

## 2.1 Sexual and Asexual Reproduction

## *What you need to know...*

- What is sexual and asexual reproduction?
- Why are they important for the survival of species?

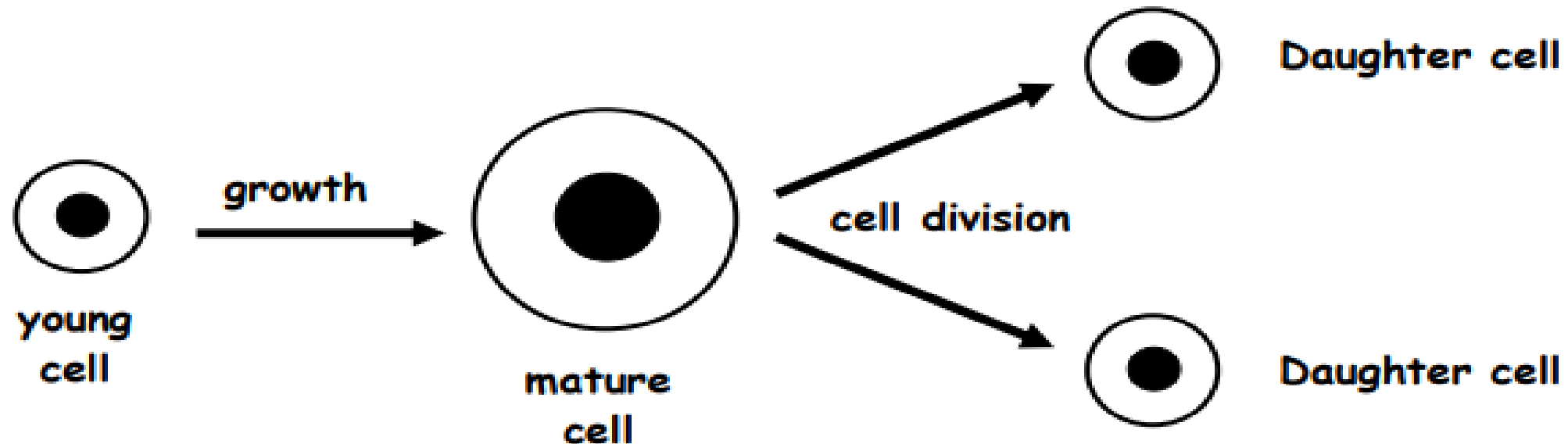
# Reproduction

- **Reproduction** is the production of **new members of a species**.
- For a species to survive it must produce sufficient young to replace those lost through old age, disease and other causes of death.
- **Reproduction** can be either **sexual** or **asexual**

# Asexual Reproduction

- **Asexual reproduction** involves on **one parent**.
- Ordinary cell division (mitosis) produces new cells identical to the original parent.
- This is how all living organisms **grow**. Their cells **divide** and multiply by replicating themselves.

- Some **unicellular organisms** reproduce this way by **asexual reproduction** e.g. bacteria and yeast.
- This produces cells which are **genetically identical** to the parent cell
- These **genetically identical organisms** are known as **clones**.



- Asexually reproducing organisms do not need to find a mate, so the energy that would have been used for sexual activity can be used for other things.
- Asexually reproducing organisms grow quickly
- Asexual reproduction does **not produce variation** as all **organisms are genetically identical**
- This means **all organisms** would be affected by changes in environmental conditions.

# Questions

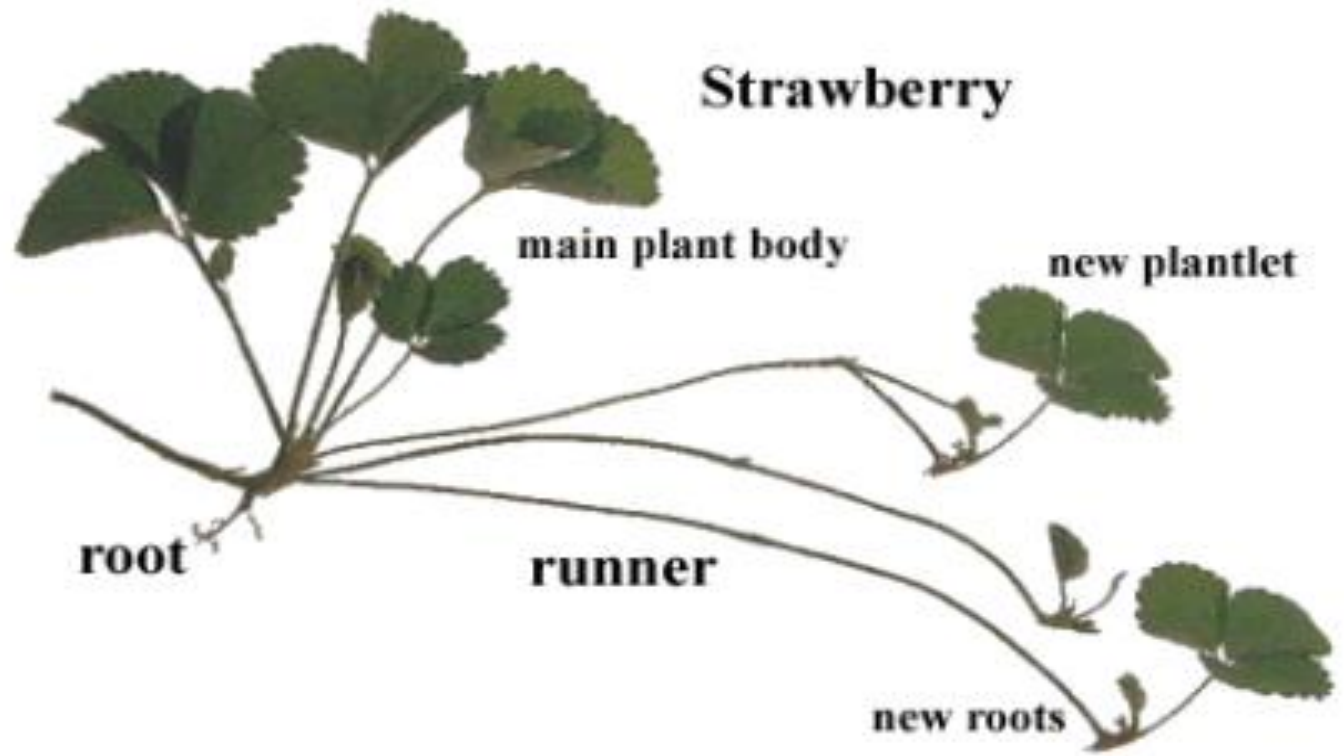
1. What is the definition of Reproduction?
2. Name the two types of Reproduction?
3. How many parents are involved in Asexual Reproduction?
4. Name two unicellular organisms who reproduce Asexually?
5. The offspring of an asexually reproduced organism is said to be a clone, what does this mean?
6. Give one advantage and one disadvantage of asexual reproduction?

