

Next Generation NCLEX® NEWS

Next Generation NCLEX®: Scoring Models

The Next Generation NCLEX® News is a quarterly publication that provides the latest information about the research being done to assess upcoming changes to the NCLEX Examinations. In this issue, you will find information related to Next Generation NCLEX (NGN) Scoring.

Scoring Models are systematic methods that are applied to candidate responses. They map candidate responses into measurable score points, which allows for inferences to be drawn on the ability level of candidates' knowledge or skill represented by the item.

The following chart describes the three different NGN scoring models.

0/1 Scoring

- Earn 1 point for endorsing each correct response
- Earn 0 points for endorsing each incorrect response
- Total score for a multi-point item is the sum of all correct responses

+/- Scoring

- Earn 1 point for endorsing each correct response
- Subtract 1 point for endorsing each incorrect response
- The total score for a multi-point item is the sum of all positive and negative points
- Negative total scores are truncated at zero

Rationale Scoring

- Earn points when both responses in the pair are correct
- Applied to items that require full understanding of paired information (e.g., cause/effect relationships)

0/1 Scoring

The 0/1 scoring rule is a classic rule that traditionally has been used to score multiple choice items. Selecting the correct option (key) results in earning a point. Selecting an incorrect option (distractor) results in a score of zero. This rule is applied to all single response items (see the example multiple choice item).

Example 0/1 Scoring / Multiple Choice Item

➤ **Which of the following actions should the nurse take?**

- Prepare the client for a chest x-ray.
- Administer intravenous fluids to the client.
- Request a prescription for acetaminophen.
- Place a nasal cannula on the client for oxygen administration.

➤ **Which of the following actions should the nurse take?**

- Prepare the client for a chest x-ray.
- Administer intravenous fluids to the client.
- Request a prescription for acetaminophen.
- Place a nasal cannula on the client for oxygen administration.

The 0/1 scoring rule is also applied to multi-point items¹. For these items, the total score for the item is the sum of all the correct options. The following are examples of the 0/1 scoring rule for multi-point items.

¹ Bauer, D., Holzer, M., Kopp, V., & Fischer, M. (2011). Pick-N multiple choice-exams: A comparison of scoring algorithms. *Advances in Health Sciences Education*, 16(2), 211–221. <https://doi.org/10.1007/s10459-010-9256-1>; Ripkey, D. R., Case, S. M., & Swanson, D. B. (1996). A “new” item format for assessing aspects of clinical competence. *Academic Medicine*, 71(10), 534–536. <https://doi.org/10.1097/00001888-199610000-00037>; and, Betts, J., Muntean, W., Kim, D., & Kao, S-c. (2021) Evaluating different scoring methods for multiple response items providing partial credit. *Educational and Psychological Measurement*. DOI: 10.1177/0013164421994636



Matrix Multiple Choice

For this item type, each row is scored independently with the 0/1 scoring, and the scores for the rows are summed together to get a total score for the item. As each row is scored with a 0 or a 1, the maximum score is the total number of rows provided. The following is an example with a maximum score of 5 points as there are five rows.

Example Matrix Multiple Choice Item

Assessment Finding	Improved	No Change	Declined	
RR 36	<input checked="" type="radio"/> <input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
BP 118/68	<input type="radio"/> <input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	
pale skin tone	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="checkbox"/>
pulse oximetry reading 91%	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="checkbox"/>
interacting with daughter at bedside	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	

1 pt Row 1: correct
 0 pt Row 2: incorrect
 1 pt Row 3: correct
 1 pt Row 4: correct
 + 1 pt Row 5: correct

4 total points

In the example matrix multiple choice item, the candidate has answered rows 1, 3, 4, and 5 correctly which results in 4 points. The candidate answered row 2 incorrectly which resulted in a score of 0. Overall, this response pattern results in an item score of 4 points because it is the sum of the correct options. No penalty is implemented for selection of any distractors.

Multiple Response 'Select N'

For the 'Select N' multiple response items, each correct option is scored as 1 point and each incorrect option is scored as 0 points. Unlike the 'Select all that apply' (SATA) multiple response items, a candidate is not able to select more than the 'N' options specified in the item stem. The following example shows a 'Select 4' item which would have a maximum score of 4 points. In this example, the candidate selected 3 correct options and 1 incorrect option, which results in a total score of 3 points. Again, no penalty is implemented for selecting an incorrect option.

Example Multiple Response Select N Item

➤ Select 4 findings that require **immediate** follow-up.

