

Surname	Initial(s)
Signature	

Paper Reference(s)

**5005 5025**

# Edexcel GCSE

**Science (5005)**

**Biology (5025)**

B1a – Topics 1 and 2

**Foundation and Higher Tier**

Friday 5 March 2010 – 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.

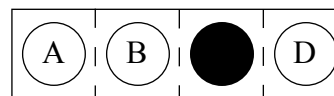
**Before the test begins:**

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.

Do any necessary calculations and rough work in this booklet. You may use a calculator if you wish.

You must not take this booklet or the answer sheet out of the examination room.

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

**The problem with the cane toad**



The cane toad was introduced into Australia to eat the beetles that were destroying sugar cane crops. The cane toad eats small animals and poisons the larger animals that eat it.

1. A food chain for the cane toad is
  - A cane toad → beetle → sugar cane
  - B sugar cane → beetle → cane toad
  - C sugar cane → cane toad → small animals
  - D cane toad → small animals → large animals
  
2. The cane toad is
  - A prey to the beetles and a consumer
  - B predator to the beetles and a producer
  - C prey to small animals and a producer
  - D predator to the small animals and a consumer
  
3. The food chain for the cane toad can be shown as a pyramid of numbers. A pyramid of numbers shows
  - A the amount of biomass at each trophic level
  - B the number of organisms at each trophic level
  - C the size of the organisms at each trophic level
  - D the energy lost at each trophic level
  
4. The female toad lays eggs which are fertilised outside the body by the male toad. What type of reproduction is this?
  - A asexual reproduction
  - B sexual reproduction
  - C selective breeding
  - D internal fertilisation

### Pet cloning

The first cloned-to-order pet sold in the United States is named Little Nicky. Little Nicky is a kitten cloned from a cat that had died. A woman paid \$50,000 for the cloned kitten.



5. The company that cloned Little Nicky plans to clone another 50 cats in the same year. What is the total income the company will make from all the cloned cats in that year if each clone is sold for the same price as Little Nicky?
- A \$50,000
  - B \$250,000
  - C \$2,250,000
  - D \$2,550,000
6. Little Nicky would
- A be genetically different from the original cat
  - B be genetically identical to the original cat
  - C contain half the genes of the original cat
  - D be genetically identical to the cat which gave birth to it.
7. Some people object to cloning. A valid concern about cloning is that
- A cloning puts the life of the original animal at risk
  - B cloning is a result of genetic modification
  - C cloning techniques produce many embryos and most do not survive
  - D cloned animals are always very healthy
8. Some plants produce clones naturally. These clones are produced by the process of
- A asexual reproduction
  - B sexual reproduction
  - C selective breeding
  - D genetic modification

### The mayfly



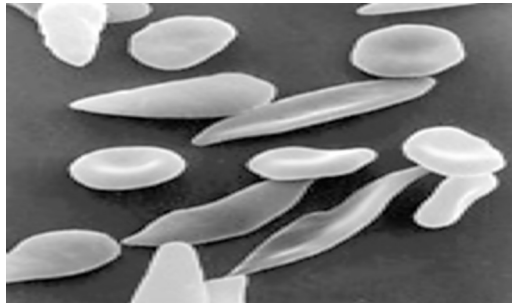
In its adult form the mayfly lives between 30 minutes and 24 hours. During this time the mayflies mate and then lay eggs which develop into mayfly nymphs. Nymph is the name given to the early stage of the mayfly life cycle.

