Paper Reference(s)

5005   5025

Edexcel GCSE

Science (5005)

Biology (5025)

B1a – Topics 1 and 2

Foundation and Higher Tier

Friday 19 June 2009 – Morning

Time: 20 minutes

Materials required for examination	**Items included with question papers**
Multiple Choice Answer Sheet	Nil
HB pencil, eraser and calculator	

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.
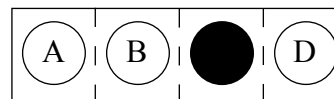All candidates are to answer questions 17 – 24.

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.

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.

A global problem

Countries have a global footprint.
The bigger the global footprint, the more damaging the effect on the environment.
This graph, produced by computer modelling, shows the global footprint of six countries.

Use this graph to answer questions 1–2.
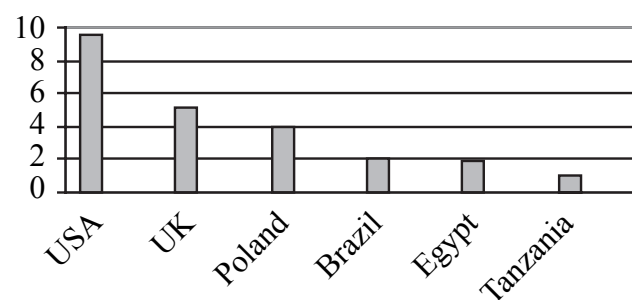
1. Which country causes the most damaging effect on the environment?

   A   Tanzania
   B   Brazil
   C   UK
   D   USA

2. What is the global footprint of Brazil?

   A   9
   B   4
   C   2
   D   1

3. The larger the population of a country, the larger its global footprint.
   Which country would be most likely to have the smallest population size?

   A   USA
   B   Brazil
   C   Tanzania
   D   UK

4. What is a benefit of using computer models to study global footprints?

   A   Computers always give reliable results.
   B   Computers use large amounts of energy.
   C   Computers can process information very fast.
   D   Computers are now relatively cheap to buy.

Crime scene investigations

5. Crime scene investigators can link people to crimes on the basis of genetic evidence.
    A genetic fingerprint is

    A   a recessive allele
    B   a genetically modified organism
    C   an imprint of an index finger
    D   the DNA profile of an individual

6. A project has assisted in the process of genetic fingerprinting.
    The project, which mapped the human genome, is known as the

    A   IVF
    B   MHG
    C   HGP
    D   DNA

7. Every individual has their own set of genes.
    These genes code for characteristics such as eye colour.
    The alleles for blue eyes are recessive to those for brown eyes.
    A person with blue eyes will have

    A   two different genes for eye colour
    B   two of the same alleles for eye colour
    C   two different alleles for eye colour
    D   one gene for eye colour and one allele for eye colour

8. A person who has one allele for blue eyes and one allele for brown eyes will have

    A   brown eyes
    B   blue eyes
    C   one blue eye and one brown eye
    D   green eyes

GloFish

GloFish are the first genetically modified organisms to be sold as pets.
GloFish have had a gene from a jellyfish inserted into them.
This causes them to glow in the dark.

9.   The gene which causes GloFish to glow came from the

     A   nucleus of the jellyfish
     B   nucleus of the non-glowing fish
     C   cytoplasm of the jellyfish
     D   cytoplasm of the non-glowing fish

10.   Genes are made of

     A   chromosomes
     B   alleles
     C   DNA
     D   enzymes

11.   The gene is removed from the DNA of a jellyfish using

     A   hormones
     B   scissors
     C   gene therapy
     D   enzymes

12.   GloFish would be at a disadvantage in the wild because

     A   they would be less easily seen by prey
     B   they would be unable to reproduce
     C   predators would be able to see them easily
     D   GloFish predators would be easily caught by GloFish

Good winter for finches

Use this information to answer questions 13, 14 and 15.

The number of colourful birds called finches visiting UK gardens over winter is at its highest level for five years.
This was recorded by the Big Garden Bird Watch for the RSPB.
Finches mainly eat seeds and are sometimes eaten by cats, kestrels or red kites.

