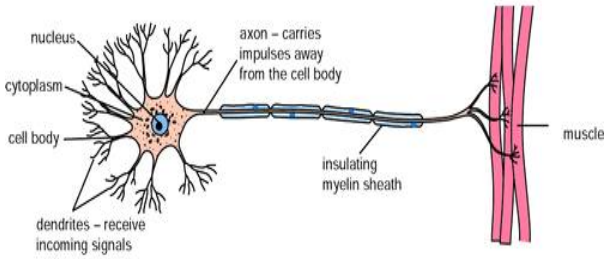
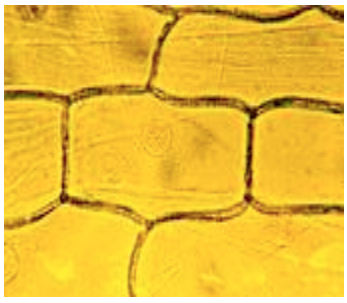
Name: Form:

# MYP 1
# Year 7

# *Cells and Reproduction*



(2024-2025)

**Statement of inquiry**

Can we use advances in medicine and technology to improve the way organs and organs systems function?

**Inquiry questions**

**Factual**

What are the features of living organisms?
How does a microscope function?
How can microscope slides be made easier to see?
What are the levels of organisation in living organisms?
What are the stages of development in cells (including examples of specialised cells)?
What are the characteristics of stem cells?
What are the stages involved in fertilization and pregnancy?
Why do some couples have problems getting pregnant?

**Conceptual**

How did the microscope enhance knowledge of cells and organs?
How have cells evolved to fulfil specialised roles?
How can we use our knowledge of unspecialised cells to treat disease?
How might scientists apply knowledge of fertilisation to increase or decrease fertility rates?

**Debatable**

What are the pros and cons of using stem cells?
What factors should be considered before using stem cells therapy?
What are the key factors to be considered when using reproductive technologies such as IVF?

**Approaches to learning (ATL)**

**ATL: CRITICAL THINKING SKILLS, Analysing and evaluating issues and ideas**

- Consider ideas from multiple perspectives
- Develop contrary or opposing arguments

**ATL: COMMUNICATION SKILLS, Give and receive meaningful feedback**

**ATL: COMMUNICATION, Take effective notes in class**

**ATL: REFLECTION, Consider content**

# 7P MYP Command Terms

| Term | Definition |
|---|---|
| **Analyse** | Break down in order to bring out the essential elements or structure. To identify parts and relationships, and to interpret information to reach conclusions. |
| **Apply** | Use knowledge and understanding in response to a given situation or real circumstances |
| **Describe** | Give a detailed account or picture of a situation, event, pattern or process |
| **Design** | Produce a plan, simulation or model |
| **Discuss** | Offer a considered and balanced review that includes a range of arguments, factors or hypotheses. Opinions or conclusions should be presented clearly and supported by appropriate evidence |
| **Document** | Credit sources of information used by referencing (or citing), following one recognized referencing system. References should be included in the text and also at the end of the piece of work in a reference list or bibliography |
| **Evaluate** | Make an appraisal by weighing up the strengths and limitations |
| **Explain** | Give a detailed account |
| **Formulate** | Express precisely and systematically the relevant concept(s) or argument(s) |
| **Interpret** | Use knowledge and understanding to recognize trends and draw conclusions from given information |
| **Outline** | Give a brief account |
| **Present** | Offer for display, observation, examination or consideration |
| **Recall** | Remember or recognize from prior learning experiences |
| **Select** | Choose from a list or group |
| **Solve** | Obtain the answer(s) using appropriate methods |
| **State** | Give a specific name, value or other brief answer without explanation or calculation |
| **Suggest** | Propose a solution, hypothesis or other possible answer |
| **Summarize** | Abstract a general theme or major point(s) |

# 7B MYP Glossary Cells & Reproduction

**Population Growth / On the slide / Building a life**

| Word | Meaning |
|---|---|
| Population | The number of a given animal or plant living in a place (eg. The number of human in the world) |
| Fertility Rate | The number of children born per female |
| cell | The basic unit which living things are made of. |
| cell surface membrane | Controls what goes into and out of a cell. |
| cell wall | Tough wall around plant cells. Helps to support the cell. |
| chlorophyll | Green substance found inside chloroplasts. |
| chloroplast | Green disc containing chlorophyll. Found in plant cells. Where the plant makes food by photosynthesis. |
| coverslip | Thin piece of glass used to hold a specimen in place on a slide. |
| cytoplasm | Jelly inside a cell where the cell's activities happen. |
| magnification | How much bigger a microscope makes something appear. |
| microscope | Used to magnify small things. |
| nucleus | Controls what a cell does. |
| photosynthesis | Process that plants use to make their own food. It needs light to work. Carbon dioxide and water are used up. Food and oxygen are produced. |
| slide | Glass sheet that a specimen is put on. |
| specimen | What you look at down a microscope. |
| stain | Dye used to colour parts of a cell to make them easier to see. |
| Large vacuole | Storage space in plant cells. |

**Population/Cells/Human organs/Organ parts/Seeing is believing**

| Word | Meaning |
|---|---|
| brain | Organ that controls what the body does. |
| eyepiece lens | Part of the microscope you look down. |
| focusing wheel | Wheel on a microscope that moves parts of the microscope to get the image into focus. |
| heart | Organ that pumps blood. |
| image | What you see down a microscope. |
| intestine | The small intestine is an organ used to digest and absorb food.<br>The large intestine is an organ that removes water from unwanted food. |
| kidneys | Organs used to clean the blood and make urine. |
| leaf | Plant organ used to make food by photosynthesis. |
| liver | Organ used to make and destroy substances in our bodies. |
| lungs | Organs used to take oxygen out of the air and put waste carbon dioxide into the air. |
| magnification | How much bigger a microscope makes something appear. |
| microscope | Used to magnify small things. |
| objective lens | Part of the microscope that is closest to what you are looking at. |
| organ | A large part of a plant or animal that does a very important job. |
| photosynthesis | Process that plants use to make their own food. It needs light to work. |
| root | Plant organ used to take water out of the soil. |
| root hair tissue | Found in roots. Takes in water from the soil. |
| skin | Organ used for protection and feeling. |
| slide | Glass sheet that a specimen is put on. |
| specimen | What you look at down a microscope. |
| stage | Part of the microscope. You put slides on it. |
| stem | Plant organ used to take water to the leaves and to support the leaves. |
| stomach | Organ used to store and break up food. |
| tissue | A group of cells of the same type working together to do a job. Organs are made of different tissues. |
| xylem tissue | Found in roots, stems and leaves. Transports water. |

## On the slide/Building a life

| Word | Meaning |
|---|---|
| cell | The basic unit which living things are made of. |
| cell surface membrane | Controls what goes into and out of a cell. |
| cell wall | Tough wall around plant cells. Helps to support the cell. |
| chlorophyll | Green substance found inside chloroplasts. |
| chloroplast | Green disc containing chlorophyll. Found in plant cells. Where the plant makes food by photosynthesis. |
| coverslip | Thin piece of glass used to hold a specimen in place on a slide. |
| cytoplasm | Jelly inside a cell where the cell's activities happen. |
| magnification | How much bigger a microscope makes something appear. |
| microscope | Used to magnify small things. |
| nucleus | Controls what a cell does. |
| photosynthesis | Process that plants use to make their own food. It needs light to work. Carbon dioxide and water are used up. Food and oxygen are produced. |
| slide | Glass sheet that a specimen is put on. |
| specimen | What you look at down a microscope. |
| stain | Dye used to colour parts of a cell to make them easier to see. |
| vacuole | Storage space in plant cells. |

## Shaped for the job

| Word | Meaning |
|---|---|
| adapted | When something has certain features to help it do a particular job. When the features of a cell help it do its job, the cell is said to be 'adapted' to its job. |
| cilia | Small hairs on some cells. |
| ciliated | Having cilia. |
| ciliated epithelial cell | Cell with cilia found in the lungs. |
| muscle cell | Cell that can change its length and so help us to move. |
| nerve cell | Cell that carries messages around the body. |
| neurone | Another name for a nerve cell. |
| palisade cell | Cell found in leaves which contains many chloroplasts. |
| root hair cell | Cell found in roots. It has a large surface area to help the cell absorb water quickly. |
| tissue | A group of the same cells all doing the same job. |
| xylem tube | Hollow tube formed from xylem cells and used to carry water up a plant. |

## Reproduction

| Keyword | Definition |
|---|---|
| Sperm cell | **Sperm** is the male reproductive **cell** |
| Egg cell | Female reproductive cell. |
| DNA | the fundamental and distinctive characteristics or qualities of someone or something, especially when regarded as unchangeable. |
| Mitosis | a type of cell division that results in two daughter cells each having the same number and kind of chromosomes as the parent nucleus, typical of ordinary tissue growth |
| Vagina | the muscular tube leading from the external genitals to the cervix of the uterus in women and most female mammals. |
| Cervix | the narrow neck-like passage forming the lower end of the uterus. |
| Uterus | the organ in the lower body of a woman or female mammal where offspring are conceived and in which they gestate before birth; the womb. |
| Ovary | a female reproductive organ in which ova or eggs are produced, present in humans and other vertebrates as a pair. |
| Oviduct | the tube through which an ovum or egg passes from an ovary. |
| Penis | the male genital organ of higher vertebrates, carrying the duct for the transfer of sperm during copulation. In humans and most other mam |
| Fertilisation | the action or process of fertilizing an egg or a female animal or plant, involving the fusion of male and female gametes to form a zygote. |
| Implantation | (in a mammal) the attachment of the fertilized egg or blastocyst to the wall of the uterus at the start of pregnancy. |
| Gestation | he process or period of developing inside the womb between conception and birth. |
| IVF | a medical procedure whereby an egg is fertilized by sperm in a test tube or elsewhere outside the body. |
| Puberty | the period during which adolescents reach sexual maturity and become capable of reproduction. |
| Adolescence | the period following the onset of puberty during which a young person develops from a child into an adult. |
| Menstruation | the process in a woman of discharging blood and other material from the lining of the uterus at intervals of about one lunar month from puberty until the menopause, except during pregnancy. |
| Condom | a thin rubber sheath worn on a man's penis during sexual intercourse as a contraceptive or as a protection against infection. |

| | |
|---|---|
| Sterilisation | surgery to make a person or animal unable to produce offspring. |
| Surrogacy | the process of giving birth as a surrogate mother or of arranging such a birth. |
| Caesarean section | is a surgical procedure used to deliver a baby through incisions in the mother's abdomen and uterus |
| Placenta | a flattened circular organ in the uterus of pregnant eutherian mammals, nourishing and maintaining the fetus through the umbilical cord. |
| Umbilical cord | a flexible cord-like structure containing blood vessels and attaching a human or other mammalian fetus to the placenta during gestation. |
| Amniotic fluid | the fluid surrounding a fetus within the amnion. |
| Contraceptive pill | Combination **birth control pills**, also known as the **pill**, are oral **contraceptives** that contain estrogen and a progestin. Combination **birth control pills** suppress ovulation — keeping your ovaries from releasing an egg. |

# 7B 1a Can you name and define the 7 things all organisms have in common?

| | | |
|---|---|---|
| 1. M | | |
| 2. R | RESPIRATION | |
| 3. S | | |
| 4. G | | Increasing in size |
| 5. R | | |
| 6. E | | |
| 7. N | | |

**7B1b Can you deduce whether they are alive or not?**

Elephant

- ❑ Movement
- ❑ Respiration
- ❑ Sensitivity
- ❑ Growth
- ❑ Reproduction
- ❑ Excretion
- ❑ Nutrition

ALIVE/NOT ALIVE

iPhone

- ❑ Movement
- ❑ Respiration
- ❑ Sensitivity
- ❑ Growth
- ❑ Reproduction
- ❑ Excretion
- ❑ Nutrition

ALIVE/NOT ALIVE

Fire

- ❑ Movement
- ❑ Respiration
- ❑ Sensitivity
- ❑ Growth
- ❑ Reproduction
- ❑ Excretion
- ❑ Nutrition

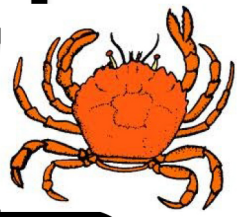
ALIVE/NOT ALIVE

Zombie

- ❑ Movement
- ❑ Respiration
- ❑ Sensitivity
- ❑ Growth
- ❑ Reproduction
- ❑ Excretion
- ❑ Nutrition

ALIVE/NOT ALIVE

## 7B1b Can you deduce whether they are alive or not?



Elephant

The elephant is alive/ not alive because

iPhone

The iPhone is alive/ not alive because

Fire

The fire is alive/not alive because

Zombie

The Zombie is alive/not alive because

Movement Respiration Sensitivity Growth Reproduction Excretion Nutrition

7B1c Plants ARE alive too!
Can you prove it by explaining how they carry out MRS GREN

Sunflower

Movement = _____
_____

Respiration = _____
_____

Sensitivity = _____
_____

Growth = _____
_____

Reproduction = _____
_____

Excretion = _____
_____

Nutrition = _____
_____

Activity Help

# 7B 1d Robert Hooke

**You are going to read the description of the life and work of Robert Hooke and then answer some questions.**

Robert Hooke was one of the best scientists of the 17th century. One of his most famous inventions was a new kind of microscope.

It was different from earlier microscopes because it had three glass lenses to magnify the object, rather than two. This means that you get a clearer image of the object. It was called the **compound microscope**.

Although this microscope looked very different from modern ones, being over half a metre tall, the microscope in your classroom is based on the same design.

This new microscope allowed Robert Hooke to observe things people had never seen before. He looked at many things including insects, other tiny living things and feathers.

He is most famous for his description of a slice of cork which he noticed was divided into small sections which he called 'cells', because they reminded him of the rooms or cells in a monastery.

Robert Hooke recorded his observations in a book called *Micrographia*.

His observations of cork were very important because until then scientists had not realised that by looking at things closely you could see new things that could not be seen at a distance, such as cells.

1. ..... ..... invented the compound microscope.
2. It was different from earlier microscopes because it had

   ..... ..... instead of .....
3. Robert Hooke looked at lots of things including

   .....
4. He called the structures he saw in cork ..... .
5. His observations of cork were important because he noticed

   .....

© Harcourt Education Ltd 2003 *Catalyst 1*
This worksheet may have been altered from the original on the CD-ROM.

# 7B 1e (Extension)- Robert Hooke and Cell Theory

Although Robert Hooke had discovered 'cells' in 1665, he did not understand the importance of his discovery. At that time, scientists knew that organisms were made of tissues and organs but they thought that these were not living. It was believed that only a whole organism was living, and that the parts that made it were not!

By the end of the eighteenth century, microscopes had improved so much that scientists were able to see cells in plants. Plant cells were much easier to see than animal cells because of their thick cell walls. Cell surface membranes, separating individual animal cells, were too thin to be seen. Microscopes continued to become more powerful and, in 1831, Robert Brown discovered a small, dark structure in each plant cell which he called a nucleus (after the Latin for 'small nut', which is what he thought it looked like).

In 1838 the importance of cells became clearer, when Mattias Schleiden came to the conclusion that all plants were made of cells. The next year another scientist, Theodor Schwann, discovered that all animals were also made from cells and that all living things started from one cell. However, he thought that new plant cells sprouted off from other cells. It was not until 1875 that Walther Fleming disproved this idea and discovered how cell division occurs, with a cell splitting into two, down the middle. Walther Fleming also developed the idea of staining cells so that he could see them better.

This century, scientists have discovered a great deal about cells and how they work, using the electron microscope which can see things in much more detail ever before.

**1** In which year did Robert Hooke discover cells?

**2** **a** Explain what the word 'tissue' means today.

**b** How does your answer to part **a** differ from what scientists thought in the seventeenth century?

**3** At the start of the second paragraph it says 'By the end of the eighteenth century, microscopes had improved so much …' In what way do you think they 'improved'?

**4** Why did scientists find cells in plants before finding them in animals?

**5** What job of cell surface membranes is referred to in the text?

**6** Who discovered the nucleus?

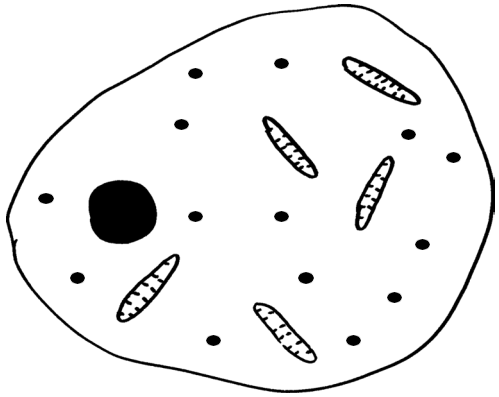
**7** When did Theodor Schwann say that animals were made up of cells?

**8** Draw a diagram to show how Theodor Schwann thought a new plant cell would be made.

**9** Name a stain that Walther Fleming might have used.

# 7B 2a What's inside an animal cell?

1. **Use these words to draw arrows to label the correct part** (proteins, membrane, nucleus, DNA, reactions, energy)



Mitochondria:

Power stations for the cell [ ] is made here.

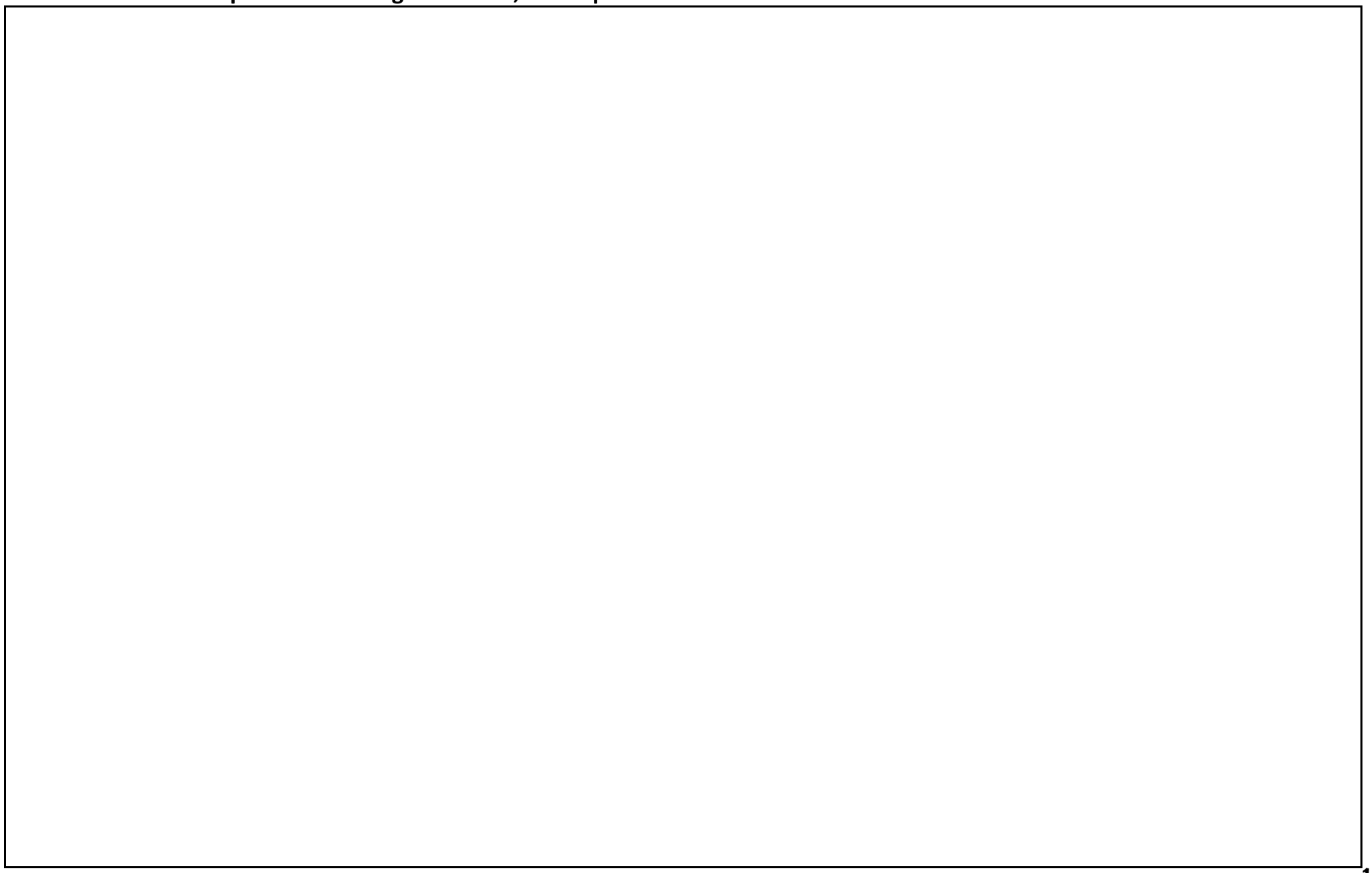
Ribosome: P [ ] are made here.

N [ ] : This controls the cell's activities.

Cell m [ ] : Controls what moves in and out of the cell.

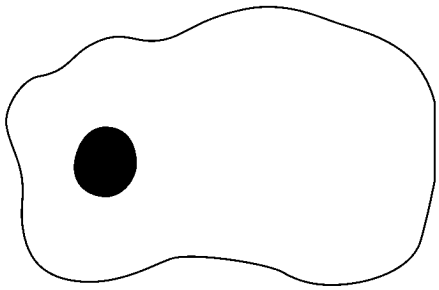
Cytoplasm: Where chemical r [ ] : Controls what moves in and out of the cell.

