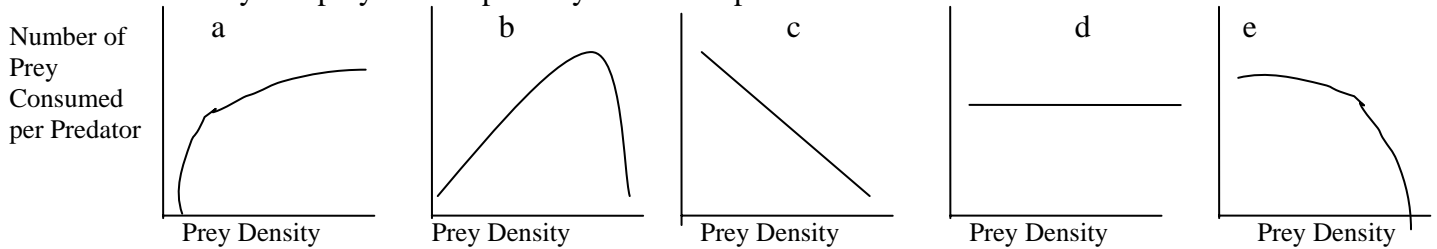




**Multiple Choice questions: 2 points each.** Please put your answers to this section on the Standardized Bubble Sheet. Feel free to use the question sheet for scratch work. Each question has only one correct answer. You will not be penalized for guessing on this section. Fill in your Answer Sheet carefully. Make sure that the number of the question matches the number whose bubble you're filling in!

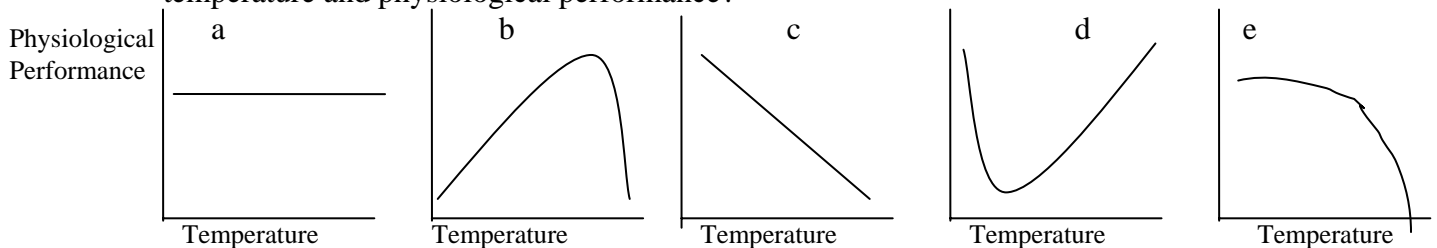
- 1) Which of the following curves describes the most common relationship between prey density and prey consumption by individual predators?



- 2) Which of the following animals is warming its body by behaving as an endotherm?
- A beetle that rests in a patch of sunlight
  - A moth that shivers its wings before flight
  - A lizard that lies on a warm rock
  - A turtle that moves to a warm, shallow part of a pond
- 3) Which of the following answers best and most completely describes the possible sources of energy for living organisms?
- Light, organic molecules, inorganic molecules
  - Radiation, electricity, food
  - The sun, carbon dioxide, water
  - Hydrogen sulfide, carbon dioxide, volcanic rifts
  - Giant Eagle, Acme, Topps
- 4) Which of the following is the best explanation for why there are so few marine endotherms?
- High radiative heat losses
  - High evaporative heat gain
  - High convective heat losses
  - High evaporative heat losses
  - Low metabolic heat production
- 5) Direct interactions among individuals, such as root competition in plants, and territoriality in animals, often leads to which of the following types of dispersion?
- Clumped
  - Random
  - Regular
  - Aggravated
  - Scaling
- 6) Which of the following is an example of Liebig's law of the minimum?

- a) Survival rates for Mosquitoes are near the minimum necessary to sustain the population
- b) The expansion of the distribution of Purple Loosestrife in North America each year is always above some minimal level.
- c) Populations of House Sparrows are well above the minimum acceptable level, allowing them to spread.
- d) Physiological performance of Gypsy Moths is minimal at low temperatures.
- e) Reproduction of Wild Mice is usually limited by food availability, but when they live in human houses mouse reproduction is limited by availability of nest sites.

