Interpreting ACER Test Results

This document briefly explains the different reports provided by the online ACER Progressive Achievement Tests (PAT). More detailed information can be found in the relevant teacher manuals.

Understanding the PAT scales
Each learning area that is assessed by one of the PATs has a PAT scale. Each scale consists of pat units that are named after that scale.

- PAT reading comprehension scale – patc
- PAT maths and PAT maths plus - patm
- PAT science scale – patsc
- PAT written and dictated spelling – pats
- PAT punctuation and grammar – patpg

A PAT scale locates the difficulty of the questions and the achievements of the students on the same scale. Easy questions and low achieving students are located lower down the scale. Hard questions and high achieving students are located higher up the scale.

When students sit a test, their test raw score, or the number of questions they answered correctly is converted into a **scale score**. This is a location on the PAT scale. Low achieving students have low scale scores. High achieving students have high scale scores.

The question difficulties show the location of the questions on the same PAT scale as the students’ scale scores. Easy questions have lower locations than harder questions. All the questions from all the tests in the same PAT learning area are located on the one scale. This is why **student achievement can be compared and monitored over time using scale scores** regardless of which test students sat in that learning area.

**Qualities of scale scores**

- Scale scores are measures on an interval scale. This means that a difference of 5 pat units in the middle of the PAT scale (for example, from 50 to 55) is equivalent to the same difference on any other part of the scale (for example, from 15 to 20 or from 85 to 90 pat units).
- Scale scores allow comparison of students’ results on test booklets of varying difficulty.
- Scale scores enable the tracking of students’ development in skills as measured by the test from year to year.
- Scale scores provide a common achievement scale for all tests within the same learning area giving teachers the flexibility to match test difficulty to student achievement and measure growth over time.
Understanding the individual reports

The on-line individual report graphically shows the student’s scale score, which is their location on the scale, and the question difficulties or the location of the test questions, on the same scale.

The student’s scale score is the dotted line. On the example above, the student’s scale score is 111.4.

The numbers are the questions in the test. Easier questions are lower on the scale and harder questions are higher on the scale. The circled numbers are questions this student answered correctly. The numbers in red squares are questions this student answered incorrectly. The numbers in white squares are questions this student missed.

The analytic strength of the PATs comes from locating student achievement and question difficulty on the same scale. The questions get harder as you move up the scale. Typically, students should answer easier questions correctly and harder questions incorrectly. Students who show atypical responses, such as the illustrated example, require further teacher investigation. This example shows this student has tended to get the easy questions wrong and harder questions right.

Questions that are located around a student’s scale score are questions the student has a fifty per cent chance of answering correctly. These are skills the student is currently consolidating. Questions that are 10 or more pat units below the student’s scale score are questions they are mainly likely to answer correctly. These are skills this student has largely mastered. Questions that are 10 or more pat units above the student’s scale score are questions this student is currently likely to find too challenging.

Teachers can use the question difficulty locations to help identify what students typically have mastered, and what they need to learn next.
Margins of error

All test scores have an associated margin of error. Statistical principles can be used to estimate the size of the likely error on any given test score. These margins of error are often expressed as +/- (plus or minus) a particular value, or as shading or dotted lines on a diagram.

In the individual on-line report, the margin of error for the student’s scale score is identified with the dark grey shading either side of the red dotted line (the student’s scale score).

The grey shading on this report shows that this student’s score could have been somewhere between 108 to 114 on this scale. This is one standard error, which means there is a 68% chance of the student’s score falling somewhere in this range. Small differences in scale scores should not be given more importance than they deserve.

Each PAT manual provides tables showing the error for each scale score.

It is important to understand that the errors are very large when students get most of the questions right in a test or most of the questions wrong. These students have a scale location that is broadly indicative only and is problematic to use when measuring improvement over time. It is recommended that teachers give students a test that is better matched to their ability if monitoring over time is required. Use the student’s indicative scale score to find a test with question difficulties in the same range as the student’s scale score. Diagrams illustrating question difficulty for each of the tests can be found in each PAT manual.

The individual report also provides a stanine and percentile rank for this student.

