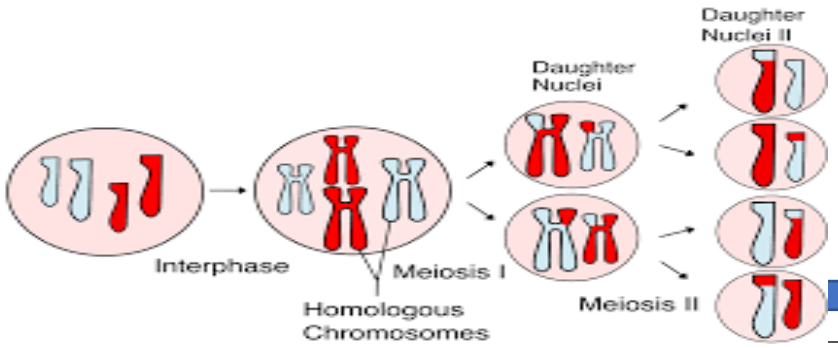
Lesson 8 B6. 8- Asexual and sexual reproduction.

Connection

1. Define meiosis.
2. State how many cells are produced during meiosis?
3. Describe stages of meiosis.



Consolidation

Complete and self assess the relevant past paper question for this topic - From the B6 DIP file

Extension

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

Activation

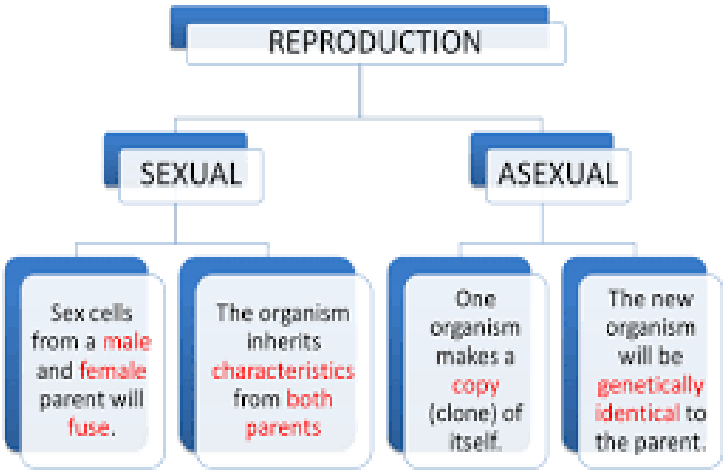
LI: understand that asexual reproduction involves just one parent and produces genetically identical offspring and understand that sexual reproduction leads to variety in the offspring.

1. Make a note of the title and the LI.
2. Copy keywords: asexual reproduction, clone, natural selection, sexual reproduction, variation.
3 https://www.youtube.com/watch?v=Fh9b6a-3DLQ
4.Read the text on pages 252- 253.
5. Copy table on page 252.

Demonstration

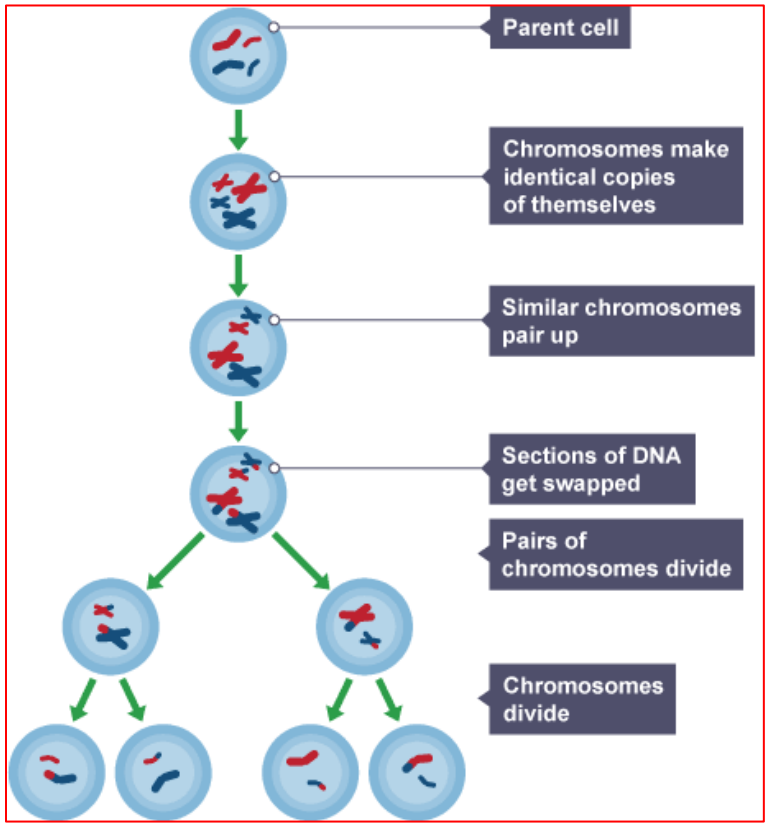
Attempt questions 1-7
In 15 mins answer as many questions as you can.
Self mark the questions you have done making any necessary corrections in blue pen