9. The mayfly nymphs grow from
- A fertilised egg cells
  - B unfertilised egg cells
  - C fertilised sperm cells
  - D unfertilised sperm cells
10. Mayfly nymphs live for 1–2 years before becoming adult mayflies. During this time they live in rivers feeding on algae and mayfly nymphs are eaten by fish such as trout. An increase in the numbers of mayfly nymphs would cause
- A algae numbers to increase and trout numbers to increase
  - B algae numbers to increase and trout numbers to decrease
  - C algae numbers to decrease and trout numbers to decrease
  - D algae numbers to decrease and trout numbers to increase
11. There is fossil evidence of mayflies dating back over 300 million years. Fossils are
- A pictures of animals in rocks
  - B the mineralised remains of the hard parts of plants and animals
  - C the imprint of an organism preserved in ice
  - D the skeleton of animals that lived millions of years ago
12. Mayflies have survived on Earth for so long because they have
- A adapted to a changing environment
  - B become extinct in a changing environment
  - C been selectively bred by humans
  - D mutated to be less well adapted to their environment

### Sickle cell anaemia

Sickle cell anaemia is a disorder which causes the haemoglobin in the red blood cells to become distorted.

The cells become sickle shaped.



13. Sickle cell anaemia is
- A a genetic disorder caused by the environment
  - B a genetic disorder inherited from parents
  - C caused by human genetic modification
  - D caused by selective breeding
14. Sickle cell anaemia is coded for by DNA.  
Which one of the following structures is where DNA is most found?
- A cell membrane
  - B haemoglobin
  - C nucleus
  - D cytoplasm
15. DNA forms alleles.  
An allele is an alternative form of a gene.  
Human alleles are found on structures called
- A carriers
  - B chromosomes
  - C characteristics
  - D red blood cells
16. The allele for sickle cell anaemia is recessive.  
A person with only one recessive allele for sickle cell anaemia will
- A pass the allele on to some offspring but not have sickle cell anaemia
  - B pass the allele on to some offspring and have sickle cell anaemia
  - C have sickle cell anaemia but not pass the allele on to any offspring
  - D neither have sickle cell anaemia nor pass it on to any offspring

**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**

**Personalised medicines**

Medicine in the 21st century will be changed by the knowledge of the full DNA sequence.  
Knowing the full DNA sequence (the digital recipe of our genes) will enable scientists to develop tailor-made drugs.  
This opens the door to an era of "personalised medicine", with each patient being treated according to their unique genetic signature.

17. The sequencing of the human genetic code was called
- A the human DNA project
  - B the human genetic mapping project
  - C the human genome project
  - D the *Homo sapiens* project
18. The ability of scientists to make personalised medicine to treat diseases is most likely to
- A have no impact on current drug usage
  - B replace traditional drugs to reduce side effects
  - C cure all genetic diseases
  - D cure all non-genetic diseases
19. Another use for the sequencing of the human genetic code is for
- A forensic science to help solve crimes
  - B the cloning of pet animals
  - C the genetic modification of crop plants
  - D the selective breeding of sheep
20. Personalised medicine could also include the growing of specific human organs on animals for transplantation into humans.  
An ethical concern about this method of human organ production is
- A human organs may be rejected when implanted
  - B human organs produced in this way will not be rejected
  - C the human DNA needs to be harvested from cheek cells
  - D the animals used may be deformed as a result of the organ growth

**Cystic fibrosis(CF)**

21. Genetic research might produce a treatment for cystic fibrosis (CF). This type of treatment is called

**A** designer medication  
**B** genetic modification  
**C** gene therapy  
**D** designer cloning

22. CF is a disorder caused by a recessive allele. If a person has one allele for CF they are a carrier. Which is the correct Punnett square for the offspring of two people who are both carriers of CF?

	<b>C</b>	<b>C</b>
<b>c</b>	Cc	Cc
<b>c</b>	Cc	Cc

**A**

	<b>C</b>	<b>C</b>
<b>C</b>	CC	CC
<b>c</b>	Cc	Cc

**B**

	<b>C</b>	<b>c</b>
<b>c</b>	Cc	cc
<b>c</b>	Cc	cc

**C**

	<b>C</b>	<b>c</b>
<b>C</b>	CC	Cc
<b>c</b>	Cc	cc

**D**

23. Two carriers for CF produce an offspring. What is the percentage chance that the offspring will also be a carrier for CF?