13.   Which of these are herbivores?

      A   cats
      B   kestrels
      C   seeds
      D   finches

14.   How many different predators are named in the information above?

      A   one
      B   three
      C   four
      D   five

15.   One correct food chain for the information above is

      A   seeds ⟶ cats ⟶ finches
      B   seeds ⟶ finches ⟶ red kites
      C   finches ⟶ cats ⟶ red kites
      D   finches ⟶ red kites ⟶ kestrels

16.   An increase in the number of finches is likely to cause

      A   an increase in the number of seeds
      B   a decrease in the number of red kites
      C   the number of cats to decrease
      D   the number of seeds to decrease

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 Great Bird Watch

Use the information below to answer questions 17–19.

The results of a survey show the average number of different types of birds per garden in Berkshire for January in 2007 and 2008.

bird type	January 2007	January 2008
Blue tit	2.86	2.46
Blackbird	1.82	2.26
Woodpigeon	2.00	2.09
Starling	2.07	2.08
House sparrow	2.66	2.04
Chaffinch	1.61	2.00
Robin	1.34	1.39
Great tit	1.34	1.36
Collared dove	1.35	1.29
Goldfinch	1.06	1.10

17. Based on this data, how many bird types declined in number in 2008?

   A   3
   B   5
   C   7
   D   10

18. What bird type increased by the most in 2008?

   A   Great tit
   B   Goldfinch
   C   Chaffinch
   D   Blackbird

19. How can you tell from the information provided that the numbers are averages?

   A   They counted the birds and divided by the number of gardens
   B   The numbers are not all whole numbers
   C   Averages are calculated for validity
   D   Averages are calculated for reliability

20. The Great Bird Watch was carried out on the same weekend in January in both years. What is the reason for this?

    A   It is cold in January

    B   There are fewer birds in Berkshire in January

    C   To make the results comparable

    D   So they could average the results

The earthworm

The earthworm has been around in the same form for at least 120 million years.

21.   What evidence would scientists use to back up the fact that earthworms have been on Earth for at least 120 million years?

    A   Computer modelling of the earthworm life cycle
    B   Fossil evidence from 120 million years ago
    C   Genetic evidence from 120 million years ago
    D   Earthworms have very long life spans

22.   Earthworms are a member of the phylum Annelida (segmented worms).
    What kingdom do they belong to?

    A   Protoctista
    B   Chordata
    C   Mammalia
    D   Animalia

23.   Annelids have segmented bodies and light sensitive cells.
    These characteristics enable annelids to live in their selected environment.
    These characteristics are known as

    A   mutations
    B   adaptations
    C   modifications
    D   variations

24.   The information which codes for the characteristics of annelids is found in the DNA.
    What is the shape of a DNA molecule?

    A   single spiral
    B   tubular
    C   double helix
    D   hexagon

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.

Sampling

Jenny and David were investigating the number of species of plants on the school field. They used 1 m^2 quadrats (a square frame) to collect the data on the plants.


25.   What would be the best method to collect valid data on the number of species?

    A   Place quadrats on the green areas of the field
    B   Place quadrats where there are more species
    C   Place quadrats randomly over the whole field
    D   Place quadrats around the edges of the field

Use this graph to answer questions 26 and 27.

Jenny and David plotted a graph showing the **cumulative** number of plant species.
In quadrat 1 they found four species.
In quadrat 2 they found two new species so the **cumulative** number of species found was now six.

