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BASIC SCIENCES · ANATOMY

PRACTICE SHEET

Veterinary Anatomy MCQs and Exam Questions

100 MCQs + Model Answers

The same 120 questions with their plates and the options only.

PAGES	SECTIONS	FIGURES
42	7	123

INSIDE THIS PAPER

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04 Upper against lower motor neuron
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06 The written paper · 20 questions, model answers at the back
07 The answer key · on its own sheet, with the reason for each

LEVEL
Vets & veterinary students

EDITION
November 2026

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Veterinary Anatomy MCQs and Exam Questions

100 MCQs + Model Answers

STUDY NOTES · BASIC SCIENCES · ANATOMY · UPDATED 2026-09-07

CONTENTS

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LEARNING OBJECTIVES

After working through these notes you will be able to:

- ✓ **Sit** 120 anatomy questions under timed conditions without the answers in view.
- ✓ **Produce** a written answer to order, rather than recognising one among four.
- ✓ **Mark** yourself by area, and read the six scores rather than the total.
- ✓ **Distinguish** the terms that cost marks: median from sagittal, dorsal from frontal, rostral from cranial, and where the limb words change.
- ✓ **Recall** the dental and vertebral formulae of the seven domestic species.
- ✓ **Explain** why an organ lies outside the serous cavity it appears to be in.
- ✓ **Separate** upper from lower motor neuron signs on tone, reflexes and atrophy.
- ✓ **Decide**, from a weak area, which single page on this site to read next.

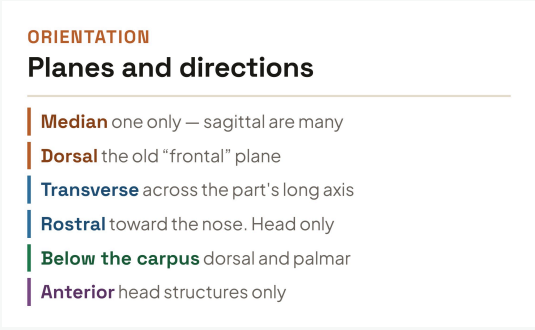
TL;DR

All 120 questions from the article, laid out as a paper you can print and sit: 100 multiple-choice questions with their options only, then 20 written exam questions — and every one of them with its labelled plate, because anatomy is not asked in words alone. The answer key and the model answers are on their own sheets at the back, so they can be turned face down. Mark yourself by area rather than out of a hundred: the six area scores tell you what to read, and the total does not. The notes before the paper are the material it tests most often, in the form it is asked in.

AT A GLANCE

WHAT THIS IS	120 questions with their plates. Answers at the back
THE PAPER	100 multiple-choice, then **20 written** with model answers
EVERY QUESTION	Carries a labelled plate, credited to its source
TIME IT	About **2 hours** for the whole paper
TERMINOLOGY	15 questions
OSTEOLOGY AND JOINTS	17 questions
VISCERA AND CAVITIES	18 questions
VESSELS	13 questions
NERVES	12 questions — the smallest, and the page says why
SPECIES DIFFERENCES	25 questions — the largest
THE ANSWER KEY	Even and shuffled: **25 each** of A, B, C and D
WHAT TO DO NEXT	Take your weakest area, read its page, re-sit that area only

01 The words that decide the first fifteen marks



The four planes and the directional terms, with the two places students most often slip. Diagram — Vet-eBooks.com, drawn for this guide.

- **One median plane**, dividing the body into equal right and left halves. Planes parallel to it are **sagittal** and there are infinitely many. "Midsagittal" is the median plane under another name, not a third thing.
- **Dorsal** is the plane the older books called *frontal*. It was renamed because *frontal* describes a human forehead, which means nothing on an animal standing on four legs.
- **Transverse** is at right angles to the long axis **of the part** — not of the ground. A transverse section of the head and one of the trunk are not parallel.
- **Rostral** exists only on the head: toward the nose. There is no rostral end of a tail.

- ⭐ **Below the carpus and tarsus the words change.** Cranial and caudal stop; the front surface is **dorsal**, and the back is **palmar** in the forelimb and **plantar** in the hind.
- **Anterior, posterior, superior, inferior** are human terms. In a quadruped they are restricted to certain structures of the head.
- A radiographic view is named **point of entry, then point of exit**: a dorsopalmar beam enters the dorsal surface and leaves the palmar one.

02 The numbers, in the form they are asked

SPECIES	PERMANENT FORMULA	TOTAL	UPPER INCISORS
Dog	3-1-4-2 / 3-1-4-3	**42**	Present
Cat	3-1-3-1 / 3-1-2-1	**30**	Present
Horse	3-1-3(4)-3 / 3-1-3-3	**36–42**	Present
Ox	0-0-3-3 / 3-1-3-3	**32**	None — a dental pad
Sheep, goat	0-0-3-3 / 3-1-3-3	**32**	None — a dental pad
Pig	3-1-4-3 / 3-1-4-3	**44**	Present

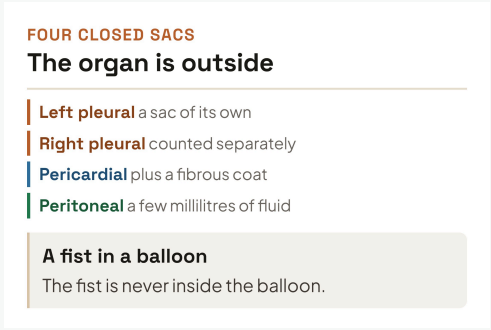
- ⭐ **The zeros are the answer.** Ruminants have no upper incisors and no upper canines; they tear grass against a **dental pad**. That single row answers more of this paper than any other.
- The **pig at 44** has the most complete dentition of the domestic species — the true omnivore's mouth. The **cat at 30** has the most reduced.
- The dog's formula is **not symmetrical**: four premolars in each quadrant, but two upper and three lower molars.
- The **carnassials** of the dog are the upper P4 and the lower M1. The upper P4 has three roots and is the strongest tooth of the upper jaw.

SPECIES	VERTEBRAL FORMULA	THE CORD ENDS AT
Dog	C7 T13 L7 S3 Cd20–23	L6–L7
Cat	C7 T13 L7 S3 Cd18–20	L6 to S3, variably
Horse	C7 T18 L6 S5 Cd15–21	S2 — the most caudal
Ox	C7 T13 L6 S5 Cd18–20	S1 in the adult
Sheep, goat	C7 T13 L6(7) S4–5 Cd16–18	Almost the whole sacrum
Pig	C7 T14–15 L6–7 S4 Cd20–23	L5–L6 — the most cranial

- **Cervical seven** is the conserved count, in almost every mammal from the giraffe to the mouse. Thoracic, lumbar and sacral counts are not conserved at all.

- The cord is shorter than its canal by a different amount in every species, so a **vertebral count is useless without the termination**. The horse's cord ends most caudally, at S2; the pig's most cranially, at L5–L6.
- A lumbosacral epidural is routine in the dog because the cord ends at L6–L7, so the space is **behind** it. The cat's cord can still reach that space — the same approach is not the same procedure.

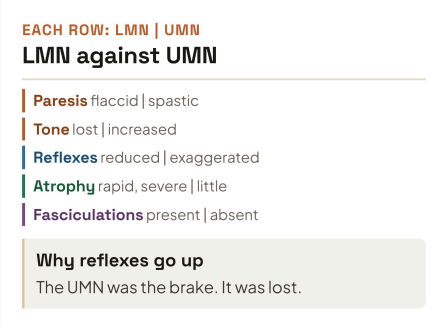
03 Four closed sacs, and the organ outside them



Four closed sacs, and why the organ is outside the one it sits in. Diagram — Vet-eBooks.com, drawn for this guide.

- ⭐ **One continuous sheet does both jobs.** It lines the wall as the parietal layer, folds back, and covers the organ as the visceral layer. The organ is pushed *into* the sac from outside and is never in its cavity.
- **Four** serous cavities: left pleural, right pleural, pericardial, peritoneal. The two pleural sacs count separately *because they are separate sacs*.
- The **mediastinum leaks** in the dog and adult horse, which is why a unilateral pneumothorax usually becomes bilateral. The foal is the exception.
- The **pericardium** is the one sac with a fibrous coat outside its serous layers, and that coat resists distension in the short term — so a small fast effusion tamponades where a large slow one may not.
- **Retroperitoneal**: kidneys, ureters and terminal rectum. Peritoneum on one face only, so they can be reached without opening the sac.
- A **regional** cavity is named by where it is; a **serous** cavity is a closed sac lying inside a region. The thoracic cavity is a region; a pleural cavity is a sac within it.

04 Upper against lower motor neuron



The five findings that separate upper from lower motor neuron signs. Diagram — Vet-eBooks.com, drawn for this guide.

- The chain is **two neurons**: an upper motor neuron in the central nervous system commands a lower motor neuron, and only the lower one reaches muscle. The LMN is the **final common path** — voluntary, reflex and postural traffic all go through it.
- ⭐ **Reflexes go up below a UMN lesion by disinhibition.** The UMN's normal job includes braking the spinal reflex arc, so losing it *releases* the reflex. Hyperreflexia is a sign of something lost, never of something added.
- **LMN disease**: flaccid paresis, lost tone, reduced or absent reflexes, rapid severe neurogenic atrophy, fasciculations. Losing the final common path disconnects the muscle from *all* control.
- **Tone is active.** Slow type I units fire tonically and the γ loop keeps the spindle sensitive at every length, which is why tone is *lost* in LMN disease rather than merely reduced.
- Read **tone, reflexes and atrophy together**. Any one of the three alone is ambiguous; as a set they separate UMN from LMN and rule the neuromuscular junction and the muscle in or out.

SCORE	WHAT IT MEANS	WHAT TO DO
85–100	You know this material	Re-sit only the questions you got wrong, a week from now
70–84	Solid, with gaps	Find the gaps by area, read those pages, re-sit those sections
50–69	The framework is there and the detail is not	Work area by area rather than re-sitting the whole paper
Under 50	Too early for a mock	Read first, test later. A test you cannot answer teaches you only that

KEY TERMS — QUICK GLOSSARY

Median plane	The single plane dividing the body into equal right and left halves. There is one. Planes parallel to it are sagittal, and of those there are infinitely many.
Gomphosis	The peg-in-socket fibrous joint that holds a tooth in its alveolus. A tooth is articulated with the jaw, not fused to it.
Retroperitoneal	Lying behind the peritoneal sac with serous membrane on one face only — the kidneys, ureters and terminal rectum. They can be reached without opening the cavity.
Synsarcosis	A muscular attachment where no bony joint exists. The dog's forelimb is slung from the trunk by one, with serratus ventralis as the main sling.
Disinhibition	The release of a reflex whose inhibitory control has been lost. It is why hyperreflexia is a sign of something lost rather than something added.
Pneumatic bone	A bone filled by air-sac diverticula in the bird, linking the skeleton to the airway. It is why those bones are avoided for intraosseous fluids.
Homoplasy	Shared appearance without shared ancestry or shared function — the tuna and the dolphin. Distinct from both homology and analogy.
Dental pad	The fibrous cushion where a ruminant's upper incisors would be. The lower incisors bite against it; nothing is cut between opposing teeth.

QUICK REVISION — REMEMBER THESE

1. **The area score is the useful number.** A total of 70 with four out of seventeen on osteology is not a general anatomy problem; it is a bones problem, and it is one evening's work.
2. **There is one median plane and infinitely many sagittal ones.** Almost every orientation mark is lost on that distinction or on *rostral*, which exists only on the head.
3. **Below the carpus and tarsus the words change.** Cranial and caudal become dorsal and palmar in the forelimb, dorsal and plantar in the hind.
4. **The organ is never in the serous cavity.** One continuous sheet lines the wall, folds back and covers the organ, so the organ is pushed *into* the sac from outside.
5. **Ruminants have no upper incisors.** The zeros in 0-0-3-3 are the answer to more questions on this paper than any other single fact.
6. **Reflexes are exaggerated below an upper motor neuron lesion because the brake was lost**, not because anything was added. That is the one idea behind the whole UMN column.

