NEET MDS Dental Anatomy and Oral Histology

Sample Paper – 3

Duration: 11 Minutes | **Maximum Marks: 56**

Instructions

- This paper contains **14** Multiple Choice Questions (Single Best Response), modelled on the Dental Anatomy, Embryology and Oral Histology content of **NEET MDS** conducted by NBEMS.
- The **14-question** length matches the number of Dental Anatomy and Oral Histology items you actually meet in the real 240-question paper.
- Each correct answer carries **+4 marks**. There is **negative marking of 1 mark** for every incorrect answer; unattempted questions carry no penalty.
- Every question has **exactly one best answer**. Choose the single most appropriate option.
- Attempt this practice paper in one timed sitting of about **11 minutes**, the pace the real computer-based test demands.

Permanent Tooth Morphology

Q1. Among all the anterior teeth of the permanent dentition, the tooth with the greatest mesiodistal crown width is the:

(A) Mandibular canine

(B) Maxillary central incisor

(C) Maxillary canine

(D) Maxillary lateral incisor

Q2. In an occlusal scheme showing canine protected occlusion, during a right lateral excursion the posterior teeth of both sides are protected because:

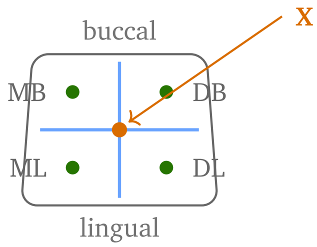
(A) The right posterior teeth remain in group function while the left side disoccludes

(B) The mandibular incisors contact the maxillary incisors and carry the excursive load

(C) Both condyles translate downwards and forwards so that all teeth separate equally

(D) The maxillary and mandibular canines on the right side contact and immediately disocclude every posterior tooth on both sides

Q3. The occlusal outline below is of a permanent mandibular molar showing four cusps of nearly equal size separated by a plus-shaped (cross) developmental groove pattern, with the groove junction marked **X**. This tooth is the:



(A) Mandibular first molar

(B) Maxillary first molar

(C) Maxillary second molar

(D) Mandibular second molar

Q4. The tooth showing the greatest variation in crown form, root form and size, and which is also the most commonly impacted tooth in the permanent dentition, is the:

(A) Maxillary canine

(B) Mandibular second premolar

(C) Third molar

(D) Maxillary lateral incisor

Deciduous Dentition and Eruption

Q5. The usual sequence in which the deciduous teeth erupt within one quadrant is:

(A) Central incisor, lateral incisor, first molar, canine, second molar

(B) Central incisor, lateral incisor, canine, first molar, second molar

(C) Central incisor, first molar, lateral incisor, canine, second molar

(D) Lateral incisor, central incisor, canine, first molar, second molar

Q6. The first deciduous tooth to erupt into the oral cavity, and the approximate age at which it does so, are:

(A) The mandibular central incisor, at about 6 months

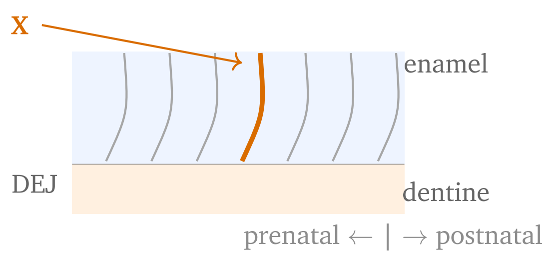
(B) The maxillary central incisor, at about 6 months

(C) The mandibular central incisor, at about 12 months

(D) The mandibular first molar, at about 6 months

Enamel

Q7. The ground section below shows several incremental lines in enamel. The single darker and much more accentuated line marked **X** separates enamel formed before birth from enamel formed after birth, and it is found only in the deciduous teeth and in the permanent first molar. Line **X** is the:



(A) Enamel tuft

(B) Enamel lamella

(C) Neonatal line

(D) Hunter-Schreger band

Q8. Regarding the hypomineralised and developmental structures of enamel, which statement is correct?

