

Name: _____ Student No: _____

Part B: Short Answer Questions - Please answer in the space provided (worth 15 marks)

1. Please list three striking demographic transitions that have occurred in humans during your lifetime. (3 marks)

1 mark for each correct response:

we are getting old: old people now outnumber young people – previously young people outnumbered old people.

more people live in cities – previously more people lived in rural areas.

The developing world is now much larger compared to the developed world.

2. Please explain why the timing that the ancestor of new world primates reached South America is surprising. Where did this ancestor come from? (2 marks).

Surprising because this probably involved dispersal over the Atlantic Ocean (1 mark).

Ancestor came from Africa (1 mark). Travelled from Africa to South America is also acceptable.

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3. Define instinct. Define Insight learning. What features distinguish behaviours associated with these types of causation? (3 marks)

INSTINCT: behaviour pattern that develops in functional form on its first performance (genetically coded) (1 mark).

OR

INSTINCT: behaviour pattern that develops in individuals that receive adequate nutrition and is functional on its first performance (1 mark).

INSIGHT LEARNING: behaviour pattern used to solve a novel problem that is performed correctly by reasoning, or problem solving, or thinking it through, or cognition. (1 mark).

DISTINGUISHING FEATURE: insight learning relates to plastic responses to novel situations (shaping behaviour by thinking it through). Instincts are fixed responses to commonly encountered situations (or situations that are common or important enough to act as a selective force favouring a fixed genetically coded response) (1 mark).

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4. Describe what determines sex and what this means for the ploidy (chromosome copy number) in male and female Hymenoptera (bees, ants, wasps...) (2 marks)

Females are diploid (2n) (1 mark).

Males are haploid (n) (1 mark) also acceptable males are monoploid

OR

Females have twice as many chromosomes as males

5. HAR1 is a Highly Accelerated Region found by Katherine Pollard in a homologous non-coding region of a number of different vertebrates.
A) What have we learned about the evolution of this region by comparing its sequence in a number of different vertebrates? Please restrict your answers to sequence comparisons. (3 marks)

HAR1 is highly conserved in non-human vertebrates (1 mark). There were very few nucleotide changes from distant vertebrate relative to chimp (chicken to chimp example) (0.5 mark).

HAR1 evolved rapidly during the evolution of humans from a common ape ancestor (1 mark). There were many nucleotide changes between chimp and human (0.5 mark).

- B) What do we know about the expression and structural significance of HAR1's associated RNA in *Homo sapiens*? (2 marks)

The RNA is expressed in the brain, especially during development (1 mark).

RNA structure interacts with a protein (Reelin) that is involved in the development of the unique layered structure of the human brain/also acceptable increased complexity/increased structuring (1 mark).

THE END