**A** 25%  
**B** 50%  
**C** 75%  
**D** 100%

24. What is the genotype of a person who has CF?

**A** CC  
**B** Cc  
**C** cC  
**D** cc

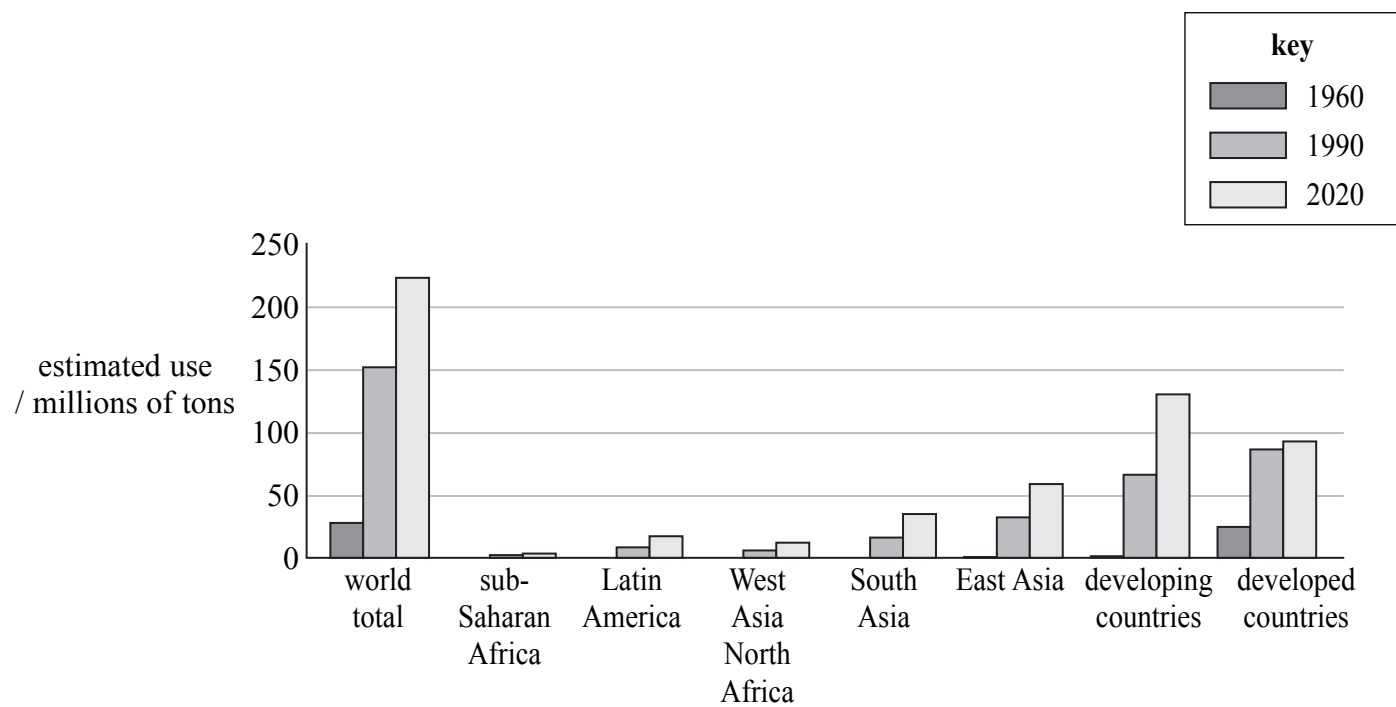
**TOTAL FOR FOUNDATION TIER PAPER: 24 MARKS**

**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.**

**Fertilisers**

Fertilisers are a source of nitrates.  
Nitrates increase crop yields.  
The graph shows the estimated fertiliser use from 1960 to 2020 in various countries.



