

Three Cognitive Levels

Cognitive levels in an examination may be described as the degree of knowledge or thought process that a person must perform in order to answer the question correctly. The NBRC written examinations use three cognitive levels in composing the examination questions. The three cognitive levels are: recall, application, and analysis.

Recall - Questions at the “Recall” cognitive level test a therapist’s ability to remember common facts in the respiratory care profession. Examples of “recall” include: normal values, signs and symptoms of a disease, normal dosages, laboratory tests.

Application - “Application” cognitive level builds on “Recall” where a therapist must be able to remember the basic facts and apply the relevant theories, principles or procedures in a clinical setting. “Application” involves what to do in a given situation.

Analysis - Questions at the “Analysis” cognitive level test a therapist’s ability to evaluate information in making logical and sound clinical decisions. The clinical decisions may involve initiation of a new procedure, recommendation of changes to a procedure, or solutions requiring problem-solving skills.

Based on the current NBRC exam matrices, the 140-item CRT examination has the following distribution of cognitive levels: Recall = 35, Application = 74, and Analysis = 31. For the 100-item written RRT examination, the distribution of cognitive levels is: Recall = 6, Application = 15, and Analysis = 79. The CRT examination contains more “Recall” questions than the written RRT examination (25% for CRT vs. 6% for written RRT).

Candidates for the NBRC examination should become thoroughly familiar with the structure of the questions at all three cognitive levels, in particular “Application” and “Analysis” for the written RRT examination. Below are examples showing a common topic written as questions at three different cognitive levels.

Three sets of examples are described below to show three cognitive levels (recall, application, and analysis):

Question Set #1 (The three questions below deal with the use of nasal cannula at the recall, application and analysis cognitive levels)

1 (Recall) - What is the approximate $F_{I}O_2$ of a nasal cannula at a flow rate of 2 L/min of oxygen in adult patients with a normal breathing pattern?

- A. 18%
- B. 24%
- C. 28% *
- D. 32%

1. (Application) - Mr. Jones is using 2 L/min of oxygen via nasal cannula. Following a routine pre-operative sedative dose, his tidal volume and respiratory rate begin to decrease. Based on this information, the $F_{I}O_2$ delivered to Mr. Jones would be:

- A. about 28%.
- B. higher than 28%. *
- C. lower than 28%.
- D. close to 100%.

1. (Analysis) – Ms. Fowler is using a nasal cannula at a flow rate of 2 L/min of oxygen. Since her breathing pattern changes frequently, her SpO_2 reading is unstable and ranges from 87% to 94%. You would recommend changing the:

- A. flow rate to 5 L/min.
- B. flow rate to 8 L/min.
- C. nasal cannula to a 28% air entrainment mask. *
- D. nasal cannula to a 40% simple mask.

Question Set #2 (The three questions below deal with the use of Heliox at the recall, application and analysis cognitive levels)

2. (Recall) – A 80/20 mixture of Heliox contains:

- A. 80% oxygen.
- B. 80% helium. *
- C. 20% helium.
- D. 20% nitrogen.

2. (Application) – An oxygen flow meter is used to deliver a 80/20 mixture of Heliox. Since the physician orders a delivered flow of 9 L/min via non-rebreathing mask, you would set the flow at:

- A. 5 L/min. *
- B. 7 L/min.
- C. 9 L/min.
- D. 11 L/min.

2. (Analysis) – Dr. Newland asks the therapist to recommend a suitable oxygen therapy for a patient who has the following ABG results while receiving 2 L/min of oxygen via a nasal cannula: $pH = 7.37$, $PaCO_2 = 56$ torr, $PaO_2 = 46$ torr. In reviewing the 70 year-old patient's medical record, the therapist notes that the patient has a history of COPD. The s breathing pattern is shallow and labored with a spontaneous rate of 33/min. Breath sounds reveal moderate crackles and wheezing. The therapist should recommend:

- A. non-rebreathing mask at 4 L/min.
 - B. 24% air entrainment mask at 4 L/min.
 - C. 70/30 mixture of Heliox at 4 L/min.*
 - D. 80/20 mixture of Heliox at 4 L/min.
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Question Set #3 (The three questions below deal with the use of tidal volume during mechanical ventilation at the recall, application and analysis cognitive levels)

3. (Recall) - For a 45 year-old postoperative patient weighing 60 Kg, the tidal volume on a mechanical ventilator should be set at:

- A. 300 ml.
- B. 500 ml.*
- C. 800 ml.
- D. 1,000 ml

3. (Application) - Mr. Moreland, a 45 year-old post-operative patient, is being mechanically ventilated with the following settings: SIMV = 12/min, $V_T = 500$ ml, $F_{iO_2} = 30\%$, PEEP = 3 cm H₂O. The most recent ABG report shows: pH = 7.33, PaCO₂ = 56 torr, PaO₂ = 77 torr. Based on these data, the therapist should:

- A. increase the tidal volume to 600 ml.*
- B. increase the PEEP to 5 cm H₂O.
- C. decrease the SIMV rate to 10/min.
- D. decrease the F_{iO_2} to 25%.

3. (Analysis) - Mr. Moreland, a 45 year-old post-operative patient, is being evaluated for weaning from mechanical ventilation. The rapid shallow breathing index (RSBI) is 50 breaths/min/L using the following ventilator parameters: SIMV = 0/min, spontaneous frequency = 20/min, PSV = 10 cm H₂O, $F_{iO_2} = 30\%$, PEEP = 3 cm H₂O. The therapist should:

- A. initiate weaning attempt.
- B. increase SIMV to 4/min and repeat RSBI procedure.
- C. increase spontaneous frequency and repeat RSBI procedure.
- D. decrease PSV to 0 cm H₂O and repeat RSBI procedure.*