Paper Reference(s)

5005   5025

Edexcel GCSE

Science (5005)

Biology (5025)

B1a – Topics 1 and 2

Foundation and Higher Tier

Friday 6 March 2009 – Morning

Time: 20 minutes

Materials required for examination
Multiple Choice Answer Sheet
HB pencil, eraser and calculator

Items included with question papers
Nil

Instructions to Candidates

Use an HB pencil. Do not open this booklet until you are told to do so.
Mark your answers on the separate answer sheet.

Foundation tier candidates: answer questions 1 – 24.
Higher tier candidates: answer questions 17 – 40.
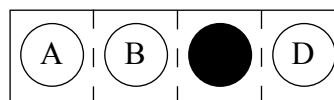All candidates are to answer questions 17 – 24.

Before the test begins:

Check that the answer sheet is for the correct test and that it contains your candidate details.

How to answer the test:

For each question, choose the right answer, A, B, C or D
and mark it in HB pencil on the answer sheet.
For example, the answer C would be marked as shown.

Mark only **one** answer for each question. If you change your mind about an answer, rub out
the first mark **thoroughly**, then mark your new answer.

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Turn over

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**Questions 1 to 16 must be answered by Foundation tier candidates only.
Higher tier candidates start at question 17.**

In the garden

David made a pile of dead leaves in his garden.
Worms and slugs feed on these dead leaves.
Birds and hedgehogs eat worms and slugs.
Hedgehogs are covered in fleas which feed on the hedgehogs' blood.

1.   Which of the following shows a correct food chain in the garden?

A   fleas ⟶ hedgehogs ⟶ slugs ⟶ dead leaves
B   dead leaves ⟶ worms ⟶ hedgehogs ⟶ birds
C   dead leaves ⟶ slugs ⟶ hedgehogs ⟶ fleas
D   worms ⟶ hedgehogs ⟶ fleas ⟶ birds
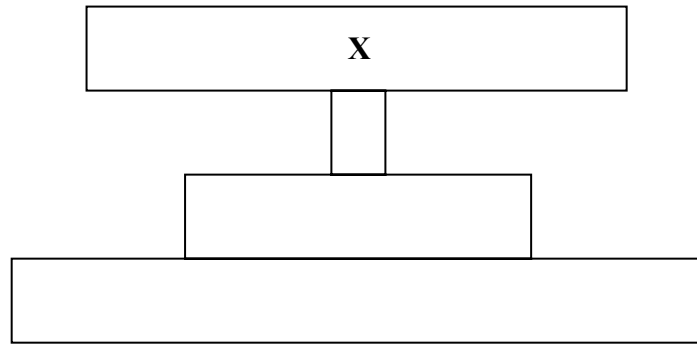
2.   The diagram shows a food web from the garden.
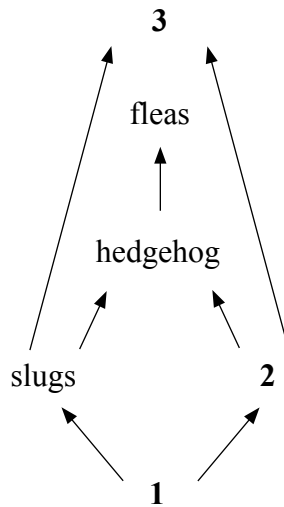
Which row of the table shows the names of organisms **1**, **2** and **3** in the food web?

	organism		
	1	**2**	**3**
A	worms	dead leaves	birds
B	dead leaves	birds	worms
C	birds	worms	dead leaves
D	dead leaves	worms	birds

