

TWENTY FIRST CENTURY
science

Module B1

YOU AND YOUR GENES

Practice test

FOUNDATION

Name:

Form/teaching set:

Answer all of the questions.

Write your answers in the spaces provided on this paper.

1 A plant breeder develops a new variety of sweet pea. Sweet peas come in many colours, including red, pink, cream, and purple.

The flowers of the new variety are a bright pink colour and have a pleasant scent.

The plant breeder cuts pieces from the new plant and grows them to make many new plants. Each new plant has bright pink flowers and a pleasant scent.

(a) Use a word from the list to finish the sentence to explain why all of the new plants look and smell the same.

flowers genes leaves roots

All of the new plants have identical

[1]

(b) What name is given to identical organisms produced in this way?

Put a **ring** around the **one** correct answer.

cells clones chromosomes embryos

[1]

(c) The plant breeder grows some of the plants in his garden.

He collects seeds from these plants.

He uses the seeds to grow more plants.

Which statement **best** describes the likely colour of the flowers he grows from these seeds?

Put a tick (✓) in the box next to the **one** correct answer.

They all have pink flowers.

They all have pink or red flowers.

None of them have pink flowers .

Some will be pink but others will be other colours.

[1]

[Total marks: 3]

2 Cystic fibrosis is a genetic disease controlled by a recessive allele.

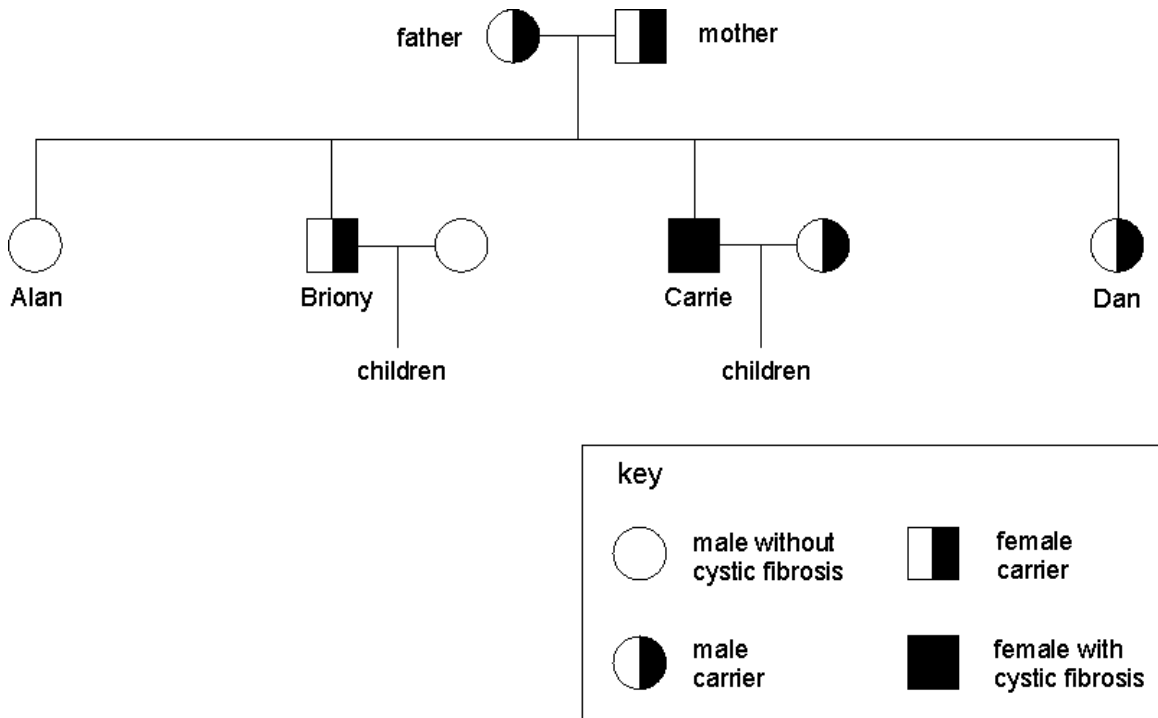
(a) Which of the following are symptoms of cystic fibrosis?

Put ticks (✓) in the boxes next to the two correct answers.

- Production of thick slimy mucus blocks the lungs, making breathing difficult.
- The blood does not clot easily, so wounds bleed a lot.
- The muscles become weak, so it is difficult to walk.
- The duct from the pancreas becomes blocked, so the digestive enzymes are not released.
- The brain is affected, making it difficult to remember things.

