

A Level Biology A
H420/02 Biological Processes

Question Set 23

Multiple Choice Questions

1 The haploid chromosome number in the koala, *Phascolarctos cinereus*, is 8.

Independent assortment of chromosomes in meiosis contributes to genetic variation in the gametes of the koala.

How many genetically different versions of koala gamete would it be possible for one individual to produce if independent assortment were the only source of genetic variation?

- A 64
- B 128
- C 256
- D 512

$$n = 8$$

$$2^8 = 256$$

Your answer

C

[1]

2 The first stage of primary succession is the pioneer community.

Which of the following statements about a pioneer community are correct?

- 1 species produce large numbers of wind-carried seeds or spores
- 2 biomass is low
- 3 contains a large number of species

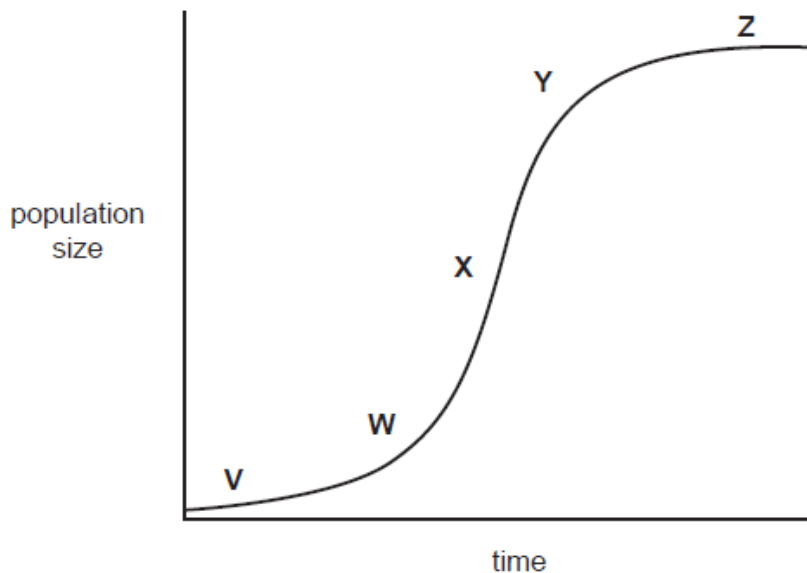
- A 1, 2 and 3
- B Only 1 and 2
- C Only 2 and 3
- D Only 1

Your answer

B

[1]

3 The graph shows a typical population growth curve.



Which row correctly describes what is happening at each of stages V to Z?

	V	W	X	Y	Z
A	reproduction rate is higher than death rate	as time doubles population doubles	population size is proportional to time	population growth is slowing	reproduction rate is similar to death rate
B	reproduction rate is higher than death rate	as time doubles population more than doubles	reproduction rate is much higher than death rate	population growth is slowing	reproduction rate is similar to death rate
C	reproduction rate is higher than death rate	as time doubles population doubles	population size is proportional to time	population growth is decreasing	reproduction rate is similar to death rate
D	reproduction rate is higher than death rate	population is increasing rapidly	reproduction rate is much higher than death rate	population is decreasing	reproduction rate is similar to death rate

Your answer

B

[1]

4 Which of the following statements about gene therapy is **not** correct?

- A changes resulting from gene therapy cannot be passed on to offspring
- B germ-line gene therapy affects the whole organism
- C gene therapy is a form of genetic engineering
- D somatic cell gene therapy can only affect a limited number of cells

Your answer

A

[1]

5 Below are three processes that occur within living organisms.

- 1 apoptosis
- 2 mitosis
- 3 meiosis

Which of these processes is important in determining the body plan of an organism?

- A 1, 2 and 3
- B Only 1 and 2
- C Only 2 and 3
- D Only 1

Your answer

B

[1]

6 Which of the following statements about antibiotic resistance is correct?

- A All antibiotics cause mutations in bacterial DNA.
- B Antibiotic resistance in bacteria is evidence to support Darwin's theory of evolution by natural selection.
- C The development of antibiotic resistance in bacteria is an example of genetic drift.
- D The development of antibiotic resistance in bacteria is an example of stabilising selection.

Your answer

B

[1]

7 Bacteria are used in many areas of biotechnology.

In which of the following processes, **A** to **D**, do bacteria **not** play an active role?

- A bioinformatics
- B bioremediation
- C cheese-making
- D manufacturing human insulin

Your answer

A

[1]

8 Mycoprotein is a food produced using the fungus *Fusarium venenatum*.

Which statement about mycoprotein is correct?

- A production of protein is slower than in animals and plants
- B production is dependent on seasons
- C waste products can be used as a substrate
- D there are no ethical issues associated with production

Your answer

C

[1]

9 Which of the following statements about ecosystems is **not** true?

- A An ecosystem is affected by biotic and abiotic factors.
- B An ecosystem is all of the organisms and habitats in a large area.
- C An ecosystem is dynamic.
- D There is a flow of biomass between trophic levels in an ecosystem.