3.   This is a correct pyramid of numbers for the garden

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┌─────────────────────────────────────┐
│                  X                   │
└─────────────────────────────────────┘
              ┌─────┐
              │     │
       ┌──────┴─────┴──────┐
       │                   │
 ┌─────┴───────────────────┴─────┐
 │                               │
 └───────────────────────────────┘
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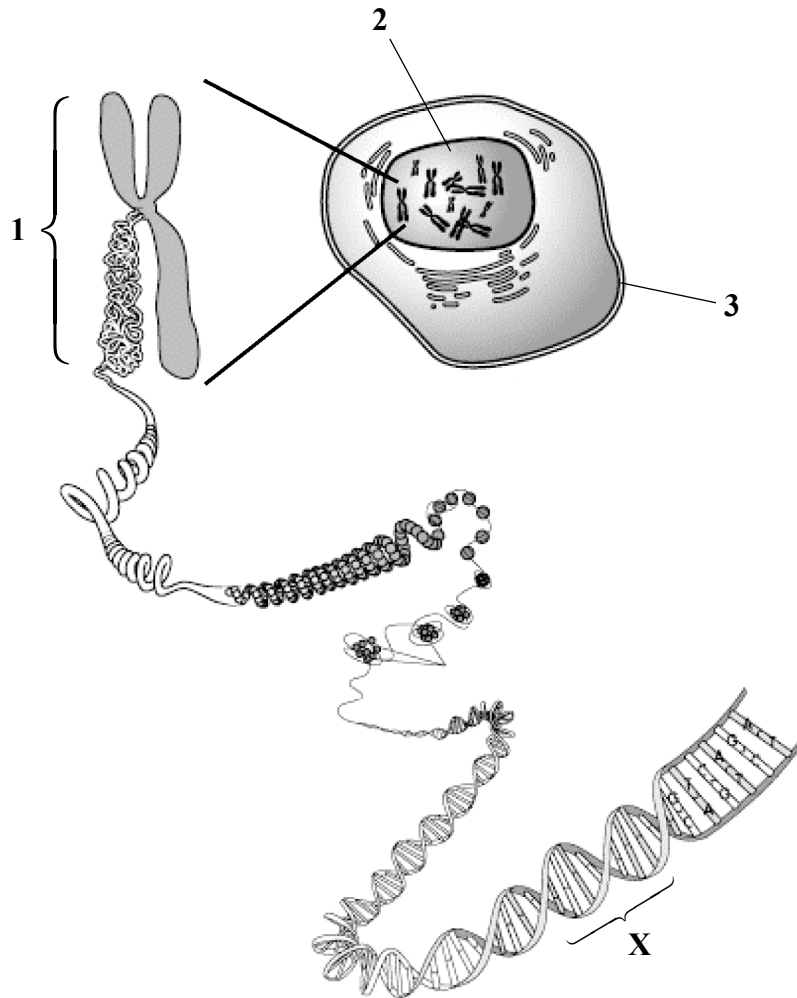
X is

A   birds
B   fleas
C   slugs
D   worms

4.   A fox started visiting the garden.
The fox eats some of the birds and hedgehogs in the garden.
The fox is a

A   producer
B   predator
C   herbivore
D   prey

Animal cells

Our body is made up of different cells.
Each cell contains structures that help to keep the cell alive.

Use the information from the diagram to answer questions 5 and 6.

5. Which row of the table correctly names parts 1 to 3 of the cell?

|	part of the cell		
	1	2	3
A	chromosome	cell membrane	nucleus
B	nucleus	chromosome	cell membrane
C	chromosome	nucleus	cell membrane
D	cell membrane	nucleus	chromosome

6. Part **X** on the diagram shows a unit of inheritance.
A unit of inheritance is

    A   a gene
    B   dominant
    C   recessive
    D   a gamete

7. Some organisms produce clones.
Clones are

    A   identical to both parents
    B   identical to neither parent
    C   identical to one parent
    D   identical to another species

8. Some people carry alleles that cause disease.
An allele is

    A   a chromosome
    B   a disease
    C   an alternative form of a chromosome
    D   an alternative form of a gene

Classifying organisms

A new species has been discovered in the dry
forests of Madagascar.
The new species has wings and can fly, it gives birth
to live young and is covered in body hair.
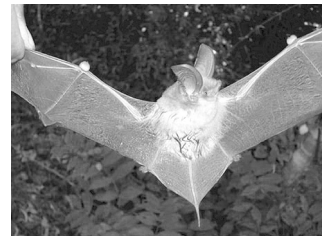
**9.** The new species is a

    A   mammal
    B   bird
    C   reptile
    D   amphibian

10. The new species sleeps on broad, slippery green leaves.
Which adaptation would enable the new species to survive in this habitat?

