

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 12 November 2010 – 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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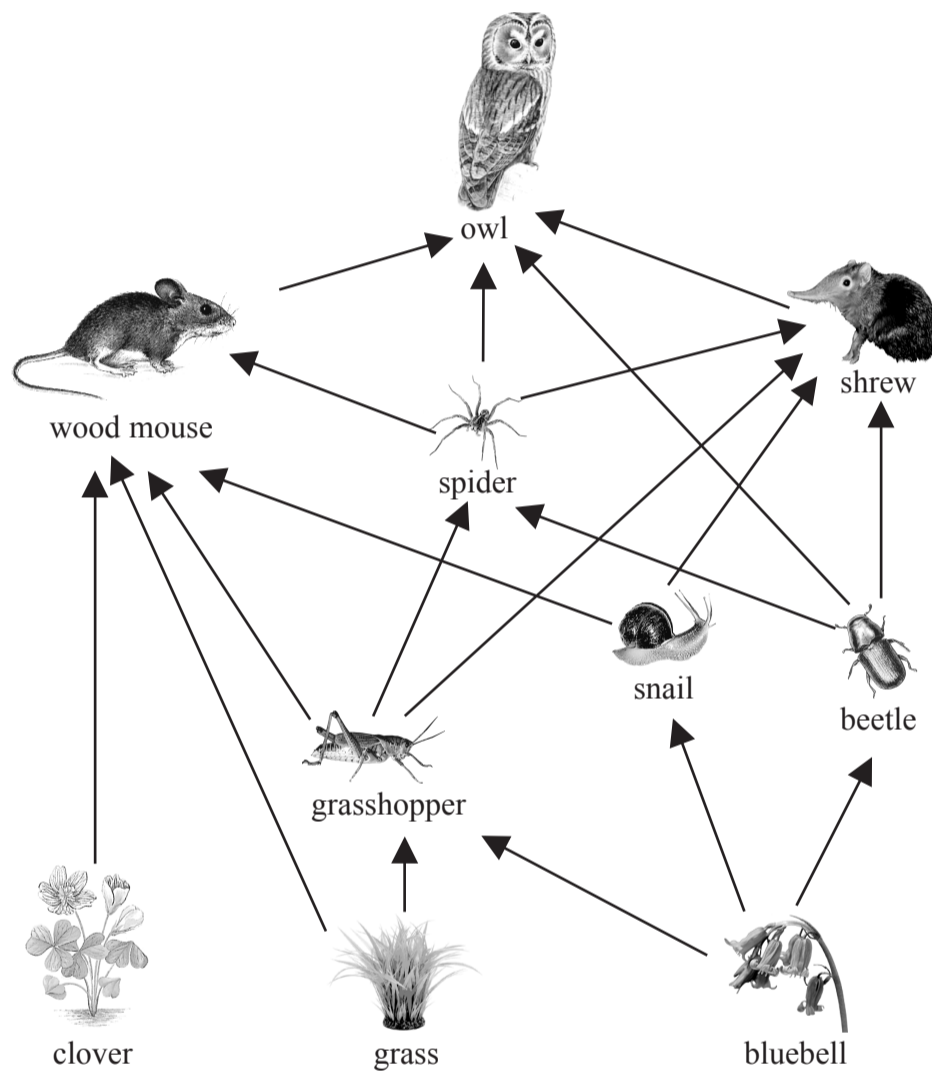
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Questions 1 to 16 must be answered by Foundation tier candidates only.  
Higher tier candidates start at question 17.

**In the woods**

*Use the diagram to answer questions 1 to 4.*

The diagram shows a woodland food web.



1. How many types of organisms in the food web are producers?
- A none
  - B one
  - C two
  - D three

2. Two predators of the spider are

- A grasshopper and beetle
- B owl and shrew
- C wood mouse and grasshopper
- D snail and beetle

3. Which is a correct food chain from the food web?

- A grass → grasshopper → shrew → beetle
- B owl → spider → grasshopper → grass
- C bluebell → snail → shrew → owl
- D owl → shrew → snail → bluebell

4. The number of grasshoppers increased.  
The most likely reason for this is

- A the number of shrews decreased
- B the number of spiders increased
- C the number of clover plants decreased
- D the grass died

### Tigers

These tiger cubs are brother and sister.

Their parents were both orange with black markings.