7) Which of the following curves describes the most common relationship between temperature and physiological performance?

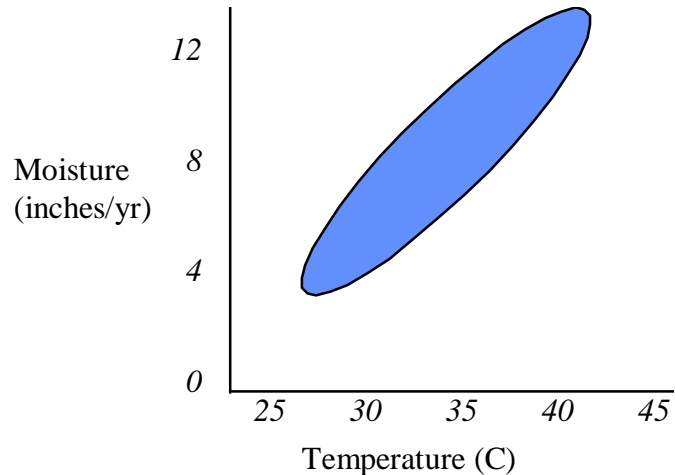


The next two questions deal with the following scenario: Your book describes the work of Bolser and Hay, who tested the hypothesis that tropical seaweeds have more chemical defenses than temperate seaweeds. They gathered several species of seaweeds from the coast of temperate North Carolina and from the tropical Bahama Islands. They were careful to pick the same species of seaweed in the two study sites. In an aquarium, they presented samples of these two seaweeds to temperate and tropical sea urchins and scored how much these herbivorous animals ate.

- 8) Which of the following best describes the work of Bolser and Hay?
  - a) Observational study
  - b) Field experiment
  - c) Lab experiment
  - d) Mathematical model
  
- 9) Bolser and Hay found that both temperate and tropical sea urchins ate about twice as much of the temperate seaweeds as of the tropical seaweeds. Which of the following conclusions best fits those results?
  - a) This proves the hypothesis that tropical seaweeds have more chemical defenses than temperate seaweeds.
  - b) This disproves the hypothesis that tropical seaweeds have more chemical defenses than temperate seaweeds.
  - c) This is consistent with the hypothesis that tropical seaweeds have more chemical defenses than temperate seaweeds.
  - d) This is inconclusive, and does not allow any inference about the hypothesis

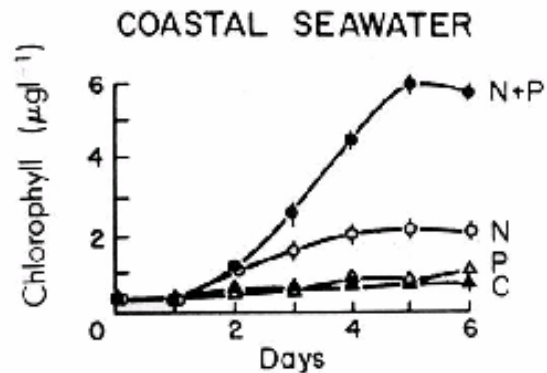
10) An ecologist has measured the performance of desert snakes as related to temperature and moisture. The results are depicted in this graph, where the darkened region indicates the range of conditions that the snake can tolerate. Which of the following is MOST correct?

- This snake can tolerate temperatures from 27 - 42 C
- This snake can tolerate moisture levels from 3 - 13 inches/year
- The niche of this snake changes over time
- Temperature tolerance for this snake depends on moisture availability
- These data represent a full description of the niche for this snake



11) In class we discussed the graph to the right. Which of the following statements about this graph is most correct?

- Coral are limited by Phosphorus and Nitrogen
- Seahorses vary in their growth rate according to source location.
- Rotifers from Nebraska consume more Chlorophyll than do rotifers from Pennsylvania
- Phytoplankton are limited by Nitrogen
- Cats show very little phenotypic plasticity across environments

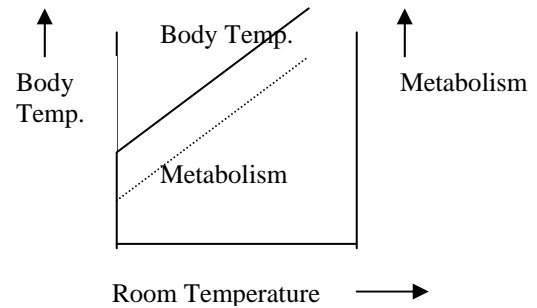


12) Lizards are poikilotherms. Your book explains that they use which of the following means to control body temperature?