[2]

(b) The diagram shows a family with a history of cystic fibrosis.



(i) Alan **does not** show the symptoms of cystic fibrosis.

Some of these statements could be true, but some must be false.

Put a tick (✓) in the **one** correct box next to each statement.

	could be true	must be false
He has one dominant allele and one recessive allele.	<input type="checkbox"/>	<input type="checkbox"/>
He has two dominant alleles.	<input type="checkbox"/>	<input type="checkbox"/>
He has two recessive alleles.	<input type="checkbox"/>	<input type="checkbox"/>

[1]

(ii) Carrie **does** show the symptoms of cystic fibrosis.

Which of these statements explains why?

Put a tick (✓) in the box next to the **one** correct answer.

- She has inherited one dominant allele from her father and one dominant allele from her mother.
- She has inherited one recessive allele from her father and one dominant allele from her mother.
- She has inherited one dominant allele from her father and one recessive allele from her mother.
- She has inherited one recessive allele from her father and one recessive allele from her mother.

[1]

(iii) Briony married a man who does not have cystic fibrosis, as shown on the diagram.

What is the chance that a child of this marriage will develop symptoms of cystic fibrosis?

Put a tick (✓) in the box next to the one correct answer.

- no chance at all
- 1 in 4
- 1 in 2
- it is certain

[1]

(iv) In the future it may be possible to treat cystic fibrosis by gene therapy.

Here are five statements describing the process of gene therapy.

They are in the wrong order.

- A** After a period of time, check to see if the normal gene is present in the cells of the patients.
- B** Identify the gene that causes cystic fibrosis.
- C** Make many copies of the normal allele
- D** Put copies of the normal gene into the cells of cystic fibrosis patients.
- E** Remove the allele from a person who does not have cystic fibrosis.

Fill in the boxes to show the correct order. The first one has been done for you.

B				
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[3]

[Total marks: 8]

3 Diabetes is a disease where the pancreas does not produce enough of the hormone insulin.

People with this disease have daily injections of insulin.

In the future, it may be possible to treat diabetes using embryonic stem cells.

(a) What are embryonic stem cells?

Put a tick (✓) in the box next to the **one** correct answer.

any cell taken from a human embryo

cells taken from the stem of a plant

unspecialized cells that can develop into any type of cell

[1]

(b) Four people are discussing the use of embryonic stem cells.

Amy

In the long term this could reduce the cost of treating diabetes.



Brian

This treatment is too expensive to be used for all diabetes sufferers.



Chrissy

This is unnatural and wrong. It should be banned.



Dave

This will save me having to inject insulin every day.



(i) Which person has diabetes?

Put a tick (✓) in the box next to the one correct answer.

Amy

Brian

Chrissy

Dave

[1]

(ii) Which person is making an ethical statement?

Put a tick (✓) in the box next to the one correct answer.

Amy

Brian

Chrissy

Dave

[1]

[Total marks: 3]

4 Tom and Alison plan to have a family.

Tom knows that someone in his family had the genetic disease called retinoblastoma.

When Alison becomes pregnant, her doctor gives her this information to read.

Retinoblastoma

Some diseases have a genetic cause. Retinoblastoma is an eye disease that affects young children. It is caused by a recessive allele on chromosome 13. A person can be a carrier of the defective allele. Carriers do not show symptoms of the disease, but can pass the faulty gene on to their children.

It is possible for people to be tested to see whether they carry faulty genes that might cause inherited disease in their children.

It is also possible to have a test during pregnancy that shows whether the fetus has inherited the faulty gene. If the gene has been passed on to the fetus, the parents may decide to terminate the pregnancy.

(a) Use words from this list to finish the sentences.

carrier cells dominant genes recessive

Chromosomes occur in pairs. The chromosomes in each pair carry the same in the same place but there are different versions called alleles.

The allele that causes retinoblastoma is

The normal allele, which does not cause the disease, is

A person with one allele for retinoblastoma and one that is normal is called a

[4]

(b) The doctor says that Alison can have a test to find out if the fetus has retinoblastoma.

Suggest two reasons why Tom and Alison might choose not to have the test.

.....

.....

.....

.....

[2]

[Total marks: 6]

[Total marks for test: 20]

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Practice test

HIGHER

Name:

Form/teaching set:

Answer all of the questions

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flowers genes leaves roots

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(b) What name is given to identical organisms produced in this way?

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(c) The plant breeder grows some of the plants in his garden.

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He uses the seeds to grow more plants.

What colour will the flowers on these plants be?