    A   white hair
    B   suckers on its feet
    C   short tail
    D   webbed feet

11. Selective breeding can be used to produce animals with desired characteristics.
Another method used by humans to produce animals with desired characteristics is

    A   natural selection
    B   evolution
    C   genetic engineering
    D   classification

12. Modern horses are called *Equus callabus.*
Fossils of earlier horses include *Equus scotti* and *Equus stenonis.*
These horses do **not** belong to the same

    A   class
    B   order
    C   species
    D   genus

Inheriting characteristics

The Punnett square shows how eye colour is inherited in a family.
The mother's egg cells contain either the allele for brown eyes (**B**) or the allele for blue eyes (**b**).
All of the father's sperm cells contain the allele for brown eyes (**B**).

mother's egg cells

		B	**b**
father's sperm cells	**B**	BB	Bb
	B	**L**	Bb
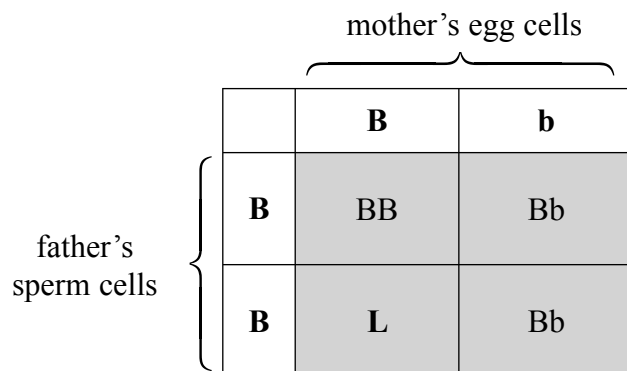
13. Which of the following is missing from box **L** in the diagram?

    A   BB
    B   Bb
    C   bB
    D   bb

14. The four shaded boxes show the

    A   parent phenotype
    B   parent genotype
    C   offspring phenotype
    D   offspring genotype

15. The type of reproduction indicated by the Punnett square is

    A   artificial

    B   asexual

    C   sexual

    D   selective

16. The information in the Punnett square shows that the mother has

    A   two blue eyes

    B   one brown eye and one blue eye

    C   two bluish-brown eyes

    D   two brown eyes

Higher tier candidates start at question 17 and answer questions 17 to 40.
Questions 17 to 24 must be answered by all candidates: Foundation tier and Higher tier.
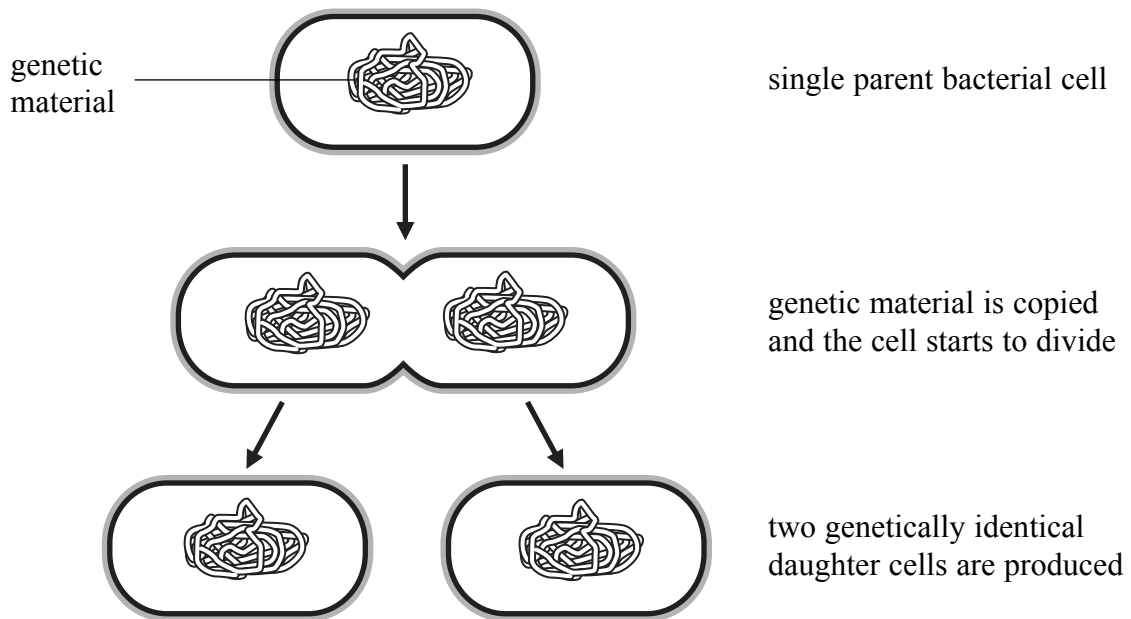
Endangered species

