

Name:

Form:

- Aim to complete three lessons each week.
- Use the online text book to help you
- <https://www.kerboodle.com/app>
- Login using your user name (1st initial followed by surname all lower case eg Joe Blogs = jblogs)
- Password (initially the same as your user name) should be reset to stewards lower case
- Complete the work described in the four part lesson
- Institution code is fu0
- Use the mark schemes provided to self assess your work and make corrections in blue pen.

what are other
words for
variation?

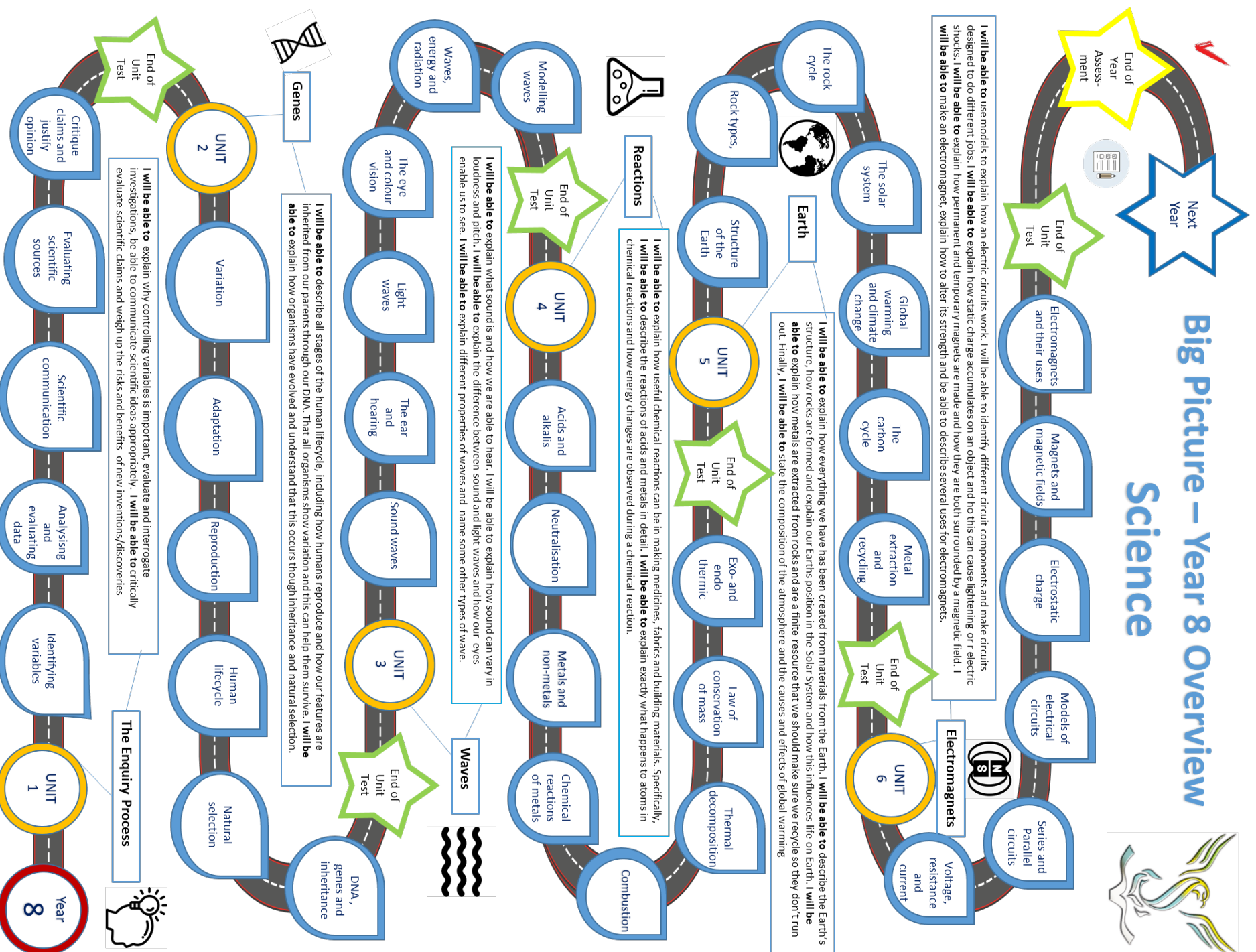


modification, change,
alteration, mutation,
fluctuation, variety, deviation,
difference, version, variant





Big Picture – Year 8 Overview Science



ZOOM IN...

MY LEARNING JOURNEY:

Subject: Genes Year: 8 Unit: 4

AIMS:

Students will be able to explain how organisms reproduce. How there is variety between the different species but also within a species. Students will learn how mutations in DNA create variation within a species. They will also learn how environmental changes and the impact of humans can affect biodiversity and why it is important to guard against this. Finally they will learn how scientists can genetically engineer the DNA of organisms to display desired characteristics.

DEVELOPING COURAGE

C Understanding how our genes work
O To learn out genetic engineering
U Understand how we are all related
R Learning about DNA – something smaller than the eye can see
A How humans are affecting their environment
G Work together to protect our environment
E Investigating the exciting advances that genetic engineering may bring in the future

PREVIOUS LEARNING

Pupils will need to have some experience of animals and plants being adapted to their environment. They will understand that environments can change and that this can be dangerous. There will be a basic understanding with regards to living organisms being able to reproduce. Also, that a lifecycle shows the different stages of an organism's life from birth to old age.

WHAT WE KNOW/ REMEMBER

-
-
-
-
-

UP NEXT

Earth

- Evolution
- Biodiversity
- Inheritance
- Genetic modification
- Variation
- Adaptation
- Puberty
- Reproduction
- Foetal development

CAREERS

- Geneticist
- IVF nurse
- Forensic Scientist
- Nursery Teacher



PERSONAL OBJECTIVES

-
-
-
-
-
-
-
-
-
-

RECOMMENDED READING

1. The Human DNA Manual. Understanding Your Genetic Code by Melita Irving,
2. Dna, Genes, and Chromosomes by Mason Anders,
3. Darwin: An Exceptional Voyage by Fabien Grolleau / Jeremie Royer. air Smith

Connection

Have a look at the topic overview and the zoom in.

Populate what you know and your personal objectives.

Lesson 1: Book 1 – Variation (10.1.1)

Activation

LI: **State that variation is caused by the environment or inheritance.**

1. Make a note of the date, title and the LI
2. Key words – variation, species, environmental variation, inherited variation.
3. Read pages 200-201
4. Give 3x examples of genetic and 3x environmental characteristics
5. <https://www.youtube.com/watch?v=jUHokSPkzT8&vl=en-GB>
6. https://www.youtube.com/watch?v=DjGZp_IU5EY
7. Answer Questions A, B, C, D



Consolidation

Make a note of one thing you think you understand well and one thing that you would like to ask your teacher

Demonstration

Attempt Summary questions

In 15 mins answer as many questions as you can.

Self-mark the questions you have done making any necessary corrections in blue pen

Challenge yourself to answer as many as you can:

Single chemistry bottle question is for all students

Double chemistry bottle question are for students looking to extend their knowledge

Triple chemistry bottle question is for students looking to challenge themselves.