# Asexual Reproduction in Multicellular Organisms

- Organisms such as plants can reproduce asexually. There are various structures produced by plants to allow them to reproduce by this method such as runners (strawberry plants), tubers (potato plants) and bulbs (daffodils).

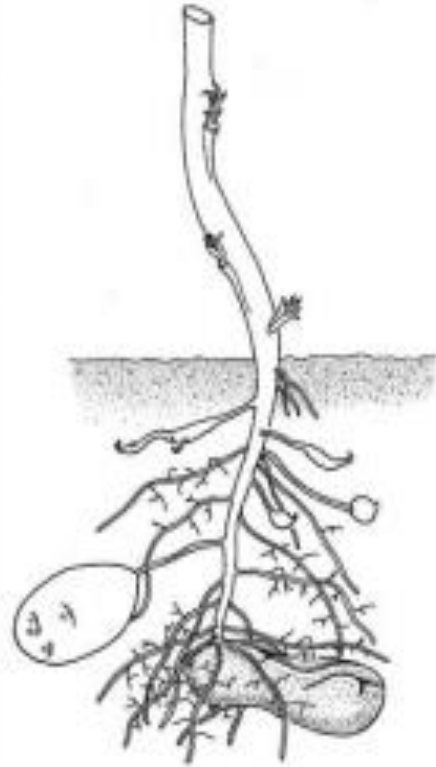


# Runners



**Tubers**

**(Potato Plant)**



**Bulb**

**(Daffodil)**



**(see unit 2.2 for more detail)**

# Sexual Reproduction

- **Sexual** reproduction involves **two parents**. All of the offspring produced are different from each other.
- Sexual reproduction is important for introducing variation in a population and enables species to adapt to changing environmental conditions.
- Sexual reproduction is a much slower process than asexual reproduction but variation means **some organisms** could survive changes in environmental conditions.

# Task

Using your notes create a table with the following headings

- Type of Reproduction
- Number of Parents Involved
- Advantage
- Disadvantage

# Sexual Reproduction

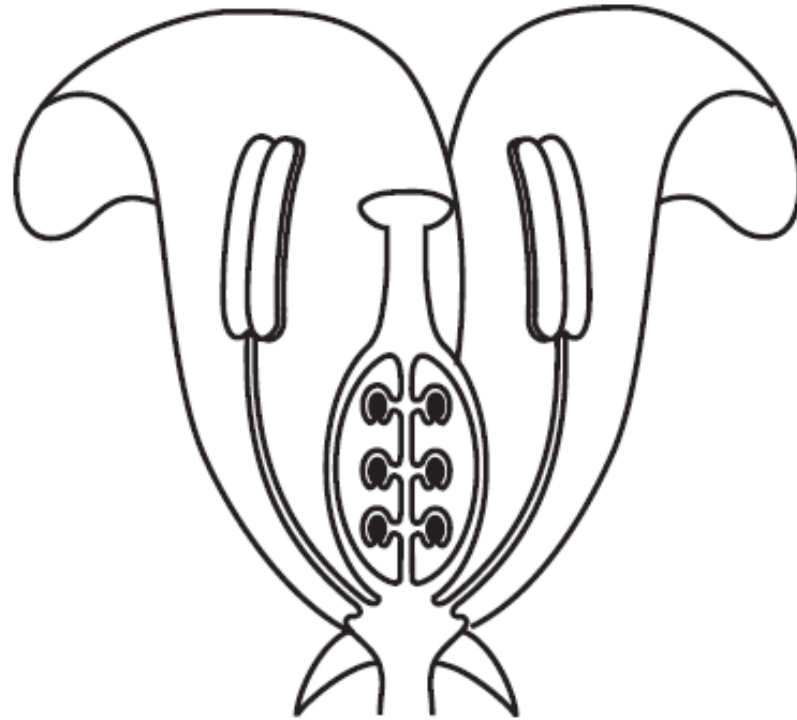
- Sexual Reproduction involves the production **sex cell** which are called **gametes**, these are produced by special sex organs

