

GCSE Combined Science: Trilogy

Worksheet: Chromosomes

TIME 35 min	TOTAL 32 marks	CALCULATOR Allowed	DIFFICULTY Easy, Medium
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Topics: Chromosomes

NAME _____	CLASS _____	DATE _____
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- Use black ink or black ball-point pen. Pencil should only be used for drawing.
- Answer all questions in the spaces provided.
- In all calculations, show clearly how you work out your answer.
- The marks for questions are shown in brackets.

0 1

The nucleus of a cell contains chromosomes.

0 1 . 1

Name the molecule that chromosomes are made of.

.....

.....

.....

[1 mark]

0 1 . 2

Complete the sentence.

Each chromosome carries a large number of _____ .

.....

.....

.....

[1 mark]

0 1 . 3

How are chromosomes normally arranged in body cells?

Tick (✓) **one** box.

In groups of three

☐

In pairs

☐

One of each type

☐

Joined into one long chromosome

☐

[1 mark]

0 1 . 4

A human body cell contains 46 chromosomes.

How many pairs of chromosomes is this?

.....

.....

.....

[1 mark]

0 2

The nucleus of a cell contains the genetic material.

0 2 . 1

Write these structures in order of size, starting with the smallest.

cell, chromosome, gene, nucleus

.....

.....

[1 mark]

0 2 . 2

Where in a plant cell are chromosomes found?

Tick (✓) **one** box.

Cell wall

☐

Chloroplast

☐

Nucleus

☐

Permanent vacuole

☐

[1 mark]

0 2 . 3

Figure 1

Term	Description
Chromosome	A type of cell division
Gene	Part of a cell that contains the chromosomes
Nucleus	A small section of DNA
	Structure made of a long molecule of DNA that carries many genes

Figure 1 shows three terms and four descriptions.
Draw **one** line from each term to its description.

.....

.....

.....

.....

.....

.....

[3 marks]

0 2 . 4

Which cell does **not** contain its chromosomes in pairs?

Tick (✓) **one** box.

Cheek cell

☐

Muscle cell

☐

Nerve cell

☐

Sperm cell

☐

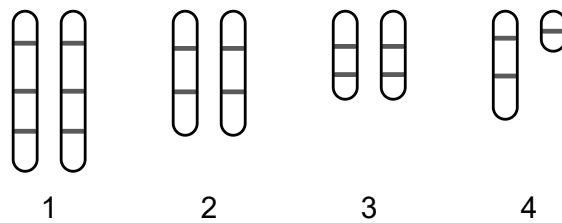
[1 mark]

0 3

Figure 2 shows all the chromosomes from a body cell of an insect. The chromosomes have been arranged in pairs, numbered 1 to 4.

Pair 4 are the sex chromosomes. In this species, females have two X chromosomes and males have one X chromosome and one smaller Y chromosome.

Figure 2



0 3 . 1

How many chromosomes are there in a body cell of this insect?

.....

.....

.....

[1 mark]

0 3 . 2

Give **one** piece of evidence from Figure 2 that shows the chromosomes in pair 2 are a pair.

.....

.....

[1 mark]

0 3 . 3

Is this insect male or female?
Give a reason for your answer.

.....

.....

.....

.....

[2 marks]

0 3 . 4

How many chromosomes would there be in a sperm cell of this insect?
Explain your answer.

.....

.....

.....

.....

[2 marks]

0 4

Table 1 shows the number of chromosomes in the cells of four organisms.

Table 1

Organism	Number of chromosomes in a body cell	Number of pairs of chromosomes in a body cell	Number of chromosomes in a gamete
Mosquito	6	3	3
Pea plant	14		
Cat		19	
Cow	60		

0 4 . 1

Complete Table 1.

.....

.....

.....

.....

.....

.....

[3 marks]

0 4 . 2

Explain why the number of chromosomes in a gamete is half the number in a body cell.

.....

.....

.....

.....

[2 marks]

0 4 . 3

A student said:
'Cows must have more genes than cats because cows have more chromosomes.'
Explain why the student may be wrong.

.....

.....

[1 mark]

0 5

Human cheek cells and bacterial cells both contain genetic material made of DNA.

0 5 . 1

Compare how the genetic material is arranged in a human cheek cell and in a bacterial cell.

.....

.....

.....

.....

.....

.....

.....

.....

[4 marks]

0 6

Chromosomes are found in the nucleus of cells.