Challenge yourself to answer as many as you can:
Green questions to GCSE Level 3
Blue questions to GCSE Level 6
Purple questions to GCSE Level 9



Answers: B6.8- Asexual and sexual reproduction

Connection

1. **Meiosis** is the type of cell division that produces **gametes**.
2. Four
3. 

Demonstration

1 It preserves desirable characteristics; if the chances of meeting another individual are rare; it produces many offspring quickly; requires less energy.
2 Introduces variation, increasing the chances of survival (particularly if the environment changes); can be manipulated to produce new varieties/breeds.

3 Daffodil; strawberry; fungus, e.g. bread mould.

4 Produces many identical plants quickly/without the need for sowing seed.
5 Asexual in human; sexual in mosquito.

6 If conditions change (e.g. an immune response or anti-malarial drug), it increases the chances of survival.

7 The temperature and plentiful food supply

Lesson 9 B6. 9- Genetics.

Connection

1. What is asexual reproduction?
2. List advantages of asexual reproduction.
3. Describe how malaria parasite reproduces sexually and asexually.

Activation

LI: understand and be able to use genetics terms, such as gamete, chromosome, gene, dominant, recessive, genotype, phenotype, homozygous and heterozygous

1. Make a note of the title and the LI.
2. Copy keywords: allele, carrier, dominant, recessive, genotype, phenotype, homozygous, heterozygous.
3. https://www.youtube.com/watch?v=reVLRjZIh3c
4. Read the text on pages 254-255

Demonstration

Attempt questions 1-5
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:
Green questions to GCSE Level 3
Blue questions to GCSE Level 6
Purple questions to GCSE Level 9

Consolidation

Complete and self assess the relevant past paper question for this topic - From the B6 DIP file

Extension

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

Answers: B6.9- Genetics

Connection

1. **Asexual reproduction** does not involve sex cells or fertilisation and only one parent is required.

2.

• the population can increase rapidly when the conditions are favourable.
•only one parent is needed.
•it is more time and **energy** efficient as you don't need a mate.
•it is faster than sexual reproduction.

3.

Malarial parasites reproduce sexually in the host mosquito	Malarial parasites reproduce asexually in the human host

Demonstration

1 Allele.
2 A person with two normal alleles will (clearly) be normal. A person with two defective genes will be unable to produce the CFTR protein and therefore have cystic fibrosis. A person with one normal allele will be able to produce the CFTR protein and therefore not suffer from cystic fibrosis.
3 The allele is dominant if it expressed, i.e. the characteristics associated with it are always visible.
4 The genotype refers to the alleles for a particular gene that an organism has, e.g. AA, Aa or aa. The phenotype refers to the visible appearance or characteristic.
5 No this is not true. Describing a trait as dominant does not mean it is the most common in the population; it means that it is expressed over the recessive trait. How frequently a trait is observe in a population is not related to whether or not it is dominant or recessive. Instead, it is a reflection of how frequently the gene responsible for causing a trait is found in people

Lesson 10 B6. 10- Genetic crosses.

