

Shakopee Public Schools | Department of Teaching & Learning
UNDERSTANDING THE CogAT 7

The Overview

The CogAT 7 is a test of reasoning skills – It is not like a spelling or a math test where if you know the words or the facts you can get 100%. There is no defined curriculum for the CogAT. It is a norm-referenced test and the national average is 50th percentile. To better serve individual student needs as well as identify students for High Potential and Gifted and Talented programs, Shakopee Schools plans to administer the CogAT to all students in grades 2 or 3 and to select older students.

There are three parts to the CogAT: Verbal Battery, Quantitative Battery, and Non-Verbal Battery.

Verbal Battery

The Verbal Battery tests a student's vocabulary, as well as his/her comprehension of ideas, efficiency and verbal memory, and ability to discover word relationships. Statistics show a high correlation between high verbal ability and success in a variety of school subjects.

Three sub-tests are administered in the verbal section. Each test has approximately 20 questions and the student is given ten minutes to complete each sub-test. These three sub-tests comprise the verbal score.

Verbal Classification

The student is given a list of three words that are alike in some way. The student is asked to choose a word, from a selection of five words, that is also alike in the same way.

Verbal Classification

Example: green, blue, red, ...
Choices: color; crayon, paint, yellow, rainbow.

Sentence Completion

The student is given a sentence with a word left out and is asked to choose a word that makes the best sense in the sentence.

Sentence Completion

Example: Apples _____ on trees.
Choices: fall; grow; show; bloom; spread.

Verbal Analogies

The student is given three words in dark type. The first two words go together. The third word goes with one of the answer choices. The student is asked to choose the word that goes with the third word the same way that the second word goes with the first.

Verbal Analogies

Example: **new** (is to) **old** : **wet** (is to)
Choices: rain; drip; hot; sun; dry .

Quantitative Battery

The Quantitative Battery tests the student's quantitative reasoning and problem solving ability and provides an appraisal of the student's general level of abstract reasoning.

Three tests are administered in the quantitative battery. The first test has twenty-five questions and students are given 8 minutes to finish. The second has 20 questions with a 10 minute testing time. The third has fifteen questions with a 12 minute testing time.

Quantitative Relations

The student is given two problems numbered one and two with three answer choices. The student is to solve the two problems and determine if the answer is greater, less than, or equal to.

Quantitative Relations

Example: 1. $0+3$ 2. $3+0$
Choices: a) 1 is greater than 2
b) 1 is less than 2
c) 1 is equal to 2.

Number Series

The student is given a series of numbers and is asked to decide which number should come next in the series.

Number Series

Example: 5; 10; 15; 20
Choices: 25; 30; 35; 40; 45.

Equation Building

Equation Building

Example: $1\ 2\ 3 - x$
Choices: 1; 2; 3; 4; 6.

The student is given numbers and signs. The student is asked to combine the numbers and signs to get a solution that is an answer choice.

Non-Verbal Battery

The Nonverbal Battery presents the most novel problems to students. The items on these tests use only geometric shapes and figures that have had little direct relationship to formal school instruction. The tests require no reading. The nonverbal battery is particularly suitable for obtaining an accurate estimate of development for students who have difficulty with reading, who have limited competency in English, or who have limited opportunities. The tests in the nonverbal battery are between fifteen and twenty-five questions each and students are given ten minutes for each test.

Figure Classification

The student is given three figures that are alike in some way. They are given three answer choices and five pictures to choose from. They are asked to decide which figure goes best with the three answer choices.

Figure Classification

Example: The student is given three items that are odd shaped but each one has 4 sides and is black.

Choices: a black circle; a black triangle; a 4 sided white object; a black 4 sided object; six-sided white object.

Figure Analogies

The student is given three figures. The first two figures go together; the third figure goes with one of the answer choices.

Figure Analogies

Example: The first two figures are a large square that goes together with a small square. The second pair is to go together the same way that the first two figures go together. For the second pair you are given a large circle.

Choices: a small triangle; a large circle; a small square; a small circle; and a large rectangle.

Figure Analysis

The student is shown how a square piece of dark paper is folded and where holes are punched in it. The student is to figure out how the paper will look when it is unfolded.

Figure Analogies

Example: If a dark piece of paper is folded in the center from top to bottom and a hole is punched in the bottom right hand corner, what will the piece of paper look like when it is unfolded?

Choices: A) one hole in the bottom right hand corner
 B) one hole in the bottom right hand corner and one in the top right hand corner
 C) one hole in the top right hand corner
 D) one hole in the bottom right hand corner and one in the bottom left hand corner
 E) one hole in the bottom right hand corner and one in the top left hand corner.