7. **Homology is shared ancestry; analogy is shared function.** Nerve supply is the evidence that survives when attachments migrate; shared function proves nothing.
8. **Cats are not small dogs, and small ruminants are not small oxen.** Four of the species questions turn on exactly that.

MEMORY AIDS

One median, many sagittal — *Median* shares its root with *medium* — the middle, and there is only one middle. Everything parallel to it is sagittal.

Where the limb words change — **C**arpus and tarsus are the **C**hangeover. Above them cranial and caudal; below them dorsal in front, and palmar in the hand, plantar in the foot.

A fist in a balloon — The fist pushes into the balloon and is covered by it, but it is never inside the balloon's cavity. That is every serous sac and the organ in it.

The UMN was the brake — Lose the brake and the reflex runs faster. Lose the motor itself — the LMN — and nothing runs at all. Up means brake lost; down and wasted means motor lost.

TEST YOURSELF — ACTIVE RECALL

Cover the answers and try to retrieve each one from memory first — self-testing beats re-reading.

TERMINOLOGY AND ORIENTATION · 15 QUESTIONS

1. **How many median planes does an animal have?**

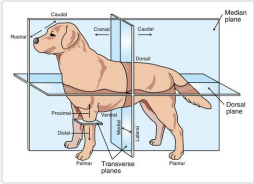


Image — Colville T, Bassert JM. Clinical Anatomy and Physiology for Veterinary Technicians , 4th ed. Elsevier — Fig. 1.1. Reproduced for educational reference.

A Infinitely many
B One per body region
C One
D Two — a left and a right

2. **Older texts call it the frontal plane. What does veterinary nomenclature call it, and why was it renamed?**

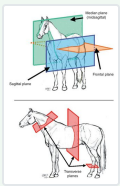


Image — Akers RM, Denbow DM. Anatomy and Physiology of Domestic Animals , 3rd ed. Wiley — Fig. 1.7. Reproduced for educational reference.

A The coronal plane, because it follows the coronary suture
B The horizontal plane, because it is parallel to the ground
C The transverse plane, because it cuts across the body
D The dorsal plane, because “frontal” refers to the plane of the human forehead

3. **A section is taken at right angles to the long axis of a cannon bone. Which plane is it?**

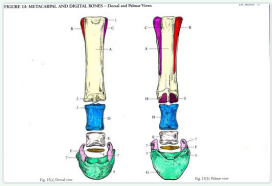


Image — Raynor M. The Horse Anatomy Workbook , Figure 15, Metacarpal and Digital Bones. Reproduced for educational reference; copyright remains with the original author and publisher.

A Dorsal
B Transverse
C Median
D Sagittal

4. **Below the carpus and the tarsus, which pair of directional terms replaces cranial and caudal?**

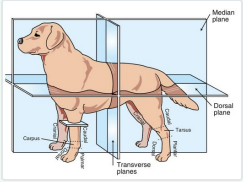


Image — Colville T, Bassert JM. Clinical Anatomy and Physiology for Veterinary Technicians , 4th ed. Elsevier — Fig. 1.1. Reproduced for educational reference.

A Superior and inferior
B Medial and lateral
C Dorsal and palmar or plantar
D Rostral and caudal

5. **Which term means "toward the nose", and where may it be used?**

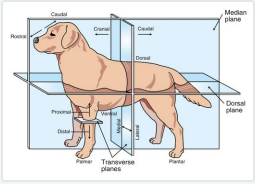


Image — Colville T, Bassert JM. Clinical Anatomy and Physiology for Veterinary Technicians , 4th ed. Elsevier — Fig. 1.1. Reproduced for educational reference.

A Anterior, on the head and neck
B Dorsal, on the head only
C Cranial, anywhere on the body
D Rostral, on the head only

6. **In a quadruped, where may "anterior", "posterior", "superior" and "inferior" still be used?**



Image — Popesko P. Atlas of Topographical Anatomy of the Domestic Animals , Vol. II: Trunk, 6th ed. Saunders — Fig. 43. Reproduced for educational reference.

A Anywhere — they are synonyms for cranial, caudal, dorsal and ventral
B On the limbs only
C For certain structures of the head only
D In radiography only

7. **A radiographic view is named dorsopalmar. What does that tell you?**

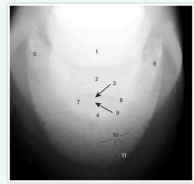


Image — Ashdown RR, Done SH. Clinical Anatomy of the Horse . Mosby/Elsevier — Fig 4.73, dorsopalmar view radiograph of distal phalanx. Reproduced for educational reference.

A The beam enters palmar and exits dorsally
B The plate is dorsal and the beam is palmar
C The limb is held in a dorsal plane
D The beam enters dorsally and exits palmar

8. **A Greek-derived clinical term has up to four parts. In what order should you read it?**

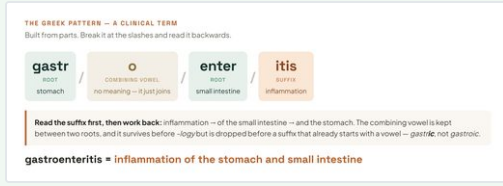


Diagram — Vet-eBooks.com, built for this guide. The word parts and the rules it illustrates are from Taibo A. Veterinary Medical Terminology Guide and Workbook , 2nd ed. Wiley.

A Root first, then the prefix, then the suffix
B The suffix first, then work backwards
C The combining vowel first, because it carries the sense
D Prefix first, then straight through to the end

9. **What does the combining vowel in a term such as *gastrology* contribute to its meaning?**

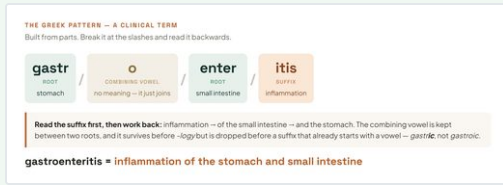


Diagram — Vet-eBooks.com, built for this guide. The word parts and the rules it illustrates are from Taibo A. Veterinary Medical Terminology Guide and Workbook , 2nd ed. Wiley.

A It links the term to a body system
B It marks the term as Greek rather than Latin
C Nothing — it exists only to make the word sayable
D It indicates a plural

10. **In the muscle name *extensor carpi radialis*, what does the ending *carpi* signal?**

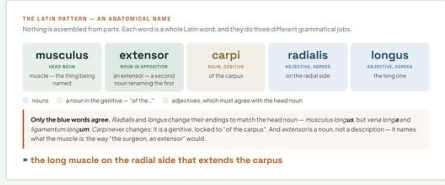


Diagram — Vet-eBooks.com, built for this guide. The word parts and the rules it illustrates are from Taibo A. Veterinary Medical Terminology Guide and Workbook , 2nd ed. Wiley.

A A genitive — "of the" carpus
B An adjective agreeing with extensor
C A diminutive
D A plural — more than one carpus

11. **Which statement best describes the division of labour between Latin and Greek in veterinary vocabulary?**



Diagram — Vet-eBooks.com, drawn for this guide. Regional terms and their definitions taken from Schaller O, Constantinescu GM (eds.). Illustrated Veterinary Anatomical Nomenclature , 4th ed. Thieme — the illustrated companion to the Nomina Anatomica Veterinaria .

A As a strong tendency, Latin names the parts and Greek describes what goes wrong
B Latin is anatomical and Greek is never used in anatomy
C The two are used interchangeably with no pattern
D Latin is used for animals and Greek for humans

12. **Anatomy is traditionally divided into gross, microscopic and developmental. Which statement is correct?**



Diagram — Vet-eBooks.com, drawn for this guide. Data from Dyce, Sack and Wensing's Textbook of Veterinary Anatomy , 5th ed., ch. 1.

A Developmental anatomy stops at birth
B Microscopic anatomy taught in its own right is histology
C Developmental anatomy and embryology are the same subject
D Gross anatomy includes everything visible under a light microscope

13. **What is the difference between systematic and regional anatomy?**

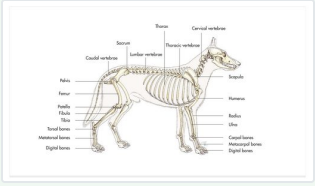


Image — König HE, Liebich H-G. Veterinary Anatomy of Domestic Animals: Textbook and Colour Atlas , 7th ed. Thieme — Fig. 1.26. Reproduced for educational reference.

A Systematic is gross; regional is microscopic
B There is no difference — they are two names for the same approach
C Systematic is for animals, regional is for humans
D Systematic follows a system; regional follows a place

14. **Surface, applied, surgical and radiographic anatomy are best described as:**

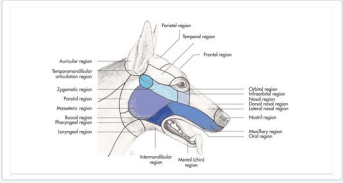


Image — König HE, Liebich H-G. Veterinary Anatomy of Domestic Animals: Textbook and Colour Atlas , 7th ed. Thieme — Fig. 20.1. Reproduced for educational reference.

A Four separate branches of the nomenclature
B Regional anatomy pursued with a particular aim
C Subdivisions of microscopic anatomy
D Modern replacements for systematic anatomy

15. **Which of these is *not* one of the branch names fixed by the anatomical nomenclature?**

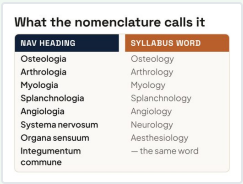


Diagram — Vet-eBooks.com, drawn for this guide. Data from the contents of Constantinescu's Illustrated Veterinary Anatomical Nomenclature , 4th ed., and Sisson and Grossman's The Anatomy of the Domestic Animals , Vol. I.

A Osteologia
B Splanchnologia
C Aesthesiology
D Angiologia

OSTEOLOGY, JOINTS AND THE SKELETON · 17 QUESTIONS

16. **Why is a bone described as an organ rather than as a tissue?**

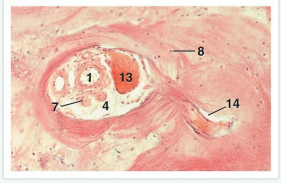


Image — Bacha WJ, Bacha LM. Color Atlas of Veterinary Histology , 3rd ed. Wiley-Blackwell — Fig. 5.19. Reproduced for educational reference.

A Because it contains bone tissue, periosteum and endosteum, marrow, and its own vessels and nerves
B Because it can be dissected out whole
C Because it belongs to the skeletal system
D Because it is hard and tissues are soft

17. **Roughly what proportion of a bone is mineral, and what does that explain?**

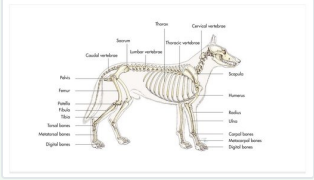


Image — König HE, Liebich H-G. Veterinary Anatomy of Domestic Animals: Textbook and Colour Atlas , 7th ed. Thieme — Fig. 1.26. Reproduced for educational reference.

A 90–95%, which is why bone is brittle
B 10–20%, which is why bone is flexible in life
C 30–40%, which is why bone bleeds
D 60–70%, which is why bone does not change after death the way soft tissue does

18. **Joints are first split on a single question. What is it?**

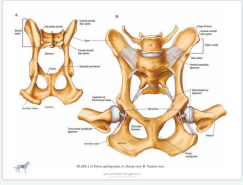


Image — McCracken TO, Kainer RA. Color Atlas of Small Animal Anatomy: The Essentials , Plate 1.21 (p. 22). Reproduced for educational reference; copyright remains with the original authors and publisher.

