Inherited Disorders

GCSE Biology · Written to the shared content for AQA, Edexcel and OCR

Name _____ Class _____ Date _____

1. Worked example

Describe polydactyly and cystic fibrosis and how each is inherited. (4 marks)

Step 1 · Polydactyly

Having extra fingers or toes.

Step 2 · Inheritance

Caused by a dominant allele, so one copy is enough; an affected parent has a 50% chance of passing it on (if heterozygous).

Step 3 · Cystic fibrosis

A disorder of cell membranes, causing thick sticky mucus in the lungs and digestive system.

Step 4 · Inheritance

Caused by a recessive allele: a person must inherit two copies; carriers (Ff) are unaffected.

Answer: Polydactyly: dominant. Cystic fibrosis: recessive (cell membranes)

Check: Two carrier parents have a 25% chance of an affected child each pregnancy.

2. Now try one with the steps

Two carriers of cystic fibrosis (Ff × Ff) plan a family. Calculate the probability that a child is a carrier. (2 marks)

Step 1 · Punnett square

Step 2 · Carriers

Answer:

3. Practice

Show your working. The marks tell you how much is expected.

1. What is polydactyly? [1]

2. Is polydactyly caused by a dominant or recessive allele? [1]

3. Cystic fibrosis is a disorder of which part of the cell? [1]

4. What is a carrier? [1]

5. Give one symptom of cystic fibrosis. [1]

6. Two carriers (Ff × Ff) have a child. What is the probability it has cystic fibrosis? [2]

7. A carrier (Ff) and an affected person (ff) have a child. What is the probability it has cystic fibrosis? [2]

8. Can two people without polydactyly have a child with polydactyly? Explain (ignore new mutations). [2]

9. Give one economic and one ethical issue of embryo screening. [2]

10. In the family tree, two unaffected parents have a child with cystic fibrosis. Explain how this shows that cystic fibrosis is recessive. [2]

11. An unaffected child of two carriers wants to know the chance they are a carrier. Give the probability fraction. [2]

12. In a population, 1 in 25 people are carriers of cystic fibrosis. What percentage is this? [1]

13. Explain what gene therapy aims to do for cystic fibrosis. [2]

14. Two carriers have 4 children. Explain why it is possible for none of them to have cystic fibrosis. [2]

4. Before you hand it in

"Carriers have a mild form of cystic fibrosis."
A carrier (Ff) has one normal allele and does not have the disorder.

"Polydactyly is recessive because it is rare."
Polydactyly is DOMINANT; it is still uncommon in the population.

Writing 'ethical' for every issue
Economic = cost; social = effects on families and society; ethical = right or wrong (e.g. embryo destruction).