

Name:
Science Class:
Teacher:
Hand in day:

Y9 Science
Term 1: Homework Booklet
Biology

	Hand in Date	Parents Signature
Inheritance, Variation and Evolution		
Homework 1		
Homework 2		
Homework 3		
Homework 4		

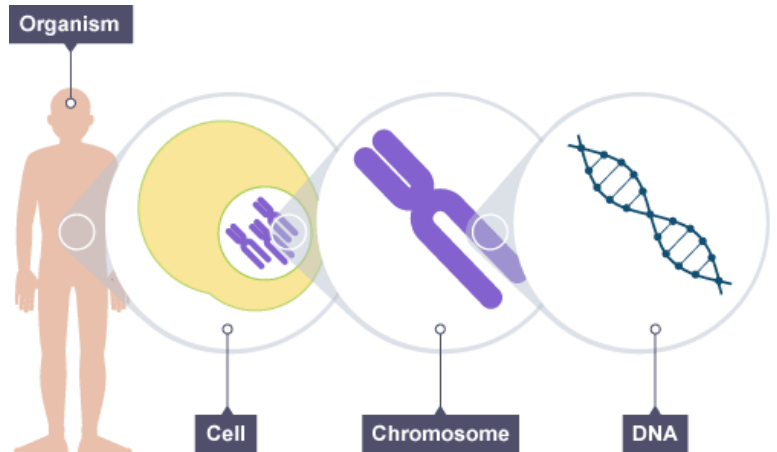
Inheritance, Variation and Evolution: Homework 1

Comprehension Task:

DNA

DNA stands for **deoxyribonucleic acid**. It is a chemical made up of two long molecules. The molecules are arranged in a spiral, like a twisted ladder. We call this the **double helix** structure.

There is DNA in the **nucleus** of every cell. DNA carries genetic information. It has all the instructions that a living organism needs to grow, reproduce and function.



Genes

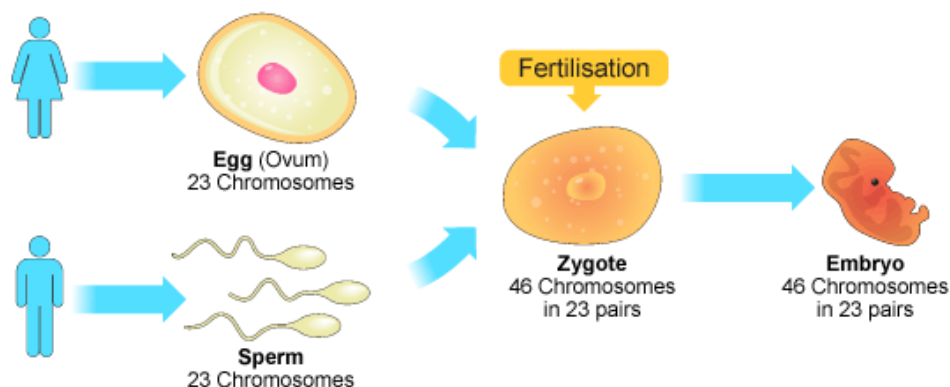
Genes are short sections of DNA. Genes carry information for particular characteristics, such as ear shape or eye colour. Different sets of genes carry information for different characteristics. There are many genes in a chromosome.

Chromosomes

In a cell nucleus, DNA is organised into coiled strands called **chromosomes**. Humans have 46 chromosomes in each cell.

Half the chromosomes are inherited from one parent and half from the other. As humans, therefore, we have **23 chromosomes** from each parent.

Children generally look a little like their mother and their father, but are not identical to either. They inherit their features from each parent's DNA. Every sperm and egg cell contains half of the genetic information needed for an individual (23 single chromosomes). When the chromosomes fuse during fertilisation, a new cell is formed, which is known as a zygote. It has all the genetic information needed for an individual.



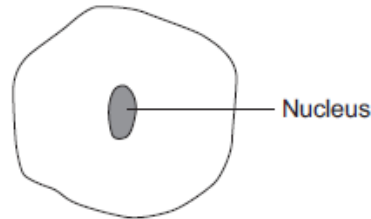
Questions

1. What does DNA stand for?
2. How do we describe the structure of DNA?
3. In which part of a cell is DNA found?
4. What are genes?
5. Genes determine our eye colour. Give another example of a characteristic that is determined by our genes.
6. What are chromosomes?
7. How many chromosomes are found in most body cells?
8. Why are chromosomes found in pairs?
9. How many chromosomes are found in sex cells?
10. What is the name of the cell formed when a sperm fuses with an egg cell?