Connection

1. What is allele?
2. Describe cystic fibrosis symptoms.
3. What is meant by homozygous?

Activation

LI: use the terms dominant, recessive, genotype, phenotype, homozygous and heterozygous and know that some human conditions, such as cystic fibrosis, are caused by a recessive allele

1. Make a note of the title and the LI.
2. Copy keywords: Punnett square
3. https://www.youtube.com/watch?v=PyP_5EgQBmE
4. Read the text on pages 256-257
5. Copy Figure 6.31

Demonstration

Attempt questions 1-4
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:
Green questions to GCSE Level 3
Blue questions to GCSE Level 6
Purple questions to GCSE Level 9

Consolidation

Complete and self assess the relevant past paper question for this topic - From the B6 DIP file

Extension

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

Answers: B6.10- Genetic crosses

Connection

1. **Alleles** are different versions of the same gene.
2. Suffers produce mucus that is thicker and stickier than normal, making it difficult to breath.

3. Homozygous alleles are both identical for the same characteristic, for example AA or aa.

Demonstration

1 BB.

2 B.

3

Father - Tt gametes	Mother - tt gametes: t	t
T	Tt	Tt
t	tt	tt

4

Male - Bb gametes	Female - Bb gametes: B	b
B	BB brown eyes	Bb brown eyes
b	Bb brown eyes	Bb red eyes

Lesson 11 B6. 11- Tracking gene disorders.

Connection

1. What does it mean healthy carrier?
2. What is the percentage of inheriting cystic fibrosis if mother (cc) and father (Cc).
3. State the probability of the couple having a child with cystic fibrosis if both parents are **Cc**

Activation

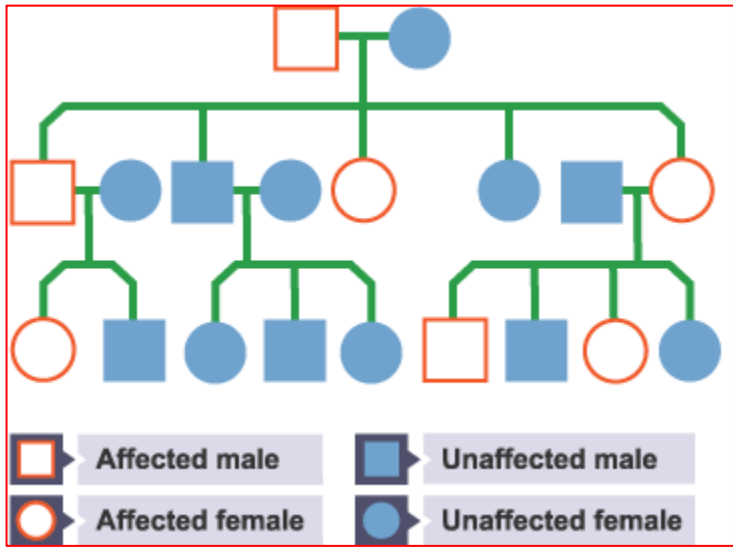
LI: understand the use of a family tree to show the inheritance of a characteristic and explain economic, social and ethical issues concerned with embryo screening.

1. Make a note of the title and the LI.
2. Copy keywords: embryo screening, family tree, in-vitro fertilisation.
3. https://www.youtube.com/watch?v=wky7R3zYtTQ
https://www.youtube.com/watch?v=uhKqmNOiPR8
4. Read the text on [illegible]
5. Copy Figure

Demonstration

Attempt questions 1-6
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:
Green questions to GCSE Level 3
Blue questions to GCSE Level 6
Purple questions to GCSE Level 9



Consolidation

Complete and self assess the relevant past paper question for this topic - From the B6 DIP file

Extension

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

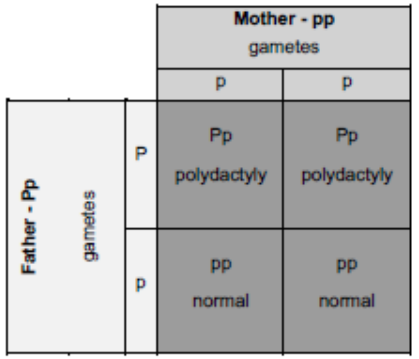
Answers: B6.11- Tracking gene disorders

Connection

1. Carriers have no symptoms and are usually unaware they are carrying the recessive allele.
2. 50 % chance that child will be born with cystic fibrosis.
3. Probability is 1 in 4 (or 25%).