# Sexual Reproduction in Flowering Plants

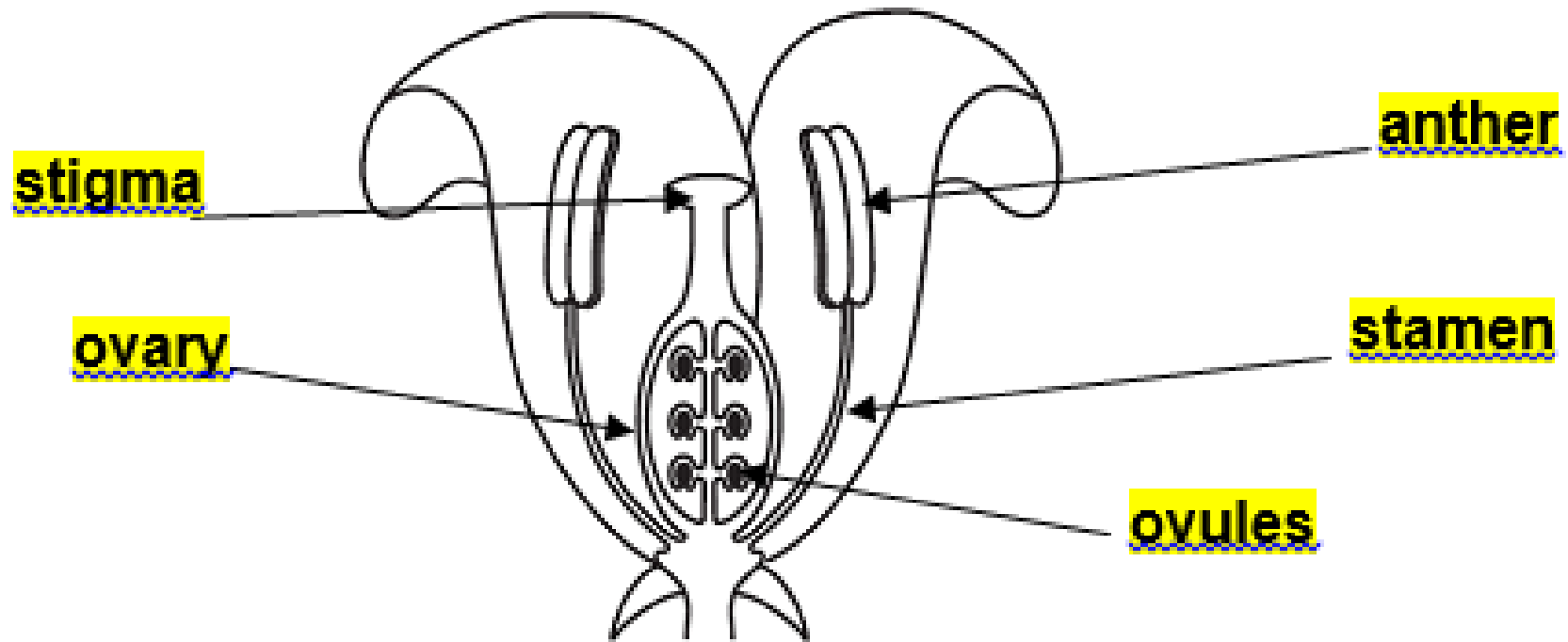
- What parts of the flower are important for Sexual Reproduction?
- The following activities will allow you to identify the parts of the Flower and their role in Sexual Reproduction in plants.

# Flower Diagram

- Stick a copy of this diagram in your jotter and use the table to help you label the structures



# Flower Diagram Answers





# Parts of the Flower

Use your textbook to complete a table showing the structure and functions of the parts of Flower

<b>Name of Structure</b>	<b>Function of Part</b>
Stamen	
Anther	
Stigma	
Ovary	
Ovules	

# Parts of the Flower Table



<b>Name of Structure</b>	<b>Function of Part</b>
Stamen	<b>Male part of flower made up of the filament and the anther</b>
Anther	<b>Produces pollen grains, which contain the male gamete.</b>
Stigma	<b>Female part of the flower. Traps pollen grains on its sticky surface.</b>
Ovary	<b>Produces ovules</b>
Ovules	<b>Contain the female gametes  </b>



# Sexual Reproduction in Flowering Plants

- The **anther produces pollen** which **contains the male gamete**.
- The **ovary produces ovules** which **contain the female gamete**.

# Pollination and Fertilisation

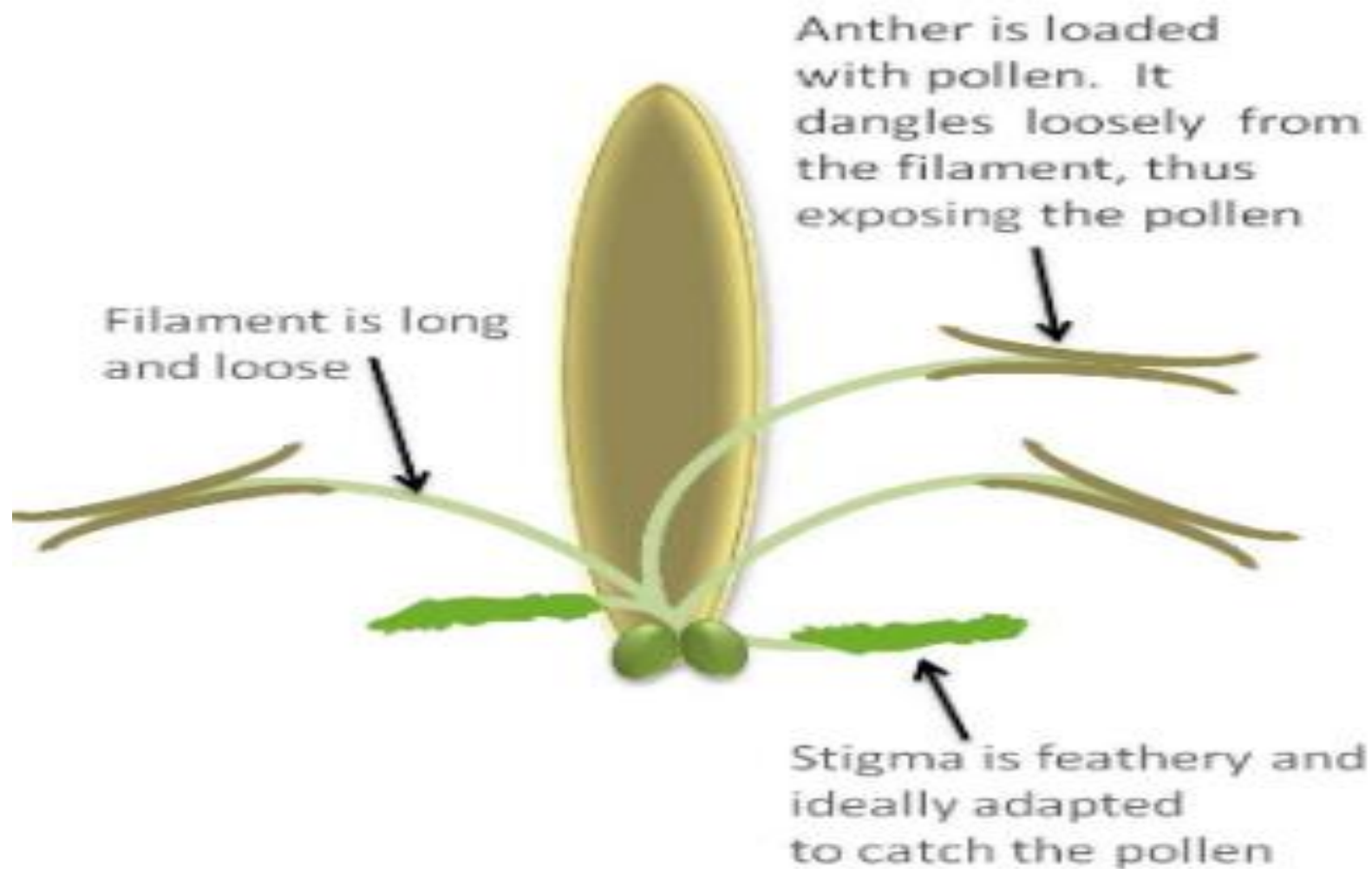
**Pollination** is the **transfer of pollen from the anther to the stigma**. This can be performed by either wind or insects.

