

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 17 June 2011 – Afternoon

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.

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

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Turn over

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

Feed the world

In many countries rice provides 25% of the energy obtained from food.

1. In a food chain rice is described as
 - A a consumer
 - B a predator
 - C prey
 - D a producer

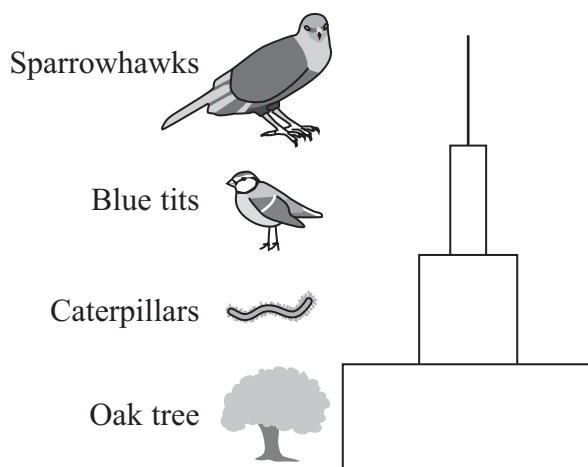
2. A new variety of rice has been genetically engineered to provide the human body with extra vitamin A.
To genetically modify the rice, a gene must be removed from the
 - A cytoplasm of a cell
 - B nucleus of a cell
 - C sex cell
 - D cell membrane

3. Genes are made of
 - A cells
 - B cytoplasm
 - C DNA
 - D gametes

4. The production of rice for food can provide more energy than the production of meat for food because
 - A when you produce meat there is no waste
 - B rice can be grown organically
 - C rice is at the start of the food chain so there is less energy wastage
 - D meat has no nutritional value

Food chains

Use the diagram to answer questions 5, 6 and 7.



5. Which organism has the greatest biomass in this food pyramid?

- A sparrowhawk
- B blue tit
- C caterpillar
- D oak tree

6. What is the name given to this type of pyramid?

- A a pyramid of numbers
- B a pyramid of biomass
- C a pyramid of organisms
- D a pyramid of populations

7. Which of the organisms in the pyramid are predators ?

- A sparrowhawk and oak tree
- B blue tit and sparrowhawk
- C blue tit and caterpillar
- D caterpillar and oak tree

8. How is most energy lost from the food pyramid?

- A growth and respiration
- B respiration and excretion
- C excretion and feeding
- D feeding and growth

Spider plants (*Chlorophytum*)

A spider plant can reproduce by producing genetically identical plantlets on the ends of hanging stems.



9. What is the name given to this type of reproduction?
- A asexual reproduction
 - B sexual reproduction
 - C internal fertilisation
 - D external fertilisation
10. The new plantlets are
- A clones of the parent plant
 - B variants of the parent plant
 - C carriers of the parent plant
 - D gametes of the parent plant
11. The characteristics of the spider plant are coded for by its genes. Genes are found on structures called
- A nuclei
 - B alleles
 - C chromosomes
 - D chloroplasts
12. A project carried out by scientists has mapped human genes. This project is known as the
- A human DNA project
 - B human chromosome project
 - C human inheritance project
 - D human genome project

Organic farming

Many farmers in Britain today are changing their farming methods to those approved by the Soil Association for the production of organic crops.

13. What is the most likely reason for farmers choosing to produce organic crops?
- A it increases shelf life
 - B it increases the selling price
 - C it decreases crop yield
 - D it decreases biodiversity
14. Organic farmers can use the soil bacterium *Bacillus thuringiensis* to control pests. What is the main benefit of using *Bacillus thuringiensis* for organic farming?
- A insects and their larvae are never harmed by this bacterium
 - B less fertilisers are needed to maximise the crop growth
 - C it can act as a selective pesticide and can be naturally present in soil
 - D there is a possibility that the pests may become resistant to it
15. Modern crop plants are often identical. This is important because
- A they increase biodiversity
 - B they give consistent crop yields
 - C only part of the plant can be eaten by insects
 - D all the crop plants are resistant to insecticides
16. Which of the following methods would be acceptable when trying to produce organic beef from cattle?
- A genetic modification of cattle
 - B selective breeding of cattle
 - C use of steroids to increase muscle mass
 - D injecting cattle with multiple antibiotics

**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**

The Sloth

Sloths spend about 18 hours per day sleeping and can live for up to 30 years.



