

## Golden Knowledge Multiple Choice Question sheet: Topic 6: Genetics (TRILOGY COURSE)

Use the table below to help you identify which questions are for each lesson / section of learning within this topic:

Lesson Ref	Specification ref (Trilogy)	Lesson content	Question numbers
B13.1	6.1.1	Types of reproduction	1-8
B13.2	6.1.2	Cell division in sexual reproduction	9-16
<del>B13.3</del>	<del>6.1.3</del>	<del>The best of both worlds</del>	<del>17-22</del>
B13.4	6.1.3	DNA and the genome	23-30
<del>B13.5</del>	<del>6.1.5</del>	<del>DNA structure and protein synthesis</del>	<del>31-37</del>
<del>B13.6</del>	<del>6.1.5</del>	<del>Gene expression and mutation (H)</del>	<del>38-49</del>
B13.7	6.1.6	Inheritance in action	50-56
B13.8	6.1.8	More about genetics (sex determination)	57-60
B13.9	6.1.5	Inherited disorders	61-68
B13.10	6.1.5	Screening for genetic disorders	69-72
B14.1	6.2.1	Variation	73-79
B14.2	6.2.1	Evolution by natural selection	73-79
<del>B15.1</del>	<del>6.2.2</del>	<del>Speciation</del>	<del>80-84</del>
<del>B15.2</del>	<del>6.3.1</del>	<del>History of Genetics</del>	<del>85-93</del>
<del>B15.3</del>	<del>6.3.2</del>	<del>Theories of Evolution</del>	<del>94-98</del>
<del>B15.4</del>	<del>6.3.3</del>	<del>Accepting Darwin's Ideas</del>	<del>99-103</del>
B14.3	6.2.3	Selective breeding	104-108
B14.4	6.2.4	Genetic engineering	109-113
<del>B14.5</del>	<del>6.2.5</del>	<del>Cloning</del>	<del>114-117</del>
<del>B14.6</del>	<del>6.2.5</del>	<del>Adult Cell cloning</del>	<del>114-117</del>
B14.7	6.2.4	Ethics of genetic technologies	118-121
B15.5	6.3.4	Evidence for Evolution	122-128
B15.6	6.3.5	Fossils and extinction	122-128
B15.7	6.3.6	More about extinction	129-133
B15.8	6.3.7	Antibiotic resistant bacteria	134-138
B15.9	6.4	Classification	139-143
B15.10	6.4	New systems of classification	144-146

1. What is the main outcome of meiosis?
  - a) Identical cells
  - b) Non-identical cells
  - c) Somatic cells
  - d) Stem cells
2. Which of the following accurately describes the result of mitosis?
  - a) Formation of non-identical cells
  - b) Formation of somatic cells
  - c) Formation of identical cells
  - d) Formation of gametes
3. How does sexual reproduction differ from asexual reproduction?
  - a) Sexual reproduction involves two parents, while asexual reproduction involves one.
  - b) Sexual reproduction results in identical offspring, while asexual reproduction leads to variation.
  - c) Sexual reproduction is a faster process compared to asexual reproduction.
  - d) Sexual reproduction only occurs in plants.

4. What happens when male and female gametes fuse during sexual reproduction?
  - a) They form identical offspring.
  - b) They create somatic cells.
  - c) They mix genetic information, leading to offspring variation.
  - d) They produce gametes.
  
5. How are gametes typically produced?
  - a) Through mitosis
  - b) Through asexual reproduction
  - c) Through meiosis
  - d) Through binary fission
  
6. In meiosis, what type of cells are generated?
  - a) Identical cells
  - b) Non-identical cells
  - c) Somatic cells
  - d) Stem cells
  
7. What is the primary outcome of mitosis?
  - a) Formation of non-identical cells
  - b) Formation of somatic cells
  - c) Formation of identical cells
  - d) Formation of gametes
  
8. Which statement accurately describes asexual reproduction?
  - a) It involves the fusion of male and female gametes.
  - b) It leads to genetic variation in offspring.
  - c) It requires the participation of two parents.
  - d) It only requires one parent.
  