N/A

| | |
|-------------------|---|
| In-text questions | <p>A Differences in characteristics within a species.</p> <p>B A group of organisms which share very similar characteristics (and are able to produce fertile offspring).</p> <p>C Variation between organisms in a species due to the characteristics inherited from their parents.</p> <p>D Variation caused by a person’s surroundings and lifestyle.</p> |
| Activity | <p>Spelling key terms</p> <p>Working with a partner, students test their spelling of species, variation, adaptation, inherited, environmental.</p> |
| Summary questions | <p>1 species, characteristics, offspring, variation, environmental, inherited (6 marks)</p> <p>2 Environmental: tattoo, scar. Inherited: blood group, eye colour. Both: body mass, intelligence. (6 marks)</p> <p>3 Identical twins have the same inherited characteristics. Any difference must therefore be caused by environmental factors. (2 marks)</p> <p>4 Extended response question (6 marks). Example answers: Variation is the difference in characteristics within a species. Inherited variation depends on characteristics inherited from parents. For example, lobed or lobe-less ears, eye colour, and blood type. Environmental variation depends on changes in a person’s surroundings and/or lifestyle. For example, dyed hair, tattoos, and scars. Many characteristics are affected by both inherited and environmental variation. For example, height. Some characteristics are not affected by environmental factors at all. For example, eye colour, blood group.</p> |

Connection

1. Recall what is variation.
2. Name two types of variation.
3. Give 2 examples of each variation.



Lesson 2: Book 1 – Continuous and discontinuous. (10.1.2)

Activation

LI: **Plot bar charts or line graphs to show discontinuous or continuous variation data.**

1. Make a note of the date, title and the LI
2. Key words –discontinuous variation, continuous variation.
3. Read pages 202 to 203
4. https://www.youtube.com/watch?v=MHx_I-plkzc
5. Copy the bar charts to show continuous and discontinuous.
6. Answer Questions A, B, C, D



Consolidation

Make a note of one thing you think you understand well and one thing that you would like to ask your teacher



Demonstration

Attempt Summary questions

In 15 mins answer as many questions as you can.

Self-mark the questions you have done making any necessary corrections in blue pen

Challenge yourself to answer as many as you can:

Single chemistry bottle question is for all students

Double chemistry bottle question are for students looking to extend their knowledge

Triple chemistry bottle question is for students looking to challenge themselves.

Connection

- 1. Variation is the differences between individuals within a species.
- 2. Inherited variation, environmental variation.
- 3.
 - Inherited variation: eye colour
 - hair colour
 - skin colour
 - Environnemental variation:
 - diet
 - accidents
 - culture

Activation & Demonstration

| | |
|-------------------|---|
| In-text questions | A Characteristics that can only result in certain values. B Characteristics that can take any value within a range. C bar chart D histogram, often with a line added |
| Activity | Which graph? a bar chart b histogram c histogram d histogram |
| Summary questions | 1 discontinuous, continuous, graph, bar chart, histogram (5 marks) 2 Continuous: length of arm, maximum sprinting speed, average leaf size. Discontinuous: hair colour, shoe size. (5 marks) 3a Most people are of an average height, around 150 cm. Few people are very short, below 135 cm. Few people are very tall, above 170 cm. (3 marks) B Height is affected by both inherited and environmental factors. If your parents are tall, you are also likely to be tall (inherited). However growth can be affected by environmental factors, for example, malnourishment. (3 marks) 4 Extended response question (6 marks). Example answers: Continuous variation is variation that can take any value within a range. For example, height, body mass, arm span, hair length, or length of feet. Continuous data should be plotted on a histogram. A line is often added to the histogram to see the shape of the graph. This type of variation usually produces a curve known as a normal distribution. Discontinuous variation is variation that can only result in certain values. For example, gender, blood type, eye-colour, or shoe size. Discontinuous variation should be plotted on a bar chart. |

Connection

1. Give an example of discontinuous data.
2. Give an example of continuous data.
3. Describe what type of graphs are used to show continuous and discontinuous data.



Lesson 3: Book 1 – Adapting to change. (10.1.3)

Activation

LI: Explain how characteristics of a species are adapted to particular environmental conditions.

1. Make a note of the date, title and the LI
2. Key words – adaptation.
3. Read pages 204 to 205
4. List 3x adaptations of a plant and 3x of an animal that enable them to survive in the desert
5. <https://www.youtube.com/watch?v=BYkPlbnviro>
6. Answer Questions A, B, C.



Consolidation

Make a note of one thing you think you understand well and one thing that you would like to ask your teacher



Demonstration

Attempt Summary questions

In 15 mins answer as many questions as you can.

Self-mark the questions you have done making any necessary corrections in blue pen

Challenge yourself to answer as many as you can:

Single chemistry bottle question is for all students

Double chemistry bottle question are for students looking to extend their knowledge

Triple chemistry bottle question is for students looking to challenge themselves.

Connection

- 1. Blood group, eye colour.
- 2. Body mass, hair length.
- 3. Bar chart –discontinuous data, line graph – continuous data.

Activation & Demonstration

| | |
|-------------------|--|
| In-text questions | <p>A Characteristics that enable an organism to be successful</p> <p>B Any two from: saves energy, nutrients can be reused provide a layer of warmth/protection at the base of the tree.</p> <p>C hibernation, migration, grow thicker fur</p> |
| Activity | <p>Nocturnal animals</p> <p>Credit suitable information poster on a nocturnal animal of the student’s choice (e.g., owl), and how the animal is adapted for hunting at night.</p> <p>Poster should include features of the animal with special adaptations, explained using as many scientific terms as possible.</p> |
| Summary questions | <p>1 characteristics, variation, survive, extinction (4 marks)</p> <p>2 Changes to a habitat cause an increased competition for survival. Those organisms best adapted to the change will survive and reproduce. This increases the population of that species. Unsuccessful organisms will have to move to another habitat, or die. (3 marks)</p> <p>3 Any three from: waxy layer, spines instead of leaves, large root system, stems which can store water. (3 marks)</p> <p>4a One mark for plausible suggestion (1 mark) with reasoning (1 mark) and effect on population (1 mark).</p> <p>For example, if the atmosphere is warmer, there may be less snow (1 mark)</p> <p>This means that the hare would be less well camouflaged if white (1 mark) and so be more likely to be eaten / so population would decrease (1 mark).</p> <p>b If any change in fur colour from reddish-brown to white is caused by a drop in temperature (1 mark), any increase in temperature would cause no response, so the hare would retain its reddish-brown colour (1 mark) meaning it remains well adapted to its habitat (1 mark). <i>OR</i> other species may have white fur (1 mark) which means they would lose their camouflage (1 mark) if the temperature rose and snow melted (1 mark).</p> |

Connection

1. Define adaptation.
2. List plant adaptations in a desert.
3. Describe how animals cope with the seasons.



Lesson 4: Book 1 – Adolescence (10.2.1)

Activation

LI: State changes to the bodies of boys and girls during puberty.

1. Make a note of the date, title and the LI
2. Key words – adolescence, puberty, sex hormones.
3. Read pages 206 to 207
4. https://www.youtube.com/watch?v=IK_dTO5WosI
5. List the changes that occur to boys, girls and both during puberty (bullet points page 207)
6. Answer Questions A, B



Consolidation

Make a note of one thing you think you understand well and one thing that you would like to ask your teacher



Demonstration

Attempt Summary questions

In 15 mins answer as many questions as you can.

Self-mark the questions you have done making any necessary corrections in blue pen

Challenge yourself to answer as many as you can:

Single chemistry bottle question is for all students

Double chemistry bottle question are for students looking to extend their knowledge

Triple chemistry bottle question is for students looking to challenge themselves.