A Whether they contain cartilage
B Whether they move
C Whether there is a gap
D Whether they are in the limb or the trunk

19. **A tooth is held in its socket by the periodontal ligament. What kind of joint is that?**

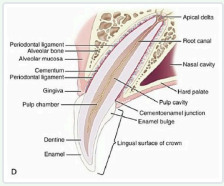


Image — Evans HE, de Lahunta A. Miller and Evans' Anatomy of the Dog , 5th ed. — FIG 7.7D, diagrammatic section through a superior canine. Reproduced for educational reference.

A A gomphosis
B A synchondrosis
C A suture
D A symphysis

20. **What is the permanent dental formula of the dog, and how many teeth does it give?**

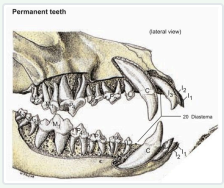


Image — Budras KD, McCarthy PH, Fricke W, Richter R. Anatomy of the Dog , 5th ed. — plate: permanent teeth, lateral view. Reproduced for educational reference.

A 2 × (I 3/3, C 1/1, P 4/4, M 2/3) = 42
B 2 × (I 3/3, C 1/1, P 4/4, M 3/3) = 44
C 2 × (I 3/3, C 1/1, P 3/2, M 1/1) = 30
D 2 × (I 3/3, C 1/1, P 3/3, M 3/3) = 40

21. **Which teeth have no deciduous precursor in the dog?**

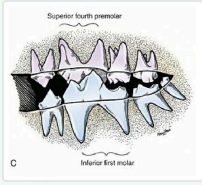


Image — Evans HE, de Lahunta A. Miller and Evans' Anatomy of the Dog , 5th ed. — FIG 7.7C, bite of the shearing teeth, medial view. Reproduced for educational reference.

A The canines
B The incisors
C P1 and every molar
D The carnassials

22. **Which two teeth are the carnassials of the dog?**

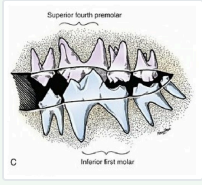


Image — Evans HE, de Lahunta A. Miller and Evans' Anatomy of the Dog , 5th ed. — FIG 7.7C, bite of the shearing teeth, medial view. Reproduced for educational reference.

A Upper M1 and lower M2
B Upper P4 and lower M1
C Upper C and lower C
D Upper P3 and lower P4

23. **Working from outside in, what is the correct order of the tissues of a tooth?**

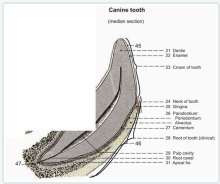


Image — Budras KD, McCarthy PH, Fricke W, Richter R. Anatomy of the Dog , 5th ed. — plate: canine tooth, median section. Reproduced for educational reference.

- **A** Enamel throughout, with pulp immediately beneath it
- **B** Dentine over the crown, enamel in between, cementum in the centre
- **C** Cementum over the crown, enamel over the root, pulp in between
- **D** Enamel over the crown and cementum over the root, dentine in between, pulp in the centre

24. **Which foramen is the landmark for a maxillary nerve block in the dog?**

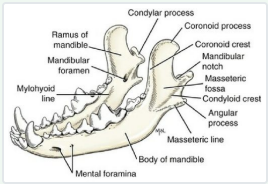


Image — Evans HE, de Lahunta A. Miller and Evans' Anatomy of the Dog , 5th ed. — FIG 4.38, left and right mandibles. Reproduced for educational reference.

- **A** The infraorbital foramen
- **B** The palatine foramen
- **C** The mental foramen
- **D** The mandibular foramen

25. **The canine skull is usefully described as two boxes joined by the face. Which bones make the braincase?**

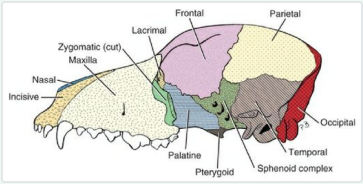


Image — Evans HE, de Lahunta A. Miller and Evans' Anatomy of the Dog , 5th ed. — FIG 4.3, bones of the skull, lateral aspect. Reproduced for educational reference.

- **A** Frontal, maxilla, zygomatic and temporal
- **B** Occipital, atlas, axis and sphenoid
- **C** Incisive, maxilla, nasal, palatine and mandible
- **D** Occipital, parietal, temporal, frontal, sphenoid and ethmoid

26. **Every tetrapod limb has three segments. What are they, in order from the body outwards?**

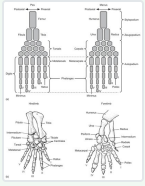


Image — Kardong KV. Vertebrates: Comparative Anatomy, Function, Evolution , 6th ed. McGraw-Hill — Fig 9.23, basic organization of the fore- and hindlimbs, after Smith and Jarvik. Reproduced for educational reference.

- **A** Zeugopodium, stylopodium, autopodium
- **B** Stylopodium, autopodium, zeugopodium
- **C** Autopodium, zeugopodium, stylopodium
- **D** Stylopodium, zeugopodium, autopodium

27. **How many digits did the earliest tetrapods have?**

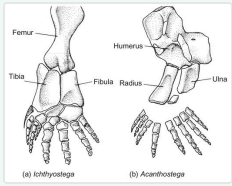


Image — Kardong KV. Vertebrates: Comparative Anatomy, Function, Evolution , 6th ed. McGraw-Hill — Fig 9.24, polydactylous limbs of the earliest tetrapods, after Coates and Clark. Reproduced for educational reference.

A Seven and eight — five is an early settlement, not the starting point
B Three, which the horse has retained
C Five — the number every land vertebrate started from
D Four, with a fifth appearing later

28. **Which vertebral count is the most conserved across mammals?**



Image — Budras et al., Bovine Anatomy , 2nd ext. ed. — plate: Vertebral column, thoracic skeleton and nuchal ligament. Reproduced for educational reference.

A Thoracic
B Lumbar
C Sacral
D Cervical

29. **In the horse's foot, what suspends the coffin bone (P3)?**



Image — Ashdown RR, Done SH. Color Atlas of Veterinary Anatomy, Vol. 2: The Horse , 2nd ed. Elsevier — Fig 7.66, the right digit in median section: medial view. Reproduced for educational reference.

A It hangs from the navicular bone
B It is supported by the digital cushion
C It rests directly on the sole
D It is suspended from the inside of the wall by interlocking lamellae

30. **The hoof wall has three layers. Which one holds a nail?**

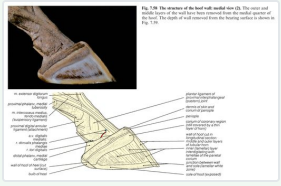


Image — Ashdown RR, Done SH. Color Atlas of Veterinary Anatomy, Vol. 2: The Horse , 2nd ed. Elsevier — Fig 7.58, the structure of the hoof wall: medial view (2). Reproduced for educational reference.

A The middle tubular horn
B The inner lamellar layer
C All three equally
D The outer periople

31. **Which bones does the deep digital flexor tendon pass over to reach P3, and why does that matter?**

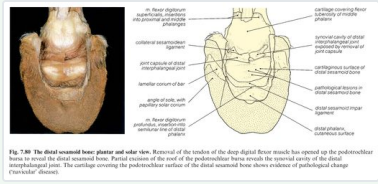


Image — Ashdown RR, Done SH. Color Atlas of Veterinary Anatomy, Vol. 2: The Horse , 2nd ed. Elsevier — Fig 7.80, the distal sesamoid bone: plantar and solar view. Reproduced for educational reference.

A Over the proximal sesamoids — it explains fetlock injury

B Over the navicular bone — it explains why the tendon features in both navicular syndrome and laminitic rotation

C Over the pastern joint — it explains ringbone

D Over the coronet — it explains coronary band injury

32. **Why is movement part of hoof health?**

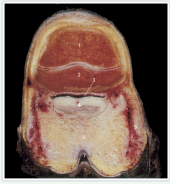


Image — Ashdown RR, Done SH. Clinical Anatomy of the Horse . Mosby/Elsevier — Fig 4.77, frontal section of left hoof, palmar view. Reproduced for educational reference.

A Because the foot has no muscle, and the frog, digital cushion and ungular cartilages form a pump driven by loading

B Because the sole thickens with wear

C Because exercise strengthens the hoof wall directly

D Because the coronet only grows under load

VISCERA AND THE BODY CAVITIES · 18 QUESTIONS

33. **How many serous cavities are there, and what are they?**

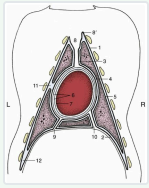


Image — Dyce KM, Sack WO, Wensing CJG. Textbook of Veterinary Anatomy , 5th ed. Elsevier — Fig. 4.21, the distribution of the pleura and pericardium. Reproduced for educational reference.

A Three — pleural, pericardial and peritoneal

B Two — thoracic and abdominal

C Five — the four above plus the vertebral canal

D Four — left pleural, right pleural, pericardial and peritoneal

34. **A student says "the intestine lies in the peritoneal cavity". Why is that wrong?**

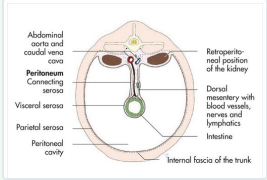


Image — König HE, Liebich H-G. Veterinary Anatomy of Domestic Animals: Textbook and Colour Atlas , 7th ed. Thieme — Fig. 1.62, schematic illustration of the serous membranes. Reproduced for educational reference.

A The peritoneal cavity is in the pelvis, not the abdomen
B The organ is outside the sac, pushed into it — the cavity holds only a few millilitres of fluid
C The intestine lies in the abdominal cavity, which is a serous cavity
D The intestine is retroperitoneal

35. **What is the relationship between a parietal and a visceral serous layer?**

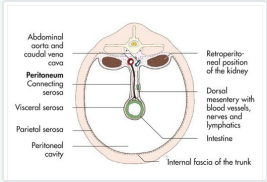


Image — König HE, Liebich H-G. Veterinary Anatomy of Domestic Animals: Textbook and Colour Atlas , 7th ed. Thieme — Fig. 1.62, schematic illustration of the serous membranes. Reproduced for educational reference.

A They are one continuous sheet: it lines the wall, folds back, and covers the organ
B The parietal layer is serous and the visceral layer is fibrous
C The visceral layer is a remnant of the parietal layer in the embryo
D They are two separate membranes that face each other

36. **Which set of organs is retroperitoneal?**

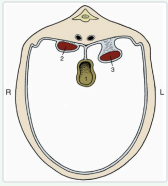


Image — Dyce KM, Sack WO, Wensing CJG. Textbook of Veterinary Anatomy , 5th ed. Elsevier — Fig. 5.22, position of the kidneys in relation to the peritoneal cavity. Reproduced for educational reference.

A Liver, spleen and stomach
B Jejunum, ileum and descending colon
C Ovaries, uterine horns and bladder
D Kidneys, ureters and terminal rectum

37. **Most dogs given a unilateral pneumothorax show it bilaterally. Why?**

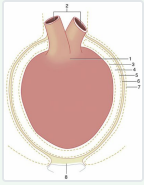


Image — Dyce KM, Sack WO, Wensing CJG. Textbook of Veterinary Anatomy , 5th ed. Elsevier — Fig. 7.5, schematic illustration of the pericardium. Reproduced for educational reference.