- vital signs
- lung sounds
- capillary refill
- client orientation
- radial pulse characteristics
- characteristics of the cough

1 pt Option 1: correct
 0 pt Option 3: incorrect
 1 pt Option 4: correct
 + 1 pt Option 5: correct

3 total points

Drop-Down Cloze

For this item type, one or more drop-down response options are embedded within a sentence or passage to create a cloze-type item. Each drop-down is worth 1 point and is conceptually identical to a multiple-choice item, though having a different response format. Points are accumulated by selecting the correct option in each drop-down. Selecting the incorrect option results in earning 0 points. The total item score is the sum of all drop-down scores. In the following example, there are 3 drop-downs which indicates the maximum score is 3 points. The candidate answered the first and third correctly but missed the second. This response pattern resulted in an item score of 2 points.

Example Drop-Down Cloze Item

The nurse has reviewed the Nurses' Notes entries from 1330 to 1600, and the Diagnostic Results from 1330 to 1600.

- Based on the findings in the Nurses' Notes at 1500 and Imaging Studies at 1600, which of the following actions should the nurse take? Complete the following sentences by choosing from the lists of options.

The nurse should insert . It would be a priority for the nurse to request a prescription for . The nurse should prepare the chest for surgery within

1 pt DD 1: correct
0 pt DD 2: incorrect
+ 1 pt DD 3: correct

2 total points

Drop-Down Table

This item type is similar to the drop-down cloze with the main difference being the drop-down elements are located within a table rather than a sentence or passage. As there are 3 drop-down elements in the example item, the maximum item score is 3 points, and the response pattern for this example resulted in a score of 2 points.

Example Drop-Down Table Item

- Complete the following table by choosing the potential nursing intervention per body system that the nurse should implement from the lists of options.

Body System	Potential Nursing Interventions
<input checked="" type="checkbox"/> Neurologic	<input type="text" value="Select ..."/>
<input type="checkbox"/> Respiratory	<input type="text" value="Select ..."/>
<input checked="" type="checkbox"/> Cardiovascular	<input type="text" value="Select ..."/>

Note: Each category must have at least 1 response option selected.

1 pt DD 1: correct
0 pt DD 2: incorrect
+ 1 pt DD 3: correct

2 total points



Bowtie

Bowtie items will always have a maximum score of 5 points because there are 5 targets for the 5 correct tokens. Points are earned by selecting the correct tokens from their respective lists and placing them on the correct targets. Tokens for the 'Action to Take' and 'Parameter to Monitor' can be dropped in either of their respective targets. The candidate selected both of the correct tokens for the 'Action to Take' in the example item and could have dragged them to either of the two 'Action to Take' targets. The candidate's response, therefore obtained 4 points: 2 for the 2 correct 'Action to Take' options, 1 for the correct 'Condition Most Likely Experiencing', and 1 of the 2 correct 'Parameter to Monitor.'

Example Bowtie Item

The nurse is reviewing the client's assessment data to prepare the client's plan of care.

➤ Complete the diagram by dragging from the choices below to specify what condition the client is most likely experiencing, 2 actions the nurses should take to address that condition, and 2 parameters the nurse should monitor to assess the client's progress.

Action to Take

}

Parameter to Monitor

Condition Most Likely Experiencing

Action to Take

}

Parameter to Monitor

Actions to Take	Potential Conditions	Parameters to Monitor
<div style="display: flex; flex-direction: column; gap: 5px;"> <div style="background-color: #90EE90; padding: 5px; border: 1px solid #000;">Request a prescription for an oral steroid.</div> <div style="display: flex; align-items: center;"> <input checked="" type="checkbox"/> <div style="background-color: #90EE90; padding: 5px; border: 1px solid #000;">Administer oxygen at 2 L/min via nasal cannula.</div> </div> <div style="background-color: #90EE90; padding: 5px; border: 1px solid #000;">Insert a peripheral venous access device (VAD).</div> <div style="display: flex; align-items: center;"> <input checked="" type="checkbox"/> <div style="background-color: #90EE90; padding: 5px; border: 1px solid #000;">Obtain a urine sample for urinalysis and culture and sensitivity (C & S).</div> </div> <div style="background-color: #90EE90; padding: 5px; border: 1px solid #000;">Request an order for 50% dextrose in water to be administered intravenously.</div> </div>	<div style="display: flex; flex-direction: column; gap: 5px;"> <div style="background-color: #ADD8E6; padding: 5px; border: 1px solid #000;">Bell's palsy</div> <div style="display: flex; align-items: center;"> <div style="background-color: #ADD8E6; padding: 5px; border: 1px solid #000;">hypoglycemia</div> <div style="margin-left: 10px;"><input checked="" type="checkbox"/></div> </div> <div style="background-color: #ADD8E6; padding: 5px; border: 1px solid #000;">ischemic stroke</div> <div style="background-color: #ADD8E6; padding: 5px; border: 1px solid #000;">urinary tract infection (UTI)</div> </div>	<div style="display: flex; flex-direction: column; gap: 5px;"> <div style="background-color: #ADD8E6; padding: 5px; border: 1px solid #000;">temperature <input checked="" type="checkbox"/></div> <div style="background-color: #ADD8E6; padding: 5px; border: 1px solid #000;">urinary output</div> <div style="background-color: #ADD8E6; padding: 5px; border: 1px solid #000;">neurologic status <input type="checkbox"/></div> <div style="background-color: #ADD8E6; padding: 5px; border: 1px solid #000;">serum glucose level</div> <div style="background-color: #ADD8E6; padding: 5px; border: 1px solid #000;">electrocardiogram (ECG) rhythm</div> </div>