Inheritance, Variation and Evolution: Homework 2

Complete the exam questions below:

1. The diagram below shows a cell.



(a) Draw a ring around the correct answer to complete each sentence.

(i) In the nucleus of a cell, genes are part of

chromosomes. membranes. receptors.
--

 (1)

(ii) Different genes control different

characteristics gametes nuclei

 of an organism. (1)

(b) In sexual reproduction, an egg fuses with a sperm.

(i) Draw a ring around the correct answer to complete the sentence.
An egg and a sperm fuse together in the process of

cloning. fertilisation. mitosis.
--

 (1)

(ii) Egg cells and sperm cells each contain the structures given in the box.

chromosome	gene	nucleus
-------------------	-------------	----------------

List these three structures in size order, starting with the smallest.

- 1 _____ (smallest)
- 2 _____
- 3 _____ (largest)

(2)

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- (iii) The egg and the sperm contain genetic material.

Draw a ring around the correct answer to complete the sentence.

The genetic material is made of

carbohydrate.

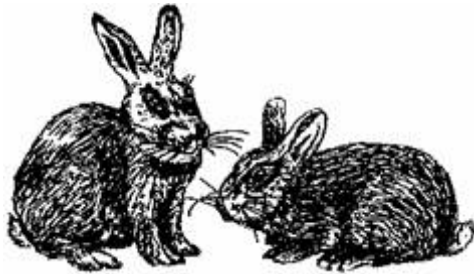
DNA.

protein.

(1)

(Total 6 marks)

2. These young rabbits look like their parents. This is because information about characteristics such as fur colour is passed from parents to their young.



Choose words from this list to complete the sentences below.

body

chromosomes

clones

cytoplasm

genes

nucleus

sex

Information is passed from parents to their young in _____ cells.

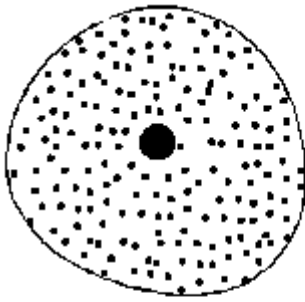
Each characteristic, e.g. fur colour, is controlled by _____.

The structures which carry information for a large number of characteristics are called _____.

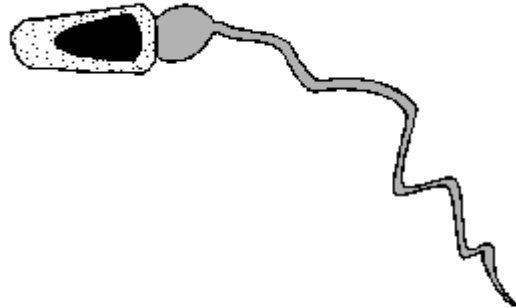
The part of the cell which contains these structures is called the _____.

(Total 4 marks)

3. Men and women produce different gametes (sex cells).



Female gamete



Male gamete

Not to scale

(a) In sexual reproduction the male and female gametes join together.

What is the name for this process?

(1)

(b) Complete the sentences about sex cells.

(i) Male gametes are called

They are produced in the

(2)

(ii) Female gametes are called

They are produced in the

(2)

(Total 5 marks)

4. The shape of a person's earlobes is controlled by a gene.

Figure 1 shows two types of earlobe.

Figure 1



Free earlobe



Attached earlobe

A dominant allele codes for free earlobes.

(a) What is a dominant allele?

Tick (✓) **one** box.

An allele expressed even if a person only has one copy of the allele

An allele expressed only if a person has two copies of the allele

An allele expressed only if a person has no recessive allele

An allele expressed only if it is inherited from the male parent

(1)

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- (b) A man with free earlobes and a woman with attached earlobes have children together.

Complete **Figure 2** to show the possible genotypes of the children.

Use the symbols:

E = allele for free earlobes

e = allele for attached earlobes

Figure 2

		Woman	
		e	e
Man	E	Ee	
	e		

(2)

- (c) What is the probability that one of the children would have attached earlobes?

Use **Figure 2**.

Tick (✓) **one** box.

0.125

0.25

0.5

0.75

(1)

(Total 4 marks)

Inheritance, Variation and Evolution: Homework 3

1. Polydactyly is an inherited condition. Polydactyly is controlled by a dominant allele.

The photograph shows the foot of a baby with polydactyly.