A The mediastinum leaks
B Air tracks through the diaphragm
C The dog has no mediastinum
D The two pleural sacs are a single cavity in the dog

38. **Why can a small, fast pericardial effusion tamponade the heart when a large, slow one may not?**

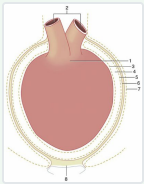


Image — Dyce KM, Sack WO, Wensing CJG. Textbook of Veterinary Anatomy , 5th ed. Elsevier — Fig. 7.5, schematic illustration of the pericardium. Reproduced for educational reference.

A Because the pericardium has no fibrous coat
B Because a fast effusion is always larger in the end
C Because the fibrous coat outside the serous layers resists distention in the short term
D Because a slow effusion drains itself through the mediastinum

39. **What is the difference between a regional cavity and a serous cavity?**

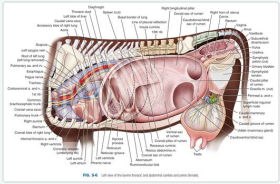


Image — Orsini JA, Grenager NS, de Lahunta A (eds). Comparative Veterinary Anatomy: A Clinical Approach . Academic Press/Elsevier — Fig 5-6, left view of the bovine thoracic and abdominal cavities and pelvis (female). Reproduced for educational reference.

A Regional cavities are in the trunk; serous cavities are in the head
B Regional cavities contain organs; serous cavities are empty of everything
C They are two names for the same thing
D Regional cavities are named by where they are; serous cavities are closed sacs lying inside the regions

40. **In a midline coeliotomy, which layer is the holding layer of the closure?**



Image — Skerritt G. King's Applied Anatomy of the Abdomen and Pelvis of Domestic Mammals . Wiley — Fig 1.10(c), transverse section of the ventral body wall of the dog. Reproduced for educational reference.

A The subcutaneous fat
B The external lamina of the rectus sheath
C The peritoneum
D The skin

41. **What changes about the rectus sheath behind the umbilicus?**

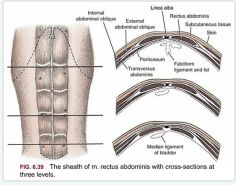


Image — Evans HE, de Lahunta A. Miller and Evans' Anatomy of the Dog , 5th ed. Elsevier — Fig 6.39, the sheath of m. rectus abdominis. Reproduced for educational reference.

A The sheath is replaced by the linea alba
B The external lamina disappears
C The internal lamina disappears, leaving only transversalis fascia and peritoneum deep to the rectus
D Both laminae fuse into one thick layer

42. **Why does a “full” exploratory coeliotomy run from xiphoid to pubis?**

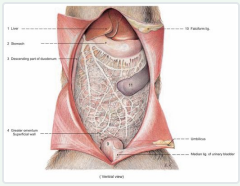


Image — Budras KD, McCarthy PH, Fricke W, Richter R. Anatomy of the Dog , 5th ed. Schlütersche — Abdominal cavity and digestive apparatus, ventral view. Reproduced for educational reference.

A Because the bladder cannot be reached otherwise
B Because a shorter incision cannot be extended
C To make closure easier
D Because the abdomen's cranial third hides inside the rib cage

43. **Which structure bounds the epiploic foramen ventrally?**

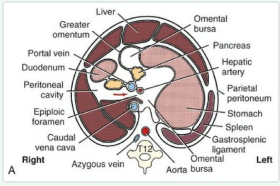


Image — Evans HE, de Lahunta A. Miller and Evans’ Anatomy of the Dog , 5th ed. Elsevier — Fig 7.36A, peritoneal schema, transverse section. Reproduced for educational reference.

A The aorta
B The portal vein
C The hepatic artery
D The caudal vena cava

44. **In the dog, what is routinely done with the falciform ligament at coeliotomy, and why?**

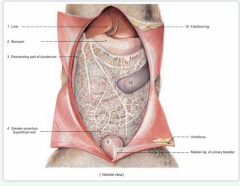


Image — Budras KD, McCarthy PH, Fricke W, Richter R. Anatomy of the Dog , 5th ed. Schlütersche — Abdominal cavity and digestive apparatus, ventral view. Reproduced for educational reference.

A It is preserved as a closure layer
B It is used to wrap an anastomosis
C It is resected, because it is fat-laden and obscures the cranial abdomen
D It is sutured to the diaphragm

45. **The ruminant stomach is best described as:**

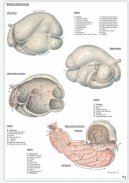


Image — Budras KD, Habel RE, Mülling CKW, Greenough PR. Bovine Anatomy: An Illustrated Text , 2nd ext. ed. Schlütersche — Stomach [Ventriculus], p. 71. Reproduced for educational reference.

A One glandular stomach with three diverticula
B Four stomachs in series
C One stomach with four compartments, three of them non-glandular forestomachs
D Two stomachs, each with two chambers

46. **About what proportion of the ruminant stomach is rumen, and what does that explain clinically?**

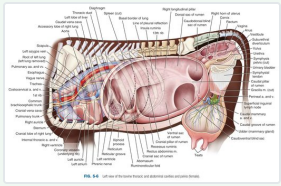


Image — Orsini JA, Grenager NS, de Lahunta A (eds). Comparative Veterinary Anatomy: A Clinical Approach . Academic Press/Elsevier — Fig 5-6, left view of the bovine thoracic and abdominal cavities and pelvis (female). Reproduced for educational reference.

A About 60%, which is why bloat is right-sided
B About 80%, which is why you auscultate the left paralumbar fossa
C About 95%, which is why the other compartments are vestigial
D About 40%, which is why the rumen is hard to find

47. **Inside the rumen, where do gas, fibre and fluid sit?**

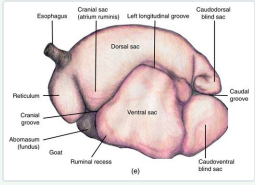


Image — Sarhan MS, Reece WO et al. Guide to Ruminant Anatomy: Dissection and Clinical Aspects , 2nd ed. Wiley — Fig 3.18e, goat stomach, left surface. Reproduced for educational reference.

A Fibre ventrally, gas in the middle, fluid dorsally
B Gas ventrally, fibre dorsally, fluid in the middle
C Gas dorsally, fibre floating in the middle, fluid ventrally
D They are continuously mixed and do not stratify

48. **Which compartment lies against the diaphragm opposite the heart, and what does that explain?**

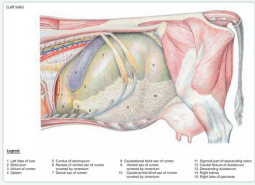


Image — Budras KD, Habel RE, Mülling CKW, Greenough PR. Bovine Anatomy: An Illustrated Text , 2nd ext. ed. Schlütersche — Abdominal cavity and Digestive system, p. 69, left side. Reproduced for educational reference.

A The reticulum — it explains hardware disease
B The rumen — it explains left-sided bloat
C The omasum — it explains impaction
D The abomasum — it explains displacement

49. **What does the reticular groove do in the suckling calf?**

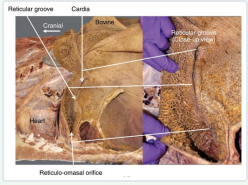


Image — Sarhan MS, Reece WO et al. Guide to Ruminant Anatomy: Dissection and Clinical Aspects , 2nd ed. Wiley — Fig 3.19d, reticular groove, with close-up. Reproduced for educational reference.

A It closes so that milk bypasses the forestomachs and goes straight to the abomasum
B It opens to admit milk to the rumen for fermentation
C It separates the reticulum from the omasum
D It closes to trap swallowed metal

50. **Where does the abomasum normally lie, and what happens when it fills with gas?**

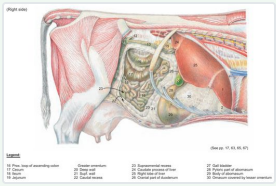


Image — Budras KD, Habel RE, Mülling CKW, Greenough PR. Bovine Anatomy: An Illustrated Text , 2nd ext. ed. Schlütersche — Abdominal cavity and Digestive system, p. 69, right side. Reproduced for educational reference.

A Dorsally, and gas has no effect on its position

B On the floor of the abdomen mostly to the right; gas can float it left (LDA) or right, where it may twist

C In the pelvis, and gas displaces it cranially

D On the left, and gas moves it right

VESSELS AND CIRCULATION · 13 QUESTIONS

51. **On abdominal ultrasound, which vessel is the landmark for the left adrenal gland?**

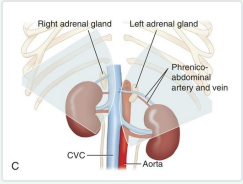


Image — Mattoon JS, Sellon RK, Berry CR (eds). Small Animal Diagnostic Ultrasound , 4th ed. Elsevier — Fig. 4.24, C. Reproduced for educational reference.

A The left renal vein

B The caudal vena cava

C The aorta

D The portal vein

52. **Where does the portal vein lie in relation to the body of the pancreas?**

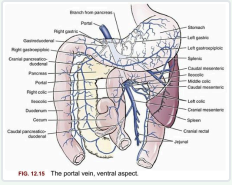


Image — Evans HE, de Lahunta A. Miller and Evans' Anatomy of the Dog , 5th ed. Elsevier — Fig 12.15, the portal vein, ventral aspect. Reproduced for educational reference.

A Ventral to it

B Dorsal to it

C Within it

D Lateral to it on the right only

53. **Canine kidney size on ultrasound is assessed how?**

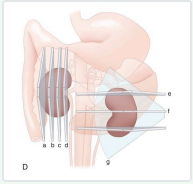


Image — Mattoon JS, Sellon RK, Berry CR (eds). Small Animal Diagnostic Ultrasound , 4th ed. Elsevier — Fig. 4.23, D. Reproduced for educational reference.

A As an absolute length in centimetres

B As a ratio to the aorta, 5.5–9.1

C As a ratio to the length of L2

D By volume, calculated from three measurements

54. **Embryonic aortic arch IV becomes the aorta. Which side do mammals keep, and which do birds?**

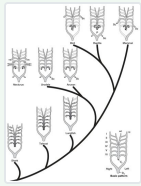


Image — Kardong KV. Vertebrates: Comparative Anatomy, Function, Evolution , 6th ed. McGraw-Hill — Fig 12.19, evolution of the aortic arches, after Goodrich. Reproduced for educational reference.

A Mammals the right, birds the left
B Both keep the left
C Mammals the left, birds the right
D Both keep the right

55. **For a lymph node on ultrasound, which measurement is more useful than size?**

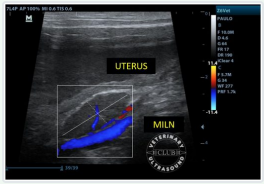


Image — Meirelles A, Aguillera P. Abdominal Ultrasound in Cats and Dogs: An Illustrated Reference Value Guide — Figure 33. Reproduced for educational reference.

A Distance from the nearest vessel
B The number of nodes in the group
C Depth from the skin
D Shape — a short : long axis ratio above 0.7 is a feature of malignancy

56. **Gain and power are often confused. What is the difference?**

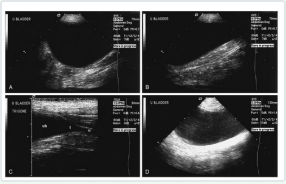


Image — Mattoon JS, Sellon RK, Berry CR (eds). Small Animal Diagnostic Ultrasound , 4th ed. Elsevier — Fig. 4.28. Reproduced for educational reference.

A They are two names for the same control on modern machines
B Gain amplifies echoes after the fact; power is the energy going into the patient
C Gain affects depth; power affects frequency
D Gain is the energy going into the patient; power amplifies the returning echoes

57. **A dark far field on an ultrasound image is usually which kind of problem?**



Image — Mattoon JS, Sellon RK, Berry CR (eds). Small Animal Diagnostic Ultrasound , 4th ed. Elsevier — Fig. 4.6. Reproduced for educational reference.

