1. Nitrous oxide is:
    a. Metabolized by the liver enzymes
    b. Metabolized by the kidney in the renal tubules
    c. Metabolized by enzymes in the blood
    d. Not metabolized in the body, but instead exhaled unchanged by the lungs
    Answer = d

2. Therapeutic effects of nitrous oxide include:
    a. Anxiolysis
    b. Analgesia
    c. Amnesia
    d. All of the above
    Answer = d

3. Distraction during nitrous oxide sedation can be a great supplemental technique. Distraction could include any of the following EXCEPT:
    a. Storytelling by a child life specialist
    b. Singing a lullaby by the child's mother and the nursing staff
    c. Loud talking in multiple conversations between the parents and the nursing staff
    d. Asking the child to take several slow deep breaths focusing on their breathing
    Answer = c

4. A child who is receiving nitrous oxide sedation develops increased sweating, looks pale, has facial grimacing, and starts to have repetitive swallowing. Your diagnosis and next action step would be:
    a. Impending vomiting; reduce the nitrous oxide concentration immediately
    b. Breakthrough pain; increase the nitrous oxide concentration to 80%
    c. Stable; continue the current level of nitrous oxide
    d. Too tight face mask; simply provide "blow by" gas flow
    Answer = a

5. Nitrous oxide sedation is contraindicated in all of the following situations EXCEPT:
    a. Recent brain tumor resection
    b. Severe post-operative ileus following an appendectomy
    c. History of asthma
    d. Recent eye surgery
    Answer = c

6. If sedation with nitrous oxide does not seem to be effective, one potential reason could be:
    a. The child is allergic to nitrous oxide and is therefore not responding
    b. The child does not like the face mask and nitrous oxide should be provided as "blow by" gas flow
    c. The circuit tubing may be kinked, preventing comfortable exhalation

d. The oxygen tank is empty and the child is receiving 100% nitrous oxide gas
Answer = c

7. Nitrous oxide sedation can generally be utilized for all of the following procedures EXCEPT:
    a. Bladder catheterization for VCUG
    b. Peripheral IV placement for antibiotic administration
    c. Chest tube placement for pneumothorax
    d. Simple laceration repair with topical anesthetics
    Answer = c

8. The purpose of the circuit's flow meter is to:
    a. Provide a scavenger system to minimize environmental exposure
    b. Indicate amount of nitrous oxide remaining in the tank
    c. Indicate gas delivery in liters per minute
    d. Indicate minutes of operation
    Answer = c

9. Techniques to minimize occupational exposure to nitrous oxide gas include:
    a. Standing back at least 2 feet at all times from a patient who is receiving nitrous oxide
    b. Incorporating a scavenging system into the circuit that connects to the waste gas/suction vacuum system
    c. Taking the mask on and off the child's face to allow them to exhale and dilute the nitrous oxide
    d. Providing no more than 40% nitrous oxide gas
    Answer = b

10. Other contraindications to nitrous oxide sedation include:
    a. Known vitamin B12 deficiency
    b. Previous chemotherapy with bleomycin sulfate
    c. Recent penetrating eye injury
    d. All of the above
    Answer = d

11. Advantages of using nitrous oxide for sedation in children include all of the following EXCEPT:
    a. It has both rapid onset and rapid recovery
    b. There is no need for monitoring during the procedure
    c. It is not irritating to the airways or lungs
    d. The percentage of inhaled nitrous oxide can be titrated to the patient's needs
    Answer = c

12. The pre-procedure equipment check prior to a nitrous oxide sedation should include:
    a. Checking to ensure that the nitrous oxide and oxygen tanks are open and have adequate gas supply

b. Checking to ensure that the circuit fail safe mechanism is working
c. Checking to make sure that the scavenging vacuum system is working
d. All of the above
Answer = d

13. The term, "fail safe," when applied to nitrous oxide equipment, means that:
a. It can never deliver less than 30% oxygen
b. It always turns on when connected to a vacuum system
c. It never fails to provide adequate sedation
d. It has a locking mechanism to prevent unauthorized use
Answer = a

14. Risks associated with nitrous oxide include:
a. Anemia due to altered vitamin B12 metabolism
b. Potential for illicit/recreational abuse
c. Nausea and vomiting
d. All of the above
Answer = d

15. Titration of the percentage of delivered nitrous oxide during sedation is valuable because:
a. The percentage of oxygen administered only increases if the nitrous oxide percentage is increased
b. Teenagers often require a higher percentage of delivered nitrous oxide than toddlers
c. The percentage of nitrous oxide should be decreased during the most painful part of the procedure
d. The percentage of nitrous oxide can be titrated to individual patient effect
Answer = d

16. At the end of the procedure, 100% oxygen is administered in order to:
a. Maximize the patient's oxygen saturation before the oxygen is removed
b. Decrease environmental nitrous oxide exposure for the health care team
c. Minimize the risk of diffusion hypoxia to the patient
d. Clean all of the nitrous oxide out of the circuit before it is turned off
Answer = c

17. The functions of the grey reservoir bag on the circuit include all of the following EXCEPT:
a. To even out gas flow and provide a gas reservoir to maximize patient breathing comfort
b. To provide a visual indication of respiration
c. To save leftover nitrous oxide for use with another patient
d. To provide positive pressure ventilation with 100% oxygen in an emergency
Answer = c

18. NPO guidelines for patients who are to receive minimal sedation with nitrous oxide alone include:
    a. Full meal up to 4 hours prior, light snack including crackers or toast and clear liquids up to 2 hours prior
    b. Fasting for everything after midnight and for a minimum of 8 hours
    c. No restrictions on any input, since children should eat a full meal right before the procedure so they are not hungry
    d. Full meal 8 hours prior, then clear liquids until 2 hours prior, since having food in the stomach more recently than 8 hours before the procedure increases the risk of nausea and vomiting with nitrous oxide

    Answer = a

19. Patient monitoring during nitrous oxide sedation includes:
    a. Continuous ECG monitoring
    b. Continuous pulse oximetry
    c. Continuous end tidal carbon dioxide monitoring
    d. Non-invasive blood pressure measurements every 3 minutes

    Answer = b

20. Which of the following children would NOT be a good candidate for nitrous oxide sedation?
    a. An 8 year old whose grandfather has a history of malignant hyperthermia with anesthesia agents
    b. A 5 year old who needs a peripheral IV placed for antibiotics for cellulitis
    c. A 14 year old who presents to the emergency department acutely combative with no clear etiology
    d. A 3 year old with a history of a VP shunt placed as an infant who needs a catheterized urine sample to be obtained for a fever work up

    Answer = c