17. What is the name given to features such as the long arm and hooked claws that help the Sloth to survive?
- A selections
 - B classifications
 - C adaptations
 - D chromosomes
18. What is the most likely advantage to the Sloth of moving very slowly and spending 18 hours per day sleeping?
- A they will spend less time eating
 - B they will not require as much energy to live
 - C they will be less likely to be caught by predators
 - D they will live longer
19. Members of the same species of Sloth may fight with one another for food. This is an example of
- A predator prey relationship
 - B intra-species competition
 - C natural selection
 - D adaptation leading to new species

20. One type of Sloth is *Bradypus torquatus*.
Which row of the table is correct for the classification of this Sloth?

	<i>Bradypus</i>	<i>torquatus</i>
A	species	species
B	genus	genus
C	species	genus
D	genus	species

Haemophilia

21. Haemophilia is a genetic disorder that affects the blood's ability to clot. People who do not have the disorder, have clotting factors which cause bleeding to stop. Haemophiliacs lack these clotting factors.

What is the most likely effect of a lack of clotting factors?

- A blood becomes too sticky and does not flow
- B blood is unable to carry as much oxygen
- C the body is less effective at fighting bacterial infection
- D a wound is less likely to heal

Use the information to answer questions 22 and 23.

Haemophilia is caused by a genetic mutation on the X chromosome.
The genetic diagram shows sex inheritance.

	male gametes		
	X	Y	
female gametes	X	XX	XY
	X	XX	XY

22. If the mother has one mutated X chromosome, what is the percentage chance that her son will inherit this chromosome?

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

23. If the father has a mutated X chromosome, what is the percentage chance that his daughter will inherit this chromosome?

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

24. A child has two of the same alleles for a specific characteristic.
This is known as

- A homozygous
- B heterozygous
- C transgenic
- D a carrier

TOTAL FOR FOUNDATION TIER PAPER: 24 MARKS

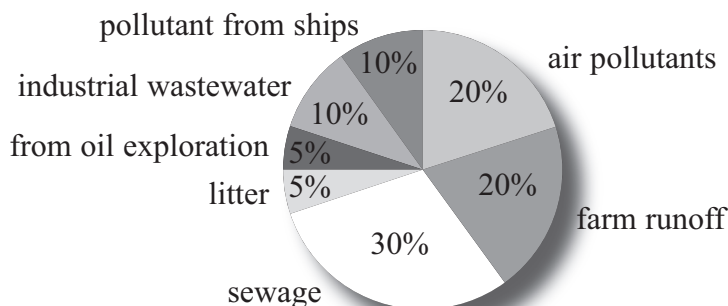
Foundation tier candidates do not answer any more questions after question 24.

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

Water pollution

Use the information to answer questions 25 and 26.

The pie chart shows the percentage of pollutants entering oceans.

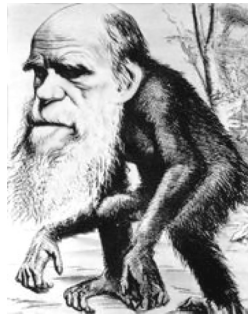


25. All of these pollutants result from human activity.
What will be most likely to happen to the percentages and the amount of pollution if the human population continues to increase?
- A the percentages will be similar but the amount of pollution would increase
 - B the percentages will increase but the amount of pollutants remain the same
 - C both the percentages of each type of pollutant and the amount would rise
 - D there is no effect on either the percentage or the amount of pollution
26. Which statement about ocean pollutants is true?
- A oceans are at their maximum pollution level
 - B half the pollutants are from sewage and farming
 - C air pollutants have no effect on water pollution levels
 - D industrial wastewater is the lowest contributor to ocean pollution
27. Sewage contains nitrogen compounds which help plants
- A produce magnesium
 - B produce proteins
 - C produce oxygen
 - D produce glucose

28. Computer modelling is used to predict the effects of pollutants.
Computer modelling is used because
- A it always produces accurate results
 - B it is faster than carrying out live measurements
 - C the models produced can be unreliable
 - D you can put in all known and unknown variables

On the origin of species

This cartoon appeared following the release of the book by Charles Darwin titled 'On the origin of species'.