(A) Lamellae are thin leaf-like faults running the full thickness of enamel, tufts arise at the dentinoenamel junction and extend only into the inner third, and spindles are odontoblast processes that have crossed the dentinoenamel junction

(B) Tufts run the full thickness of enamel from the surface to the dentinoenamel junction, while lamellae are confined to the inner third

(C) Spindles are hypomineralised sheets of organic matrix that extend from the enamel surface into the dentine

(D) Lamellae, tufts and spindles are all fully mineralised structures with no organic content

Dentine and Pulp

Q9. In a ground section of dentine viewed by transmitted light, an area appears completely **black**, while an adjacent area appears **translucent**. The correct explanation is that:

(A) The black area is sclerotic dentine with occluded tubules, and the translucent area is a dead tract with air-filled tubules

(B) The black area is a dead tract, in which the tubules are empty and air-filled after the odontoblast processes have degenerated, while the translucent area is sclerotic dentine, in which the tubules have been occluded by mineral so that dentine and tubule contents have nearly the same refractive index

(C) Both areas are dead tracts, differing only in the thickness of the ground section

(D) The black area is interglobular dentine and the translucent area is the granular layer of Tomes

Q10. Unmineralised or hypomineralised areas of dentine matrix that lie just beneath the mantle dentine, retain the outline of unfused calcospherites, are traversed by uninterrupted dentinal tubules, and are markedly increased in vitamin D deficiency, are called:

(A) Predentine

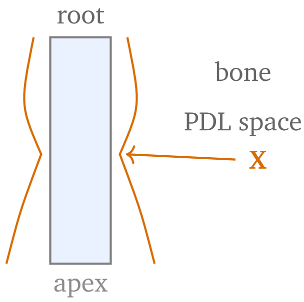
(B) Interglobular dentine

(C) Tomes' granular layer

(D) Reparative dentine

Cementum and Periodontal Ligament

Q11. The diagram below shows the periodontal ligament space around a root. The space is not uniform: it is widest at the crest and at the apex and narrowest at the level marked **X**, giving an hourglass profile. The average width of this ligament and the significance of level **X** are:



(A) About 2.0 mm, and **X** is the apical foramen

(B) About 0.02 mm, and **X** is the alveolar crest

(C) About 0.2 mm, and **X** is the level of the cementoenamel junction

(D) About 0.2 mm, and **X** is the fulcrum or axis of rotation of the tooth, near the middle third of the root

Q12. The clusters of epithelial cells scattered through the periodontal ligament, which are the persisting remnants of Hertwig's epithelial root sheath and may give rise to a radicular cyst, are the:

(A) Cementocytes in their lacunae

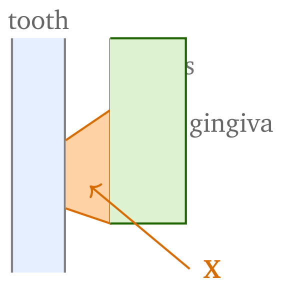
(B) Cell rests of Serres, derived from the dental lamina

(C) Epithelial rests of Malassez

(D) Undifferentiated mesenchymal cells of the perivascular spaces

Oral Mucosa, Salivary Glands and TMJ Histology

Q13. The diagram shows the dentogingival junction. The epithelium marked **X** forms a collar at the base of the gingival sulcus and is the only epithelium in the body that attaches to a hard, non-shedding surface. The structure through which it attaches to the tooth is the:



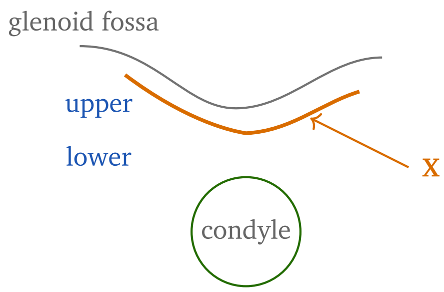
(A) A desmosomal attachment to the enamel rods

(B) A hemidesmosomal attachment to the internal basal lamina laid down on the tooth surface

(C) A layer of Sharpey's fibres inserted into the enamel

(D) A tight junction between the epithelial cells and the enamel crystals

Q14. The section of the temporomandibular joint below shows the disc marked **X** dividing the joint cavity into two compartments. The movements occurring in the upper and lower compartments respectively are:



(A) Translation (gliding) in the upper compartment and rotation (hinge) in the lower compartment

(B) Rotation in the upper compartment and translation in the lower compartment

(C) Rotation in both compartments

(D) Translation in both compartments

Detailed Solutions

Q1.

Solution

Concept – crown width is measured mesiodistally, not incisocervically: The question asks which anterior crown is the **widest**, so compare mesiodistal dimensions only and ignore length.

Step 1 – list the anterior teeth: The anterior teeth are the central incisors, lateral incisors and canines of both arches, six per arch.

