

# Factsheet ACT General Intelligence

27-03-2017

## Description

The ACT General Intelligence is an adaptive capacity test, consisting of three sub-tests that combine to measure the intelligence domain. Adaptive tests involve presenting different items to every candidate, in line with their level. The level is determined during the test.

Traditional tests operate under the assumption that every question is equally difficult. In adaptive tests, each task has been carefully studied to determine their difficulty. Every candidate will be presented different items, in line with their level. Simply put, when someone answers a question incorrectly, it will be followed by an easier question. When someone answers a question correctly, it will be followed by a slightly more difficult question. This lets the tester determine the level of the candidate during the test itself.

And helps us prevent giving candidates at the lower end of the scale that are too difficult, or candidates at the higher end questions that are too easy. The key advantage of this is that it lets us establish a person's level a lot more accurately and quickly.

In practice, this means that every candidate will take a different test. Once the candidate's level has been reliably measured, the sub-test in question is done. The candidate can then take a quick break and continue with the next sub-test.

The main advantages of ACT General Intelligence:

- Candidates are always tested at their own level
- The test takes less time
- The test results are more accurate
- Items are not published online

## Intended purpose

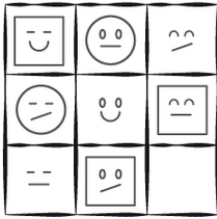
The ACT General Intelligence consists of three sub-tests, which will be discussed below:

### *Numerical*



In the numerical test, candidates are asked to discover the logical relationship between a sequence of numbers. This analytical capacity is important for positions that require candidates to perform calculations or draw conclusion on the basis of numbers.

### Abstract



In the abstract test, candidates are asked to discover a pattern in a sequence of figures and to apply it logically. This analytical capacity is important for conceptually complex positions that require certain problem-solving skills.

### Verbal

Kilo	Zwaar
Mijl	?

In the verbal test, candidates are asked to pick two words from a possible six that are analogous to two other, specific words. This verbal/analytical capacity is important for positions that require verbal and/or written reasoning skills.

## Application

The ACT can be used to obtain an intelligence score for any candidate, compared to a norm group representative for the Dutch workforce (including job-seekers). The norm group contains people between the ages of 18 and 69. Practically speaking, this means that people can take the test from the age of 16, but there are no age-related norm groups.

The ACT is used to aid in selection and to provide advice. The norm groups were established in a selection context, because it may be that people are less motivated to score highly in advisory situations, which could impact their score.

## Approve Test

The Approve Test is a retest that you can use to determine whether the score in a supervised situation is the same as the results of a test taken in a non-supervised situation. In practice, that means that candidates could take the test at home and take the supervised approve test in your offices at a later date.

The result of the Approve Test is a V if the retest confirms the score pattern of the original test, and a ? if a considerable discrepancy is found. For candidates who score a ?, we recommend asking the candidate to retake the entire test in a supervised situation and to use the second test for your advice. The Approve Test takes about 10 minutes.

## Development

In late 2014, a large-scale calibration study was conducted with about 3900 people, leading to the creation of 228 items for all three sub-tests (Number Sequences, Figure Sequences, and Verbal Analogies). This study was used to estimate the difficulty and discriminative value of each item. The quality of the items was tested with the aid of various fit statistics and all items deemed inadequate were discarded.

In July 2016, the items were recalibrated on the basis of new data and compared to fit values once more. Ultimately, this resulted in an item bank of 122, 126 and 204 items for Number Sequences, Figure Sequences and Verbal Analogies, respectively. New items are developed to expand and broaden these item banks periodically.

**Reliability:**

Digit Sets:	.81
Figure Sets:	.77
Verbal Analogies:	.86
G-score:	.92

**Norm groups:**

	<i>N</i>
VMBO:	300
MBO:	659
HBO:	570
WO:	490

These norm groups are based on data obtained in real-life selection situations.

**Validity:****Internal structure:**

- There are strong correlations between the three sub-tests ( $\approx .60$ ), indicating a certain *g*-factor (general intelligence)
- This also applies to various sub-groups (immigrant background/native background, male/female, age)

**Concept validity:**

- Study with MCT-H by NOA ( $N = 92$ ):
  - Strong correlations with sub-tests, averaging .67 (.81 after correction for (un)reliability).
  - G-scores of both tests virtually identical (correlation of .99)
  - So: both tests measure the same thing (intelligence), but the ACT General Intelligence does not take as long
- Study with reading comprehension test taken by applicants in the transport sector ( $N = 937$ ), correlation of .60 with G-score.
- Divergent validity: no relationship (as expected) with the Accuracy, Extroversion, Kindness, and Neuroticism character traits, but an established relationship with Openness ( $r = .28$ ).

**Criterion validity:**

- Study based on students ( $N = 66$ ), where G-score predicted academic performance ( $r = .37$ ) and was correlated to divergent thinking ( $r = .38$ )
- Study based on applicants in the transport sector, which demonstrated the predicted relationship between intelligence based on the ACT General Intelligence and reaction times ( $r = .25$  with reaction time and  $r = -.25$  with the number of times candidates did not react in time in a reaction time and concentration test; respectively,  $r = -.15$  and  $r = -.23$  in a selective choice test).



- Criterion validity study ( $N = 92$ ), which demonstrated, as expected, that the scores for General Intelligence correlated with socio-economic status (level of education, occupational level and income) and the complexity of one's profession. The expected interaction effects of intelligence and job complexity on job performance were also demonstrated, as well as interaction effects of intelligence and job complexity on job satisfaction.
- The same study showed that scores for the ACT General Intelligence could retrospectively 'predict' the final grades obtained in secondary school. ( $r = .34$ ).

**Cultural bias:**

- People with an immigrant background have lower scores than people with a native background, but the differences are minor to moderate. You can choose, however, to take this element into consideration when interpreting scores.
- An initial study into item bias has shown that item bias (*differential item functioning/DIF*) is minimal at the item level. We are currently investigating this matter further.