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| 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 20 November 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.

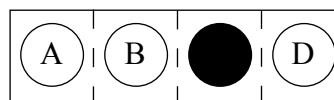
Before the test begins:

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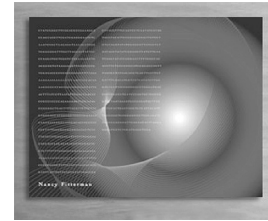
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**Questions 1 to 16 must be answered by Foundation tier candidates only.
Higher tier candidates start at question 17.**

Gene art

Art companies are now offering to produce an image of a single gene to hang in your home.



1. Genes are made of
 - A chromosomes
 - B cytoplasm
 - C DNA
 - D HGP

2. To have a picture of your gene you must send a sample of your cheek cells to the company. They extract the gene and decode it. Which part of the cheek cell contains the genes?
 - A cytoplasm
 - B nucleus
 - C cell membrane
 - D vacuole

3. Genes are found on structures called
 - A chromosomes
 - B vacuoles
 - C nuclei
 - D membranes

4. The human genome project has enabled human genetic information to be used in the
 - A cloning of sheep
 - B genetic modification of wheat
 - C selective breeding of dogs
 - D solving of crimes

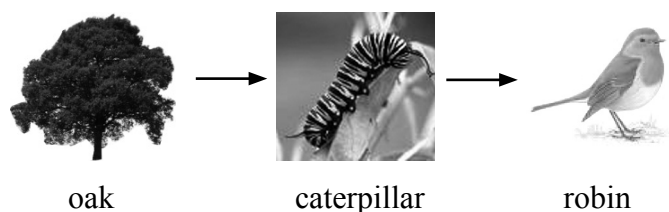
Robins

According to data collected by the Royal Society for the Protection of Birds (RSPB), climate change is causing some birds to lay their eggs earlier.

On average robins lay their first egg one week earlier in the year compared to robins that lived 40 years ago.

5. This year, the average date when robins laid their first egg was 22nd April. What was the average date that robins laid their first egg 40 years ago?
- A 15th April
 - B 22nd April
 - C 29th April
 - D 22nd May

This is a food chain for a robin.



6. The robin in this food chain is
- A a predator and a consumer
 - B a predator and a producer
 - C a consumer and prey to the caterpillar
 - D a producer and prey to the caterpillar
7. What do the arrows represent in the food chain?
- A the number of organisms at each level
 - B the direction of energy flow
 - C the amount of food that is eaten
 - D the amount of energy that is lost
8. Hawks hunt and kill robins. Which row of the table shows how an increase in the number of hawks will affect the populations of robins and caterpillars?