9. What is the main outcome of meiosis?
  - a) Chromosome number doubles
  - b) Chromosome number remains the same
  - c) Chromosome number is halved
  - d) Chromosome number quadruples
  
10. How is the full number of chromosomes restored after fertilization?
  - a) Mitosis
  - b) Meiosis
  - c) Fusion of gametes
  - d) Cell differentiation
  
11. In which part of the body do cells divide by meiosis?
  - a) Brain
  - b) Digestive system
  - c) Reproductive organs
  - d) Skin
  
12. Which of the following best describes the process of meiosis?
  - a) Cells divide into identical daughter cells
  - b) Chromosome number is halved, resulting in non-identical cells
  - c) Cells divide into somatic cells
  - d) Cells differentiate into various tissue types
  
13. What type of cell division occurs after fertilization?
  - a) Meiosis
  - b) Mitosis
  - c) Binary fission
  - d) Somatic division

14. What happens to cells during embryonic development when they divide by mitosis?
- Chromosome number is halved
  - They become haploid cells
  - They differentiate into specialized cell types
  - They become non-identical cells
15. In meiosis, what occurs with the chromosome number?
- It doubles
  - It remains the same
  - It is halved
  - It quadruples
16. How is the full chromosome number reestablished in the zygote?
- Through cell differentiation
  - By the fusion of gametes
  - Via binary fission
  - By asexual reproduction
23. What is the structure of DNA?
- Double helix
  - Single-stranded
  - Circular
  - RNA molecule
24. What is a genome?
- A type of protein
  - The complete genetic material of an organism
  - A specific gene
  - A section of a chromosome
25. Where is DNA primarily contained in eukaryotic cells?
- In the ribosomes
  - In the mitochondria
  - In the nucleus
  - In the cytoplasm
26. What is a gene?
- A large segment of DNA
  - A type of chromosome
  - A small section of DNA that codes for a specific trait
  - A type of protein
27. How do genes code for a sequence of amino acids?
- By directly producing proteins
  - By controlling the cell's shape
  - By influencing the cell's size
  - By replicating themselves
28. When did the Human Genome Project reach completion?
- 1990
  - 2003
  - 2010
  - 2020
29. What was one of the primary goals of the Human Genome Project?
- To create designer babies
  - To develop new vaccines
  - To identify links between genes for different people
  - To produce artificial chromosomes

30. Why is the Human Genome Project considered important?
- It aimed to clone humans
  - It focused on gene editing
  - It had no significant impact
  - It helped to identify and understand the human genetic code
50. What are different versions of a gene called?
- Phenotypes
  - Genotypes
  - Chromosomes
  - Alleles
51. How is the genotype represented for a specific allele?
- With a picture
  - Using a two-letter code
  - With a long descriptive phrase
  - By a numerical value
52. What do genotypes code for?
- Physical characteristics
  - Eye colour
  - Blood type
  - Phenotypes
53. In genetic inheritance, is it usually a single gene or multiple genes that influence a phenotype?
- A single gene
  - Multiple genes
  - A mix of genes and environment
  - Environmental factors only
54. How is probability used in predicting the results of a single gene cross?
- By flipping a coin
  - By rolling a die
  - By calculating the likelihood of different genotypes
  - By random chance
55. What tool is used to visually represent the possible outcomes of a genetic cross?
- A microscope
  - Punnett square diagram
  - Genetic family tree
  - DNA sequencing machine
56. How can genetic cross diagrams be linked to family trees?
- By using different colours
  - By creating a pedigree chart
  - By performing complex calculations
  - By drawing pictures of family members
57. How many pairs of chromosomes are found in ordinary human body cells?
- 23
  - 44
  - 46
  - 22