Your answer

B

[1]

10 A teacher wrote:

“A garden pond is a dynamic environment that is home to a variety of organisms. The temperature of the pond varies depending on the weather and the time of year, and this affects the populations of the species that live there.”

Which of the following terms applies to the teacher’s description of the garden pond?

- A a community
- B an ecosystem
- C a habitat
- D a niche

Your answer

B

[1]

11 Hox genes contribute to the overall body plan of an animal.

Which of the following rows correctly describes Hox genes?

	Base sequence	Product	Mutations
A	varies between taxonomic groups	transcription factor	entirely random
B	varies between taxonomic groups	transcription factor	never occur
C	similar in all animals	polypeptide	have little or no effect
D	similar in all animals	polypeptide	are often lethal

Your answer

D

[1]

12 Hox genes contain a homeobox sequence of 180 base pairs.

Two species have a homeobox sequence of 180 base pairs where 1.7% of the base pairs are different.

Which of the following shows the number of amino acids coded for that would be different in the two species?

- A minimum 0 and maximum 1
- B minimum 0 and maximum 3
- C minimum 1 and maximum 2
- D minimum 1 and maximum 3

$$180 \times 1.7\% = 3 \text{ base pair}$$

min: all changes in base do not result in change in amino acid

max: each different base pair cause a different amino acid being coded for

Your answer

B

[1]

13 Meiosis is an important feature of sexual reproduction.

Which of the following processes occurs during meiosis **and** contributes to genetic variation in the offspring?

- 1 crossing over
- 2 gene mutation
- 3 random fertilisation

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

Your answer

D

[1]

14 The adult wandering albatross, *Diomedea exulans*, has wingspans that range from 2.5 m to 3.5 m.

Which of the following describes the variation in wingspan of the wandering albatross?

- A** intraspecific and controlled only by genetic factors
- B** interspecific and controlled only by environmental factors
- C** intraspecific and controlled by both genetic and environmental factors
- D** interspecific and polygenic

Your answer

C

[1]

15 Which of the following is **not** associated with the use of artificial selection in farm animals?

- A** health problems in more productive breeds
- B** inbreeding
- C** increased frequency of mutations
- D** reduced gene pool

Your answer

C

[1]

16 Which of the following is **not** a valid concern about the use of genetic modification?

- A that antibiotic resistance genes could transfer to pathogenic bacteria
- B that herbicide resistance genes could be transferred to wild species
- C that certain seeds might not be available for use by poor farmers
- D that the use of human embryos in stem cell production is unethical

Your answer

D

[1]

17 The following passage outlines the process of phototropism in plants:

Auxin is synthesised in cells at the.....of the shoot. Auxin causes the cells to.....on one side, so the stem bends. Scientists originally thought auxin wasby light but this was disproved by the fact that plants growing in the dark and plants growing in unilateral light hadauxin levels.

Which option, **A** to **D**, is the correct sequence of missing words?

- A meristem, shorten, destroyed, different
- B tip, elongate, destroyed, similar
- C meristem, shorten, synthesised, raised
- D tip, elongate, synthesised, similar

Your answer

D

[1]

18 Corals are a group of animals that usually live on the sea bed close to the surface of the water.

Many corals can reproduce both sexually and asexually.

Which of the following statements about asexually-produced coral offspring is **not** true?

- A All offspring produced from an individual organism will be genetically identical.
- B If a change in the environment harms one of the offspring produced from an individual organism it will probably harm them all.
- C Meiosis occurred in order to produce the offspring.
- D The offspring will tend to thrive if conditions are similar to those present when the parent organism reproduced.

Your answer

C

[1]

19 The ability to roll one's tongue is under the control of a single gene. The gene has two alleles R and r.

People who can roll their tongues can have the genotypes RR or Rr. People who cannot roll their tongues have the genotype rr.

A survey by a student showed that 12% of the population in a single school cannot roll their tongues.

The student then used the Hardy-Weinberg principle to calculate the number of heterozygous individuals in the school.

Which of the following represents the percentage of heterozygous individuals at the student's school?

Use the equations: $p + q = 1$ and $p^2 + 2pq + q^2 = 1$

- A 21.1%
- B 22.7%
- C 42.8%
- D 45.3%

$$q = \sqrt{0.12} = 0.3464$$

$$p = 1 - 0.3464 = 0.6535$$

$$2pq = 2 \times 0.3464 \times 0.6535 = 0.4528$$

$$\text{percentage} = 0.4528 \times 100$$

$$= \boxed{45.3\%}$$

Your answer

D

[1]

Total Marks for Question Set 23: 19

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