Criteria®

Criteria Mechanical Reasoning Assessment (CMRA)

INFORMATION BRIEF

Criteria Mechanical Reasoning Assessment (CMRA)

Predict job performance in roles involving mechanical tools, equipment and machinery.

The Criteria Mechanical Reasoning Assessment (CMRA) measures a candidate's mechanical aptitude and reasoning ability. It's a short, engaging, mobile-friendly assessment that can predict performance for occupations that involve operating, maintaining and servicing tools, equipment and machinery.

The CMRA is ideal for a variety of entry- to manager-level roles requiring mechanical aptitude.

MEASURES

Mechanical aptitude and ability to learn how to operate, maintain, install, and repair equipment and machinery

PREDICTS

How candidates will perform in roles involving the operation, maintenance, and servicing of tools, equipment, and machinery

QUESTIONS

Candidates complete up to 30 questions

TIME

The CMRA is timed and takes up to 15 minutes to complete

What is the CMRA?

The CMRA assesses mechanical reasoning ability, which is a core cognitive attribute that can predict performance across a wide range of positions.

During the assessment, candidates complete up to 30 questions. Each item features an image-based scenario, which requires candidates to identify the correct response, based on relevant mechanical reasoning concepts and principles. Candidates have 15 minutes to complete as many of the 30 questions as they can.

The questions are presented in straightforward, easy to understand language, which make the CMRA suitable for all candidates with an English reading ability of grade six or above. The questions gradually increase in difficulty as candidates progress through the assessment.

The assessment is streamed dynamically: each candidate receives questions from an item pool that contains multiple items of the same type and level of difficulty. This means the assessment offers a relatively unique experience for each candidate, while maintaining the same number and complexity of questions.

Why use the CMRA?

Research shows that cognitive aptitude is one of the most accurate predictors of job success:

- ✓ 2.5x as predictive as reference checks
- ✓ 4x as predictive as experience
- ✓ 6.5x as predictive as education level

Assessing specifically for mechanical aptitude enables you to assess each candidate's ability to learn and apply knowledge and skills related to mechanical aptitude.

The CMRA questions are designed to encompass scenarios that represent a broad spectrum of mechanical reasoning areas, including weight distribution, fulcrums, air flow, buoyancy, gears, pressure, momentum, speed, light, force, and other related subject matter. By targeting all of these areas, the CMRA provides a broader measure of general mental ability than other narrower assessments of mechanical reasoning.

In addition, the scenarios included in the CMRA were carefully designed to minimize gender and racial/ethnic bias. The CMRA has demonstrably less adverse impact than other tests of mechanical aptitude.

The CMRA has been extensively validated, demonstrating that the test is highly predictive of job performance in roles involved in the operation, maintenance and servicing of tools, equipment, and machinery.

Which jobs is the CMRA applicable for?

The CMRA is particularly suited towards entry- to manager-level roles, where employees are required to process information, solve problems and learn new skills in relation to mechanical actions. Such roles include construction, custodial, electrical, maintenance, manufacturing, mechanical, technical sales, utility, and warehouse operations.

Some of the more common roles our customers use the CMRA for include:

✓ Machine Operators

✓ Electricians

✓ Construction Workers

✓ Field Service Technicians

✓ Apprentice intakes requiring mechanical ability

What is the candidate experience like?

Flexible testing on any device

Candidates can complete the CMRA on any digital device they choose – a mobile phone, tablet, laptop or desktop – in any location and at any time.

Example question

Which metal bar can withstand more pressure before being flattened by the vice?

A
B

○ A
○ B
○ No Difference
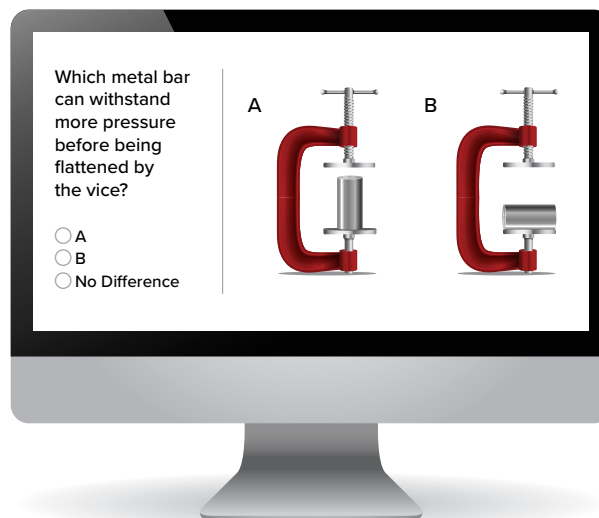
Ensuring a fair candidate experience

Like all of our assessments, the CMRA can be completed remotely over the internet under unsupervised conditions. This provides a high level of flexibility and convenience for the candidate. We adopt the following best practice strategies to ensure online security.