**2. Now draw and label a plant cell adding a cell wall, chloroplasts and a vacuole.**



# 7B 2b Plant and Animal Cells

**1** Draw lines from the words to the correct part of each cell. The words can be used more than once or not at all.



**cell membrane**

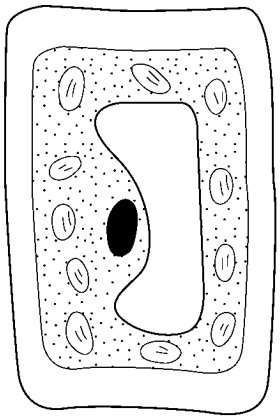
**cell wall**

**chloroplasts**

**cytoplasm**

**nucleus**

**large vacuole**



This is a diagram of an _____cell

This is a diagram of a _____cell

**2** In the blank space in the sentence underneath each diagram, fill in the word **plant** or the word **animal**.

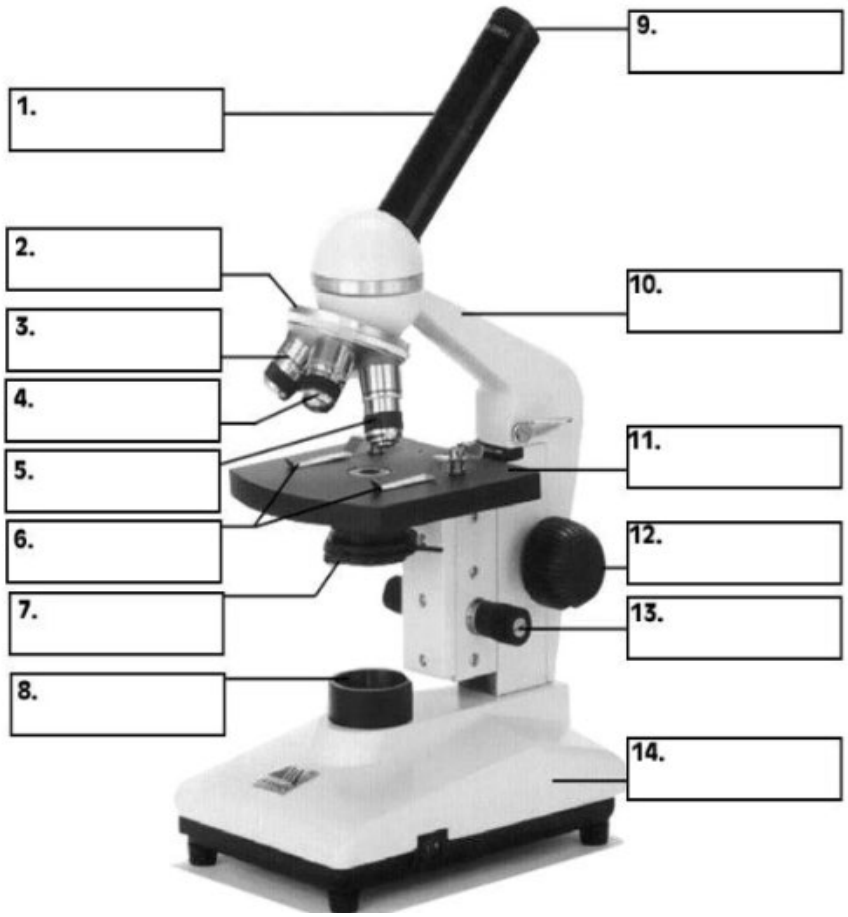
**3.** Draw lines from the labels above to the cells. **Watch out! Not all the cells have all those organelles!**

**3** Draw lines from the parts of cells to their functions as listed below. The first one has been done.

| PART OF CELL | FUNCTION |
|---|---|
| Cell surface membrane | Tells the cell what to do. |
| Chloroplasts | Keeps the cell together and controls what goes into and out of the cell. |
| Nucleus | A jelly-like substance. Many of the cell's activities happen here. |
| Cell wall | A storage space filled with cell sap. |
| Cytoplasm | Green discs that allow the plant to make food by photosynthesis. |
| Vacuole | Supports the cell. |

# 7B 2c The Microscope

**1** Label the parts using words from the box.




coarse focus
eyepiece lens
fine focus
light source
objective lens
stage
body tube
base
arm
nose piece
condenser
stage clips

**2** Complete the sentences;

a) We use a microscope to make objects look _____ (larger / smaller).

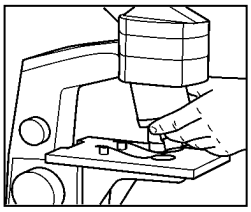
b) Why do we need a mirror or a light when using a microscope?

_____

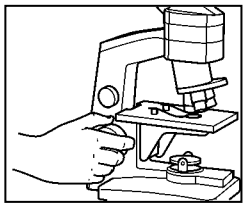
c) How do you calculate the magnification of a microscope?

_____

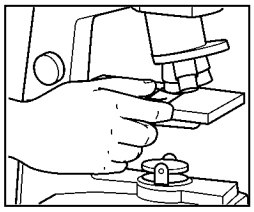
# 7B 2d Using a Microscope – the basics



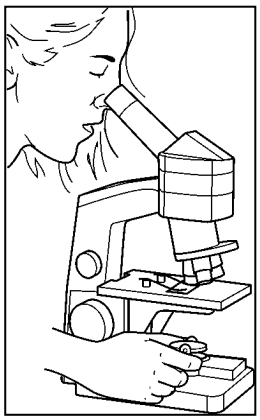
**1** Put the smallest **objective lens** so that it is over the hole in the **stage**.



**2** Turn the **coarse focusing wheel** to make the gap between the **stage** and the **objective lens** as small as possible.



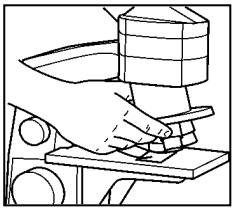
**3** Place a **slide** on the **stage** and place the clips on the **slide** to hold it in place.



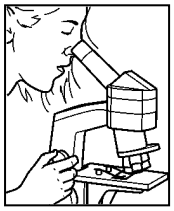
**4** Adjust the **light source**. Either turn on the lamp or turn your mirror so that light is reflected up into the hole in the stage. *Never* point the mirror directly at the Sun. This can permanently damage your eyesight.

**5** Look into the **eyepiece lens**. It is best to look down your microscope with both eyes open! If you do this your eyes will not get tired and you will see more.

**6** Turn the **coarse focusing wheel** so that the gap between the **stage** and the **objective lens** gets bigger. Keep turning until what you see is clear (**in focus**).



**7** To see a bigger image, place the next largest **objective lens** over your **specimen**.



**8** Look down the microscope again and turn the **fine focusing wheel** a small amount one way to get your **image in focus** again. If this doesn't work, turn the **fine focusing wheel** a small amount the other way. Do *not* use the coarse focusing wheel. If you can't see anything, go back to a lower **magnification**.

## Looking after the microscope

- Always cover it up once you have used it. The glass in the lenses scratches easily – even dust will scratch it!
- Always use the 'fine focusing wheel' with the larger objective lenses, otherwise you may break your slide and damage the objective lens.
- Always place the smallest objective lens over the hole in the stage when changing slides.
- Always carry the microscope in two hands.
- Always carry the microscope upright or the eyepiece lens can fall out and break.

# 7B 2e Inside Cells – Extension

The modern microscope was invented in about 1590 by a Dutch spectacles maker called Zacharias Janssen. Since that time the microscope has helped scientists to discover what plants and animals are made up of and how cells work. A light microscope, like the ones most often used, can magnify things up to about x1500. Electron microscopes can magnify things up to about x1,500,000.

Using electron microscopes, scientists have been able to see what cytoplasm is made up of. It's not just jelly! It contains lots of very small parts called **organelles**. One of these organelles is the **mitochondrion**. Respiration happens inside the mitochondria. Other organelles are used to make new chemicals.

To measure the sizes of very small things, scientists have to use units that are smaller than millimetres. A **micrometre** (written 'µm') is 1/1000th of a millimetre; that is
1 µm = 0.001 µm. Animal cells are generally between 10 and 30 µm wide and plant cells are between 10 and 100 µm.

1 What sort of microscopes are most often used in schools and universities?

2 What would be the best type of microscope to use to look at:

**a** whole water fleas which are 3 mm long

**b** cell membranes?

3 Where are 'organelles' found?

**4 a** Name one type of 'organelle'.

**b** Say what this organelle does in the cell.

**5** **a** How big is 1 mm in micrometres?

**b** What is the symbol for a micrometre?

**6** In millimetres, what range of sizes do animal cells come in?

**7** If a cell which is 20 µm wide is looked at with a magnification of x1500, how wide will it appear to be? Give your answer in the most convenient units.

# 7B 2f Microscope and Cells - Summary

**1** Here are some instructions on using a microscope. Put the number '1' next to the instruction you should do first. Put the number '2' next to the instruction you should do next and so on.

| | |
|---|---|
| | Look into the eyepiece lens. |
| | Place the smallest objective lens directly above the stage. |
| | Place the slide on the stage. |
| | Turn the coarse focusing wheel until the slide comes into focus. |
| | Turn the coarse focusing wheel to move the objective lens as close to the stage as possible. |
| | Adjust the light source. |

**2** Fill in the missing words in the sentences below. Use the words in the box.

| **eyepiece** | **magnified** | **microscope** | **objective** | **slide** | **specimen** |
|---|---|---|---|---|---|

Cells need to be _____ to be seen clearly. We can use a _____ to do this. When using a microscope, the thing we are looking at is called the _____.

It is placed on a piece of glass called a _____.

The lens of the microscope that is closest to the object we want to look at is called the _____ lens. The other lens is the _____ lens.

**3** Each of the following sentences has at least one mistake in it. Rewrite each, correcting the mistakes.

**a** The vacuole contains a substance called cytoplasm

**b** Animal cells have a cell wall, a nucleus and cytoplasm.

**c** Chloroform is a green substance found in chloroplasts.

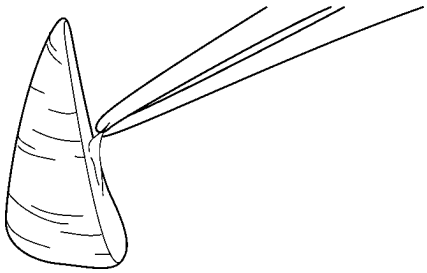
**d** Microscopes have two lenses, the eyepiece lens and the objective lens.

**e** The magnification of a microscope is worked out by adding the magnifying power of the two lenses together.

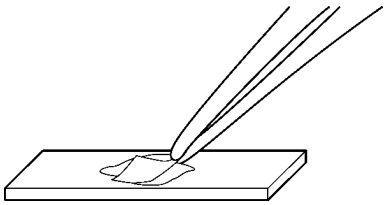
**4** You are given a microscope which has three objective lenses: x4, x10 and x40. The microscope has eyepiece lenses: x10. Make a table like the one below to show all the possible magnifications you could get.

| **Magnification of eyepiece lens** | **Magnification of objective lens** | **Total magnification** |
|---|---|---|
| x10 | x4 | x40 |
| | | |
| | | |

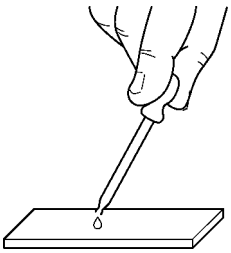
# 7B 3a Making a Slide of Onion Cells



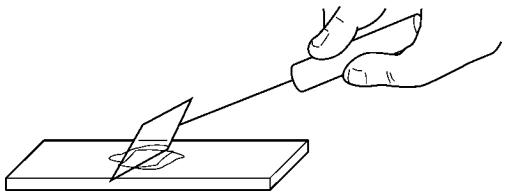
**1** Using some forceps, a scalpel or your fingernails, peel off a thin layer of onion cells. Remember – the sample needs to be thin otherwise light will not go through it and you will not see anything.



**2** Place your sample (your **specimen**) onto the middle of your slide.



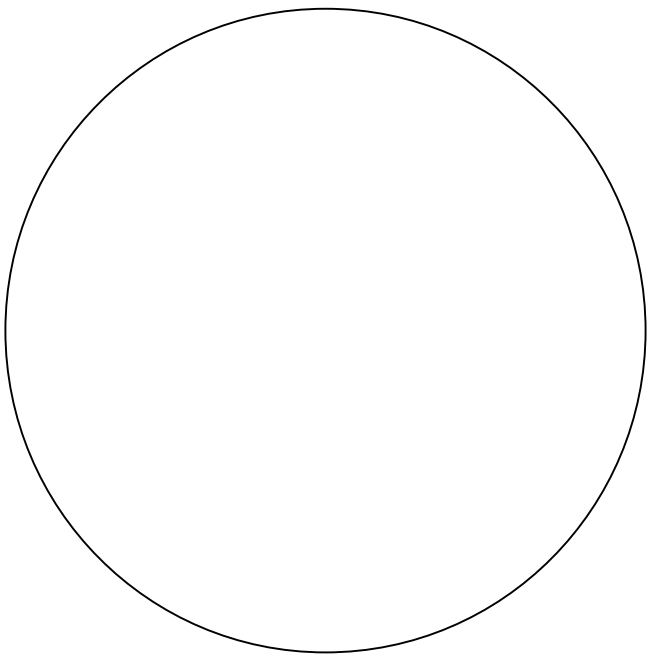
**3** Add a drop of iodine solution to your sample. The iodine solution is a **stain** to make the cells more visible.



**4** Lower a coverslip onto your specimen using a mounted needle. If you do this carefully and slowly you will not get any air bubbles.

**Results:** Draw what you see in the space here.

Try and label the **cell walls** and the **nucleus** and the **large vacuole**.



**Conclusion/Analysis**

**1** What does a stain do?

**2** Why do we use coverslips?

**3** Why is the coverslip lowered gently using a mounted needle?

**4** What things should you do to stay safe while preparing a slide?

**5.** From the next set of sentences, circle the three that are the reasons we use a coverslip.

**a** To flatten the specimen.

**b** To stain the specimen.

**c** To magnify the specimen.

**d** To hold the specimen in place.

**e** To stop the specimen drying out.

**f** To heat up the specimen.

ans:

# 7B 3b Observing Cheek Cells

All living things are made of cells. You are made up of many millions of cells. Cells are very small, so small you cannot see them with your naked eye. Instead we use a microscope to observe cells. You are going to see some cells using a light microscope.

**THINK ABOUT**

- How do you prepare cells to see them through a microscope?
- How do you focus a microscope safely to see cells?
- How do you draw what you see under a microscope?
- How can you measure what you see under a microscope?

**TASK**

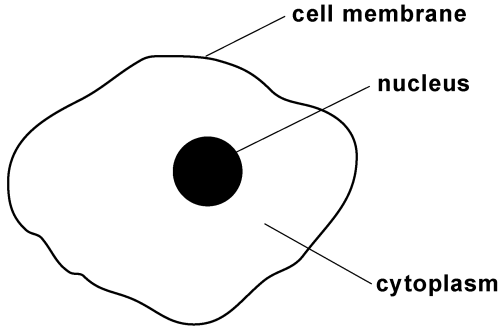
Your teacher will show you how to prepare a slide carefully and use a microscope to observe some cells. Focus your microscope at low and high magnification carefully and draw what you can see. Draw a diagram carefully using the tips below.

(total magnification = magnification of eye piece x magnification of objective lens)

**Tips for microscope drawings:**

- Use a sharp pencil on plain paper.
- Decide which part of the image you want to draw.
- Use continuous lines to draw your diagram; do not sketch.
- Label the parts of the image you can identify.
- Write a title for your diagram, stating the name of the cell.
- Write down the magnification at which you observed the cell.

**A human cheek cell**



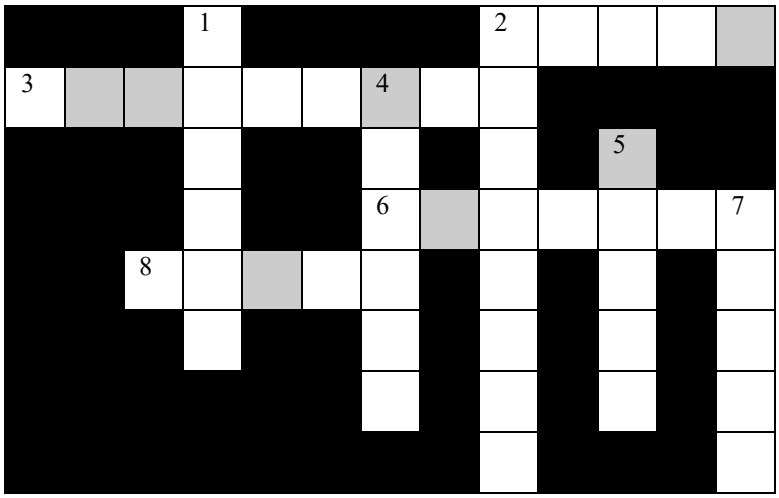

magnification x 100

**KEY WORDS**

cell, cell membrane, cell wall, cover slip, focus, lens, magnification, magnify, microscope, slide, stain, cytoplasm, eyepiece, objective, nucleus, vacuole

# 7B 3c Microscope Crossword

**1** Using the clues below, fill in this crossword.



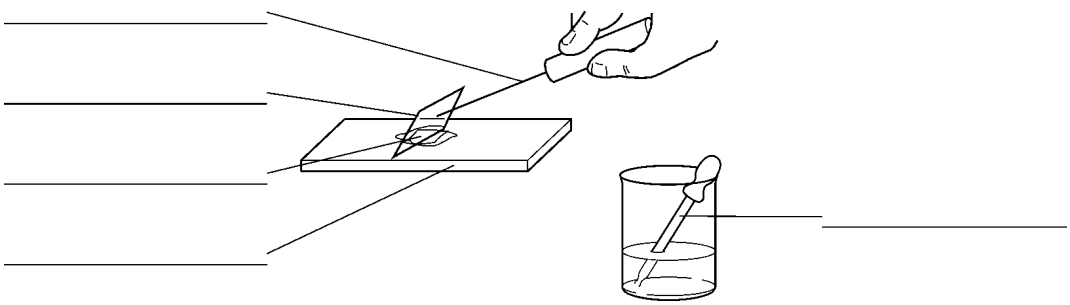
| **Across** | **Down** |
|---|---|
| **2** The specimen is put on this. | **1** We should lower a coverslip using a mounted. . |
| **3** The thin piece of glass put on top of the specimen. | **2** What we look at using a microscope. |
| **6** All cells have one of these. | **4** A microscope has two of these. |
| **8** Slides and coverslips are made of this. | **5** All living things are made of these. |
| | **7** Part of a theatre and part of a microscope. |

**2** From the crossword, write down the letters in the shaded squares. Now rearrange these letters to make a word. The word is something that all plant cells have.

The word is ☐

**3** Look at the diagram below. It shows somebody making a slide. Label the parts on the diagram using the words in the box.

| **coverslip** | **mounted needle** | **pipette** | **slide** | **specimen** |
|---|---|---|---|---|



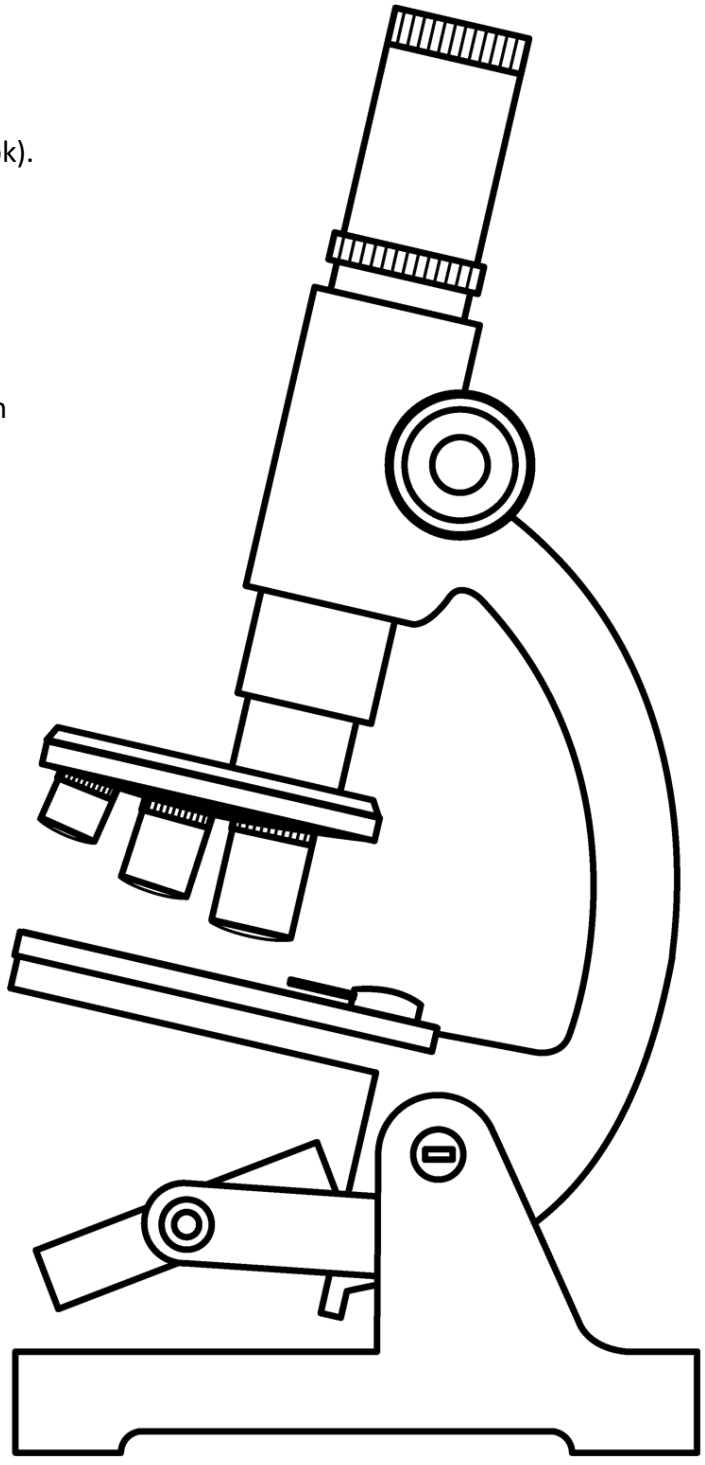
# 7B 3d Making A Poster of a Cell

Imagine the Science Museum has asked you to make a poster of a cell for a display. Make a POSTER of **one** of the following:

- an animal cell
- a plant cell
- a specialised cell (research in the text book).

Use the key words below to label each part of the cell clearly. Make an information card, perhaps using a key, to describe what cells are and the structures they contain. Include the function of the different structures.

Your teacher may ask you to give a short presentation about your model.



**KEY WORDS**

cell, cell membrane, cell wall, chloroplast, cytoplasm, nucleus, mitochondria , vacuole

# 7B 4a Specialized Animal Cells

**1** Fill in the missing words in the sentences below. Use the words from the box. Each word can be used more than once.

| |
|---|
| **adapted** |
| **move** |
| **muscle** |
| **tissue** |

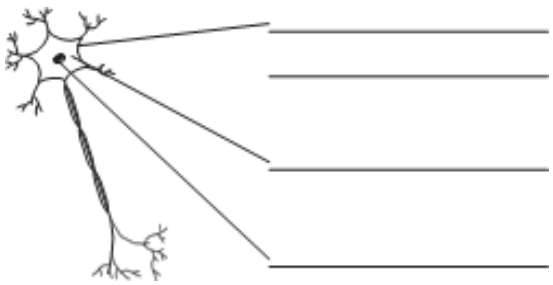
**a** Some cells have special jobs to do. They often have special shapes to help them with their function. We say that these cells are _____ for their function.

**b** A group of the same type of cells, all working together, is called a _____

**c** A group of **muscle cells** all grouped together is called _____

Muscle cells help us to _____

**2** Here is a drawing of a **nerve cell**.



**a** Write in the words **cell surface membrane**, **cytoplasm** and **nucleus** on the correct lines.

**b** How is its shape adapted to carry messages around the body?

**3** Here is a drawing of a **ciliated epithelial cell**.
How is it adapted to remove dirt from the lungs?

Adapted from Exploring Science for QCA © Pearson Education Limited 2002

# 7B 4b Specialized Plant Cells

1 Fill in the missing words in the sentences below.

Use the words from the box.

| |
|---|
| **hair** |
| **root** |
| **tissue** |
| **xylem** |

Plants have some specialized cells.

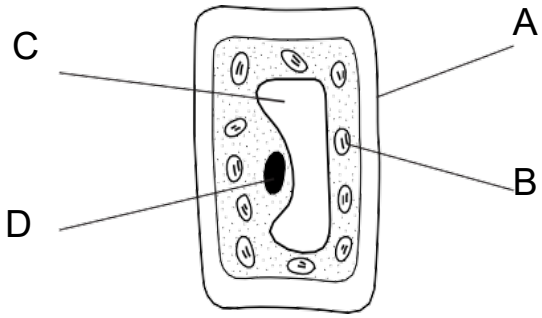
**a** Some cells help to carry water around the plant.
Theses are called ☐ cells.