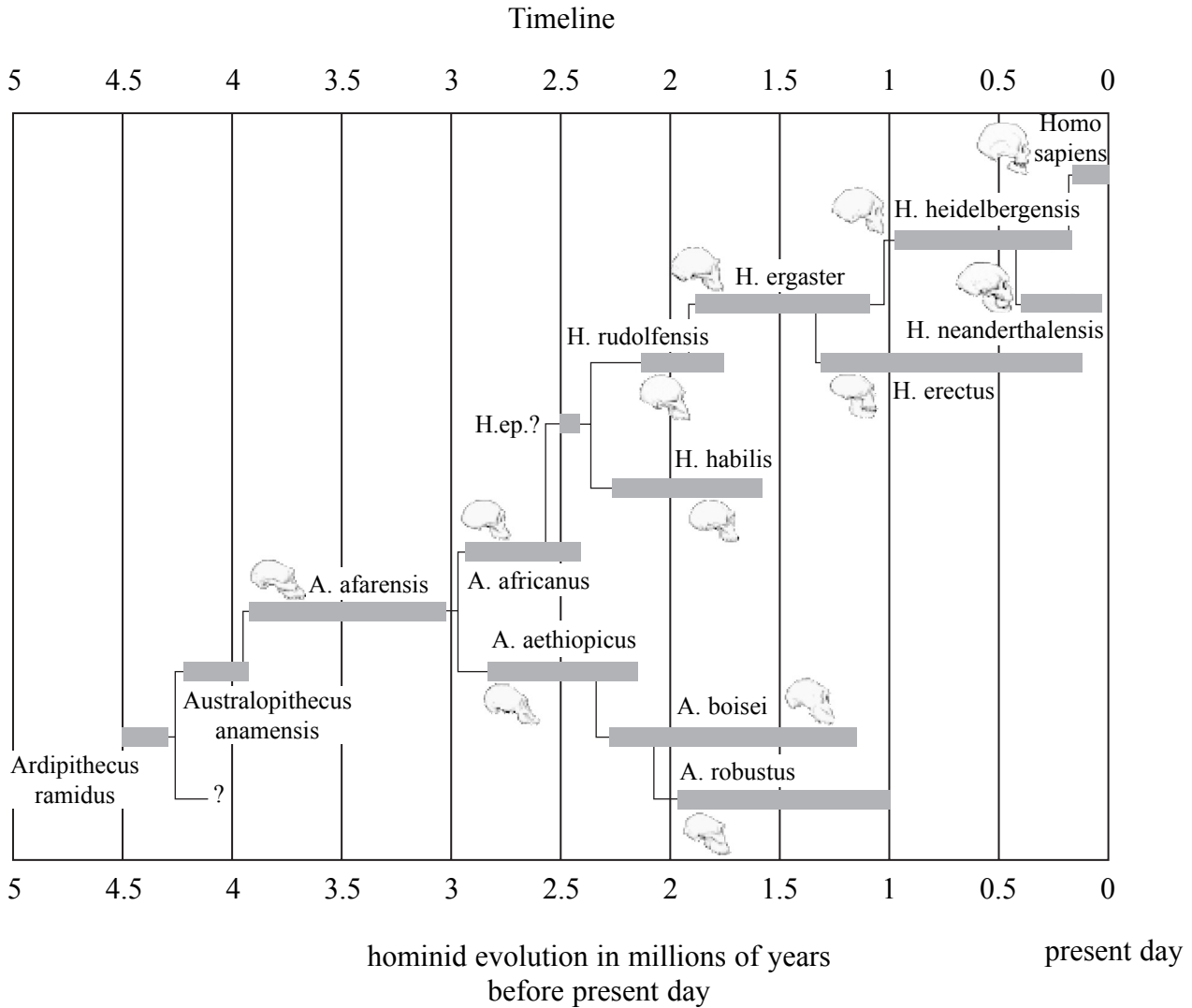
| | robins | caterpillars |
|---|----------|--------------|
| A | increase | increase |
| B | decrease | increase |
| C | increase | decrease |
| D | decrease | decrease |

The evolution of man

Use the information to answer questions 9–12.

The timeline below shows when different hominid species lived during the Earth’s history. All the species shown on the timeline are hominids.

Each bar (■) represents the time span during which each species existed.



9. Evidence for this timeline is mainly from

- A direct observation
- B the fossil record
- C Darwin’s book
- D computer models

10. The earliest evidence of hominids was
- A 4.5 years ago
 - B 2.5 million years ago
 - C 4.5 million years ago
 - D 5 million years ago
11. What is the maximum number of hominid species living at the same time?
- A 2
 - B 5
 - C 8
 - D 15
12. The species of hominid living in the present day is
- A *Ardipithecus ramidus*
 - B *Homo sapiens*
 - C *H. neanderthalensis*
 - D *A. robustus*

A welcome return to knobbly vegetables

EU laws which ensured fruit and vegetables were sold in standard sizes have been changed.
For example, knobbly carrots and curved cucumbers are now set to make a comeback in our shops.

