# Reproduction, Variation and Inheritance

From how characteristics pass from parents to offspring to why no two living things are exactly alike, this topic covers key KS3 biology ideas that lead straight into GCSE genetics.

13. (a) When fertilisation takes place, the nucleus of a sperm joins with the nucleus of an ovum (egg).

In which part of the reproductive system does fertilisation normally take place in humans?
Tick the correct box.

| | | | |
|---|---|---|---|
| cervix | ☐ | ovary | ☐ |
| oviduct | ☐ | uterus | ☐ |

☐ 13a
1 mark

(b) The table below gives information about fertilisation in three animals.

| animal | Does fertilisation take place inside or outside the body? | number of eggs released at a time |
|---|---|---|
| human | inside | 1 |
| bird | inside | 4 |
| frog | outside | 3000 |

Frogs release their eggs and sperm into water.
The eggs are fertilised in the water.

Why is it an advantage for frogs to release large numbers of eggs and sperm?

_____

_____

☐ 13b
1 mark

KS3 Science SATs, Tier 3-6, Paper 2 (2005) - Q13(a)-(b)

(c) (i) When pigs reproduce, which **two** types of cell pass information from the pigs to their piglets?
Tick the **two** correct boxes.

| | | | | | |
|---|---|---|---|---|---|
| blood cell | ☐ | nerve cell | ☐ | cheek cell | ☐ |
| egg cell | ☐ | muscle cell | ☐ | sperm cell | ☐ |

4ci 1 mark

4ci 1 mark

(ii) When pigs reproduce, two cells join together.

What is this process called?
Tick the correct box.

| | | | |
|---|---|---|---|
| adaptation | ☐ | classification | ☐ |
| fertilisation | ☐ | variation | ☐ |

4cii 1 mark

KS3 Science SATs, Paper 1 (2009) - Q4(c)

9. The drawings show identical twins, Sara and Helen, and their parents.


father


mother


Sara

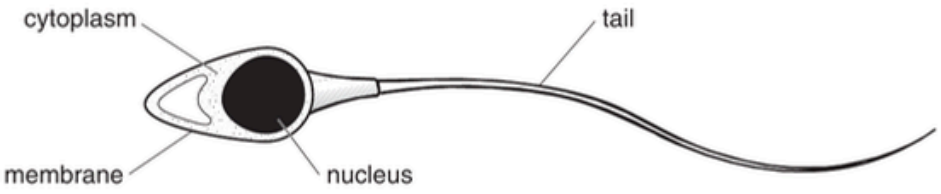

Helen

(a) (i) Sara and Helen have blue eyes like their mother.

Describe how genetic information is passed on from a parent to a child.

KS3 Science SATs, Tier 5-7, Paper 1 (2007) - Q9(a)(i)

13. (a) The diagram shows a sperm cell. Sperm cells are adapted for fertilisation.



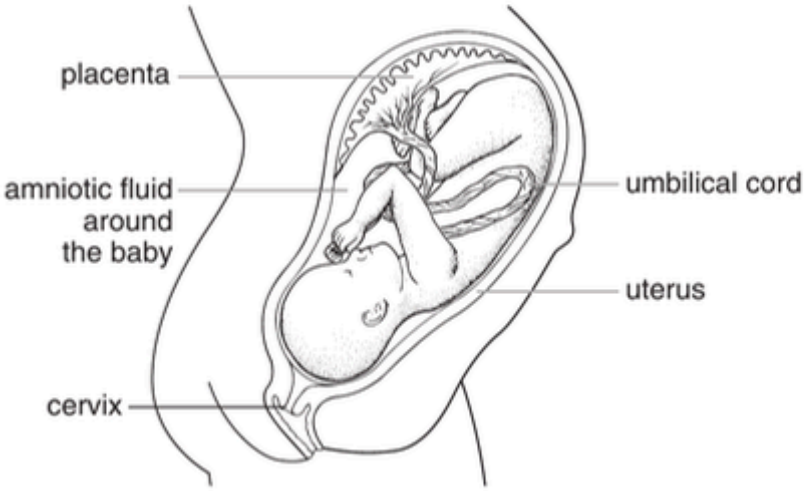

Sperm cells use their tails to swim towards an ovum (egg).
Give **one** other way the sperm cell is adapted for fertilisation.