- They can cool themselves by exposing as much surface area as possible to directly receive the sun's rays.
- They can escape the thermal constraints of the environment by being endothermic.
- They can warm themselves metabolically when within the thermal neutral zone.
- Their body temperature reflects the ambient temperature, but they can nonetheless regulate their body temperature through behavioral and other means.
- Metabolic heat production is the major determinant of their body temperature

- 13) Which of the following sets of terms can best be used to describe the trophic diversity of ALL living organisms, as described in your book?
- Photosynthetic, Chemosynthetic, Heterotrophic
  - C3, C4, CAM
  - Protists, Plants, Fungi
  - Herbivore, Carnivore, Detritivore
  - Mullerian, Batesian, Crypsis

- 14) During your physiology class a friend brings in an odd animal that you have never seen before. As part of a class project, you place the animal in a small chamber and measure its body temperature and metabolic rate as you vary the room's temperature. Your results are shown to the right. Which of the following statements is most correct, based on these results?



- This is consistent with optimal foraging theory
- This is a cold-blooded animal
- This is a homeotherm
- There is a distinct thermal neutral zone
- Metabolism increases with room temperature

- 15) To better understand the ecology of Blunt-Nosed Shrews (small carnivorous mammals), you set up an a field experiment in which you vary prey availability and water availability; two levels of each, in all combinations. After a year you measured success by measuring the total mass of Shrews in each of the plots. Here are the results (masses in grams):

	Water Availability	
Prey Availability	Low	High
Low	2.0	10.5
High	15.2	177.7

Which of the following is MOST correct?

- Shrews did not respond to this experimental manipulation
  - Of these two variables, Prey is the only limiting factor
  - Of these two variables, Water is the only limiting factor
  - Adequate levels of both Prey and Water are needed for optimal growth
  - The response to these factors is additive, with no "interaction"
- 16) In class we ranked some levels of organization in biology, from low smallest to largest. Based on that discussion, which of the following is listed from largest to smallest?
- population, individual, ecosystem, community
  - individual, community, population, ecosystem
  - ecosystem, community, population, individual
  - individual, population, community, ecosystem
  - ecosystem, population, community, individual

- 17) Male Lions usually have large ruffs of hair on their neck and shoulders, called “manes.” In the August 23, 2002 issue of the journal *Science*, Peyton West and Craig Packer reported, “Heat appears to be the dominant factor shaping the [color and size of the] lion’s mane.” They noted that lions in warm years tended to have shorter manes than in cool years, and manes are darker in cooler habitats and seasons. They also found that male lions with manes had higher body temperatures than did females (which don’t have manes) or males that didn’t have manes.
- a) (3 points) Based on what we've learned in class, please explain their hypothesis – why would having a long dark mane affect heat balance?
- b) (3 points) *Briefly describe a new experiment or observation would help evaluate this hypothesis. What sorts of results would you expect if the hypothesis were correct?*
- 18) (2 points) In your book, the work of Werner and Mittelbach on bluegills is used as an example of optimal foraging theory. List two pieces of information they needed to calculate which prey items to include in the “optimal” diet.
- 19) (4 points) Do you agree with the following statement? Why or why not?  
“The physical environment limits the geographic distribution of species”
- 20) (4 points) Your book had a section devoted to the relationship between organism size and population density. Please construct a fully labeled graph demonstrating the most important features of this relationship.

21) **15 points.** Pre-prepared review sheet question: Remember: your answer should be well-reasoned and well-written -- outline format is not acceptable (though you may outline the answer for your own benefit on the back of another page). Your answer should fit on this page.

*Choose two different organisms from two different biomes (one from one biome, one from another). You may use different aquatic environments (Chapter 3) instead of biomes (Chapter 2) if you prefer Compare and contrast the adaptations for thermal balance or water balance of these two organisms*