25. A correct interpretation of the graph is
- A no fertilisers were used prior to 1960
  - B the use of fertilisers will increase the most in developed countries by 2020
  - C the use of fertilisers increased in all areas between 1960 and 1990
  - D most fertilisers were used by developing countries in 1990

26. The predictions for 2020 are likely to be based on computer models.  
Which row of the table shows the factors needed for a computer model to be successful?

	past data used	current data used	predicted data used
<b>A</b>	yes	yes	yes
<b>B</b>	yes	yes	no
<b>C</b>	no	yes	no
<b>D</b>	yes	no	yes



27. Fertilisers can be used to increase crop yields.  
Why do crop yields need to be increased?
- A human population is decreasing
  - B human population is increasing
  - C farming techniques are improving
  - D air pollution levels are decreasing
28. The use of nitrogen compounds in fertilisers helps the plants to
- A produce proteins for growth of the plants
  - B produce magnesium for chlorophyll production
  - C produce proteins for chlorophyll production
  - D produce magnesium for growth of the plants

### GM cotton

Some cotton plants have been genetically modified to contain a gene for making a pesticide.

29. Which row of the table shows processes necessary for genetic modification?

	gene artificially inserted	pollination
<b>A</b>	no	no
<b>B</b>	yes	no
<b>C</b>	yes	yes
<b>D</b>	no	yes

30. These are two statements about GM cotton.

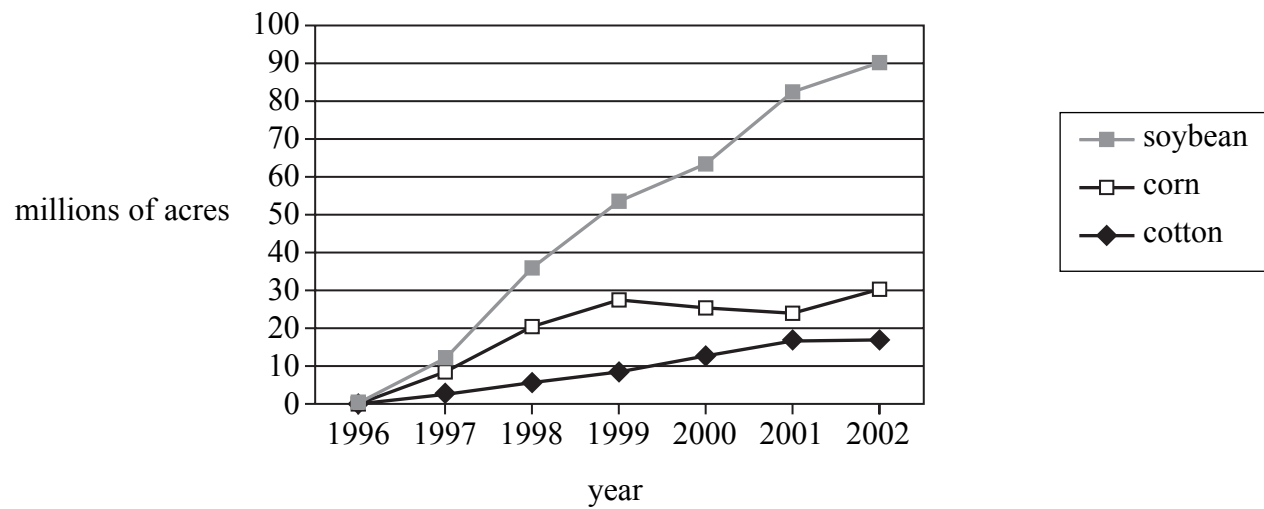
- 1 Enzymes are used to both remove and insert genes
- 2 One ethical concern about GM cotton is how it will impact on the environment

Which are true?

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

### Growing crops

The graph shows the change in the total area of land used in the world to grow GM crops from 1996 to 2002.