Connection

- 1. Characteristics that enable an organism to be successful.
- 2.
 - Waxy layer
 - Fleshy stems
 - Widespread roots
 - Spines
- 3.
 - Hibernation
 - Migration
 - Thick winter coat

Activation & Demonstration

| | |
|-------------------|--|
| In-text questions | <p>A The period of time in which a person changes from a child into an adult.</p> <p>B The physical changes a person’s body experiences when changing from a child to an adult.</p> <p>C Any two from: breasts develop, ovaries release eggs, periods start, hips widen.</p> <p>D Any two from: voice breaks, testes/penis get bigger, testes start to produce sperm, shoulders widen, growth of facial hair/chest hair.</p> |
| Activity | <p>Problem pages</p> <p>The reply should include the following points:</p> <p>Kyle is undergoing puberty, caused by male sex hormones. He is changing from a child into an adult.</p> <p>A number of changes will occur, including his voice deepening, getting taller, and his genitals growing.</p> <p>The whole process takes several years but the precise start and finish time is different for everyone. This is something that happens to everyone and we cannot stop puberty. It is nothing to worry about.</p> |
| Summary questions | <p>1 adolescence, physical, puberty, hormones (4 marks)</p> <p>2 pubic hair/underarm hair growth, body odour, growth spurt (3 marks)</p> <p>3 Give two marks for general changes (pubic hair/underarm hair growth, body odour, emotional changes, and growth spurt).</p> <p>Give two marks for male-only changes (voice breaks, testes/penis get bigger, shoulders widen, facial/chest hair).</p> <p>Give two marks for reasons (hormones/released from testes/chemical messengers/reproductive system needs to become fully functional).</p> |

3.

Connection

1. Define adolescence.
2. Describe what happens during puberty.
3. Explain what causes puberty ?



Lesson 5: Book 1 – Reproductive system (10.2.2)

Activation

LI: Give a function of the main structures of the male and female reproductive system.

1. Make a note of the date, title and the LI
2. Key words – reproductive system, sperm cells, testicles, scrotum, sperm duct, urethra, penis, semen, sexual intercourse, egg, cell, ovaries, cervix, vagina, gametes, fertilisation.
3. Read pages 208 to 209
4. https://www.youtube.com/watch?v=-ekRRuSa_UQ
5. Answer Questions A, B, C, D



Consolidation

Make a note of one thing you think you understand well and one thing that you would like to ask your teacher



Demonstration

Attempt Summary questions

In 15 mins answer as many questions as you can.

Self-mark the questions you have done making any necessary corrections in blue pen

Challenge yourself to answer as many as you can:

Single chemistry bottle question is for all students

Double chemistry bottle question are for students looking to extend their knowledge

Triple chemistry bottle question is for students looking to challenge themselves.

Connection

1. Adolescence is the period of life between child and adulthood.
2.
 - Pubic and underarm hair grows
 - Stronger body smell
 - Emotional changes
 - Growth spurt
3. The changes that happen during puberty are caused by **hormones**. Male sex hormones produced in testicles. Female sex hormones are produced in ovaries.

Activation & Demonstration

| | |
|-------------------|---|
| In-text questions | A Produce sperm and release them inside the female. B Produce egg and allow a baby to grow until it is ready to be born. C uterus (womb) D female: egg cell, male: sperm |
| Activity | Glossary The students’ glossaries should contain key words from Big Idea 10. |
| Summary questions | 1 1 mark for each correct match. (6 marks) penis – carries sperm out of the body vagina – receives sperm during sexual intercourse sperm duct – carries sperm to the penis oviduct – carries an egg to the uterus testicles – produce sperm ovaries – contain eggs 2 Sperm are male sex cells; semen is a fluid containing both sperm and the nutrients to keep sperm alive. (2 marks) 3 4 marks for identifying the correct structure 1 mark for the correct order, and 1 mark for a well organised flow chart. testicles → sperm duct → urethra/penis → vagina |

Lesson 6: Book 1- Fertilisation and implantation. (10.2.3)

Activation

LI: Describe causes of low fertility in male and female reproductive systems.

1. Make a note of the date, title and the LI
2. Key words – cilia, ejaculation, implantation, embryo.
3. Read pages 210 to 211.
4. <https://www.bbc.co.uk/programmes/p00w628c>
5. Answer Questions A, B, C.

Demonstration

Attempt Summary questions

In 15 mins answer as many questions as you can.

Self-mark the questions you have done making any necessary corrections in blue pen

Challenge yourself to answer as many as you can:

Single chemistry bottle question is for all students

Double chemistry bottle question are for students looking to extend their knowledge

Triple chemistry bottle question is for students looking to challenge themselves.

Connection

1. State the function of reproductive system.
2. List the parts of male reproductive system.
3. Describe fertilisation.



Consolidation

Make a note of one thing you think you understand well and one thing that you would like to ask your teacher

Activation & Demonstration

Connection

- 1. The function of reproductive system is to produce gametes.
- 2. Testicles, scrotum, sperm duct, penis, urethra.
- 3. The joining of a male and female gamete is fertilisation. When a sperm and egg join, the egg is fertilised and a baby starts to develop.

| | |
|-------------------|---|
| In-text questions | A moved along by cilia B Penis releases sperm/semen into the vagina. C Fertilised egg (or embryo) attaches to the lining of the uterus. |
| Summary questions | 1 fertilisation – the nuclei of the sperm and egg cell join together ejaculation – semen is released into the vagina implantation – the fertilised egg attaches to the lining of the uterus cilia – the little hairs that move the egg cell along the oviduct (4 marks) 2a Penis becomes erect and vagina becomes moist. Penis inserted into vagina. Sperm/semen released/ejaculated into vagina. (3 marks) b male: low sperm count/sperm that do not swim properly (1 mark); female: egg cells not being released/blocked fallopian tubes (1 mark) 3 Example answers (6 mark): Eggs are larger; sperm are smaller. Sperm can swim; eggs must be moved by cilia. Eggs are made before birth/only mature; sperm are made constantly. Only one egg released per month; millions of sperm released each ejaculation. |

Connection

1. State the job of cilia cells.
2. Describe ejaculation.
3. Explain why there are could be difficulties of getting pregnant.



Lesson 7: Book 1- Development of a fetus. (10.2.4)

Activation

LI: Show stages in development of a fetus from the production of sex cells to birth.

1. Make a note of the date, title and the LI
2. Key words – gestation, fetus, placenta, umbilical cord, amniotic fluid.
3. Read pages 212 to 213.
4. <https://www.youtube.com/watch?v=XEfng4Q4bfk>
5. Answer Questions A, B, C.



Consolidation

Make a note of one thing you think you understand well and one thing that you would like to ask your teacher



Demonstration

Attempt Summary questions

In 15 mins answer as many questions as you can.

Self-mark the questions you have done making any necessary corrections in blue pen

Challenge yourself to answer as many as you can:

Single chemistry bottle question is for all students

Double chemistry bottle question are for students looking to extend their knowledge

Triple chemistry bottle question is for students looking to challenge themselves.

Connection

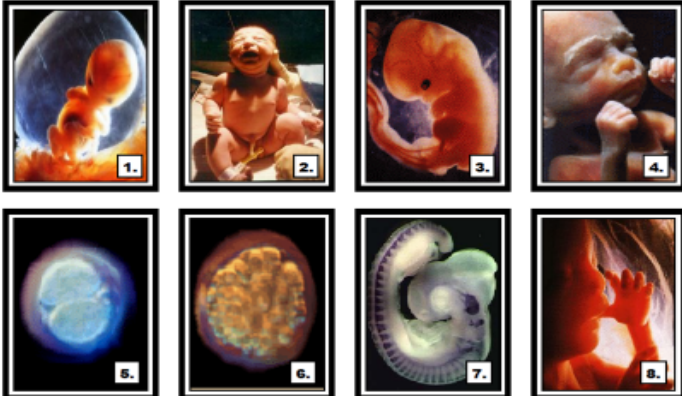
1. The cilia cells waft the egg cell along the oviduct towards uterus.
2. The sperm cells mixed with special liquids from the glands is forced out of the penis.
3. Common male problems: low sperm count or producing sperm that doesn't swim properly. Common female problems: egg not being released monthly, blocked fallopian tubes.