Step 2 – take the maxillary central incisor: Its crown measures about **8.5 mm** mesiodistally, the largest figure among all twelve anterior teeth.

Step 3 – compare it with the nearest rival: The maxillary canine measures about 7.5 mm mesiodistally, so it is clearly narrower.

Step 4 – note why the maxillary central incisor is so wide: It is the only anterior tooth whose crown is wider mesiodistally in a way that dominates the labial aspect, which is why it sets the midline aesthetics and why a diastema between the two centrals is so conspicuous.

Step 5 – avoid the classic confusion: Widest mesiodistally is a different question from longest. Length belongs to the canine; mesiodistal width belongs to the maxillary central incisor.

Why the other options are wrong:

- A, the mandibular canine: is narrower than the maxillary canine, at about 7 mm, and is nowhere near the widest.
- C, the maxillary canine: is the **longest** anterior tooth, but at about 7.5 mm it is narrower than the central incisor. This is the intended trap.
- D, the maxillary lateral incisor: is about 6.5 mm wide and is the most variable anterior tooth in size, not the widest.

Final Answer: Maxillary central incisor $\Rightarrow \boxed{\text{B}}$

Answer: (B) Go Back to Q1

Q2.

Solution

Concept – what canine protected occlusion actually means: It is an occlusal scheme in which the canines alone carry the excursive contacts, so that every posterior tooth is unloaded the moment the mandible moves sideways.

Step 1 – define the excursion: In a right lateral excursion the mandible moves to the right. The right side becomes the **working** side and the left side the **non-working** or balancing side.

Step 2 – identify the contact: In canine guidance, the only teeth that touch on the working side are the maxillary and mandibular **canines**.

Step 3 – follow what that contact does: The steep lingual incline of the maxillary canine guides the mandibular canine along it. This immediately separates the working-side posterior teeth.

Step 4 – account for the other side: Because the guidance is on a long, steeply inclined tooth, the vertical separation it produces is enough to disocclude the **non-working** side posterior teeth as well, preventing balancing interferences.

Step 5 – explain why the canine is the chosen tooth: It has the longest root, the best crown-to-root ratio and the densest surrounding bone, and it carries a high density of periodontal proprioceptors that reflexly reduce the elevator muscle activity.

Why the other options are wrong:

- A, group function on the working side: is a **different** occlusal scheme, in which several working-side teeth share the excursive load. It is by definition not canine protection.
- B, the incisors carrying the excursive load: describes **incisal** guidance, which operates in protrusion rather than in lateral excursion.
- C, both condyles translating so that all teeth separate: is wrong on the mechanics. In a lateral excursion the working-side condyle merely rotates around a vertical axis while the non-working condyle translates. The separation of the posterior teeth is produced by the tooth guidance, not by symmetrical condylar translation.

Final Answer: Canine contact disoccludes all posterior teeth $\Rightarrow \boxed{\text{D}}$

Answer: (D) Go Back to Q2

Q3.

Solution

Concept – the groove pattern identifies a mandibular molar: The number of cusps and the shape of the developmental grooves are the quickest way to tell the two mandibular molars apart.

Step 1 – use the cusp count: The diagram shows **four** cusps, mesiobuccal, distobuccal, mesiolingual and distolingual, of nearly equal size.

Step 2 – use the groove pattern: A central groove running mesiodistally crossed by a single buccal and a single lingual groove gives a **plus or cross shape**, with the crossing point at X.

Step 3 – match to a tooth: Four nearly equal cusps in a plus-shaped pattern is the definition of the permanent **mandibular second molar**.

Step 4 – confirm with the arch: The outline is broader buccolingually at the buccal aspect and the crown converges lingually, which is a mandibular rather than a maxillary form.

Step 5 – add the supporting features: The mandibular second molar also has two roots that are closer together and often more distally inclined than those of the first molar, and its crown is slightly smaller.

Why the other options are wrong:

- A, the mandibular first molar: has **five** cusps, because it carries an additional distal cusp, and its grooves form a Y-shaped rather than plus-shaped pattern. The cusp count in the diagram rules it out.
- B, the maxillary first molar: has four major cusps but they are of clearly unequal size, with a large mesiolingual cusp, and it carries an oblique ridge running from the mesiolingual to the distobuccal cusp. An oblique ridge is never present in a mandibular molar, and no plus-shaped pattern results.
- C, the maxillary second molar: also has an oblique ridge, though a smaller one, and its distolingual cusp is markedly reduced, giving a rhomboidal outline rather than four equal cusps.