Demonstration

1 PP – polydactyly
Pp – polydactyly
pp – normal.
2



3 He must have at least one copy of the dominant allele, C. But we do not know whether he has one or two.
4 Charles, Sarah, David, Stephen, Anthony, Daniel, Linda and Christian.
5 Medical – the opportunity for a couple not pass on the defective allele to their child; (the possible opportunity for research).
Social – (possible) requirement of social support for parents and/or child; selecting the gender of a child.
Economic – cost of any medical support required; insurance premiums; employment possibilities.
6 Student answer. The possibility of destroying an embryo should be weighed against the possibility of developing, or not developing breast cancer. Students may also appreciate that many breast cancer sufferers do not develop cancer until later life.

Lesson 12 B6. 12- Gregor Mendel.

Connection

1. What allele causes Polydactyly?
2. Define embryo screening.
3. State drawbacks of embryo screening.

Activation

LI: plan experiments to explore phenomena and test hypotheses and draw conclusions from given observations, and evaluate data in terms of reproducibility.

1. Make a note of the title and the LI.
2. Copy keywords: hypothesis, pure line, reproducibility, valid.
3. https://www.youtube.com/watch?v=n3cXcDEveRc
https://www.youtube.com/watch?v=3f_eisNPpnc
4. Read the text on pages 260-261
5. Copy Figure 6.38

Demonstration

Attempt questions 1-6
In 15 mins answer as many questions as you can.
Self mark the questions you have done making any necessary corrections in blue pen

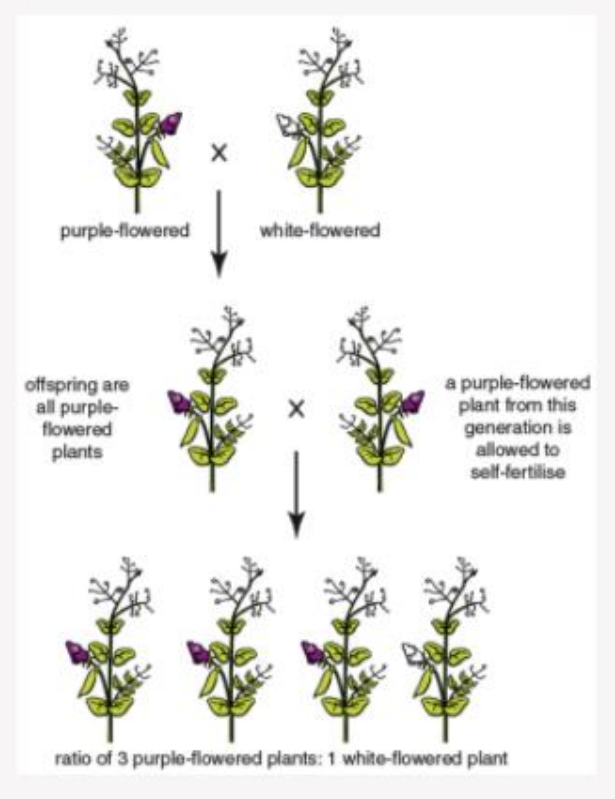
Challenge yourself to answer as many as you can:
Green questions to GCSE Level 3
Blue questions to GCSE Level 6
Purple questions to GCSE Level 9

Consolidation

Complete and self assess the relevant past paper question for this topic - From the B6 DIP file

Extension

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



Answers: B6.12-Gregor Mendel

Connection

1. Polydactyly is caused by a dominant allele.
2. When couples use IVF few cells can be removed from embryo and tested for a detective allele.
3. - Potential selection of embryos for social reasons (to have a baby of particular sex)

Demonstration

1 Wide range of varieties available; fertilisation easy to control; easy to cultivate; grow, flower and set seed in one growing season.

2 Mendel was investigating inheritance of traits in peas. If the peas were not of pure lines, and other characteristics appeared, then the investigation would not do what it set out to do, investigating one trait at a time.

3.

3

Plant 2 - pp gametes	Plant 1 - PP gametes: P	P
p	Pp purple	Pp purple
p	Pp purple	Pp purple

You do not really need a Punnett square to show this cross.

For the self-fertilisation/cross of the purple-flowered plants:

Plant 2 - Pp gametes	Plant 1 - Pp gametes: P	p
P	Pp purple	Pp purple
p	Pp purple	pp white

4 Yes, there's a 1:1 ratio of yellow seeds to green seeds. (but there would have been even more confidence with a greater number of seeds).