58. Out of the 23 pairs of chromosomes in human body cells, how many pairs code for specific characteristics?
- 23
  - 1
  - 22
  - 2
59. Which pair of chromosomes determines the development of secondary sexual characteristics in humans?
- The 1st pair
  - The 23rd pair
  - The 11th pair
  - The 22nd pair
60. What is the purpose of a genetic cross or Punnet square diagram in genetics?
- To study plant growth
  - To depict chemical reactions
  - To illustrate the inheritance of traits
  - To investigate ecological relationships
61. How are genetic disorders typically inherited?
- Through the environment
  - From a combination of diet and exercise
  - As a result of random mutations
  - Through genetic inheritance
62. What is the primary cause of genetic disorders?
- Exposure to radiation
  - The presence of specific alleles
  - Viral infections
  - A poor diet
63. What are the symptoms of polydactyly?
- Respiratory issues
  - Extra fingers or toes
  - Vision problems
  - Skin rashes
64. Which type of allele causes polydactyly?
- Recessive allele
  - Co-dominant allele
  - Incomplete dominant allele
  - Dominant allele
65. What are the symptoms of cystic fibrosis?
- Extra fingers or toes
  - Breathing difficulties, lung infections and problems with digestion
  - Skin discolouration
  - Blood disorders
66. Which type of gene causes cystic fibrosis?
- Dominant gene
  - Co-dominant gene
  - Incomplete dominant gene
  - Recessive gene

67. What can you do based on informed judgments about issues concerning embryo screening given information?
- Select a child's gender
  - Prevent any genetic disorders
  - Choose specific physical traits for your child
  - Make informed decisions about potential medical interventions
68. How might embryo screening and gene therapy contribute to limiting suffering?
- By ensuring everyone has the same genetic makeup
  - By allowing individuals to choose their own genetic makeup
  - By identifying and preventing genetic disorders
  - By increasing genetic diversity
69. How are genetic disorders typically passed from one generation to the next?
- Through random mutations
  - By acquiring them during one's lifetime
  - By inheriting specific alleles
  - Through environmental factors
70. What is the primary cause of genetic disorders?
- Accidents and injuries
  - A lack of exercise
  - The presence of dominant alleles
  - The inheritance of certain genes
71. What can informed judgments about embryo screening be based on?
- Personal preferences
  - Ethical considerations
  - Chance and randomness
  - Genetic engineering
72. How might embryo screening and gene therapy contribute to reducing suffering?
- By guaranteeing that everyone has identical genetics
  - By increasing the likelihood of genetic disorders
  - By identifying and preventing genetic disorders
  - By promoting genetic diversity
73. What is the genome in the context of biology?
- The scientific study of fossils
  - The genetic material of an organism
  - The classification of organisms
  - The interaction between organisms and their environment
74. How does the genome interact with the environment to influence the development of an organism?
- By ignoring the environment's impact
  - By preventing any genetic variations
  - By remaining isolated from environmental changes
  - By responding to and adapting to environmental conditions
75. What does the term variation mean in biology?
- A mathematical equation
  - The process of elimination
  - The differences in the characteristics of individuals
  - The genetic code of an organism
76. Within a species, is genetic variation extensive and diverse?
- True
  - False

77. How do all variants of a gene or characteristic typically arise?
- Through natural selection
  - As a result of controlled breeding
  - Due to mutation
  - Through genetic engineering
78. When do mutations occur in an organism?
- Only when triggered by external factors
  - Infrequently and randomly
  - Continuously and intentionally
  - As a result of controlled genetic experiments
79. What can a new phenotype lead to if it is well-suited to environmental changes?
- Rapid extinction of the species
  - Decreased genetic diversity
  - A relatively rapid change in the species
  - A decreased likelihood of survival
104. What is selective breeding primarily based on?
- Natural selection
  - Random chance
  - Artificial selection
  - Environmental factors
105. Selective breeding is a process where humans:
- Allow organisms to evolve naturally
  - Encourage any genetic changes
  - Breed organisms to exhibit specific traits
  - Prevent reproduction entirely
106. Which of the following best defines selective breeding?
- The process of breeding organisms to acquire random traits
  - Allowing nature to determine the outcome of breeding
  - The purposeful breeding of organisms to express particular genetic characteristics
  - Breeding to create genetic diversity in populations
107. What is an example of selective breeding?
- Allowing wild rabbits to breed in the forest
  - Breeding dogs with no specific characteristics
  - Creating new plant species through natural pollination
  - Developing a new breed of drought-resistant wheat
108. What issues might be associated with selective breeding?
- Limited control over genetic traits
  - Rapid progress in achieving desired characteristics
  - Increased genetic diversity
  - Reduced productivity in agriculture
109. What does genetic engineering involve? (HIGHER)
- Natural selection of desirable traits
  - Manipulating an organism's genes to express specific characteristics
  - Encouraging random mutations in DNA
  - Using chemicals to alter an organism's behaviour
110. Which of the following is true about GM crops? (HIGHER)
- They are all naturally occurring in the wild
  - GM stands for Great Modification in crops
  - GM crops have their DNA intentionally changed
  - They only grow in specific climates

