

Surname	Initial(s)
Signature	

Paper Reference(s)

5005 5025

Edexcel GCSE

Science (5005)

Biology (5025)

B1a – Topics 1 and 2

Foundation and Higher Tier

Tuesday 15 November 2011 – 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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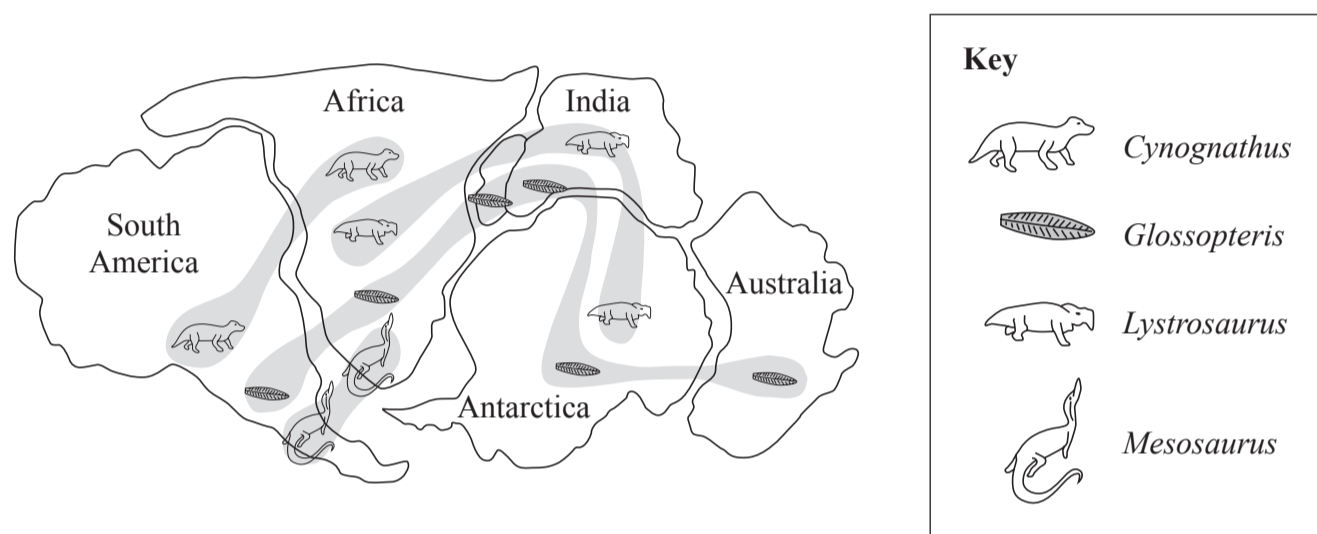
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Questions 1 to 16 must be answered by Foundation tier candidates only.
Higher tier candidates start at question 17.

Fossil evidence

Use the information and diagram to help you answer questions 1 and 2.

Millions of years ago, the southern continents were joined together.
The map shows these continents and some of the fossils found on these continents.



1. Which fossil was found on all the continents shown in the map?

- A *Cynognathus*
- B *Glossopteris*
- C *Lystrosaurus*
- D *Mesosaurus*

2. Which continents show fossil evidence of *Cynognathus*?

- A Antarctica and South America
- B South America and Africa
- C Africa and India
- D India and Antarctica

