Supplementary Material 1

Example of LLM mark scheme phrasing (for SAPs)

You are planning to restore a Class I cavity in a lower molar using composite resin. Outline the key steps involved in placing a composite restoration.
(5 marks)

Mark Scheme:

1. ***Cavity Preparation*** *(1 mark):*
    - ***Detail:*** *The cavity should be properly cleaned and shaped. All carious tissue must be removed to prevent any further decay under the restoration. Ensure smooth margins, particularly on the enamel, to promote a good bond. If enamel margins are present, it's beneficial to bevel them to increase surface area for bonding. Be conservative with tooth structure while ensuring sufficient access and space for the composite material.*
2. ***Etching*** *(1 mark):*
    - ***Detail:*** *Apply* ***35-37% phosphoric acid*** *to the enamel for around 15-20 seconds and then to the dentine for 10-15 seconds. This step demineralizes the enamel and opens the dentine tubules to create a micro-retentive surface for bonding. Proper etching increases the surface energy of the tooth, allowing for stronger adhesion. Thoroughly rinse the etched surfaces with water to remove all etching agent and debris, then gently dry the tooth, keeping the dentine moist to avoid collagen fiber collapse.*
3. ***Bonding*** *(1 mark):*
    - ***Detail:*** *Apply a* ***dental adhesive bonding agent*** *(often a primer followed by adhesive) to both the enamel and dentine. The adhesive fills the micro-pores created by etching, forming a hybrid layer that enhances retention and provides a tight seal to reduce microleakage. Light cure the adhesive for 10-20 seconds according to the manufacturer's instructions to ensure proper polymerization. Some adhesives may require multiple layers or air-thinning before curing. Achieving a good bond reduces the risk of secondary caries and improves the longevity of the restoration.*
4. ***Incremental Placement of Composite*** *(1 mark):*
    - ***Detail:*** *Place the composite resin in* ***increments no greater than 2 mm****. This technique minimizes polymerization shrinkage, which can lead to stress on the restoration and tooth structure, potentially causing marginal gaps or microfractures. Light cure each layer for 20-40 seconds based on the composite material's instructions. Use a layering technique to ensure each increment is adequately cured and to match the natural anatomy of the tooth. The use of a shade-matching technique is also crucial here to ensure aesthetics.*
5. ***Finishing and Polishing*** *(1 mark):*
    - ***Detail:*** *Once the final increment is placed and cured, shape the restoration using* ***finishing burs*** *and discs to recreate the tooth's natural*

contours, especially ensuring that the occlusion is correct and that no excess material remains at the margins. After shaping, use progressively finer polishing instruments (such as rubber points or polishing paste) to achieve a smooth, glossy surface that resists plaque accumulation. Proper finishing reduces the likelihood of staining or wear and enhances the aesthetic appearance of the restoration, especially in visible areas.

Supplementary Material 2

Example of LLM mark scheme

A 45-year-old male patient presents with generalised bleeding on probing, probing depths of 6-7 mm, and radiographic evidence of 30% horizontal bone loss. He is a smoker (20 cigarettes/day) with poor plaque control, and his BPE scores are predominantly 3s and 4s. Describe the steps in managing this patient's periodontal condition, including both initial and long-term strategies. (5 marks)

Mark Scheme:

1. ***Initial Assessment and Diagnosis*** *(1 mark):*
    - *Full periodontal examination, including six-point probing and radiographic assessment to confirm diagnosis of* ***generalized stage II-III periodontitis****.*
    - *Identify contributing risk factors:* ***smoking and poor plaque control****.*
    - *Discuss initial communication of diagnosis and importance of addressing modifiable risk factors, particularly* ***smoking cessation****.*
2. ***Initial Therapy (Non-surgical Phase)*** *(1 mark):*
    - *Focus on* ***non-surgical periodontal therapy (NSPT)*** *or* ***scaling and root planing (SRP)*** *to reduce microbial load and inflammation.*
    - *Emphasize the need for* ***plaque control*** *through oral hygiene instruction (brushing technique, interdental cleaning).*
    - *Discussion of potential adjuncts such as* ***antimicrobial mouth rinses****.*
3. ***Smoking Cessation*** *(1 mark):*
    - *Detailed discussion of the role of* ***smoking cessation*** *in improving treatment outcomes.*
    - *Involvement of* ***Very Brief Advice (VBA)*** *or referral to smoking cessation services.*
4. ***Reassessment Phase*** *(1 mark):*
    - ***Reevaluation*** *after 6-8 weeks to assess clinical outcomes (reduction in probing depths, bleeding on probing, plaque scores).*
    - *Determine if further non-surgical treatment is needed or if* ***surgical intervention*** *(e.g., flap surgery) is required for persistent deep pockets.*
5. ***Long-term Maintenance Phase*** *(1 mark):*
    - *Importance of a structured* ***periodontal maintenance*** *program with* ***regular recalls*** *(every 3-6 months).*
    - *Ongoing* ***plaque control*** *and smoking cessation reinforcement.*
    - *Monitoring for signs of* ***disease recurrence*** *and managing compliance with oral hygiene.*