Final Answer: Mandibular second molar $\Rightarrow \boxed{D}$

$\boxed{\text{Answer: (D)}}$ Go Back to Q3

Q4.

Solution

Concept – the last tooth in each series is the most variable: Within any tooth series the terminal member is the least stable in form, and the third molar is the terminal member of the molar series.

Step 1 – take the variability: Third molars vary in everything. The crown may carry three, four, five or more cusps, it may be peg-shaped or bulbous, and the roots are commonly fused, dwarfed, hooked or dilacerated.

Step 2 – take the count: They are also the teeth most often congenitally missing, so even their presence is variable.

Step 3 – take the impaction: The third molar is the **most commonly impacted** tooth, because it erupts last, at about 17 to 21 years, into whatever space is left at the back of the arch.

Step 4 – explain the impaction: By then the arch length is fixed and the ramus has often not resorbed enough anteriorly to provide room, so the tooth is trapped against the ramus or against the second molar. The mandibular third molar is the single most frequently impacted tooth of all.

Step 5 – link variability and impaction: Both follow from the same fact. It is the last tooth to develop, so it has the least developmental control and the least available space.

Why the other options are wrong:

- A, the maxillary canine: is the **second** most commonly impacted tooth, but it is a stable, remarkably constant tooth in form. It fails on the variability half of the question.
- B, the mandibular second premolar: is variable in its lingual cusp number, being two-cusped or three-cusped, and it is a common congenitally missing tooth, but its variation is limited to the lingual cusps and it is not the most commonly impacted tooth.
- D, the maxillary lateral incisor: is the most variable **anterior** tooth and is frequently peg-shaped or missing, but the question asks across the whole dentition and the lateral incisor is rarely impacted.

Final Answer: Third molar $\Rightarrow \boxed{\text{C}}$

Answer: (C) Go Back to Q4

Q5.

Solution

Concept – the deciduous eruption order is not simply front to back: The first molar jumps ahead of the canine, and that single break in the front-to-back order is what the question tests.

Step 1 – write the standard sequence: Central incisor, lateral incisor, **first molar**, canine, second molar. In letter notation this is **A, B, D, C, E**.

Step 2 – attach the approximate ages: Central incisor about 6 to 8 months, lateral incisor about 9 to 13 months, first molar about 14 to 18 months, canine about 16 to 22 months, second molar about 25 to 33 months.

Step 3 – read the ages back: The ages confirm the order. The first molar at roughly 16 months clearly precedes the canine at roughly 19 months.

Step 4 – match to the options: Only option A gives central incisor, lateral incisor, first molar, canine, second molar.

Step 5 – note why the sequence matters: The deciduous dentition is complete by about two and a half to three years. Knowing that D erupts before C tells you which tooth to expect next in a partially erupted child and helps you judge whether eruption is delayed.

Why the other options are wrong:

- B, A B C D E: is the tempting straight front-to-back order. It is wrong because it places the canine before the first molar, whereas the first molar erupts several months earlier.
- C, A D B C E: puts the first molar second, ahead of the lateral incisor. The lateral incisor erupts at about 9 to 13 months, well before the first molar.
- D, B A C D E: starts with the lateral incisor. The central incisor is always the first tooth in the quadrant to erupt, and this option repeats the canine-before-molar error as well.

Final Answer: Central incisor, lateral incisor, first molar, canine, second molar $\Rightarrow$ $\boxed{\text{A}}$

Answer: (A) Go Back to Q5

Q6.

Solution

Concept – two facts must both be right, the tooth and the age: The question pairs an identity with a timing, so check each half separately.

Step 1 – settle the tooth: The first deciduous tooth to appear is the **mandibular central incisor**.

Step 2 – justify the arch: Mandibular teeth generally erupt ahead of their maxillary counterparts in the deciduous dentition, and the incisors show this most clearly.

Step 3 – settle the age: It erupts at about **6 months**, with a normal range of roughly 6 to 8 months.

Step 4 – cross-check with the maxillary central: The maxillary central incisor follows at about 8 to 12 months, which confirms that the mandibular tooth is first.

Step 5 – apply the clinical rule: A useful clinical guide is that the number of erupted teeth is roughly the age in months minus six, up to about two years. That rule only works because eruption starts at six months with the mandibular central incisor.

