

A Level Biology B

H422/01 Fundamentals of biology

Question Set 25

Module 5 Genetics, control and homeostasis.

Multiple Choice Questions

1 A couple have a child. Both parents are heterozygous for the cystic fibrosis allele.

Which of the options, **A** to **D**, is the probability that the child will have cystic fibrosis?

A 0.25

B 0.5

C 0.75

D 1

Your answer

[1]

2 Which of the options, **A** to **D**, describes the type of gene mutation that causes Huntington's disease?

A change of nucleotide that affects the protein

B change of nucleotide that does not affect the protein

C deletion of nucleotides

D insertion of nucleotides

Your answer

[1]

- 3 The chi-squared (χ^2) test was used to determine whether the inheritance pattern of a dihybrid cross was statistically significant.

Four phenotypes were produced from the cross.

χ^2 was calculated as 8.62 and the significance level (p) was 0.05.

A table of χ^2 values is shown below.

	Probability (p)							
df	0.99	0.95	0.90	0.50	0.10	0.05	0.01	0.001
1	0.0016	0.0039	0.016	0.46	2.71	3.84	6.63	10.83
2	0.02	0.10	0.21	1.39	4.60	5.99	9.21	13.82
3	0.12	0.35	0.58	2.37	6.25	7.81	11.34	16.27
4	0.30	0.71	1.06	3.360	7.78	9.49	13.28	18.46

Which of the statements, **A** to **D**, is correct?

- A** A df is 3 and χ^2 is not significant
- B** B df is 3 and χ^2 is significant
- C** C df is 4 and χ^2 is not significant
- D** D df is 4 and χ^2 is significant

Your answer

[1]

- 4 The statements below relate to the epigenetic regulation of gene expression.

Which of the following statements is/are correct?

- 1 Methylation of DNA prevents gene transcription.
 - 2 The most common base to undergo methylation is guanine.
 - 3 Acetylation of histone proteins causes DNA to become less accessible to transcription factors.
- A** 1, 2 and 3 are correct
 - B** only 1 and 2 are correct
 - C** only 2 and 3 are correct
 - D** only 1 is correct

Your answer

[1]

5 Which of the statements, **A** to **D**, is true of epigenetics?

- A** Guanine is the most commonly methylated DNA base.
- B** Identical twins show identical epigenetics.
- C** Proteins cannot undergo epigenetic modification.
- D** Some epigenetic changes can be reversed.

Your answer

[1]

6 Scientists can identify an unknown species as follows:

- extract DNA from tissue, e.g. skin or hair
- amplify a length of DNA, known as a barcode, using the polymerase chain reaction (PCR)
- read the base sequence of the DNA.

The strip below represents a length of extracted DNA before PCR. Lines **1** to **4** represent primers.

Key:

white = same DNA sequence in all species

black = variable DNA sequence between species



Which of the options, **A** to **D**, gives the pair of primers that could be used to amplify DNA from **all** species?

- A** 1 and 3
- B** 1 and 4
- C** 2 and 3
- D** 2 and 4

Your answer

[1]

- 7 The polymerase chain reaction (PCR) involves a repeating sequence of temperature changes.

Which of the options, **A** to **D**, occurs at a temperature of 72 °C?

- A** annealing of primers
- B** detachment of primers
- C** polymerisation of free nucleotides
- D** separation of DNA strands

Your answer

[1]

- 8 Which of the statements, **A** to **D**, is true of single nucleotide polymorphisms (SNPs)?

- A** All SNPs have four possible variations.
- B** Genetic recombination can generate a SNP.
- C** SNPs can influence banding patterns on a DNA fingerprint.
- D** SNPs occur in exons only.

Your answer

[1]

- 9 The statements below relate to the autonomic nervous system (ANS).

Which of the following statements is/are correct?

- 1 The ANS is a division of the peripheral nervous system.
- 2 Autonomic neurones between the CNS and the ganglia are myelinated.
- 3 Sympathetic neurones use acetylcholine and noradrenaline as neurotransmitters.

- A** 1, 2 and 3 are correct
- B** only 1 and 2 are correct
- C** only 2 and 3 are correct
- D** only 1 is correct

Your answer

[1]

10 Excitatory and inhibitory postsynaptic potentials have similarities and differences.

Which of the options, **A** to **D**, is a feature of an excitatory, but not inhibitory, postsynaptic potential?

- A** all-or-nothing response
- B** depolarising
- C** graded in response
- D** hyperpolarising

Your answer

[1]

11 The statements below relate to photoreceptor cells in the retina.

Which of the following statements is/are correct?

- 1** The inner segment of a photoreceptor cell contains many mitochondria.
 - 2** Rod cells are absent in the fovea.
 - 3** A cone cell contains three photosensitive pigments, each sensitive to a different wavelength of light.
- A** 1, 2 and 3 are correct
 - B** only 1 and 2 are correct
 - C** only 2 and 3 are correct
 - D** only 1 is correct

Your answer

[1]

12 Brain atrophy is the loss of brain tissue as a result of neuronal cell death.

A study was conducted to investigate a possible relationship between brain atrophy and levels of β -amyloid in fifty patients with Alzheimer's disease.

Paired measurements of brain volume and β -amyloid were taken from each patient using an imaging technique.

Which of the statistical tests, **A** to **D**, is appropriate to analyse the correlation of the data obtained?

- A** chi squared (χ^2) test
- B** paired Student's *t*-test
- C** Spearman's rank
- D** unpaired Student's *t*-test

Your answer

[1]

13 Alzheimer's disease is associated with several pathological changes in the brain.

Which of the options, **A** to **D**, is observed in the brain of an individual with Alzheimer's disease?

- A** β -amyloid protein in synaptic vesicles
- B** β -amyloid protein in the nuclei of neurones
- C** neurofibrillary tangles in the cytoplasm of neurones
- D** Tau protein around neurones

Your answer

[1]

14 Glaucoma is an eye condition caused by increased pressure within the eye.

Which of the options, **A** to **D**, is a correct explanation for the increased pressure?

- A** decreased production of aqueous humour
- B** increased production of vitreous humour
- C** poor drainage of aqueous humour
- D** poor drainage of vitreous humour

Your answer

[1]

15 Heart rate is affected by the sympathetic and parasympathetic nervous systems.

Which of the options, **A** to **D**, is an event that stimulates the accelerator nerve?

- A** decrease in blood pH
- B** increase in blood pressure
- C** release of adrenaline into the blood
- D** release of glucose into the blood

Your answer

[1]

16 Which of the options, **A** to **D**, is true of type 2 diabetes?

- A** caused by autoimmunity
- B** present from birth
- C** rapid onset
- D** slow onset

Your answer

[1]

17 Antidiuretic hormone (ADH) is required for osmoregulation.

Which of the options, **A** to **D**, is a region of the nephron that is responsive to ADH?

- A** Bowman's capsule
- B** collecting duct
- C** loop of Henle
- D** proximal convoluted tubule

Your answer

[1]

Total Marks for Question Set 5: 17

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