13. What is the most likely effect of this change in the EU laws?
- A The price of fruit and vegetables will increase
 - B Less organic vegetables and fruit will be on sale in supermarkets
 - C The price of fruit and vegetables will decrease
 - D The price of organic fruit and vegetables will increase
14. Organic crop farming methods do **not** include
- A crop rotation
 - B weeding by hand
 - C using compost rather than manufactured fertilisers
 - D using artificial insecticides rather than biological control
15. Many people prefer to eat organically grown fruit and vegetables because
- A they contain fewer pesticides
 - B they have a lower nutritional value
 - C they are cheaper to produce
 - D they have a standard size and shape
16. Farmers can take cuttings from a plant with the best characteristics. These cuttings can be grown into new plants. Which row of the table shows this method of reproduction and the genetic characteristics of the new plants produced?

| | method of reproduction | genetic characteristics of the new plants |
|---|------------------------|-------------------------------------------|
| A | sexual | genetically identical to each other |
| B | asexual | genetically identical to the parent |
| C | sexual | genetically different to each other |
| D | asexual | genetically different to the parent |

**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.**

Lonesome George

Lonesome George is the last living giant tortoise on the island of Santa Fe (one of the Galapagos Islands). The tortoises are thought to have died out because humans hunted them and goats, which ate the vegetation, were brought to the island.



Steve Allen/Science Photo Library

17. The giant tortoises
- A competed intraspecifically with goats for food
 - B were predators of the goats
 - C competed interspecifically with goats for food
 - D were predators of the humans
18. The giant tortoises are an example of how a species less well-adapted to their environment are likely to become
- A more competitive
 - B extinct
 - C mutants
 - D more successful
19. Lonesome George has the scientific name *Geochelone abingdoni*. This means that Lonesome George belongs to the
- A species *Geochelone* and genus *abingdoni*
 - B genus *Geochelone* and species *abingdoni*
 - C class *Geochelone abingdoni*
 - D phylum *Geochelone abingdoni*
20. Scientists are attempting to breed Lonesome George with female tortoises from a similar species. This method of reproduction is known as
- A asexual reproduction
 - B survival of the fittest
 - C selective breeding
 - D genetic modification

Haemophilia

Haemophilia is an inherited disorder.

The allele for haemophilia is on the X chromosome.

Males have XY chromosomes and females have XX chromosomes.

21. Haemophilia is a disorder
- A which affects the nervous system
 - B in which blood fails to clot normally
 - C which changes the shape of the red blood cells
 - D which causes excess mucus production
22. The haemophilia allele can be inherited by
- A males only because they have one X chromosome
 - B females only because they have two X chromosomes
 - C both males and females because they both have an X chromosome
 - D males only because they have one Y chromosome
23. Harry has haemophilia.
The chance that Harry will pass on the allele for haemophilia to his female children is
- A 25%
 - B 50%
 - C 75%
 - D 100%
24. Harry marries Jane. She does not have haemophilia and she does not carry the allele for haemophilia.
All their female children will
- A have haemophilia
 - B carry one allele for haemophilia
 - C not have haemophilia and not carry the allele for haemophilia
 - D pass on the allele for haemophilia to their children.

