ANSWER KEY.

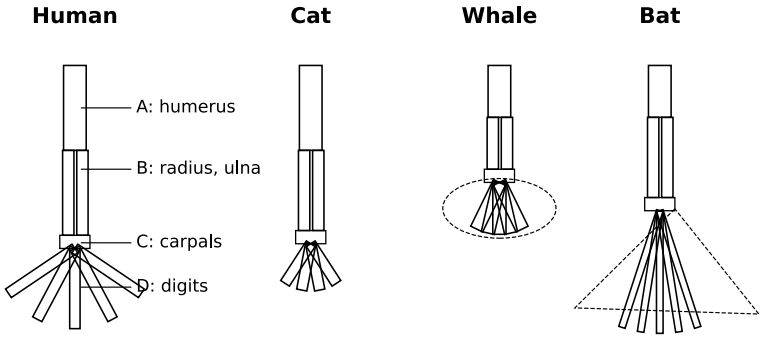
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Anatomical and Molecular Evidence

Biology | ANSWER KEY

Answer in complete sentences. Use the drawings and data as evidence.

1. The drawing shows the forelimb bones of four mammals. The letters mark bone groups in the human limb.



Simplified drawings. Whale and bat shading shows the paddle and the wing membrane.

(a) Name the bone groups labeled A, B, C, and D.

(b) These limbs are used for grasping, walking, swimming, and flying. What does their similar bone pattern suggest?

(a) **A: humerus; B: radius and ulna; C: carpals; D: digits**

(b) **The animals share a common ancestor** that had this limb, and it was changed by natural selection for different uses.

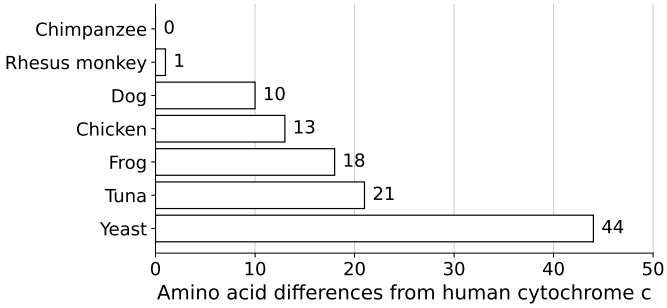
2. Decide whether each pair of structures is homologous or analogous.

Pair of structures	Homologous or analogous?
(a) A human arm and a cat's front leg	**Homologous**
(b) A bat's wing and a butterfly's wing	**Analogous**
(c) A whale's flipper and a shark's fin	**Analogous**

Homologous structures have the same origin. Analogous structures have the same use.

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3. The graph compares cytochrome c in other species with human cytochrome c (approximate values).



(a) Which species is most closely related to humans? Which is least closely related?

(b) How many more differences does the chicken have than the dog? What does this suggest?

(a) **Chimpanzee** (0 differences) is most closely related. **Yeast** (44 differences) is least closely related.

(b) 13 − 10 = **3 more differences**. **The dog shares a more recent common ancestor with humans than the chicken does.**

4. Two species have this 20-base section of DNA:

Species X: ATGCCGTAAGCTTAGCAATG

Species Y: ATGCTGTAAGATTAGGAATG

What percent of the bases are identical? Show your setup.

The sequences differ at 3 positions (5, 11, 16), so 20 − 3 = 17 bases match. 17 ÷ 20 × 100 = **85%**

5. Whales have tiny hip bones that are not attached to any legs. Explain what this vestigial structure suggests about the ancestors of whales.

Whales descended from ancestors that walked on legs. The hip bones are leftovers that natural selection has not completely removed, even though whales do not use them for walking.

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