5

Scientist	Ratio, yellow:green seeds
Gregor Mendel (1866)	3.01
Carl Correns (1900)	3.08
Erich von Tschermak-Seysenegg (1900)	3.01
William Bateson (1909)	3.05
Charles Hurst (1902)	2.94
Robert Lock (1908)	2.80

6 Sample sizes were large so conclusions on the reproducibility of results can be drawn. The ratios show a high degree of reproducibility across the six scientists.

Lesson 13 B6. 13- Key concept. Genetics is simple- or is it?

Connection

1. What is pure lines?
2. What is meant by Mendelian inheritance?
3. Define reproducibility.

Activation

LI: explain how certain characteristics are controlled by a single gene and understand many characteristics are the result of multiple genes interacting.

1. Make a note of the title and the LI.
2. Copy keywords: complex diseases, Mendelian inheritance.
3. https://www.youtube.com/watch?v=SOgVM904cPc
4. Read the text on pages 262-263

Demonstration

Attempt questions 1-6
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:
Green questions to GCSE Level 3
Blue questions to GCSE Level 6
Purple questions to GCSE Level 9

Consolidation

Complete and self assess the relevant past paper question for this topic - From the B6 DIP file

Extension

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

Answers: B6.13-Genetics is simple- or is it?

Connection

1. . A population of plants or animals all having a particular feature that has been retained unchanged through many generations. The organisms are homozygous and are said to `breed true' for the feature concerned
2. **Mendelian inheritance** refers to patterns of **inheritance** that are characteristic of organisms that reproduce sexually.
3. A measurement is **reproducible** if the investigation is repeated by another person, or by using different equipment or techniques, and the same results are obtained.

Demonstration

1 A genetic disorder whereby sufferers mix up all colours that have shades of red or shades of green in them.

2 On the X-chromosome

3 Cystic fibrosis; Huntington's disease, haemophilia; muscular dystrophy.
4 Heart disease, diabetes, obesity.
5 Mutation in *Staphylococcus aureus* giving rise to antibiotic resistance. The antibiotic-resistant genes have spread throughout the population, giving rise to MRSA.

6 The genome analysis would indicate the strain that was involved in the outbreak so this could be matched with the most appropriate antimicrobial agent.

7 Analysing the genomes of pathogens helps us to understand and control infectious disease as it allows us to select the best treatment according to the genomics of the strain of the pathogen. It is a worthwhile investment as it could save lives and money wasted on other less effective treatments.

B6 - Revision

Connection

1. What process results in the formation of gametes ?
2. Explain how scientists can use information from the mapping of the human genome.
3. Give an examples of organisms which show both asexual and sexual reproduction.

Activation

LI: Create a topic summary sheet

1. Fold an A3 sheet so it is divided into 8 sections
2. Look back over you lesson and group them into 8 main headings
3. Summarise the key points into each section, use keywords and diagrams and symbols rather than sentences

Demonstration

Test yourself by working with the person sitting next to you by talking though each box on your summary sheet and seeing how many key facts you can remember

Consolidation

Look though the relevant past paper questions for this topic - From the B6 DIP file – see if you can complete any additional questions

Extension

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

Answers: B6.14 Revision

Connection

1. Meiosis

2. Two from:

- Understand/treat (complex) disease
- Understand/treat gene disorders
- Trace human migration patterns from the past

3. Malarial parasite, daffodil, strawberry, mushroom

DNA is the code of life, the means by which every living organism on Earth stores its genetic information.

You get half of your DNA from each of your biological parents, and you will pass on a selection of half of it to any child you might conceive. DNA, which stands for deoxyribonucleic acid, is curled up and stored as chromosomes in the nucleus of every one of our cells. We also have some DNA inside the mitochondria that power our cells, while plants have extra DNA within the chloroplasts that enable them to photosynthesise.

Double helix structure

The 1953 discovery of the shape of DNA, known as a double helix, is mainly credited to Francis Crick, James Watson, Rosalind Franklin and Maurice Wilkins. It is rather like a spiral staircase or twisted ladder in which every rung is a bond between matching "bases" on its two strands. But it was the work of many researchers throughout the decades that followed that determined what DNA codes for, how it is read, and how it is copied and passed on to new cells and future generations.