2 pt correct action

1 pt correct condition

1 pt correct parameter

+ 0 pt incorrect parameter

4 total points

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+/- Scoring

The +/- scoring rule was inspired by signal detection theory. It provides a good measure of a candidate's ability to identify relevant information in the presence of distractors and has been found to be a useful and valid scoring model². Points are earned by identifying and selecting the correct options. By contrast, points are subtracted when incorrect options are selected. This method is applied to multi-point items where candidates are free to select as many or few options that apply for the item (e.g., select all that apply, multiple response items). The total score for the item is the sum of the correct options endorsed minus the sum of the incorrect options endorsed by the candidate. All negative total scores are rounded up to zero. The following NGN items are scored using the +/- scoring rule.

Multiple Response (MR) Select All That Apply (SATA)

This example shows a MR SATA item with 3 keys. As a candidate can over- or under-select options, the +/- rule is used. There are 3 keys in this example, therefore, the maximum score for this item is 3 points. Our example shows the candidate selected all 3 keys and 1 distractor. Therefore, the score for this item is +3 for the keys and -1 for the distractor, resulting in a final score of 2 points on this item (3 keys - 1 distractor = 2). The penalty of selecting a distractor is implemented.

Example MR SATA Item

➤ The nurse has been asked to prepare the client for immediate surgery. Which of the following actions should the nurse take? Select all that apply.

- Mark the surgical site.
- Provide the client with ice chips.
- Obtain surgical consent from the client.
- Perform a medication reconciliation.
- Insert a peripheral venous access device (VAD)
- Inform the client about the risks and benefits of the surgery.
- Assess the client's previous experience with surgery and anesthesia.
- Ask the client's parents to wait in the waiting room while you discuss the plan of care with the client.

3 pt correct response
- 1 pt incorrect response

2 total points

² Betts, J., Muntean, W., Kim, D., & Kao, S-c. (2021) Evaluating different scoring methods for multiple response items providing partial credit. Educational and Psychological Measurement. DOI: 10.1177/0013164421994636

Matrix MR

The +/- scoring rule is applied to multi-category items such as the Matrix MR and MR Grouping items. The Matrix MR items have categories across the columns, and they can be conceptualized as a series of MR SATA items. Similarly, the MR Grouping item can be seen as a series of MR SATA items embedded in the different row groupings.

The +/- scoring rule is applied to each column of the Matrix MR and each row grouping of the MR Grouping item types individually. Scores are summed across columns (Matrix MR) or rows (MR Grouping) to generate the total score for the item. All negative column or row scores are rounded to 0 as each column or row is scored independently and therefore does not negatively impact surrounding rows or columns.

In the Matrix MR example, each column has a single correct option, for a total of 3 possible points. The candidate selects a correct and incorrect option for the first column resulting in a score of 0; then selects 2 incorrect options for the second column for a score of -2 but is rounded to 0; and, finally, a single correct option on the last column for a score of 1. Summing across the columns results in a total score of 1 point (0 points for the 1st column + 0 points for the 2nd column + 1 point for the 3rd column).

Example Matrix MR Item

The nurse is reviewing the client's assessment data.

- For each assessment finding below, click to specify if the finding is consistent with the disease process of bowel obstruction, appendicitis, or ruptured spleen. Each finding may support more than one disease process.