**b** Some plant cells help to take water out of the ground.
Theses are called ☐ cells.

**c** A group of the same type of cells, all working together,
is called a ☐

**2** Here is a palisade cell.
Palisade cells are in the upper parts of the leaves.
It helps the plant to make food.
Which part of the cell does this?

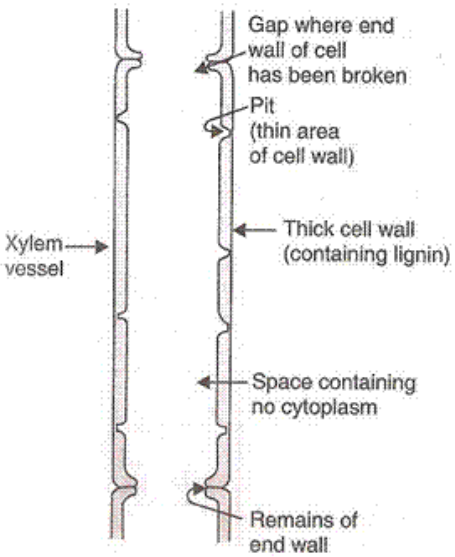
☐




**3** Here is a xylem cell.

Which feature of the cell helps it
carry water around the plant?

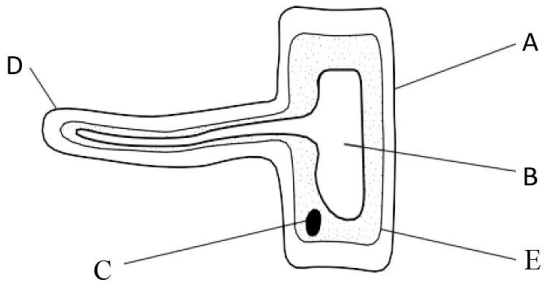
☐




The structure of xylem vessels

**4** Here is a root hair cell.

**a** Which part of the cell helps it do its job?




**b** In this drawing, what are the names of the parts labelled A, B and C?

**i** A is the _____

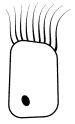
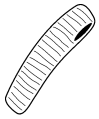
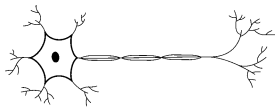
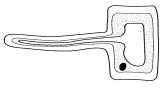
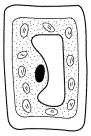
**ii** B is the _____

**iii** C is the _____

# 7B 4c Specialized Cells

Cells are different shapes because they do different jobs.

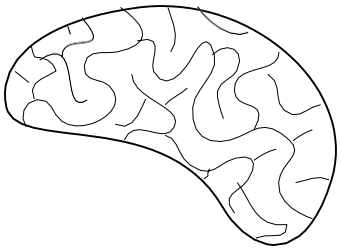
Match up the picture with the name of the cell and its job.

| cell | name | job |
|---|---|---|
|  | muscle cell | strands wave about to move things |
|  | root hair cell | it can change length |
|  | cell with cilia | it takes water from the soil |
|  | palisade leaf cell | it carries messages |
|  | nerve cell | it has lots of chloroplasts to help the plant make food |

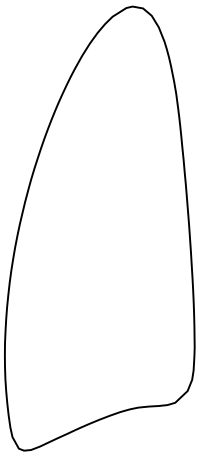
# 7B 4d Human Organs (1)



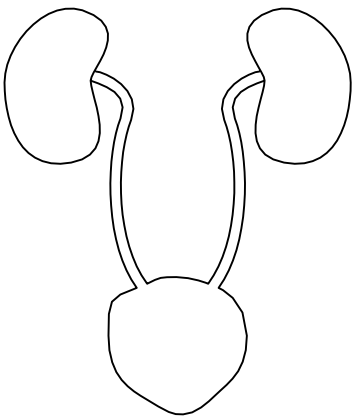
1



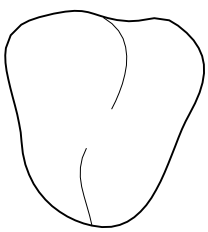
2



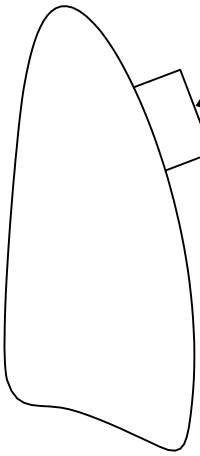
3



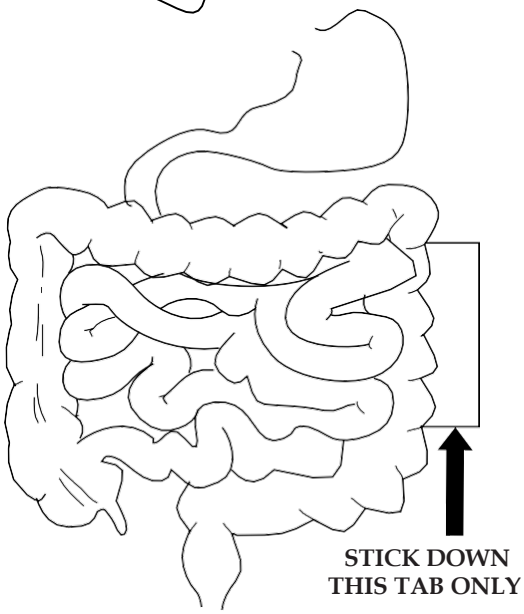
4



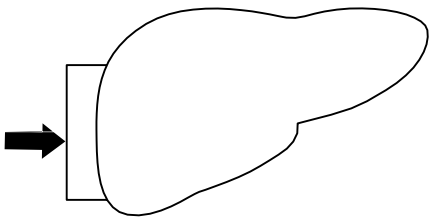
5




6




7

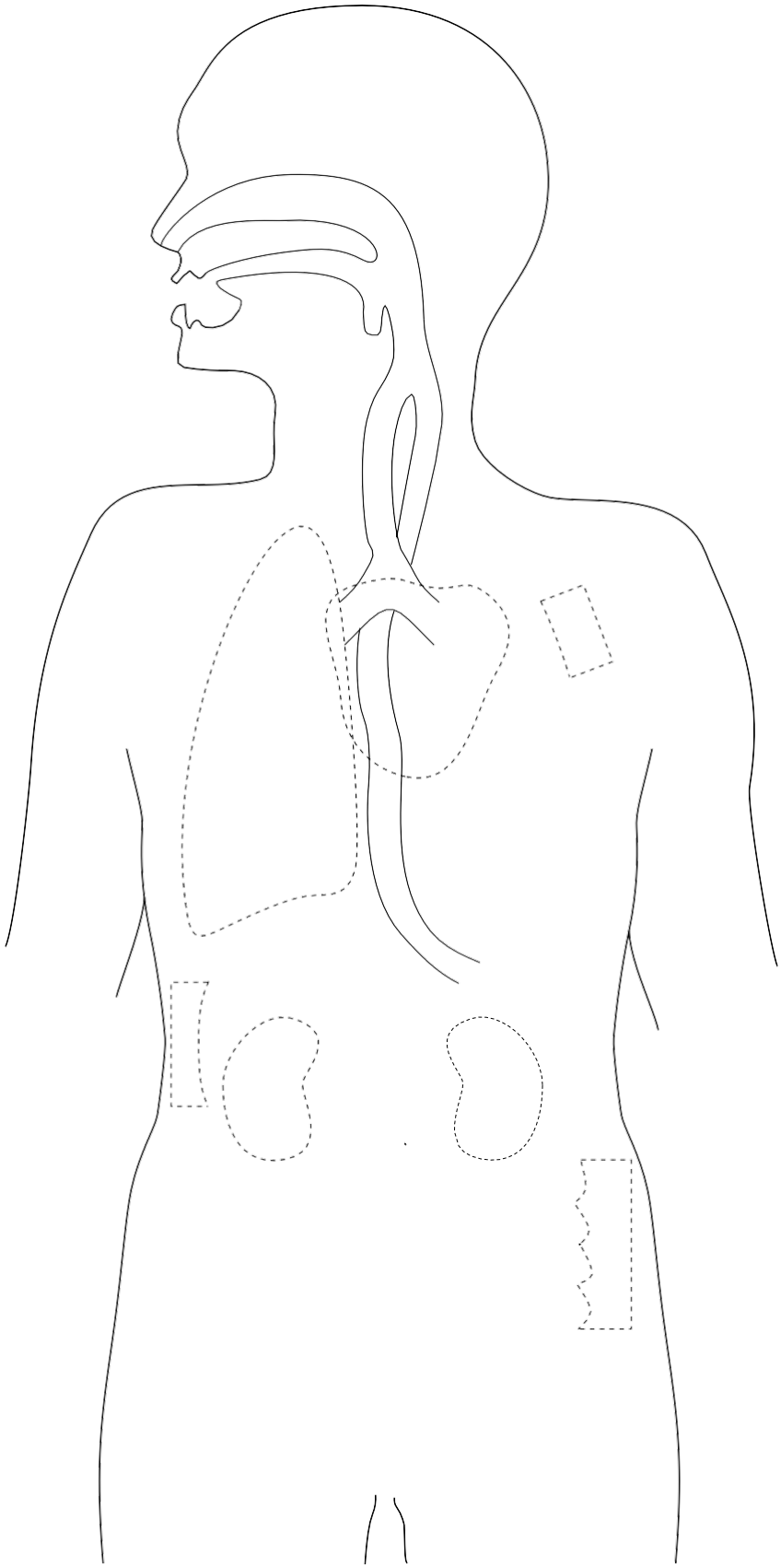



Cut out and stick the organs on the human outline on the next page. Stick them on in order. Some have tabs that you need to cut around – do not cut these off!

Adapted from Exploring Science for QCA

© Pearson Education Limited 2002

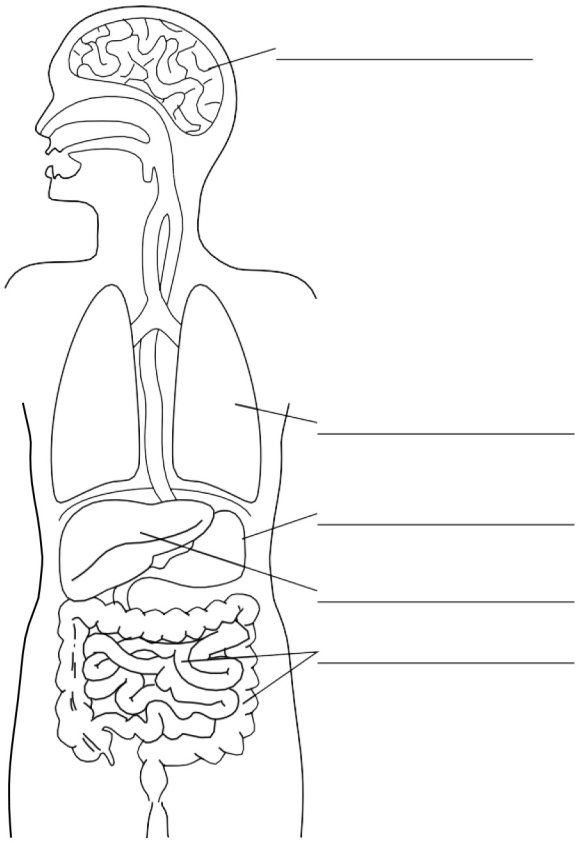
# 7B 4d Human Organs (2)



# 7B 4e Where the organs are

**1** On the diagrams below,
write the names of the organs on the lines provided.
Use the words from the box.

| |
|---|
| **Brain intestines** |
| **Leaf liver lung** |
| **Root stem stomach** |



**2** On the diagram of the human, draw in the position of the heart.

**3** Select two of the human organs and explain what they do.

a:

b:

**4** Select two of the plant organs and explain what they do.

a:

b:

# 7B 4f Organ Systems

**1** Fill in the correct word in each of the sentences.
Use the words in the box.

| |
|---|
| **circulatory** |
| **digestive leaves** |
| **nervous** |
| **photosynthesis** |
| **roots** |
| **stem** |
| **system** |

**a** A group of organs working together is called an organ _____

**b** Plants take water in through their _____. The water travels up the _____. Some of the water is used to make food using _____

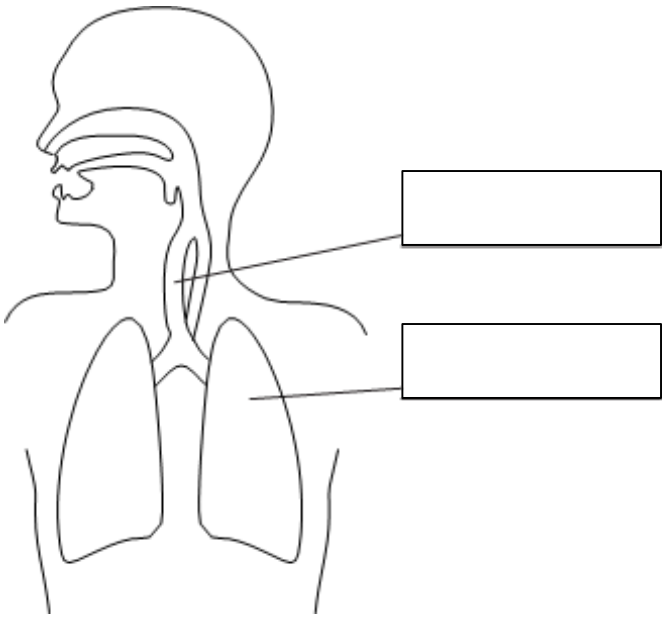
A lot of the water is lost by the _____

**c** food is digested in the _____ system.

**d** The heart is part of the _____ system.

**e** The brain is part of the _____ system.

**2** On the diagram below, label the parts of the breathing system.




© Pearson Education Limited 2002

# 7B 5a Levels of Organization Review

- Look at the levels next to the questions and decide where you should start.
  If you know the answers to your target level questions, move on to the next level.

- ❑ Write a cell organisation paragraph using these keywords: work, cells, heart, together, tissue, organ. organ system

- ❑ Define cell, tissue and organ
- ❑ Draw and label the organs onto the body in the correct positions

- ❑ Draw and label the organs onto the body in the correct positions
- ❑ Write down their functions
- ❑ Understand which systems are necessary for life and which continue life

**Low**

- **Recall** the difference between cell, tissue and organ, organ system.

**Mid**

- **Research** the roles and components of various organ systems.

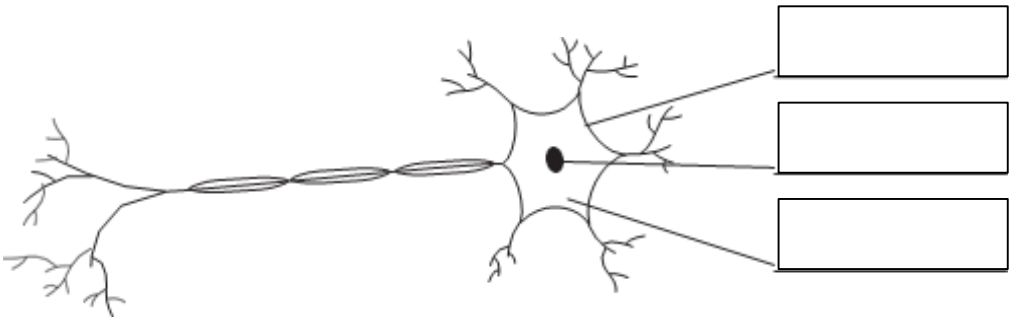
**High**

- **Describe** the position and functions of various organs within our body.

**Key Words** - Tissue, organ, organ system, cell

# 7B 5b Cells, Organs & Organ Systems Revision

**1 a** Label the parts of this cell.



**b** Which type of **tissue** does this cell form?

**c** Which **organ** might this tissue be found in

**d** Which **organ system** would this organ be found in?

**2** Name the organ system which:

**a** carries oxygen and food around the body?

**b** breaks down food?

**c** takes oxygen out of the air?

**3** In the following sentences, ***one*** organ is not correct. Put a cross through the wrong organ and write the name of the correct one in the space.

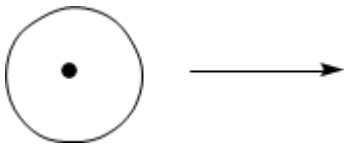
**a** The breathing system contains the lungs and intestine.

**b** The nervous system contains the brain and the little toe.

**c** The circulatory system contains the liver and blood vessels

**4** The drawing shows an animal cell.

**a** Draw two or three more diagrams to show the steps taken when this cell splits into two.



**b** What is the name of this process?

**c** What are the two new cells called?

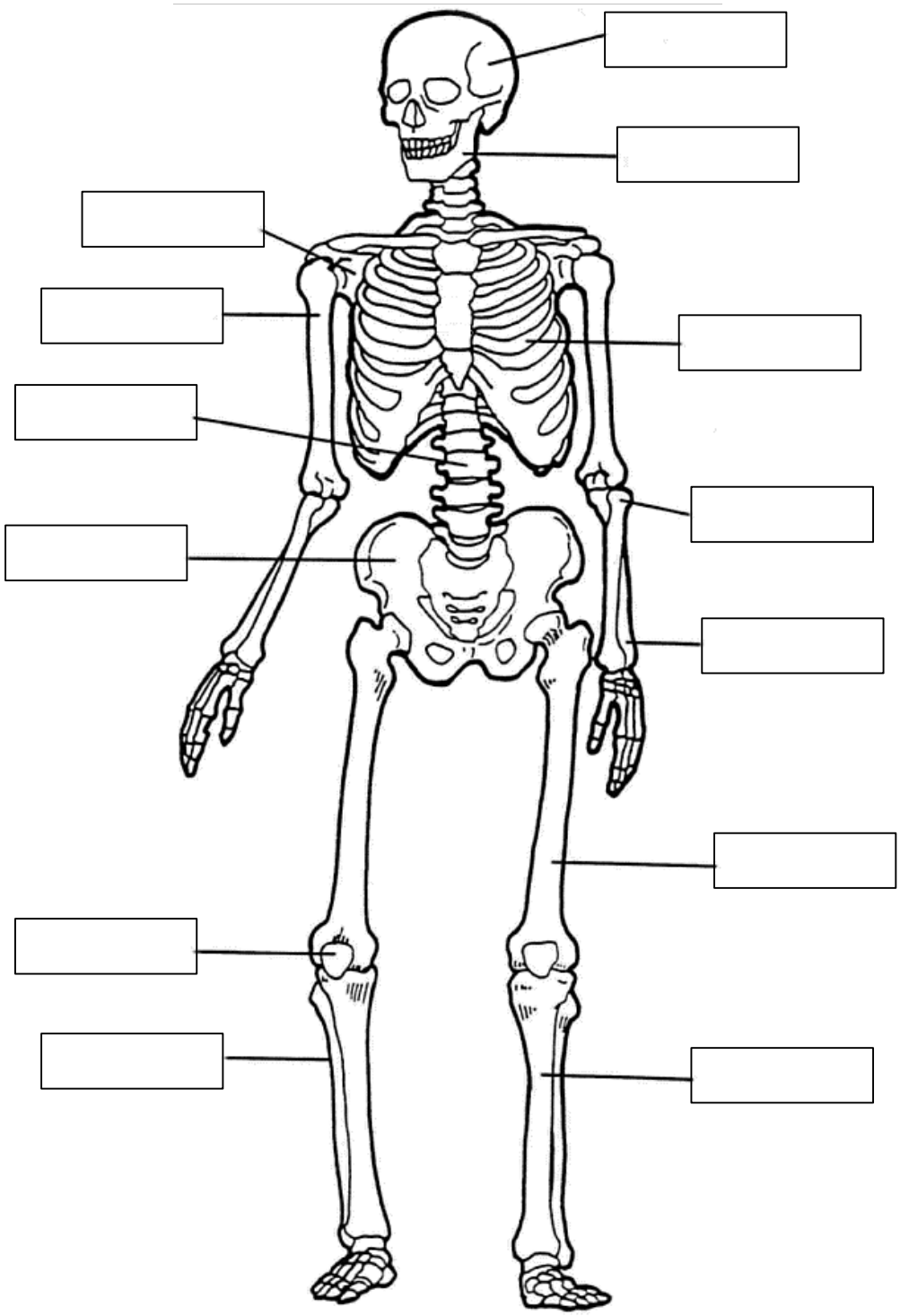
# 7B5c The Skeletal System

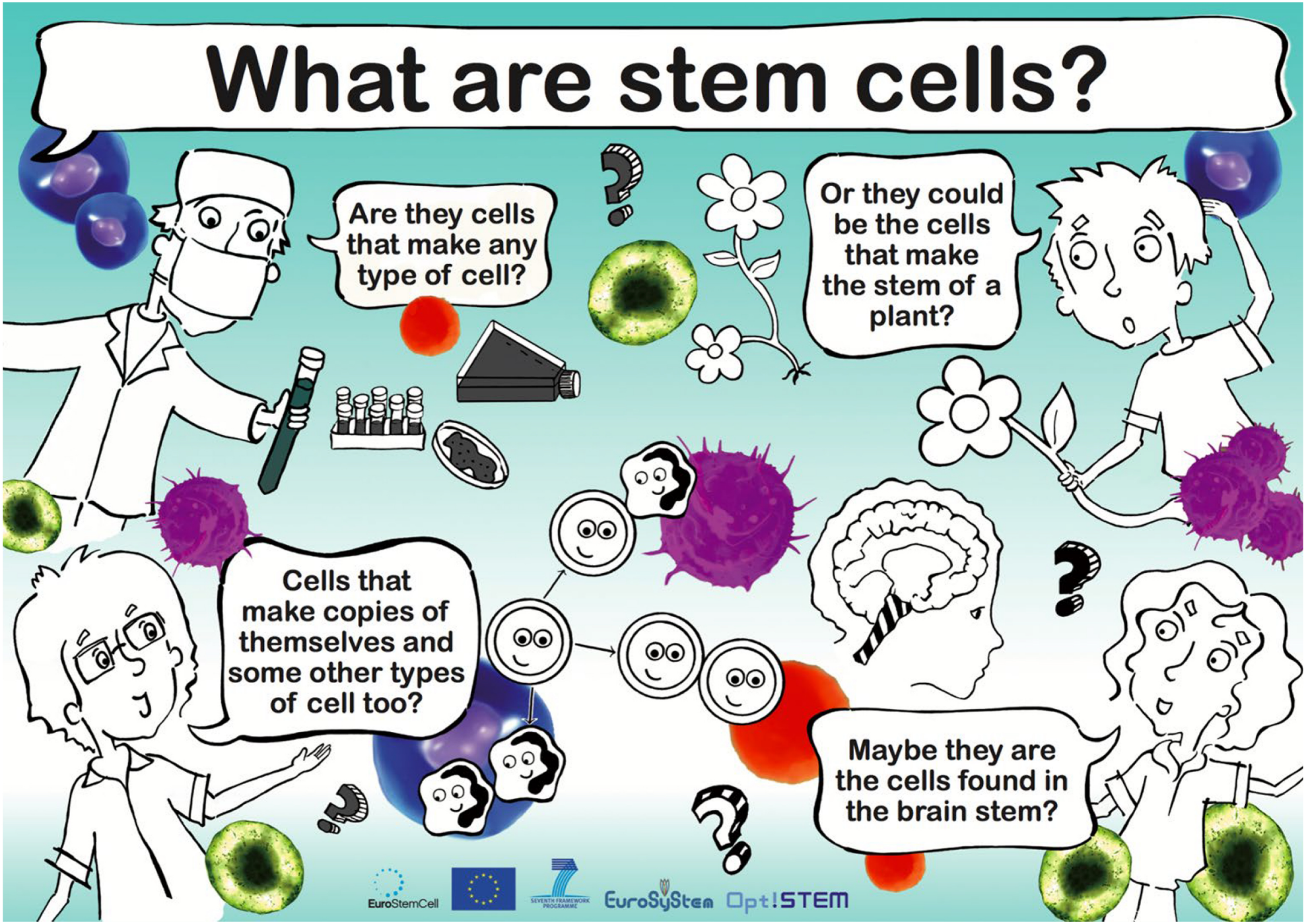
Use the bone names below to label the human skeleton.