TOTAL FOR FOUNDATION TIER PAPER: 24 MARKS

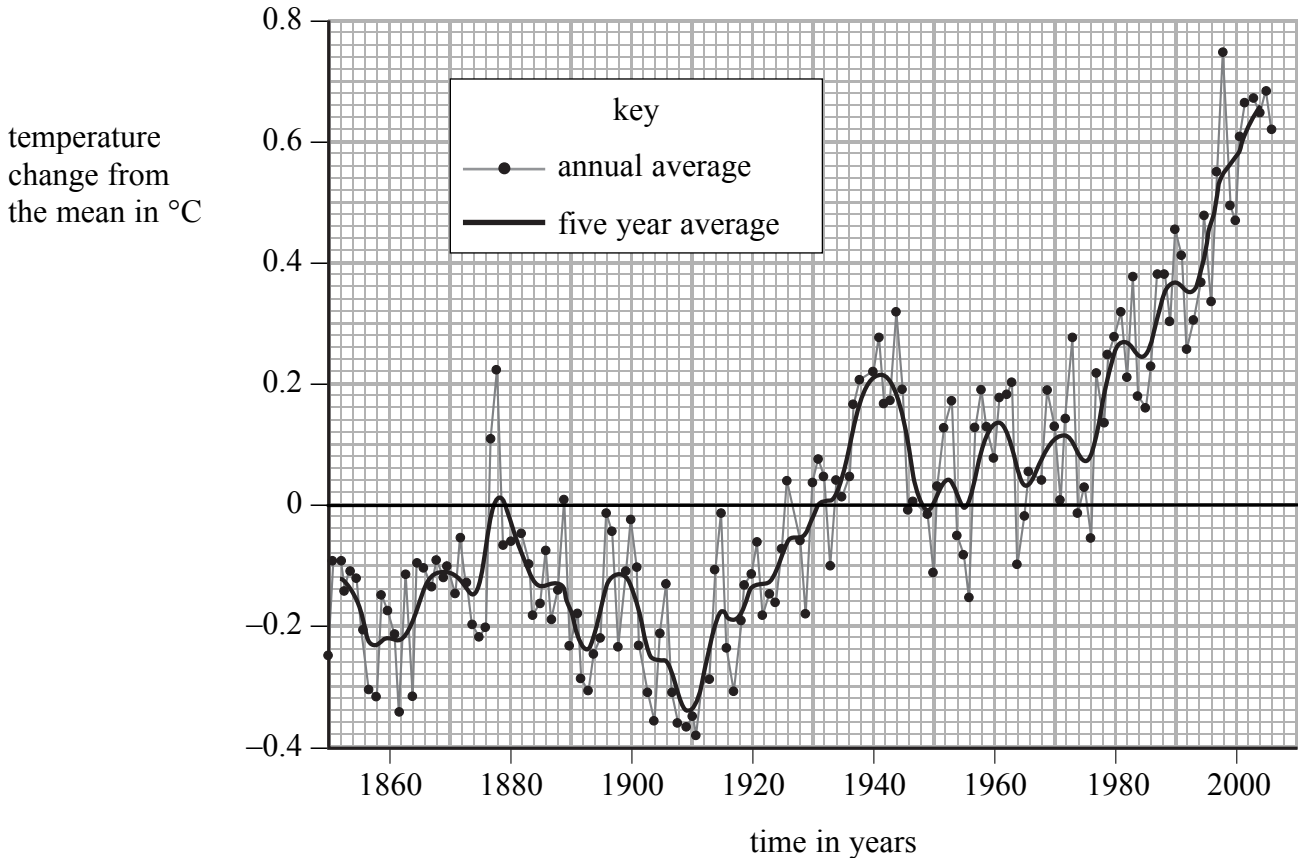
Foundation tier candidates do not answer any more questions after question 24.

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

Global temperatures

Use the graph to answer questions 25 and 26.

The graph shows how global temperatures have risen or fallen in relation to the mean global temperature. This mean temperature is shown as zero on the graph.



25. The first time that the annual average temperature rose above the mean was

- A 1876
- B 1888
- C 1942
- D 1998

26. Which is the correct statement about the graph?

- A The global temperature has increased steadily since 1908
- B The annual average and five year average are always the same
- C The five year average shows no change from the mean in 1932
- D The global temperature in the year 2000 was 0.6 °C

27. The temperature rise is believed to be caused by an increase in greenhouse gases. The main greenhouse gases are

- A carbon dioxide and methane
- B carbon dioxide and sulphur dioxide
- C carbon dioxide and oxygen
- D carbon dioxide and nitrogen

28. Computer models are used to predict the future effects of a rise in global temperatures. Which row of the table is correct for computer modelling?

| | always accurate | can predict long term changes | uses present and past data |
|---|-----------------|-------------------------------|----------------------------|
| A | yes | yes | no |
| B | yes | no | no |
| C | no | yes | yes |
| D | no | no | yes |

Glow in the dark pigs

Scientists in Taiwan say they have bred three pigs that “glow in the dark”. The pigs are created by adding genetic material from jellyfish into a normal pig embryo.

29. What is the name given to an animal which contains a gene from another animal?

- A transplant animal
- B transgenic animal
- C carrier animal
- D cloned animal

30. To genetically modify a pig, the following steps are carried out.

- 1 Jellyfish DNA inserted into embryonic pig cells
- 2 Embryonic pig cells are implanted into surrogate pig
- 3 Jellyfish DNA extracted
- 4 Embryonic pig cells are given an electric shock to stimulate cell division

What is the correct order for the production of the “glow in the dark” pigs.