A A frequency problem
B A power problem
C A gain problem
D A TGC problem

58. **Every ultrasound artefact is a broken assumption. Which set of assumptions does the machine make?**

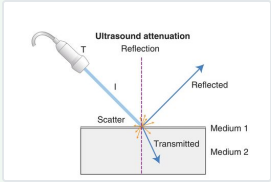


Image — Mattoon JS, Sellon RK, Berry CR (eds). Small Animal Diagnostic Ultrasound , 4th ed. Elsevier — Fig. 1.43. Reproduced for educational reference.

A That fluid is anechoic, that bone shadows, and that gas reverberates
B That tissue is homogeneous, that the probe is perpendicular, and that the patient is still
C That sound travels in a straight line, at a constant 1540 m/s, and only along the main beam
D That echoes return once, that depth is linear, and that gain is uniform

59. **Why start an abdominal scan at the liver?**



Image — Mattoon JS, Sellon RK, Berry CR (eds). Small Animal Diagnostic Ultrasound , 4th ed. Elsevier — Fig. 4.5. Reproduced for educational reference.

A Because it is the deepest organ, so depth, power and gain are then reduced working caudally
B Because it is the most commonly diseased
C Because the probe frequency is fixed by it
D Because it is the largest organ

60. **Non-visualisation of the pancreas on ultrasound tells you what?**

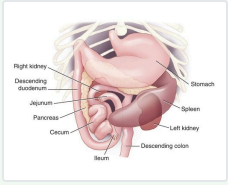


Image — Mattoon JS, Sellon RK, Berry CR (eds). Small Animal Diagnostic Ultrasound , 4th ed. Elsevier — Fig. 4.18. Reproduced for educational reference.

A That a mass is ruled out, and nothing else
B That the study is non-diagnostic and must be repeated
C That the pancreas is normal
D That pancreatitis is unlikely

61. **Which finding is NORMAL in the cat and would be abnormal read with canine expectations?**

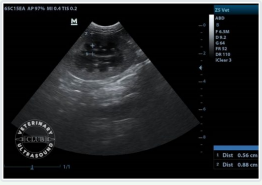


Image — Meirelles A, Aguillera P. Abdominal Ultrasound in Cats and Dogs: An Illustrated Reference Value Guide — Figure 5. Reproduced for educational reference.

A A distended gallbladder with sludge
B Free peritoneal fluid
C A jejunal node that has lost its hilus and turned hypoechoic
D A spoke-wheel stomach and an echogenic renal cortex

62. **Why does scanning the same sequence every time matter?**

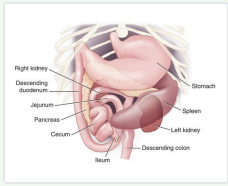


Image — Mattoon JS, Sellon RK, Berry CR (eds). Small Animal Diagnostic Ultrasound , 4th ed. Elsevier — Fig. 4.18. Reproduced for educational reference.

A It shortens the study

B Missed splenic disease is almost always a sequence failure rather than a knowledge failure

C It is required for image archiving

D It reduces the power delivered to the patient

63. **Which vessel lies dorsal to the epiploic foramen?**

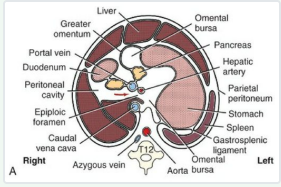


Image — Evans HE, de Lahunta A. Miller and Evans' Anatomy of the Dog , 5th ed. Elsevier — Fig 7.36A, peritoneal schema, transverse section. Reproduced for educational reference.

A The caudal vena cava

B The portal vein

C The hepatic artery

D The aorta

NERVES AND THE MOTOR SYSTEM · 12 QUESTIONS

64. **Every motor command reaches muscle through a two-neuron chain. Which neuron actually reaches the muscle?**

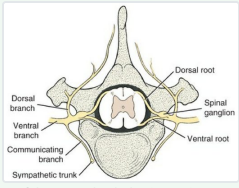


Image — Evans HE, de Lahunta A. Miller and Evans' Anatomy of the Dog, 5th ed. Elsevier — Fig. 17.1, diagram of a spinal nerve. Reproduced for educational reference.

A The lower motor neuron

B Both, in parallel

C Neither — an interneuron does

D The upper motor neuron

65. **What is a motor unit?**

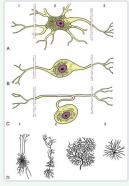


Image — Dyce KM, Sack WO, Wensing CJG. Textbook of Veterinary Anatomy, 5th ed. Saunders/Elsevier — Fig. 8.3, schematic diagrams of multipolar, bipolar and unipolar neurons, with drawings of actual neurons. Reproduced for educational reference.

A One spinal segment and the muscles it supplies

B One α motor neuron plus the muscle fibres it drives

C One muscle spindle and its γ neuron

D One muscle and all the nerves supplying it

66. **Which picture is typical of LOWER motor neuron disease?**

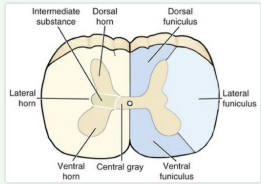


Image — Evans HE, de Lahunta A. Miller and Evans' Anatomy of the Dog, 5th ed. Elsevier — Fig. 14.14, major subdivisions of the gray and white matter of the spinal cord. Reproduced for educational reference.

A Spastic paresis, increased tone, hyperreflexia, little wasting
B Flaccid paresis, lost tone, reduced or absent reflexes, rapid severe atrophy
C Normal tone with intention tremor
D Normal strength with lost proprioception only

67. **Why are reflexes exaggerated below an upper motor neuron lesion?**

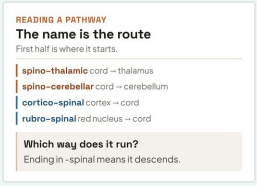


Diagram — Vet-eBooks.com, drawn for this guide. Schematic, not to scale. Data from Skerritt G. King's Applied Anatomy of the Central Nervous System of Domestic Mammals, 2nd ed. Wiley Blackwell, chs 8 and 10–13, and Dyce KM, Sack WO, Wensing CJG. Textbook of Veterinary Anatomy, 5th ed. Saunders/Elsevier, pp. 479–494.

A Because of disinhibition — the UMN normally brakes the spinal reflex
B Because the LMN becomes hypersensitive
C Because the muscle spindle enlarges
D Because sensory input increases

68. **Resting muscle tone is best described as:**

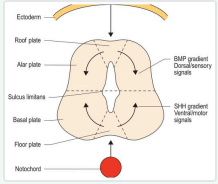


Image — Thomson C, Hahn C. Veterinary Neuroanatomy: A Clinical Approach. Saunders/Elsevier — Fig. 2.3A, dorsoventral differentiation of the neural tube. Reproduced for educational reference.

A Active — slow (type I) units fire tonically and the γ loop keeps the spindle sensitive at every length
B The result of continuous UMN firing directly onto muscle
C An artefact of the way tone is tested
D A passive property of the muscle's connective tissue

69. **Which three findings, read together, localise a lesion to UMN or LMN?**

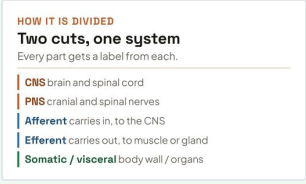


Diagram — Vet-eBooks.com, drawn for this guide. Data from Dyce KM, Sack WO, Wensing CJG. Textbook of Veterinary Anatomy, 5th ed. Saunders/Elsevier, pp. 439–440.

A Symmetry, onset and progression
B Pain, posture and gait
C Tone, reflexes and atrophy
D Proprioception, nociception and cranial nerves

70. **Which nerve supplies every extensor of the elbow, carpus and digits in the dog?**

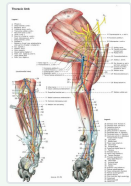


Image — Budras KD, McCarthy PH, Fricke W, Richter R. Anatomy of the Dog , 5th ed. — plate: Thoracic limb. Reproduced for educational reference.

A The ulnar nerve
B The musculocutaneous nerve
C The radial nerve
D The median nerve

71. **All the teeth of the dog are supplied by which single cranial nerve?**

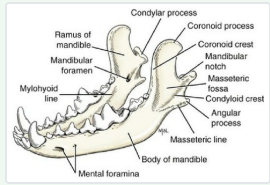


Image — Evans HE, de Lahunta A. Miller and Evans' Anatomy of the Dog , 5th ed. — FIG 4.38, left and right mandibles. Reproduced for educational reference.

A The trigeminal nerve (CN V)
B The glossopharyngeal nerve (CN IX)
C The hypoglossal nerve (CN XII)
D The facial nerve (CN VII)

72. **Which cranial nerves run in the wall of the equine guttural pouch?**

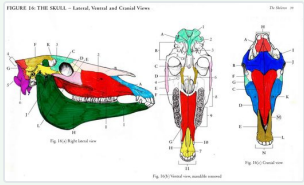


Image — Raynor M. The Horse Anatomy Workbook , Figure 16, The Skull. Reproduced for educational reference; copyright remains with the original author and publisher.

A CN I to CN IV
B CN V and CN VII only
C CN IX to CN XII
D CN II and CN III

73. **In the dog, what attaches the forelimb to the trunk?**

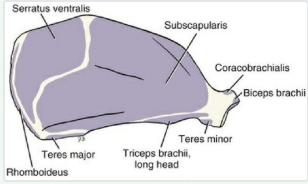


Image — Evans HE, de Lahunta A. Miller and Evans' Anatomy of the Dog , 5th ed. — Fig. 6.47, left scapula, areas of muscle attachment, medial. Reproduced for educational reference.

A A clavicle articulating with the sternum
B The scapula articulating with the first rib
C Muscle alone — the synsarcosis, with serratus ventralis as the main sling
D A fibrous joint between scapula and thorax

74. **Which pair of muscles acts as the collateral ligaments of the canine shoulder?**

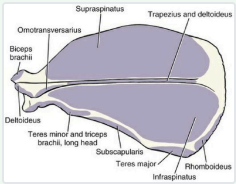


Image — Evans HE, de Lahunta A. Miller and Evans' Anatomy of the Dog , 5th ed. — Fig. 6.46, left scapula, areas of muscle attachment, lateral. Reproduced for educational reference.

- **A** Infraspinatus and subscapularis
- **B** Teres major and teres minor
- **C** Biceps brachii and triceps brachii
- **D** Supraspinatus and deltoideus

75. **Which of these is a two-joint muscle, and therefore one whose action is easy to get wrong?**



Image — Budras KD, McCarthy PH, Fricke W, Richter R. Anatomy of the Dog , 5th ed. — plate: Pelvic limb, medial view and plantar aspect of the paw. Reproduced for educational reference.

- **A** Brachialis
- **B** The long digital extensor, which starts on the femur
- **C** Serratus ventralis
- **D** Supraspinatus

SPECIES DIFFERENCES · 25 QUESTIONS

76. **Two structures are homologous when:**

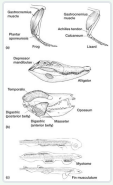


Image — Kardong KV. Vertebrates: Comparative Anatomy, Function, Evolution , 6th ed. McGraw-Hill — Fig 10.19, criteria for muscle homology, (c) after Goodrich. Reproduced for educational reference.

- **A** They look alike
- **B** They occupy the same position in the body
- **C** They trace back to the same structure in a common ancestor
- **D** They perform the same function

77. **A tuna and a dolphin have the same streamlined body shape. What is that an example of?**

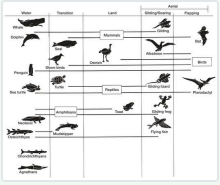


Image — Kardong KV. Vertebrates: Comparative Anatomy, Function, Evolution , 6th ed. McGraw-Hill — Fig 1.13, convergence of design. Reproduced for educational reference.