**Tibia** **Pelvis** **Skull** **Scapula (shoulder)**

**Spine (back)** **Humerus** **Patella (knee)** **Fibula**

**Radius** **Ulna** **Ribs** **Mandible** **Femur**




What are stem cells?
Are they cells that make any type of cell?
Or they could be the cells that make the stem of a plant?
Cells that make copies of themselves and some other types of cell too?
Maybe they are the cells found in the brain stem?
EuroStemCell
SEVENTH FRAMEWORK PROGRAMME
EuroSyStem
Opt!STEM

# What is a stem cell?

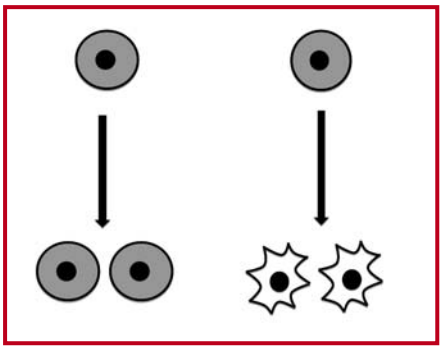
11-14 worksheet
**All about stem cells**

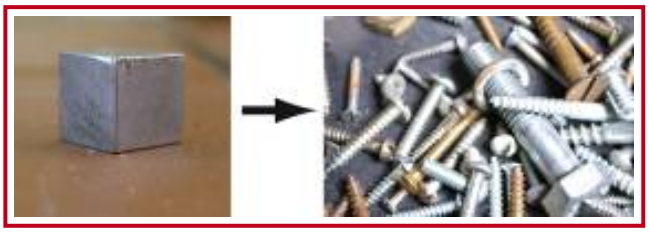
## What stem cells can do

Stem cells can _____

AND _____

Differentiation = _____





## Your body needs stem cells

Stem cells make new, healthy cells to

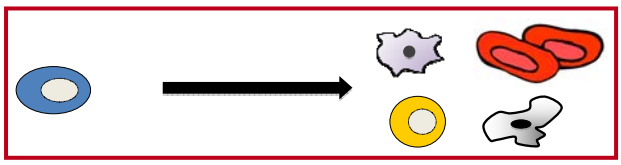
_____

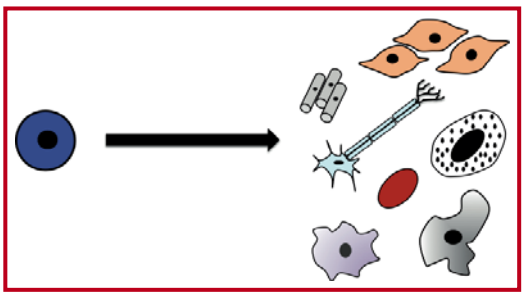
Some cells in your body are replaced a lot.
Red blood cells only live for about

_____

Stem cells also _____
so that your body never runs out of stem cells.

## Two kinds of stem cells





_____

can make ALL types of cell in your body

_____

can make a few types of specialized cells

EuroStemCell

Screws: JM http://www.logodesignweb.com/stockphoto
Blood cells: David Gregory and Debbie Marshall / Wellcome Images

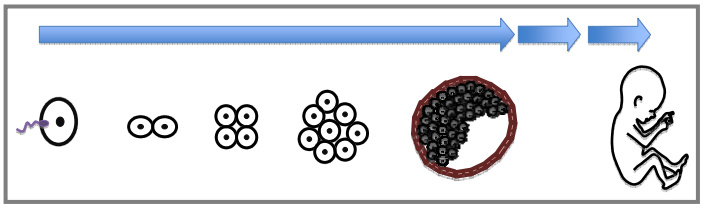
# Where do embryonic stem cells come from?



## Embryonic stem cells and human development

A sperm fertilizes an egg.

The fertilized egg _____
to make 2 cells, then 4 cells, then 8…



A _____ is a ball of about 100 cells.

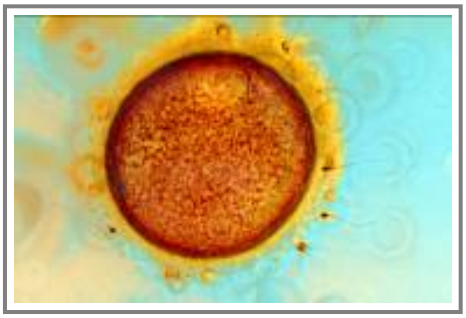
Embryonic stem cells come from the _____

## IVF and stem cells

IVF stands for _____

It is used to make embryos for people who cannot _____ easily.

Sometimes the mother and father let scientists use some of the embryos for stem cell research.



## Scientists grow cells in the laboratory

Some cells are put in a flask with the food they need.

The cells _____

Scientists can grow a lot of cells like this.

Growing lots of cells in the laboratory is called

_____

EuroStemCell

Blastocyst: Yorgos Nikas/Wellcome Images ; Egg and sperm: Spike Walker/ Wellcome Images
Flask: Wellcome library, London

# Why bother with stem cells?

11-14 worksheet
All about stem cells

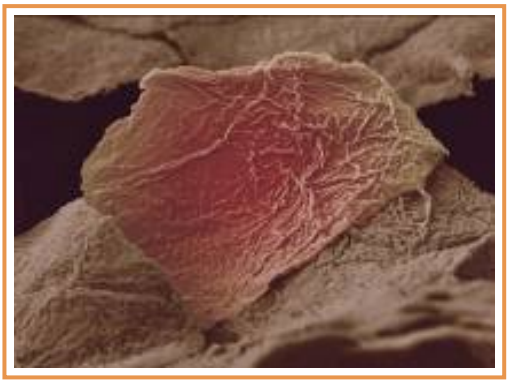
## Treating patients

Stem cells are used to grow new skin for people with bad burns. To do this we:

1. _____

2. _____

3. _____



In the future, we might use stem cells to

_____

## Understanding disease

Scientists could use stem cells to learn about diseases that are caused by

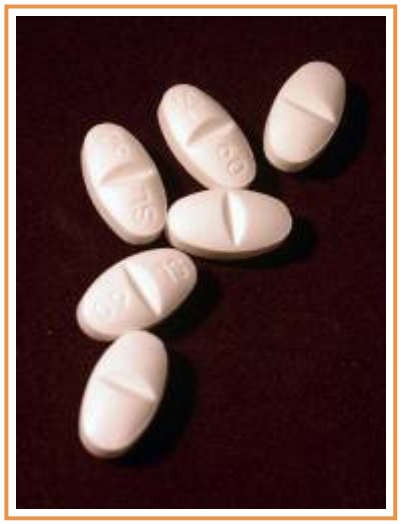
_____

They could:

- Grow specialized cells from the stem cells, for example _____
- Investigate _____

_____

## Testing drugs



Stem cells could be used to test new medicines(drugs).

Scientists would:

- Use stem cells to grow a lot of _____ cells, e.g. nerve cells, blood cells or liver cells.
- Find out what the new drugs do to these cells.

EuroStemCell

Pills: Julie Reza / Wellcome library; Burned skin: Anne Weston / Wellcome Images

# Making stem cells

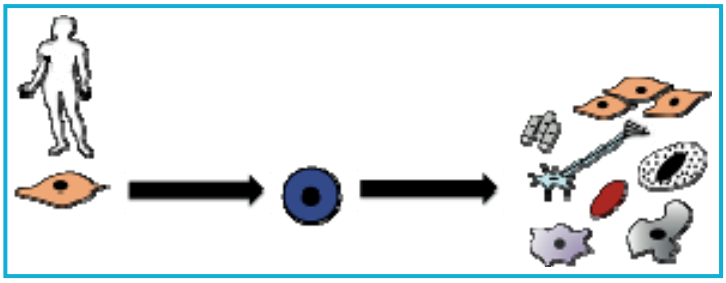


## Turning skin cells into stem cells

iPS stands for

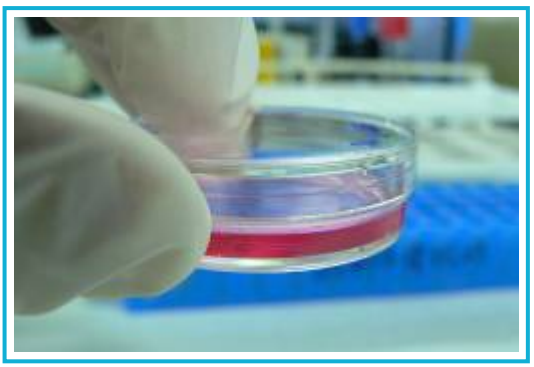
_____

iPS cells are pluripotent. That means they can make _____



iPS cells are made by adding _____ to specialized cells such as skin cells.

The process used to make iPS cells is called genetic _____



## iPS cells in medicine

iPS cells might be used to treat diseases such as

_____

Scientists would take skin cells from the patient and use them to make iPS cells.

Then they would use the iPS cells to grow

_____

for the patient.

EuroStemCell

Petri dish: Kaibara87: http://www.flickr.com/photos/34745138@N00/3075268200
Injection: Wellcome library, London

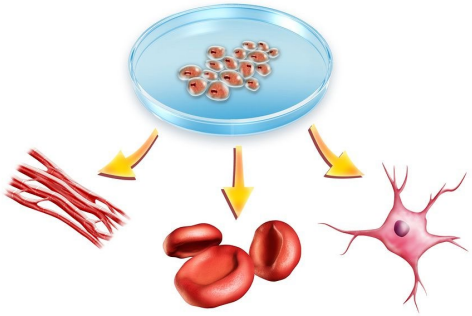
# 7B6/7a Stem Cells Assessment Task Research Template

| Questions | Notes |
|---|---|
| **What is a stem cell?**<br>1. What is a stem cell?<br>(Hint: Explain what 2 things stem cells can do.)<br>2. Why do our bodies need stem cells?<br>3. What different kinds of stem cells are there?<br>(Hint: Name 2 kinds of stem cell and explain what each kind can do.) | |
| **Where do embryonic stem cells come from?**<br>4. Where are embryonic stem cells found?<br>(Hint: Think about the stages of human development.)<br>5. Where can scientists get embryonic stem cells for research? | |
| **Why are stem cells useful?**<br>6. How are stem cells used to treat patients now?<br>7. How might stem cells be used to treat patients in the future?<br>8. How else could stem cells be used?<br>(Hint: Give 2 ways that are described in the information you have been given. You can add more ideas of your own if you wish.)<br>9. Why might some people object to using stem cells?<br>(Hint: You could consider different viewpoints based on culture, religion, background, personal opinions. You could also think about where they come from and the risks of using them. | |
| **Making stem cells (hardest)**<br>10. What is an iPS cell?<br>(Hint: Explain how iPS cells are made and what they can do. What other kind of stem cell are they like?)<br>11. How could iPS cells be used? | |
| **Additional notes/diagrams** | |

**MYP 1: Year 7 Science**

**Criterion D Assessment**

**Reflecting on the Impacts of Science**



| | |
|---|---|
| **UNIT:** | Cells and Reproduction |
| **ASSESSMENT TITLE:** | Stem Cells Explainer Clip |
| **Statement of Inquiry:** | Can we use advances in medicine and technology to improve the way organs and organs systems function? |
| **Key Concept:** | Systems |
| **Related Concepts:** | Consequences, Function |
| **ATL Focus:** | **ATL: CRITICAL THINKING SKILLS, Analysing and evaluating issues and ideas**<br>● Consider ideas from multiple perspectives<br>● Develop contrary or opposing arguments |
| **Key Scientific Vocabulary:** | stem cells, tissue, unspecialised, specialised, pluripotent, embryonic, progenitor |

# Reflecting on the use of stem cells

## Assignment Instructions (GRASPS)

| | |
|---|---|
| **G**oal | Your goal is to provide information on stem cell therapy. This is being used to treat some diseases, but there is still a lot of research going on to investigate their full potential. |
| **R**ole | You work for the Hospital Authority. You are responsible for producing patient information literature. |
| **A**udience | Individuals (and their families) who are interested in or considering using stem cell technology. |
| **S**ituation | Different stem cell therapies are becoming more common. Before individuals decide to use this therapy, they need to be informed on how it works and the positive and negative impacts associated. In particular, you should focus on the different types of stem cells (adult/tissue and embryonic stem cells) and their pros and cons. |
| **P**roduct | You will produce a short video of you presenting a slideshow on stem cells. This would be shown in a hospital or clinic. |
| **S**uccess Criteria for Assessment | The leaflet should be 2 sides of A4 and include: (these get harder as you move down the list)<br><br>**What is a stem cell?**<br>1. What is a stem cell?<br>(Hint: Explain what 2 things stem cells can do.)<br>2. Why do our bodies need stem cells?<br>3. What different kinds of stem cells are there?<br>(Hint: Name 2 kinds of stem cell and explain what each kind can do.)<br><br>**Where do embryonic stem cells come from?**<br>4. Where are embryonic stem cells found?<br>(Hint: Think about the stages of human development.)<br>5. Where can scientists get embryonic stem cells for research?<br><br>**Why are stem cells useful?**<br>6. How are stem cells used to treat patients now?<br>7. How might stem cells be used to treat patients in the future?<br>8. How else could stem cells be used?<br>(Hint: Give 2 ways that are described in the information you have been given. You can add more ideas of your own if you wish.)<br>9. Why might some people object to using stem cells?<br>(Hint: You could consider different viewpoints based on culture, religion, background, personal opinions. You could also think about where they come from and the risks of using them.<br><br>**Making stem cells (hardest)**<br>10. What is an iPS cell?<br>(Hint: Explain how iPS cells are made and what they can do. What other kind of stem cell are they like?)<br>11. How could iPS cells be used?<br>Source: www.eurostemcell.org<br><br>Write clearly and concisely. Scientific key language should be used accurately. The leaflet needs to include a clear bibliography, with at least five sources cited for the top marking bank.. |

## Key Scientific Vocabulary / Definitions:

| | **MYP definition on top**<br>**Our definition**<br>**underneath** |
|---|---|
| **Apply** | MYP definition: Use knowledge and understanding in response to a given situation or real circumstance.<br><br>Our definition: Use what you already know in a new and/or different situation. |
| **Cultural** | MYP definition: Patterns of knowledge, behavior, beliefs, shared attitudes, values, goals and practices that characterize groups of people<br><br>Our definition: The shared beliefs and values of different groups of people. |
| **Describe** | MYP definition: Give a detailed account or picture of a situation, event, pattern or process.<br><br>Our definition: Tell how something happened (i.e. “first this, then that, then the next thing”). In experiments, identify the minimum and maximum values of data in experimental results and recount the overall trends between variables. |
| **Discuss** | MYP definition: Offer a considered and balanced review that includes a range of arguments, factors or hypotheses. Opinions or conclusions should be presented clearly and supported by appropriate evidence.<br><br>Our definition: Look at both sides of an argument or an issue, weighing the strengths and limitations of each side. Conclusions should be based on scientific evidence. |
| **Document** | MYP definition: Credit sources of information used by referencing or citing, following the MLA system. References should be included in the text and also at the end of the piece of work in a bibliography.<br><br>Our definition: Use in-text references and a bibliography to show where you found the ideas and information in a piece of work. |
| **Economic** | MYP definition: Production, distribution, and use of income, wealth, and commodities<br><br>Our definition: Anything having to do with money, either personally or as a society |
| **Environmental** | MYP definition: Circumstances, objects, or conditions by which one is surrounded<br><br>Our definition: Our surroundings, particularly the natural (not built) world |
| **Ethical** | MYP definition: Process of rational inquiry to decide on issues as right or wrong, as applied to the people and their actions<br><br>Our definition: Determining whether or not an action is right or wrong |

| | |
|---|---|
| **Evaluate** | MYP definition: Make an appraisal by weighing the strengths versus the limitations.<br><br>Our definition: Look at how well something worked, whether it's a hypothesis, method, or collection of information. |
| **Explain** | MYP definition: Give a detailed account.<br><br>Our definition: Tell how and why something happened and justify it with scientific evidence and/or reasons. |
| **Moral** | MYP definition: Principles of right or wrong behaviour derived from a particular society<br><br>Our definition: Relating ethical decisions to culture |
| **Outline** | MYP definition: Give a brief account.<br><br>Our definition: Briefly describe the major points or concepts. |
| **Political** | MYP definition: Relates to government or public affairs<br><br>Our definition: How different groups or countries have power under the law |
| **Social** | MYP definition: Interactions between groups of people involving issues such as welfare, safety, rights, justice or class<br><br>Our definition: The ways in which people interact with one another |
| **Summarize** | MYP definition: Abstract a general theme or major points.<br><br>Our definition: Distill a lot of information down to the key essential points. |

**Level Descriptors and Task Specific Clarifications for Criterion D:**

| Level | Level Descriptor | Task Specific Clarification |
|---|---|---|
| 0 | The student does not reach a standard described by any of the descriptors below. | |
| 1-2 | The student is able to, **with limited success**:<br>i. **state** the ways in which science is used to address a specific problem or issue<br>ii. **state** the implications of using science to solve a specific problem or issue, interacting with a factor<br>iii. **apply** scientific language to communicate understanding<br>iv. document sources. | i. **State** a disease that stem cells could be used to treat.<br>ii. **State** at least **one impact (positive or negative)** that stem cells have on the society, focusing on **one of the factors** (moral, economic, political or cultural), but with inaccuracies.<br>iii. Some **clear and concise language is applied** but this is rare. **Scientific vocabulary** generally not applied.<br>iv. **Limited** source (one source) included in the bibliography, not in any particular format.. |
| 3-4 | The student is able to:<br>i. **State** the ways in which science is used to address a specific problem or issue<br>ii. **State** the implications of using science to solve a specific problem or issue, interacting with a factor<br>iii. **sometimes apply** scientific language to communicate understanding<br>iv. **sometimes** document sources correctly. | i. **State** a disease which could be treated by stem cells. What are the symptoms?<br>ii. **State** at least **one impact (positive or negative)** that stem cells have on the society, focusing on **one of the factors** (moral, economic, political or cultural).<br>iii. Sometimes use **clear and concise language**. S**cientific vocabulary** sometimes applied. Limited **images / graphs** used to illustrate key points.<br>iv. **Some** sources (2 sources) included in the bibliography. |

| Level | Level Descriptor | Task Specific Clarification |
|---|---|---|
| 5-6 | The student is able to:<br>i. **Outline** the ways in which science is used to address a specific problem or issue<br>ii. **Outline** the implications of using science to solve a specific problem or issue, interacting with a factor<br>iii. **usually apply** scientific language to communicate understanding **clearly and precisely**<br>iv. **usually** document sources correctly. | i. **Outline** 2-3 diseases that stem cell therapy could be used to treat. Refer to the different types of stem cells.<br>ii. **Outline** at least **one positive and one negative impact** that stem cells have on society, focusing on **one of the factors** (moral, economic, political or cultural).<br>**Support** these arguments with **evidence**.<br>**Outline** the main ideas and impacts.<br>iii. Usually use **clear and concise language**. S**cientific vocabulary** generally applied.<br>Some **images / graphs** used to illustrate key points.<br>Leaflet is 2 sides of A4.<br>iv. **Adequate** sources (3 sources) included in the bibliography. Sources generally reliable.<br>Bibliography presented in a clear format. |
| 7-8 | The student is able to:<br>i. **Summarize** the ways in which science is applied and used to address a specific problem or issue<br>ii. **Describe and summarize** the implications of using science and its application to solve a specific problem or issue, interacting with a factor<br>iii. **consistently apply** scientific language to communicate understanding **clearly and precisely**<br>iv. document sources **completely** | i. **Summarize** 4 diseases that stem cell therapy could be used to treat. Refer to the different types of stem cells and the specialised cell which is affected. **Summarize** how stem cells would solve the problem.<br>ii. **Describe** at least **two positive and two negative impacts** that this technology has on the society, focusing on **one of the factors** (moral, economic, political or cultural).<br>**Support** these arguments with reliable **evidence**.<br>**Summarize** the main ideas and impacts.<br>iii. Use **clear and concise language** throughout.<br>Appropriate **scientific vocabulary** generally applied.<br>Relevant **images / graphs** used to illustrate key points.<br>Leaflet is 2 sides of A4.<br>iv. **Numerous** reliable sources (4-5 sources) included in the bibliography.<br>Bibliography presented in a clear APA format.<br>**Image references** included. |

**Student Task Planning Notes:**

7B8a Components of Blood

# Platelets

Platelets help blood clot by forming a platelet plug

Platelets are formed in the bone marrow

150,000 to 400,000 platelets in each microlitre of blood (average = 250,000)


Platelets contain chemicals that stimulate blood vessel repair

Platelets last for an average of 10 days,

Photo credit: visualsonline.cancer.gov

7B8a Components of blood

# Red blood cells

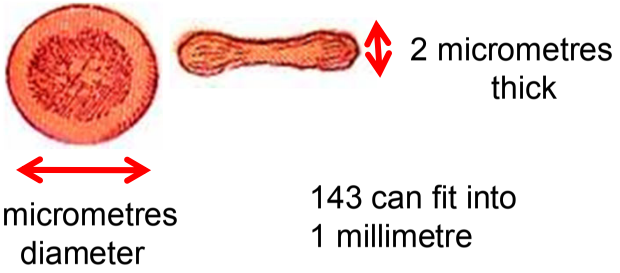
People who do not get enough iron in their diet have small, pale red blood cells and feel tired all the time.

People who lose a lot of blood have normal red blood cells but too few of them.

Stem cells in the centre of bones make about 2 million new ones per minute.

Healthy adults have about 20,000,000,000,000 red blood cells.

Photo credit: visualsonline.cancer.gov




143 can fit into 1 millimetre

Full of a red chemical called haemoglobin that contains iron.

Haemoglobin picks up oxygen in the lungs and releases it in other parts of the body.

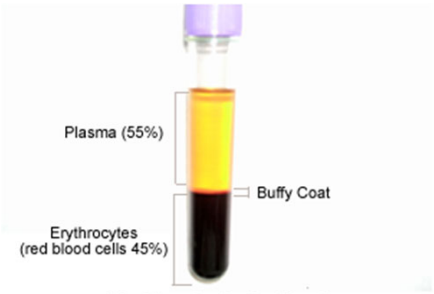
The thin shape means that it can bend to fit through tiny blood vessels and oxygen can get in and out the cell easily.