The order of DNA's chemical bases form the genetic code. These come in four types: adenine (A), guanine (G), cytosine (C) and thymine (T). The bases always pair up with the same complementary compound on the other strand of DNA: A with T, and C with G.

Three bases in a row together code for a specific amino acid, the basic building blocks of proteins. ACT, for instance, tells cells to make an amino acid called threonine. In this way, each gene tells the cell's machinery how to make a vast array of proteins.

There is a lot of DNA packed into every human cell. If you stretched it out, it would be almost two metres long. So your three billion bases, which are more than 99 per cent the same as everyone else's, need to be packaged up neatly. The coiled strands of your DNA are thus organised into chromosomes. Humans usually have 46 of these in each cell, 23 from each parent. The number varies in other animals: fruit flies have only eight and the black mulberry plant has 308, for example. Mitochondrial DNA is entirely inherited from an organism's mother.

What makes DNA so amazing is that it can copy itself, which allows all known organisms to function, grow and reproduce. Each strand of DNA in the double helix can serve as a template for duplicating its sequence of bases, enabling new cells to be exact copies of existing ones – although mutations often occur as a result of small errors in this process.

DNA testing

Because everyone's DNA is unique – except for identical twins – it can be used to identify people, which is why forensic scientists collect samples of blood, saliva or hair and the like at crime scenes.

Aside from encoding your physical features, DNA can also reveal some of your risk for certain medical conditions. For example, mutations in the *BRCA1* and *BRCA2* genes increase the risk of breast and ovarian cancer. However, other factors like your diet and habits also affect the risk, and we are a long way from definitively tying most diseases to precise genes, and from having tests that conclusively indicate your risk.

QUESTIONS:

1a) Where do we get our DNA from?

b) Who are the four people credited with discovering the shape of DNA?

c) When was the shape of DNA discovered and what is its shape?

2a) What are the links/bonds between DNA's 2 strands known as?

b) Using your answer to 2a, what are the four types and how do they match up?

c) What are the building blocks of proteins and what is the link with your answer to 2a and 2b.

3a) Why does DNA have to be tightly coiled and how is it "organised"?

b) Using your answer to 3a, how many do humans have and how many are passed on from each parent?

c) Explain the role of mutations and other factors in conditions such as cancer.

B6 Lesson 1- DART Answers

1. a) You get half of your DNA from each of your biological parents.
   - b) Francis Crick, James Watson, Rosalind Franklin and Maurice Wilkins
   - c) The 1953 discovery of the shape of DNA, known as a double helix.
   -

2. a) is a bond between matching "bases" on its two strands. The order of DNA's chemical bases form the genetic code.

- b) These come in four types: adenine (A), guanine (G), cytosine (C) and thymine (T). The bases always pair up with the same complementary compound on the other strand of DNA: A with T, and C with G.
- c) Three bases in a row together code for a specific amino acid, the basic building blocks of proteins.

3. a) If you stretched DNA out, it would be almost two metres long. So your three billion bases, which are more than 99 per cent the same as everyone else's, need to be packaged up neatly.

- b) Humans usually have 46 of these in each cell, 23 from each parent.
- c) Mutations in the *BRCA1* and *BRCA2* genes increase the risk of breast and ovarian cancer.

Attainment Band :	B6 Genetics (AQA) Knowledge and Understanding
Yellow Plus/ Yellow	Understand that genes work by coding for the production of a particular protein, and non-coding genes switch genes on and off. Explain the mapping of the human genome in understanding historical human migration. Explain that the gametes produced by meiosis are genetically unique. Construct Punnett squares to predict the outcome of genetic crosses. Make judgements about embryo screening.
Blue	Describe a gene as a section of DNA that controls a particular characteristic. Describe the importance of the mapping of the human genome. Explain that the method of reproduction may depend on circumstances. Explain the need for meiosis in producing gametes. Complete Punnett squares to show the inheritance of characteristics controlled by single genes. Describe the inheritance of polydactyly and cystic fibrosis.
Green	Recall the definition of the genome. Recall that the entire human genome has been mapped. Identify that organisms reproduce by asexual and sexual reproduction. Identify meiosis as the cell division used to produce gametes. Recall that genes exist in different forms called alleles, and know key genetic terms. Recall that some disorders are inherited.
White	Some elements of the above have been achieved