QUIZZ QUESTIONS will be simpler than these examples, but if you can answer theses you will be in good shape

Chapter 1: The Biology of Behavior

MC: Animals behave as if they are asking themselves what to do to maximize the lifetime reproductive success.

MC: There was a significant intellectual shift to objectively consider the biology of animal behavior, led by Tinbergen, Von Frisch and Lorenz (recognized by a nobel prize), based initially on watching and categorizing behavior in order to form hypotheses that were testable by experimentation.

MC: Tinbergen argued that to fully understand any behavioral TRAIT, one must address 4 domains, Causation (including mechanism and stimulus), Survival Value (ideally measured as how the behavior influences lifetime reproductive FITNESS), Ontogeny (as description of the impact of innate and environmental influences on the development of a behavior) and Evolution (understanding the evolutionary patterns and forces that have changed behavior over generations).

Q: It appeared that the horse Clever Hans could count when in fact he was simply using subtle, unconscious cues, from the trainer. This demonstrates

A) Animals can learn count
B) Animals have a conscious
C) Animals can act in simple ways that appear to maximize outcome
D) Animals are capable of complex mathematical calculations

Q: State which of Tinbergen's 4 domains are addressed by each of the following statements.

1) Human laughter and most other primate laughter includes voicing on only the exhalation whereas chimpanzees voice on both inhalation and exhalation. This suggests that the ancestral state of laughter was to voice only on exhalation.
2) Laughter functions to show inclusion in a social group as animals and humans tend to produce a common rhythm and individuals that do not conform are often excluded from the group.
3) Infants laugh, and while that laugh will change with age and experience there is an innate tendency to laugh.
4) Laughter is triggered by both happiness and nervousness.

Q: Take an animal behavior such as bird song or migration and write four statements (that are true to the best of your knowledge) which address one of Tinbergen's 4 domains. Indicate which domain each statement addresses.

Chapter 2: Multiple Realities

MC: Animals evolve to gather and filter important information an ecologically and context specific manner. The term Umwelt, meaning "subjective universe" captures this idea.

Q: Some bats use echolocation to hunt for insects, some moths can detect and evade the echolocation signals. Are these signals perceived, filtered and used similarly by the bat and the moth?

Q: Describe the sensory system of one organism that has a very different "Umwelt" (subjective universe) than that of us humans. Explain how this might (you need not be 100% correct) have evolved given what you know about the ecology of that species.

Q: From the perspective of Animal Behavior research, explain the statement "There is no single reality".

Q: A star like nasal appendage has evolved in one group of moles that allows it to sense and capture very small prey items very quickly. Explain how the very rapid "handling time" for each food item was a necessary evolutionary adaptation for eating such small prey items.

Chapter 3: Adjusting Priorities

MC: Some animals adjust some responses to some stimuli depending on some contextual aspects. But which responses, stimuli and contexts will depend on the ecological and evolutionary history of that species.

MC: Fitness (LRF) is equal to ones "Life Time Reproductive Success" divided by the average life time reproductive success of others in the population. LRF determines the evolutionary trajectory of behaviors for which there is a genetic basis to the observed variation.

Q: Explain the importance of considering LRF rather than just LRS?

Q: Female wasps lay eggs in the larvae of another insect. Her own larvae will consume that host and will mate with other individuals that hatch from that same host. Explain why the female wasp would lay more males if she was laying her eggs in a larvae that already contains eggs from another female.

Chapter 4: Brains and Glands

MC: Brains operate based on electrical (+ and – charge on ions) and chemical (neurotransmitters) signals, the details of which contribute to a neuron's role in a circuit (inhibitory, excitatory, likelihood of firing and A.P. etc.) and therefore to behavioral output.

MC: By studying simple circuits, scientists can learn how complex brains work, though there is still a large gap in our knowledge:

Q: The simple circuit in the fish nervous system which includes the Mauthner cell and underlies the C-start escape response to predators includes excitatory connections and inhibitory interneurons. Describe this situation according to Tinbergen's model of a Sign Stimulus, an Innate Releasing mechanism and a Fixed Action Pattern.

Q: Explain how understanding crab chewing is "a portal to understanding thought, emotion, and motion".

Chapter 5: Instinct (closely tied to chapter 6 on learning)

MC: Some rather complex behavior are performed by animals with no prior experience or practice, these are often referred to as "instincts". Other behaviors require considerable input from the environment to be fully shaped, but even these can be species specific, have constrained critical periods or require specific input thus we know they are not devoid of genetic input.