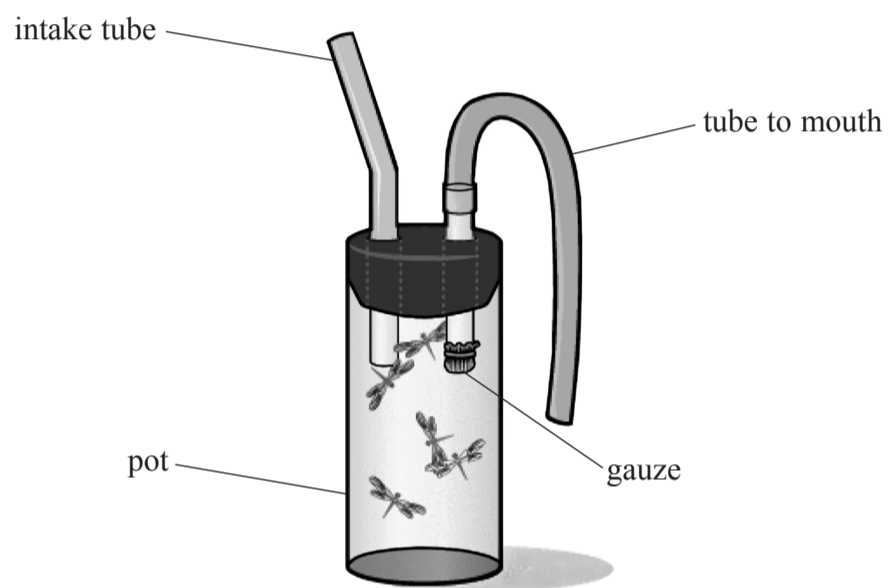
3. What is a fossil?

- A rocks with drawings on them
- B the mineralised remains of the soft parts of animals only
- C the mineralised remains of plants and animals
- D the bones and shells of animals

4. Fossils provide evidence for
- A selective breeding
 - B genetic engineering
 - C forensics
 - D evolution

Sampling populations

5. Sally used a pooter to catch small invertebrates in her garden.



Sally placed the intake tube over the invertebrates to be sampled and sucked through the tube to her mouth.
This caused the invertebrate to enter the pot.

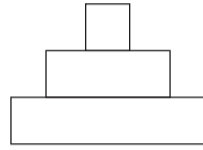
What is the reason for the gauze underneath the tube to the mouth?

- A to help the invertebrates to escape
 - B to keep the air in the pot clean
 - C to stop the invertebrates getting into your mouth
 - D to keep the invertebrates in the pot long enough to count
6. Sally collected 10 invertebrates in 1 m² of her garden.
Estimate how many invertebrates Sally would expect to find in her 50 m² garden.
- A 10
 - B 50
 - C 500
 - D 5 000

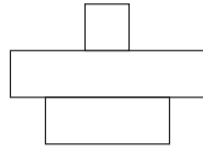
7. Sally suggested a food chain for the garden could be

rose bushes → aphids → ladybirds

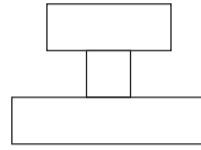
Which pyramid of biomass best represents this food chain?



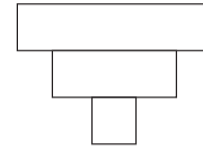
A



B



C



D

8. Sally only collected invertebrates.
What is absent in all invertebrates?

- A** a heart
- B** legs
- C** a backbone
- D** eyes

Gene therapy

9. A recent study which has mapped each human gene is likely to lead to the treatment of genetic disorders.
Which row of the table shows genetic disorders?

	sickle cell anaemia	haemophilia	Huntington's disease
A	yes	yes	yes
B	no	yes	yes
C	yes	no	yes
D	yes	yes	no

10. Genetic disorders are usually due to a change in a gene.
Which of these statements about genes are true?

- 1 genes are made up of DNA
2 genes are found on chromosomes

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

11. The research study to map every human gene was called the

- A human project
B human genetic project
C human genome project
D human therapy project

12. For human gene therapy to be carried out, healthy alleles must be removed from the

- A membrane of a cell
B nucleus of a cell
C mutated cell
D chloroplast of a cell

13. Some genetic disorders are caused by recessive alleles.
An allele is an alternative form of

- A the same chromosome
B a different chromosome
C the same gene
D a different gene

Use the information and diagram to answer questions 14 to 16.