There are two types of pollination

- Wind Pollination
- Insect Pollination

# Wind Pollination

- Flowers are small without bright petals, scent or nectar
- Anthers hang outside flower so that pollen is blown away by wind
- Feathery stigmas hang outside flower so that they can catch pollen blown in the wind
- Pollen grains are light and smooth so that they are blown easily away.



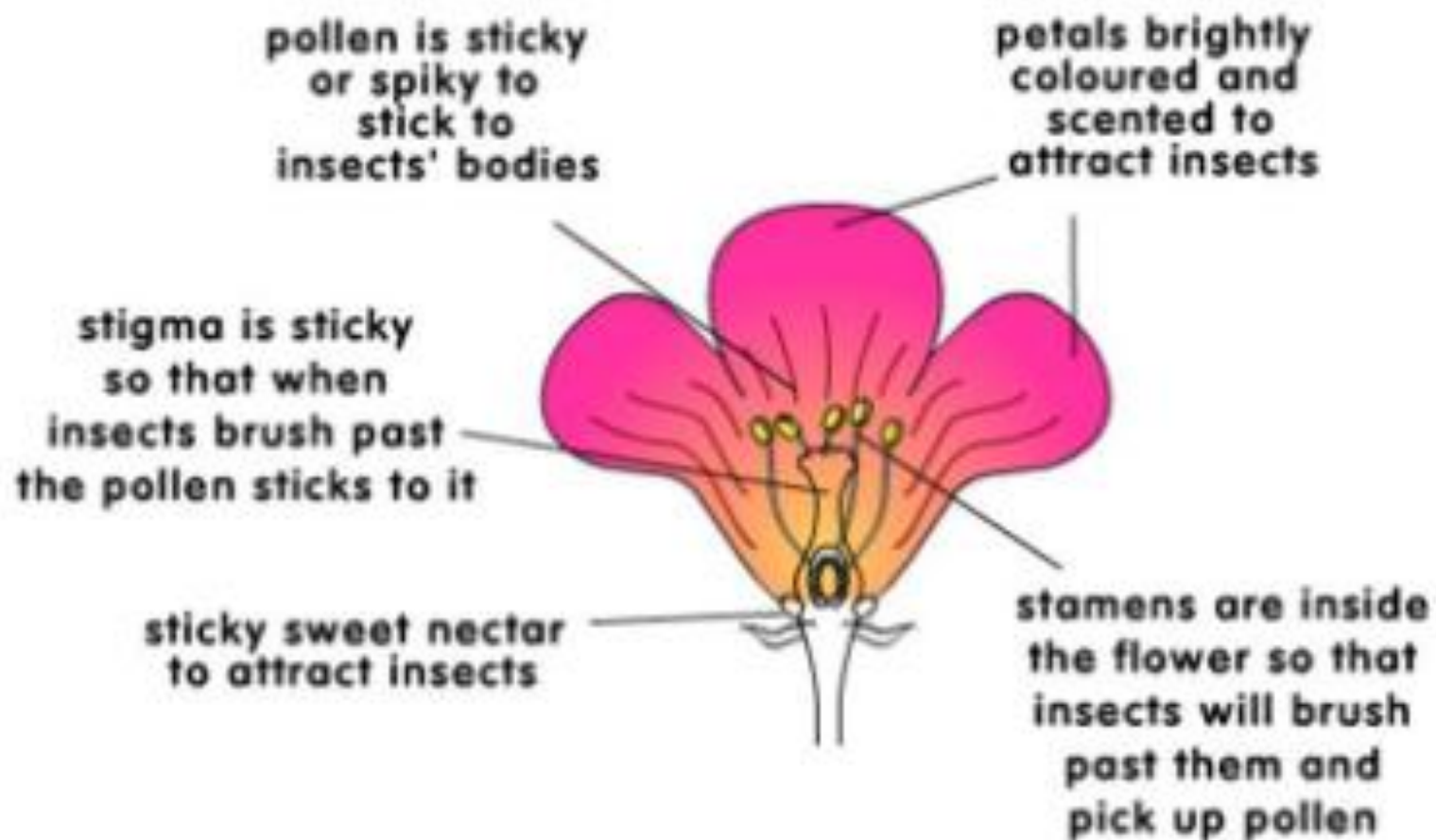
# Examples



# Insect Pollination

- Flowers large with bright petals, scent and nectar to attract insects
- Anthers and sticky stigma inside flower so that insect brushes against them
- Pollen grains are rough or sticky to catch onto insect.