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They all have pink flowers.

They all have pink or red flowers.

None of them have pink flowers .

Some will be pink but others will be other colours

[1]

[Total marks: 3]

2 Cystic fibrosis is a genetic disease controlled by a recessive allele.

(a) State two symptoms of cystic fibrosis.

1

.....

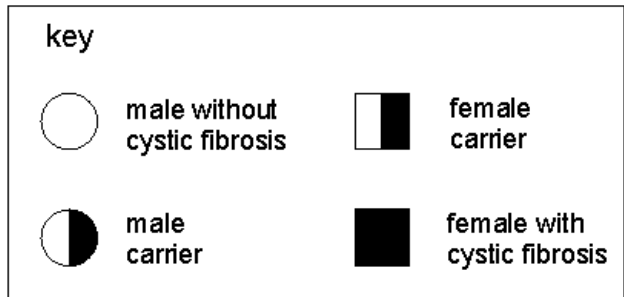
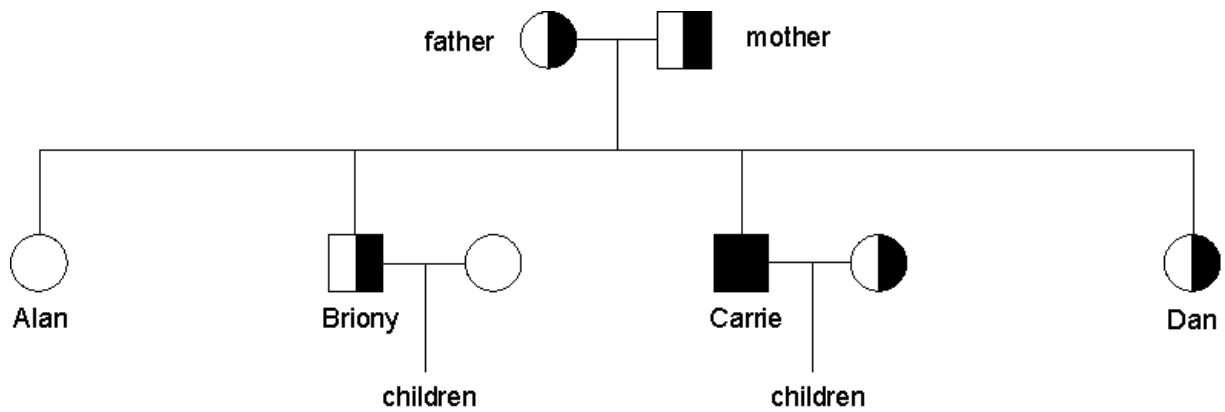
[1]

2

.....

[1]

(b) The diagram shows a family with a history of cystic fibrosis.



(i) Which children will show no symptoms of cystic fibrosis?

Put a tick (✓) in the box next to each correct answer.

- Alan
- Briony
- Carrie
- Dan

[2]

(ii) Briony and Carrie both marry and have children.

The chance of Carrie having children with cystic fibrosis is greater than the chance of Briony having children with cystic fibrosis.

Which of these statements explain how Carrie may have a child with cystic fibrosis?

Put a tick (✓) in the box next to each correct answer.

Carrie has one recessive and one dominant gene.

Carrie is a carrier.

Carrie has two recessive genes.

Carrie has two dominant genes.

Carrie marries a man who is a carrier.

[2]

(iii) In the future it may be possible to treat cystic fibrosis by gene therapy.

Here are five statements describing the process of gene therapy.

They are in the wrong order.

- A** After a period of time, check to see if the normal gene is present in the cells of the patients.
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- E** Remove the allele from a person who does not have cystic fibrosis.

Fill in the boxes to show the correct order. The first one has been done for you.

B				
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[2]

[Total marks: 8]