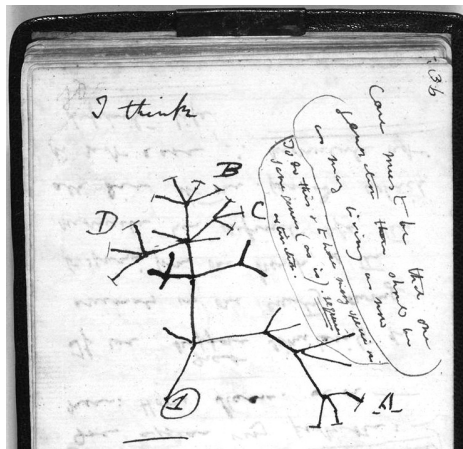


31. Which statement is supported by the data in the graph?
- A in 2002 the total land used to grow all soybean rose to 90 acres
  - B there was a reduction in the demand for GM cotton during 2000 and 2001
  - C the land used for GM corn increased steadily between 1996 and 2002
  - D more land was used for GM soybean than for GM cotton and GM corn combined in 2000
32. The proportion of land used for organic crops has increased over the past 10 years. Which row of the table is correct for the growing of organic crops?

	crop yields are increased	biological control can be used
<b>A</b>	yes	yes
<b>B</b>	yes	no
<b>C</b>	no	no
<b>D</b>	no	yes

### Darwin's tree of life

In Darwin's 'On The Origin of Species', published in 1859, the British naturalist drew a diagram of an oak tree to depict how one species can evolve into many others.



33. This diagram shows that
- A all organisms evolved from trees
  - B all organisms have evolved from common ancestors
  - C evolution is based on natural selection
  - D evolution is limited and will stop
34. During 1859, Darwin's ideas were not easily accepted by the scientific community. This was because
- A Darwin's theory of evolution was not based on observation or evidence
  - B scientists always need experimental evidence to accept a theory
  - C some scientists held religious beliefs that conflicted with Darwin's theory
  - D natural selection was considered to be evidence for extinction
35. The classification of organisms into groups was linked to Darwin's tree of life. What is the correct order of classification from the least similar to the most similar?