Activation & Demonstration

| | |
|-------------------|--|
| In-text questions | <p>A about 9 months (40 weeks)</p> <p>B nutrients and oxygen</p> <p>C about 4 weeks</p> <p>D cervix relaxes and uterus muscle contracts, pushing the baby out of the vagina.</p> |
| Activity | <p>Elephant gestation</p> <p>22 x 4 = 88 weeks. This is more than twice the length of the gestation period in humans (40 weeks).</p> |
| Summary questions | <p>1 fetus, uterus, gestation, amniotic fluid, umbilical cord, blood (7 marks)</p> <p>2 Any three from: Substances transferred between maternal and fetal blood. Occurs in the placenta. Oxygen and nutrients diffuse from mother to baby. Waste substances, like carbon dioxide, diffuse from baby to mother. (3 marks)</p> <p>3 Extended response question (6 marks). Example points: Placenta is area where substances pass between the mother's and fetus blood. It acts as a barrier, stopping infections and harmful substances reaching the fetus. Umbilical cord connects the fetus to the placenta. It carries the fetus blood/oxygen/nutrients from the placenta to the baby and carries carbon dioxide from the fetus to the placenta. Amniotic fluid acts as a shock absorber/protects the fetus from bumps.</p> |

Connection

Put these pictures into the correct order!



Consolidation

Make a note of one thing you think you understand well and one thing that you would like to ask your teacher



Lesson 8: Book 1- The menstrual cycle. (10.2.5)

Activation

LI: Identify key events on a diagram of the menstrual cycle.

1. Make a note of the date, title and the LI
2. Key words – period, menstruation, menstrual cycle, ovulation, contraception, condom, contraceptive pill.
3. Read pages 214 to 215.
4. <https://www.youtube.com/watch?v=VI2wRbO8LZU>
5. Answer Questions A, B, C,D.



Demonstration

Attempt Summary questions

In 15 mins answer as many questions as you can.

Self-mark the questions you have done making any necessary corrections in blue pen

Challenge yourself to answer as many as you can:

Single chemistry bottle question is for all students

Double chemistry bottle question are for students looking to extend their knowledge

Triple chemistry bottle question is for students looking to challenge themselves.

Connection

Answer

5,6,7,3,1,4,8,2

Activation & Demonstration

| | |
|-------------------|--|
| In-text questions | <p>A 28 days</p> <p>B The release of an egg cell from one of the ovaries.</p> <p>C condoms and the contraceptive pill</p> <p>D barrier method</p> |
| Summary questions | <p>1 menstrual cycle, lining, vagina, period, condoms, pregnancy (6 marks)</p> <p>2 period – lining is lost as blood through the vagina ovulation – egg is released Uterus lining thickens ready for a fertilised egg to implant. If egg is not fertilised, the lining breaks down and the cycle starts again. (4 marks)</p> <p>3 Around day 14 (1 mark) as this is when an egg is present/ovulation has just occurred to meet the sperm (1 mark) and the lining of the uterus is thick to receive a fertilised egg. (1 mark)</p> <p>4 Extended response question (6 marks). Example answers: Condoms are used by males during intercourse. They are an example of the barrier method of contraception. The barrier method protects against STIs and is highly effective at preventing pregnancy. The contraceptive pill is taken by females. It must be taken daily and gives no protection against STIs. It is highly effective at protecting pregnancy.</p> |

Lesson 9: Book 2- Natural selection . (10.3.1)

Connection

1. Recall what is variation?
2. Describe how long menstrual cycle lasts?
3. Explain how contraceptive pill works.

Activation

LI: Describe natural selection as a theory that explains how species evolve and why extinction occurs.

1. Make a note of the date, title and the LI
2. Key words – **evolution, fossil, natural selection**
3. Read pages 164 to 165
4. <https://www.bbc.co.uk/bitesize/topics/zpffr82/articles/z7hj2nb>
5. Answer Questions A, B, C



Consolidation

Make a note of one thing you think you understand well and one thing that you would like to ask your teacher

Demonstration

Attempt Summary questions

In 15 mins answer as many questions as you can.

Self-mark the questions you have done making any necessary corrections in blue pen

Challenge yourself to answer as many as you can:

Single chemistry bottle question is for all students

Double chemistry bottle question are for students looking to extend their knowledge

Triple chemistry bottle question is for students looking to challenge themselves.



Connection

- 1. Variation is the differences between individuals within a species.
- 2. It last around 28 days and it is controlled by hormones.
- 3. Contraceptive pills contain hormones which can prevent pregnancy by stopping ovulation.

Activation & Demonstration

| | |
|-------------------|---|
| In-text questions | <p>A The process of species gradually developing/changing over time.</p> <p>B The remains of plants or animals that lived a long time ago, which have changed to stone.</p> <p>C Organisms with the characteristics that are most suited to the environment survive and reproduce. Less well-adapted organisms die.</p> |
| Activity | <p>Evolution cartoon</p> <p>Credit sensible cartoon strip demonstrating variations in a species, 'survival of the fittest', and evolution of the species. Species can be real or imaginary as long as the scientific concepts shown are sound.</p> <p>For example, peppered moths are pale coloured at first because tree bark was pale. Dark-coloured moths were readily predated on as they were less camouflaged. The Industrial Revolution turned tree barks dark so the trend reversed. Pale moths now less well camouflaged and dark moths better camouflaged. The population of dark moths now outweighs that of the pale moths.</p> |
| Summary questions | <p>1 evolved, millions, fossils, remains, stone (5 marks)</p> <p>2 Organisms which have adaptations suited to their habitat survive for longer. This means they produce more offspring. Offspring are likely to inherit their parents' advantageous characteristics. Therefore more offspring with the advantageous characteristics survive, continuing the process. (3 marks)</p> <p>3 Example answers (6 marks):</p> <p>Prior to the Industrial Revolution, pale moths were more successful because the pale moths were camouflaged from predators on pale tree bark. Therefore most of the peppered moth population was pale. The Industrial Revolution caused trees to become blackened. Pale moths became less camouflaged/successful. Dark moths became more camouflaged/successful. Therefore dark moths reproduced more than pale moths. The population of dark moths increased rapidly. The population of pale moths decreased rapidly. Therefore a greater proportion of peppered moths were dark in colour.</p> |

Lesson 10: Book 2- Charles Darwin. (10.3.2)

Connection

1. Recall what is natural selection.
2. Describe what is evolution.
3. Explain the evolution using peppered moths example.

Activation

LI: Describe the role of evidence in supporting theories.

1. Make a note of the date, title and the LI
2. Key words – peer review.
3. Read pages 166 to 167
4. <https://www.youtube.com/watch?v=s64Y8sVYfFY>
5. Answer Questions A, B, C.



Consolidation

Make a note of one thing you think you understand well and one thing that you would like to ask your teacher

Demonstration

Attempt Summary questions

In 15 mins answer as many questions as you can.

Self-mark the questions you have done making any necessary corrections in blue pen

Challenge yourself to answer as many as you can:

Single chemistry bottle question is for all students

Double chemistry bottle question are for students looking to extend their knowledge

Triple chemistry bottle question is for students looking to challenge themselves.



