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Item Analysis Report

Applies to the following products:

Questionmark OnDemand **Questionmark OnDemand for Government** **Questionmark Perception**

Questionmark OnPremise

Applies to the following Perception versions: **Perception 5.7** **Perception 5.4**

The Item Analysis Report provides an analysis of the performance of questions within a user's Results Warehouse. It can be viewed in summary, comprehensive, or in detailed view. This report provides an in-depth classical test theory psychometric analysis of item performance for dichotomously scored questions contained within an assessment. Item analysis provides detailed classical test theory statistics at an assessment and question (item) level. This information can be used to determine how well one's questions perform psychometrically.

Note: If you have less than 50 results, the statistics generated by the Item Analysis Report will be less trustworthy than if more than 50 results exist for an assessment. For further information, please refer to [What statistics are used in the Item Analysis Report? \(https://www.questionmark.com/content/what-statistics-are-used-item-analysis-report\)](https://www.questionmark.com/content/what-statistics-are-used-item-analysis-report)

This page includes the following sections:

- What question types are supported?
- Selecting an assessment (mandatory)
- Using the revision filter
- Using the group filter
- Using the date filter
- Using the attempt filter
- Using the item-total correlation discrimination filter
- Using the item difficulty p-value filter
- What information the Item analysis report summary provide?
 - Navigating the Item analysis report summary
- Viewing the detailed item report
- What statistics are shown?

What question types are supported?

The following question types, when scored dichotomously (i.e., worth either 0 or 1 point, 0 or 5 points, etc.), are supported by the Item Analysis Report:

- Multiple Choice
- True/False
- Yes/No
- Multiple Response
- Ranking
- Matching
- Knowledge Matrix
- Select a Blank
- Pull-down list

Only dichotomously scored questions will be reported on in the Item Analysis Report.

Items that have been deleted after delivery will be excluded from the Item Analysis Report, even if the items were dichotomous.

Note: As of the 2014.2 release of OnDemand, all questions in an assessment will appear on the summary page of the Item Analysis Report, but **only** dichotomously scored supported questions will have item detail pages.

Selecting an assessment

To create your report, you must first select an assessment to report on. You can:

- Search by partial name
 - Type in any text and press **Enter**, or click the find next button to search for the next matching assessment in the assessment tree.
- Search by autocomplete list
 - As you type, a filtered auto complete list is presented. You can select any item from the auto complete list to have it selected in the assessment tree.
- Navigate by assessment folder hierarchy. The assessment hierarchy is presented to allow you to navigate the assessment folder tree. In addition to the assessment name, the assessment description (if defined) and the Questionmark assessment ID are also displayed in the following format:
 - **[Assessment name], [assessment description, if defined], [Questionmark assessment ID]**

The assessments available to you will depend on what assessments you have stored in your shared repository.

Note: The result data for an assessment must be ETLed from the Questionmark source database to the Results Warehouse database. ETL stands for Extract, transform, and load, and an ETL occurs when data is migrated from the Questionmark database into the Results Warehouse. How often this transfer occurs is configurable by your Questionmark administrator. If the assessment does not appear in the assessment tree, it means its results have not been ETLed into the Results Warehouse yet. Please check the **About** tab for information on when the ETL was last run.

Finally, please be aware that you can only select one assessment to run an Item Analysis Report on.

Using the revision filter

Some assessments will have multiple revisions that have been used to take an assessment. In this scenario, multiple revisions may be present for a user to select. If only minor changes have occurred (questions haven't changed), then multiple revisions will be included in a single selection. If a breaking change occurs (revision with different questions), then revisions will be presented as a separate assessment on which to report.

Before you select an assessment on which to report, you can choose whether to ignore assessment and question revisions.

- If **Ignore assessment revisions** is selected, all assessment results will be treated as belonging to a single revision.
- If **Ignore question revisions** is selected, all question results will be treated as belonging to a single revision.

You can select neither, one of the two, or both options.

If you don't select either option, you'll only be able to report on a single revision's set of results (if an assessment has more than one revision, you'll need to select which revision on which to report), and question revisions will appear as separate items as usual.

Using the group filter

The group filter allows users to optionally filter their report results by groups. Users can select one or more groups to filter the report data on by selecting the **Filter by group** checkbox and then selecting the groups they want to filter on.

Note: By default, reports do not take into account groups. Therefore the very first time a user navigates to a filter page the Filter by group checkbox and filter options are not set. For future visits to the page, the selected group filter option will be remembered. Please also note users can search for **Group not set** to generate reports on results that are not associated with any groups.

