Chapter 20: Inheritance
Then and now

Questions from page 278 of *ESA Study Guide Year 10 Science*

Understanding

1. Name the two scientists who worked out the molecular structure of DNA.

   _____ and _____

2. What is one word that means 'all the genes in an organism'? _____
3. What is a 'transgenic' organism? Give an example.

Thinking

1. Suggest one benefit in scientists having decoded the human genome.

2. How could being able to produce a transgenic organism be helpful for farmers?

Contributing

People disagree about whether genetic engineering of plants and animals should be allowed in New Zealand. Find one article about GE from a magazine, newspaper or online. Read it and summarise it in your own words. At the end, state and justify your own opinion of GE.

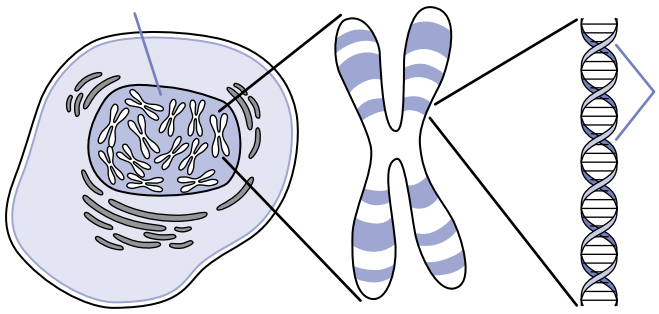
Answers (except for 'Contributing') are provided on page 336 of *ESA Study Guide Year 10 Science*

Chapter 20: Inheritance
Chromosomes, DNA and genes

Questions from pages 280, 281 of *ESA Study Guide Year 10 Science*

Understanding

1. Label the following diagram that shows the relationship between a cell, a nucleus, a chromosome, DNA, and a gene.



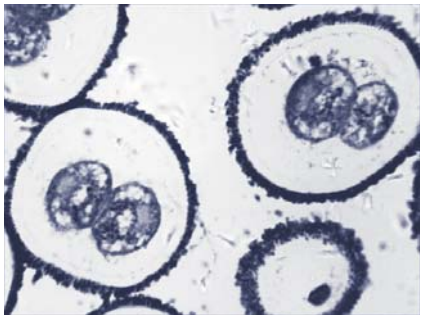
2. Why is DNA such an important molecule?

3. a. In what way is DNA similar in all organisms? _____
   b. In what way is DNA different in different species?

4. Name the type of cell division that gives rise to two identical daughter cells from one parent cell. _____

Thinking

1. If a parent cell contains 16 chromosomes, how many chromosomes will each daughter cell contain after mitosis? _____
2. State one place in the human body where mitosis occurs.



Mitosis in eggs from a worm

Answers are provided on page 336 of *ESA Study Guide Year 10 Science*

Chapter 20: Inheritance Characteristics

Questions from page 282 of *ESA Study Guide Year 10 Science*

Understanding

1. Describe 'variation'.

2. Which parts of a chromosome control inherited characteristics?
3. Name two dominant alleles in humans.

4. Name two recessive alleles in humans.

Thinking

1. If a person has an allele for a straight nose *and* an allele for an upturned nose, which type of nose will the person have?
2. Explain why the children of a woman who has coloured her hair black might not also have black hair.

Contributing

1. Make a list of five dominant human traits. For each trait, give the first name of a person in your class who shows that dominant trait.

2. Is the dominant allele for a trait always the most common? Carry out research to answer this question.

Answers (except for 'Contributing') are provided on pages 336–7 of *ESA Study Guide Year 10 Science*

Chapter 20: Inheritance Crosses

Questions from page 284 of *ESA Study Guide Year 10 Science*

Understanding

1. Explain (in words and/or pictures) the difference between the following.

   a. Gene and allele: _____

   _____

   b. Dominant allele and recessive allele: _____

   _____

2. What are two alleles of the gene for hair colour? _____ _____

Thinking

1. If *B* is the allele for brown eyes and *b* is the allele for blue eyes:

   a. Which is the dominant allele? _____

   b. What colour eyes will a person have if the dominant allele is present? _____

   c. If someone has the alleles *Bb*, what colour are their eyes? _____

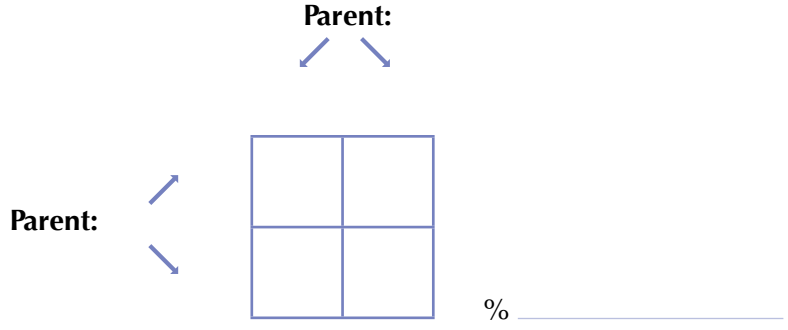
   d. Which alleles could be passed on to the offspring from the mother if a mother's alleles for eye colour are:

      i. *BB* _____ ii. *Bb* _____ iii. *bb* _____

   e. What will determine her offspring's eye colour if the mother's alleles are *Bb* or *BB*?

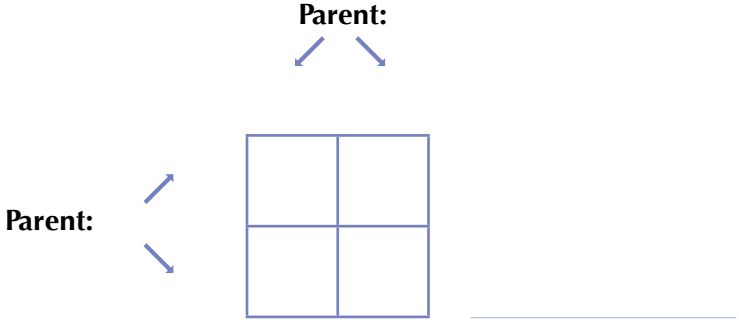
   _____

   f. Two parents both carry the alleles *Bb*. Use a Punnett square to work out what percentage of their offspring would be expected to have blue eyes.



% _____

2. *W* is the allele for wavy hair and *w* is the allele for straight hair. A father has the alleles *WW*, a mother *Ww*. What type of hair could their children have? Draw a Punnett square to work out the answer.



_____

Answers are provided on page 337 of *ESA Study Guide Year 10 Science*

Chapter 20: Inheritance Evolution

Questions from page 286 of *ESA Study Guide Year 10 Science*

Understanding

1. Explain the following terms.
   a. Evolution: _____
   b. Natural selection: _____
   c. 'Survival of the fittest': _____
2. Name three resources for which individual members of a species might need to compete.

_____ _____ _____

Thinking

A group of birds lives in an isolated valley. The birds eat worms from the top layer of the soil. The birds have a variety of beak lengths. The climate in the valley becomes drier and worms move deeper into the soil to stay moist. Explain how the climate change may indirectly affect the beak length of the birds.

_____

_____

_____

Contributing

During the course of evolution, many species have become extinct. We know about them only from the fossil record. Choose one extinct species of animal or plant and find out the following.

- Name of species: _____
- How long ago it lived: _____
- When it became extinct: _____
- A possible reason for its extinction: _____

_____

_____

- What it might have looked like, with an illustration if possible.

_____

_____

_____

_____

_____

_____

_____

Answers (except for 'Contributing') are provided on page 338 of *ESA Study Guide Year 10 Science*