Connection

- 1. Natural selection is a process by which a species **changes** over time in response to changes in the **environment**, or **competition** between organisms, in order for the species to **survive**.
- 2. Evolution is a slow process that can take many thousands, even millions, of years to happen.
- 3. During the nineteenth century pollution killed off some of the lichens and soot deposits caused the tree bark to appear darker. Light coloured moths were no longer camouflaged and were more likely to be eaten by birds. The dark moths were now better camouflaged.

Activation & Demonstration

| | |
|-------------------|--|
| In-text questions | <p>A natural selection</p> <p>B finch</p> <p>C Where a scientist’s work is reviewed by another scientist working in a similar field.</p> |
| Activity | <p>Natural selection</p> <p>Students should present their ideas in the form of a newspaper article, with a catchy title, and information that is organised into columns.</p> <p>There should be a short introduction to explain who Darwin is but the main content should be explaining the concept of evolution.</p> <p>For example:</p> <p>Darwin’s theory states that organisms evolve as a result of natural selection.</p> <p>Darwin realised that organisms best suited to their environment are more likely to survive and reproduce, passing on their characteristics to their offspring.</p> <p>Gradually, a species changes over time.</p> <p>We now know that these characteristics are passed on through genes.</p> |
| Summary questions | <p>1 Darwin, evolution, selection, peer review (4 marks)</p> <p>2 The fossil record provides evidence that organisms have changed over time. Changes have been observed in microorganism populations, for example, the development of antibiotic-resistant bacteria. Species that have not adapted to environmental changes have become extinct. (3 marks)</p> <p>3 This is the checking of work before it is published. This is often carried out by another scientist who works in a similar area of science. (2 marks)</p> <p>4 Example answers (6 marks):</p> <p>Each island has a different food supply. Finches that hatch with adaptations suited to the food supply of their habitat are more likely to live longer and survive. Other finches are unlikely to find enough food to survive, so die before mating. Well-adapted finches will reproduce. These offspring are likely to share their parents’ characteristics. These offspring are also well adapted so will also produce offspring of their own.</p> <p>Over time, the whole population will gain the advantageous adaptation. This supplies evidence for the theory of natural selection, as each island’s population evolves in a slightly different way.</p> |

Lesson 11: Book 2- Extinction (10.3.3)

Connection

1. How organism evolved .
2. Describe what organisms Darwin studied.
3. Explain why people disagree with Darwin.

Activation

LI: Explain how biodiversity is vital to maintaining populations, and how within an ecosystem, having many different species ensures resources are available for other populations, like humans.

1. Make a note of the date, title and the LI
2. Key words – extinct, competition, biodiversity, population.
3. Read pages 168 to 169
4. <https://www.youtube.com/watch?v=jphrpR9ffKA>
5. Answer Questions A, B, C.



Consolidation

Make a note of one thing you think you understand well and one thing that you would like to ask your teacher

Demonstration

Attempt Summary questions

In 15 mins answer as many questions as you can.

Self-mark the questions you have done making any necessary corrections in blue pen

Challenge yourself to answer as many as you can:

Single chemistry bottle question is for all students

Double chemistry bottle question are for students looking to extend their knowledge

Triple chemistry bottle question is for students looking to challenge themselves.



Connection

- 1. Organism have evolved through natural selection.
- 2. Darwin studied finches and many other plants and animals.
- 3. There was insufficient evidence when the theory was published to convince many scientists
 - the mechanism of inheritance and variation was not known until 50 years after the theory was published

Activation & Demonstration

| | |
|-------------------|---|
| In-text questions | <p>A An extinct species is one that has completely died out – no new organism can be created.</p> <p>B Any three from: changes to the organism’s environment, destruction of habitat, outbreak of a new disease, introduction of new predators and competitors.</p> <p>C dinosaur, dodo.</p> <p>D Biodiversity is a measure of the variety of all the different species of organisms on earth or within an ecosystem.</p> |
| Summary questions | <p>1 extinct, anywhere, environment, predators (4 marks)</p> <p>2 If an area has a low biodiversity only a small number of species will be present, as a limited supply of food/shelter is provided. The ecosystem is unstable, because if this food source is lost through disease/fire/environmental factors and an alternative species is not present to eat, all organisms may die. (4 marks)</p> <p>3 Example answers (6 marks):</p> <p>Species live in habitats where they are successfully adapted. Changes to the habitat (e.g., climate change – reduction of ice cap for polar bears or introduction of a predator for dodo) can cause individuals to die/become less well adapted. This could lead to more competition for food/food sources become more scarce. Disease may also kill organisms (credit named disease and organism). Fewer/no offspring are produced as a result. Population of the species decreases. Extinction occurs when all individuals of a species, throughout the world, have died.</p> |

Lesson 12: Book 2-Preserving biodiversity. (10.3.4)

Connection

1. Define extinction.
2. Describe how organisms become extinct?
3. Explain what is biodiversity.

Activation

LI: Evaluate ways of preserving plant or animal material for future generations.

1. Make a note of the date, title and the LI
2. Key words – endangered species, conservation, captive breeding, gene bank.
3. Read pages 170 to 171
4. <https://www.youtube.com/watch?v=2XdeLpm42i8>
5. Answer Questions A, B, C,D.



Consolidation

Make a note of one thing you think you understand well and one thing that you would like to ask your teacher

Demonstration

Attempt Summary questions

In 15 mins answer as many questions as you can.

Self-mark the questions you have done making any necessary corrections in blue pen

Challenge yourself to answer as many as you can:

Single chemistry bottle question is for all students

Double chemistry bottle question are for students looking to extend their knowledge

Triple chemistry bottle question is for students looking to challenge themselves.



Connection

- 1. Organisms that are unable to do this quickly enough can become extinct.
- 2. -Changes to organism’s environment.
 - Destruction of habitat.
 - New predators.
 - New pathogen.
- 3. Biodiversity is a measure of variety of all the different species of organisms on earth or in particular Ecosystem.

Activation & Demonstration

| | |
|-------------------|---|
| In-text questions | <p>A Loss of habitat and threat of poachers.</p> <p>B The protection of a natural environment/habitat.</p> <p>C Create stable, healthy population of a species and gradually re-introduce species into its natural habitat.</p> <p>D Any two from: ensures food supply, potential sources of medicine not lost, other appropriate benefit to humans.</p> |
| Activity | <p>Captive-breeding debate</p> <p>The debate should cover advantages and disadvantages of captive-breeding programmes.</p> <p>Advantages include: creates a stable and healthy population, can gradually re-introduce the species back into its natural habitat to repopulate in the wild, helps to prevent extinction, enables scientists to study the organisms, protects the organisms from poachers.</p> <p>Disadvantages include: can be perceived as cruel, animals have less space, animals have less choice of partners, reduces gene pool, increases the risk of inherited disorders, encourages organisms to display unnatural behaviours, organisms may not be able to cope with re-introduction to the wild.</p> |
| Summary questions | <p>1 endangered, extinct, banks, captivity, conservation (5 marks)</p> <p>2 Gene banks store genetic samples from many different species. These samples can be used for research. These samples can be used to create new individuals. (3 marks)</p> <p>3 The advantages are that populations of endangered species can be stabilised/increased and endangered species can then be re-introduced into their natural habitat.</p> <p>The disadvantages are that it is difficult to maintain genetic diversity and organisms bred in captivity may not survive in the wild. (4 marks)</p> <p>4 Example answers (6 marks):</p> <p>Positive effects by humans: Populations of species can be maintained using a range of techniques, for example, conservation, captive breeding, and seed/gene banks. Conservation is where humans protect natural habitats of engendered species. This reduces disruption to food chains and food webs. Captive breeding can stabilise/increase the population of endangered species before re-introducing them to the wild. Gene banks provide a back-up against the extinction of species by preserving their genetic material.</p> <p>Negative effects by humans: Human activity has caused many organisms to become extinct or endangered, for example, hunting/poaching of animals in the case of the rhino. Deforestation leads to the loss of animal habitat. There is also general competition with animals (for food, space, and water).</p> |

Lesson 13: Book 2- Inheritance. (10.3.5)

Connection

1. Define what is conservation.
1. Describe captive breeding.
2. Explain gene banks.

Activation

LI: Explain how inherited characteristics are the result of genetic information, in the form of sections of DNA called genes, being transferred from parents to offspring during reproduction.