111. What can bacterial cells be genetically engineered to do? (HIGHER)
- Produce harmful substances
  - Mutate uncontrollably
  - Reproduce rapidly
  - Produce useful substances
112. What is a potential benefit of genetic engineering in agriculture? (HIGHER)
- Reduced crop yield
  - Increased pesticide use
  - Improved resistance to pests and diseases
  - Decreased food production
113. Why might people object to genetic engineering? (HIGHER)
- Due to its extensive use in medical research
  - Concerns about potential risks and unforeseen consequences
  - Because it's an entirely natural process
  - It has no impact on the environment
118. What is one of the main reasons for considering the potential risks associated with genetic engineering and GM crops? (HIGHER)
- Ensuring genetic engineering is only used for medical purposes
  - Evaluating the safety of the environment and human health
  - Promoting the widespread use of GM crops
  - Encouraging faster crop growth through genetic modification
119. When making informed judgments about genetic engineering, what should you consider regarding traditional farming practices? (HIGHER)
- The importance of preserving traditional farming practices over genetic engineering
  - How traditional farming practices can be integrated with genetic engineering
  - The superiority of genetic engineering compared to traditional farming practices
  - The cultural significance and history of traditional farming practices
120. What is the role of the scientific community in helping individuals make informed judgments about genetic engineering and GM crops? (HIGHER)
- Encouraging people to accept genetic engineering without question
  - Providing accurate information and research to help individuals make informed decisions
  - Discouraging any discussion or debate about genetic engineering
  - Promoting the benefits of GM crops while ignoring potential risks
121. Why is it essential to evaluate both the advantages and disadvantages of genetic engineering and GM crops when making informed judgments? (HIGHER)
- To prove that genetic engineering is always superior to traditional farming
  - To consider the potential benefits and risks associated with these technologies
  - To avoid any use of GM crops altogether
  - To minimize discussion about GM crops' safety and effectiveness
122. What are fossils?
- Ancient stories of past life
  - Remains of organisms from millions of years ago
  - Artifacts created by early humans
  - Modern-day plant and animal species
123. How are fossils formed?
- By the remains of organisms that never decay
  - Through the rapid growth of new organisms
  - When parts of organisms are replaced by minerals during decay
  - By preserving traces of organisms on digital devices



124. What is the term for parts of an organism that do not decay because the conditions necessary for decay are absent?
- Mineralized segments
  - Preserved remains
  - Non-biodegradable fragments
  - Fossilized tissues
125. When parts of an organism are replaced by minerals as they decay, what kind of fossilization process is occurring?
- Trace fossilization
  - Carbonization
  - crystallisation
  - Imprint preservation
126. What are preserved traces of organisms?
- Microscopic fossils
  - Fossils found in the stomachs of predators
  - Imprints of ancient organisms
  - Remains of soft-bodied creatures
127. Why is it challenging for scientists to be certain about how life began on Earth?
- They have no interest in the topic
  - There is a complete lack of evidence
  - Multiple theories exist, but none are supported by evidence
  - They don't want to share this information with the public
128. What do scientists use to represent the evolutionary relationships among different species?
- Ecological niches
  - Taxidermy specimens
  - Fossilized bones
  - Evolutionary trees
129. What is the definition of extinction?
- A sudden change in an organism's characteristics
  - The birth of new species
  - When there are no living individuals of a species still alive
  - The growth of a population
130. Which of the following best describes factors that may contribute to the extinction of a species?
- Enhanced conservation efforts
  - Increased genetic diversity
  - Improved environmental conditions
  - Various environmental pressures and threats
131. What are some common environmental factors that can contribute to the extinction of a species?
- Increased genetic diversity
  - Enhanced conservation efforts
  - Pollution, habitat loss, and climate change
  - Efficient reproduction rates
132. When a species can no longer adapt to changing environmental conditions, it may face:
- Enhanced genetic diversity
  - Rapid population growth
  - Extinction
  - Improved adaptation rates