The Punnett square shows the genetic cross for two parents where the father has the genetic disorder cystic fibrosis (CF). Cystic fibrosis is caused by recessive alleles.

		father's gametes	
		f	f
mother's gametes	{	F	Ff
		f	ff
		X	

14. Which row of the table correctly names the father's and mother's gametes?

			gametes	
			father's	mother's
A	sperm	sperm		
B	sperm	ova		
C	ova	sperm		
D	ova	ova		

15. What will be the genotype of X?

- A FF
- B Ff
- C ff
- D ff

16. How many of the potential offspring in the Punnett square would be carriers of CF but not have the disorder?

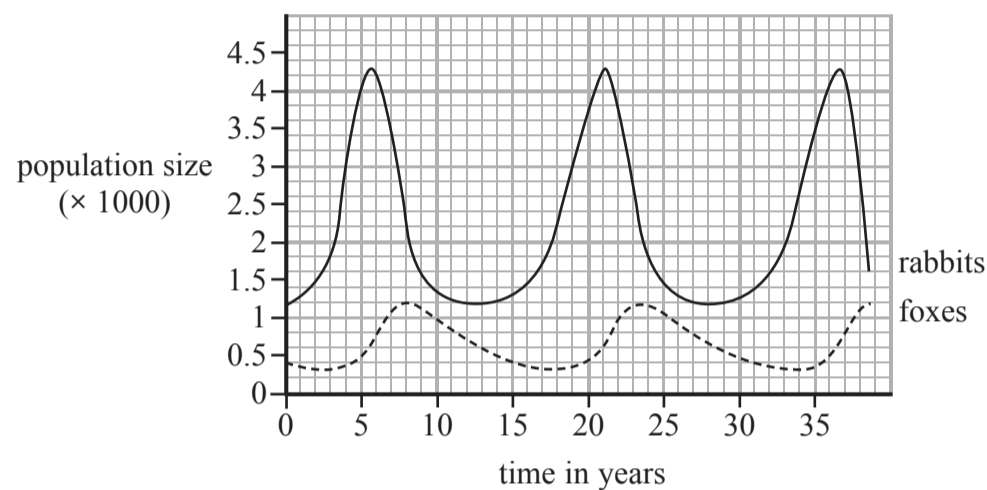
- A one
- B two
- C three
- D four

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.

Predator-prey relationships

Use this information to answer questions 17 and 18.

The graph shows the relationship between rabbits and foxes in a specific ecosystem.



17. Which statement is correct for this graph?
- A the population of foxes is always greater than the population of rabbits
 - B the population of rabbits is always greater than the population of foxes
 - C the populations of rabbits and foxes are directly proportional to one another
 - D the population of rabbits always decreases as the population of foxes decreases
18. Which row of the table shows the correct numbers of rabbits and foxes at 25 years?

	population of rabbits at 25 years	population of foxes at 25 years
A	1050	1400
B	1400	1050
C	400	3600
D	3600	400

19. The male rabbits in this ecosystem fight with each other for mates. This is an example of
- A interdependent competition
 - B intra-species competition
 - C selective breeding of rabbits
 - D predator-prey relationships

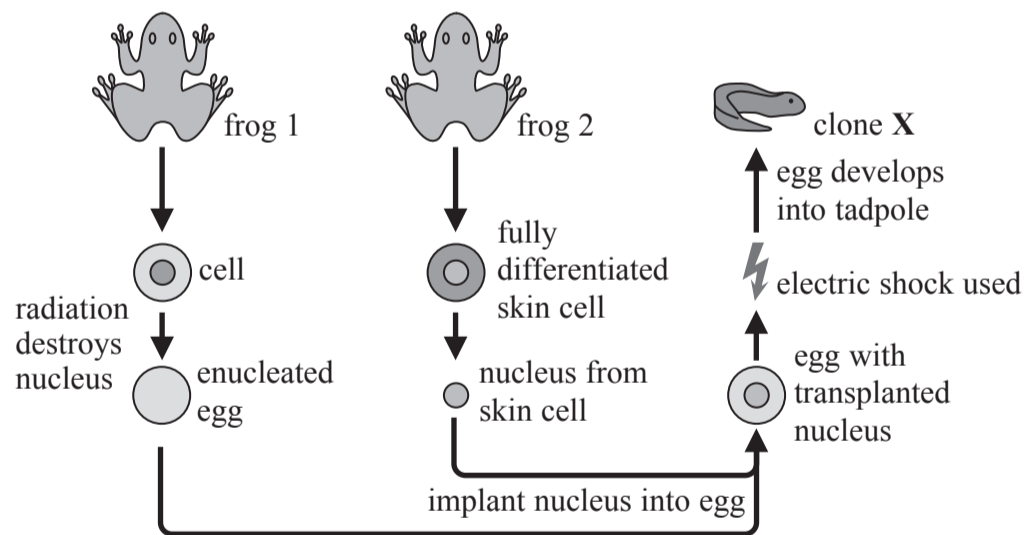
20. Computer models are used to predict the change in predator-prey relationships. Which row of the table is correct for computer modelling?