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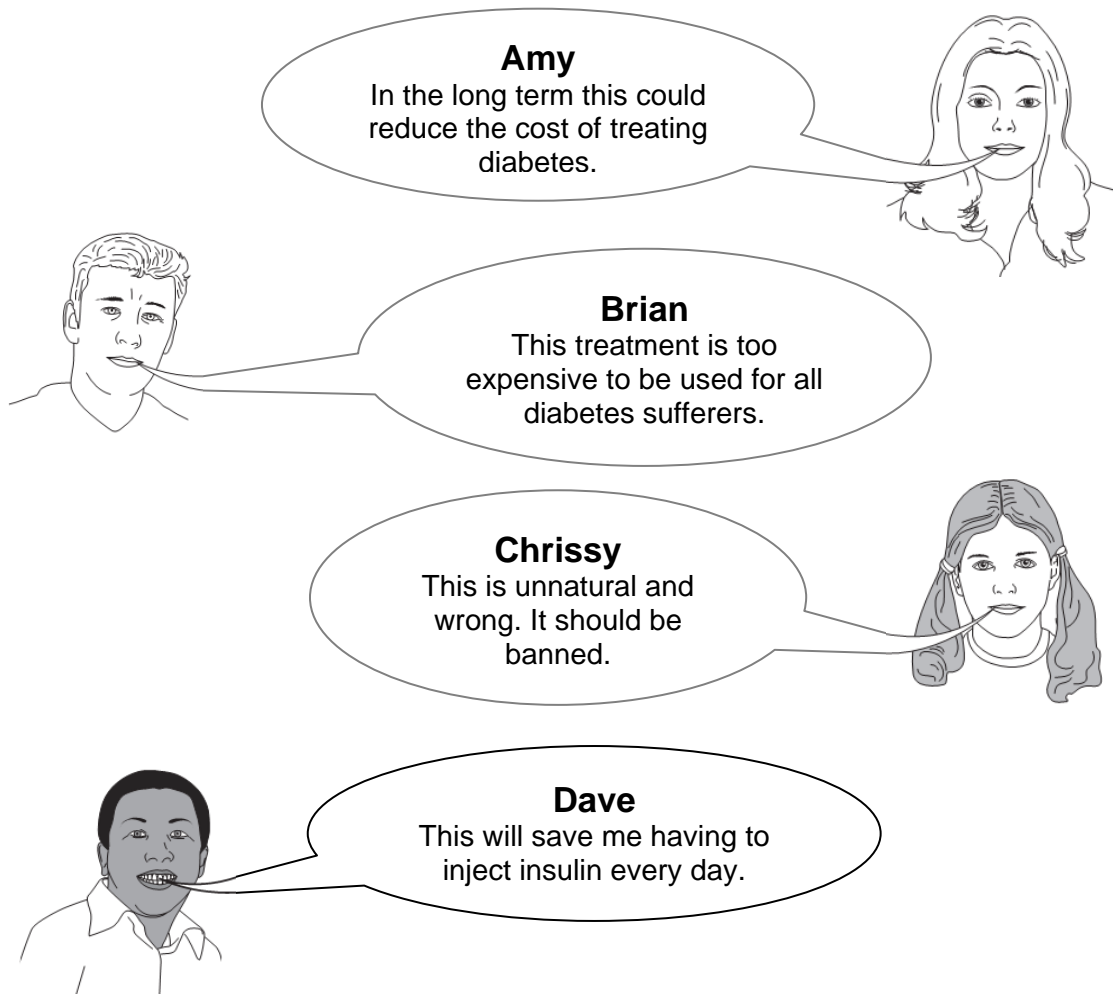
In the future, it may be possible to treat diabetes using embryonic stem cells.

(a) What are stem cells?

.....

[1]

(b) Four people are discussing the use of embryonic stem cells.



(i) Which person has diabetes?

Put a tick (✓) in the box next to the one correct answer.

- Amy**
- Brian**
- Chrissy**
- Dave**

[1]

(ii) Which person is making an ethical statement?

Put a tick (✓) in the box next to the one correct answer.

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- Brian**
- Chrissy**
- Dave**

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[Total marks: 3]

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It is also possible to have a test during pregnancy that shows whether the fetus has inherited the faulty gene. If the gene has been passed on to the fetus, the parents may decide to terminate the pregnancy.

(a) Tom is a carrier of the inherited disease retinoblastoma.

Which of these statements describes the pair of alleles that Tom has for this gene on the two chromosomes 13?

Put a tick (✓) in the box next to each correct answer.

- He has one dominant allele.
- He has two dominant alleles.
- He has one recessive allele.
- He has two recessive alleles.

[1]

(b) The doctor says that Alison can have a genetic test to find out if the baby has retinoblastoma.

Suggest two reasons why Tom and Alison might choose not to have the test.

1

.....

[1]

2

.....

[1]

(c) Genetic testing can be used to find out the gender of a fetus.

The test involves determining whether the gene combination for male or female is present.

Write down the combination of genes that show that the fetus is female.

.....

[1]

(d) Tom is worried about the security of the information gained from genetic testing.

Suggest two reasons why Tom might be worried about the security of the genetic testing results.

1

.....

[1]

2

.....

[1]

[Total marks: 6]

[Total marks for test: 20]