> One fifth ($\frac{1}{5}$) of the 259 species of birds in Britain are on the endangered list.
> Research suggests that more than 1,000 species of other animals and plants could also become extinct.

17.   Approximately how many species of birds are on the endangered list?

     A   5
     B   52
     C   207
     D   1295

18.   To find out if a species is endangered, scientists must do a survey.
     They must be sure that their data is valid.
     They must collect data on the total number of

     A   males and females within the species
     B   females only within the species
     C   males only within the species
     D   individuals regardless of their gender

19.   To be sure that the data is reliable the scientists must do the survey

     A   several times within a single habitat
     B   once only within a single habitat
     C   several times in several habitats
     D   once only in several habitats

20.   Scientists used a computer model to study the effects of a fungal disease on a population of birds.
     Computer modelling can be unreliable when it

     A   predicts changes that occur over a long period very quickly
     B   includes information on other organisms in the environment
     C   takes too long to re-run the computer model
     D   does not include information on all of the changes that will affect population size

Mutations

Bacteria reproduce by a process called binary fission.
The diagram shows how this process is carried out.

genetic material ————   single parent bacterial cell

genetic material is copied
and the cell starts to divide

two genetically identical
daughter cells are produced

21.   This method of producing offspring involves

       A   sexual reproduction
       B   asexual reproduction
       C   artificial selection
       D   genetic modification

22.   Cell division involves mitosis.
       Mitosis produces

       A   2 haploid daughter cells
       B   4 haploid daughter cells
       C   2 diploid daughter cells
       D   4 diploid daughter cells

23.   The genetic material in bacteria can mutate.
       A mutation in one of the daughter cells would mean that this daughter cell is a

       A   clone of the parent cell
       B   variant of the parent cell
       C   clone of the other daughter cell
       D   gamete of the parent cell

24. The population size of the mutated cells is greater than the population size of the non-mutated cells because

    A   the non-mutated cells have evolved
    B   the mutated cells are better adapted to the environment
    C   the mutated cells reproduce less rapidly
    D   the non-mutated cells compete more successfully for resources

TOTAL FOR FOUNDATION TIER PAPER: 24 MARKS

Foundation tier candidates do not answer any more questions after question 24.

Questions 25 to 40 must be answered by Higher tier candidates only.
Foundation tier candidates do not answer questions 25 to 40.

A long voyage

During his world voyage, Charles Darwin made observations that led him to write 'On the origin of species'.