	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

Cloning frogs

Use this information to answer questions 21 and 22.

Frogs are easier to clone than sheep as a surrogate mother is not needed.



21. X is a clone of
- A frog 1 only
 - B frog 2 only
 - C both frog 1 and frog 2
 - D neither frog 1 nor frog 2

22. An electric shock is used during the process of cloning.
Why is an electric shock used?
- A to enucleate the egg cell from frog 1
 - B to remove the skin cell from the frog 2
 - C to start cell division in the egg cell with the transplanted nucleus
 - D to insert the nucleus into the egg cell

23. Frogs have smooth skin and lay their eggs in water.
Frogs belong to the vertebrate group named

- A amphibians
- B fish
- C reptiles
- D mammals

24. There are three main types of common frog.
Their names are

- *Rana temporaria*
- *Rana esculenta*
- *Rana catesbeiana*

These frogs belong to

- A the same species only
- B the same species but different genus
- C a different genus and species
- D the same genus but different species

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.**

Human population growth

25. It is expected that by 2050 the world's human population will be 9 billion. This means that food production across the world needs to increase by approximately 70% to keep up with demand.

Growing more crops rather than farming cattle would

- A decrease food production as more energy will be lost at each trophic level
- B increase food production as less energy will be lost at each trophic level
- C increase food production as meat from cattle has a higher energy value
- D decrease food production as crop plants have a higher energy value

26. Scientists can genetically modify plants. Which row of the table identifies how crops can be genetically modified to **increase** crop yield?

	drought resistant	higher vitamin content	pest resistant
A	yes	no	yes
B	yes	yes	yes
C	no	no	yes
D	yes	yes	no

27. Which of the following are used to insert genes into DNA to genetically modify crop plants?

- A transgenic animals
- B cloning techniques
- C gene therapy techniques
- D enzymes including ligase

28. The introduction of genetically modified crops into the environment is controversial.

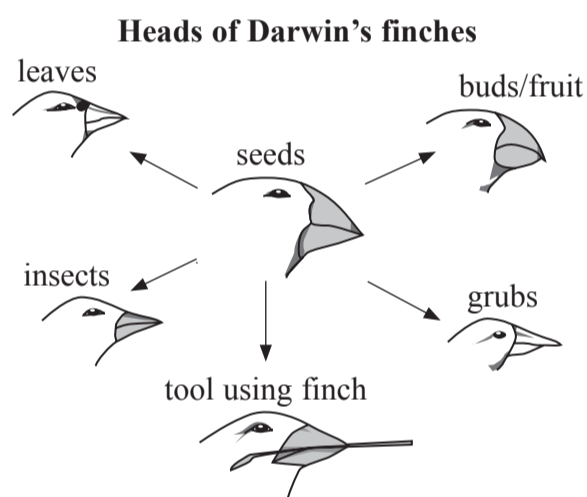
Which of these statements are likely to cause concern to some people when growing genetically modified crops?

- 1 there may be unforeseen effects on food chains
 - 2 genetically modified crops may cross fertilise with other plants in the environment
- A 1 only
B 2 only
C both 1 and 2
D neither 1 nor 2

Darwin's finches

Use the information and the diagram to answer questions 29 and 30.

When Charles Darwin visited the Galapagos Islands he discovered many types of finches. The diagrams show the finches found on the Galapagos Islands and the type of food they ate.