New red blood cells have a nucleus but as they mature in bone marrow they break down their nucleus to make space for more haemoglobin.

7B 8a Components of blood

# Plasma

Plasma is the liquid part of blood.



Blood Sample after Centrifugation

Plasma makes up 55% of blood.

Plasma is yellow in colour and is mostly water (93%)


If someone has eaten a lot of fat, their plasma can appear milky!

Plasma contains dissolved substances around the body.

Plasma contains lots of different substances, including glucose, hormones, minerals and carbon dioxide.

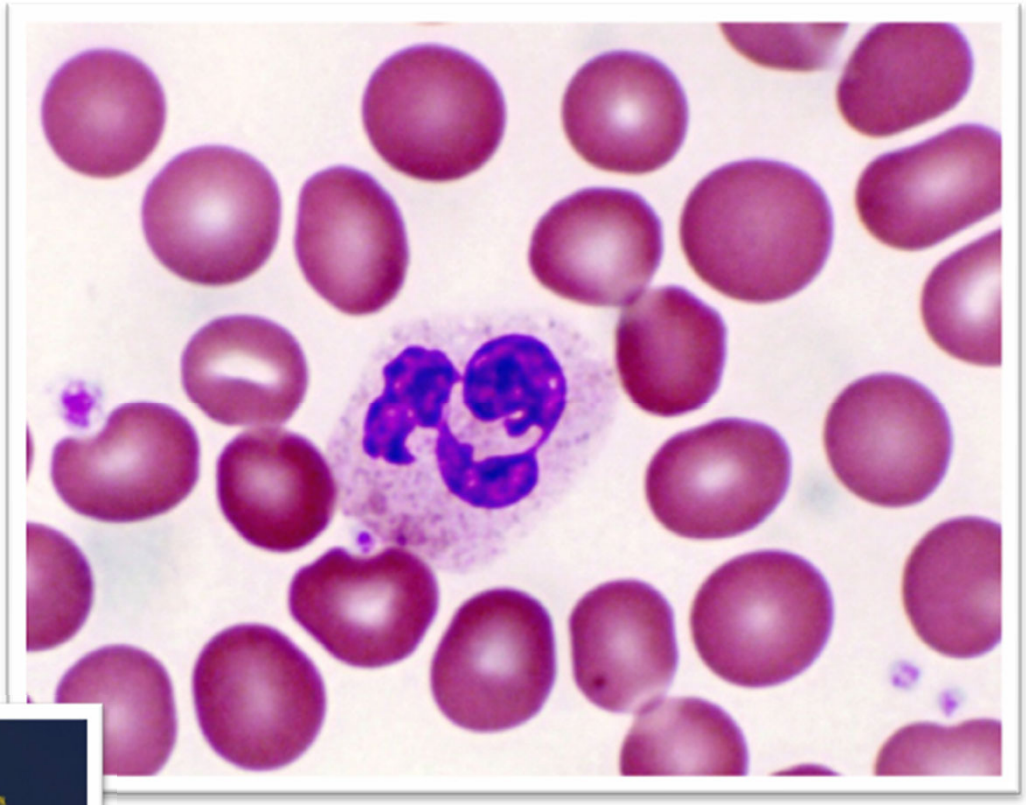
Photo credit: visualsonline.cancer.gov

7B 8a Components of blood

# White blood **cells**

More of these are produced when you have an infection.

They have unusual shaped nuclei.



When they catch a microbe they change shape, wrap themselves around it and take it into their cytoplasm.

They move through blood vessels until they find microbes.

SEM of white cell destroying micr

Inside their cytoplasm are little bags of chemicals that can destroy most microbes.

13 micrometres

77 can fit into 1 millimetre

They can squeeze out of blood vessels to attack infections in other tissues.

# 7B 8b Analysing a 'blood' sample

Your teacher will give you the samples of each patient's blood.

The 4 different colours represent the different components of the blood.

- red beads = red blood cells to carry oxygen
- white beads = white blood cells to fight infection
- blue beads = platelets to help in blood clotting
- yellow beads = plasma, the liquid part of blood

Analyze the 'blood' samples and use the diagnosis cards below to determine if any of the patients are healthy or have a particular medical condition,

| | | |
|---|---|---|
| **Healthy person**<br><br>average **red blood cell** count:<br>is approximately 40% | **Healthy person**<br><br>average **white blood cell** count:<br>is approximately 1% | **Healthy person**<br><br>average **platelet** count:<br><br>is approximately 4% |
| **Anaemia**<br>Does the **red blood cell** count in your sample match the normal value?<br><br>Could your patient have anaemia? (reduced number of red blood cells) | **The flu**<br>Does the **white blood cell** count in your sample match the normal value?<br><br>Could your patient have the flu? (increased number of white blood cells) | **Haemophilia**<br>Does the **platelet** count in your sample match the normal value?<br><br>Could your patient have haemophilia? (large reduction in number of platelets) |

**Write up your results using the MYP Practical Report template.**

**Remember to make your results RELIABLE!**

# 7B 8c MYP Criterion C Assessment Criteria (optional)

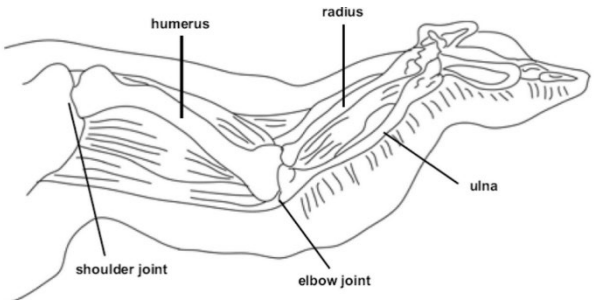
**Maximum score: 8 points**

| Assessment Level | Level Descriptor |
|---|---|
| 7-8 | i. **correctly collect, organize, transform and present** data in numerical and/ or visual forms<br>**Data table is organized, correct headings, units and repeats. Percentages are used for blood cell counts.**<br>**Bar chart/pie chart or similar correctly labelled axes.**<br>**ii. accurately interpret data** and **outline** results **using correct scientific reasoning**<br>**All 4 blood samples are correctly categorized and explained using the given diagnosis information.**<br>iii. **discuss** the validity of a prediction based on the outcome of a scientific investigation **N/A**<br>iv. **discuss** the validity of the method based on the outcome of a scientific investigation<br>**Any reasonable justification, that the method achieved reliable results or not.**<br>v. **describe** improvements or extensions to the method that would benefit the scientific investigation.<br>**At least 2 improvements described in reasonably detail (more repeats, wider range of blood samples/people, larger samples (more blood cells to count)** |
| 5-6 | i. **correctly collect, organize and present** data in numerical and/or visual forms<br>ii. **accurately interpret** data and **outline** results **using scientific reasoning**<br>iii. **outline** the validity of a prediction based on the outcome of a scientific investigation<br>iv. **outline** the validity of the method based on the outcome of a scientific investigation<br>v. **outline** improvements or extensions to the method that would benefit the scientific investigation. |
| 3-4 | i. correctly collect and present data in numerical and/or visual forms<br>ii. accurately interpret data and outline results<br>iii. state the validity of a prediction based on the outcome of a scientific investigation<br>iv. state the validity of the method based on the outcome of a scientific investigation<br>v. state improvements or extensions to the method that would benefit the scientific investigation. |
| 1-2 | i. collect and present data in numerical and/or visual forms<br>ii. interpret data<br>iii. state the validity of a prediction based on the outcome of a scientific investigation, with limited success<br>iv. state the validity of the method based on the outcome of a scientific investigation, with limited success<br>v. state improvements or extensions to the method that would benefit the scientific investigation, with limited success. |
| 0 | The student does not reach a standard described by any of the descriptors below. |

# 7B 9a Chicken Wing Dissection

**INTRODUCTION**: the chicken wing in some respects is similar to the human arm. It is composed of numerous different cells, tissues and organs. These body parts interact and cooperate to allow the chicken to perform a variety of movements.

## Bones of the Chicken




The **upper wing** consists of a **humerus**, which is at one end, and the **ulna** and the **radius** at the lower wing. These bones connect at the elbow joint. The rest of the wing is composed of modified hand bones.

**MATERIALS**:

- Chicken wing
- Blunt and sharp dissecting probes
- Scalpel
- Paper Towel
- Forceps
- Dissecting tray
- Scissors

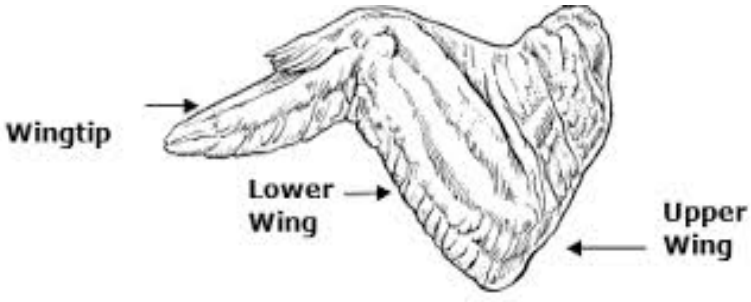
**CAUTION: Scalpels and scissors are very sharp.**
**Use extreme care. Only cut downward and/or away from your body.**

**PROCEDURE**:

a) Examine the chicken wing, and compare it with the picture below. Do you have the left or right wing? (Circle one)

b) Identify the upper wing, the lower wing, and the wingtip.

c) Examine the wing at the point where it was removed from the body. Depending on the way the wing is cut, you might see cartilage and bone marrow.




d) Using scissors cut down the middle of the skin, starting at the top end of the upper wing. Try not to cut through the muscles below the skin. Do this by piercing the skin and then slipping the scissors between the skin layer and the muscle.

e) Cut down the sides of the skin to make a T-shaped cut. Start at the first cut and cut away from it in both directions. Peel the skin and cut to loosen it. (Note: chicken skin can be very difficult to remove. Take your time peeling it back so as not to damage the tissues underneath it.)

**<u>OBSERVATIONS</u> Complete Table 1 and answer the questions as you carry out the dissection**

**Fat -** Look for yellowish tissue clumped together beneath the skin. This is fat tissue, made of fat cells. Where do you find the most fat tissue? Describe its location.

**Muscles** - Observe the muscles in the wing. Describe what you see – focus on colour and texture

- Find two muscles in the wing that bend and straighten the elbow joint. Each muscle pulls on the lower wing bones in one direction (the flexor bends the joint). Since the flexor cannot lengthen by itself to push the bone back to straighten the joint, another muscle pulls the bone in the opposite direction (extensor).
- Hold the wing down at the shoulder and alternately pull on each muscle. Observe what happens.

**Tendons –** These are shiny white tissues at the ends of the muscles that attach muscles to bones.

- Find as many tendons as you can on the chicken wing. Describe their locations carefully.
- Pull on a tendon to see how it helps the chicken move its wing. What do tendons do?

**Joints and Ligaments -** Two bones come together at a joint. Bend and straighten the elbow joint and observe how the bones fit together. Ligaments connect bones to other bones at joints. They look like a shiny white covering of the joint surfaces.

- Closely examine the elbow joint between the upper wing and the lower wing and identify the ligaments. Describe their location and appearance.

**Cartilage -** Between the bones is another shiny white material that is slippery. This is cartilage. What do you think its function is?

**Wing -** Move the wing again. Explore how the muscles, tendons, ligaments, and cartilage play roles in the wing's movement.

**<u>EXTENSION</u> -** Can you find any other examples of tissues? Add these to your table and describe them in as much detail as you can. (HINT: there should be at least three other tissue types to find – look for string-like structures, hollow tubes and more….)

When you have finished observing the wing and writing your notes, tidy up the equipment as directed by your teacher and wash your hands WITH SOAP.

**Table 1**

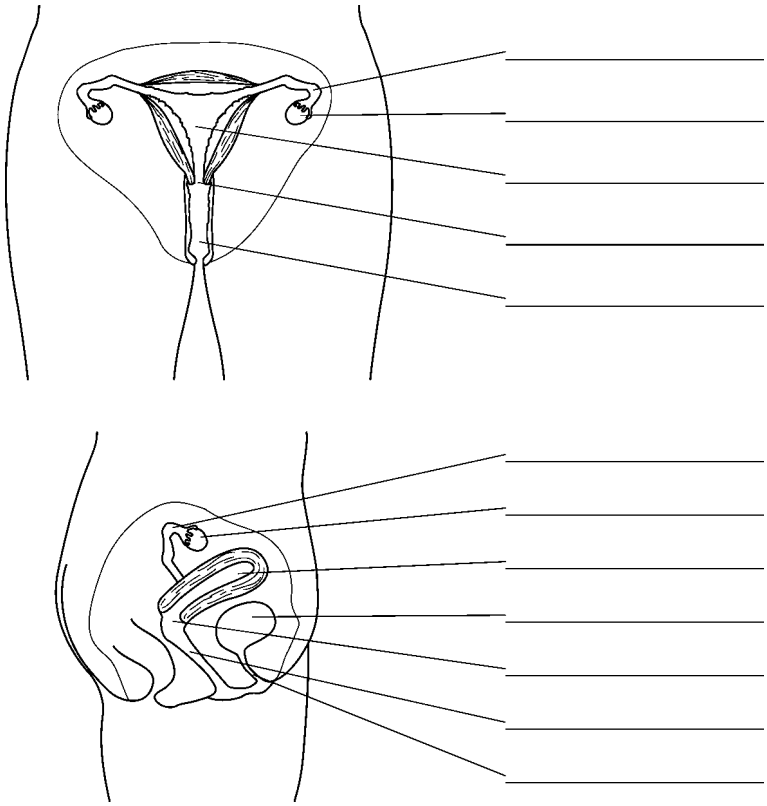
| Tissue | Description (colour, texture etc.) | Tissue it attaches to |
|---|---|---|
| **Skin** | | |
| **Fat** | | |
| **Muscle** | | |
| **Tendon** | | |
| **Ligament** | | |
| **Cartilage** | | |
| | | |
| | | |
| | | |

**HOMEWORK**

Your homework is to write a comprehensive conclusion about what you've learned. Start by explaining what a tissue is. Try to include all the words in bold from the table.

# 7B 10a The Female Reproductive System

**1** Label the parts of the female reproductive system on the diagrams. Use the words in the box below. Each word can be used more than once.



**2** Complete these sentences using the words in the box. Each word can be used more than once.

| **bladder** | **cervix** | **oviducts** | **ovaries** | **urethra** | **uterus** | **vagina** |
|---|---|---|---|---|---|---|

**a** The egg cells are released from the _____

**b** Egg cells travel down the _____ on their way to the _____

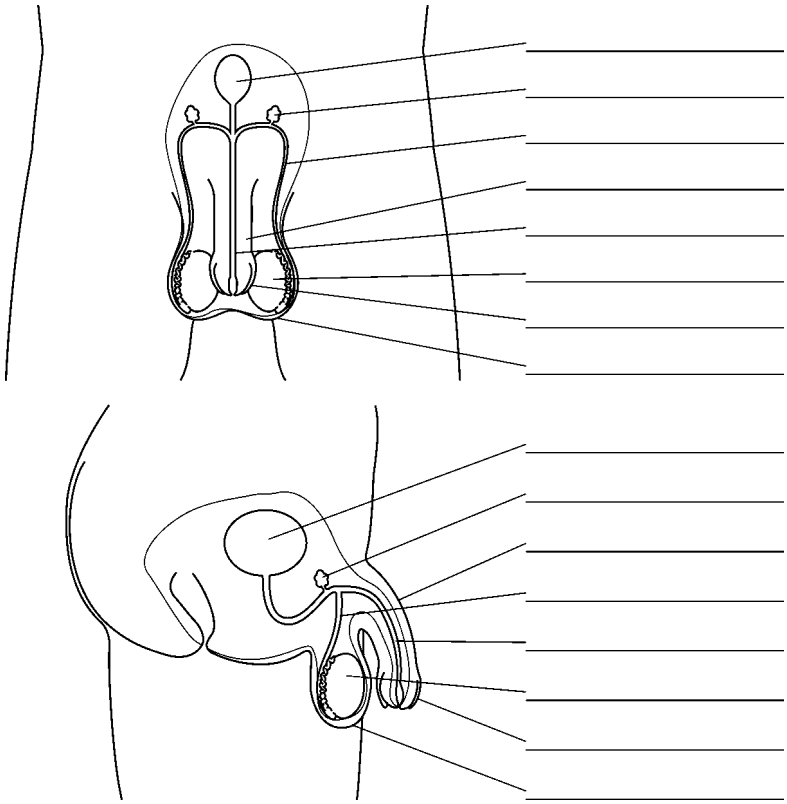
**c** When a women is pregnant the _____ helps to hold the baby in place.

**d** A baby develops in the _____

**Questions:** If you have any questions about the female reproductive system, you may want to write them down below and show this to your teacher.

# 7B 10b The Male Reproductive System

**1** Label the parts of the male reproductive system on the diagrams.
Use the words in the box below. Each word can be used more than once.



**2** Complete these sentences using words in the box. Each word can be used more than once.

| bladder | foreskin | glands | penis | scrotum | sperm duct | testes | urethra |
|---|---|---|---|---|---|---|---|

**a** Sperm cells are made in the _____

**b** The tubes that sperm cells travel down on their way out of the body are the _____ and _____

**c** The head of the penis is protected by the _____

**d** _____ add special liquids to the sperm cells to make semen.

**Questions:** If you have any questions about the male reproductive system, you may want to write them down below and show this to your teacher.

# 7B 10c Reproductive Organs

**1** On the diagrams below, label the parts described in the sentences with the letters. The first one has been done for you.

**A** where female sex cells are stored

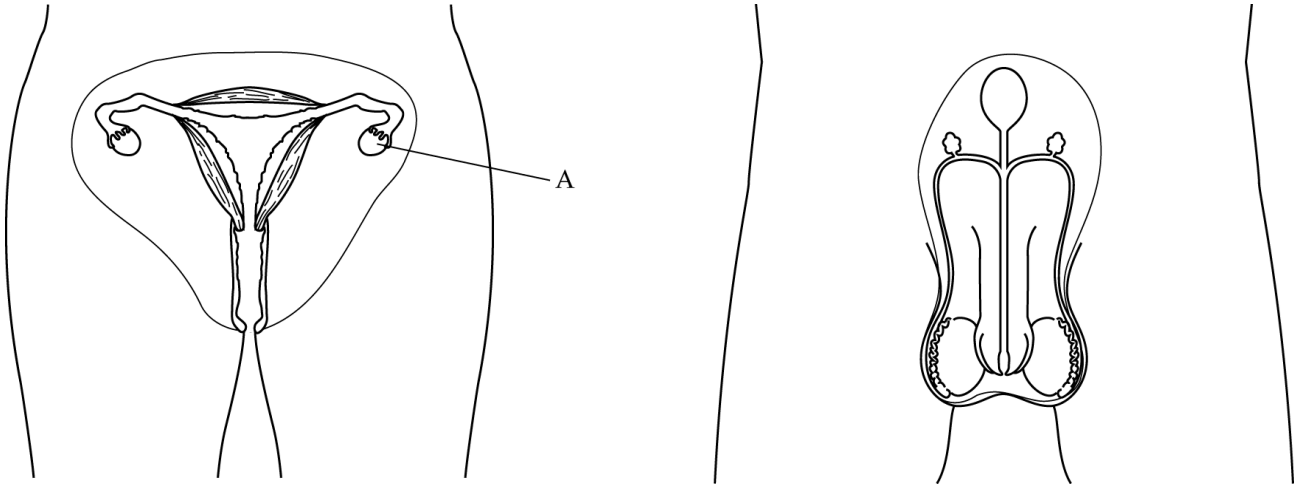
**B** where a baby could develop

**C** adds special fluids to sperm cells

**D** where male sex cells are made

**E** a tube containing cells with cilia (hairs)

**F** protects the head of the penis.




**2** Answer the following questions by circling the right answer.

**a** How often is an egg cell released from an ovary?

**once a year** **once a day** **once a month** **once a decade** **never**

**b** What does the cervix do?

**holds a baby in place** **produces sperm cells**

**produces egg cells** **moves the egg cells**

**c** What is the name given to the mixture of sperm cells and fluids?

**sperm** **oviduct liquid** **scrotum** **urine** **semen**

**3** List the names of the tubes that sperm cells pass through on their way out of the body.

**4** Explain why sperm cells are made in a part of the body that hangs outside.

**Extension:** Research about sperm cells.
What makes them special? How many are produced? How is this different for egg cells.

**Extension**: Anne's ovaries are not releasing egg cells.

Why not? Think of as many reasons as you can.

# 7B 10d Reproductive System Word Search

**1** Find the following words in the grid below. Draw a coloured line through the words that you find. If the word is something found in the female reproductive system, draw a red line through it. If it is something found in the male reproductive system, draw a blue line through it.* If it is found in both, draw two lines (one red and one blue) through the word.

| | | | | | |
|---|---|---|---|---|---|
| **bladder** | **cervix** | **egg cell** | **oviduct** | **sex cell** | **ovary** |
| **penis** | **scrotum** | **sperm cell** | **sperm duct** | **testis** | |
| **urethra** | **uterus** | **vagina** | | | |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P | A | M | O | U | S | E | E | N | F | G | F | G | R |
| F | T | R | O | T | U | F | D | B | O | V | A | R | Y |
| J | K | U | D | E | G | P | G | T | H | Q | L | Z | V |
| F | W | R | U | R | U | E | G | G | C | E | L | L | T |
| B | C | E | L | U | B | N | I | G | H | T | O | L | B |
| B | O | T | E | S | T | I | S | I | L | T | V | A | L |
| S | T | H | E | S | C | S | N | V | A | G | I | N | A |
| C | E | R | V | I | X | I | G | R | E | E | D | N | D |
| R | E | A | L | L | K | L | A | D | I | N | U | F | D |
| O | R | M | I | S | E | X | C | E | L | L | C | A | E |
| T | A | R | E | R | Y | A | E | C | E | L | T | S | R |
| U | A | R | S | P | E | R | T | S | U | C | B | T | I |
| M | O | F | A | L | S | P | E | R | M | C | E | L | L |
| F | S | P | E | R | M | D | U | C | T | O | P | I | A |

**2** **a** Take the first nine letters of the first row of the grid and rearrange them to make a word.

**b** Explain what this word means.

# 7B 11a Teen Dreams Video Worksheet

1. a) What is the male sex hormone called?

   b) What does it do to the male brain and body during puberty? List at least 4 effects.

2. a) What is the female sex hormone called?

   b) What does it do to the female brain and body during puberty? List at least 4 effects.

3. Why do males have some of the female sex hormone?

4. Why do females have some of the male sex hormone?

5. What can happen as a drawback to rapid growth during puberty?

# 7B 11b Adolescence

**1.** Complete the table below. The first example has been done for you.

| Physical change | Boy | Girl |
|---|---|---|
| A | Hair grows on face | |
| | | |
| B | | |
| C | | |
| D | | |
| E | | |
| F | | |
| G | | |
| H | | |

Other changes that are not physical happen during adolescence.
What changes are these?

