Inheritance – 2021 IGCSE 0610

1. March/2021/Paper_12/No.32

What is defined as 'a thread-like structure of DNA, carrying genetic information in the form of genes'?

A allele

B chromosome

C protein

D zygote

2. June/2021/Paper_11/No.33

What is the transmission of genetic information from generation to generation called?

A fertilisation

B inheritance

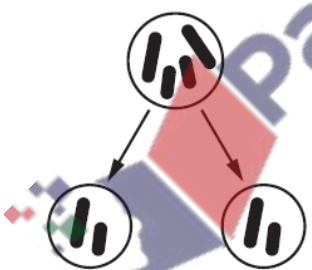
C meiosis

D reproduction

3. June/2021/Paper_11/No.34

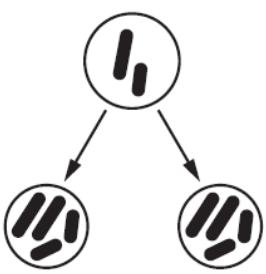
Which diagram shows the results of the process of mitosis?

A

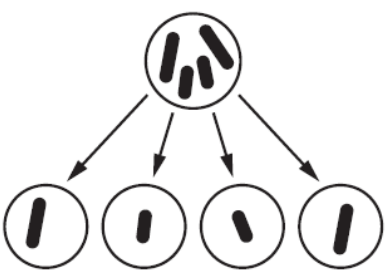


B

C

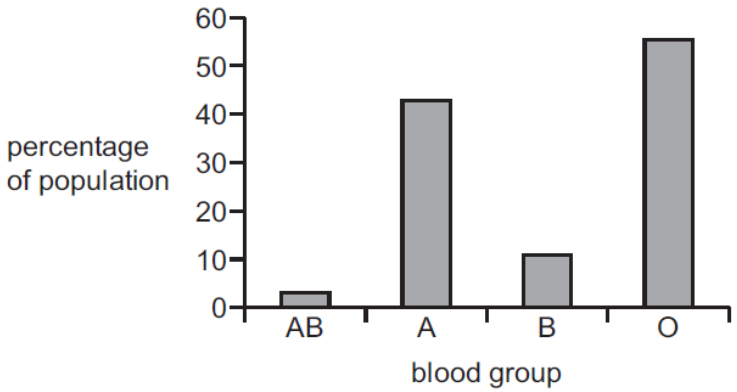


D



4. June/2021/Paper_11/No.35

The graph shows the distribution of blood groups in one area.



This is an example of discontinuous variation.

Which statement about discontinuous variation is correct?

A There is a range of genotypes between two extremes.

B There is a range of phenotypes between two extremes.

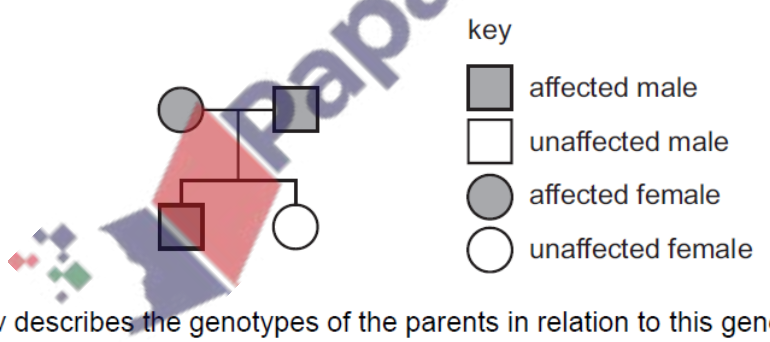
C There are intermediates between the phenotypes.

D There are no intermediates between the phenotypes.

5. June/2021/Paper_12/No.34

Both parents in a family have a characteristic caused by the dominant allele of a gene. They have two children.

The pedigree diagram of the family is shown.



Which row describes the genotypes of the parents in relation to this gene?

	female parent	male parent
A	heterozygous	heterozygous
B	heterozygous	homozygous
C	homozygous	heterozygous
D	homozygous	homozygous

6. June/2021/Paper_13/No.33

By which process is genetic information transmitted from generation to generation?