- A 4, 3, 1, 2
- B 3, 1, 2, 4
- C 3, 1, 4, 2
- D 3, 4, 1, 2

31. It is possible to use a similar technique to grow human body organs on pigs for transplantation into humans.
These are two statements about this process.

- 1 Many pig embryos fail to develop during this process
- 2 Transplant organs made by this process will not be rejected by humans

Which are ethical concerns about this use of pigs?

- A 1 only
 B 2 only
 C both 1 and 2
 D neither 1 or 2
32. In the UK, gene therapy can be used to treat people with cystic fibrosis.
Gene therapy
- A cures an individual of cystic fibrosis
 B stops cystic fibrosis being passed on to children
 C alleviates the symptoms of cystic fibrosis but does not cure it
 D cures cystic fibrosis and prevents it being passed on to children

Music affects plant growth

There is evidence that music can affect the rate at which some plants grow.
Experiments with different types of music have been shown to promote root growth in plants.

33. A valid and reliable experiment to show how music affects root growth in a single species would need to
- A have few repeats and the same seed species
 B have many repeats and different seed species
 C have few repeats and different seed species
 D have many repeats and the same seed species

34. Plants need to take in minerals for healthy growth.
Which row of the table shows the type of mineral and its direct use in the plant?

| | type of mineral | direct use in plant |
|---|-----------------|------------------------|
| A | magnesium | protein formation |
| B | nitrate | protein formation |
| C | phosphate | chlorophyll production |
| D | potassium | chlorophyll production |

Cloning

Some people are concerned about the cloning of animals but they may not realise that they are eating cloned vegetables everyday.

35. What is involved in the process of cloning vegetables?
- A a nucleus is inserted into an enucleated cell and transferred into a surrogate
 - B the required genes are inserted into the vegetables using enzymes
 - C asexual reproduction resulting in no variation
 - D pollen and ova combine to produce identical seeds
36. Which row of the table shows the correct processes for the cloning of animals such as ‘Dolly the sheep’?

| | nucleus is removed from the donor body cell | enucleated egg cell is inserted into surrogate | electric shock is given to start the embryo heart |
|---|---------------------------------------------|------------------------------------------------|---------------------------------------------------|
| A | yes | yes | yes |
| B | no | yes | yes |
| C | yes | no | no |
| D | no | no | no |

Genetically modified crop plants to be grown in secret

No GM food trials were undertaken in this country during 2008. More than 50 that have been conducted from 2000 to 2007 have been affected by vandalism. Opponents of GM benefit from current rules, which dictate that all trials must be disclosed on a Government website.

37. The trials of GM crops need to take place over many years. The reason for this is that
- A there may be problems in getting the GM crop plants to grow
 - B GM crop plants will always destroy natural species
 - C GM crop plants will never evolve into better species over time
 - D there may be unexpected problems which develop over time

38. These are two statements about genetic modification of crops.
- 1 Plants can be genetically modified, using enzymes, to be resistant to weedkillers
 - 2 Plant hormones are used to genetically modify dwarf wheat plants

Which are true?

- A 1 only
 B 2 only
 C both 1 and 2
 D neither 1 or 2
39. The production of designer babies causes some controversy.
 Which statement is true?
- A It is ethical to produce designer babies as only one embryo is produced
 B Cloning is a method of producing designer babies
 C Embryo screening could produce babies which do not carry a genetic disorder
 D Designer babies can be produced without the mother having hormone treatment

40. Which row of the table is correct for designer babies?

| | designer babies | | |
|----------|----------------------------------|--------------------------------------|---------------------------------|
| | are free from all disease | have selected characteristics | are genetically modified |
| A | yes | no | no |
| B | yes | no | yes |
| C | no | yes | no |
| D | no | yes | yes |

TOTAL FOR HIGHER TIER PAPER: 24 MARKS

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