Q: Explain what is meant by "Nature via Nurture".

Q: Explain the fallacy of the concept of "Nature versus Nurture".

Q: Give an example of a behavior that is shaped by both nature (genetics) and nurture (environment or learning).

Q: Which behaviors would you expect would be more dependent on learning and which more based on instinct.
L or I : A bat's ability to identify water.
L or I : A rat's food preference.
L or I : A vampire bat's choice of food.
L or I : A spider's ability to spin a symmetric web.
L or I : The song of cuckoo bird (this is a brood parasite)
L or I : The song of a white crested wren (this is the species Marler studied)

Chapter 6: Learning (closely tied to chapter 5 on instinct)

MC: Learning is the process of extracting information from the environment to be used later (to shape behavior).

MC: Different species are capable of learning different things, learning in different contexts, learning (and forgetting) at different rates. This demonstrates the genetic influence on learning.

Q: From the perspective of Animal Behavior, explain the statement "There is no *taubla rasa*."

Chapter 7: Moving Through Space

MC: Animals rely on many abilities to know where they are and how to get where they need to go, often including "back up" systems.

MC: Experimental manipulations in which a predicted specific indirect response are a powerful tool with which to determine which senses an animal is using to move through space.

Q: Choose one of the following 4:

- Design an experiment to determine whether a species of solitary bee uses landmarks to find its nest opening (they live in a hole in the soil).
- Design an experiment to determine if dung beetles use the stars to navigate back to their burrow at night.
- Design and experiment to determine if sea turtles use the earth's magnetic field to swim in a direction that keeps them in the circulating Atlantic currents.

Chapter 8: Genetics

MC: Most behaviors are influenced by many genes.

MC: Domestication provides many examples that demonstrate the genetic basis of various behaviors because domestication includes a very strong selective force on animals who's behavior is familiar to us and for which we can observe the difference from closely related wild species.

MC: Heritability is a measure of how much of the observed phenotypic VARIANCE is due to underlying genetic VARIANCE. The remainder of the phenotypic VARIANCE is due to variation in the environment, as well as dominant and epistatic genetic influence. (note: This book did not emphasize this fact, but a heritability measure is specific to the genetic population being studied and the environmental context understudy, one cannot always extrapolate a heritability value to all populations and all environments.)

Q: Use the example of pigeons, foxes or sheep to explain the change in behavior due to selection leading to a change in allele frequency for the group.

Q: If you are studying the genetic basis of a behavior, which of Tinbergen's 4 domains are you addressing. (Explain your reasoning, this is not a straightforward question).

Q: Give one example of the genetic basis for behavior in a naturally occurring behavior in a natural population.

Chapter 9: Living in Groups

MC: By joining a group an individual decreases its chance of being killed by a predator. This is known as "the dilution effect".

MC: INCLUSIVE FITNESS is a concept that explains kin selection by demonstrating that an individual can increase its own LRF by performing costly behavior that benefit related individuals is "Benefit times relatedness is greater than the cost" (Br>C) where benefit and cost are measured in reproductive fitness.

Q: Which statement is true, and explain your answer:
1: The tendency to form a dominance hierarchy has evolved because, on average, it leads to an increase in the Life Time Reproductive Fitness of an individual.
2: The tendency to form a dominance hierarchy has evolved because it allows that species to reproduce more offspring.

Q: Would you expect to find herd behavior in predatory species of prey species? Explain.

Chapter 10: Communication

MC: Animals communicate with the goal to manipulate the behavior of others.

MC: Different species have evolved to use different modes (visual, auditory, electric, etc) of communication depending on selective pressures from the environment.

MC: Many communication signals have evolved from reflexes or intention movements. This evolutionary process of "ritualization" has decreased the cost to an individual such that the actual costly movement, or physical interaction is not needed in order to effectively communicate.

MC: If signals are not reliable on average, they will not persist through evolutionary time, this leads to a concept of "honest signals" which refers to the signal or signaling system, not the signaler. In other words, we expect animals to evolve signals that are not easily cheated. (this was emphasized more in class than in the book).

Q: Explain how the threat display signal of an "opercular flare" in cichlids may have evolved the process of ritualization.

Q: Name at least 4 venues in which animals use communication.