Dynamic item bank

To enhance test security, the CMRA is a dynamic assessment that draws on a large bank of test scenarios. This means that no two candidates will ever receive the exact same set of questions, giving you confidence in their individual results.

Time adjustments

Extra time can be provided to candidates with relevant accessibility needs. Please speak to your Customer Success Manager to enable this feature.

Secure online assessment

Our online testing engine is delivered using secure web technology, which allows us to ensure that assessment security and integrity is maintained and that assessment time is tracked accurately.

Detailed assessment session logging

From the moment the candidate logs in to start their assessments to the moment they finish, we create detailed test logs of the candidate's testing session, including time spent in the assessment and internet connectivity.

What score ranges are available?

The CMRA includes a series of suggested score ranges that help you understand how each candidate's results compare to the scores associated with successful performance in various roles. These ranges are based on large samples of prior scores from individuals applying for or occupying similar roles and are supported by validation studies. Available score ranges include:

- ✓ Electrician
- ✓ Forklift Operator
- ✓ Manufacturing/Production
- ✓ Material Handler
- ✓ Mechanic
- ✓ Mechanic Tech
- ✓ Oil Services Worker
- ✓ Sales (Mechanical Engineer)
- ✓ Service Technician (Install and Repair)
- ✓ Utility Worker
- ✓ Warehouse

Can I create my own score ranges?

You can create your own score ranges within the Criteria platform. We can work with you to gather and analyze results from your own organization (either from incumbents or using data from your applicant pool) to build appropriate score ranges for your roles.

Reporting

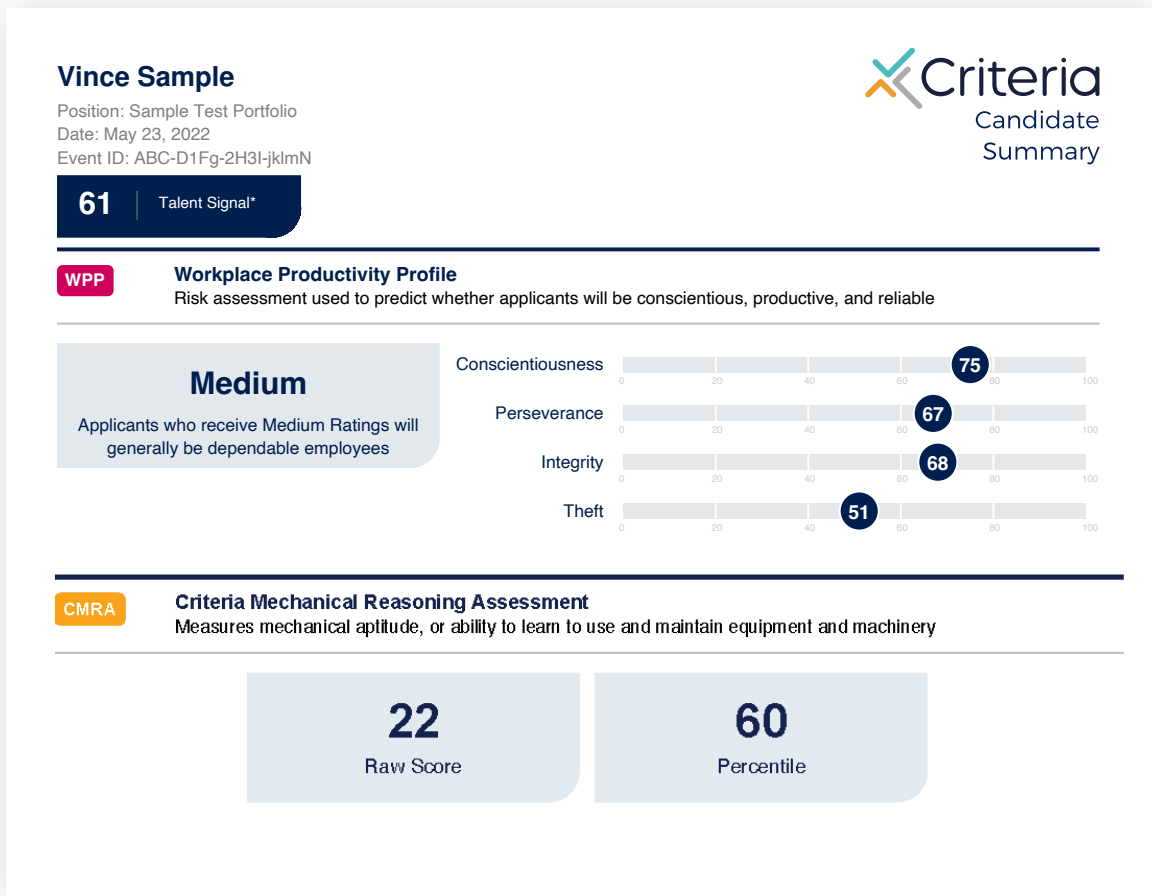After candidates complete testing, you can access two different reports.

