

The Number Knowledge Test: Administration and Scoring

The Number Knowledge test is an oral test. It is administered, individually, to each child and it requires oral responses from each child. Children are not permitted to use paper and pencils to figure out the answers. Although this is not an issue at the kindergarten level, older children often request paper and pencils guessing, correctly, that the problems would be easier to solve if children did not have to figure them out "inside their heads." To measure intuitive knowledge, however, it is important that children DO figure things out in their heads. At the kindergarten level, the test takes about 5 to 10 minutes to complete.

Before actually administering the test, you will need to prepare your own test kit. This entails creating the visual props required for some items, ensuring you have sufficient scoring sheets for each child you will be testing, and assembling all materials so you can manipulate them easily and comfortably. It is strongly recommended that you practice giving the test to a friend or colleague before using it with children in your class. This will ensure that test administration and scoring is automatic and it will allow you to focus all your attention on the child's responses, problem-solving strategies, and other behaviors (e.g. expressions of frustration) that provide indications of his or her level of understanding.

Suggestions for administering the test -

- Plan a time when the other children in your class are occupied, so you will not be interrupted.
- Choose your location carefully so that materials in the surroundings, such as a number line, will not provide visual aids.
- Prepare the child for the test by explaining that the questions will be easy at first but they will get harder and harder. You don't expect them to know all the answers. Some of them are even challenging for older children to get right!
- For children who are 6 or younger, start at the preliminary level and continue testing until the child has not passed sufficient items at any level to progress to the next level, as specified on the test form. Whenever possible, enter the child's answer on the scoring form and mark each item as passed or failed in such a way that failures are not apparent to the child.
- For children who are 8 and older, you can omit the preliminary item and Level 0 and start testing at Level 1. As a general rule, always start testing at a level that is at least two years below the age of the child you are testing. This will ensure that children experience success on their beginning level of the test and provide an index of their baseline knowledge.
- Administer all items at each level that you progress to (unless the child is terribly frustrated) in order to determine the child's maximum potential.
- Provide frequent reinforcement throughout, for example by saying "Good" after each response) without actually telling children whether their answers are right or wrong.
- If a child's strategy is not apparent, you may wish to ask, "How did you figure that out?" and record the strategy used or reported on the scoring sheet. Directions for coding strategy use on the scoring sheet are provided below.

Coding Strategy Use -

For selected items on the test (such as items 1, 3, and 7 at Level 1; items 1, 2, and 8 at Level 2; items 1, 5, and 6 at Level 3), additional information about a child's number knowledge can be gained by coding strategy use. If the strategy used is not apparent in children's responses, ask them how they figured out the answers (i.e. "How did you figure that out?"). Based on the child's explanation, mark one of the following on the test record form:

CU = Count up from "one". Circle CU if the child uses a counting up from "one" strategy for solving addition problems.

CO = Count on. Circle CO if the child enters the counting sequence at the point of one of the addends and then counts on, one number at a time.

R = Retrieval. Circle R if the child says that she figured out the answer in her head (e.g. "I just knew it", "My brain told me", "I learned that").

Scoring the test

One point is assigned for each item passed at Levels 0, 1, 2 and 3. For all two-part items, both (a) and (b) must be passed to earn one point. If testing commences at Level 1 (for children who are at least 8 years old), points are automatically assigned for Level 0 items.

A total raw score for each child on this test can be computed by summing the number of points the child received across all levels of the test. A chart to convert raw scores to developmental levels scores is provided below and can be used if you find this information useful. It is important to note in this context that a developmental level describes the knowledge or the performance of an abstract entity: the "average" child in our culture. In practical terms, this means that about 60% of the U.S. children who have taken this test perform at the level indicated. About 20% perform somewhat better, some as high as the next whole level up. About 20% perform somewhat worse, some as low as the next whole level down. For this reason, developmental level scores provide only a rough index of a child's knowledge or growth.

Developmental Level Conversion Chart

Raw Score	Developmental Level Score	C.A. Equivalents
1-3	-0.5	2-3 years
4-6	0.0	3-4 years
7-8	0.5	4-5 years
9-14	1.0	5-6 years
15-19	1.5	6-7 years
20-25	2.0	7-8 years
26-28	2.5	8-9 years
29-30	3.0	9-10 years

Interpreting the test -

Although test results can be used to compare the performance of a particular child to the rest of the class or to compare your class to national averages, a far more important use of the test is for instructional planning. When used at the beginning of the year, the test can give you valuable information on the sorts of number knowledge each child brings to the learning situation, and the strategies each child has available to make sense of number problems. You can use this information to decide which Number Worlds activities each child might benefit from and you can use it to form small groups for a Number Worlds exploration. You may wish to group children so that all children in the group are at a similar level in their number understanding or you may wish to group children in such a fashion that more knowledgeable children can function as group leaders or "mini-teachers."

When used at the end of the year, the test can give you a measure of each child's learning progress, knowledge growth, and readiness for mathematics learning at the next grade level. The test can also be used in the middle of the year if an interim measure of children's knowledge is desired; for example, you might want to configure new learning groups for a continuing exploration of Number Worlds.

Test results can also be used to help you determine the strengths and weaknesses of your class as a whole; for example, you can quantify the percentage of children who pass or fail particular items of the test. This information can be invaluable for instructional planning. If you discover that most children in your class have an easier time telling you which of two numbers is bigger than which of two numbers is smaller, you may wish to devote extra time to the count-down "Blast Off" activities that are included in each Number Worlds land.

Finally, as with individual children, the information you gather at the beginning of the year for your class as a whole can be used at the end of the year to give you a picture of the progress your class has made as a group. When you compare beginning- to end-of-the-year results, you may obtain a well-deserved sense of accomplishment as you identify areas of growth. If growth is not as great as you expected or hoped for in some areas, you can use these results to modify or adapt your instructional planning for the next school year.