29. These finches provided evidence for

- A evolution as a result of artificial selection
- B evolution as a result of natural selection
- C evolution due to genetic engineering
- D evolution due to asexual reproduction

30. Each species of finch had a different shaped beak. The different beak shapes led to the finches

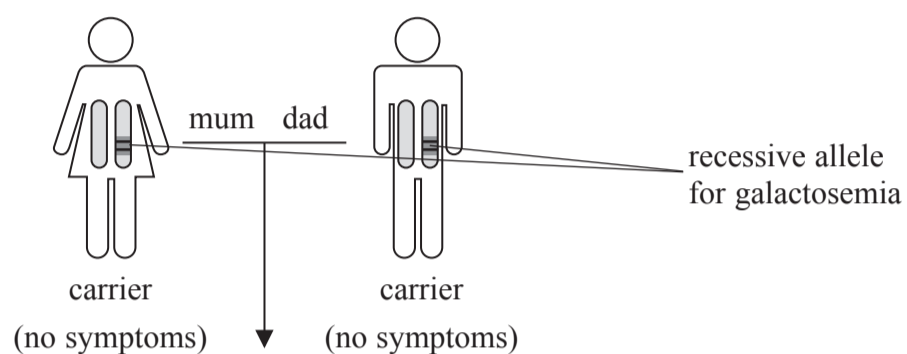
- A becoming extinct due to less competition for food sources
- B becoming extinct as they were better able to survive a changing environment
- C surviving better due to less competition for food
- D surviving better due to less competition for mates

- 31.** Which of these statements about Darwin's finches are true?
- 1 mutations in the finches made their gene pool more diverse
 - 2 the change in beak shape came about as a result of intra-specific competition
- A** 1 only
B 2 only
C both 1 and 2
D neither 1 nor 2
- 32.** Darwin's theory of natural selection caused problems for the scientific community at the time because
- A** it went against the religious belief that God created all the creatures on Earth
 - B** Darwin had not researched his theory very well
 - C** it agreed with the other scientific theories of evolution
 - D** Darwin was unable to give any evidence to support his theory

Galactosemia

Use this information to answer questions 33 and 34.

Galactosemia is a rare genetic disorder which is caused when a person inherits two recessive alleles. Galactosemia affects the body's ability to break down a sugar called galactose.