The colour and markings of tigers are important in helping them to survive in their natural habitat.



5. The natural colour and markings of tigers are controlled by

- A characteristics
- B genes
- C cells
- D genetic engineering

6. The chromosomes of the tiger cubs are found in their cells.  
Which part of a cell contains chromosomes?
- A DNA
  - B genes
  - C nucleus
  - D cytoplasm
7. The white tiger looks very different to his sister and to his parents.  
This difference is caused by
- A gene mutation
  - B natural selection
  - C asexual reproduction
  - D competition
8. White tigers are less likely to be successful in their natural habitat than coloured tigers.  
The reason for this is because white tigers
- A are less camouflaged than coloured tigers so are more likely to be eaten by prey
  - B will be better camouflaged than coloured tigers so will not be seen by prey
  - C will have more predators than coloured tigers so are more likely to be eaten
  - D cannot compete as well for resources with other tigers that are better camouflaged
9. Passing genetic information from parents to offspring is called
- A natural selection
  - B selective breeding
  - C evolution
  - D inheritance

### Sea monsters

The fossilised skull of a ferocious, 16 metres long ‘sea monster’ has been discovered. The skull is from an extinct dinosaur called a pliosaur.



10. The pliosaur had very powerful jaws with razor-like teeth. These features were

- A naturally selected
- B genetically engineered
- C genetically modified
- D artificially selected

11. The pliosaur was a reptile. All reptiles

- A produce milk
- B have scaly skin
- C give birth to live young
- D have body hair

12. Which row of the table gives information about the fossilised skull of the pliosaur?

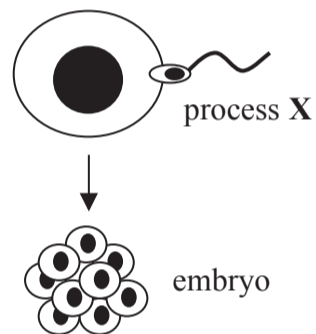
	made from	age of fossil (years)
A	remains of soft tissue	thousands
B	mineralised remains	millions
C	remains of soft tissue	millions
D	mineralised remains	thousands

13. Which of these statements are true for all fossils?
- 1 fossils provide evidence for evolution
  - 2 dead organisms fully decay before forming fossils
- A** 1 only  
**B** 2 only  
**C** both 1 and 2  
**D** neither 1 nor 2

**A ball of cells**

*Use the diagram to answer questions 14 and 15.*

The diagram shows the early stages in the development of a human.



14. Process X is
- A** transplantation  
**B** cloning  
**C** fertilisation  
**D** competition
15. Which row of the table shows the type of reproduction that produced the embryo and the genetic characteristics of the embryo?

	type of reproduction that produced embryo	genetic characteristics of embryo
<b>A</b>	sexual	different from parents
<b>B</b>	asexual	identical to parents
<b>C</b>	sexual	identical to parents
<b>D</b>	asexual	different from parents

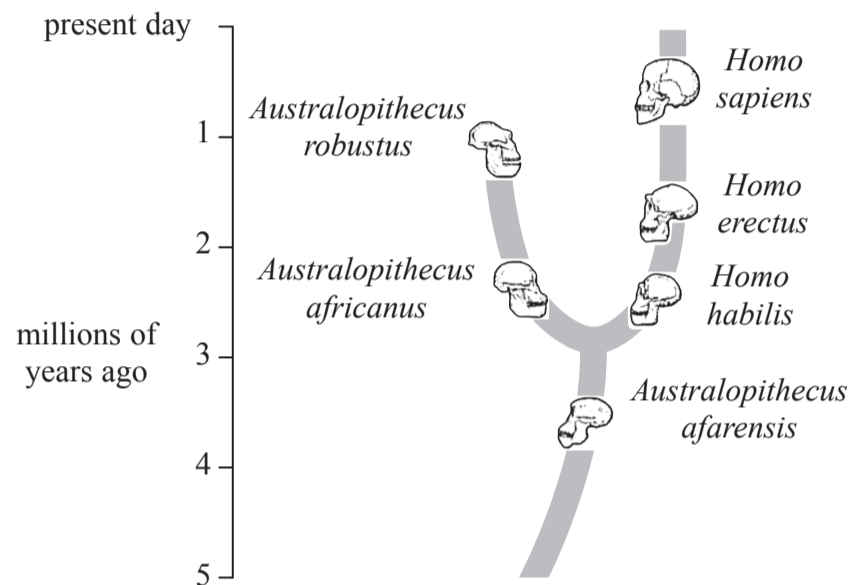
16. Cells from embryos can be tested to see if they contain alleles that cause genetic disorders. Alleles are
- A two genes that are the same
  - B genes which cause disease
  - C two different genes
  - D alternative versions of the same gene

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

Passing time

Use the diagram to answer questions 17 to 19.