✓ A **Candidate Summary Report** that provides a high-level overview of a candidate's results on the CMRA and any other Criteria assessments they've completed.

✓ A **Candidate Score Report** that provides detailed information of a candidate's scores on the CMRA.

Candidate Summary Report

This report gives you a short, simple summary of a single candidate's results across each test they've completed and, if you've enabled it, their Talent Signal (based on a weighted average of their performance across individual tests).

In the candidate summary, you'll see an overall raw score that reflects the candidate's mechanical reasoning abilities. In addition, you'll also see a percentile score to provide context and meaning to the raw score, comparing it with scores from hundreds of thousands of previous administrations to candidates from similar organizations and industries.

If a score range has been selected for the job, the summary will show whether the candidate scored in range or outside of the range.

Vince Sample
Position: Sample Test Portfolio
Date: May 23, 2022
Event ID: ABC-D1Fg-2H3I-jklmN

Criteria
Candidate
Summary

61 | Talent Signal*

WPP   **Workplace Productivity Profile**
Risk assessment used to predict whether applicants will be conscientious, productive, and reliable

Medium
Applicants who receive Medium Ratings will generally be dependable employees

	0	20	40	60	80	100
Conscientiousness					**75**	
Perseverance				**67**		
Integrity				**68**		
Theft			**51**			

CMRA   **Criteria Mechanical Reasoning Assessment**
Measures mechanical aptitude, or ability to learn to use and maintain equipment and machinery

22
Raw Score

60
Percentile

Candidate Score Report

The score report gives you detailed results on individual candidates. It includes:

- ✓ Candidate information (name, position, date completed)
- ✓ Summary information on the CMRA
- ✓ A results summary, which displays the candidate's raw score out of 30 and the equivalent percentile score.
- ✓ A **Raw Score** graphic, showing their raw score on a normal distribution, which indicates how their score compares to other test-takers.
- ✓ If enabled, a shaded area in the raw score distribution indicates how the candidate's raw score compares to a **Selected Score Range**. In the example below, the candidate's raw score of 22 falls within the Material Handler suggested range of 18-30.
- ✓ A **Results Details** section, displaying an explanation of the candidate's percentile score.
- ✓ A **Score Explanation** section, providing further explanation of the score.

Vince Sample
Position: Sample Test Portfolio
Test Date: June 5, 2023
Test Event ID: ABC-D1Fg-2H3I-jkImN | Test Ver: 1.0

✕ Criteria
Score Report

APTITUDE TEST

Criteria Mechanical Reasoning Assessment

The CMRA measures a subject's mechanical aptitude. The test can predict performance for occupations that involve the operation, maintenance, and servicing of tools, equipment and machinery.

Results Summary

22	60
Raw Score	Percentile

Raw Score

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

Selected Score Range

Service Technician
Suggested Range: 16-30

✓ In Range

Results Details

Vince Sample achieved an overall score of 22, which means Vince answered 22 questions correctly. This corresponds to a percentile rank of 60, meaning Vince scored better than 60% of the people who have taken this test.

Score Explanation

High Range Scores (Above 80th Percentile)
People with higher test scores can generally learn and do mechanical jobs better than people with mid or low range scores. They are more likely to pick up training faster than those with lower scores.

Low Range Scores (Below 25th Percentile)
People with lower mechanical ability may be able to do many mechanical jobs, but may require more training and may take longer to pick up on job skills.