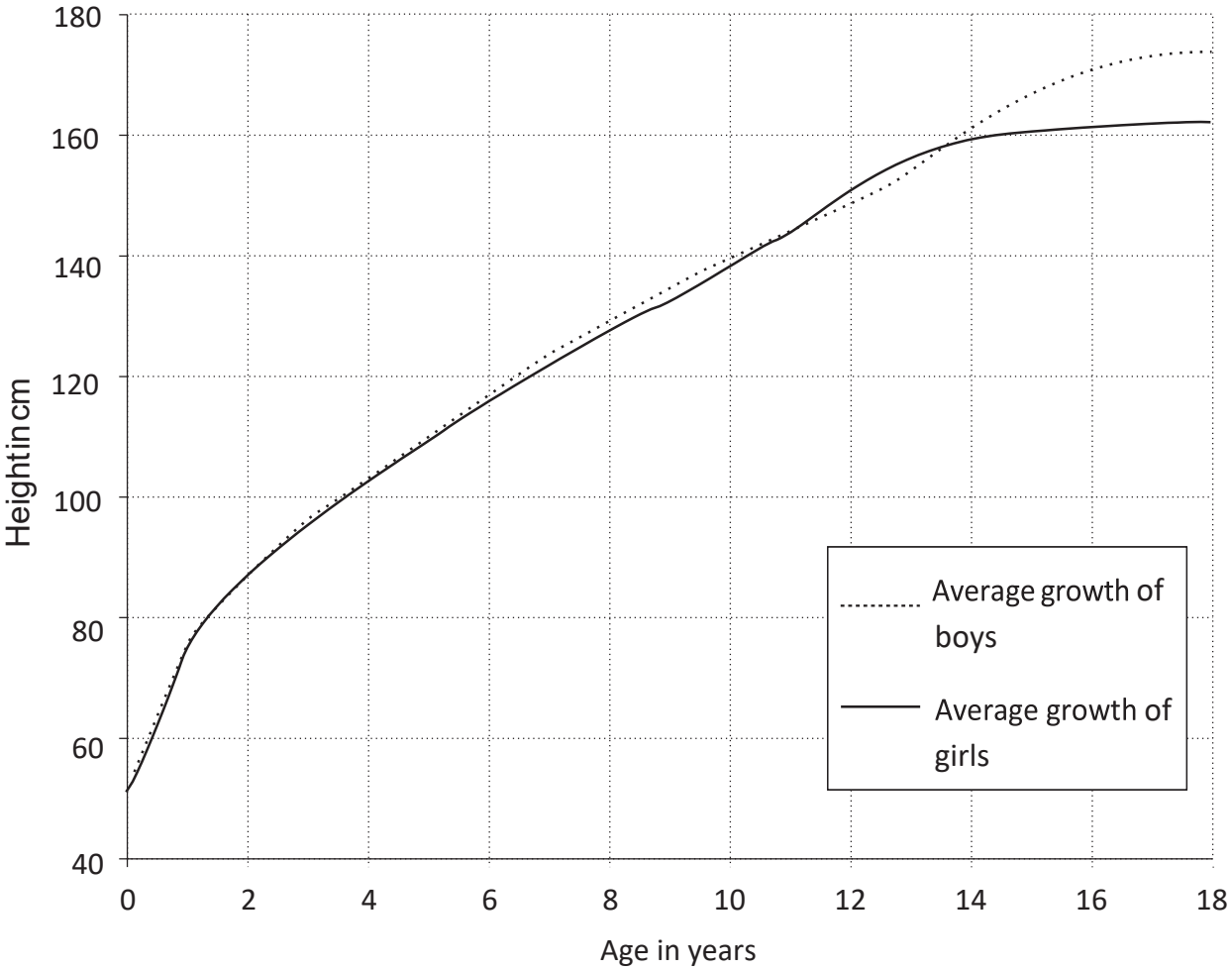
**2.** Write a definition for the term “adolescence”.

Explain how puberty is different from adolescence.

**3.** Your body consists of lots of cells made by cell division. Each cell lives for a certain period of time, then dies. Cell division can happen faster, slower or at the same speed as cell death. This controls how much we grow.

Explain how the rates of cell division and cell death compare during adolescence

**4**




**a** Look at the graph. Who grows faster, boys or girls:

i. At age 12?

ii. At age 15?

**b** How does this difference relate to the start of puberty in boys and girls?

## EXTENSION

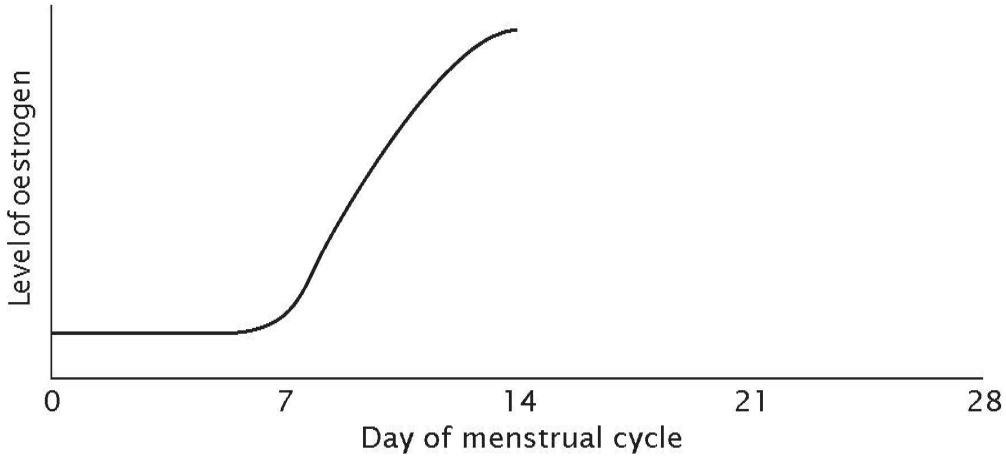
**5 a** Testosterone and oestrogen are very important body chemicals.
What is the general name for these chemicals?

**b** Write a paragraph to explain how these two chemicals are linked to boys and girls, and why they are important.

**6** Read the following information about hormones and the menstrual cycle.

> The menstrual cycle is controlled by the hormones called oestrogen and progesterone. While an egg is developing in the ovary, ready to be released into the oviduct, oestrogen makes the lining of the uterus grow thicker, ready to receive a fertilised egg

The graph shows how the oestrogen levels change during the first half of the menstrual cycle.




**a** Copy the graph and continue the curve to show what you think happens to the oestrogen level after day 14.

**b** Explain why you think this happens.

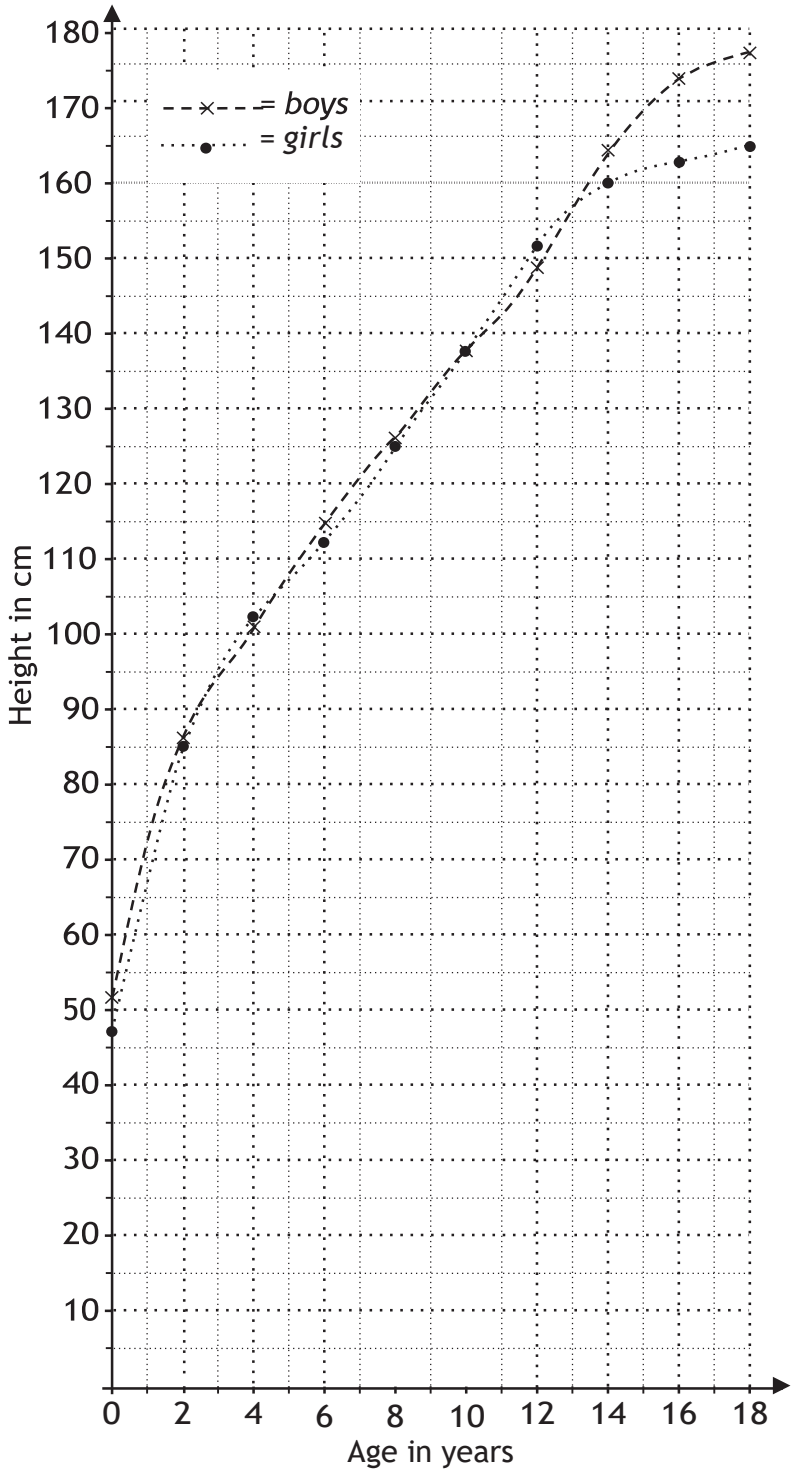
**c** Mark an X on the curve to show when ovulation takes place.

**d** Circle the days on the horizontal axis when the woman is most likely to have her period.

# 7B11c Growth spurts

**Children are growing all the time, but as teenagers you grow faster for a couple of years. This fast growth is called a growthspurt. You are going to analyse a graph showing growth of children.**

The graph below shows the average height of girls and boys today. Agraph can tell you how fast or slow something is happening. A steepline shows faster growth. A less steep line shows slower growth.




This data was obtained from Davidson and Passmore Human Nutrition and Dietetics [Passmore and Eastwood]

© Harcourt Education Ltd 2003 *Catalyst 1*

1 Between what ages are girls taller than boys?

2 At age 12 girls are taller than boys. At what age will boys be taller than girls again?

3 At age 6, how much taller are boys than girls?

4 At age 18, how much taller are boys than girls?

5 How much do girls grow between ages 16 and 18?

6 How much do boys grow between ages 16 and 18?

7 Who grows the most between ages 16 and 18?

8 At age 10 ½ are girls or boys growing faster?

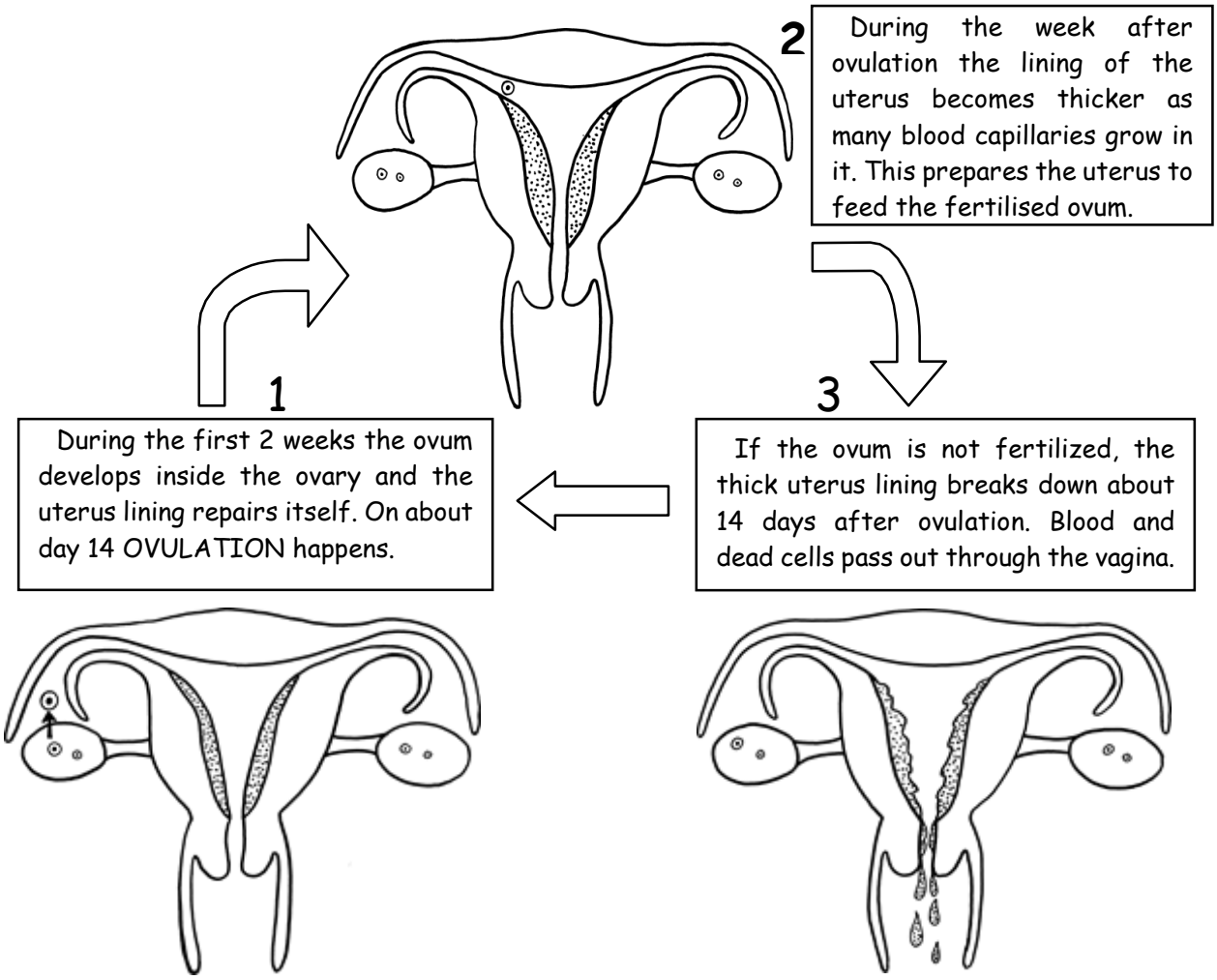
9 At age 13 ½ are girls or boys growing faster?

10 At what age between 0 and 18 do girls and boys grow fastest?

11 The estimated average height data for a man aged 18 years in the 19th century is 165 cm. Why do you think this differs from the recently collected data above?

# 7B 12a The Menstrual Cycle

Once every month a woman's body releases an ovum (egg cell) into the oviduct (Fallopian tubes). Usually the ovum is not fertilised and it dies. The woman has her period when the lining of the uterus breaks down and blood and dead cells pass out through the vagina. The diagram below shows what happens during a woman's monthly cycle.




Exercise - Complete the sentences below.

1) Only one ovum is released every _____

2) The release of an ovum from the ovary is called _____

3) Ovulation happens after about _____ days.

4) The uterus lining _____ the fertilised ovum..

5) If the ovum is not fertilised it will _____

6) A woman has her period when the _____ lining breaks down.

KS3 Science Revision Worksheets Special Edition © P. Hill, Beaver Educational Resources 2000. Registered to Hampton Community College. TW12 3HB.

# 7B 12b Menstrual Cycle Questions

**1.** Add these words into the spaces in the sentences below.

**period egg menstrual vagina hormones uterus pregnant**

A woman's monthly cycle is called the _____ cycle.

It is controlled by _____ that move in her bloodstream.

The cycle begins with her _____ , which is when blood

and dead cells pass out of her _____ ,

which had thickened ready for a fertilised _____

A woman has her period only if she is not _____

**2** Copy and complete these sentences by choosing from the words in **bold**.

When an egg splits into two after fertilisation, the twins born are **identical** / **non-identical**. They look **different** / **the same**.

When two eggs are fertilised at the same time, the twins born are **identical** / **non-identical**. They look **different** / **the same**.

**3** You will need a calendar for these questions.

**a** Lucie begins her period on 3rd April. She has a regular 28-day menstrual cycle.

i. On which date would ovulation happen? _____

ii. When would Lucie expect her next period to begin? _____

iii. On which date, in March, did her last period start? _____

**b** With a 28-day menstrual cycle, how many periods should Lucie expect to have every year? _____

**c** Lucie had her first period on her thirteenth birthday, and had 481 eggs in her ovaries. At what age would she stop having periods if she never became pregnant? _____

## EXTENSION

**4** Use this information to answer the questions.

A gerbil is fertile and can become pregnant again within a couple of days of giving birth. The gestation period for a gerbil is 24 days. If the male gerbil is not removed immediately the babies are born, he will mate again and the female will be pregnant within seven days.

Typically, a gerbil has five or six babies in each litter. If another litter is born within a month, the mother will abandon the first litter and the babies will die.

**a** How many babies could a female gerbil have in a year if the male is not removed when a litter is born? Show your working.

**b** A gerbil typically lives for $2\frac{1}{2}$ to 3 years and the female is fertile from about 2 months old to 18 months old. Why do you think she reproduces so frequently in this time?

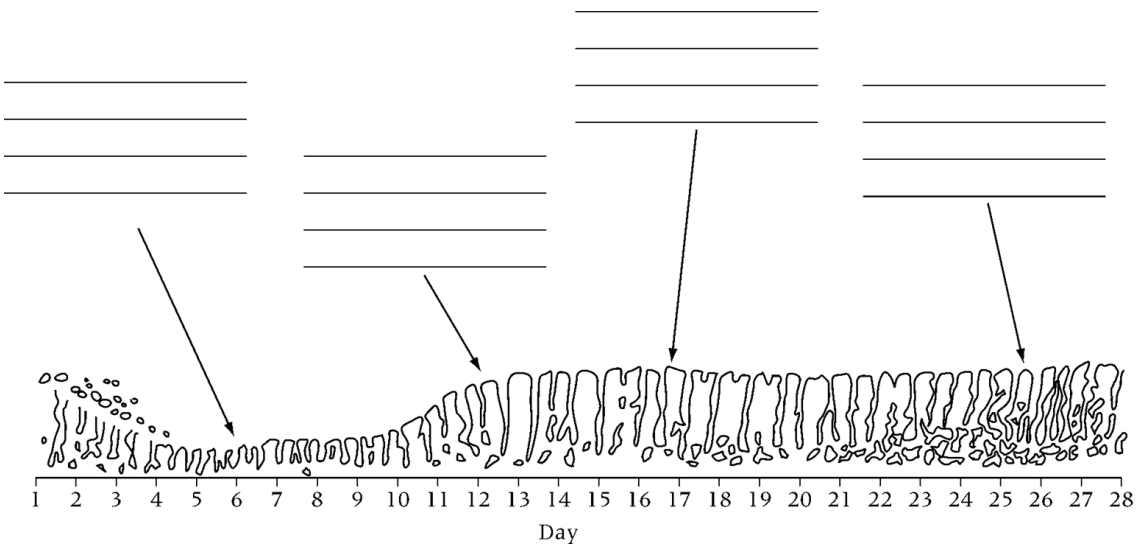
**c** If you are a gerbil breeder you usually keep a male with four or five females. Suggest why this might help the babies to survive.

**5** When a woman reaches around 50 years of age she begins her menopause. This is when her ovaries contain very few eggs. Explain why this causes her periods to stop.

# 7B 12c The Menstrual Cycle (extra questions)

**1** The diagram shows how the thickness of the lining of the uterus changes. Write these labels in the spaces above the diagram.

| | |
|---|---|
| The lining gets thicker | An egg is released |
| The lining breaks down | The lining stays thick |




**2** Now complete these sentences using the words in the box.

| | | | | | | |
|---|---|---|---|---|---|---|
| **blood** | **fertilised** | **menstruation** | **ovaries** | **ovulation** | **period** | **vagina** |

**a** Egg cells are released from the _____ . The time when they are released is called _____ . If the egg cell meets a sperm cell it will be _____ . If it does not, it will die.

**b** The time when the uterus lining breaks apart is called _____ Another name for this is 'having a _____ .' During this time the uterus lining and a little _____ passes out of the _____

**Extension:** It seems strange that women living in the same home, often have their menstrual cycle at the same time of the month. Is this actually true? If so, try and find out some reasons why.

# 7B 13a Sex Cells (Gametes)

**1** The male and female sex cells have different shapes to help them do their jobs. They are said to be **adapted** to their jobs.

Here is a list of how cells can be adapted. In the space next to each sentence write the words sperm cell, egg cell, both or neither.

**a** It has a tail to help it to swim. ____

**b** It has a food store. ____

**c** It has special hairs on it to help it push things along. ____

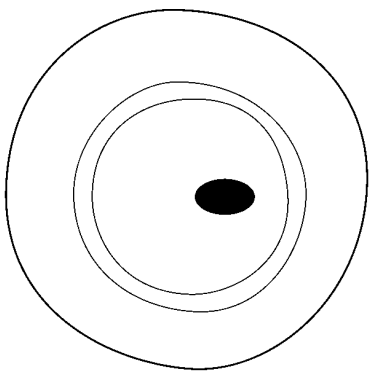
**d** It contains half the information needed to make a new life. ____

**e** It has special chemicals on the tip of its head to help it get into things. ____

**f** It has only a little cytoplasm so that it can have a thin, streamlined shape. ____

**2** **a** On the diagrams below label where the **adaptations** in question 1 are found. Just use the letters for the labels.

A sperm cell at a magnification of x1000.



An egg cell at a magnification of x500.

**b** Look at the drawings of the sex cells above. On the lines below, write down how long or wide each one is in real life.

A sperm cell is ____ mm long. Its head is ____ mm wide.

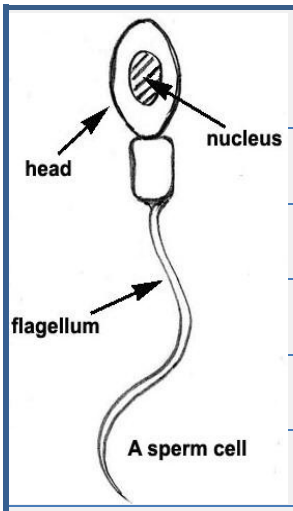
An egg cell is ____ mm wide.

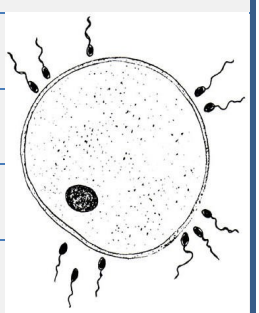
**Extension:** Explain how identical twins may form compared to non-identical twins.