25.   During his voyage Darwin collected evidence by observing

     A   the physical appearance of different organisms only
     B   the physical appearance of different fossils only
     C   the physical appearance of different organisms and the appearance of fossils
     D   the physical appearance and behaviour of different organisms and the appearance of fossils

26.   On the Galapagos Islands Darwin found many species of finches that had different shaped beaks.
        Darwin suggested that species with different shaped beaks evolved from one common ancestor.
        This was due to the availability of

     A   different types of food
     B   different nesting sites
     C   mates
     D   water

27.   Darwin stated that natural selection is necessary for evolution.
        Natural selection is when organisms with

     A   only genetic mutations survive to breed
     B   only dominant genes survive to breed
     C   the best adaptations survive but do not breed
     D   the best adaptations survive to breed

28.   Darwin published his book 'On the origin of species' and some people were upset.
        This was because the book stated that

     A   humans evolved from Adam and Eve
     B   humans evolved from apes
     C   humans and apes had common ancestors
     D   humans and apes evolved from a single cell

Modifying organisms

The United States (U.S.) produces 40% of the world's corn.
A certain amount of this corn is genetically modified to make it resistant to pests that destroy the crops.

The graph shows how the percentage of U.S. agricultural land used to grow GM corn has changed over time.
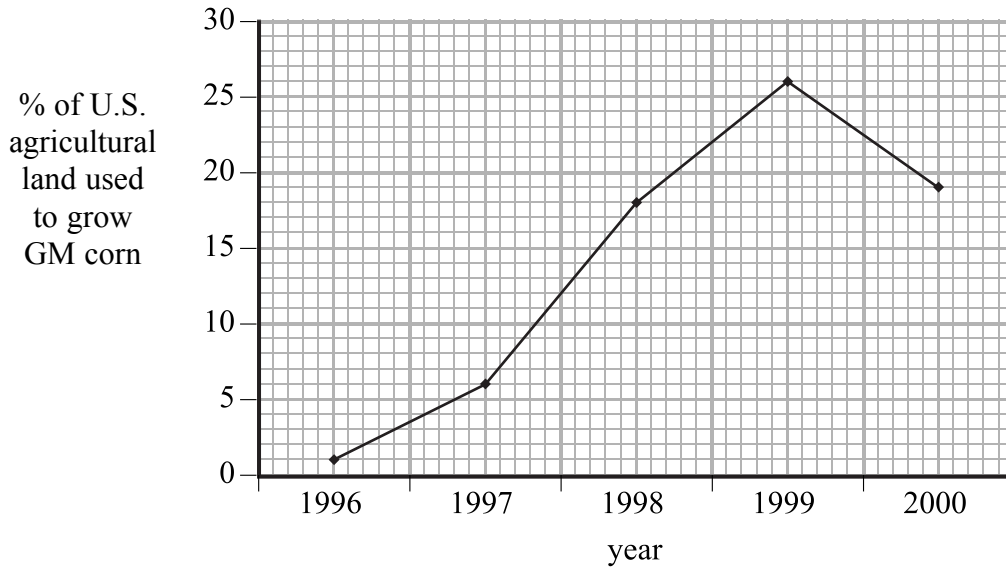

29.   The graph shows that the percentage of agricultural land used to grow GM corn

        A   increased most rapidly between 1996 and 1997
        B   increased steadily from 1996 but dropped by 8% between 1999 and 2000
        C   was three times greater in 1998 than in 1997
        D   doubled between 1996 and 1997

30.   Corn is genetically modified by inserting foreign genes into its genome.
        This is carried out using

        A   plasmids and enzymes
        B   plasmids and hormones
        C   hormones and enzymes
        D   hormones, plasmids and enzymes