Phylum
Kingdom
Class
Order
Family
Genus
Species

A

Kingdom
Phylum
Class
Order
Family
Genus
Species

B

Kingdom
Phylum
Family
Order
Class
Genus
Species

C

Phylum
Kingdom
Class
Genus
Order
Family
Species

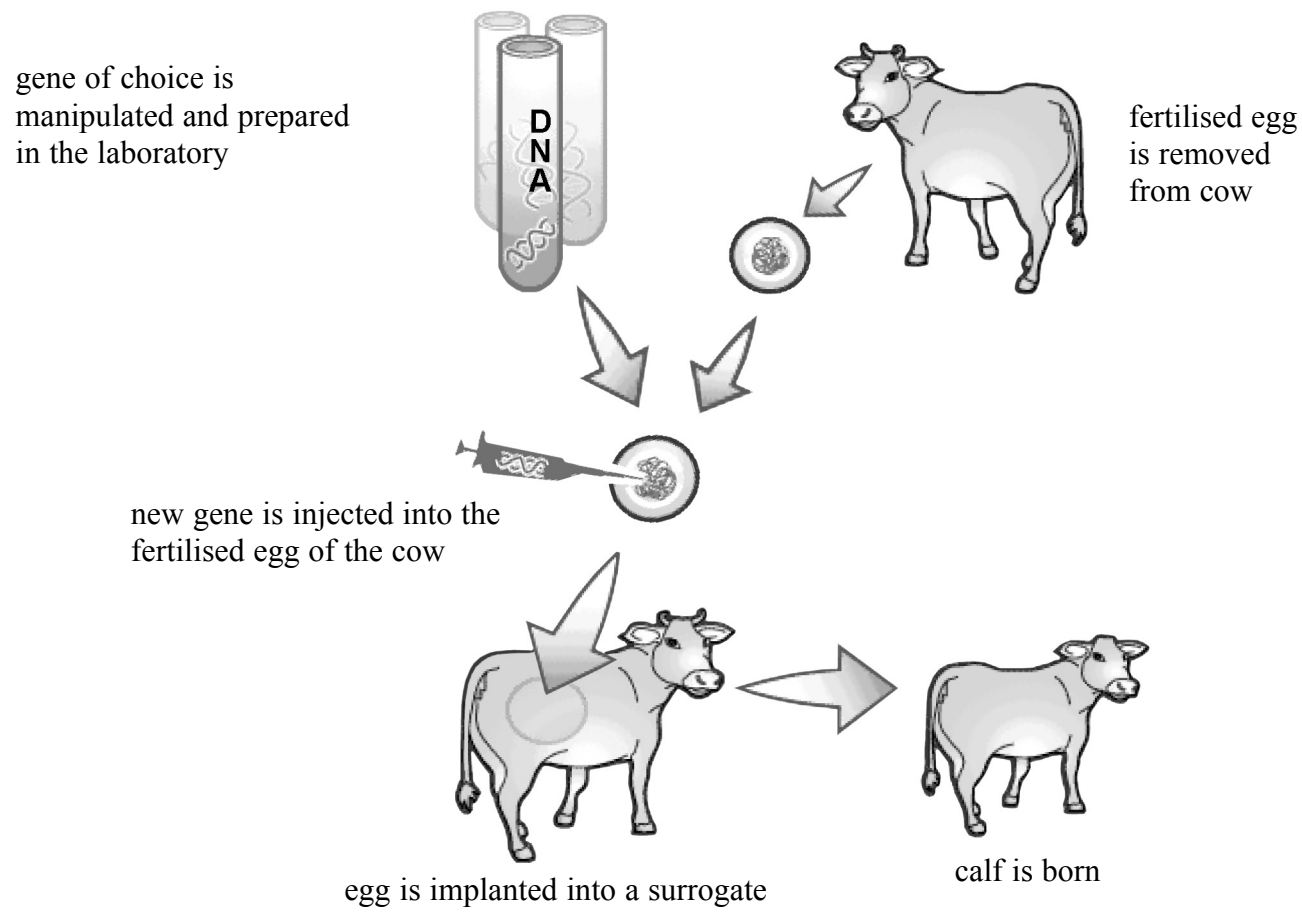
D

- 36.** Advances in genetics suggest that the relationship between organisms is much more complex than Darwin first thought.  
Which row of the table shows areas of genetic research which may influence scientists' view on the tree of life?

	<b>discovery of DNA</b>	<b>outcomes of HGP</b>
<b>A</b>	yes	yes
<b>B</b>	yes	no
<b>C</b>	no	yes
<b>D</b>	no	no

### A new method of farming

This is a method used for the production of designer milk containing human antibodies.



37. The gene of choice is removed from
- A a cow body cell using hormones
  - B a cow body cell using enzymes
  - C a human body cell using hormones
  - D a human body cell using enzymes
38. The calf produced by this process will have
- A diploid body cells and haploid gametes
  - B diploid body cells and diploid gametes
  - C haploid body cells and diploid gametes
  - D haploid body cells and haploid gametes

39. Which row of the table is correct for the name of an animal used in this way and a useful characteristic of designer milk?

	<b>name of animal used in this way</b>	<b>useful characteristic of designer milk</b>
<b>A</b>	transplant	high cholesterol
<b>B</b>	transgenic	high cholesterol
<b>C</b>	transplant	low cholesterol
<b>D</b>	transgenic	low cholesterol

40. These are two statements about the genetic modification of cattle.

- 1 cattle can be genetically modified, using enzymes, to produce human antibodies in their milk
- 2 cattle which have been genetically modified only reproduce asexually

Which are true?

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

**TOTAL FOR HIGHER TIER PAPER: 24 MARKS**

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