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ANALYSIS of **CogAT 7** RESULTS

Using CogAT Scores to Identify Academically Talented Students

Selection standards should meet three criteria:

- fairly identify academic talent among students who differ in ethnicity, economic circumstances, and familiarity with the English language
- apply to students whether they have even or uneven ability profiles
- produce the best possible match between a student's cognitive resources and the cognitive demands of the talent development program

Age- versus Grade-Normed Scores

Interpretations of scores on ability tests and judgments about academic talent generally rely on age norms, which offer a different perspective on development from grade-normed scores on achievement tests. On CogAT, age norms are used for the following score types:

- standard age scores
- national age percentile ranks
- local age percentile ranks

For most students, national age percentile ranks (PRs) and grade PRs do not differ greatly, so program selection based on national age PRs is an equitable criterion. When national age PRs and grade PRs do differ, it is often because the student is much older or younger than other students in the same grade. In these cases, students' scores may warrant special consideration.

Students who are older than their grade peers will have lower age PRs than grade PRs because their scores are being compared with those of students of the same age, some of whom are in higher grades and have had more schooling. Therefore, these older students are less likely to qualify for programs for the academically talented if you use CogAT standard age scores or national age PRs rather than national grade PRs to make that decision. An older student with very high grade PRs may need a greater academic challenge even if his or her age PRs do not meet the criteria set for your program for academically talented students.

Composite and Partial Composite Scores

Requiring a high composite score for all three batteries eliminates many of the most-able students. The composite most accurately summarizes the abilities of students who have an A 42 CogAT Score Interpretation Guide profile (all CogAT scores are at approximately the same level) and least accurately summarizes the scores of students with an E profile (two CogAT scores show an extremely large difference).

Therefore, when identifying gifted students, the profile of scores on all three batteries provides a better indicator of cognitive development than the overall composite score alone.

Although the overall composite must be used with care, the quantitative-nonverbal (QN) partial composite score can be quite helpful for talent identification. (Note: The QN partial composite is an optional score available on some paper-based CogAT score reports. Contact your Riverside Assessment Consultant Executive for availability information.)

The QN partial composite is useful for these reasons:

- It better predicts achievement in mathematics and some technical domains than either the Quantitative Battery or Nonverbal Battery alone.
- It allows for meaningful score interpretation for English language learner (ELL) students since none of the items on either the quantitative or nonverbal tests require language.

The verbal reasoning score, on the other hand, is the best predictor of success in a wide range of achievement domains that rely heavily on language.

Considerations for Different CogAT Score Patterns

It is important to understand the issues that arise for students with different score patterns before reviewing recommendations for using CogAT scores. The following are explanations and examples of issues regarding two types of ability profiles:

- even patterns (A profiles)
- uneven patterns (B or C profiles)

"A" Profiles

When schools set a cut score for the standard age scores or percentile ranks that will determine eligibility for programs for academically talented students, issues arise regarding selecting students with even score patterns (**A** profiles). If the standard is based on **national** norms, standard age scores or age PRs will be the primary criteria.

If eligibility is based on **local** norms, local percentile ranks (LPR) will be the primary criteria. In this case, you could still use the pattern of scores summarized in the ability profile, but the median age stanine is not as helpful since it is based on national norms. For example, a student with a profile of 7A may have LPRs that would map onto local stanine scores of 8 or 9. In either case, the **A** profile would still hold.

For ease of discussion, national norms are used in the examples that follow.

The usefulness of relatively flat or **A** profiles depends on the kinds of programming options available. Consider the following examples.

- **Whole-grade acceleration** requires advanced reasoning and achievement in multiple domains. Students with strong scores on all three CogAT batteries are more likely to succeed than students with uneven profiles, especially if the relative weakness is in verbal or quantitative reasoning.
- **Single-subject acceleration** or enrichment activities in a particular domain are more likely to require more domain-specific reasoning abilities. For example, a student with strong scores on the QN partial composite and excellent mathematics achievement may be a strong candidate for acceleration in mathematics. The student with strong scores on all three batteries would also be a strong candidate for single-subject acceleration.

As the preceding examples illustrate, the problem with academic enrichment programs requiring students to have **A** profiles and high composite scores lies not in the students admitted to such programs but in the highly able students who are not admitted.

"B" and "C" Profiles

Approximately 60 percent of students who obtain a median age stanine of 9 have significantly uneven score patterns (**B** or **C** profiles). These high-scoring students are much more likely to have a relative weakness on one of the three batteries than a relative strength. Most surprising is that these high-scoring students are much more likely than others to show an extreme relative weakness. Among average-ability students, only 3.2 percent show an extreme weakness. However, among the most-able students, that percentage is 16.2, or five times more likely. In fact, as many of these very able students with a median stanine of 9 show a significant or extreme weakness as show a flat profile. This underscores the importance of measuring reasoning abilities in multiple domains rather than in a single domain, especially for students who have extremely high or low scores.