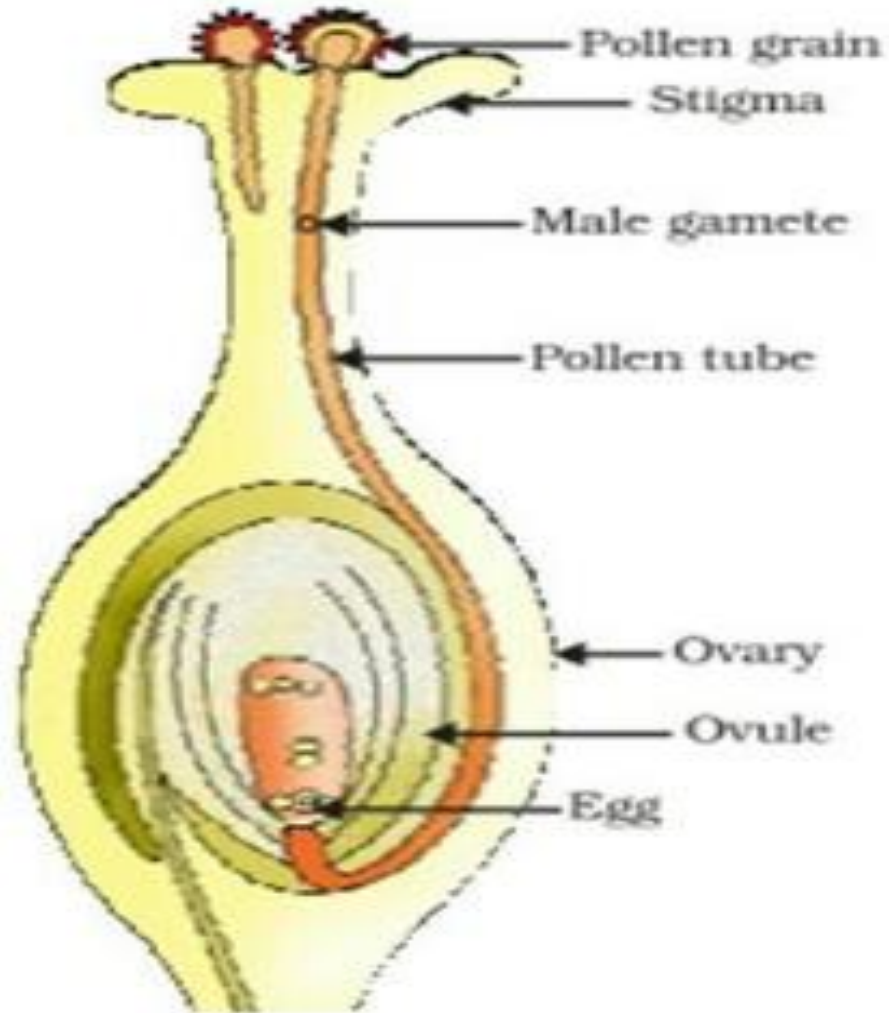




# Examples



When a **pollen grain** lands on the stigma during pollination a sugary substance on the surface causes it to **grow a pollen tube**.



- The pollen tube **grows down into the ovary**. The **male sex cell nucleus** then leaves the pollen grain and **travels down the pollen tube into the ovary** to reach the female sex cell nucleus.
- **The fusion of the nuclei from the male and female sex cell is called fertilisation**. The fertilised egg is zygote which is referred to as a seed.

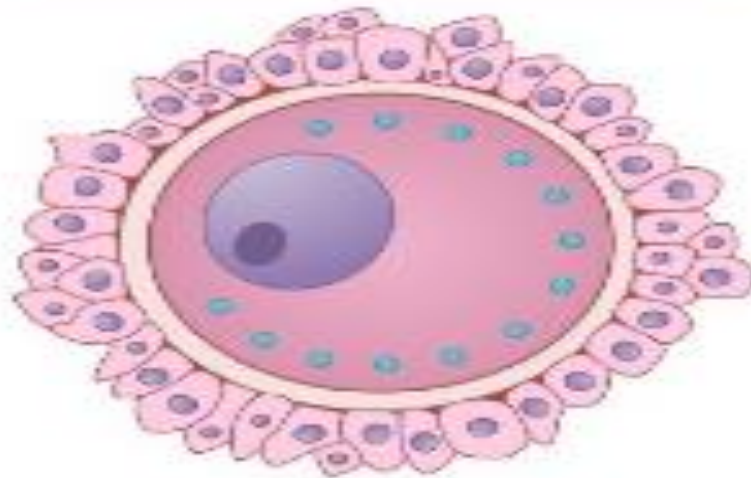
# Sexual Reproduction in Animals

- In mammals the **male gamete** is **sperm** and the female **gamete** is the egg.
- The **sperm cell** consists of a head, which contains a **nucleus** and a **tail** to allow it to **swim**. A large number of sperm cells are produced.