133. How can human activities impact the extinction of species?
- By promoting habitat conservation
  - By reducing pollution levels
  - By implementing wildlife reserves
  - Through activities like deforestation and overhunting
134. Why do bacteria evolve rapidly compared to many other organisms?
- They have shorter lifespans
  - They reproduce at a fast rate
  - They have more complex genetic material
  - They are less susceptible to mutations
135. How do mutations in bacterial pathogens contribute to the emergence of new strains?
- Mutations make bacteria smaller in size
  - Mutations weaken bacterial cell walls
  - Mutations lead to antibiotic resistance
  - Mutations cause bacterial reproduction to cease
136. Which of the following bacterial strains is known for its resistance to antibiotics?
- E. coli*
  - Staphylococcus aureus*
  - Salmonella*
  - Streptococcus*
137. How can the rate of development of antibiotic-resistant bacterial strains be reduced?
- Using fewer antibiotics
  - Completing antibiotic courses as prescribed
  - Avoiding all antibiotic use
  - Using antibiotics for a shorter duration
138. What is one of the challenges in dealing with antibiotic-resistant bacteria?
- Rapid development of new antibiotics
  - Low cost of developing new antibiotics
  - Slow development of new antibiotics
  - Abundant availability of new antibiotics
139. Why are living things traditionally classified into groups according to their structure and characteristics?
- To organize them alphabetically
  - To determine their age
  - To understand their genetic makeup
  - To facilitate scientific study and communication
140. Who is known for developing the classification system still used today, based on shared characteristics and evolutionary relationships?
- Charles Darwin
  - Carl Linnaeus
  - Gregor Mendel
  - Louis Pasteur
141. What is the binomial system used for in biology?
- To name organisms with only a single word
  - To categorize living things based on size
  - To represent species with two-part scientific names
  - To organize organisms based on their geographical distribution

142. How have developments in biology impacted classification systems?
- They have led to the abandonment of classification systems
  - They have made classification systems more complex
  - They have had no effect on classification systems
  - They have improved our understanding of evolutionary relationships
143. What is the correct order of biological classification from the broadest category to the most specific?
- Kingdom, Order, Family, Phylum, Class, Genus, Species
  - Species, Genus, Family, Order, Class, Phylum, Kingdom
  - Kingdom, Phylum, Class, Order, Family, Genus, Species
  - Phylum, Class, Kingdom, Family, Genus, Order, Species
144. Who is credited with developing the 'three domain system' in biological classification?
- Charles Darwin
  - Carl Woese
  - Linnaeus
  - Gregor Mendel
145. How has the understanding of biochemical processes contributed to the development of classification models?
- It revealed the names of new species
  - It allowed for the classification of extinct species
  - It improved the accuracy of evolutionary trees
  - It advanced the models of classification
146. What do evolutionary trees represent in biology?
- The age of fossils
  - Genetic mutations in species
  - The relatedness of different organisms
  - The geographic distribution of species

**Marksheet – Fill in your answers using this grid:**

Qn	Answer	Correct	Check
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Total			/93

## **Feedback and Review**

*Reviewing and providing feedback on your GCSE biology questions is an important part of the learning process. Here's a list of tasks to help you effectively review and learn from the content you didn't know:*

**Identify Weak Areas:** Go through the questions you answered and identify the specific topics or concepts you struggled with.

**Revisit the Questions:** Re-read the questions you answered incorrectly to understand the context and what was expected in your response.

**Consult Textbooks and Notes:** Refer to your GCSE biology textbooks, revision guides and class work to find information related to the topics you found challenging.

**Online Resources:** Use online resources and educational websites, videos, or articles to gain a deeper understanding of the topics you struggled with. Ask if you are unsure which to use.

**Create a Summary:** Summarize the key points for each topic or concept in your own words. This will help reinforce your understanding.

**Practice Problems:** Look for additional practice questions or worksheets related to the weak areas you identified and attempt them.

**Flashcards:** Create flashcards for important terms, definitions, and concepts. Use them for quick and effective review.

**Mind Maps:** Create visual mind maps or concept maps to connect related ideas and concepts. This can help you see the bigger picture.