When students have very high scores on two batteries, their composite scores can also be very high, that is, above the 90th percentile. Nevertheless, these composite scores can be misleading because they sometimes conceal a weakness in a cognitive area that is essential for high-level achievement in a particular program of study.

Talent Identification Case Studies

When identifying academic talent among students who are native speakers of English, emphasis should be placed on the verbal and quantitative abstract reasoning skills that are fundamentally involved in almost all higher-level academic learning tasks. The problems that arise in using the composite score for such students can be illustrated by case studies based on the four students whose CogAT scores are shown in Table 1 on the next page.

Table 1. CogAT Scores for Students with Uneven Score Patterns

	Student 1	Student 2	Student 3	Student 4
	SAS PR S	SAS PR S	SAS PR S	SAS PR S
Verbal Battery	140 99 9	119 88 7	118 87 7	111 75 6
Quantitative Battery	133 98 9	132 98 9	116 84 7	138 99 9
Nonverbal Battery	114 81 7	130 97 9	143 99 9	143 99 9
Composite	132 98 9	129 97 9	128 96 9	135 99 9

These case studies represent frequently occurring uneven score patterns in which all scores are above average. Although these students have similar composite scores, they do not all have the same probability of attaining very high levels of achievement in a program for academically talented students.

Student 1: Strengths in V and Q, Weakness in N

Student 1			
	SAS	PR	S
Verbal	140	99	9
Quantitative	133	98	9
Nonverbal	114	81	7
Composite	132	98	9

Characteristics: Student 1 has very high scores on both the Verbal and the Quantitative Batteries but a relative weakness on the Nonverbal Battery.

Recommendation: Of the four students whose scores are listed in Table 1, Student 1 has the greatest probability of attaining very high levels of achievement and of being successful in any gifted and talented program. When using CogAT scores as part of the criteria for selecting students who are native speakers of English for talent development programs, give greater weight to the Verbal and Quantitative Batteries, since those reasoning skills are fundamentally involved in almost all higher-level academic learning tasks.

Student 2: Strength in Q and N, Weakness in V

Student 2			
	SAS	PR	S
Verbal	119	88	7
Quantitative	132	98	9
Nonverbal	130	97	9
Composite	129	97	9

Characteristics: Student 2 has very well-developed quantitative and nonverbal reasoning skills but weaker verbal reasoning skills.

Recommendation: Weaker verbal reasoning skills could be a handicap in a talent development program. However, if English is not the student’s first language, the lower verbal score may not be an impediment, especially in science and mathematics. Consider enrichment or acceleration in math or science.

Student 3: Above-Average on Q and V, Very High Score on N

Student 3			
	SAS	PR	S
Verbal	118	87	7
Quantitative	116	84	7
Nonverbal	143	99	9
Composite	128	96	9

Characteristics: Student 3 has a very high score in nonverbal reasoning but only above-average scores on quantitative and verbal reasoning.

Recommendation: Student 3 has the lowest probability of having high levels of achievement in any academic area and is not a promising candidate for the typical talent development program. Individuals such as Student 3 can excel, however, in programs that depend heavily on spatial and figural reasoning abilities. For ELL students, the low verbal score would be unremarkable; however, the low quantitative score is still worrisome.

Student 4: Extreme Relative Weakness in V

The composite score is especially misleading when there is an extreme relative weakness.

	Student 4		
	SAS	PR	S
Verbal	111	75	6
Quantitative	138	99	9
Nonverbal	143	99	9
Composite	135	99	9

Characteristics: Student 4 has a high composite score but relatively weak verbal reasoning skills.

Recommendation: Student 4 would be likely to have trouble in many programs for academically talented students because of her relatively weak verbal reasoning skills. For native speakers of English, a much lower verbal score sometimes reflects a learning disability that should be further investigated (e.g., twice-exceptional students [students who are gifted and have a learning disability]). However, Student 4's very high scores in

quantitative and nonverbal reasoning indicate that she may well benefit from a greater challenge in mathematics and science courses that do not depend critically on verbal skills.

Who Qualifies for a Talent Development Program in the B and C Profile Groups?

Approximately 60 percent of students with stanines of 9 on at least two batteries have uneven ability profiles. Using the composite score for such students can lead to inappropriate identification or placement of individuals in talent development programs, so we strongly recommend that the overall composite **not** be used to determine admission to such programs. Students are better selected for specific educational programs based on the match between their particular cognitive strengths and the demands of the program. An extreme relative weakness suggests that the student might be twice-exceptional.

Sources:

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