Why the other options are wrong:

- B, the maxillary central incisor at 6 months: has the right age but the wrong arch. The maxillary central incisor lags behind by two to six months.
- C, the mandibular central incisor at 12 months: has the right tooth but the wrong age. Twelve months is far too late; by one year a child usually has six to eight teeth already. Absence of any tooth by 13 to 15 months is what defines delayed eruption.
- D, the mandibular first molar at 6 months: is wrong on the tooth. The deciduous first molar erupts at about 14 to 18 months, third in the sequence.

Final Answer: Mandibular central incisor at about 6 months $\Rightarrow \boxed{\text{A}}$

Answer: (A) Go Back to Q6

Q7.

Solution

Concept – birth leaves a permanent mark in the enamel that is forming at the time: Only a tooth actively mineralising at the moment of birth can record the event.

Step 1 – read the defining feature: The line separates **prenatal from postnatal** enamel, so it must have formed at birth.

Step 2 – name it: That is the **neonatal line**, an exaggerated incremental line, essentially one accentuated stria among the ordinary ones, which is why the diagram draws it thicker and darker than its neighbours.

Step 3 – explain why it is accentuated: Birth is a sudden physiological shock. The change from placental to independent nutrition, the transient hypocalcaemia and the metabolic stress of the first days all disturb the ameloblasts, so the enamel laid down at that moment is more hypomineralised than usual and appears darker.

Step 4 – apply the distribution rule: A tooth can only record birth if it is mineralising at birth. That is true of **all deciduous teeth** and of the **permanent first molar** alone. Every other permanent tooth begins mineralising after birth and therefore has no neonatal line.

Step 5 – note the applications: Because prenatal enamel is better formed than postnatal enamel, the neonatal line is used in forensic dentistry to establish live birth, and its prominence reflects the severity of the birth process.

Why the other options are wrong:

- A, an enamel tuft: is a hypomineralised structure arising at the dentinoenamel junction and extending into the inner third of enamel. It is a developmental fault, not an incremental line, and it has no relation to birth.
- B, an enamel lamella: is a thin leaf-like fault running through the full thickness of enamel, oriented roughly perpendicular to the surface. It runs the wrong way and carries no timing information.
- D, a Hunter-Schreger band: is an optical phenomenon caused by the alternating direction of enamel rods in the inner two-thirds. The bands are alternating light and dark parazones and diazones, they are visible only under reflected light, and they are present in every tooth.

Final Answer: Neonatal line $\Rightarrow \boxed{C}$

$\boxed{\text{Answer: (C)}}$ **Go Back to Q7**

Q8.

Solution

Concept – three named enamel structures, told apart by extent and origin: Lamellae, tufts and spindles are constantly confused, so fix each one by where it starts and how far it goes.

Step 1 – take the enamel lamella: It is a thin, **leaf-like** fault of organic material running through the **full thickness** of enamel, from the surface all the way to the dentinoenamel junction, and it sometimes continues into dentine. Lamellae may be developmental, formed where a group of ameloblasts left unmineralised matrix, or post-eruptive cracks filled with organic debris from saliva. They are potential routes for bacteria into the tooth.

Step 2 – take the enamel tuft: It arises **at the dentinoenamel junction** and projects outwards only into the **inner third** of enamel. It is a hypomineralised, branching structure resembling tufts of grass, produced where groups of rods change direction abruptly. Tufts do not reach the surface and so they are not a caries route.

Step 3 – take the enamel spindle: It is an **odontoblast process** that has crossed the dentinoenamel junction into the enamel, having been trapped there because odontoblasts reached the site before amelogenesis began. Spindles are short, they cross the junction, and they may act as pain receptors.

Step 4 – fix the distinguishing rule: Lamella runs the full thickness, tuft occupies the inner third, spindle is a trapped odontoblast process crossing the junction. Length also separates them: lamellae are the longest, tufts intermediate, spindles the shortest.

Step 5 – match the option: Option A states exactly this set of three descriptions, so it is the correct statement.

Why the other options are wrong:

- B: reverses the two. Tufts are confined to the inner third and lamellae run the full thickness, which is the exact opposite of what this option says. This is the commonest error in the topic.
- C: misdescribes the spindle completely. Spindles are odontoblast processes, not sheets of organic matrix, and they extend from dentine **into** enamel rather than from the surface into dentine.
- D: is false for all three. Lamellae, tufts and spindles are all hypomineralised structures with a high organic content, which is precisely why they show up as defects in ground sections.