A inheritance

B mitosis

C meiosis

D variation

7. June/2021/Paper_13/No.34

Some reptiles can lose and regrow their tails to avoid predation.

Which process occurs to regrow the tail?

A digestion

B fertilisation

C meiosis

D mitosis

8. June/2021/Paper_21/No.32

What carries a copy of the gene to the cytoplasm to make a protein?

A alleles

B DNA molecules

C ribosomes

D mRNA molecules

9. June/2021/Paper_21/No.33

Which statement about meiosis is correct?

A Daughter cells are genetically identical.

B The chromosome number changes from haploid to diploid.

C It is used to produce body cells.

D It allows the formation of new combinations of chromosomes.

10. June/2021/Paper_21/No.34

Colour blindness is a characteristic that is sex-linked.

Which statement about colour blindness is correct?

A The gene for colour blindness is located on the Y chromosome and colour blindness is more common in males than in females.

B The gene for colour blindness is located on the X chromosome and colour blindness is more common in males than in females.

C The gene for colour blindness is located on the X chromosome and colour blindness is more common in females than in males.

D The gene for colour blindness is located on the Y chromosome and colour blindness is more common in females than in males.

11. June/2021/Paper_22/No.32

The Tasmanian devil is an animal with seven pairs of chromosomes in each body cell.

The diagram shows the chromosomes in a cell from a Tasmanian devil.

Which statement is correct?

A The cell is a haploid cell containing pairs of chromosomes.

B The cell is a diploid cell with no pairs of chromosomes.

C The cell is a haploid cell with no pairs of chromosomes.

D The cell is a diploid cell containing pairs of chromosomes.

12. June/2021/Paper_22/No.33

Some statements about mitosis are listed.

1 Cells divide and produce new cells to repair damaged tissues.

2 Chromosomes are duplicated and the cell separates to form gametes.

3 Chromosomes are duplicated and the cell separates to form genetically identical cells.

4 Mitosis is used in asexual reproduction.

Which statements are correct?

A 1, 2 and 3 **B** 1, 3 and 4 **C** 2 and 4 **D** 3 and 4 only

13. June/2021/Paper_23/No.33

Which definition of mitosis is correct?

A nuclear division giving rise to genetically different cells

B nuclear division giving rise to genetically identical cells

C fusion of nuclei giving rise to a genetically different cell

D fusion of nuclei giving rise to a genetically identical cell

14. June/2021/Paper_23/No.34

What happens during meiosis?

A A haploid cell produces haploid cells that are genetically identical.

B A haploid cell produces haploid cells that are genetically different.

C A diploid cell produces haploid cells that are genetically identical.

D A diploid cell produces haploid cells that are genetically different.

15. June2021/Paper_31/No.6

(a) Dimples are an indentation of the cheek visible when smiling.

Fig. 6.1 is a photograph showing a person with dimples.

Fig. 6.1

The number of male and female students in a class that had dimples was recorded.

The results are shown in Table 6.1.

Table 6.1

characteristic	sex	number of students
with dimples	male	4
	female	5
without dimples	male	13
	female	12

(i) Calculate the total number of male students in the class.

..... [1]

(ii) Calculate the difference in number between male and female students **with** dimples.

..... [1]

(iii) Describe the evidence from Table 6.1 that shows that dimples are a type of discontinuous variation.

.....

.....

.....

.....

..... [2]

(iv) State **one other** example of discontinuous variation in humans.

..... [1]

(v) State **one** example of continuous variation in humans.

..... [1]

(b) Variation can be caused by a mutation.

Complete the sentences about mutation using words from the list.

Each word can be used once, more than once or not at all.

alleles **decrease** **genetic** **impulses**

increase **ionising** **maintain** **physical** **stimuli**

A mutation is a ..... change.

Mutations form new ..... .

Some chemicals and ..... radiation can

..... the rate of mutation.

[4]

[Total: 10]

16. June2021/Paper_32/No.4

(a) (i) Define the term genetic engineering.

.....

.....

.....

.....

..... [2]

(ii) State **one** example of genetic engineering.

.....

.....

..... [1]

(b) Fig. 4.1 is a diagram of a fruit fly with normal wings and a fruit fly with vestigial wings.