31. Which of the statements below give a valid reason why the U.S. might genetically modify their crops?

        1   GM crop yields are greater than yields produced from non-GM varieties

        2   GM crops are organic which removes the need for chemical pesticides that harm the environment

A   1 only
**B**   2 only
C   1 and 2
D   neither

32. The genetic diagram shows how GM crops might transfer their genes to their offspring. The allele, R, represents resistance to pesticide and the allele, r, represents non-resistance.
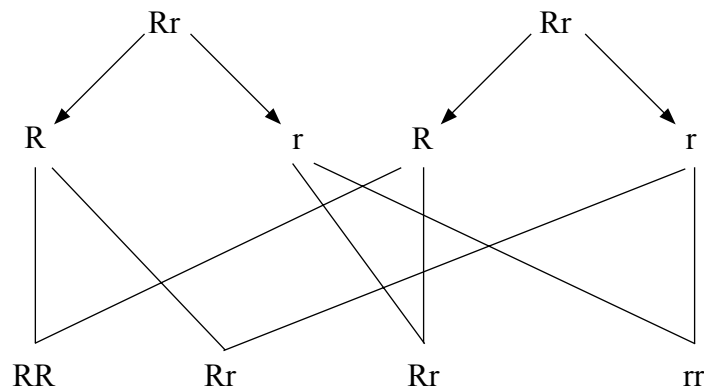
The genetic diagram shows that

A   both parent plants are homozygous for the pesticide resistance
B   25% of the offspring have the same genotype as the parent plants
C   50% of the offspring have a heterozygous genotype
D   75% of the offspring have a homozygous genotype

Getting personal
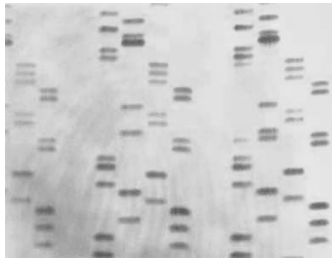
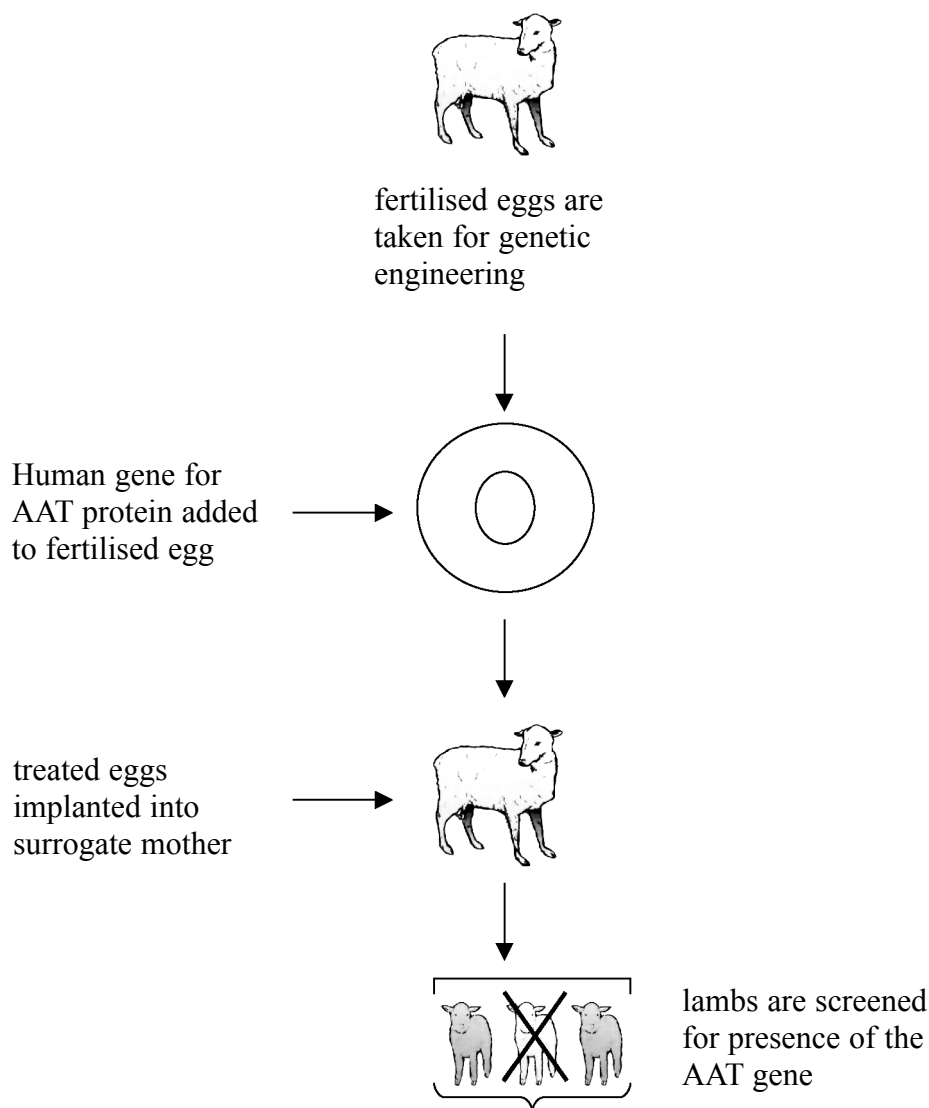First the Human Genome Project (HGP), now the Personal Genome Project (PGP).
The PGP means that you can have your DNA sequenced.
You can find out about your health, now and in the future, and about what time of day you work best.