This evolutionary tree shows the possible relationship between humans (*Homo sapiens*) and their ancestors.



17. How many of these organisms belong to the same species as *Homo sapiens*?
- A none
  - B two
  - C three
  - D six
18. Which of the organisms, that lived approximately 2.5 million years ago, is a direct ancestor of *Homo sapiens*?
- A *Homo erectus*
  - B *Homo habilis*
  - C *Australopithecus africanus*
  - D *Australopithecus afarensis*
19. *Homo sapiens* is thought to have evolved by natural selection. Natural selection is a process over
- A a few generations which produces changes within a species
  - B many generations which produces changes within a species
  - C a few generations which produces no change in a species
  - D many generations which produces no change in a species



20. Which process does **not** result in the evolution of *Homo sapiens*?

- A genetic mutation
- B competition
- C asexual reproduction
- D adaptation

### Cloned pigs

Pigs can be used to produce organs for human transplants.  
In 2001, five cloned piglets were produced.  
They all lacked a gene which triggers the human immune system.



21. The five piglets were produced using genetic information from

- A a sperm cell
- B a body cell
- C an egg cell
- D a bacterial cell

22. Which of these statements about using mammals to produce cloned human organs for transplants are true?

- 1 cloned human organs are less likely to be rejected by humans than donated human organs
- 2 mammals are likely to be killed after they have been used to grow cloned human organs

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

23. Selective breeding, using the cloned pigs, may produce future piglets that have the desired characteristic.  
Which of these statements are true?

- 1 selective breeding involves changing the genes of the parents
- 2 selective breeding involves choosing two parents to breed together

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

24. Animals can have their genomes altered to give them desired characteristics.  
Genomes that have been altered in this way are genetically

- A modified
- B transplanted
- C mutated
- D selected

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

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

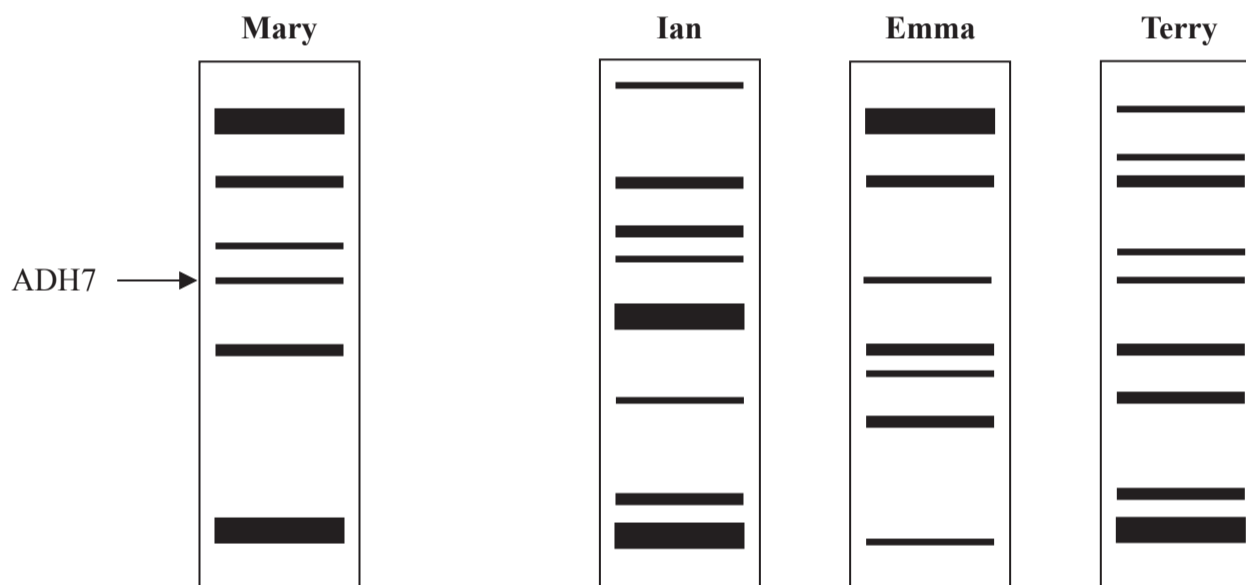
Questions 25 to 40 must be answered by Higher tier candidates only.  
 Foundation tier candidates do not answer questions 25 to 40.