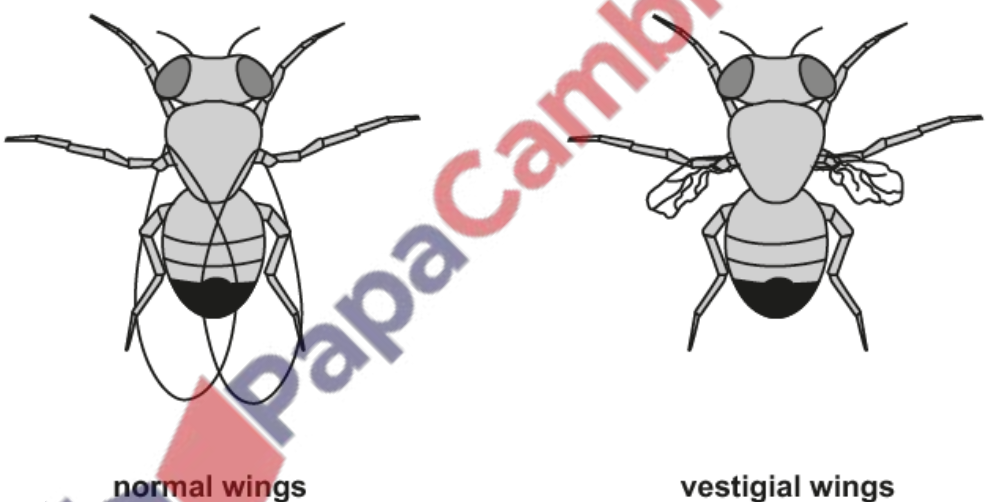


Fig. 4.1

A gene determines whether fruit flies have normal wings or vestigial wings.

There are two alleles for this gene:

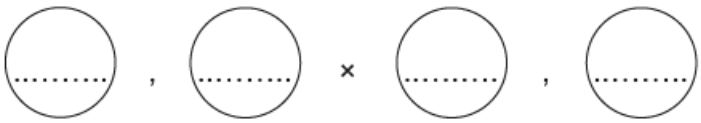
- **A** is dominant and represents the allele for normal wings
- **a** is recessive and represents the allele for vestigial wings.

(i) A homozygous dominant fruit fly was crossed with a heterozygous fruit fly.

Complete the genetic diagram to predict the probability of the offspring having vestigial wings.

parental phenotypes normal wings × normal wings

parental genotypes ..... × .....

gametes  , × ,

offspring genotypes ....

offspring phenotypes ....

probability of offspring having vestigial wings .....

[5]

(ii) State the genotype of a pure-breeding fruit fly that has normal wings.

..... [1]

(iii) The binomial name for a fruit fly is *Drosophila melanogaster*.

State the genus of this fruit fly.

..... [1]

[Total: 10]

17. June2021/Paper_33/No.10

(a) Fig. 10.1 shows the results of crossing a plant with red flowers with a plant with white flowers.