Plant biodiversity measured using the quadrat sampling method
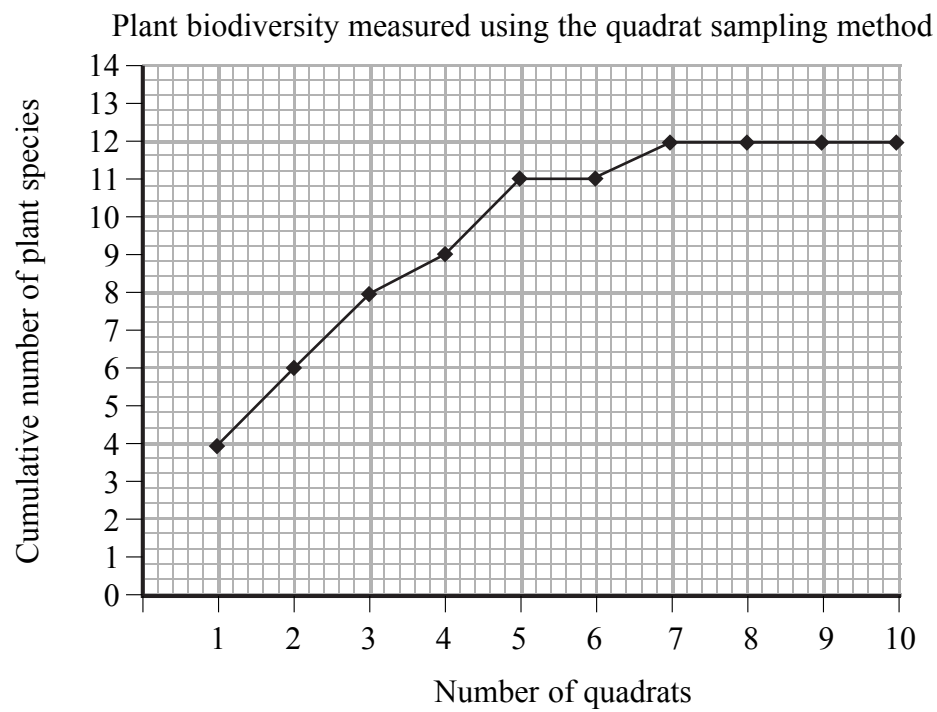
26. What was the number of **new** plant species found in quadrat 3?

    A   2
    B   4
    C   8
    D   12

27. What was the total number of plant species found?

    A   10
    B   12
    C   14
    D   22

28. Why are the number of plant species different in each sample taken?

    A   The conditions across the field were identical
    B   There was intraspecific competition limiting the number of species
    C   There was interspecific competition between species
    D   The conditions varied and as a result there was no competition

A gardener's problem

A gardener wanted to grow white roses.
He crossed two purple roses together and the results are shown.

Use this diagram to answer questions 29 and 30.
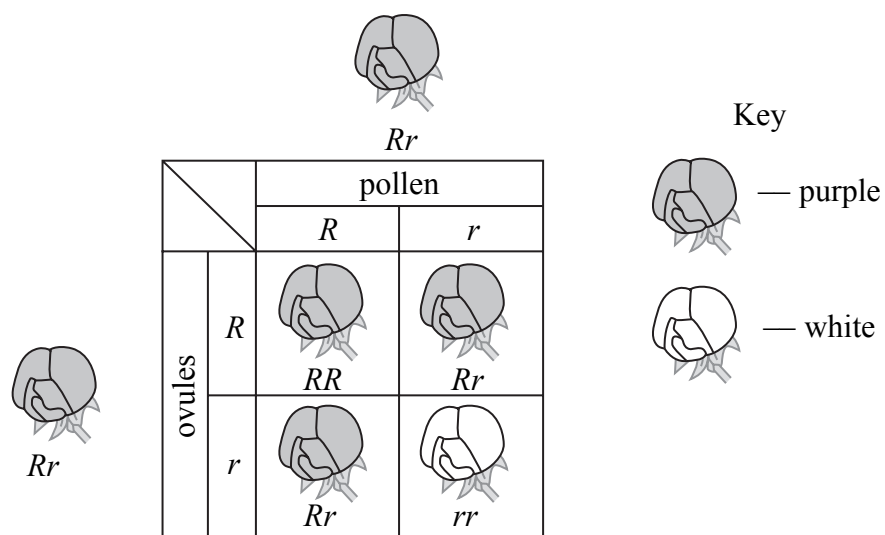
29.   The parent plants in this cross were