Assessment Finding	Bowel Obstruction	Appendicitis	Ruptured Spleen
appetite	<input checked="" type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
pain level	<input checked="" type="checkbox"/> <input type="checkbox"/>	<input checked="" type="checkbox"/> <input type="checkbox"/>	<input checked="" type="checkbox"/> <input type="checkbox"/>
bowel pattern	<input type="checkbox"/>	<input checked="" type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>
gastrointestinal symptoms	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Note: Each column must have at least 1 response option selected.

Column 1	1 pt correct response	- 1 pt incorrect response	

	0 points		← +
Column 2	0 pt correct response	- 2 pt incorrect response	

	0 points (No negatives)		← +
Column 3	1 pt correct response	- 0 pt incorrect response	

	1 point		← +
	1 Total Item Points		← =

In the MR Grouping item example, the body systems represent the row groupings and the +/- scoring rule is applied to each group and then summed up for a total item score. There are 2 correct options in the first grouping, a single correct option in the middle grouping, and 2 correct options in the last grouping, for a total of 5 possible points. The candidate selects both correct options in the first grouping, a correct and incorrect option in the middle grouping, and 2 correct options along with an incorrect option for the final grouping. Applying the +/- scoring rule to each grouping results in earning 2 points in the first group, no points for the middle group, and 1 point in the final group. Taking the sum across all the groupings results in a total score of 3 points.

Example MR Grouping Item

➤ For each body system below, click to specify the potential nursing intervention that would be appropriate for the care of the client. Each body system may support more than 1 potential nursing intervention.

Body System	Potential Nursing Interventions
Neurologic	<input checked="" type="checkbox"/> <input type="checkbox"/> neurologic check every 2 hours
	<input type="checkbox"/> computed tomography (CT) scan
	<input checked="" type="checkbox"/> <input type="checkbox"/> morphine 1 mg, IV, every hour p.r.n. pain
	<input type="checkbox"/> electroencephalogram (EEG)
Respiratory	<input checked="" type="checkbox"/> <input type="checkbox"/> chest x-ray every morning
	<input checked="" type="checkbox"/> <input type="checkbox"/> oxygen at 2 L/min via nasal cannula
	<input type="checkbox"/> arterial blood gas (ABG) every 4 hours
	<input type="checkbox"/> incentive spirometry every 1 hour
Cardiovascular	<input checked="" type="checkbox"/> <input type="checkbox"/> aspirin 81 mg, p.o., every morning
	<input checked="" type="checkbox"/> <input type="checkbox"/> echocardiogram
	<input type="checkbox"/> continuous telemetry
	<input checked="" type="checkbox"/> <input type="checkbox"/> defibrillator at bedside

Note: Each category must have at least 1 response option selected.

Row 1	2 pt correct response	
-	0 pt incorrect response	
2 points		← +
Row 2	1 pt correct response	
-	1 pt incorrect response	
0 points		← +
Row 3	2 pt correct response	
-	1 pt incorrect response	
1 point		← +
3 Total Item Points		← =



Rationale Scoring

The rationale scoring rule is applied to items assessing paired information: concepts that require justification through a rationale. For example, a nurse must perform action X **because of** Y. To demonstrate a full understanding of the concept, correct options for both pieces of the paired information must be selected to receive 1 point. If any incorrect option is selected, then a score of 0 is obtained. Below is an example of three possible response patterns and their corresponding scores.

Example of Rationale Scoring

• Full Credit (1 pt):

➤ Complete the following sentence by choosing from the lists of options.

The client is at highest risk of developing as evidenced by the client's

vital signs

hypoxia
stroke
dysrhythmias
a pulmonary embolism

neurologic assessment
respiratory assessment
cardiovascular assessment

• No Credit (0 pt):

➤ Complete the following sentence by choosing from the lists of options.

The client is at highest risk of developing as evidenced by the client's

vital signs

hypoxia
stroke
dysrhythmias
a pulmonary embolism

neurologic assessment
respiratory assessment
cardiovascular assessment

• No Credit (0 pt):

➤ Complete the following sentence by choosing from the lists of options.