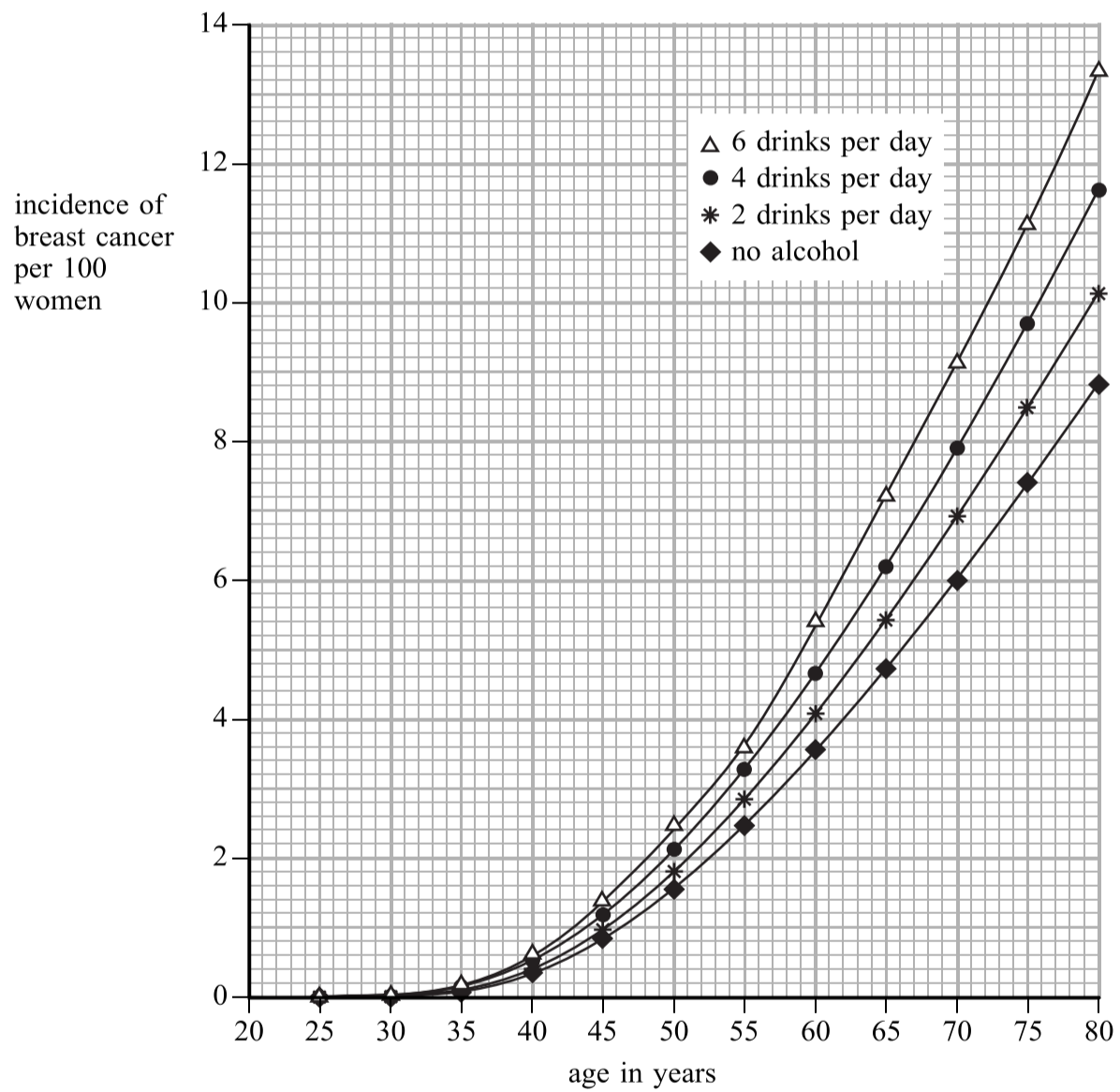
33. Both of these parents are carriers of galactosemia. What is the genotype of each of these carriers?
- A both heterozygous for galactosemia
 - B both homozygous recessive for galactosemia
 - C both homozygous dominant for galactosemia
 - D mum is heterozygous but dad is homozygous recessive for galactosemia
34. What is the percentage likelihood that a child of these two parents will have galactosemia and show symptoms of the disease?
- A 25%
 - B 50%
 - C 75%
 - D 100%
35. If a person has the disorder galactosemia, what is the percentage likelihood that they will pass one recessive allele for galactosemia to their offspring?
- A 25%
 - B 50%
 - C 75%
 - D 100%

36. Currently in the UK, gene therapy can
- A cure genetic disorders and stop them from being inherited by offspring
 - B alleviate the symptoms of genetic disorders in the short term
 - C change the genetic material of the gametes of a carrier of the disorder
 - D eradicate the disease from all body cells and the gametes of a carrier

Nature or nurture

Use the graph to answer questions 37 and 38.

The graph shows how the incidence of breast cancer changes with alcohol intake and age.



37. Which interpretation is incorrect based on the information on the graph?
- A the incidence of breast cancer is lower when no alcohol is drunk
 - B as age increases the risk of breast cancer increases
 - C drinking increasing amounts of alcohol per day increases the risk of breast cancer
 - D there is no change in breast cancer at 50 with increased alcohol intake
38. The graph shows evidence that
- A breast cancer is affected by both genetic influences and the environment
 - B ageing has no effect on breast cancer
 - C the environment can have an influence on the incidence of breast cancer
 - D breast cancer is mainly caused by genetic mutation
39. Breast cancer is linked to the faulty BRCA1 allele.
'Designer babies' that do not have the faulty BRCA1 allele can be produced and therefore are less likely to develop breast cancer.
- The production of 'designer babies' involves the
- A cloning of embryos to produce genetically identical offspring
 - B genetic modification of embryos to remove the BRCA1 allele
 - C use of surrogate mothers to prevent the BRCA1 allele being passed on
 - D screening of embryos so those without the faulty BRCA1 allele are used
40. Producing a 'designer baby' that does not contain the faulty BRCA1 allele may present an ethical problem because
- A clones will all carry identical genes and may have other genetic disorders
 - B embryos carrying the faulty gene will develop breast cancer
 - C during the process many embryos may be destroyed
 - D changing the genome of any organism results in further mutation

TOTAL FOR HIGHER TIER PAPER: 24 MARKS

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