shell, tube-like digestive system with two openings. Mouth has rasp-like radula. Unsegmented body.	Sexual reproduction with most molluscs having separate sexes that produce either eggs or sperm though many snails are hermaphrodite.
Arthropoda	Crabs, shrimp, millipede, centipede, insects, spiders 	Hard segmented exoskeleton made of chitin, jointed legs, tube-like digestive system with two openings. At least three pairs of jointed legs.	Most reproduce sexually with male transferring sperm to female.

5.1.1.3 *Hydra* is a cnidarian and the diagram shows budding which is a type of asexual reproduction. *Planaria* is a platyhelminth and the diagram shows regeneration which is also a type of asexual reproduction.

- 5.1.1.4**
- Parthenogenesis is the development of unfertilised eggs into adults.
 - Parthenogenesis allows the build-up of a large population in a short time without the need to find a mate, e.g. aphids can produce several generations of female young when conditions are favourable in summer ensuring continuity of the species.
 - In parthenogenesis the offspring are identical to the parent, which is an evolutionary disadvantage in a changing environment for the continuity of the species.

5.1.1.5 In general, animal species need sexual reproduction with genetic variation in the offspring for survival and continuity of the species. In a changing environment a lack of variation usually leads to extinction when no individuals have favourable features to survive the change. Rotifers, which appear to have survived 35 million years with only female forms seem to go against this general rule that limits long lived asexuality.

5.1.1.6 Sexual reproduction requires meiosis so that each parent can produce haploid gametes and then fertilisation is needed when two gametes fuse to form a zygote which will develop into a new individual.