Inheriting characteristics

**Gene found that reduces dangers of alcohol**

An allele of the gene ADH helps to remove alcohol from the body. This allele is called ADH7 and could reduce the risk of alcohol related cancers.

25. Genetic fingerprints can be used to determine which alleles have been inherited. The genetic fingerprints have been taken from Mary and her three children Ian, Emma and Terry.



Which of the three children have inherited the ADH7 allele from Mary?

- A Ian only
- B Ian and Emma
- C Ian and Terry
- D Emma and Terry

26. Mary's husband, Philip, is homozygous recessive for the ADH allele. Mary is heterozygous for the ADH allele. **A** represents the dominant ADH7 allele and **a** represents the ADH allele.

Which Punnett square is correct?

		Phillip's gametes	
		a	a
Mary's gametes	A	Aa	Aa
	a	aa	aa

**A**

		Phillip's gametes	
		A	a
Mary's gametes	A	AA	Aa
	a	Aa	aa

**B**

		Phillip's gametes	
		a	a
Mary's gametes	A	Aa	Aa
	A	Aa	Aa

**C**

		Phillip's gametes	
		A	A
Mary's gametes	a	Aa	Aa
	a	Aa	Aa

**D**

27. What is the percentage chance that Mary and Philip's next child will carry the ADH7 allele?

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

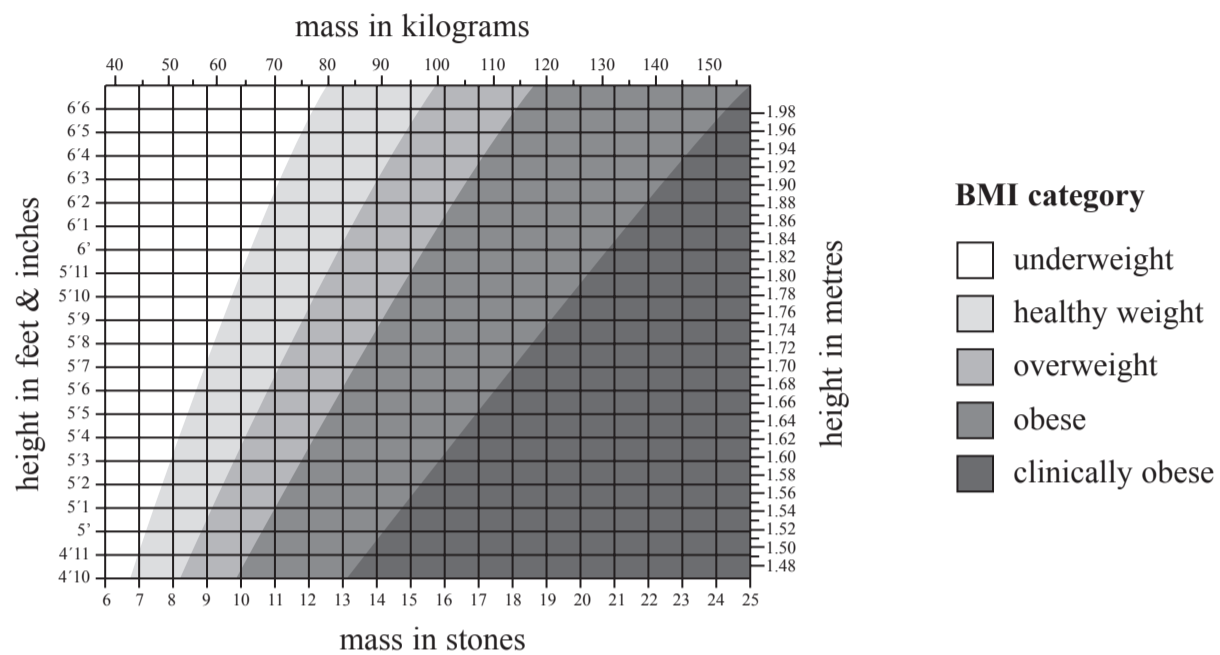
28. How many alleles of any gene does each of Mary's body cells contain?