1. Make a note of the date, title and the LI
2. Key words – inheritance, characteristics, chromosome, DNA, gene, mutation.
3. Read pages 172 to 173
4. Draw and label the figure at the top of page 173 – showing fertilisation
5. <https://www.youtube.com/watch?v=hywRdDVR76A>
6. Answer Questions A, B, C,D.



Consolidation

Make a note of one thing you think you understand well and one thing that you would like to ask your teacher

Demonstration

Attempt Summary questions

In 15 mins answer as many questions as you can.

Self-mark the questions you have done making any necessary corrections in blue pen

Challenge yourself to answer as many as you can:

Single chemistry bottle question is for all students

Double chemistry bottle question are for students looking to extend their knowledge

Triple chemistry bottle question is for students looking to challenge themselves.



Connection

1. Conservation means protecting a natural environment to ensure that habitats not lost.
2. Captive breeding is breeding organisms in human-controlled environment.
3. Gene banks store genetic samples from many different species: seed banks (dried seeds); tissue bank (buds and other cells); cryobanks (seed & embryo); pollen banks (pollen grains).

Activation & Demonstration

| | |
|-------------------|---|
| In-text questions | <p>A Genetic material stored in the nucleus, containing all the information needed to make an organism.</p> <p>B A long strand of DNA.</p> <p>C A section of DNA that contains the information to produce a characteristic.</p> <p>D 46</p> |
| Summary questions | <p>1 nucleus, DNA, chromosomes, characteristic, genes (5 marks)</p> <p>2 gene, chromosome, DNA, nucleus, cell (2 marks)</p> <p>3 Example answers (4 marks):</p> <p>If a DNA mutation occurs within a gene (and is not detected) it can cause disease.</p> <p>If a mutation occurs in a gamete it may be passed onto the organisms’ offspring, for example, inherited disorder such as cystic fibrosis.</p> <p>Occasionally mutations are beneficial, for example, antibiotic resistance in bacteria.</p> <p>4 Example answers (6 marks):</p> <p>Genes code for characteristics. Genes are found on chromosomes. A human has 46 chromosomes. Each parent supplies 23 chromosomes. A sex cell/egg/sperm contains 23 chromosomes. During fertilisation the egg and sperm combine. An embryo/fertilised egg has 46 chromosomes. The embryo/fertilised egg contains chromosomes from both parents.</p> |

Lesson 14: Book 2- DNA (10.3.6)

Connection

1. Where DNA can be found.
2. Describe genes.
3. Explain mutation.

Activation

LI: Find out why scientists Watson, Crick, and Franklin were so important.

1. Make a note of the date, title and the LI
2. Key words – DNA.
3. Read pages 174 to 175
4. Draw top half of diagram page 174 – DNA molecule
5. <https://www.youtube.com/watch?v=G1zNlISbCxI>
6. Answer Questions A, B, C,D.



Consolidation

Make a note of one thing you think you understand well and one thing that you would like to ask your teacher

Demonstration

Attempt Summary questions

In 15 mins answer as many questions as you can.

Self-mark the questions you have done making any necessary corrections in blue pen

Challenge yourself to answer as many as you can:

Single chemistry bottle question is for all students

Double chemistry bottle question are for students looking to extend their knowledge

Triple chemistry bottle question is for students looking to challenge themselves.



Connection

- 1. DNA can be found in cell’s nucleus.
- 2. Gene is the section of DNA that holds the information to produce a characteristic.
- 3. The change in the DNA is mutation. If a change occurs in a gene it can effects organism’s characteristics. If a mutation occurs in gametes that altered form of DNA may be passed onto organism’s offspring.

Activation & Demonstration

| | |
|-------------------|---|
| In-text questions | <p>A DNA is made of two strands that are joined together by bonds between bases. The strands are twisted to form a double helix. B Identical twins</p> <p>C Watson, Crick, Franklin, and Wilkins</p> |
| Summary questions | <p>1 strands, helix, bases, C (4 marks)</p> <p>2 A timeline showing key steps in scientists’ understanding of DNA: role of Darwin (evolution), Mendel (selective breeding), discovery of double-helix structure of DNA, DNA fingerprinting, Human Genome Project, Dolly the sheep. (4 marks)</p> <p>3 Example answers (6 marks):</p> <p>Early work by Mendel led to the discovery that certain characteristics can be passed from parents to offspring.</p> <p>Miescher identified ‘nuclein’ in the nucleus of the cell. Nuclein is now called DNA.</p> <p>Avery transferred DNA between bacteria, transferring characteristics in the process. This proved that genes are sections of the DNA molecule.</p> <p>Chargaff’s work showed that all DNA molecules contain equal quantities of bases in their respective pairs (number of A = number of T, number of C = number of G).</p> <p>Wilkins and Franklin then used X-rays to take an image of DNA crystals.</p> <p>Watson and Crick built on the evidence gathered by a number of other scientists. This helped them to produce the double-helix model of the DNA molecule.</p> <p>4 Any three of the following, for one mark each: improved genetic testing (1), location of genes that might be linked to increased chances of inheriting a disease (1), new gene therapy treatment (1), new knowledge of how humans have evolved (1), personalised medicines (1).</p> |

Lesson 15: Book 2- Genetics (10.3.7)

Connection

1. What is the shape of DNA.
2. Name four bases.
3. Explain who identified shape of DNA.

Activation

LI: Use a diagram to show how genes are inherited.

1. Make a note of the date, title and the LI
2. Key words – allele, recessive, dominant, Punnett square.
3. Read pages 174 to 175
4. Draw figure pages 176 to show chromosomes with alleles for blue or brown eyes
5. <https://www.youtube.com/watch?v=BRMcTdKNpOA>
6. Answer Questions A, B, C,D.



Consolidation

Make a note of one thing you think you understand well and one thing that you would like to ask your teacher

Demonstration

Attempt Summary questions

In 15 mins answer as many questions as you can.

Self-mark the questions you have done making any necessary corrections in blue pen

Challenge yourself to answer as many as you can:

Single chemistry bottle question is for all students

Double chemistry bottle question are for students looking to extend their knowledge

Triple chemistry bottle question is for students looking to challenge themselves.



Connection

- 1. Double helix.
- 2. Thymine, Adenine, Cytosine, Guanine.
- 3. Scientists worked out the structure of DNA in the 1950s. Rosalind Franklin made ‘X-ray diffraction’ images of DNA. James Watson and Francis Crick used information from one of her images to work out a model for the structure of DNA. Work by Maurice Wilkins, a colleague of Franklin, supported their model.