See the sections, What are norms? What are percentiles?
Understanding the group reports

The group report shows the response each student in your class gave to each question in the test. This helps you to identify patterns of strength and weakness in the way students have responded to the questions for the whole class as well as for individuals.

The questions are numbered along the top. If you scroll over the question number, a window will pop up with that question.

The question difficulty refers to the location of the question on the PAT scale for this learning area. Compare the question difficulty locations across the test: the lower numbers indicate the easiest questions and the higher numbers the harder questions for this test.

The question classification is the sub-strand of the learning area that this question assesses.

The percentage correct is the percentage of students in your class who answered this question correctly.

You can sort the group report in different ways to help you to identify possible patterns in student responses that can inform your teaching.

- ![Checkmark](image) This allows you to sort by correct answers and incorrect answers.
- ![Graph](image) This allows you to sort by students' scale scores. This ranks the students by their achievement on this test.
- ![9](image) This allows you to sort by stanines. See What are norms? What are stanines?
- ![Percentile](image) This allows you to sort by percentile ranks. See What is a percentile rank?
What are norms?

All the PATs have norm reference samples consisting of Australian students from all states and territories and from all school systems – government, Catholic and independent. A random, stratified sampling frame was used to select the schools. PATs were administered to students in different year levels of the norm reference sample so you can compare your students’ achievements on the test with the norm reference sample by year level.

The norm data has a normal distribution on each PAT scale. This means:

- There are a few students located on the higher parts on the scale, because they got most of the test right.
- Most students are located in a large bulge around the part of scale that shows they answered about half the questions correctly and about half the questions incorrectly.
- There are a few students located on the lower parts of the scale, because they got most of the test wrong.

The following diagram shows the distribution of the norm reference group as a curved line on the scale. You can see where the line bulges to show the majority of students. The numbers inside the curved line indicate the percentage of students in the norm reference group with locations on this part of the scale.

The norm data for the PATs is reported as percentile ranks and as stanines. They are different ways of describing the distribution of achievement of the norm reference sample on a PAT scale. You do not need to use both forms of norm data.

There are reports in the PAT manual that present the norm data visually. You may prefer to use the visual information and ignore the percentile ranks and stanines.

If you find the norm reference data confusing, you do not need to use it. You can gain a great deal of useful information from the PATs just by using students’ scale scores and question difficulties.
What is a percentile rank?
A percentile rank is associated with a scale score. Take any student’s scale score and the corresponding percentile rank indicates the percentage of students in the norm reference group for that year level with lower scale scores.

The red line on the diagram above shows that a student with a scale score of 70 has a percentile rank of 40, meaning 40 per cent of the norm reference group had scale scores below 70.

Percentiles should not be used to measure progress over time. Use scale scores for this purpose. It is important to remember that the norm data is indicative only. Percentile rank shows how your students compare with the norm sample, but this information should not be over interpreted.
What are stanines?

Stanines divide the student achievement distribution for the norm reference group into nine categories, with stanine 1 the lowest, stanine 5 the midpoint and stanine 9 the highest. Your students’ scale scores are used to match them to one of the stanines in the norm reference group distribution.

- Students in stanine 9 are located well above norm reference group ‘bulge’ on same part of the scale as the small number of students in the norm reference group who got most of the test right.
- Students in stanine 5 are located on the same part of the scale as the ‘bulge’, or the largest number of students in the norm reference group. These students answered about half the questions correctly and about half incorrectly.
- Students in stanine 1 are located well below norm reference group ‘bulge’. They are located on the same part of the scale as the small number of students in the norm reference group who got most of the test wrong.

Stanines are useful for describing distributions of achievement; however, it is recommended that only differences of two or more stanines should be regarded as indicating a real difference in performance.

Stanines should not be used to measure progress. Use scale scores for this purpose. It is important to remember that the norm data is indicative only. Stanines show how your students compare with the norm sample, but this information should not be over interpreted.

Technical information

All ACER PAT teacher manuals provide detailed technical information. Refer to the appropriate chapter in each manual for information about construction of each PAT scale, validity, reliability and characteristics of the norm-reference groups.