# 7B 13b The journey of a sperm cell

**Keywords**

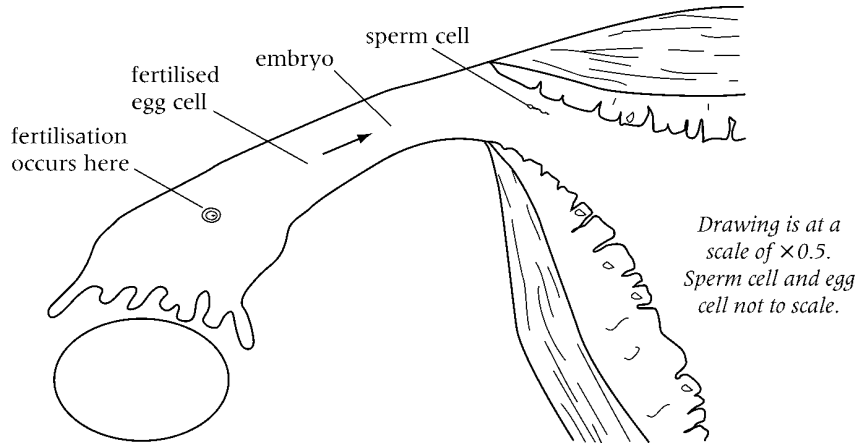
**Testicles Sperm duct Urethra penis Vagina Cervix Uterus Fallopian tube Egg cell Fertilise**



# 7B 13c Making an Embryo

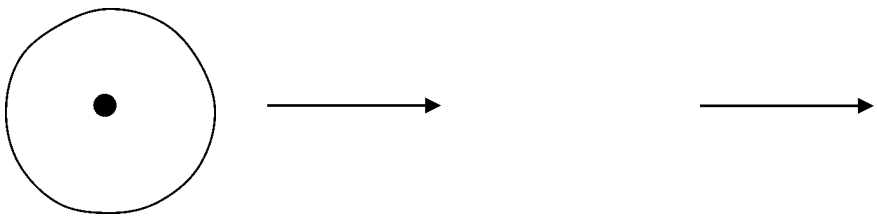
**1** The place where fertilisation normally occurs is marked on the diagram. Sperm cells start swimming when they get to the oviduct. A sperm cell is marked. Sperm cells swim **about 1 mm in every minute.**




**a** Work out how long it would take for the sperm cell to get to the egg cell (use a ruler to measure). Show your working.

**b** In the places marked on the diagram draw in the fertilised egg cell and the embryo.

**c** The fertilised egg cell turns into an embryo by **cell division**. The fertilised egg cell divides into two new cells. These two new cells divide into two more cells each. Draw two more diagrams to show what happens.



*fertilised egg cell*

**d** Look at the last drawing you did. If each of these cells divides into two, how many cells will the embryo now have?

**e** What is **implantation**?

**f** On the diagram, label the place where implantation occurs.

**2** These sentences are about twins. Write 'true' or 'false' by each sentence.

**a** Identical twins happen when a fertilised egg cell divides in two, but the two cells split apart.

**b** Identical twins will always be different sexes.

**c** Non-identical twins happen when two egg cells are fertilised.

**d** Non-identical twins can be the same sex or different sexes.

**e** Identical twins happen when two egg cells are fertilised.

**f** Non-identical twins happen when egg cells turn into embryos on their own.

**Extension:** Sometimes some couples find it difficult to get pregnant. Do some research and find out about different types of **fertility treatment**. How do these improve the chances of successful fertilization?

# 7B 13d Fertilisation

Put the steps of fertilisation in the correct order

During ejaculation, the man's penis releases sperm into the vagina

Sperm breaks through the egg's outer lining and they join together

Sperm enters uterus through the cervix and travels to the egg/fallopian tubes

Fertilised egg divides to form a ball of cells called an embryo

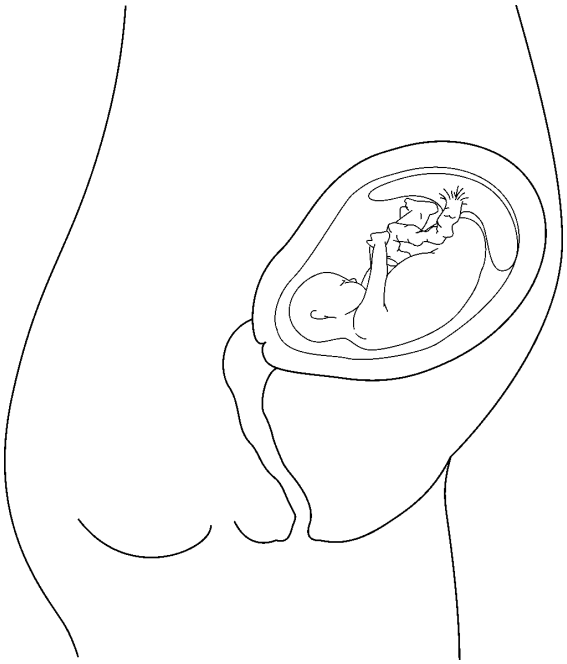
Embryo attaches to the lining of the uterus and develops into a foetus

The sperm travels in semen to the top of the vagina

# 7B 14a The Developing Fetus

**1** **a** Label the following parts on the drawing below.

amniotic fluid umbilical cord fetus placenta vagina uterus



**b** Add an arrow in pen to show the direction food and oxygen takes between the placenta and umbilical cord.

**c** Add an arrow in pencil to show the direction carbon dioxide and waste takes between the placenta and umbilical cord.

**2** Fill in the table to show what each part does.

| **Part** | **Job** |
|---|---|
| Amniotic fluid | |
| Umbilical cord | |
| Placenta | |

**3** What do you think happens to the uterus as the fetus grows?

**Extension:** Find out why it is dangerous for a pregnant woman to drink alcohol, smoke or take drugs.

# 7B 14b Stages of Pregnancy

Try to match each diagram with the correct description.

***3 weeks***
The fertilised egg is dividing rapidly. It has formed a ball of cells. It is too small to be seen without a microscope.

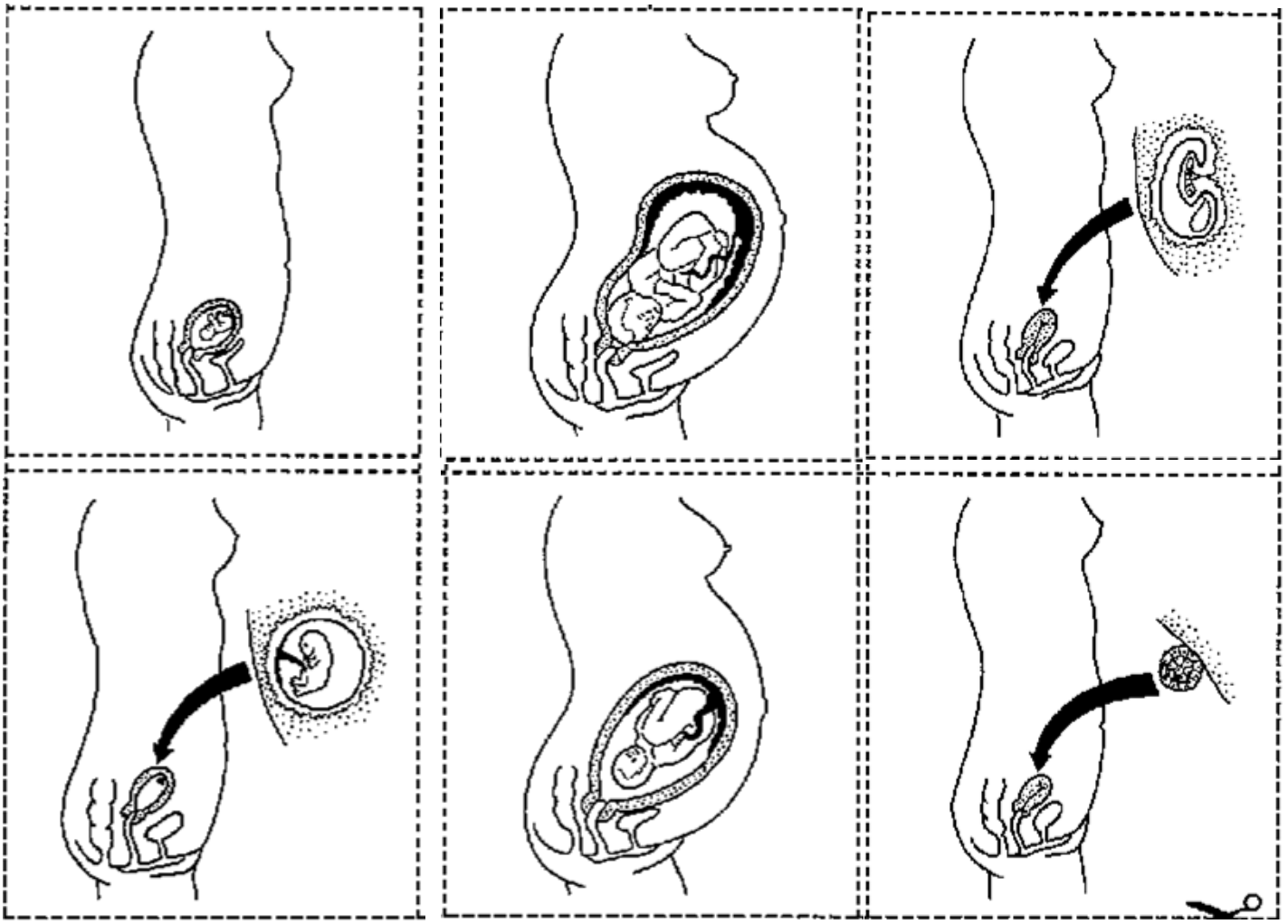
***12 weeks***
The fetus is about 50 mm long. It can kick its legs and move its fingers. Its head is out of proportion with the rest of its body. Most of the organs inside its body are working.

***6 weeks***
The ball of cells now looks like a tadpole. There is a 'head end' and a 'tail end' and a bulge where the heart is forming.

***24 weeks***
The fetus has grown so much that the mother looks pregnant. She can feel her baby moving inside her. Its heart can be heard beating.

***8 weeks***
You can now see the eyes. The arms and legs have formed with tiny fingers and toes. At this stage the baby is called a fetus.

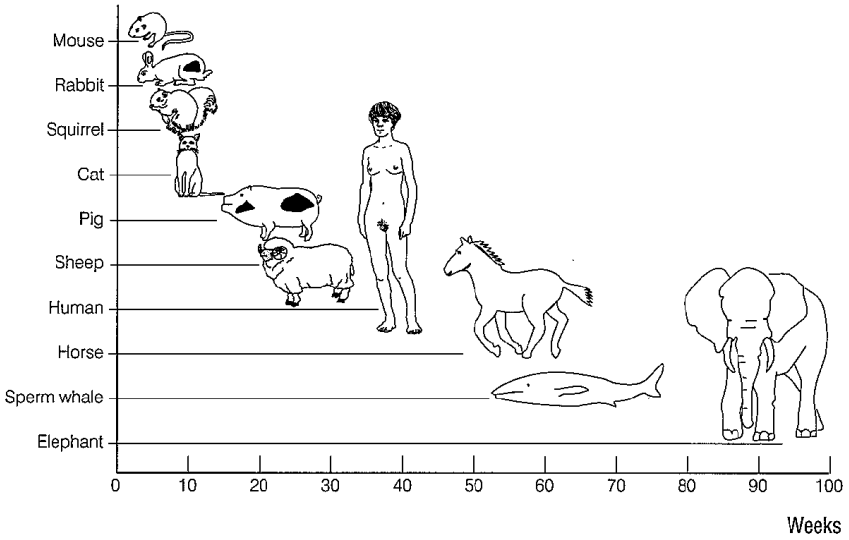
***30 weeks***
The baby is almost ready to be born. Its head is just above the cervix. When the muscles of the mother's uterus contract, it will be born head first.



# 7B 14c How long in the womb?

**Gestation** is the length of time a pregnancy lasts. It is the time from fertilisation until birth.

Look at the chart below, which shows the gestation time for different mammals.




**1** What can you say about the differences in gestation time between a rabbit and a pig?

**2** What is the gestation time of a) a sheep?

b) a horse?

**3** Do your answers to question 2 fit in with your ideas about a rabbit and a pig? If so, explain how.

**4** Can you see any pattern in the gestation times?

**5** a) Can you name an animal that does not fit into this pattern?

b) Describe how it does not fit the pattern.

Mark scheme

You will receive 2 marks for each question correctly answered.



Adapted from Spotlight Science 7 - Revised © Nelson Thornes Ltd

# 7B 14d Birth and After

Match the half-sentences from the left-hand side (these start with a number) with those from the right-hand side.

| | |
|---|---|
| *1* A baby is ready to be born | by the cord which must be cut and tied. |
| *2* Usually it is lying head downwards | when it is 9 months old. |
| *3* The start of birth is when the mother | and this is called the after-birth. |
| *4* These 'squeezes' are called contractions | the sac bursts letting out the fluid. |
| *5* The mother is now | feels the muscles of her uterus start to 'squeeze'. |
| *6* The baby is surrounded by a bag | since this position makes it easier for birth. |
| *7* As the uterus slowly pushes the baby out | and at first they happen every 30 minutes. |
| *8* Contractions now become stronger | in labour. |
| *9* When the baby is born it is still attached to the placenta | and come every 3 minutes. |
| *10* Later the rest of the cord and the placenta come out | or sac containing fluid. |

Adapted from Spotlight Science 7 - Revised Nelson Thornes Ltd

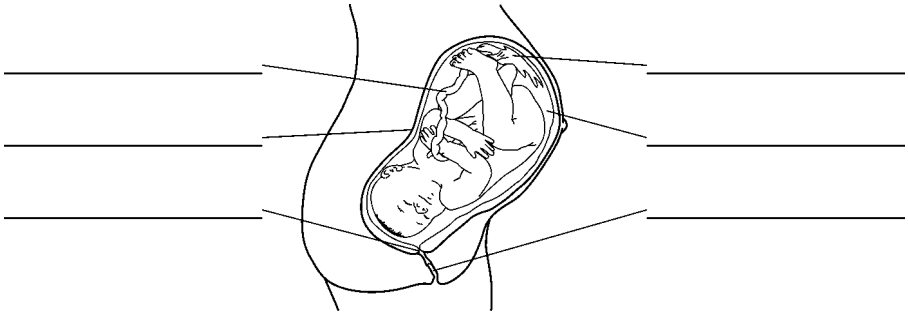
© Keith Johnson, Sue Adamson, Gareth Williams

# 7B 14e Being Born

**1** Write these words in order of size, smallest first: baby, fertilised egg cell, fetus, embryo.

**2** **a** Label the drawing below with the following words:

uterus amnion cervix vagina placenta cord



**b** Which parts does the baby go through on its way out of the uterus?

**c** Which part breaks when the baby is ready to be born?

**d** Which part needs to be cut after the baby has been born?

**e** Which part comes out as the **afterbirth**?

**f** How does a woman know that she is about to give birth?

**g** What is a **navel**?

**3** **a** How is the baby protected inside the uterus?

**b** How is it protected after birth?

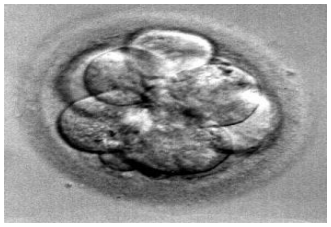
**4** **a** How does the baby get food and oxygen in the uterus?

**b** How does it get these after birth?

**Extension:** Research and explain how the **placenta** works.

# IVF – The Facts

- Look through the facts about IVF below.
- Highlight the facts you already know in yellow.
- Highlight the facts you are most surprised by in pink.



**Scientific**

Infertility is the inability to get pregnant (conceive).

- The fertility rate in HK is 1.19 (this means that on average, most couple in HK have 1 child).
- IVF means 'in vitro' fertilization.
- The first IVF baby was born in the UK in July 1978. Her name is Louise Brown.
- In 1997 the IVF pregnancy rate was 2%
- The IVF pregnancy rate in HK was 33% per cycle in 2018.

**Legal**

- In HK ONLY heterosexual married couple are eligible for IVF treatment (single women and unmarried couples do not qualify for IVF)
- Choosing the sex (gender) of a baby is illegal.
- If one partner removes consent for use of eggs/sperm, embryos must be destroyed.

**Political**

- ONLY permanent HK residents are eligible for subsidized IVF treatment in HK.
- Women have to be younger than 40 years old and have NO biological children.

**Economic**

- The hospital authority in HK offer subsidized IVF treatment at $20 000 per cycle.
- The average waiting time through the public system is 3 years.
- Couples may choose to opt for private treatment which reduces waiting time but costs between $80 000 – 100 000 per cycle.

**Social**

- Some pro-life supporters disagree with destroying embryos that are not used in treatment.
- Some religious leaders believe that we shouldn't interfere with natural reproduction.
- Many women are waiting until they are older to have children, when their fertility is lower and it is more difficult to conceive.
- "Designer babies" is a term used by the media. It describes an embryo chosen for specific characteristics or genetic traits.

# 7B 15b Family Matters

| | |
|---|---|
| **Family A**<br>▪ Mr and Mrs A are in their mid thirties and are unemployed.<br>▪ They come from large families and desperately want children of their own.<br>▪ They received one cycle of IVF on the NHS and spent their life savings on a second cycle. Both were unsuccessful.<br>▪ They cannot afford to pay for this treatment privately again. | **Family B**<br>▪ Miss B is single and in her late forties.<br>▪ She is a successful business-woman.<br>▪ She always intended to have children, but never met the right man.<br>▪ She has tried insemination with donor sperm but did not conceive.<br>▪ Miss B would like IVF to try IVF treatment again with donated sperm. |
| **Family C**<br>▪ Mr and Mrs C have been married for 2 years.<br>▪ Mr C is in his mid forties. Mrs C is thirty.<br>▪ He has one son from a previous marriage who lives with them.<br>▪ They have been trying for a child for 3 years, but with no success. | **Family E**<br>▪ Mrs E is a 35 year old widow.<br>▪ Mr E died of cancer, but froze a sample of his sperm before he died.<br>▪ Mrs E has a good job that pays well.<br>▪ She is a smoker.<br>▪ Mrs E would like to have IVF with husband's frozen sperm to have the baby she has always wanted. |
| **Family D**<br>▪ Mr and Mrs D are in their early twenties and have been married for five years.<br>▪ Mr D previously decided he did not want any children, so he had a vasectomy which prevents him having children.<br>▪ They now both want children.<br>▪ Mr D has tried, unsuccessfully, to have the vasectomy reversed.<br>▪ They would now like to have IVF treatment using donor sperm. | **Family F**<br>▪ Mrs F and Mrs F are a gay couple and have been together for ten years.<br>▪ They are in their mid thirties.<br>▪ Mrs F's male friend has offered to donate sperm so the couple can have a child.<br>▪ They would like to use IVF treatment to fertilise their eggs before implantation of embryos into one of them. |

**Who should receive IVF treatment and why?**

# Reflecting on the use of a reproductive technology

*With an increasing knowledge and understanding of the natural world including ourselves we are now in a position to manage not only our environment but also our own biology including our reproduction. This has consequences for individuals but also for society and even the world at large.*

*While many countries such as Japan and Germany worry about a falling birth rate and an ageing population, other countries such as China and India are trying to increase the life expectancy of their people and reduce birth rates.*

*While many couples use forms of contraception to prevent them from having children, more and more couples across the world find that they are unable to conceive children naturally and seek medical help.*

*The reproductive technologies / aids available are:*

- *Barrier methods (condom, diaphragm)*
- *Contraceptive pill*
- *Sterilization (Male and female)*
- *Caesarean section*
- *Fertility treatments*
- *Surrogacy*
- *IVF*

**Goal** – Your goal is to provide information on ONE reproductive technology.

**Role** – You work for the Hospital Authority. You are responsible for producing patient information leaflets.

**Audience** – Individuals who are interested in or considering using the reproductive technology.

**Situation** – Different reproductive technologies are becoming more common, depending on the need of the individuals. Before individuals decide to use these technologies they need to be informed on how it works and the positive and negative impacts associated.

**Product** – You will create a leaflet for a doctor's surgery on ONE reproductive technology / aid.

**Success criteria for assessment** –

- The leaflet should be a maximum of 2 sides of A4.
- The leaflet should include:
  - A brief introduction of the human problem that exists (e.g. overpopulation or underpopulation)
  - Scientific explanation of how the chosen reproductive technology works and will solve the problem.
  - Discussion on positive and negative impacts of this technology
  - Provide specific examples with useful data, statistics, graphs etc.
  - A conclusion including your judgement on how effective the technology would be.
- Write clearly and concisely. Scientific vocabulary should be applied consistently.
- The leaflet needs to include a clear bibliography, with at least five sources cited.

**Student Task Planning Notes:**

# 7B 16a Human reproduction review

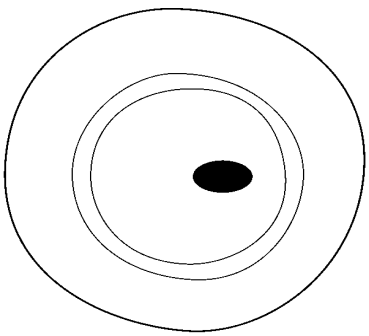
**1** Draw lines to match the words below with the correct meaning.
The first one has been done for you.

| WORDS | MEANINGS |
|---|---|
| Egg cell | Often called 'making love' |
| Ejaculation | A sex cell made in the testes |
| Fertilisation | Semen is released from the penis |
| Sexual intercourse | The female sex cell |
| Sperm cell | The joining of a sperm cell and an egg cell |

**2** Which of these sentences are about human reproduction? Tick the correct boxes.

| | |
|---|---|
| 1. The sperm cell and the egg cell join (**fuse**) outside the female. | |
| 2. The sperm cell and the egg cell fuse inside the oviduct. | |
| 3. The sperm cell and the egg cell fuse inside the sperm duct. | |
| 4. The fertilised egg cell divides into two. | |
| 5. A ball of cells that will grow into a baby is called an embryo. | |
| 6. The embryo grows inside the uterus. | |
| 7. The embryo grows inside the ovary. | |
| 8. The embryo grows outside the female. | |

**3** The nucleus of the egg cell contains half the instructions about how a new animal will look.
The nucleus of the sperm cell contains the other half of the instructions.
On the diagrams below label the nucleus in the sperm cell and the nucleus in the egg cell.



**Questions:** If you have any questions about human reproduction, you may want to write them down below and show this to your teacher.

# 7B 16b Internal and External Reproduction

| | |
|---|---|
| Reptiles' eggs have leathery shells and contain lots of stored food | Frogspawn is a food source for other aquatic animals |
| Birds produce a much smaller number of eggs than fish or birds | Amphibians such as frogs lay lots of eggs in water |
| Birds' eggs have hard shells | An elephant's fertilised egg grows inside the uterus |
| Female fish release eggs in very large numbers into the water. The eggs are then fertilized by the sperm from male fish | The sperm from the frog can swim to the eggs and fertilise them |
| Frogs eggs only contain a little stored food | |

Decide if these statements are talking about internal or external fertilization.