Activation & Demonstration

| | | | | | | | | | | | | | | | | | | |
|-------------------|---|--------|----|--|--|--------|--|--|--|---|---|--------|---|----|----|---|----|----|
| In-text questions | A Different forms of the same gene. B dominant C two | | | | | | | | | | | | | | | | | |
| Activity | Genetic-cross outcomes 0 in 4 = 0/4 = 0 = 0% 1 in 4 = 1/4 = 0.25 = 25% 2 in 4 = 2/4 or 1/2 = 0.5 = 50% 3 in 4 = 3/4 = 0.75 = 75% 4 in 4 = 4/4 or 1 = 1 = 100% | | | | | | | | | | | | | | | | | |
| Summary questions | 1 alleles, dominant, recessive (3 marks) 2 a black b white c black (3 marks) 3 They both inherit genetic information from both parents, but during fertilisation genetic material from the parents is mixed. Each inherit a different combination of genes. (3 marks) 4 <table><tr><td colspan="2"></td><td colspan="2">father</td></tr><tr><td colspan="2"></td><td>F</td><td>f</td></tr><tr><td rowspan="2">mother</td><td>F</td><td>FF</td><td>Ff</td></tr><tr><td>f</td><td>Ff</td><td>ff</td></tr></table> 3 of 4 offspring will inherit freckles. 3/4 = 0.75 = 75% Only 1 in 4 offspring will not inherit freckles (1/4 = 0.25 = 25%). (6 marks) | | | | | father | | | | F | f | mother | F | FF | Ff | f | Ff | ff |
| | | father | | | | | | | | | | | | | | | | |
| | | F | f | | | | | | | | | | | | | | | |
| mother | F | FF | Ff | | | | | | | | | | | | | | | |
| | f | Ff | ff | | | | | | | | | | | | | | | |

Connection

1. Recall what is an allele?
2. Describe recessive and dominant alleles.
3. Produce a Punnett square for:
White fur is recessive. Grey fur is dominant. Two mice that are heterozygous for the fur colour gene mate. Determine the probability that the offspring will have grey fur.



Lesson 16: Book 2- Genetic modification. (10.3.8)

Activation

LI: Suggest arguments for and against genetic modification.

1. Make a note of the date, title and the LI
2. Key words – genetic modification.
3. Read pages 176 to 177
4. List 3x examples of genetic modification
5. <https://www.youtube.com/watch?v=rx953M-tpp4>
6. Answer Questions A, B, C,D.



Consolidation

Make a note of one thing you think you understand well and one thing that you would like to ask your teacher



Demonstration

Attempt Summary questions

In 15 mins answer as many questions as you can.

Self-mark the questions you have done making any necessary corrections in blue pen

Challenge yourself to answer as many as you can:

Single chemistry bottle question is for all students

Double chemistry bottle question are for students looking to extend their knowledge

Triple chemistry bottle question is for students looking to challenge themselves.

Connection

- 1. **Alleles** are **different versions** of the same gene.
- 2. A **dominant allele** is always expressed, even if one copy is present. A **recessive allele** is only expressed if the individual has two copies and does not have the dominant allele of that gene.

3. Probability - 75%

| | | |
|---|---------|----------|
| | A | a |
| A | AA grey | Aa grey |
| a | Aa grey | aa white |

Activation & Demonstration

| | |
|-------------------|--|
| In-text questions | <p>A Altering the genes of an organism to display desired characteristics.</p> <p>B Very precise/much quicker than selective breeding.</p> <p>C vaccines and antibiotics</p> |
| Activity | <p>GM cartoon strip</p> <p>Cartoon strip should include the following:</p> <p>Select an organism (plant or animal) and identify a characteristic to alter.</p> <p>Take genes from another organism that shows this characteristic. These are known as foreign genes.</p> <p>Insert the foreign genes into the plant/animal cells at the early stages of the organism’s development.</p> <p>As the organism develops, it will display the characteristics of the foreign genes.</p> |
| Summary questions | <p>1 foreign, characteristics, genetic, vaccines/antibiotics/insulin (4 marks)</p> <p>2 Genetic modification is much more precise than selective breeding, it is a much quicker process, and it can alter characteristics more dramatically, for example, making fish glow in polluted water. (3 marks)</p> <p>3 Two appropriate arguments for, for example: to produce crops of higher yield, to produce disease-resistant crops. (2 marks)</p> <p>Two appropriate arguments against, for example: interfering with organisms against their will, may increase allergies, can lead to unwanted cross breeding. (2 marks)</p> |

Lesson 17 & 18: Book 1 & 2 – Revision

Connection

Q1. Give a reason why organisms might be genetically modified?

Q2. How do scientists create a genetically modifies organism?

Q3. Give a disadvantage of genetic modification.

Activation

LI: Practice some Big Idea questions about Genes

1. Make a note of the date, title and the LI
2. Read page 39 for Book 1 questions and page 43 for Book 2 questions
3. Use the previous pages of the book and your notes to help you answer the questions



Demonstration

Work with others on your table to answer as many of the questions as you can.

In 45 mins answer as many questions as you can.

Self-mark the questions you have done making any necessary corrections in blue pen



Consolidation

Make a note of one thing you think you understand well and one thing that you would like to ask your teacher



Lesson 17: Revision Answers **10 Genes– Part 1 Checkpoint**

Connection

- 1. High yields, create plants that contain their own insecticide, to produce medicinal drugs
- 2. Scientists take genes from one organism and put them in another
- 3. Some people think it is unethical or carries a risk to human health (no evidence) or could create super species such a such as super weeds or super bugs

Activation & Demonstration

| | |
|---------------------------|--|
| End-of-Big Idea questions | <p>1a Arctic (1 mark)</p> <p>b white fur – camouflage thick fur – insulation large feet – to stop the bear sinking into the snow sharp claws – to catch prey (4 marks)</p> <p>2 Girls – breasts develop, periods. Boys – testes produce sperm, voice deepens. Both – pubic hair grows, growth spurt. (6 marks)</p> <p>3a A – oviduct, D – cervix (2 marks)</p> <p>b vagina (1 mark)</p> <p>c uterus (1 mark)</p> <p>d An egg is released from an ovary. (2 marks)</p> <p>4a Umbilical cord (1 mark)</p> <p>b surrounded by (shock absorbing) amniotic fluid (1 mark)</p> <p>c Cervix relaxes, muscles in uterus wall contract, baby pushed through vagina. (3 marks).</p> <p>d Any three from the following: Allows maternal and fetal blood to flow close together. Supplies oxygen/nutrients. Removes waste/carbon dioxide. Prevents infections/harmful substances passing to the fetus. (3 marks)</p> <p>5a Differences in a characteristic within a species. (1 mark)</p> <p>b balance/(bathroom) scales (1 mark)</p> <p>c histogram (1 mark)</p> <p>d x-axis for mass of student, y-axis for number of students (2 marks)</p> <p>e Each student’s body mass could take any value (between the smallest and largest mass). (1 mark)</p> <p>f Some variation passed on in genes (from parents). This is inherited variation. Diet/exercise/lifestyle also affect body mass. This is environmental variation. Overall body mass is a result of both environmental and inherited variation. (4 marks)</p> |
|---------------------------|--|