In situations where there are no groups associated with the results for an assessment, a message indicating this will be displayed to the user. In cases where groups are associated with the results for an assessment, the available groups will be displayed in a tree. The user can select one or more groups within the tree to filter the results by.

Note: For information on assigning participants to groups please refer to the section Assigning participants. For information on scheduling assessments to groups please refer to Scheduling assessments. Please refer to Filtering by group: scenarios (/content/what-are-potential-scenarios-filtering-group) for information on the results that will be presented to you in different filtering case scenarios.

Using the date filter

From the date filter you can specify the dates you want the results to be filtered from. The options are:

- All dates
- Last 1 month
- Last 3 months
- Last 6 months
- Last 12 months
- All results since

- Custom date range

Please be aware that the date filter does **not** filter against time of day.

Using the attempt filter

From the attempt filter you can specify whether **All attempts**, the **First attempt**, the **Last attempt**, or a **Specific attempt** should be used in the report. This is for cases where a participant has taken an assessment multiple times. By default, **All attempts** is selected.

Using the item-total correlation discrimination filter

This filter allows you to customize the acceptable, borderline and unacceptable filter values. The borderline value updates automatically when either the acceptable or unacceptable values are altered. The following validation rules exist for the filter:

- Valid values for the discrimination fall between -1 and 1.
- The acceptable discrimination value needs to be < the unacceptable value.

Using the Item difficulty p-value filter

This filter allows the user to customize the **acceptable**, **borderline**, and **unacceptable** filter values. The borderline values update automatically when either the acceptable or unacceptable values are altered. The following validation rules exist for the filter:

- Valid values for the p-value fall between 0 and 1.
- The ranges must be valid for the selected values (i.e. the lower acceptable value is > the lower unacceptable value but < the acceptable higher value).

Generating the report

Click on your preferred format for the creation of your report. You can choose from HTML (summary or comprehensive view), PDF (summary or comprehensive view), or CSV.

Distribution method	Description
HTML distribution	Selecting HTML will generate the Item analysis report summary page, which contains a scatter plot and a table of summary information. By clicking on any of the rows one can go into a detailed item view for each question which provides more details on the item and its psychometric performance.

Distribution method	Description
Comprehensive view HTML distribution	Selecting Comprehensive view HTML will generate the Item analysis report comprehensive view page, which contains detailed statistics for the questions in the selected assessment, all displayed on a single page. Unlike the detail view, the comprehensive view does not include a scatter plot or a table of summary information.
PDF distribution	Print-friendly PDF versions of both the Item analysis report summary report and the Item analysis report comprehensive view report can be generated. Selecting the respective button will generate a print-friendly version of the selected report and ask you whether you wish to save or open the report.

Distribution method	Description
CSV distribution	<p>Selecting this option will cause a dialog to appear asking you whether you wish to save or open the report. The resulting file whether saved or opened directly will generate an analysis-friendly version which can be viewed in Excel, SPSS, or most statistical analysis tools.</p> <p>The Item Analysis Report contains four CSV distribution buttons, one for the main report, one for an Item detail CSV view of the report, one for a Question choice detail CSV view of the report, and one for the Participant comments CSV view of the report.</p> <p>The Summary CSV contains details about the questions shown in the selected assessment. It includes the Questionmark question ID, the question wording, question description, question type, topic it is from, the item difficulty p-value and the item total correlation discrimination.</p> <p>The Item detail CSV contains one item per row and list the majority of the statistics for each item. If a statistic is not available for a question type (e.g., High-Low for a Hotspot question) this information is marked as N/A. The information included in the CSV is the assessment name, assessment description, question wording, question description, topic it is from, question number, presentation order, item difficulty p-value, p-value 95% confidence interval, item-total correlation discrimination, Item-total correlation 95% confidence interval, question type, question status, question minimum possible score, question maximum possible score, number of participants presented the question, number of participants who responded to the question, high-low discrimination, and item reliability.</p> <p>The Comprehensive view CSV contains detailed information about the questions shown in the selected assessment all displayed on a single page. It includes all the information that the Item detail and Question choice detail CSV files include.</p> <p>The Question choice detail CSV contains detailed information about each assessment, including the assessment name, assessment description, question wording, question description, question number, correct answer, outcome #, answer option, All %, Upper %, Middle %, Low %, Upper-Lower %, All #, Upper #, Middle #, Low #, and Upper-Lower #.</p> <p>The Participant comments CSV contains a line item for every question based participant comment in the assessment. This report only supports Multiple Choice, True/False, Yes/No, Pull-down, Multiple Response, Select a Blank, Drag and Drop, Fill in the blank, and Numeric. Columns included in the CSV are:</p> <ul style="list-style-type: none"> • Assessment name • Question wording • Question description • Question number (the Questionmark question ID) • Participant comments

What information the Item analysis report summary provide?