- A** 2
- B** 4
- C** 8
- D** 12

- 29.** The Human Genome Project (HGP) will allow scientists to find out whether an unborn child is carrying the alleles for a genetic disorder.  
A disadvantage of having this information is that
- A** the disorder could be cured before the child is born
  - B** some tests are unable to confirm that the child will develop the disorder
  - C** scientists can develop new medicines to treat the disorder
  - D** it can prevent the disorder from being inherited

### Growth in organisms

30. A doctor can use a BMI chart, like the one shown below, to determine your BMI category.



Suzie's height is 1.7 m and her mass is 80 kg.  
What is Suzie's BMI category?

- A underweight
- B healthy weight
- C overweight
- D obese

31. BMI can be calculated using the formula

$$\text{body mass index} = \frac{\text{body mass in kg}}{(\text{height})^2 \text{ in m}^2}$$

Russell's height is 1.5 m and his mass is 90 kg.  
What is Russell's BMI in kg/m<sup>2</sup>?

- A 12.5
- B 30
- C 40
- D 48.2

32. These statements are about growth of organisms.  
How many of the statements are true?

- plant growth is affected by nitrate concentration in the soil
- plant and animal growth is influenced by nutrition
- human growth is determined by genes and is influenced by the environment

- A** none  
**B** one  
**C** two  
**D** three

### Glow in the dark

Scientists have used a bioluminescent gene from a firefly to modify a plant so that the plant can glow in the dark.



33. The statements give the stages used to genetically modify a plant.  
They are not in the correct order.

- 1 bioluminescent gene inserted into bacteria
- 2 bioluminescent gene removed from firefly
- 3 bacteria infects the plant
- 4 bioluminescent gene incorporated into plant genome
- 5 the plant produces light

What is the correct order of these statements?

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

34. How many of these statements about genetically modified (GM) plants are true?

- GM plants are always transgenic organisms
- GM plants are always organic
- cloning is used to genetically modify plants

- A** none  
**B** one  
**C** two  
**D** three

35. A field of GM crops can feed more people than a field of beef cattle.  
The reason for this is because

- A** cattle use energy to maintain their body temperature  
**B** plants can be genetically modified but cattle cannot be genetically modified  
**C** cattle store more energy per tonne than the same mass of plants  
**D** plants absorb energy from the Sun to produce sugars

36. The most likely reason that people are opposed to growing GM crops is that

- A** there is evidence that GM crops have a high nutritional value  
**B** all pests eating the crops will become resistant to pesticides  
**C** the long term effect of eating GM crops on human health is not known  
**D** growing GM crops reduces the need for rearing cattle

### Designer babies

The completion of the Human Genome Project (HGP) has brought the possibility of ‘designer babies’ much closer.



37. Which statement is true for designer babies?

- A** embryo screening could produce babies without any genetic disorders  
**B** sexual reproduction is not involved in the production of designer babies  
**C** cloning can be used to produce designer babies  
**D** designer babies are genetically identical to their parents



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

<b>designer babies</b>			
	<b>are genetically modified</b>	<b>are produced using IVF</b>	<b>have selected characteristics</b>
<b>A</b>	yes	no	yes
<b>B</b>	no	yes	no
<b>C</b>	yes	no	no
<b>D</b>	no	yes	yes

#### **Gene therapy for breast cancer**

Gene therapy is one of the most promising developments in medicine. It is currently being investigated for the treatment of breast cancer.

39. These statements are about the effects that gene therapy might have on the lives of breast cancer patients.

Which of the statements are true?

- 1 gene therapy ensures that the children of breast cancer patients do not develop breast cancer
- 2 gene therapy could prevent breast cancer from developing further and spreading to other parts of the body

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

40. Scientists are currently investigating different methods of gene therapy for the future treatment of genetic disorders.

Gene therapy could

- A** treat all diseases in future generations  
**B** prevent alleles in gametes becoming faulty  
**C** incorporate healthy alleles to alleviate the symptoms of the disorder  
**D** remove faulty alleles causing the disorder from all body cells

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

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