Lesson 18: Revision Answers **10 Genes – Part 2 Checkpoint**

| | |
|---------------------------|--|
| End-of-Big Idea questions | <p>1a captive breeding – animals, seed bank – plants, conservation – both (3 marks) b An endangered species is one with only small numbers of organisms left in the world. A species that is extinct has no organisms of that species alive anywhere in the world. (2 marks)</p> <p>2a Charles Darwin (1 mark) b Rosalind Franklin (1 mark) c Francis Crick (1 mark) 3a nucleus (1 mark) b DNA (1 mark) c A chromosome is a long strand of DNA. A gene is a (short) section of DNA. Chromosomes contain many genes and each gene codes for a single characteristic. (2 marks) d Half of chromosomes come from the mother and half from the father. Genetic material is transferred from mother via the egg and from father via sperm. Sperm and egg's genetic material combine during fertilisation. Embryo/fertilised egg contain pairs of chromosomes/46 chromosomes. (4 marks)</p> <p>4a fossils (of dinosaur skeletons) (1 mark) b No organisms of that species are alive anywhere in the world. (1 mark) c The introduction of new predators can mean more organisms in a species are eaten than number of offspring produced. Destruction of habitat can mean loss of shelter for organisms, which leads to the death of individuals through exposure. Credit any other sensible suggestions of causes of extinction with a relevant explanation. (4 marks) d Gene banks store genetic samples, for example, seeds/eggs/sperm/tissue. Samples from gene banks can be used to create new organisms in the future. Samples can also be used for research. (3 marks)</p> <p>5 Punnett square for two Rr parents. The chance of producing wrinkled rr peas is 1 in 4. (6 marks)</p> <p>6 Example answers (6 marks): Organisms evolve through natural selection slowly over time. Organisms in a species show variation – this is caused by differences in their genes. The organisms with the characteristics that are best adapted to the environment survive and reproduce. Less well-adapted organisms die. This process is known as 'survival of the fittest'. Genes from successful organisms are passed to the offspring in the next generation. This means the offspring are likely to possess the characteristics that made their parents successful. This process is then repeated many times. Over a long period of time this can lead to the development of a new species.</p> |
|---------------------------|--|

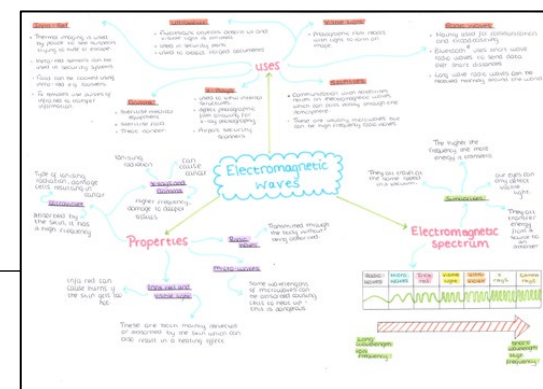
N/A

Activation

LI: Complete a piece of revision work

1. Make a summary sheet OR
2. Make flash cards OR
3. Complete the revision questions from book 1 (page 197) and 2 (page 161)

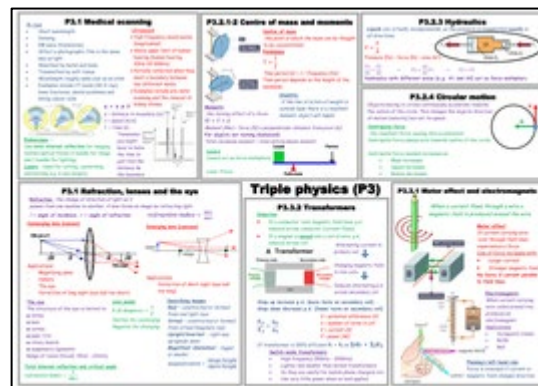
mind map



Make a note of one thing you think you understand well and one thing that you would like to ask your teacher

Demonstration

Use your revision work to quiz the person sat next to you OR work in a group to quiz each other.



flash cards



Summary sheet



| Attainment Band | Genes & Reproduction Knowledge and Understanding |
|-----------------|--|
| Yellow/Yellow + | <ol style="list-style-type: none"> 1. Explain how the similarities and differences between organisms can be used to classify them. 2. Evaluate the importance of variation in organisms by assessing the advantages and disadvantages of variation to a species' survival. 3. Evaluate the relative importance of genetic and environmental <u>variation</u> and conclude that genetic variation is essential for long-term survival and environmental variation can affect short-term survival. 4. Evaluate the importance of selective breeding in producing sufficient food for the world's population; explore the ethical issues involved in selective breeding – including the impact on biodiversity and the dangers of inbreeding. 5. Evaluate the strengths and weaknesses of the male reproductive system. 6. Explain how the male and female reproductive structures are designed for <u>fertilisation</u>; describe methods of combating infertility. 7. Explain how and why some problems with menstruation occur. 8. Choose scales to produce a line graph to show how a <u>fetus</u> grows during gestation; explain how a pregnant uterus is different from a normal uterus. 9. Explain the effect of different substances on the health and development of the <u>fetus</u>; explain whether given data are reliable and valid and suggest how to improve the quality of the data. 10. Predict and research how identical twins occur and <u>analyse</u> evidence about their features. 11. <u>Analyse</u> the role of different scientists in the discovery of the structure of DNA. 12. Explore the ethics and evaluate the use of extracted DNA. 13. Explain the impact of slight '<u>changes</u>' to the DNA passed on from the parents. 14. Evaluate the importance of Darwin's work in explaining how life has evolved. |
| Blue | <ol style="list-style-type: none"> 1. Explain the importance of biodiversity and present the key points. 2. Identify variation within a species by gathering and presenting data about individuals within a species; explain the difference between variation within species and across species. 3. Explain that offspring from the same parents may be very different because they have unique, random combinations of their parents' hereditary information. 4. Explain how farmers use the process of selective breeding – for example breeding dairy cows that produce large quantities of milk. 5. Describe the structure and function of the main parts of the male reproductive system. 6. Describe the structures and functions of the main parts of the female reproductive system; describe some problems of male and female reproductive structures that lead to infertility. 7. Describe how the menstrual cycle works. 8. Describe the difference between a <u>fetus</u> and an embryo; describe the structures and functions of different parts of a pregnant uterus. 9. Describe the effects of different substances on the development of the <u>fetus</u>; describe whether there is enough evidence to draw conclusions. 10. Explain how inherited differences arise in members of the same family. 11. Explain and model the structure of DNA; explain the link between chromosomes, genes and DNA. 12. Explain why it is important for scientists to extract DNA from organisms. 13. Explain that the fusion of male and female sex-cell nuclei (in both animals and plants) produces a new individual that is genetically unique. 14. Explain how the theories of Darwin and Wallace were similar (focusing on natural selection), and how Lamarck's theory was different (focusing on acquired characteristics). |



| | |
|-------|--|
| Green | <ol style="list-style-type: none"> 1. Recall differences between different species and describe how we use variation to classify organisms. 2. Explain the difference between continuous variation and discontinuous variation by looking at the differences in features between individuals of the same species. 3. Recognise that features such as height, eye <u>colour</u>, freckles etc. are inherited, whereas scars, tooth loss, tattoos etc. are gained from the environment. 4. Describe how we breed animals with features that we want <u>in order to</u> produce more organisms with the feature. 5. Name the main parts of the male and female reproductive systems; <u>recognise</u> sperm as the male sex cell. And the egg as the female sex cell. Describe <u>fertilisation</u> as being a fusion of a male nucleus and a female nucleus. 6. Name some changes that occur during puberty. 7. Describe growth as reproduction of cells. 8. Name certain substances that will affect the development of the <u>fetus</u>. 9. Identify inherited differences between members of the same family. 10. Identify that cells have nuclei containing chromosomes that carry genetic information, DNA. 11. Recall that during <u>fertilisation</u> one chromosome in each pair comes from each of the parents. 12. Describe how differences between individuals (<u>e.g.</u> neck length of giraffes) causes competition for food, and describe how only those organisms that can get food will survive. |
| White | <ol style="list-style-type: none"> 1. Some of the above elements have been achieved. |