The Item analysis report summary is broken down into:

1. An overview graph
2. A table of excluded questions, if any (i.e., question types not supported by the Item Analysis Report)
3. A summary table of statistics
 1. A detailed statistics on a per item basis

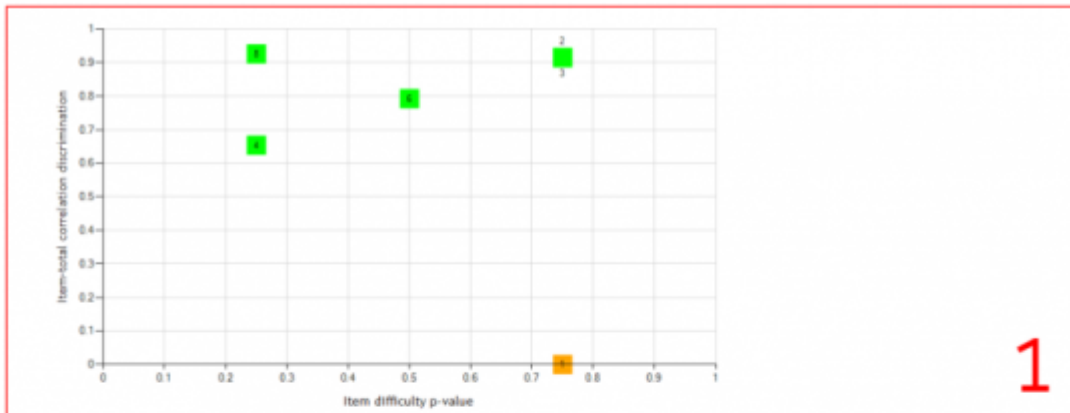
From the summary table that contains information from the assessment level, it is possible to see some detailed statistics on a per question (item) basis.

Note: As of the 2014.2 release of OnDemand:

- Item-rest correlation discrimination is now calculated in addition to item difficulty by item-total correlation discrimination.
- There is no longer an excluded questions table that lists unsupported question types; all questions in an assessment are now shown in the summary table, but only dichotomously scored supported questions will have item detail pages.
- There are now two scatterplots in the summary output, the first displaying item-total correlation discrimination and the second displaying item-rest correlation discrimination. You can toggle which scatterplot appears via the radio buttons above the scatterplot. In PDF output, both scatterplots are shown.
- The summary table is now sortable using the column headings.
- Items where the item difficulty p-values could not be calculated are marked with an asterisks. If a user selects such an item from the table, the "Item detail statistics are not available for this item" message appears. Item detail views and comprehensive views are not available for these items.

Navigating the Item analysis report summary

When an Item Analysis Report is first generated, you are presented with the **Item analysis report summary** page, which includes an assessment level overview graph (1) and summary table (3), as shown below. If any unsupported questions exist in the assessment that is being reported on, a section on questions excluded from the report (2) will also be shown.



1

The selected assessment contained unsupported question types which have not been shown on this report. In addition any questions without results will not be shown on this report.

Excluded questions

Presentation order	Perception question id	Question type	Question description
5	4692396840915783	Multiple Response	MRQ (p)
7	3152451511260573	Matching	Matching (p)
9	2000748211828230	Select A Blank	SAI
10	6161155695270349	Select A Blank	SAI (multiple)
11	0532572742929360	Pull Down List	Pull-down list (p)
12	0909916000778235	Knowledge Matrix	Matrix (p)
13	1229891136051530	Pull Down List	Pull-down list (d)
14	167190088496486	Select A Blank	Copy of SAI (multiple)(p)

2

Select an item from the table below in order to view more item analysis details.

Presentation order	Question wording	Question description	Revision	Topic	Item difficulty p-value	Item-total correlation discrimination
1	In the context of testing, what does the term item discrimination mean?	MCQ	9	Selected Response	0.75	0
2	Consider the table of item statistics, then indicate whether the ensuing statement is true or false. Note that choice C is the correct answer. This item does help to discriminate between the more know...	T-F	6	Selected Response	0.75	0.915
3	Consider the table of item statistics, then indicate whether the ensuing statement is true or false. Note that choice C is the correct answer. This item does help to discriminate between the more know...	Y-N	7	Selected Response	0.75	0.915
4	Multiple Response Question: What characteristics of the Arabic number system explain how it simplified mathematical calculations?	MRQ (d)	8	Selected Response	0.25	0.654
6	For each item, select the correct answer from the options provided.	matching (d)	2	Selected Response	0.5	0.793
8	Put the 5 steps of the PM process in order from first to last.	ranking (d)	1	Selected Response	0.25	0.926