CNRI/Science photo library

A man and his wife have three children.

D = allele for polydactyly (6 toes on each foot)

d = allele for 5 toes on each foot

The man has polydactyly (**Dd**). The wife does not have polydactyly (**dd**).

(a) Complete the Punnett square below:

		Father	
Mother			

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- (b) (i) What combination of alleles does the man have?

Tick (✓) **one** box.

DD

Dd

dd

(1)

- (ii) What combination of alleles does the man's wife have?

Tick (✓) **one** box.

DD

Dd

dd

(1)

- (c) Draw a ring around the correct answer to complete each sentence.

- (i) The man and his wife plan to have another child.

The probability that this child will have 6 toes on each foot is

1 in 2.

1 in 3.

1 in 4.

(1)

(Total 6 marks)

2. Cystic fibrosis is an inherited disorder.

Mr and Mrs Brown do **not** have cystic fibrosis but they have a child with cystic fibrosis.

(a) Draw a ring around the correct answer to complete each sentence.

(i) The allele for cystic fibrosis is a

- | |
|-------------------|
| carrier allele. |
| dominant allele. |
| recessive allele. |

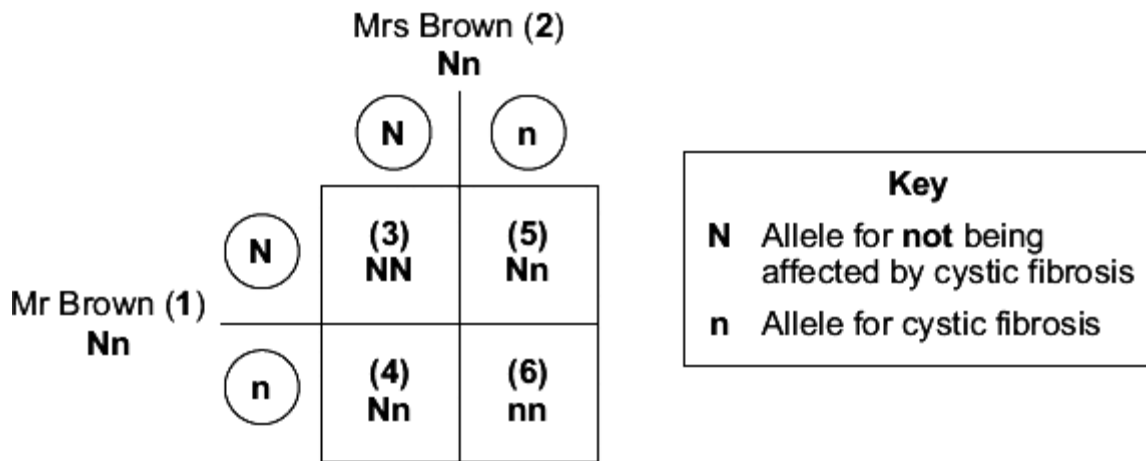
(1)

(ii) Mr and Mrs Brown are both

- | |
|-----------|
| carriers. |
| immune. |
| infected. |

(1)

(b) The diagram shows how the allele for cystic fibrosis can be inherited by Mr and Mrs Brown's children.



(i) Give the number of **one** person in the diagram who has cystic fibrosis.

(1)

(ii) The chance that Mr and Mrs Brown's next child will have cystic fibrosis is

(1)

Inheritance, Variation and Evolution: Homework 4

1. Complete the sentences to describe the theory of natural selection:

Survive	Variation	Genes	Species	Environment	Reproduce
Passed	Evolve	Generation	Adapted		

- Individuals in a s_____ show a wide range of v_____ and this variation is because of differences in their g_____.
- Individuals with characteristics most suited to their e_____ are more likely to s_____ and r_____. The genes that allow these individuals to be successful are passed to their offspring.
- Those that are poorly a_____ to their environment are less likely to survive and reproduce. This means that their genes are less likely to be passed on to the next g_____.
- Given time, a species will gradually e_____.
- Both genes and the environment can cause variation, but only genetic variation can be p_____ on to the next generation.

2. Peppered moths can either be light coloured or dark coloured. During the 19th century, an increase in pollution caused the bark on trees to go darker. How did this affect the numbers of each type of moth and why?

	What happened to the number of each type?	Explanation
Light coloured	Increase/Decrease	
Dark coloured	Increase/Decrease	

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