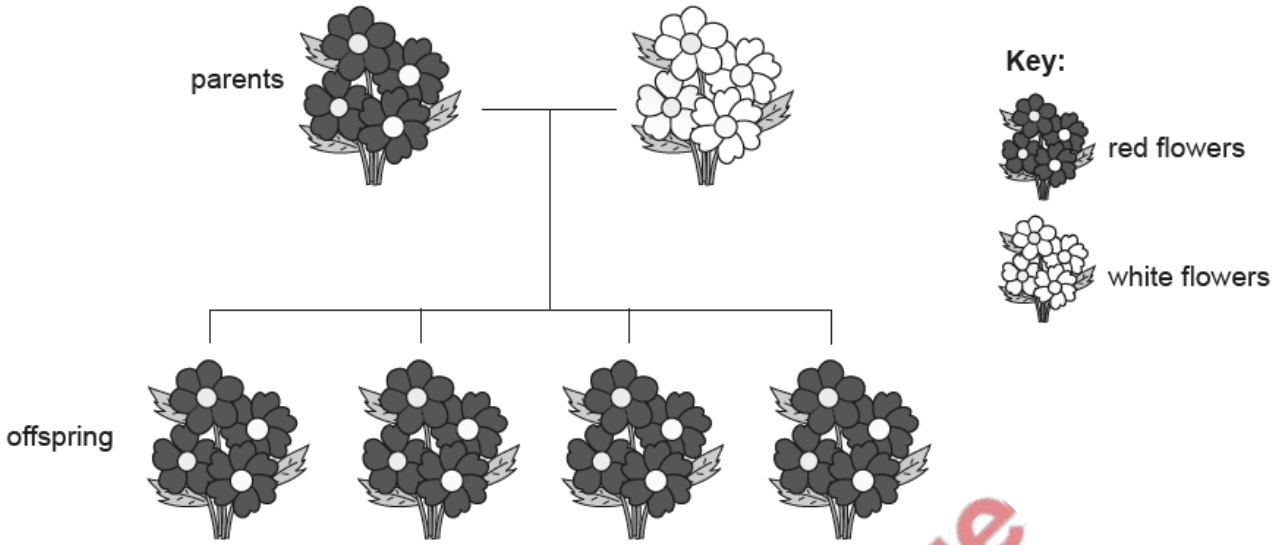


Fig. 10.1

Both of the parent plants were homozygous for flower colour.

All of their offspring had red flowers.

(i) State what is meant by the term homozygous.

.....

.....

..... [1]

(ii) The gene controlling flower colour in this plant species has two alleles:

- **R** is dominant and represents the allele for red flowers
- **r** is recessive and represents the allele for white flowers.

Describe the evidence shown in Fig. 10.1 that supports the fact that **R** is the dominant allele for flower colour in this species of plant.

.....

.....

..... [1]

(b) Another plant with red flowers was crossed with a plant with white flowers.

Some of the offspring plants from this cross had red flowers and some of the offspring plants had white flowers.

Complete the genetic diagram to show the results of this cross.

	red-flowered plant	X	white-flowered plant
parental genotypes	.....	X	.....

parental gametes ....

offspring genotypes .....

offspring phenotypes .....

[5]

[Total: 7]

18. June2021/Paper_41/No.5

Fig. 5.1 shows some of the stages in the reproduction of the bacterium *Escherichia coli*.

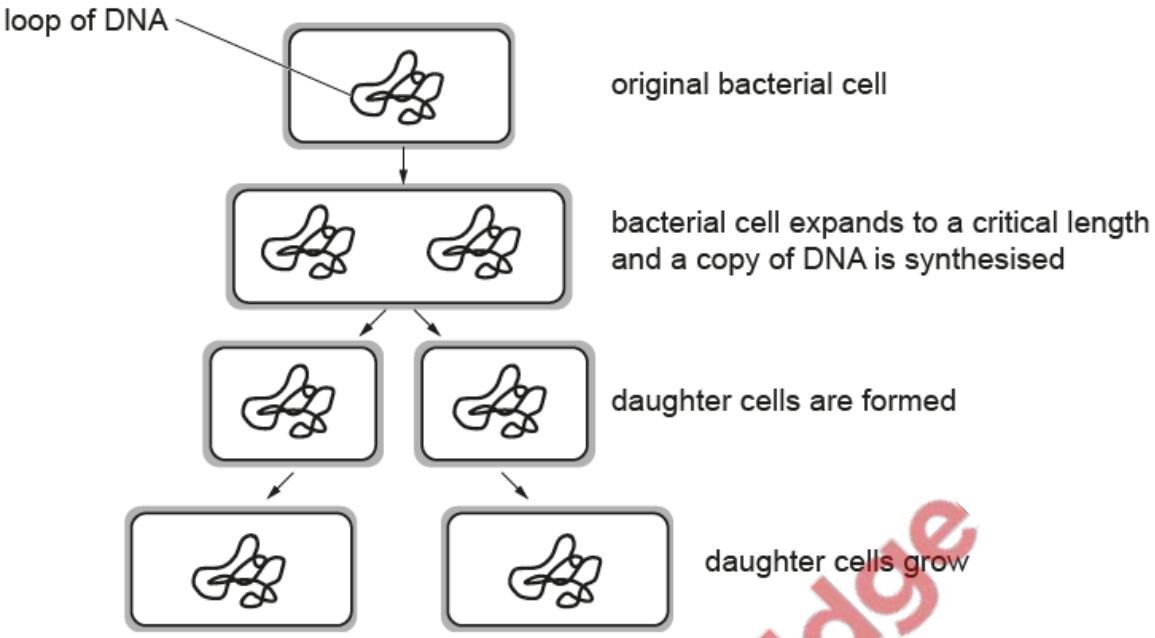


Fig. 5.1

(a) Complete the sentences about the cells in Fig. 5.1.