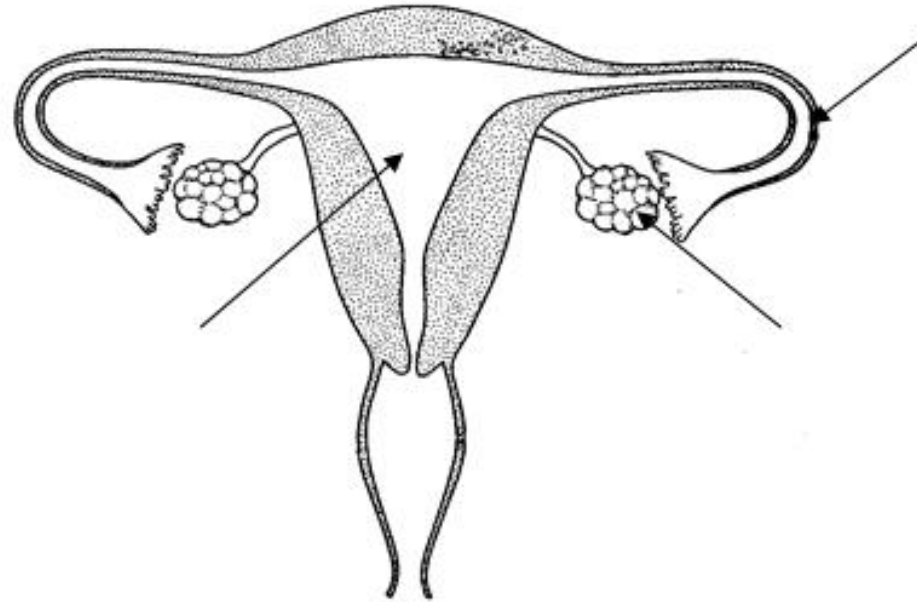
- The **egg cell** is **larger** than the sperm and has a **food store**, it is unable to move on its own. It also contains a **nucleus**.

Human Egg (Ovum)