- **A** Serial homology
- **B** Analogy of ancestry
- **C** Homoplasy
- **D** Homology

78. **What is the permanent dental formula of the ox, and what is the total?**

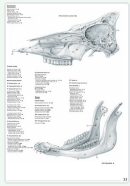


Image — Budras et al., Bovine Anatomy , 2nd ext. ed. — plate: Cranium and mandible. Reproduced for educational reference.

A 3-1-4-2 / 3-1-4-3, total 42
B 0-0-3-3 / 3-1-3-3, total 32
C 3-1-4-3 / 3-1-4-3, total 44
D 3-1-3-3 / 3-1-3-3, total 36

79. **Which domestic species has the most complete dentition, and how many teeth?**

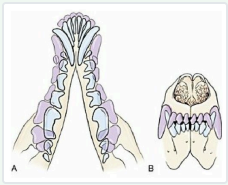


Image — Evans HE, de Lahunta A. Miller and Evans' Anatomy of the Dog , 5th ed. — FIG 7.7 A and B, superimposition of the dental arches and the bite of the incisor and canine teeth. Reproduced for educational reference.

A The horse, with 42
B The ox, with 32
C The pig, with 44
D The dog, with 42

80. **How many permanent teeth does the cat have?**

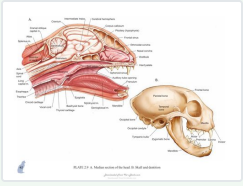


Image — McCracken TO, Kainer RA. Color Atlas of Small Animal Anatomy: The Essentials , Plate 2.9 (p. 42). Reproduced for educational reference; copyright remains with the original authors and publisher.

A 42
B 36
C 28
D 30

81. **What is the vertebral formula of the horse?**

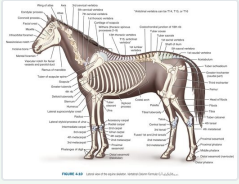


Image — Orsini JA, Grenager NS, de Lahunta A (eds). Comparative Veterinary Anatomy: A Clinical Approach . Academic Press/Elsevier — Fig 4-10, lateral view of the equine skeleton. Reproduced for educational reference.

A C7 T14–15 L6–7 S4 Cd20–23
B C7 T18 L6 S5 Cd15–21
C C7 T13 L7 S3 Cd20–23
D C7 T13 L6 S5 Cd18–20

82. **In which species does the spinal cord end most caudally?**

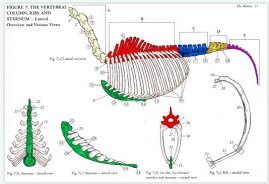


Image — Raynor M. The Horse Anatomy Workbook , Figure 7, The Vertebral Column, Ribs and Sternum. Reproduced for educational reference; copyright remains with the original author and publisher.

A The ox, at S1
B The horse, at S2
C The dog, at L6–L7
D The pig, at L5–L6

83. **Why is a lumbosacral epidural safe in the dog?**

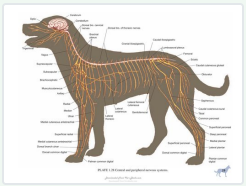


Image — McCracken TO, Kainer RA. Color Atlas of Small Animal Anatomy: The Essentials , Plate 1.28 (p. 29). Reproduced for educational reference; copyright remains with the original authors and publisher.

A Because the dog has no cauda equina
B Because the dural sac ends at L3
C Because the dog has three sacral vertebrae
D Because the lumbosacral space is behind the end of the cord

84. **Ox, sheep and goat are often treated as one row in a table. Name one way the sheep and the goat differ from each other:**



Image — Budras et al., Bovine Anatomy , 2nd ext. ed. — plate: Vertebral column, thoracic skeleton and nuchal ligament. Reproduced for educational reference.

A The goat is digitigrade
B The sheep has four sacral vertebrae to the goat's five
C The sheep has no dental pad
D The goat has three stomach compartments

85. **Which digits bear weight in the ox, and what is the stance called?**

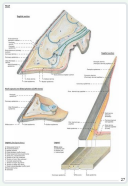


Image — Budras et al., Bovine Anatomy , 2nd ext. ed. — plate: Hoof. Reproduced for educational reference.

A III and IV; digitigrade
B III and IV; unguligrade
C II–V; digitigrade
D III alone; unguligrade

86. **In cattle, where is most lameness found?**

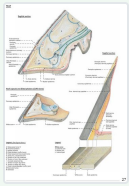


Image — Budras et al., Bovine Anatomy , 2nd ext. ed. — plate: Hoof. Reproduced for educational reference.

A The lateral claw of the hind foot
B The medial claw of the fore foot
C The lateral claw of the fore foot
D The medial claw of the hind foot

87. **Why does dehorning an adult cow open a sinus?**

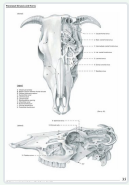


Image — Budras et al., Bovine Anatomy , 2nd ext. ed. — plate: Paranasal sinuses and horns. Reproduced for educational reference.

A Because the maxillary sinus lies under the horn base
B Because the horn is hollow and continuous with the nasal cavity
C Because the cornual artery runs inside the sinus
D Because the frontal sinuses extend into the horn cores

88. **Why is the left paralumbar fossa the surgical window in cattle?**

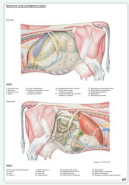


Image — Budras et al., Bovine Anatomy , 2nd ext. ed. — plate: Abdominal cavity and digestive system. Reproduced for educational reference.

A The abomasum always lies there
B The spleen is absent on that side
C The left kidney is retroperitoneal
D The rumen is the only viscus touching the left flank

89. **The bird's lung differs from a mammal's in which fundamental way?**



Image — McLelland J. A Colour Atlas of Avian Anatomy , Wolfe — plate 288, air sacs of an adult chicken, latex cast. Reproduced for educational reference.

A It is rigid and does not inflate; air sacs drive air one way through the parabronchi
B It inflates twice per cycle rather than once
C It has alveoli but no bronchi
D It is ventilated by the diaphragm alone

90. **What is a pneumatic bone, and why does it matter clinically?**

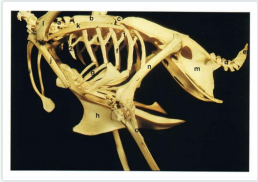


Image — McLelland J. A Colour Atlas of Avian Anatomy , Wolfe — plate 80, trunk skeleton of an adult chicken. Reproduced for educational reference.

A A hollow bone with no marrow, which cannot be used for intraosseous access
B A bone filled by air-sac diverticula, which links the skeleton to the airway
C A bone with an unusually large marrow cavity, which fractures easily
D A bone that ossifies late, so it is radiolucent in the juvenile

91. **Where does most proteolysis occur in the bird?**



Image — McLelland J. A Colour Atlas of Avian Anatomy , Wolfe — plate 123, interior of the proventriculus of an adult chicken. Reproduced for educational reference.

A The proventriculus
B The cloaca
C The gizzard
D The crop

92. **Which statement about the bird's urinary and reproductive tracts is correct?**



Image — McLelland J. A Colour Atlas of Avian Anatomy , Wolfe — plate 161, ovary and oviduct of an in-lay chicken. Reproduced for educational reference.

A Birds are ureotelic and have a small bladder
B Birds have paired functional ovaries and a urinary bladder
C Birds excrete urea through the cloaca and have no kidneys
D Birds are uricotelic, have no urinary bladder, and in most species only the left ovary develops

93. **The bird is often called the outlier that proves the rule. Why?**

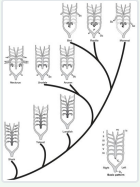


Image — Kardong KV. Vertebrates: Comparative Anatomy, Function, Evolution , 6th ed. McGraw-Hill — Fig 12.19, evolution of the aortic arches, after Goodrich. Reproduced for educational reference.

A Because birds are not tetrapods
B Because fused vertebrae, no diaphragm, a right aortic arch and a cloaca are the shared plan edited, not replaced
C Because birds share no homologies with mammals
D Because the bird skeleton has no limb segments

94. **What is the strongest evidence that two muscles in different species are homologous?**



Image — Kardong KV. Vertebrates: Comparative Anatomy, Function, Evolution , 6th ed. McGraw-Hill — Fig 10.19, criteria for muscle homology, (c) after Goodrich. Reproduced for educational reference.

A They keep the same nerve supply
B They have the same action
C They have the same attachments
D They have the same name in both species

95. **How do a cat's claws differ from a dog's, mechanically?**

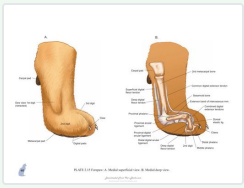


Image — McCracken TO, Kainer RA. Color Atlas of Small Animal Anatomy: The Essentials , Plate 2.15 (p. 48). Reproduced for educational reference; copyright remains with the original authors and publisher.

A They are protractible — sheathed at rest by an elastic ligament and extended by the deep digital flexor
B They are retracted by an extensor and extended by an elastic ligament
C They are permanently extended but shorter
D They are held out by the deep digital flexor at rest

96. **Why can a cat fit through any gap its head clears?**

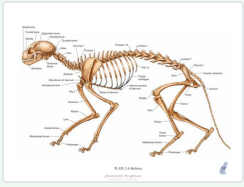


Image — McCracken TO, Kainer RA. Color Atlas of Small Animal Anatomy: The Essentials , Plate 2.4 (p. 37). Reproduced for educational reference; copyright remains with the original authors and publisher.

A The cat has no clavicle at all and no shoulder girdle
B The feline ribs are cartilaginous throughout life
C The scapulae are fused to the sternum
D A vestigial, free-floating clavicle means the forelimb hangs by muscle alone

97. **Which pair correctly describes the dog and the cat as feeders?**

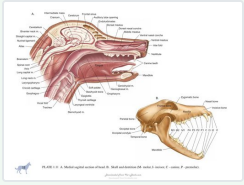


Image — McCracken TO, Kainer RA. Color Atlas of Small Animal Anatomy: The Essentials , Plate 1.11 (p. 12). Reproduced for educational reference; copyright remains with the original authors and publisher.

A Both obligate carnivores
B Dog omnivore; cat facultative carnivore
C Both facultative carnivores, the cat more so
D Dog facultative carnivore, able to digest starch; cat obligate carnivore

98. **Which two structures are found in the male dog and not in the male cat's equivalent arrangement?**

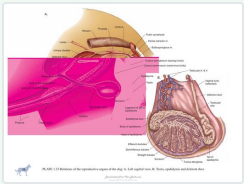


Image — McCracken TO, Kainer RA. Color Atlas of Small Animal Anatomy: The Essentials , Plate 1.23 (p. 24). Reproduced for educational reference; copyright remains with the original authors and publisher.

A A scrotum and an epididymis
B A prepuce and a retractor penis muscle
C An os penis and a bulbus glandis
D A prostate and a bulbourethral gland

99. **Which species is the exception to the usual blood-volume figure, and what is it?**

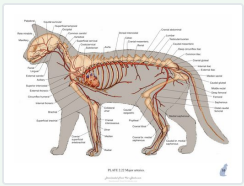


Image — McCracken TO, Kainer RA. Color Atlas of Small Animal Anatomy: The Essentials , Plate 2.22 (p. 55). Reproduced for educational reference; copyright remains with the original authors and publisher.

A The dog, at about 4%
B The ox, at about 10%
C The cat, at about 4% of body weight against 6–8% in the other domestic animals
D The horse, at about 12%

100. **Horn, claw, hoof, foot pads and the mammary gland are all filed under which heading, and why?**

What the nomenclature calls it

NAV HEADING	SYLLABUS WORD
Osteologia	Osteology
Arthrologia	Arthrology
Myologia	Myology
Splanchnologia	Splanchnology
Angiologia	Angiology
Systema nervosum	Neurology
Organa sensuum	Aesthesiology
Integumentum commune	— the same word

Diagram — Vet-eBooks.com, drawn for this guide. Data from the contents of Constantinescu's Illustrated Veterinary Anatomical Nomenclature , 4th ed., and Sisson and Grossman's The Anatomy of the Domestic Animals , Vol. I.