The DNA is in the form of a double ..... . The DNA is copied so that the number of loops of DNA after cell division is ..... in each daughter cell. The daughter cells are genetically ..... to the original cell.

[3]

(b) Students used a microscope and time-lapse photography to observe *E. coli* cells reproducing.

They used the series of photographs to identify which cells were dividing.

They measured the lengths of the dividing cells and put their data into two groups:

- cell lengths immediately before cell division
- cell lengths immediately after cell division.

Fig. 5.2 shows their results.

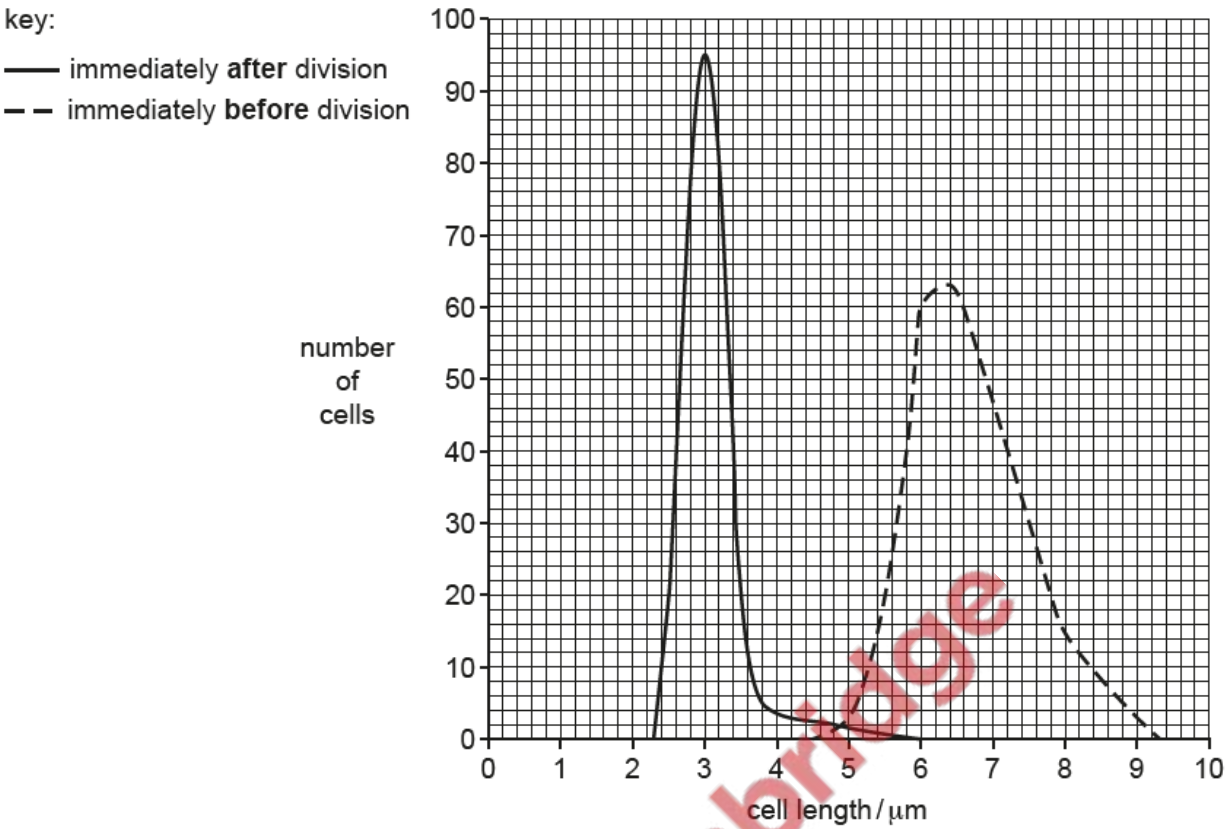


Fig. 5.2

(i) Use the information in Fig. 5.2 to state the most frequent cell length of the *E. coli* cells immediately **after** cell division.