**Teach Someone Else:** Explaining what you've learned to a friend or family member can be an effective way to reinforce your understanding.

*Use the summary box below to annotate the ideas and information that you must use to provide your own feedback on what you are going to do next to develop and enhance your learning of this content:*

**Golden Knowledge Multiple Choice Question sheet: Topic 6: Genetics (TRILOGY COURSE)****Answers**

1	b) Non-identical cells
2	c) Formation of identical cells
3	a) Sexual reproduction involves two parents, while asexual reproduction involves one.
4	c) They mix genetic information, leading to offspring variation.
5	c) Through meiosis
6	b) Non-identical cells
7	c) Formation of identical cells
8	d) It only requires one parent.
9	c) Chromosome number is halved
10	b) Fusion of gametes
11	c) Reproductive organs
12	b) Chromosome number is halved, resulting in non-identical cells
13	b) Mitosis
14	c) They differentiate into specialized cell types
15	c) It is halved
16	b) By the fusion of gametes
23	a) Double helix
24	b) The complete genetic material of an organism
25	c) In the nucleus
26	c) A small section of DNA that codes for a specific trait
27	a) By directly producing proteins
28	b) 2003
29	c) To identify links between genes for different people
30	d) It helped to identify and understand the human genetic code
50	d) Alleles
51	b) Using a two-letter code
52	d) Phenotypes
53	b) Multiple genes
54	c) By calculating the likelihood of different genotypes
55	b) Punnet square diagram
56	b) By creating a pedigree chart
57	a) 23
58	c) 22
59	b) The 23rd pair
60	c) To illustrate the inheritance of traits
61	d) Through genetic inheritance
62	b) The presence of specific alleles
63	b) Extra fingers or toes
64	d) Dominant allele
65	b) Breathing difficulties, lung infections and problems with digestion
66	d) Recessive gene
67	d) Make informed decisions about potential medical interventions
68	c) By identifying and preventing genetic disorders
69	c) By inheriting specific alleles
70	d) The inheritance of certain genes
71	b) Ethical considerations
72	c) By identifying and preventing genetic disorders

73	b) The genetic material of an organism
74	d) By responding to and adapting to environmental conditions
75	c) The differences in the characteristics of individuals
76	a) True
77	c) Due to mutation
78	b) Infrequently and randomly
79	c) A relatively rapid change in the species
104	c) Artificial selection
105	c) Breed organisms to exhibit specific traits
106	c) The purposeful breeding of organisms to express particular genetic characteristics
107	d) Developing a new breed of drought-resistant wheat
108	a) Limited control over genetic traits
109	b) Manipulating an organism's genes to express specific characteristics
110	c) GM crops have their DNA intentionally changed
111	d) Produce useful substances
112	c) Improved resistance to pests and diseases
113	b) Concerns about potential risks and unforeseen consequences
118	b) Evaluating the safety of the environment and human health
119	d) The cultural significance and history of traditional farming practices
120	b) Providing accurate information and research to help individuals make informed decisions
121	b) To consider the potential benefits and risks associated with these technologies
122	b) Remains of organisms from millions of years ago
123	c) When parts of organisms are replaced by minerals during decay
124	b) Preserved remains
125	c) Crystallisation
126	c) Imprints of ancient organisms
127	c) Multiple theories exist, but none are supported by evidence
128	d) Evolutionary trees
129	c) When there are no living individuals of a species still alive
130	d) Various environmental pressures and threats
131	c) Pollution, habitat loss, and climate change
132	c) Extinction
133	d) Through activities like deforestation and overhunting
134	b) They reproduce at a fast rate
135	c) Mutations lead to antibiotic resistance
136	b) Staphylococcus aureus (MRSA)
137	b) Completing antibiotic courses as prescribed
138	c) Slow development of new antibiotics
139	d) To facilitate scientific study and communication
140	b) Carl Linnaeus
141	c) To represent species with two-part scientific names
142	d) They have improved our understanding of evolutionary relationships
143	c) Kingdom, Phylum, Class, Order, Family, Genus, Species
144	b) Carl Woese
145	d) It advanced the models of classification
146	c) The relatedness of different organisms