The client is at highest risk of developing as evidenced by the client's

vital signs

hypoxia
stroke
dysrhythmias
a pulmonary embolism

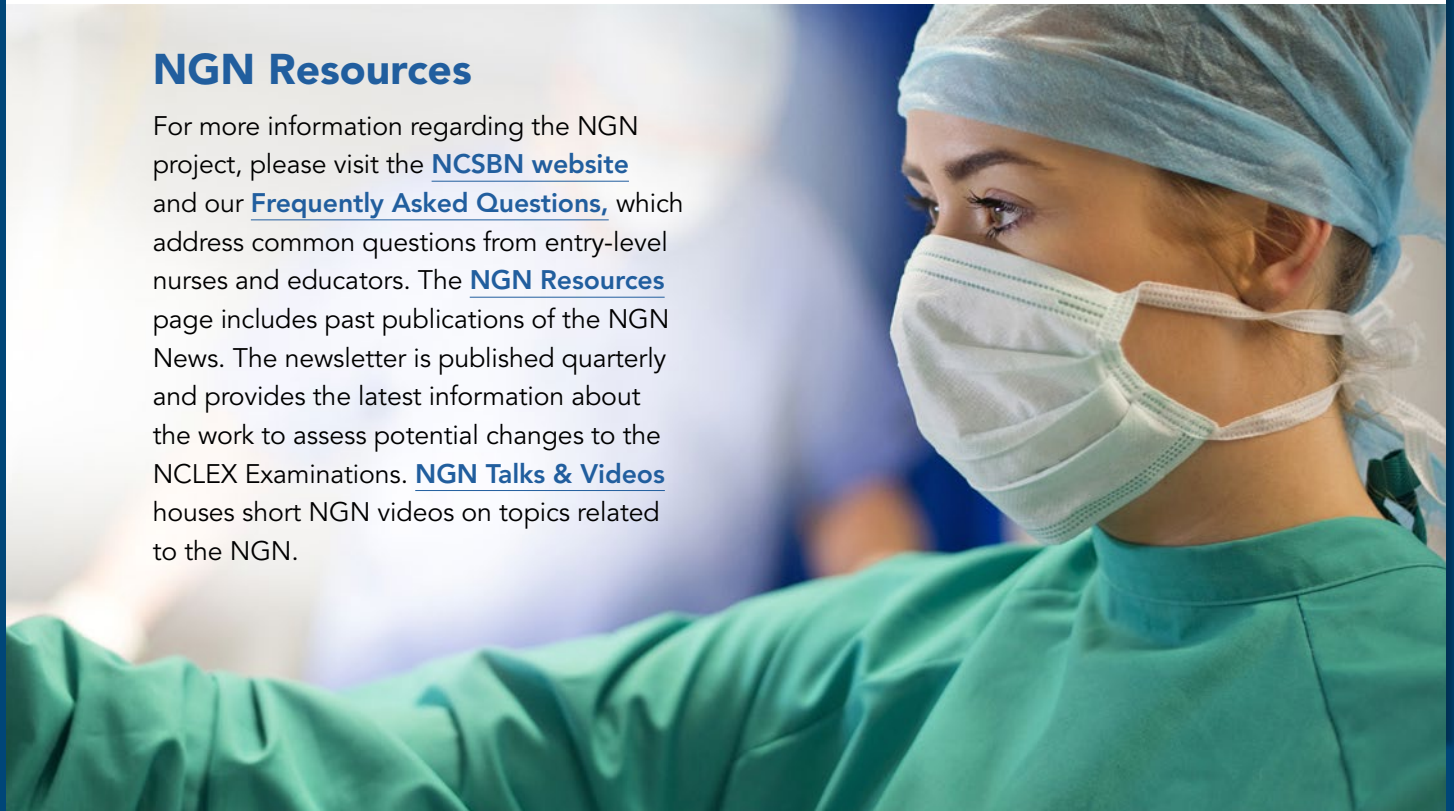
neurologic assessment
respiratory assessment
cardiovascular assessment

Summary

In summary, scoring models allow for the assignment and interpretation of candidate responses. NGN applies three scoring rules to the new item types to allow for partial credit scoring. These scoring models are called the 0/1 method, +/- method, and the rationale method. These new polytomous scoring methods will be approved at NCSBN's 2021 Annual Meeting.

NGN Resources

For more information regarding the NGN project, please visit the [NCSBN website](#) and our [Frequently Asked Questions](#), which address common questions from entry-level nurses and educators. The [NGN Resources](#) page includes past publications of the NGN News. The newsletter is published quarterly and provides the latest information about the work to assess potential changes to the NCLEX Examinations. [NGN Talks & Videos](#) houses short NGN videos on topics related to the NGN.



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111 E. Wacker Drive, Suite 2900
Chicago, IL 60601-4277
Phone: 312.525.3600
International Calls: +1.312.525.3600
Website: www.ncsbn.org



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