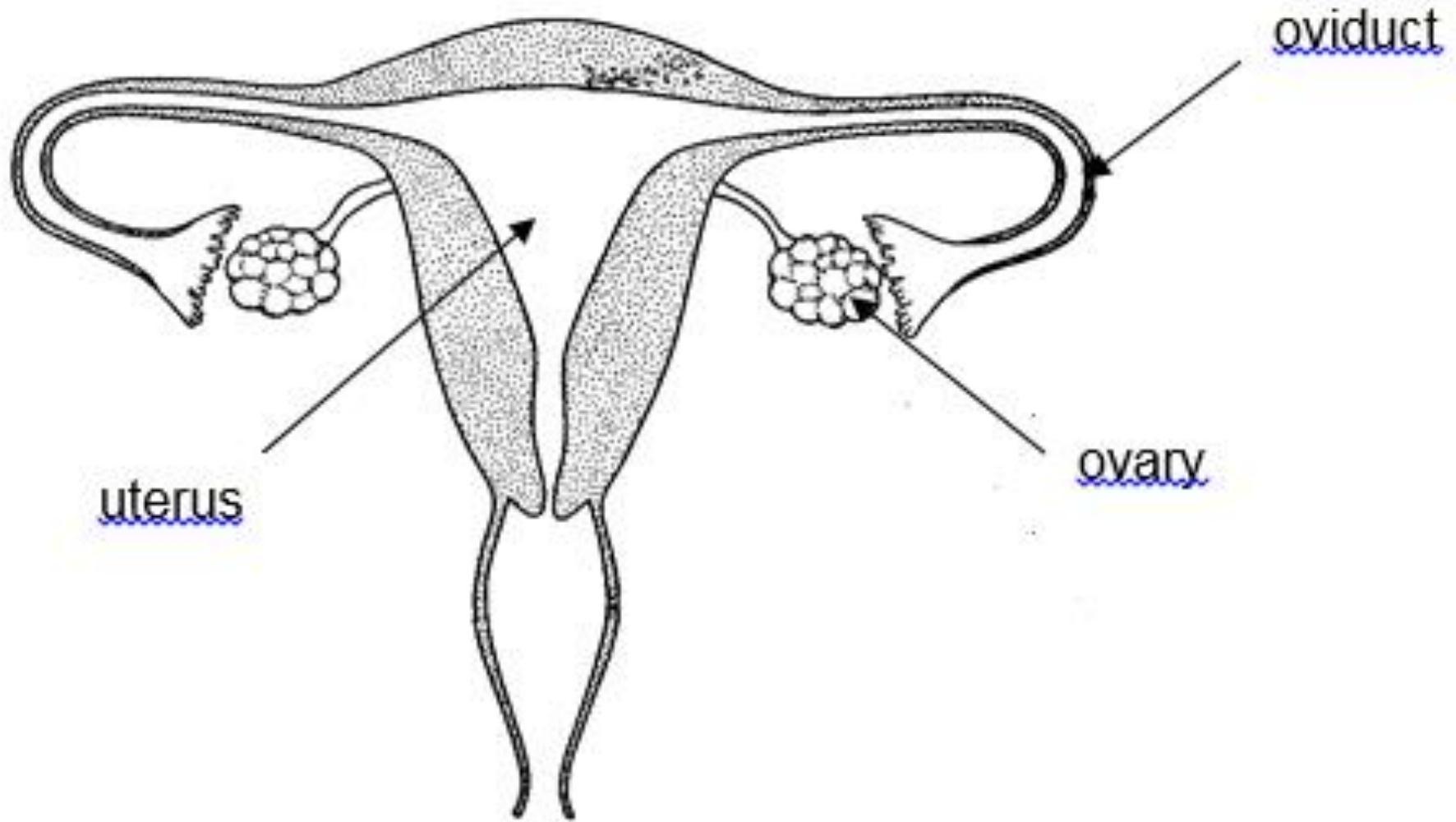


# Female Reproductive Organs

Take a diagram, stick in jotter then use the textbook to complete the labels



# Answers





Copy and Complete this table using your textbook



<b>Name of Structure</b>	<b>Function of Part</b>
Ovary	
Oviduct	
Womb	
Vagina	

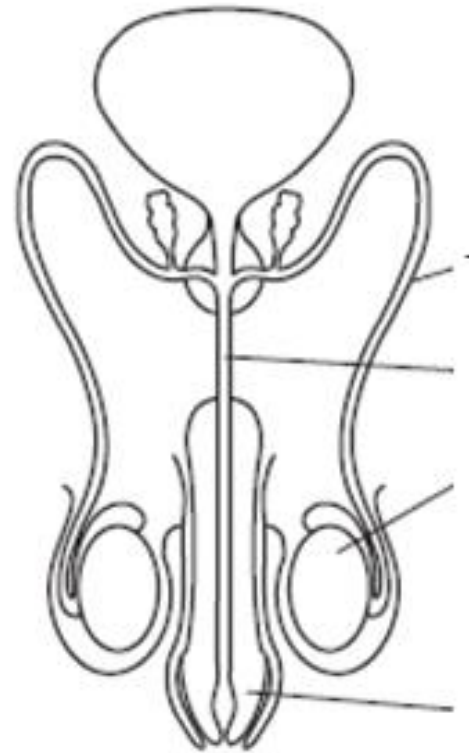


# Answers

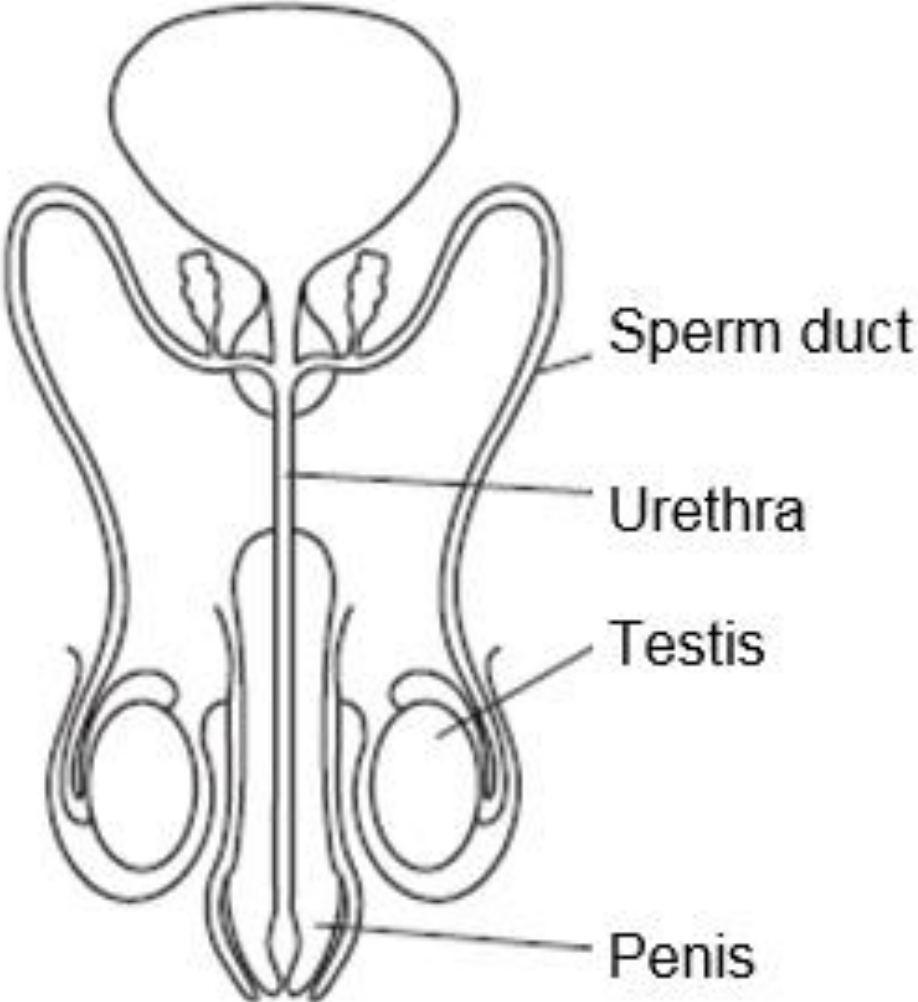
<b>Name of Structure</b>	<b>Function of Part</b>
Ovary	<b>Produces egg cells</b>
Oviduct	<b>Site of fertilisation in mammals</b>
Womb	<b>Where the embryo develops</b>
Vagina	<b>Where sperm cells are deposited</b>

# Male Reproductive Organs

Take a diagram, stick in jotter then use the textbook to complete the labels



# Answers



Copy and Complete this table using your textbook

<b>Name of Structure</b>	<b>Function of Part</b>
Testis	
Sperm duct	
Urethra	
Penis	

# Answers

<b>Name of Structure</b>	<b>Function of Part</b>
Testis	<b>Produces sperm cells</b>
Sperm duct	<b>Transfers sperm from testis to penis</b>
Urethra	<b>Tube which carries sperm cells (and urine) out of body</b>
Penis	<b>Transfers sperm cells into vagina</b>

- To produce a new offspring by **sexual reproduction**, the nuclei of the female sex cell has to fuse with the nuclei of the male sex cell in a process called **fertilisation**.
- **Sexual reproduction** leads to **variation** in a species, this may lead to some individuals that are **better adapted** to a new set of environmental conditions.
- Fertilisation either occurs by **internal fertilisation** or **external fertilisation**

# Internal Fertilisation

- Internal fertilisation occurs in land living animals as there is no water to carry the sperm to the egg.
- Internal fertilisation occurs in mammals in the oviduct of the female.