33.   PGPs are likely to cause some concern.
        The reason for this is most likely to be because personal information could be

        A   used by doctors to prescribe appropriate drugs
        B   used by scientists to personalise medicine
        C   used by couples to find out what colour eyes their child is likely to have
        D   used by insurance companies to refuse life insurance

34.   A PGP will enable you to find out whether you carry a genetic disease.
        Cystic fibrosis (CF) is a homozygous recessive disorder that is inherited.
        This means that for a child to inherit CF

        A   only one parent has to carry the faulty allele
        B   both parents need to carry at least one faulty allele
        C   both parents need to carry two faulty alleles
        D   only one parent has to carry two faulty alleles.

Some GM sheep produce milk containing a human gene called AAT.
This gene produces a protein that can be used to treat the symptoms of CF.

The diagram shows how sheep can be genetically modified to contain the human AAT gene.

fertilised eggs are
taken for genetic
engineering

Human gene for
AAT protein added
to fertilised egg

treated eggs
implanted into
surrogate mother

lambs are screened
for presence of the
AAT gene

35. The final stage in the process to obtain the AAT protein is

    A   shear the lambs and extract the AAT from the wool
    B   kill the lambs and extract the AAT from the blood
    C   kill the lambs and extract the AAT from the milk
    D   allow the lambs to grow and breed, then extract the AAT from the milk

36. Sheep that produce AAT in their milk are known as

    A   transgenic
    B   designer
    C   surrogates
    D   transplants

The health of the nation

The Body Mass Index (BMI) is used to determine
whether an individual is obese.

A survey carried out between 1996 and 2003 collected data on the BMI of children between the ages
of 2 and 10.
The table shows the results.

BMI status	survey year							
	1996	1997	1998	1999	2000	2001	2002	2003
obese	9.9%	10.6%	10.9%	11.6%	13.4%	13.1%	15.5%	13.7%
overweight including obese	22.7%	23.1%	23.4%	25.2%	26.6%	27.9%	28.7%	27.7%

37. The table shows that

    A the percentage of obese children has risen annually between 1996 and 2003
    B the percentage of overweight including obese children follows the same trend as the
percentage of obese children between 1996 and 2003.
    C there are two years when the percentage of obese children is lower than the previous
year
    D there is generally a greater percentage of obese children than overweight children.

38. In which two consecutive years are the percentage of overweight children the same?

    A 1996 and 1997
    B 1997 and 1998
    C 1998 and 1999
    D 1999 and 2000

39.   The following statements give possible reasons for the decline in obesity between 2002 and 2003.

            1   healthy eating programmes were introduced
            2   1.8% fewer children were included in the survey

Which statements could be a reason for the decline in obesity during this period?

A   1 only
B   2 only
C   both 1 and 2
D   neither 1 nor 2

40.   The survey also found out that 19.8% of overweight or obese children had parents that were either overweight or obese.
What can be concluded from this data?

A   that obesity is inherited
B   that obesity is inherited but there is an environmental influence
C   that obesity is influenced only by the environment
D   no definite conclusion can be made

TOTAL FOR HIGHER TIER PAPER: 24 MARKS

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