Final Answer: Lamellae full thickness, tufts inner third, spindles crossing the DEJ

$\Rightarrow \boxed{A}$

Answer: (A) Go Back to Q8

Q9.

Solution

Concept – what a ground section looks like depends on refractive index: In transmitted light, a structure appears dark when light is scattered away from the observer and translucent when it passes straight through.

Step 1 – take the dead tract: When odontoblasts are killed by caries, attrition or a cavity preparation, their processes degenerate and the tubules are left **empty**. In a dried ground section these empty tubules fill with **air**.

Step 2 – explain why it looks black: Air has a refractive index of about 1.0 while dentine is about 1.5. That large mismatch scatters and reflects the transmitted light completely, so the area appears **black** in transmitted light. Note that under reflected light the same area looks white, which is a favourite examination twist.

Step 3 – take sclerotic dentine: Here the odontoblasts survive the insult and respond by depositing peritubular mineral until the tubule lumen is **occluded** by mineral crystals.

Step 4 – explain why it looks translucent: A tubule filled with mineral now has almost the **same refractive index** as the surrounding intertubular dentine. With no interface to scatter light, the light passes through and the area looks **translucent**, which is why sclerotic dentine is also called transparent dentine.

Step 5 – place both in context: Both are defence and ageing responses. Sclerotic dentine forms where the odontoblast is still alive, slowing caries and reducing permeability, and it increases with age in the apical root. A dead tract forms where the odontoblast has died, and reparative dentine is usually walled off at its pulpal end. Option B states both correctly.

Why the other options are wrong:

- A: has the two exactly reversed. It assigns the black appearance to sclerotic dentine and the translucent appearance to the dead tract, which contradicts the refractive index reasoning in Steps 2 and 4.
- C: is false. The two areas differ in their contents, not in section thickness. A uniform ground section would not produce one black and one translucent zone by thickness alone.
- D: names the wrong structures. Interglobular dentine is an unmineralised matrix defect in the crown just under the mantle dentine, and Tomes' granu-

lar layer is a fine granular zone confined to the root just beneath the cementum. Neither produces a large black tract.

Final Answer: Black is the dead tract, translucent is sclerotic dentine $\Rightarrow \boxed{\text{B}}$

Answer: (B) Go Back to Q9

Q10.

Solution

Concept – dentine mineralises in globules, and the globules must fuse: When globular mineralisation fails to complete, the unfilled gaps between the globules remain as a named defect.

Step 1 – recall globular mineralisation: In much of the crown, mineral is laid down as separate spherical foci called **calcospherites**, which then enlarge and fuse into a continuous mineralised mass.

Step 2 – see what happens when fusion fails: If the calcospherites do not fuse, the spaces between them stay unmineralised. These spaces retain the **scalloped outline of the unfused globules**, which is the classic microscopic appearance.

Step 3 – name and locate the defect: This is **interglobular dentine**. It lies mainly in the crown, in the circumpulpal dentine **just beneath the mantle dentine**, and it follows the incremental pattern of the tissue.

Step 4 – apply the tubule clue: The dentinal tubules run **uninterrupted** through interglobular dentine. This is decisive. Only the matrix between the tubules failed to mineralise, so the tubules themselves are unaffected in course and number.

Step 5 – link it to vitamin D: Mineralisation depends on calcium and phosphate availability. In **vitamin D deficiency** and in hypophosphatasia the calcospherites cannot enlarge enough to fuse, so interglobular dentine is markedly increased. Its presence in large amounts is a histological marker of rickets, and it is also increased by high fluoride exposure.

Why the other options are wrong:

- A, predentine: is the unmineralised layer of newly formed matrix lying **immediately against the pulp**, between the odontoblasts and the mineralised dentine. It is a normal, continuously present zone at the wrong location, and it shows no globular outline.
- C, Tomes' granular layer: is a narrow granular zone found only in the **root**, just beneath the cementum. It is thought to represent looped or coalesced terminal tubules. Its location and appearance both differ.

- D, reparative dentine: is tertiary dentine laid down by newly differentiated cells at the pulpal surface in response to injury. It is irregular and sparsely tubular, is formed after the tooth is functional, and has no link to vitamin D or to calcospherite fusion.