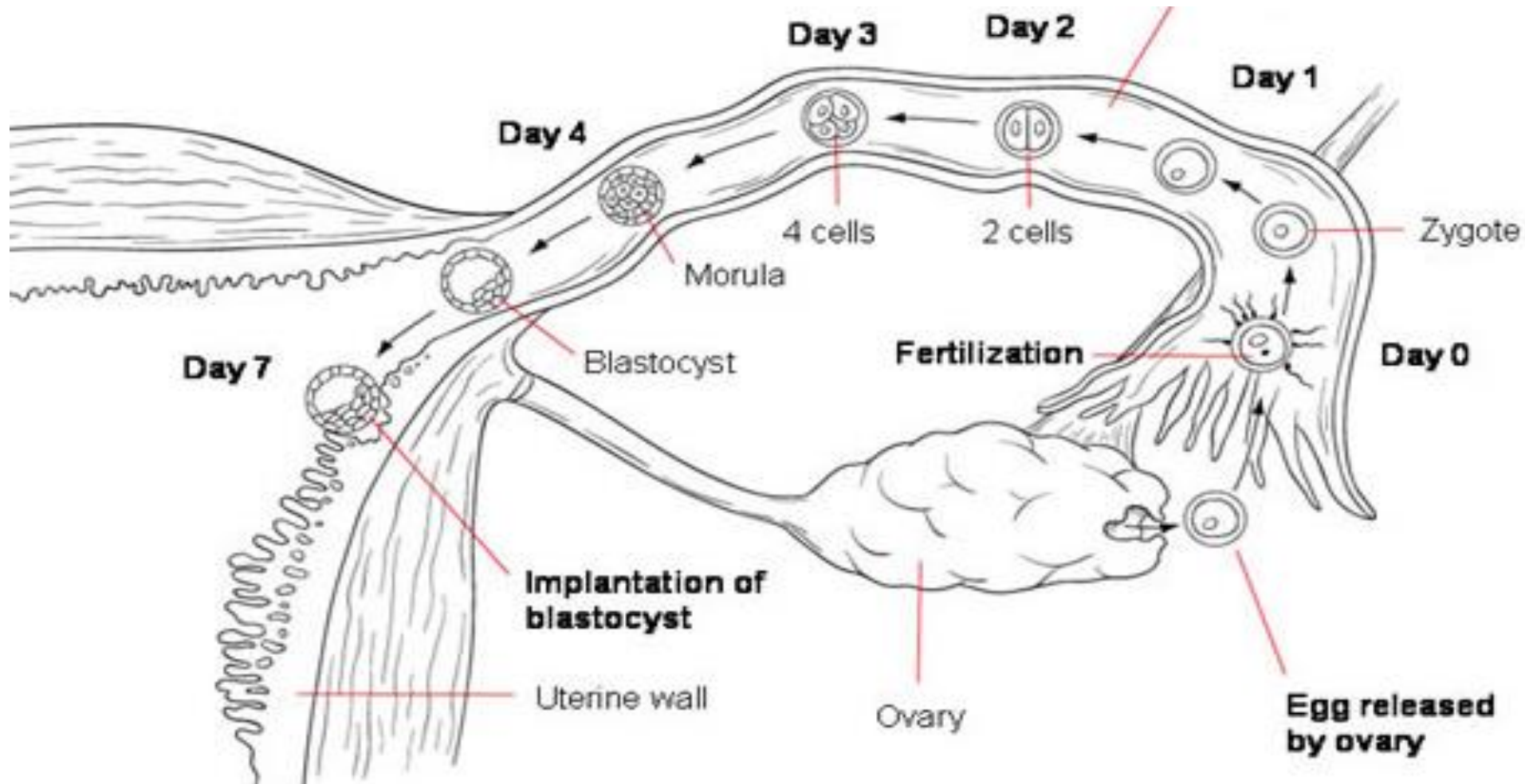


# Stages of Internal Fertilisation

Internal fertilisation occurs in the following stages

- The egg cell is released from the ovary
- The egg cell is moved along the oviduct by hair-like cilia
- The nuclei of the sperm cell fuses with the nuclei of the egg cell during **fertilisation** forming a **zygote**
- As soon as the egg has been fertilised a **fertilisation membrane** forms around the egg to prevent further entry of sperm.
- The zygote then **divides** to produce a **ball of cells**. Further cell division occurs to form an **embryo** which will eventually develop into a new individual.

# Fertilisation and the Journey to the Uterus



# External Fertilisation

- External fertilisation is found in many aquatic animals e.g. fish and amphibians.
- In external fertilisation, sperm are deposited in water close to the eggs.
- Gametes are usually released at the same time during a courtship behaviour to increase the chance of successful fertilisation.
- Large numbers of egg cells are released during external fertilisation as there is a reduced chance of fertilisation.

# Survival rates

- For a species to survive, it must be able to reproduce successfully.
- Animals which reproduce by **internal fertilisation** will have a better chance of successful fertilisation than those animals which reproduce by **external fertilisation** and will normally produce much **fewer eggs**.
- Also, those animals where there is a high degree of **parental care** (e.g. mammals) will have better chances of survival and these will also produce much **fewer eggs** than those with little or no parental care (e.g. fish).

# Summary

Copy and complete the following

- Sexual reproduction involves \_\_\_\_\_ parents.  
All of the offspring produced are different from each other.
- Sexual reproduction is important for introducing \_\_\_\_\_ in a population and enables species to adapt to changing environmental conditions.

- Asexual reproduction involves only \_\_\_\_\_ parent and all the offspring produced are identical to that parent.
- Asexual reproduction does not produce variation but it allows populations to grow \_\_\_\_\_

- Animals which reproduce by \_\_\_\_\_ **fertilisation** will have a better chance of successful fertilisation so normally produce fewer eggs
- Animals which reproduce by \_\_\_\_\_ **fertilisation** will have a lower chance of successful fertilisation so normally produce larger numbers of eggs
- Animals where there is a high degree of \_\_\_\_\_ **care** have a better chance of survival so normally fewer eggs are produced

# Summary

- Sexual reproduction involves two parents. All of the offspring produced are different from each other.
- Sexual reproduction is important for introducing variation in a population and enables species to adapt to changing environmental conditions.



- Asexual reproduction involves only one parent and all the offspring produced are identical to that parent.
- Asexual reproduction does not produce variation but it allows populations to grow quickly

- Animals which reproduce by **internal fertilisation** will have a better chance of successful fertilisation so normally produce fewer eggs
- Animals which reproduce by **external fertilisation** will have a lower chance of successful fertilisation so normally produce larger numbers of eggs
- Animals where there is a high degree of **parental care** have a better chance of survival so normally fewer eggs are produced