3

Section	Description
1	<p>The scatter plot overview graph plots a single point for each item in the summary table. The color-coding of the scatter plot points refer to the discrimination values as set by the user on the filter page.</p> <p>The overview is first displayed graphically where each question is plotted in terms of its item difficulty p-value (X-axis) and by its item-total correlation discrimination (Y-axis).</p> <ul style="list-style-type: none"> • Questions that have high (acceptable) discrimination will appear near the top of the graph. • Questions with low (unacceptable) discrimination will appear at the bottom of the graph. • Difficult questions will appear to the left of the graph. • Easy questions will appear to the right of the graph. <p>Generally, depending on the type of assessment and purpose of the assessment, one would want to see all the questions with high (acceptable) discrimination and a spread of difficulty.</p>

Feedback (/webform-feedback/nojs?submittedfrom=node/6016)

Section	Description
2	<p>The Excluded questions section includes a list of assessment questions that are not supported by the Item Analysis Report. These questions are not reported on. This section provides information on the presentation order, Perception question ID number, question type, and a question description of the unsupported questions.</p>
3	<p>The summary table contains a line item for every question from the assessment. The table is sortable. You can select an item in the table to navigate to the details of the selected item.</p> <p>The summary table provides information on the presentation order, question wording and description, question revision number, the topic the question is from, and summary information regarding the item difficulty p-value and the item-total correlation discrimination value for each question reported on.</p> <p>These statistics have traffic light markers next to them indicating:</p> <ul style="list-style-type: none"> • unacceptable performance, • borderline performance, • an acceptable performance. <p>The values for these markers are set on the filter page.</p> <p>Each column can be used to sort the questions to provide different views of the question performance. For example, one can sort the questions by difficulty to look at the hardest questions at the top of the table.</p>

By clicking on any of the rows in the summary table, one can go to a detailed item view. This will show the question level information. This view provides more details on the item and its psychometric performance.

Viewing the detailed item report

By clicking on any of the rows in the summary table, the detailed item view for that question is shown. The **Item analysis report detail** page is structured so that information becomes more detailed as one goes down the page. One can move from question to question by using the **Previous item** and **Next item** question links.

What is in the report?

The detailed item report contains:

1. This section provides high-level details in a one-row summary taken from the summary page table for the item. This includes the presentation order, question wording, question description, revision number of the question, item difficulty p-value, and item-total correlation discrimination statistic.
2. The **Description of item performance** section provides textual descriptions of the items performance based on the detailed statistics that are calculated.
3. The **Item details** section provides a detailed analysis of the question. Information included in this section includes question type, question status, minimum and maximum possible question score, number of participants presented with the question, number of participants that answered the

question, item difficulty p-value, item-total correlation discrimination, high-low discrimination, item reliability, Questionmark question ID, and the topic to which the question belongs. Decimal values are rounded to 3 decimal places where applicable.

- The **Answer option information** section contains a table containing all the possible answers for a question and the proportion of participants that selected each answer. The correct answer is indicated by a checkmark icon.
- The **Question preview** section contains a very basic preview of the question.

Presentation order	Question wording	Question description	Revision	Item difficulty p-value	Item-total correlation discrimination
1	In the context of testing, what does the term item discrimination mean?	MCQ	0	0.75 (+/- 0.217)	0 (+/- 0.102)

A

Description of item performance

- This item has borderline discrimination. Participants of low ability should have lower scores on the question than participants of high ability. Review the content of the item carefully and review how the material of the question was instructed in order to inform edits to this question. Item difficulty affects item discrimination in that items of high and low difficulty may have lower discrimination statistics.
- This item has an acceptable level of difficulty.
- The number of participants who have answered this question is low (under 50). The statistics will be less trustworthy with so few participants, see the 95% confidence interval information (in brackets next to item difficulty p-value and Item-total correlation discrimination).