_____

_____

KS3 Science SATs, Tier 5-7, Paper 2 (2006) - Q13(a)

(b) The drawing below shows a baby in its mother's uterus.




(i) Through which labelled part can alcohol pass from mother to baby?

_____

2bi
1 mark

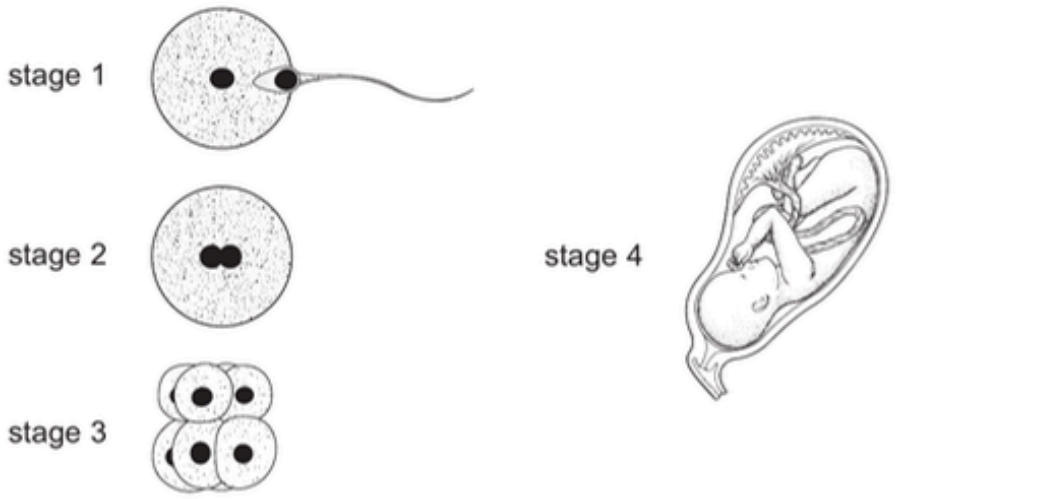
(ii) Which labelled part protects the baby from damage?

_____

2bii
1 mark

KS3 Science SATs, Tier 3-6, Paper 1 (2008) - Q2(b)

(b) The diagrams below represent what happens at fertilisation and after fertilisation has taken place.




*not to scale*

(i) Some women find it difficult to become pregnant. Doctors have developed a technique in which an ovum is fertilised in a test-tube. An embryo is then implanted into the woman's reproductive system.

Which stage opposite shows an embryo and which stage shows a foetus?

embryo _____

foetus _____

10bi
1 mark

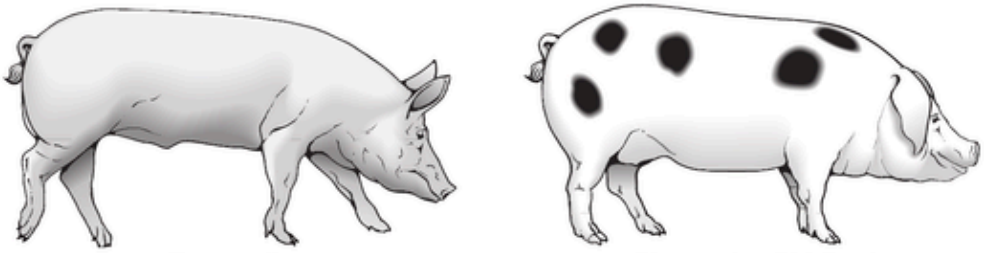
(ii) Into which part of the woman's reproductive system is the embryo implanted?

_____

10bii
1 mark

KS3 Science SATs, Tier 5-7, Paper 1 (2006) - Q10(b)

4. The drawings below show pigs from two different breeds.



**Tamworth** **Gloucester Old Spot**

4ai 1 mark

(a) (i) From the drawings above, give **two** ways in which the pigs are different.

1. _____

4ai 1 mark

2. _____

(ii) What are these differences called?
Tick the correct box.

| | | | |
|---|---|---|---|
| adaptations | ☐ | classification | ☐ |
| fertilisation | ☐ | variations | ☐ |

4aii 1 mark

(b) The drawing below shows a piglet bred from a Tamworth and a Gloucester Old Spot.



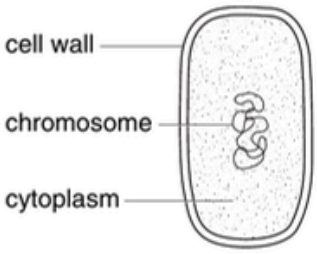
Give **one** way you can tell that one of its parents is a Tamworth.