Give your answer in **millimetres**.

..... mm
[2]

(ii) Some students concluded that the cells must be at least 6 μm in length before cell division can occur.

Describe the evidence **against** the students' conclusion. Use the information in Fig. 5.2 to support your answer.

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.....

.....

..... [2]

(i) Describe how a plasmid is cut so that a new gene can be inserted into the plasmid.

.....

.....

..... [2]

(ii) List **two** reasons, other than the presence of plasmids, that make bacteria and single-celled fungi useful to biotechnology industries.

1 .....

2 .....

[2]

[Total: 11]

19. June2021/Paper_43/No.6

There are four blood groups in the ABO system in humans: A, B, AB and O.

The gene that determines blood group has three alleles: I^A, I^B and I^o.

(a) Parents with the genotypes I^AI^o and I^BI^o are planning to have more children.

Complete the genetic diagram to determine the probability that the next child will have blood group O.

parental blood groups	A	B
parental genotypes	I^AI^o	I^BI^o

Punnett square

phenotypes of the children .....

probability that the child will have blood group O .....

[4]

(b) Explain why the ABO blood group system is an example of co-dominance.

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.....

..... [2]

(c) Fig. 6.1 shows the percentages of the global population with the four different blood groups in the ABO system.

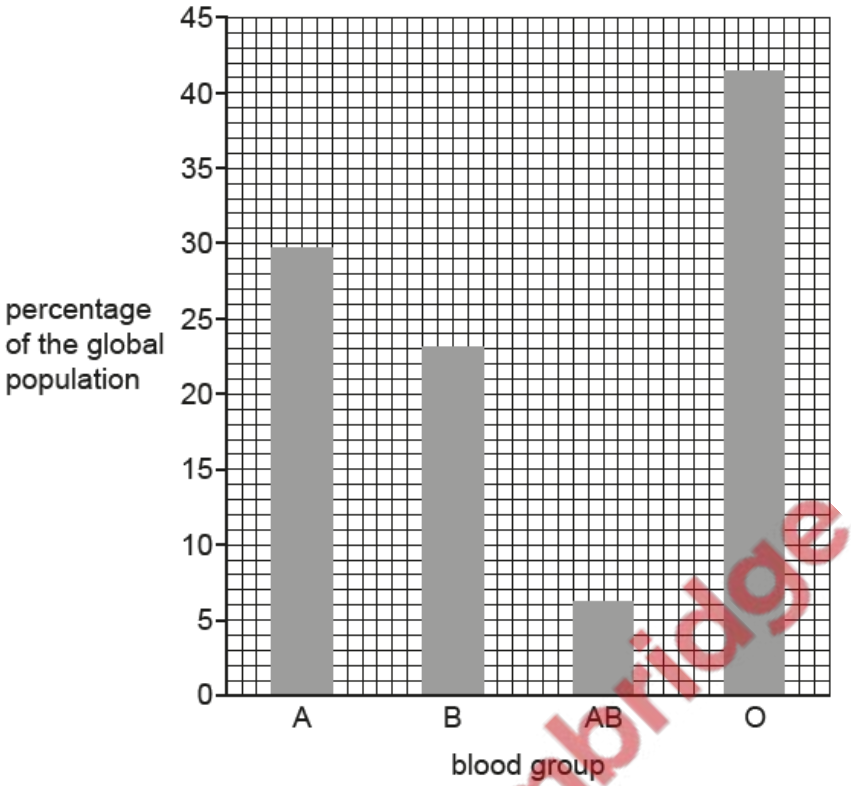

Fig. 6.1

With reference to Fig. 6.1, explain why the ABO blood group system is an example of discontinuous variation.

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..... [2]

[Total: 8]