# 7B16c Animal Reproduction Factsheet

The table below gives information about how different animals reproduce and look after their young. First, look at this explanation of what the labels in the boxes mean:

- Type of animal – Whether the animal is an amphibian, bird, fish, mammal or reptile.
- Time for development – The length of time in days for an animal to develop from a fertilised egg cell until it is born or hatches.
- Number of young – The number of offspring that are usually born or hatch after the animals have mated.
- Aftercare – How long the parents look after their offspring.
- Fertilisation – Whether fertilisation is internal or external.
- Development – Whether the offspring develop inside their mothers, like humans (internal), or outside, like fish (external).
- Survival rate – The approximate percentage of offspring who will survive long enough to have offspring of their own.

| | **Black rat snake** | **Bullfrog** | **Cod** | **Gorilla** | **Grey squirrel** | **Grey wolf** |
|---|---|---|---|---|---|---|
| Type of animal | Reptile | Amphibian | Fish | Mammal | Mammal | Mammal |
| Time for development | 3 months | 20 days | 25 days | 8.5 months | 38 days | 3 months |
| Number of young | 20 | 5000 | 3000 | 1 | 5 | 5 |
| Aftercare | None | None | None | 2.5 years | 13 weeks | 1 year |
| Fertilisation | Internal | External | External | Internal | Internal | Internal |
| Development | External | External | External | Internal | Internal | Internal |
| Survival rate | 50% | 1% | 2% | 60% | 20% | 40% |

| | **Hare** | **Harvest mouse** | **King penguin** | **Human** | **Lion** | **Polar bear** |
|---|---|---|---|---|---|---|
| Type of animal | Mammal | Mammal | Bird | Mammal | Mammal | Mammal |
| Time for development | 1.5 months | 19 days | 2 months | 9 months | 3 months | 8 months |
| Number of young | 2 | 6 | 2 | 1 | 3 | 2 |
| Aftercare | 1 month | 16 days | 1 year | 16 years | 2.5 years | 2.5 years |
| Fertilisation | Internal | Internal | Internal | Internal | Internal | Internal |
| Development | Internal | Internal | External | Internal | Internal | Internal |
| Survival rate | 30% | 15% | 40% | 99% | 50% | 50% |

| | **Rat** | **Salmon** | **Sea turtle** | **Stickleback** | **Tiger** |
|---|---|---|---|---|---|
| Type of animal | Mammal | Fish | Reptile | Fish | Mammal |
| Time for development | 22 days | 2 months | 2 months | 7 days | 3.5 months |
| Number of young | 7 | 200 | 150 | 20 | 3 |
| Aftercare | 2 weeks | None | None | 1 week | 2 years |
| Fertilisation | Internal | External | Internal | External | Internal |
| Development | Internal | External | External | External | Internal |
| Survival rate | 30% | 15% | 5% | 30% | 50% |

# 7B 16d Animal Reproduction Communication Skills

Choose **2 different types of animals** (amphibians, reptiles, birds, fish, mammals)

Give the name of the animals that you have chosen (e.g. Siberian tiger and giant cobra). **Research** how each of these animals reproduce.

You may want to consider some of the following;

Time for development (The length of time between when the egg is fertilised until it is born/hatches)

Number of young (How many babies/offspring are normally born/hatch).

Aftercare (How long the parents look after the babies/offspring after they are born/hatch).

Fertilisation (Does the sperm and the egg meet inside the mother's body or outside?)

Development (Do the babies/offspring grow inside the mother (like humans) before they are born, or do they grow outside the mother (like fish)).

Survival rate. How many of the babies/offspring normally survive to become adults?

Which of these 2 animals do you feel has the most successful method of reproduction? Explain why.

Communicate your research in the form of an extended piece of writing (essay). You may include diagrams if you wish to help explain.

A good scientific essay includes the following:

A Clear **Title**.

An **Introduction**. A statement or paragraph that explains what you are writing about and some background information.

A **discussion** of each of the points that you wish to raise, set out in clear paragraphs. This will make up about 80% of your essay and needs to include some of the following.

Good knowledge and understanding of the concepts covered.

Good use of scientific words, vocab and language.

Illustrations, pictures, diagrams or examples to help explain the points that you are making.

A **Conclusion**. This is a summary of your findings or is a clear statement of what you found out.

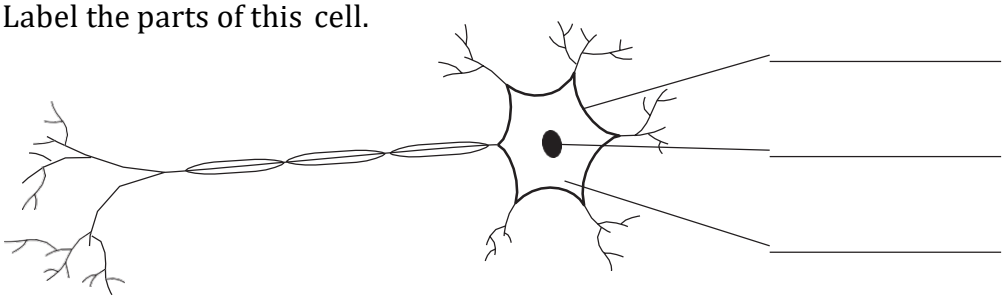
**Bibliography**. Evidence that you have used more than one source for your research (text books, different internet web sites etc

You will be assessing your **communication skills** on this piece of work. Some of the skills that you will need to show on this piece of work are on the 'Communication Skills Rubric'.

**Your essay should not be longer than 800 words.**

# 7B 17a Cells, Organs & Organ Systems Revision

**1 a** Label the parts of this cell.



**b** Which type of **tissue** does this cell form? _____

**c** Which **organ** might this tissue be found in? _____

**d** Which **organ system** would this organ be found in? _____

**2** Which organ system:

**a** carries oxygen and food around the body? _____

**b** breaks down food? _____

**c** takes oxygen out of the air? _____

**d** carries messages around the body? _____

**3** In the following sentences, *one* organ is not correct. Put a cross through the wrong organ and write the name of the correct one in the space.

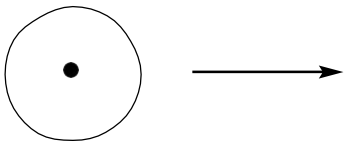
**a** The breathing system contains the lungs and intestines. _____

**b** The nervous system contains the brain and the little toe. _____

**c** The circulatory system contains the liver and blood vessels. _____

**4** The drawing shows an animal cell.

**a** Draw two or three more diagrams to show the steps taken when this cell splits into two.



**b** What is the name of this process? _____

**c** What are the two new cells called? _____

Adapted from Exploring Science for QCA

© Pearson Education Limited 2002

# 7B 17b Cells - Quick Quiz

**On your answer sheet, write in or circle the correct letter for each question.**

**7Aa**

**1** An organ is:

**A** another name for a living thing.

**B** a large part of an animal or plant that does a very important job.

**C** the part of the body that makes sounds.

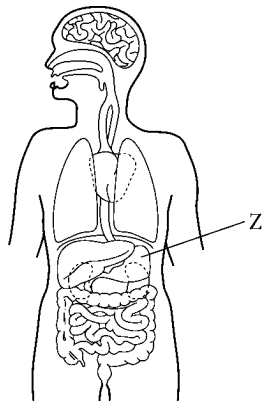
**D** another name for a body.

**2** Organs contain:

**A** hearts. **B** tissues.

**C** glass. **D** newspaper.

**3** In the picture, what is part 'Z'?




**A** stomach **B** hand

**C** kidney **D** lung

**4** What are the kidneys used for?

**A** To get rid of waste from the body.

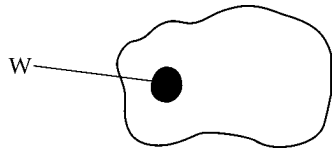
**B** To help us to breathe.

**C** To help us digest food.

**D** To make blood.

## 7Ab

**1** On this drawing of an animal cell, what is part labelled 'W'?

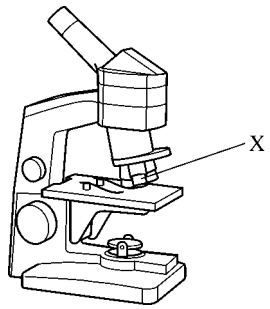



**A** cell surface membrane
**B** chloroplast
**C** nucleus
**D** heart

**2** On the drawing of the animal cell, what does part 'W' do?

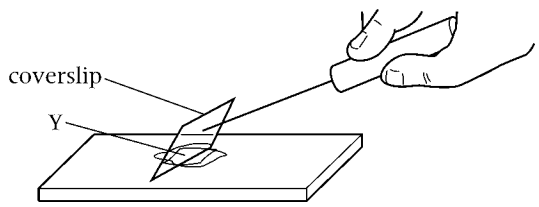
**A** makes energy **B** makes food
**C** controls the cell **D** holds the cell together

**3** On the drawing of a microscope, what is the name of the part labelled 'X'?




**A** stage
**B** focusing wheel
**C** objective lens
**D** base

**4** Look at the diagram of a slide being made. The object you want to look at ('Y') is called the:




**A** specimen. **B** kingdom.
**C** stage. **D** focus.

**7Ac**

**1** A tissue is:

**A** a collection of organs helping each other.

**B** another name for an organ.

**C** a group of cells which are all different, all doing different jobs.

**D** a group of cells which are the same, all doing the same job.

**2** A nerve cell has to carry messages around the body quickly. To help it do this it is:

**A** short and square.

**B** very small.

**C** very long.

**D** able to move around the body.

**3** A root hair cell is adapted to its job because the root hair:

**A** is hook-shaped to hold the plant in the ground.

**B** gives the cell a large surface area to help it absorb water.

**C** has many chloroplasts to help it make food.

**D** can move to help the plant move from place to place.

# 7B2 17c Reproduction Summary Sheets

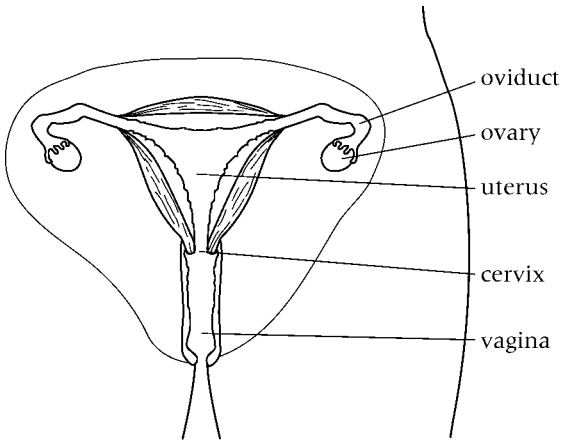
## Reproduction

**Reproduction** produces new living things (**offspring**). In **sexual reproduction** the nucleus in a male **sex cell** joins (**fuses**) with the nucleus in a female sex cell. This is called **fertilisation** and produces a **fertilised egg cell**. When fertilisation happens outside an animal's body it is called **external fertilisation**. Animals that use this method produce a lot of eggs since some will be eaten by other animals. Humans use **internal fertilisation**.

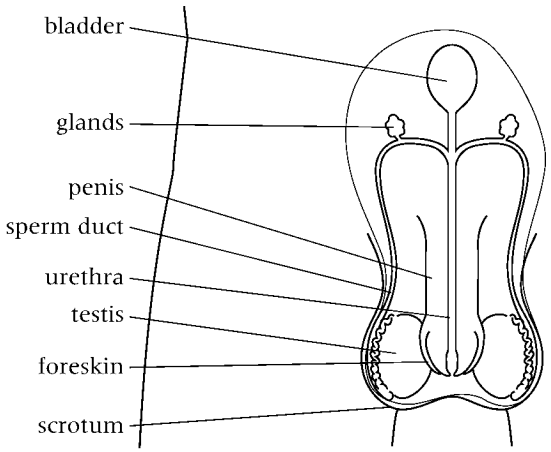
The fertilised egg cell grows into an **embryo** and the embryo eventually becomes a new living thing. Sexual reproduction needs two **parents**. The offspring from sexual reproduction are different from the parents; they are new **varieties**.

### *The human reproductive systems*

Humans have **reproductive organs** so that they can reproduce. The ovaries and testes produce sex cells.




Female – ovaries are where the female sex cells (**egg cells**) are produced.




Male – testes are where the male sex cells (**sperm cells**) are produced.

### *Puberty and adolescence*

The reproductive organs get bigger and start to make sex cells at **puberty**. This is a time when major physical changes occur in our bodies. These changes are caused by **sex hormones**.

**Changes in boys**

- voice deepens ('breaks')
- shoulders get wider
- hair grows under arms, on face and on chest
- pubic hair grows
- testes and penis get bigger
- testes start to make sperm cells
- body smell increases

**Changes in girls**

- underarm hair grows
- breasts develop
- ovaries start to release egg cells
- hips get wider
- pubic hair grows
- body smell increases

**Adolescence** is the time when puberty is occurring and emotional changes happen. It starts between the ages of 10–15 and ends at about 18. The changes start sooner in girls. After puberty, men produce sperm cells for the rest of their lives. Women stop releasing egg cells at the age of 45–55. This is called the **menopause**.

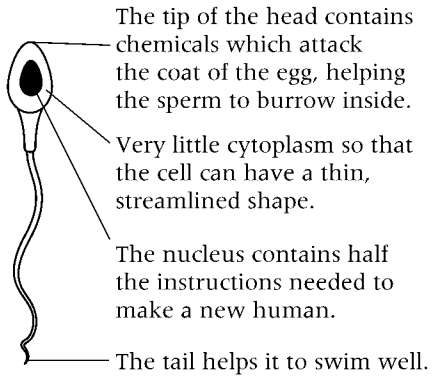
## *The menstrual cycle*

The **menstrual cycle** starts with **menstruation** (the loss of the uterus lining and some blood through the vagina). It takes 28–32 days for each cycle. About 14 days after menstruation starts, an egg cell is released from an ovary. This is called **ovulation**. If the egg cell is not fertilised, the uterus lining starts to break down and the cycle starts again.

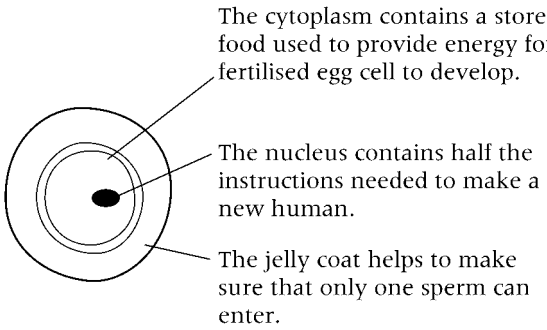
## *Sex*

The sperm cells enter the **vagina** during **sexual intercourse**. **Semen** (sperm cells mixed with special liquids from the **glands**) is forced out of the penis and into the top of the vagina. This is called **ejaculation**. The semen is moved into the top of the uterus and the sperm cells can swim down the oviducts.

Egg cells and sperm cells are **adapted** to their **functions**.



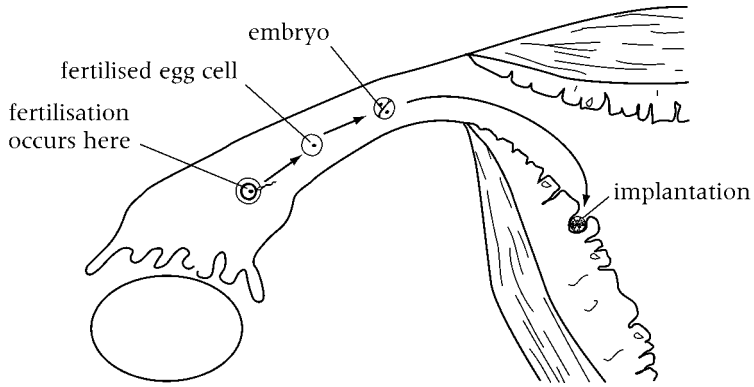

A sperm cell is much smaller than an egg cell.




The egg cell is about the size of a full stop.

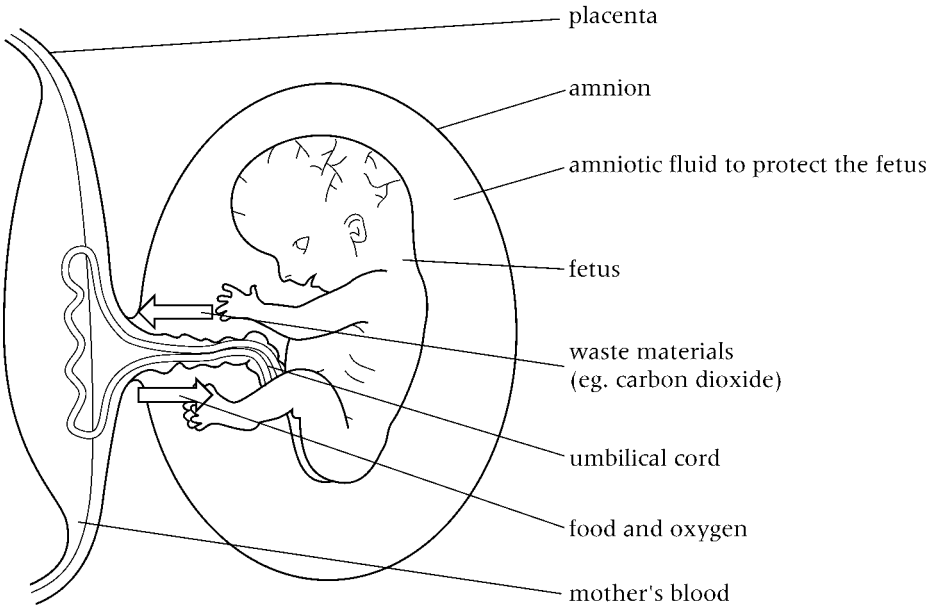
## *Pregnancy*

If the egg cell meets a sperm cell in an oviduct fertilisation can occur. The fertilised egg cell divides to form a ball of cells (an **embryo**). The embryo travels to the uterus where it sinks into the soft lining (**implantation**). The woman is now **pregnant**. Once it has developed all its organs (after about 10 weeks) it is called a **fetus**. It takes about 40 weeks (9 months) for a fertilised egg cell to grow into a baby ready to be born. This time is called the **gestation period**.




The fertilised egg cells of many animals grow and develop outside their parents. This is called **external development**. Humans use **internal development** and produce less offspring than animals using external development since the growing embryos are protected inside the mother.

While inside the uterus, the fetus is supplied with oxygen and food by the **placenta**. The placenta also gets rid of waste (especially carbon dioxide) from the fetus. The **cord** (or **umbilical cord**) connects the fetus to the placenta.




If a mother smokes, drinks too much alcohol or takes drugs while pregnant she might damage the baby. The baby might be **premature**.

## *Birth*

When the baby is ready to be born, the uterus starts **contractions** and the woman goes into **labour**. The muscles of the cervix relax. The baby is pushed out head first through the cervix and the vagina. After birth, the baby starts to breathe and the cord is cut. The scar left behind is the **navel**. After this the placenta is pushed out of the uterus. This is the **afterbirth**. The baby is fed on milk, often from the mother's breasts which contain **mammary glands** that produce milk. The milk contains **antibodies** which help destroy microbes that might cause a disease in the baby.

# 7B17d Reproduction - Quick Quiz

**On your answer sheet, write in or circle the correct letter for each question.**

## 7Ba

**1** Fertilisation is when an egg cell joins with:

**A** another egg cell.

**B** a sperm cell.

**C** a body cell.

**D** root hair cells.

**2** Salmon are fish which produce thousands of egg cells when they breed. One reason for this is that:

**A** many of the egg cells get eaten by other animals.

**B** the female salmon need to sort through their egg cells to find the biggest to use for fertilisation.

**C** salmon breed on dry land and the mass of egg cells stops the ones in the middle drying out.

**D** there is only one real egg cell, the others just help it get out of the female.

**3** Before it is born, a calf is inside a cow's:

**A** stomach.

**B** uterus.

**C** oviduct.

**D** large intestine.

**4** Tadpoles develop in water, not inside frogs. A calf develops inside a cow. One reason offspring develop inside their mothers is:

**A** the mother finds it easier to walk with her offspring inside her.

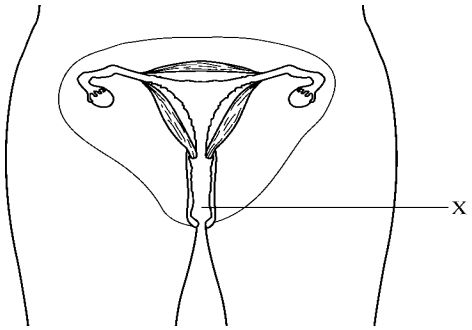
**B** the mother does not need to feed her offspring at first.

**C** the offspring are prevented from moving and so they cannot run away.

**D** the offspring are protected from other animals.

**7Bb**

**1** What is the part labelled 'X' in the diagram?




**A** bladder **B** cervix

**C** uterus **D** vagina

**2** One way that a sperm cell is adapted to its job is that:

**A** it dies quite quickly.

**B** it is hollow.

**C** it is surrounded by a liquid.

**D** it has a tail to allow it to swim.

**3** An egg cell is much larger than a sperm cell because:

**A** it needs to be able to hide from sperm cells.

**B** it needs to be big to allow it to have a streamlined shape.

**C** it contains a store of food that can be used if it is fertilised.

**D** the nucleus in an egg cell is much larger than in a sperm cell.

**4** Menopause is:

**A** the time when physical changes happen in the body.

**B** the time when men need to sleep.

**C** the time when a woman stops producing egg cells.

**D** the time when animals find a mate.

## 7Bc

**1** Fertilisation occurs in:

**A** an ovary. **B** an oviduct.

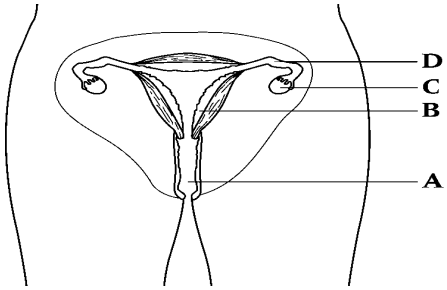
**C** the scrotum. **D** the penis.

**2** A fertilised egg cell develops into an embryo by:

**A** cell division. **B** puberty.

**C** ovulation. **D** fertilisation.

**3** Look at the diagram. Which letter shows where implantation happens?




**4** The nucleus inside every sex cell contains information. How much of the information needed to make a new life does an egg cell carry?

**A** 100% **B** 75%

**C** 50% **D** 25%

## 7Bd

**1** The loss of blood and the uterus lining in the menstrual cycle is called:

**A** menstruation.

**B** ovulation.

**C** fertilisation.

**D** urination.

**2** A developing baby is protected by:

**A** a bag of fluid (amnion).

**B** the vagina.

**C** the ovary wall.

**D** a cord.

**3** The developing baby gets food and oxygen from:

**A** the mother's stomach.

**B** the placenta.

**C** the ovary.

**D** the egg cell.

**4** A premature baby is a baby that is:

**A** born very late.

**B** very active.

**C** born if the parents are not married.

**D** born small and very early.

**7Be**

**1** Pregnancy lasts for:

**A** nine days. **B** nine weeks.

**C** nine months. **D** ninety days.

**2** Mammary glands produce:

**A** mashed up food.

**B** milk.

**C** amniotic fluid.

**D** sugar.

**3** Puberty is caused by:

**A** sex cells.

**B** eating too much.

**C** pubic hair starting to grow.

**D** sex hormones.

**4** This graph shows the height of a boy between the ages of ten and fifteen.


Between which ages was he growing the fastest?

**A** 10 and 11 **B** 11 and 13

**C** 13 and $13\frac{1}{2}$ **D** $14\frac{1}{2}$ and 15