_____

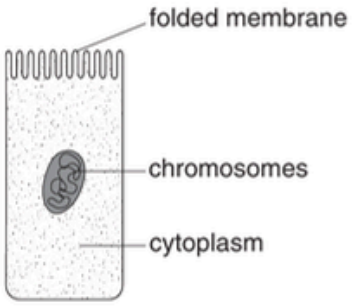
4b 1 mark

KS3 Science SATs, Paper 1 (2009) - Q4(a)-(b)

(b) The diagrams below show two other cells.




**a bacterium**




**cell from the inner lining of the intestine**

*not to scale*

(i) Look at the diagrams above.

What is the difference between the location of the genetic material in the bacterium and in the cell from the lining of the intestine?

13bi

1 mark

(ii) What is the function of the genetic material in a cell?

13bii



Modern Tuition

(c) (i) Explain why a child can look like both parents but is **not** identical to either of the parents.

_____

_____

_____

_____

10ci
1 mark

(ii) In the table below, tick **one** box by each human characteristic to show whether it is:

- inherited only
- inherited **and** affected by environmental conditions.

| human characteristic | inherited only | inherited and affected by environmental conditions |
|---|---|---|
| eye colour | | |
| skin colour | | |
| weight | | |

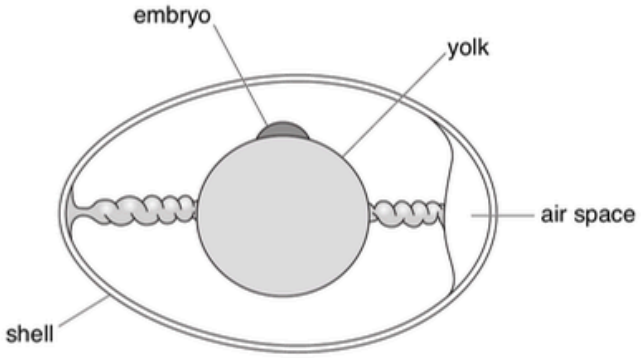
10ci
1 mark

*maximum 7 marks*

10cii
1 mark

KS3 Science SATs, Tier 5-7, Paper 1 (2006) - Q10(c)

(c) The diagram shows a section through a fertilised egg of a bird.




(i) The shell of a bird's egg is porous. This means it has microscopic holes in it.

Why does it need to be porous?

_____

13ci
1 mark

(ii) Give **one** other function of the egg shell.

_____

13cii
1 mark

(d) A bird's egg contains yolk which is a food store for the developing chick. A human egg does **not** contain yolk.

Why does a human egg **not** need to contain a food store for the embryo?

_____

_____

13d
1 mark

KS3 Science SATs, Tier 3-6, Paper 2 (2005) - Q13(c)-(d)

(ii) Sara and Helen have brown hair like their father and blue eyes like their mother.

Why do children have characteristics of both parents?

9aii
1 mark

(b) Sara and Helen are identical twins.

Why do they have identical characteristics?

9b
1 mark

(c) Sara now spends a lot of her time working outdoors in a hot country. Helen now works in an office in England.

The table shows information about three human characteristics.

| characteristic | Is it identical for Sara and Helen? |
|---|---|
| eye colour | yes |
| skin colour | no |
| weight | no |

Explain why their eye colour is identical but their weight and skin colour are **not** identical.

9c
1 mark

9c

KS3 Science SATs, Tier 5-7, Paper 1 (2007) - Q9(a)(ii)-(c)

(b) A plant breeder wants to use selective breeding to produce corn with short stalks and a high mass of grain. He could use the following varieties of corn:

| variety A | variety B | variety C |
|---|---|---|
| long stalks | short stalks | long stalks |
| high mass of grain | low mass of grain | low mass of grain |

(i) What would the plant breeder need to do to make sure he always produced corn with short stalks and a high mass of grain? Describe the three steps the breeder would use.

_____

_____

_____

_____

_____

_____

13bi
1 mark

13bi
1 mark

13bi
1 mark

(ii) Suggest **one** other characteristic that farmers might like corn plants to have to increase the amount of corn produced.

_____

13bii
1 mark

KS3 Science SATs, Tier 5-7, Paper 1 (2009) - Q13(b)