

Reproduction: practice questions

7 questions • 23 marks • mark scheme at the back

For AQA GCSE Combined Science: Trilogy 8464. **Higher tier** is only on the Higher paper.

Name

Total / 23

1 Which statement about asexual reproduction is correct? [1 mark]

- A. ☐ Gametes fuse to form the offspring.
- B. ☐ The offspring are genetically identical to the parent.
- C. ☐ Meiosis is used to form the offspring.
- D. ☐ Two parents are needed.

2 A human body cell has 46 chromosomes. Explain how meiosis and fertilisation make sure [3 marks]
that a baby has 46 chromosomes in its body cells.

3 (a) What is meant by the genome of an organism? (1) (b) Give one reason why it is [2 marks]
important to understand the human genome. (1)

4 In mice, the allele for black fur (B) is dominant to the allele for brown fur (b). A heterozygous black mouse (Bb) is crossed with a brown mouse (bb). The table shows an incomplete Punnett square. (a) Give the genotypes that go in boxes (i) and (ii). (1) (b) Give the expected ratio of black to brown offspring. (1) (c) The mice have 12 offspring. How many would you expect to be brown? (1) (d) Explain why the parent with genotype Bb is described as heterozygous. (1)

Punnett square for Bb × bb		
Gametes	B	b
b	Bb	(i)
b	(ii)	bb

Answer =

[illegible]

5 **Higher tier** **[4 marks]**

Cystic fibrosis is caused by a recessive allele (f). Two parents do not have cystic fibrosis, but both are carriers (Ff). Construct a Punnett square to work out the probability that their child has cystic fibrosis. (4)

Answer =

[illegible]

6 A couple are both carriers of the recessive allele that causes cystic fibrosis. They are offered embryo screening. Embryos are made outside the body and tested for the faulty allele. Only embryos without two copies of the faulty allele are placed in the mother's womb. Embryos that are not used are destroyed. The process is expensive. Discuss the economic, social and ethical issues of embryo screening for this couple. **[6 marks]**

[illegible]

7 Use a genetic cross to show how the sex of a human baby is inherited. Give the ratio of female to male babies. **[3 marks]**

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Mark scheme

One mark for each point unless a maximum is given. Words in brackets are not needed for the mark.

1. [1]

B B: the offspring are genetically identical to the parent (1)

2. [3]

- meiosis halves the number of chromosomes / gametes have a single set of chromosomes (1)
- so each gamete (sperm or egg) has 23 chromosomes (1)
- at fertilisation two gametes join / fuse, restoring the full number of 46 (1) ignore 'meet' without joining

3. [2]

- (a) the entire genetic material of that organism (1) allow all of the DNA of an organism
- (b) any one from: search for genes linked to (different types of) disease / understanding and treatment of inherited disorders / tracing human migration patterns from the past (1)

4. [4]

- (a) (i) bb and (ii) Bb, both needed (1)
- (b) 1 : 1 (1) allow 2 : 2
- (c) 6 (1) allow correct answer from their ratio in (b)
- (d) it has two different alleles (for the gene) (1)

5. [4] **Higher tier**

- gametes from each parent shown as F and f (1)
- offspring genotypes FF, Ff, Ff, ff shown in a Punnett square (1)
- only ff has cystic fibrosis (two recessive alleles) (1)
- probability = 1 in 4 / 0.25 / 25% / 1/4 (1) do not accept 1 : 3 or 1 : 4

6. [6]

Level 3 5-6	Discusses economic, social and ethical issues, giving points for and against, linked to the information given, and reaches a reasoned conclusion.
Level 2 3-4	Discusses at least two types of issue with some explanation. The answer may be one-sided or have no conclusion.
Level 1 1-2	Simple statements about one or two issues, with little explanation or link to the information given.

Indicative content

- ethical: prevents suffering for the child and family
- ethical: embryos are destroyed, which some people think is wrong
- social: couple can have a child without cystic fibrosis
- social: may lead to pressure to choose other characteristics, or to people with the disorder feeling devalued
- economic: screening and the process is expensive for the family or health service
- economic: may save the long-term cost of treating cystic fibrosis
- a conclusion that weighs up the issues

7. [3]

- gametes: mother X and X, father X and Y (1)
- offspring XX, XX, XY, XY (1) allow a correct Punnett square for both marks
- ratio female : male = 1 : 1 (1) allow 50% / 1 in 2 chance of each