B

Item details

Question type	Multiple Choice
Question status	Normal
Question minimum possible score	0
Question maximum possible score	1
Number of participants presented the question	5
Number of participants who responded to the question	4
Item difficulty p-value	0.75 (+/- 0.217)
Item-total correlation discrimination	0 (+/- 0.102)
High-Low discrimination	0
Item reliability	0
Perception question id	3242058082066144
Topic	Selected Response

C

Answer option information

Outcome #	Answer option	Number and percentage of participants achieving scores			
		All	Upper 27%	Middle 46%	Lower 27%
1	frequency of how often an item is answered correctly	1 (20%)	0 (N/A %)	1 (20%)	0 (N/A %)
2	measure of an item's readability and ease of comprehension	0 (N/A %)	0 (N/A %)	0 (N/A %)	0 (N/A %)
3	measure of an item's ability to distinguish between the better candidates and the poorer ones	3 (60%)	1 (20%)	1 (20%)	1 (20%)
4	measure of how easy or difficult it is to guess the correct answer for an item	0 (N/A %)	0 (N/A %)	0 (N/A %)	0 (N/A %)
5	No response	1 (20%)	0 (N/A %)	0 (N/A %)	0 (N/A %)
Total assessment mean score		63.1 %	100 %	69.2 %	7.7 %

D

Question preview

In the context of testing, what does the term item discrimination mean?

<input checked="" type="radio"/>	frequency of how often an item is answered correctly
<input type="radio"/>	measure of an item's readability and ease of comprehension
<input type="radio"/>	measure of an item's ability to distinguish between the better candidates and the poorer ones
<input type="radio"/>	measure of how easy or difficult it is to guess the correct answer for an item

E

The detailed item report for **Multiple Response, Ranking, and Matching** questions also includes **Choices** (and **Options**, when applicable) and **Correct answer** sections (for Knowledge Matrix questions, the Choices section is referred to as the **Questions** section). For these three question types, the **Answer option information** section is referred to as the **Outcome information** section. To see what the detailed item report looks like for all of the supported question types, see [What do Item Analysis Reports look like?](https://www.questionmark.com/content/what-do-item-analysis-reports-look-like/) ([https://www.questionmark.com/content/what-do-item-analysis-reports-look](https://www.questionmark.com/content/what-do-item-analysis-reports-look-like/))

What statistics are shown?

The following section provides more detailed statistics regarding the question including question type, question status, number of participants presented in the question, et cetera. In terms of the statistical information, below are some definitions:

- **Item difficulty p-value:** This is the proportion of participants who answered the question correctly. For example, a p-value of 0.600 would mean that 60% of participants answered the question correctly.
- **Item-total correlation discrimination:** This is the correlation between the question score and the assessment score. Higher positive correlation values indicate that participants who obtain high question scores also obtain high assessment scores and conversely participants who obtain low question scores also obtain low assessment scores.
- **High-Low discrimination:** This statistic shows the difference in the proportion of the top/highest 27% of participants versus the lowest 27% of participants in terms of their total test scores on this question. One would expect that the high group of participants should get the question right more often than the low group of participants. For example, 90% of high participants (0.900) got the question right whereas only 40% (0.400) of the low participants got the question right. The High-Low would therefore be 0.500 (0.900-0.400). The higher the High-Low, the greater the discrimination for the question.
- **Item reliability:** This is a calculation of item performance based on existing statistics that some organizations use to evaluate the performance of their questions.

Information regarding the answer options and the participants that selected each option is also presented. In addition, a question preview is displayed. For more details about all the statistics shown, please refer to [What statistics are used in the Item Analysis Report?](https://www.questionmark.com/content/what-statistics-are-used-item-analysis-report) (<https://www.questionmark.com/content/what-statistics-are-used-item-analysis-report>)

What is in the Item analysis report comprehensive view?

Once an assessment has been selected and the filters set, clicking on the **Comprehensive view HTML** button will generate the comprehensive version of the Item Analysis Report.

The comprehensive Item analysis view is broken down into:

1. Assessment summary statistics
 - General statistics for the assessment, including total number of results, first and last attempt dates, mean, maximum, and minimum scores, and mean, longest, and shortest times taken to write the assessment.
2. Question statistics
 - Detailed statistics on a per item basis, including all the statistics in the detailed item view of the Item analysis summary report.

Unlike the summary view of the Item Analysis Report, the comprehensive view displays the statistics for each question on a single page, therefore removing the need to click on a question to view detailed statistics.

◀ Question Type Report (/content/how-can-i-create-question-type-report)
☰ Outline ▼

up (/content/how-do-i-get-started)

Test Center Analysis Report ▶ (/content/how-can-i-create-test-center-analysis-report)

🖨️ Printer-friendly version (/print/book/export/html/6016)
📄 Terms of use (/legal)
📄 Privacy policy (/privacy)
📄 About cookies (/content/about-questionmark-cookies)

Feedback (/webform-feedback/nojs?submittedfrom=node/6016)