29. Why does this cartoon show Darwin as an ape?
- A people at the time believed the theory stated that humans evolved from apes
 - B people at the time believed that humans were evolving into apes
 - C people at the time believed in natural selection
 - D people at the time did not have strong religious beliefs
30. Darwin's book proposed a theory of evolution.
Darwin suggested that
- A humans evolved from apes
 - B humans and apes had a common ancestor
 - C humans and apes did not exist at the same time
 - D apes evolved from humans

31. Humans have the binomial name *Homo sapiens*.
Which row of the table is correct for the order, family and genus of human beings?

	order	family	genus
A	primates	hominids	<i>Homo</i>
B	hominids	homo	<i>sapiens</i>
C	hominids	primates	<i>sapiens</i>
D	primates	sapiens	<i>Homo</i>

32. Which of the following two statements about Darwin's theory of natural selection are true?

- 1 individuals within a species can have characteristics which promote successful reproduction
- 2 individuals within a species well adapted for a changing environment will become extinct

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

Transgenic calves

George and Charlie, born in 1998, were the first cloned transgenic calves.



33. What does the term transgenic mean?
- A an organism that has been cloned
 - B an organism that has had a gene from another species added to its genome
 - C an organism which had its genes mapped on its chromosomes
 - D an organism that has been selectively bred to show the best characteristics

34. George and Charlie are clones from the same parent. Cloning mammals involves the following stages. The stages are not in the correct order.

- 1 electric shock stimulates cell division
- 2 egg cell is enucleated
- 3 nucleus from body cell is removed
- 4 enucleated cell with nucleus is implanted into surrogate
- 5 nucleus from body cell inserted into enucleated egg cell

What is the correct order for the cloning of mammals?

- A 2 – 3 – 1 – 4 – 5
- B 1 – 2 – 3 – 5 – 4
- C 1 – 3 – 4 – 5 – 2
- D 2 – 3 – 5 – 1 – 4

35. It is possible to use pigs to grow human body organs for transplantation. Which statements are ethical concerns about this use of pigs?
- 1 many human embryos will be destroyed during this process
2 transplant organs made by this process will not be rejected
- A** 1 only
B 2 only
C both 1 and 2
D neither 1 nor 2

36. Transgenic cows can produce ‘designer milk’. Which row of the table shows the benefits to humans of ‘designer milk’?

	contain human antibodies	milk high in cholesterol
A	yes	yes
B	yes	no
C	no	yes
D	no	no

Factors affecting plant growth

37. Growth occurs in plants due to cell division called mitosis resulting in genetically identical cells being formed. During mitosis the genetic material is replicated and the cell divides. Which statement is correct for mitosis?
- A** DNA is replicated in the nucleus and diploid cells are formed
B DNA is replicated in the cytoplasm and diploid cells are formed
C DNA is replicated in the nucleus and haploid cells are formed
D DNA is replicated in the cytoplasm and haploid cells are formed
38. Plants may naturally develop new characteristics due to a change in their DNA. This change is
- A** a genetic change resulting in a mutation
B an environmental change resulting in a mutation
C a genetic change causing the plant to become transgenic
D an environmental change causing the plant to become transgenic

39. Which statements are true for the process of natural selection of plants in the environment?
- 1 new variants of species are always better adapted to their environment
 - 2 natural selection is a process over generations which results in changes in species
- A 1 only
B 2 only
C both 1 and 2
D neither 1 nor 2
40. Grass plants can be genetically modified.
Which of these three statements about the genetic modification of plants are true?
- 1 DNA is cut and new genetic material is inserted using enzymes
 - 2 genetically modified plants may have an adverse effect on the environment due to cross fertilisation with other plants
 - 3 plants can be genetically modified to produce their own insecticide
- A 1 and 2 only
B 1 and 3 only
C 2 and 3 only
D 1, 2 and 3

TOTAL FOR HIGHER TIER PAPER: 24 MARKS

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