    A   both homozygous dominant for flower colour
    B   both homozygous recessive for flower colour
    C   both heterozygous for flower colour
    D   one homozygous and one heterozygous for flower colour

30.   The ratio of the offspring phenotypes for flower colour was

    A   1:2:1
    B   3:1
    C   4:1
    D   5:1

31.   The gametes are contained in ovules and pollen.
    This type of cross occurs in

    A   asexual reproduction
    B   cloning
    C   genetic modification
    D   sexual reproduction

32.   The gardener then crossed two white roses.
    What is the most likely outcome of this cross?

    A   100% purple flowers
    B   50% purple flowers and 50% white flowers
    C   75% white flowers and 25% purple flowers
    D   100% white flowers

Tomato plants hit by blossom end rot

Blossom end rot occurs in tomato plants.
This can be due to a lack of calcium ions in the soil.
It can also be a result of under-watering as the calcium ions from the soil
are not transported through the plant.
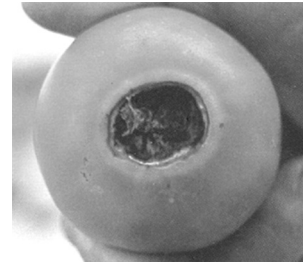
33. Using the information above, blossom end rot is an example of

   A   environmental influence only
   B   genetic influence only
   C   both environmental and genetic influences
   D   neither environmental nor genetic influences

34. In supermarkets many organic tomatoes are on sale.
     What is a reason for buying organic tomatoes?

   A   Organic tomatoes do not get blossom end rot
   B   Organic tomatoes do not have artificial pesticides sprayed on them
   C   Organic tomatoes always look better and taste better
   D   Organic tomatoes produce larger yields and so are cheaper

35. Tomato plants can be genetically modified.
     The two statements are about the genetic modification of tomato plants.

      1   Tomatoes can be genetically modified to be resistant to herbicides
      2   Genetic resistance to herbicides is likely to give a bigger crop yield

     Which of the statements are true?

   A   1 only
   B   2 only
   C   Both 1 and 2
   D   Neither 1 or 2

36. A valid concern about the genetic modification (GM) of food crops is that GM crops are
     likely

   A   to cause the food to rot more quickly
   B   to introduce new diseases
   C   to cause plants to produce a larger yield
   D   to cross pollinate with other plants

Cow to give birth to a Gaur (a ox-like animal)

Scientists at Massachusetts Advanced Cell Technology have succeeded in cloning a Gaur, an ox-like animal, at threat of extinction in Southern Asia.
They used the 'Dolly the sheep' cloning technique 692 times using gaur skin cells and cows' eggs.
They succeeded in creating 81 embryos.
All of these cloned embryos were then implanted into cows, resulting in 8 pregnancies.
5 of these were miscarriages.
3 live births are expected.

37.   What must be done to the cow's egg before the Gaur genetic material can be put into it?

    A   The egg must be stimulated with an electric shock
    B   The egg must be implanted into the surrogate
    C   The egg must be enucleated
    D   The egg must be fertilised

38.   The success rate for this type of procedure is very low mainly because

    A   the 'Dolly the sheep' cloning technique does not work
    B   none of the embryos are viable
    C   the Gaur are threatened with extinction
    D   there are few viable pregnancies

39. Some people object to this type of research on ethical grounds.

- Many embryos are produced of which few are viable
- Many eggs are used in the production of these embryos
- Animals may be distressed by the process
- Animals close to extinction may be saved by this method
- Humans may benefit from this type of research

How many of the statements are ethical reasons for objecting to this type of research?

- **A** two only
- **B** three only
- **C** four only
- **D** all five

40. Genetic research may help humans with genetic diseases.
Treatment for these diseases could be done using gene therapy.
Gene therapy can result in the

- **A** removal of the faulty gene from the gametes
- **B** complete removal of the faulty gene from all body cells
- **C** replacement of the faulty gene to alleviate the symptoms of the disease
- **D** prevention of genetic diseases in future generations

TOTAL FOR HIGHER TIER PAPER: 24 MARKS

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