A The musculoskeletal system, because they are all keratinised
B The integument for horn and hoof only; the mammary gland is reproductive
C Splanchnologia, because they are all appendages
D The common integument — they are the same organ specialised

WRITTEN EXAM QUESTIONS · 20, WITH MODEL ANSWERS

101. **Define the median plane, and explain how it differs from a sagittal plane.**

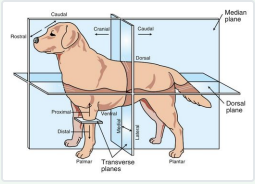


Image — Colville T, Bassert JM. Clinical Anatomy and Physiology for Veterinary Technicians , 4th ed. Elsevier — Fig. 1.1. Reproduced for educational reference.

102. **A radiographic view is requested as a dorsopalmar projection of the equine foot. Say what that describes, and name the rule that lets you read any view's name.**

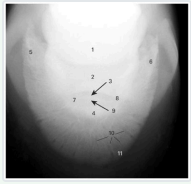


Image — Ashdown RR, Done SH. Clinical Anatomy of the Horse . Mosby/Elsevier — Fig 4.73, dorsopalmar view radiograph of distal phalanx. Reproduced for educational reference.

103. **Take the term *gastroenterology* apart, and say what each part contributes.**

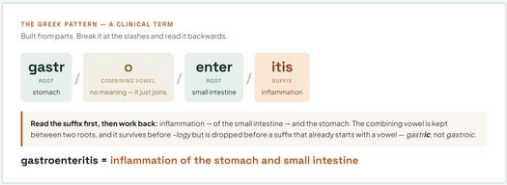


Diagram — Vet-eBooks.com, built for this guide. The word parts and the rules it illustrates are from Taibo A. Veterinary Medical Terminology Guide and Workbook , 2nd ed. Wiley.

104. **Give the permanent dental formula of the dog and of the cat, and account for the difference.**

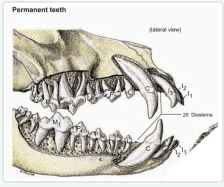


Image — Budras KD, McCarthy PH, Fricke W, Richter R. Anatomy of the Dog , 5th ed. — plate: permanent teeth, lateral view. Reproduced for educational reference.

105. **Name the two carnassial teeth of the dog and explain why they matter clinically.**

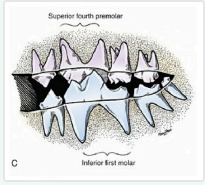


Image — Evans HE, de Lahunta A. Miller and Evans' Anatomy of the Dog , 5th ed. — FIG 7.7C, bite of the shearing teeth, medial view. Reproduced for educational reference.

106. **Working from the outside in, name the tissues of a tooth and say where each one stops.**

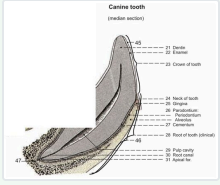


Image — Budras KD, McCarthy PH, Fricke W, Richter R. Anatomy of the Dog , 5th ed. — plate: canine tooth, median section. Reproduced for educational reference.

107. **Name the three segments of a tetrapod limb from the body outwards, and say which one carries most of the species variation.**

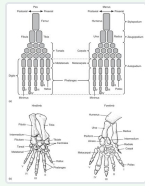


Image — Kardong KV. Vertebrates: Comparative Anatomy, Function, Evolution , 6th ed. McGraw-Hill — Fig 9.23, basic organization of the fore- and hindlimbs, after Smith and Jarvik. Reproduced for educational reference.

108. **Name the four serous cavities and explain, in one sentence, why an organ is never inside the cavity it appears to occupy.**

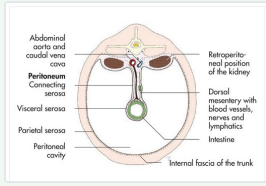


Image — König HE, Liebich H-G. Veterinary Anatomy of Domestic Animals: Textbook and Colour Atlas , 7th ed. Thieme — Fig. 1.62, schematic illustration of the serous membranes. Reproduced for educational reference.

109. **Explain why a small, rapidly accumulating pericardial effusion can tamponade the heart when a large, slowly accumulating one may not.**

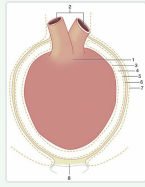


Image — Dyce KM, Sack WO, Wensing CJG. Textbook of Veterinary Anatomy , 5th ed. Elsevier — Fig. 7.5, schematic illustration of the pericardium. Reproduced for educational reference.

110. **Name the layer that holds a midline coeliotomy closure in the dog, and say what changes about it behind the umbilicus.**

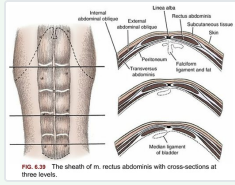


Image — Evans HE, de Lahunta A. Miller and Evans' Anatomy of the Dog , 5th ed. Elsevier — Fig 6.39, the sheath of m. rectus abdominis. Reproduced for educational reference.

111. **Describe the ruminant stomach in one sentence, then name the four compartments in the order ingesta meets them, with the side of the abdomen each lies on.**

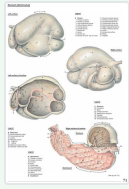


Image — Budras KD, Habel RE, Mülling CKW, Greenough PR. Bovine Anatomy: An Illustrated Text , 2nd ext. ed. Schlütersche — Stomach [Ventriculus], p. 71. Reproduced for educational reference.

112. **A colleague cannot find the left adrenal gland on abdominal ultrasound. Set out the approach you would give them.**

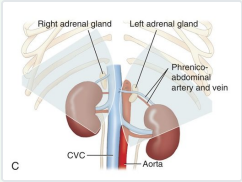


Image — Mattoon JS, Sellon RK, Berry CR (eds). Small Animal Diagnostic Ultrasound , 4th ed. Elsevier — Fig. 4.24, C. Reproduced for educational reference.

113. **Distinguish gain from power on an ultrasound machine, and give the working rule that follows.**

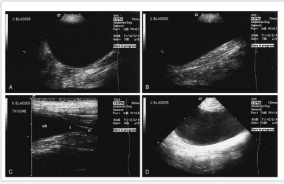


Image — Mattoon JS, Sellon RK, Berry CR (eds). Small Animal Diagnostic Ultrasound , 4th ed. Elsevier — Fig. 4.28. Reproduced for educational reference.

114. **Aortic arch IV becomes the aorta. Say which side mammals keep and which side birds keep, and give the clinical consequence of getting it the wrong way round.**

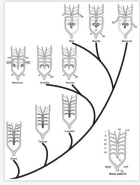


Image — Kardong KV. Vertebrates: Comparative Anatomy, Function, Evolution , 6th ed. McGraw-Hill — Fig 12.19, evolution of the aortic arches, after Goodrich. Reproduced for educational reference.

115. **Tabulate the five findings that separate upper from lower motor neuron signs, and give the one idea that makes the upper motor neuron column make sense.**

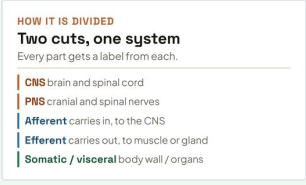


Diagram — Vet-eBooks.com, drawn for this guide. Data from Dyce KM, Sack WO, Wensing CJG. Textbook of Veterinary Anatomy, 5th ed. Saunders/Elsevier, pp. 439–440.

116. **Define a motor unit, and say how the central nervous system grades the force a muscle produces.**

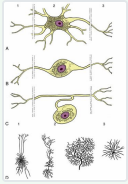


Image — Dyce KM, Sack WO, Wensing CJG. Textbook of Veterinary Anatomy, 5th ed. Saunders/Elsevier — Fig. 8.3, schematic diagrams of multipolar, bipolar and unipolar neurons, with drawings of actual neurons. Reproduced for educational reference.

117. **Explain why cattle have no upper incisors, and say what takes their place.**

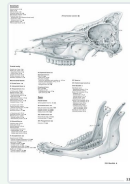


Image — Budras et al., Bovine Anatomy , 2nd ext. ed. — plate: Cranium and mandible. Reproduced for educational reference.

118. **Say why a lumbosacral epidural is a routine procedure in the dog, and why the same anatomy does not transfer to the cat unexamined.**

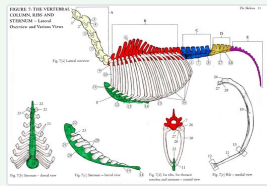


Image — Raynor M. The Horse Anatomy Workbook , Figure 7, The Vertebral Column, Ribs and Sternum. Reproduced for educational reference; copyright remains with the original author and publisher.

119. **Give three ways a bird's body plan differs fundamentally from a mammal's, and say what the differences have in common.**



Image — McLelland J. A Colour Atlas of Avian Anatomy , Wolfe — plate 288, air sacs of an adult chicken, latex cast. Reproduced for educational reference.

120. **Explain why the left paralumbar fossa is the standing surgical window in cattle, and why dehorning an adult cow opens a sinus.**

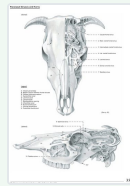


Image — Budras et al., Bovine Anatomy , 2nd ext. ed. — plate: Paranasal sinuses and horns. Reproduced for educational reference.

ANSWERS

1. **C** — There is exactly one median plane: the single plane that divides the body into equal right and left halves.
2. **D** — It is the dorsal plane.
3. **B** — Transverse.
4. **C** — Dorsal and palmar (forelimb) or plantar (hindlimb).
5. **D** — Rostral, and it is a head term only.
6. **C** — They are restricted to certain structures of the head.
7. **D** — Views are named by the beam's point of entry, then its point of exit.
8. **B** — Read the suffix first, then work backwards.
9. **C** — Nothing.
10. **A** — It is a genitive: carpi means “of the carpus”.
11. **A** — As a strong tendency, Latin names the parts and Greek describes what goes wrong.
12. **B** — Microscopic anatomy taught in its own right is histology.
13. **D** — Systematic follows a system; regional follows a place.
14. **B** — They are regional anatomy pursued with a particular aim — not separate subjects.
15. **C** — Aesthesiology.
16. **A** — An organ is several tissues working together, and a bone qualifies: bone tissue, periosteum and endosteum, marrow, and its own blood vessels and nerves.
17. **D** — About 60–70% mineral.
18. **C** — Whether there is a gap.
19. **A** — A gomphosis — a fibrous synarthrosis, the peg-in-socket joint.
20. **A** — 2 × (I 3/3, C 1/1, P 4/4, M 2/3) = 42.
21. **C** — P1 and every molar.
22. **B** — Upper P4 and lower M1.
23. **D** — Enamel over the crown, cementum over the root, dentine in between, pulp in the centre.
24. **A** — The infraorbital foramen.
25. **D** — The braincase is occipital, parietal, temporal, frontal, sphenoid and ethmoid.
26. **D** — Stylopodium, zeugopodium, autopodium — humerus or femur; radius and ulna or tibia and fibula; then the hand or foot.
27. **A** — Seven and eight.
28. **D** — Cervical — seven, in almost every mammal from the giraffe to the mouse.
29. **D** — It is suspended from the inside of the hoof wall by interlocking lamellae and does not rest on the sole.
30. **A** — Only the middle layer — the tubular horn — is thick enough to hold a nail.
31. **B** — Over the navicular bone.
32. **A** — The foot has no muscle at all.
33. **D** — Four: left pleural, right pleural, pericardial and peritoneal.
34. **B** — The organ is not in the cavity.
35. **A** — One continuous sheet does both jobs.
36. **D** — Kidneys, ureters and terminal rectum.
37. **A** — The mediastinum leaks.
38. **C** — The pericardium is the one serous sac with a fibrous coat outside its two serous layers, and that coat resists distention in the short term.
39. **D** — Both classifications are correct and they are answering different questions.
40. **B** — The external lamina of the rectus sheath.
41. **C** — The internal lamina disappears behind the umbilicus, so deep to the rectus there is only transversalis fascia and peritoneum.
42. **D** — The cranial third of the abdomen hides inside the rib cage.
43. **B** — The portal vein ventrally and the caudal vena cava dorsally.
44. **C** — It is resected.
45. **C** — One stomach with four compartments, and only the abomasum secretes acid.
46. **B** — About 80%.
47. **C** — Gas dorsally, fibre in the middle, fluid ventrally.
48. **A** — The reticulum, the most cranial and ventral compartment.
49. **A** — It closes, so milk bypasses the forestomachs and goes straight to the abomasum.