0 6 . 1

The body cells of a fruit fly contain 4 pairs of chromosomes.

How many chromosomes are in a fruit fly body cell?

.....

.....

.....

.....
[1 mark]

0 6 . 2

Explain why the chromosomes in body cells are found in pairs.

.....

.....

.....

.....

[2 marks]

0 6 . 3

Mature human red blood cells do not contain any chromosomes.

Suggest why.

.....

.....

[1 mark]

0 6 . 4

Describe the relationship between chromosomes, DNA and genes.

.....

.....

.....

.....

[2 marks]

END OF QUESTIONS

Original practice questions written to match the specification. Not produced by, affiliated with or endorsed by AQA.

Mark scheme

GCSE Combined Science: Trilogy · Worksheet: Chromosomes · 32 marks

Question 1 (4 marks)

01.1 [1 mark]

Answer: DNA

- DNA (1)
-

01.2 [1 mark]

Answer: genes

- genes (1)
-

01.3 [1 mark]

Correct: In pairs

01.4 [1 mark]

Answer: 23

- 23 (1)
-

Question 2 (6 marks)

02.1 [1 mark]

Answer: gene, chromosome, nucleus, cell

- gene → chromosome → nucleus → cell (1)

02.2 [1 mark]

Correct: Nucleus

02.3 [3 marks]

Answer: chromosome – long molecule of DNA carrying many genes; gene – small section of DNA; nucleus – contains the chromosomes

- chromosome – structure made of a long molecule of DNA that carries many genes (1)
- gene – a small section of DNA (1)
- nucleus – part of a cell that contains the chromosomes (1)

Notes: If more than one line is drawn from a term, award no mark for that term.

02.4 [1 mark]

Correct: Sperm cell

Question 3 (6 marks)

03.1 [1 mark]

Answer: 8

- 8 (1)

03.2 [1 mark]

- they are the same length / size / shape / have the same pattern of bands (1)

03.3 [2 marks]

- male (1)
- the chromosomes in pair 4 are different sizes, so there is one X and one (smaller) Y chromosome (1)

Notes: The reason mark can only be awarded if male is chosen.

03.4 [2 marks]

- 4 (1)
 - a gamete contains one chromosome from each pair / half the number of chromosomes in a body cell (1)
-

Question 4 (6 marks)

04.1 [3 marks]

Answer: pea: 7 pairs, 7 in a gamete; cat: 38 in a body cell, 19 in a gamete; cow: 30 pairs, 30 in a gamete

- pea plant: 7 (pairs) and 7 (in a gamete) (1)
- cat: 38 (in a body cell) and 19 (in a gamete) (1)
- cow: 30 (pairs) and 30 (in a gamete) (1)

Notes: 1 mark for each completely correct row.

04.2 [2 marks]

- a gamete contains one chromosome from each pair (1)
 - so when two gametes join at fertilisation, the fertilised egg has the full number of chromosomes / chromosomes in pairs again (1)
-

04.3 [1 mark]

- chromosomes differ in size / in the number of genes they carry, so more chromosomes does not necessarily mean more genes (1)
-

Question 5 (4 marks)

05.1 [4 marks]

Levels of response

- **Level 2 (3–4)** A clear, logically linked answer covering the key points accurately.
- **Level 1 (1–2)** One or two relevant points with little linking.
- **No marks (0)** Nothing relevant or worthy of credit.

Indicative content

- in the cheek cell, the genetic material is enclosed in a nucleus; in the bacterial cell it is not enclosed in a nucleus
 - the cheek cell has 46 chromosomes, each made of a long DNA molecule
 - the chromosomes in the cheek cell are in (23) pairs, one of each pair from each parent
 - the bacterial cell has a single loop of DNA, not in pairs
 - the bacterial cell may also have small rings of DNA called plasmids
 - in both cells the DNA carries many genes
-

Question 6 (6 marks)

06.1 [1 mark]

Answer: 8

- 8 (1)

06.2 [2 marks]

- one chromosome of each pair comes from the mother / egg (1)
- the other comes from the father / sperm (1)

Notes: Allow 'one set of chromosomes is inherited from each parent' for 2 marks.

06.3 [1 mark]

- they have no nucleus (1)

06.4 [2 marks]

- chromosomes are made of (long molecules of) DNA (1)
 - genes are (short) sections of the DNA on a chromosome / each chromosome carries many genes (1)
-