Mid-Range Scores (25th to 80th Percentile)
People with mid-range scores can generally learn and do mechanical jobs, but may require more training than people with high range scores.
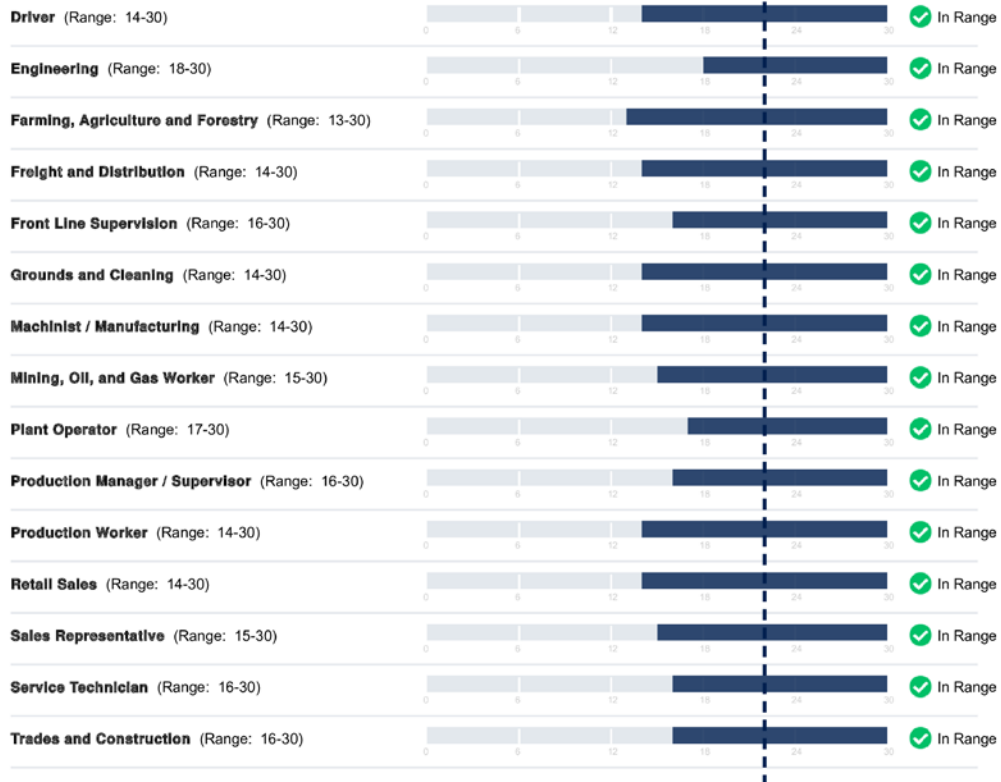
In the **Suggested CMRA Score Ranges** by Position section, you'll see how the candidate's raw score compares to all of the available score ranges for the CMRA.

Suggested CMRA Score Ranges by Position

*Based on global norms compiled by Criteria Corp.

Vince Sample | Score: 22

Position	Status
Driver (Range: 14-30)	In Range
Engineering (Range: 18-30)	In Range
Farming, Agriculture and Forestry (Range: 13-30)	In Range
Freight and Distribution (Range: 14-30)	In Range
Front Line Supervision (Range: 16-30)	In Range
Grounds and Cleaning (Range: 14-30)	In Range
Machinist / Manufacturing (Range: 14-30)	In Range
Mining, Oil, and Gas Worker (Range: 15-30)	In Range
Plant Operator (Range: 17-30)	In Range
Production Manager / Supervisor (Range: 16-30)	In Range
Production Worker (Range: 14-30)	In Range
Retail Sales (Range: 14-30)	In Range
Sales Representative (Range: 15-30)	In Range
Service Technician (Range: 16-30)	In Range
Trades and Construction (Range: 16-30)	In Range

Psychometric properties

Normative sample

A sample of all applicable test scores was used to generate the current normative data for the CMRA. Because performance on the CMRA can vary as a function of the job role being assessed, occupation-specific norms were developed for 22 relevant positions. The occupational norms were developed using an international database of test results from hundreds of thousands of individual scores (N = 271 to 58,565 for each occupational norm group). Score ranges within the Criteria platform were developed from these occupational-specific norms to provide contextualized and meaningful interpretations of test scores.

The default score ranges are based on the three-fifths rule, a popular strategy among many Organizational Psychologists in which the 40th percentile for each occupational sample is set as the suggested minimum score. More information on the Occupational Norms samples can be found in the CMRA Test Manual.

Reliability

Reliability typically refers to the internal consistency of a test, or the extent to which individual items on a test measure the same construct and result in similar test scores. The most common measurement of test reliability is Cronbach's alpha, a coefficient of reliability often referred to simply as the alpha coefficient.

Based on a sample of N = 305 test-takers, the CMRA alpha coefficient is α = 0.81. For reference, an alpha coefficient of α = .70 or above is considered to be sufficient evidence for the reliability of an assessment, per psychometric standards. Therefore, the alpha coefficient demonstrated by the CMRA is high, indicating that this test is high in internal consistency reliability.

Construct validity

Construct validity is established through evidence for convergence, or the relationships demonstrated between a test with other well-established tests that are purported to measure the same construct or attribute. The CCAT has demonstrated construct validity through its strong correlations with other leading measures of cognitive aptitude.

Across multiple construct validation studies, the CMRA demonstrated a very strong correlation (r = .71, $p < .01$, N = 305) with the Wiesen Test of Mechanical Aptitude (WTMA). The WTMA is a widely used and scientifically supported assessment of mechanical reasoning that strongly correlates (r = .26, $p < .01$, $N > 10,000$) with overall job performance. The strength of the correlations between the CMRA and the WTMA, as well as between the WTMA and job performance, are considered strong with regard to government and professional thresholds for test accuracy (U.S. Department of Labor, 2000). Therefore, these correlations provide suitable evidence for the construct validity of the CMRA.

Case Study

Manufacturer Increases Training Completion Rates and Retention for Technicians
View case study