Final Answer: Interglobular dentine $\Rightarrow \boxed{\text{B}}$

Answer: (B) Go Back to Q10

Q11.

Solution

Concept – the ligament space is shaped by how the tooth moves: The periodontal ligament is not a uniform gap. Its width mirrors the mechanics of tooth movement.

Step 1 – give the average width: The periodontal ligament averages about **0.2 mm**, with a usual range of roughly 0.15 to 0.38 mm.

Step 2 – describe the profile: The space is **widest at the alveolar crest and at the apex** and **narrowest in the middle third** of the root. Drawn out, this gives the **hourglass** shape shown in the diagram.

Step 3 – name the narrow level: The narrowest point is the **fulcrum**, the axis about which the tooth rotates when a horizontal force is applied.

Step 4 – explain the mechanics: A tooth tipped by a lateral force pivots about that fulcrum. Points furthest from the fulcrum, the crest and the apex, travel the greatest distance, so they need the widest ligament space. The fulcrum itself barely moves, so it needs the least. The hourglass shape is therefore a direct consequence of rotation about a mid-root axis.

Step 5 – add the clinical corollaries: The width is not fixed. A heavily loaded tooth widens its ligament and a hypofunctional or non-functional tooth narrows it, sometimes to about 0.1 mm. In orthodontics the fulcrum is exactly the point to move if bodily movement rather than tipping is wanted, which is why couples are applied.

Why the other options are wrong:

- A, about 2.0 mm and the apical foramen: is wrong on both counts. Two millimetres is ten times too wide and would represent gross pathological mobility, and the apical foramen is at the apex, which is one of the **widest** parts of the space rather than the narrowest.
- B, about 0.02 mm and the alveolar crest: is ten times too narrow, and the

alveolar crest is again a **wide** part of the hourglass, not the waist.

- C, about 0.2 mm and the cementoenamel junction: has the right width but names the wrong level. The cementoenamel junction lies at the coronal end of the root, above the alveolar crest, and is not the fulcrum. The fulcrum sits near the middle third.

Final Answer: About 0.2 mm, narrowest at the mid-root fulcrum $\Rightarrow \boxed{\text{D}}$

$\boxed{\text{Answer: (D)}}$ Go Back to Q11

Q12.

Solution

Concept – the periodontal ligament is the one connective tissue that normally contains epithelium: Those epithelial cells are a developmental leftover, and they explain a common jaw cyst.

Step 1 – recall root formation: The root is shaped by **Hertwig's epithelial root sheath**, formed where the inner and outer enamel epithelia meet at the cervical loop.

Step 2 – follow what happens to the sheath: Once the sheath has induced the dental papilla cells to become odontoblasts and the first layer of root dentine is laid down, the sheath **fragments**.

Step 3 – name the fragments: The broken-up remnants persist in the periodontal ligament as clusters of epithelial cells, the **epithelial rests of Malassez**.

Step 4 – explain why the fragmentation matters: The sheath must break up so that the dental follicle cells can reach the newly formed root dentine and differentiate into cementoblasts. Without fragmentation there would be no cementum, and the rests are simply the debris of that necessary process.

Step 5 – give the pathology: The rests are normally quiescent, but chronic inflammation from a necrotic pulp stimulates them to proliferate. The proliferating epithelium lines the periapical granuloma and its centre breaks down, producing a **radicular cyst**, the commonest odontogenic cyst of the jaws. This is exactly the link the question makes.

Why the other options are wrong:

- A, cementocytes in lacunae: are not epithelial and do not lie in the ligament. They are trapped cementoblasts within **cellular cementum** on the root surface.
- B, cell rests of Serres: are epithelial rests, but they are the remnants of the

dental lamina and lie in the **gingiva**, not in the periodontal ligament. They are implicated in gingival cysts and the eruption pathway, not in radicular cysts. This is the intended trap, since both are epithelial rests.

- D, undifferentiated mesenchymal cells: are genuinely present in the perivascular spaces of the ligament and are its important progenitor pool for fibroblasts, cementoblasts and osteoblasts. They are mesenchymal rather than epithelial and are not derived from the root sheath.

Final Answer: Epithelial rests of Malassez $\Rightarrow$ $\boxed{\text{C}}$

Answer: (C) Go Back to Q12

Q13.