50. **B** — It lies on the floor of the abdomen, mostly to the right.
51. **C** — The aorta carries the left adrenal; the caudal vena cava carries the right.
52. **B** — Dorsal to the body of the pancreas.
53. **B** — As a ratio to the aorta — 5.5 to 9.1.
54. **C** — Mammals keep the left, birds the right.
55. **D** — Shape beats size.
56. **B** — Gain amplifies echoes after the fact; power is the energy going into the patient.
57. **D** — A TGC problem — time-gain compensation, which corrects for attenuation with depth.
58. **C** — The machine assumes sound travels in a straight line, at a constant 1540 m/s, and only along the main beam.
59. **A** — Because it is the deepest organ.
60. **A** — It rules out a mass, and nothing else.
61. **D** — Cats are not small dogs.
62. **B** — Because missed disease is almost always a sequence failure, not a knowledge failure.
63. **A** — The caudal vena cava dorsally, with the portal vein ventrally.
64. **A** — Only the lower motor neuron.
65. **B** — One α motor neuron plus the fibres it drives.
66. **B** — Flaccid paresis, lost tone, reduced or absent reflexes, rapid severe (neurogenic) atrophy, and fasciculations.
67. **A** — Disinhibition.
68. **A** — Tone is active.
69. **C** — Tone, reflexes and atrophy.
70. **C** — The radial nerve — and that single fact explains the classic knuckling dog.
71. **A** — The trigeminal, CN V.
72. **C** — CN IX to XII, together with the internal carotid artery.
73. **C** — Muscle alone.
74. **A** — Infraspinatus and subscapularis.
75. **B** — The long digital extensor — it starts on the femur, so it crosses the stifle as well as the joints of the digit.
76. **C** — Homology is about ancestry, not function.
77. **C** — Homoplasy — the parts simply look alike.
78. **B** — 0-0-3-3 / 3-1-3-3 = 32.
79. **C** — The pig, with 44 — 3-1-4-3 / 3-1-4-3, the true omnivore's mouth.
80. **D** — 30 — 3-1-3-1 / 3-1-2-1, the most reduced dentition of the domestic species.
81. **B** — C7 T18 L6 S5 Cd15–21.
82. **B** — The horse, at S2 — the most caudal termination of the domestic species.
83. **D** — Because the cord ends at L6–L7, so the lumbosacral space is behind it.
84. **B** — The sheep has four sacral vertebrae to the goat's five.
85. **B** — Digits III and IV, unguligrade — cloven, two claws, with two vestigial digits behind.
86. **A** — The lateral claw of the hind foot.
87. **D** — Because the frontal sinuses extend into the horn cores.
88. **D** — Because the rumen occupies most of the left abdomen and is the only viscus touching the left flank.
89. **A** — The bird lung is rigid and does not inflate.
90. **B** — A bone filled by air-sac diverticula — humerus, sternum, vertebrae, pelvis and skull in the bird.
91. **C** — The gizzard, which both grinds and digests.
92. **D** — Uricotelic, no urinary bladder, and in most species only the left ovary and oviduct develop.
93. **B** — Because every one of those differences is the shared plan edited, not replaced.
94. **A** — Nerve supply.
95. **A** — The cat's claws are protractible: held sheathed at rest by an elastic ligament and extended by the deep digital flexor.
96. **D** — Because the clavicle is vestigial and free-floating, so the forelimb hangs by muscle alone and the shoulders can be drawn together.
97. **D** — The dog is a facultative carnivore — more omnivorous than the cat, and able to digest starch because it has pancreatic amylase.
98. **C** — The os penis — a penile bone — and the bulbus glandis, the swelling responsible for the copulatory tie.
99. **C** — The cat, at about 4% of body weight, against 6–8% in the other domestic animals.
100. **D** — All of them sit under the common integument, because they are the same organ specialised.

101. **W1** — The median plane divides the body into equal right and left halves. There is exactly one; A sagittal plane is any plane parallel to the median plane. There are infinitely many; "Midsagittal" is not a third plane: it is the median plane under another name, and using it as though it were separate is the commonest error in this vocabulary.
102. **W2** — The beam enters the dorsal surface and leaves the palmar surface; The rule is point of entry, then point of exit, in that order; Palmar rather than plantar tells you this is a forelimb: below the carpus the caudal surface is palmar, and below the tarsus it is plantar.
103. **W3** — Two roots — gastr (stomach) and enter (intestine) — which carry the meaning; Combining vowels, the o in each join, which carry no meaning at all and exist to make the word pronounceable; A suffix, -logy, which says what kind of word it is: a study, not a condition or a procedure; Read a clinical term suffix first, then work backwards: the suffix tells you what kind of thing the word is before the root tells you where.
104. **W4** — Dog: 2 × (I 3/3, C 1/1, P 4/4, M 2/3) = 42; Cat: 2 × (I 3/3, C 1/1, P 3/2, M 1/1) = 30; The cat has lost premolars and molars, not incisors or canines — the reduction is at the back of the arcade; That reduction is what an obligate carnivore's mouth looks like: a shearing dentition with nothing kept for grinding.
105. **W5** — The upper fourth premolar (P4) and the lower first molar (M1); They shear past one another like scissor blades — the defining occlusion of a secodont carnivore; The upper P4 has three roots and is the strongest tooth of the upper jaw, which is why it is the one that fractures on bones and the one that takes longest to extract.
106. **W6** — Enamel covers the crown; Cementum covers the root; Dentine lies under both and makes up the bulk of the tooth; Pulp is in the centre, carrying the vessels and nerves; Enamel and cementum never cover the same surface; where the two coverings meet is the neck.
107. **W7** — Stylopodium — humerus or femur; Zeugopodium — radius and ulna, or tibia and fibula; Autopodium — the hand or the foot; Almost all the variation is in the autopodium: the humerus is recognisably the same bone in every domestic species, and the foot is not.
108. **W8** — Left pleural, right pleural, pericardial, peritoneal. The two pleural sacs count separately because they are separate sacs; One continuous sheet lines the wall as the parietal layer, folds back, and covers the organ as the visceral layer; The organ is therefore pushed into the sac from outside and lies outside its cavity — a fist pushed into a balloon is never inside the balloon's cavity.
109. **W9** — The pericardium is the one serous sac with a fibrous coat outside its serous layers; That coat resists distension in the short term, so a small volume raises intrapericardial pressure sharply; Given time the fibrous layer stretches, so a slowly accumulating effusion can become very large without tamponading; The clinical point: rate matters more than volume.
110. **W10** — The external lamina of the rectus sheath is the holding layer. Skin and fat contribute nothing to the strength of the closure; Behind the umbilicus the internal lamina disappears, so deep to the rectus there is only transversalis fascia and peritoneum; The practical consequence: the depth from muscle to abdominal contents changes along the incision, and a closure that misses the external rectus sheath is a dehiscence waiting to happen.
111. **W11** — One stomach with four compartments, three of them non-glandular forestomachs; only the abomasum secretes acid; Reticulum — most cranial, across the midline, against the diaphragm; Rumen — the whole left half of the abdomen; Omasum — right; Abomasum — right, on the floor.
112. **W12** — Find the vessel first, then the gland: the adrenals are small, variable and hard to find directly, and the vessels are neither; The aorta carries the left adrenal; the caudal vena cava carries the right; Non-visualisation rules out a mass and nothing else — a normal adrenal that is not seen is not a normal adrenal that has been assessed.
113. **W13** — Power is the energy going into the patient; Gain amplifies the returning echoes after the fact; The rule: use the least power that works and adjust gain afterwards; Turning power up to fix a dark image puts energy into the animal for no diagnostic gain.
114. **W14** — Mammals keep the left fourth arch; Birds keep the right; A mammal that keeps the right instead has a persistent right aortic arch, a vascular ring that traps the oesophagus; The presenting sign is a young animal regurgitating solid food at weaning.
115. **W15** — Paresis: flaccid in LMN, spastic in UMN; Tone: lost in LMN, increased in UMN; Reflexes: reduced or absent in LMN, normal to exaggerated in UMN; Atrophy: rapid and severe (neurogenic) in LMN, little in UMN; Fasciculations: present in LMN, absent in UMN; The idea: the UMN was the brake. Losing it releases the spinal reflex, so hyperreflexia is a sign of something lost, never of something added.
116. **W16** — A motor unit is one alpha motor neuron and all the muscle fibres it supplies; Force is graded by recruiting more units, in size order — small units first; And by raising the firing rate of the units already recruited; Neither mechanism changes how hard an individual fibre contracts.
117. **W17** — The upper incisor tooth germs do form in the embryo; their development is aborted before eruption; A dental pad — dense fibrous tissue bound to the bone — takes their place; The lower incisors bite against the pad, so nothing is cut between opposing teeth; the animal tears rather than cuts; The formula records it as zeros: 0-0-3-3 / 3-1-3-3 = 32.

118. **W18** — In the dog the spinal cord ends at about L6–L7, so the lumbosacral space is behind the end of the cord; The needle therefore enters a space containing cauda equina and cerebrospinal fluid, not cord; The cat's cord can still reach the lumbosacral space, so the anatomy that makes the approach routine in a dog is not present; The general rule this illustrates: a vertebral count is useless without the termination that goes with it.
119. **W19** — The lung is rigid and does not inflate: air sacs drive air one way through the parabronchi, and there is no diaphragm; Pneumatic bones are filled by air-sac diverticula, linking the skeleton to the airway — which is why they are avoided for intraosseous fluids; The bird is uricotelic, has no urinary bladder, and in most species only the left ovary and oviduct develop; urine, faeces and gametes all leave by the cloaca; What they have in common: each is the shared tetrapod plan edited, not replaced, which is why a student who knows the dog can understand the bird.
120. **W20** — The rumen occupies most of the left abdomen, so you know what lies immediately behind the incision before you make it; The paralumbar fossa is the only part of the abdomen not covered by ribs, which is what makes a standing flank approach possible at all; The frontal sinuses extend into the horn cores in the adult; So removing the horn opens the sinus, which is why dehorning an adult is a different operation from disbudding a calf.

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2. Singh B (ed). *Dyce, Sack and Wensing's Textbook of Veterinary Anatomy*, 5th ed. Elsevier — behind the species-differences material: the vertebral and dental formulae, the limb segments and the termination of the spinal cord.
3. König HE, Liebich H-G. *Veterinary Anatomy of Domestic Animals: Textbook and Colour Atlas*, 7th ed. Thieme — behind the osteology and viscera material.
4. International Committee on Veterinary Gross Anatomical Nomenclature. *Illustrated Veterinary Anatomical Nomenclature*, 4th ed. — the authority for the branch names and the directional and sectional terms.
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