Solution

Concept – attaching soft tissue to a hard, non-shedding surface is a unique problem: The junctional epithelium solves it with a specialised basal lamina and hemidesmosomes.

Step 1 – identify the epithelium: The collar at the base of the gingival sulcus, marked X, is the **junctional epithelium**. It is non-keratinised, is about 15 to 30 cells thick coronally and tapers to 1 to 3 cells at its apical end.

Step 2 – describe the attachment apparatus: Its cells facing the tooth secrete an **internal basal lamina** directly onto the tooth surface, and they anchor to it by **hemidesmosomes**. Together these form the epithelial attachment.

Step 3 – note the second basal lamina: The same epithelium simultaneously attaches to the underlying connective tissue by an **external basal lamina**, again through hemidesmosomes. Being attached on both faces is what makes it unique.

Step 4 – explain why hemidesmosomes and not desmosomes: A desmosome joins one cell to **another cell**. Enamel is not a cell, so a cell-to-cell junction is impossible. A hemidesmosome is exactly half a desmosome and is the junction a cell uses to attach to a **basal lamina**, which is what the tooth surface has been given here.

Step 5 – give the clinical importance: The junctional epithelium has wide intercellular spaces and a very high turnover of four to six days, allowing gingival crevicular fluid and neutrophils to pass into the sulcus. It is the seal of the periodontium, and its apical migration along the root converts a gingival sulcus into a periodontal pocket.

Why the other options are wrong:

- A, desmosomes to the enamel rods: is the classic error. Desmosomes join cell to cell. Enamel rods are mineral, so no desmosome can form against them. Desmosomes do join the junctional epithelial cells to each other, but not to the tooth.
- C, Sharpey's fibres inserted into enamel: is wrong twice over. Sharpey's fibres are collagen fibres of the **periodontal ligament** that insert into cementum and alveolar bone, and they are never epithelial and never enter enamel.
- D, tight junctions to the enamel crystals: is also a cell-to-cell junction, used to seal the space between adjacent epithelial cells. It cannot attach a cell to a mineralised surface.

Final Answer: Hemidesmosomes to the internal basal lamina $\Rightarrow \boxed{\text{B}}$

Answer: (B) Go Back to Q13

Q14.

Solution

Concept – one joint doing two different jobs needs two separate cavities: The disc divides the temporomandibular joint into two functionally distinct compartments, which is why it is called a compound joint.

Step 1 – set the anatomy: The biconcave fibrocartilaginous disc lies between the mandibular condyle below and the glenoid fossa with the articular eminence above. Its periphery is attached to the capsule, so it seals off two separate synovial cavities.

Step 2 – take the upper compartment: It lies between the disc and the **glenoid fossa and articular eminence**. It is the larger cavity, holding about 1.2 mL. Here the **disc and condyle move together** as a unit forwards and downwards along the eminence. This is **translation**, a gliding movement, and it is why the upper compartment is called the discotemporal or gliding compartment.

Step 3 – take the lower compartment: It lies between the disc and the **condyle**. It is the smaller cavity, holding about 0.9 mL. Here the condyle **rotates** beneath the disc about a horizontal axis. This is the hinge movement, and the compartment is called the discocondylar or rotational compartment.

Step 4 – follow a single act of opening: For the first 20 to 25 mm of opening, the movement is almost purely **rotation** in the lower compartment. Beyond that, **translation** in the upper compartment carries the condyle and disc forwards onto the eminence to complete the opening to about 40 to 50 mm. The two movements are sequential, then combined.

Step 5 – match the option: Translation above and rotation below is option A.

Why the other options are wrong:

- B, rotation above and translation below: has the two compartments exactly reversed. This is the intended trap, and it is mechanically impossible, because the condyle can only rotate against the surface it directly touches, which is the underside of the disc.
- C, rotation in both compartments: would leave the jaw unable to open beyond about 25 mm, since maximal opening depends on the condyle-disc unit translating onto the eminence.
- D, translation in both compartments: would leave no hinge movement at all, and it also ignores the fact that the disc and condyle move together as a unit in the upper compartment rather than sliding on each other.

Final Answer: Translation above, rotation below $\Rightarrow \boxed{A}$

Answer: (A) Go Back to Q14

Answer Key

Q	Ans	Q	Ans	Q	Ans	Q	Ans	Q	Ans
1	B	2	D	3	D	4	C	5	A
6	A	7	C	8	A	9	B	10	B
11	D	12	C	13	B	14	A		