CAT4 AND STRATEGIES FOR LEARNING – QUICK REFERENCE GUIDE

CAT4®

COGNITIVE ABILITIES TEST

CAT4 and Strategies for Learning – Quick Reference Guide

Use of the *CAT4* profiles enables teachers to adapt their teaching approaches, materials, emphasis and pace in the classroom to meet individual student needs. This is enhanced by an understanding of the interaction between student characteristics and the demands of the task or the classroom. The effective teacher will use all these factors to impact each student's learning outcomes directly.

This *Quick Reference Guide* summarises the characteristics of students with different profiles, how these characteristics might look in a classroom context, and effective strategies for getting the best from these students. For more information, see the detailed guide to *CAT4* profiles.

For further support with understanding, analysing or interpreting your *CAT4* data, please book a free one-to-one data consultation with our Assessment Insights team or get in touch at Assessment.Insights@gl-assessment. co.uk. Our Assessment Insights team are assessment data experts with over 35 years combined classroom experience, here to help you make the best use of your data to inform in-school actions.

No bias profiles			
No bias profile summary	In a no bias or even profile, students' verbal, quantitative, spatial and non-verbal scores do not differ significantly from each other. By 'no bias', we mean that all the standard age scores are within nine or fewer standard age score points of each other. There is only one general piece of information provided by the test, and that is the overall level, which will be well summarised by the mean *CAT4* score. Just over two-thirds of students (66%) have no bias profiles.		
	Above average no bias	Average no bias	Below average no bias
Student characteristics	• Students with an above average or no bias profile will demonstrate strong verbal and spatial abilities. • They should perform at a very high level in most areas of learning. • These students are likely to enjoy active learning methods as well as engaging with challenging written material. • They should be supported in developing independent learning skills to ensure that achievement matches potential.	• Students with an even or no bias profile demonstrate verbal and spatial abilities in the average range. • These students will achieve at an average level in most areas of learning. • These students will benefit from a variety of active teaching approaches that are selected to address their specific needs. • They are likely to perform at a moderate level in language-based subjects and subjects such as science, technology, design and geography that draw on spatial ability. • Some student preferences and strengths may develop over time with exposure to a full range of curriculum subjects.	• Students with a below average no bias profile have low verbal and spatial abilities. • These students are likely to perform at a low level in most areas of learning, whether verbally or visually based. • They may struggle with learning across many areas and are likely to need support through specific interventions, well-targeted learning materials and a range of different learning methods.

No bias profiles			
What does this look like in the classroom?	• Where attainment is not high, teachers should identify why this does not appear to match potential and use the approaches described in the detailed guide to stimulate, enrich and extend the learning. • Teachers should take into account that students with no observable bias are usually self-motivated and independent learners and are likely to be able to make a valuable contribution to group work. • These students should be **challenged, inspired and motivated** with materials, projects and problems that are more challenging than those used for the average-attaining no bias student. • Teachers can further improve students' reasoning skills by encouraging them to find ways of communicating accurately and imaginatively to describe more precisely the relationships among concepts or the rules that sequence them. • It is important that teachers develop high expectations of such students and continue to provide support and encouragement along with the challenge to make further progress. • Teachers should provide the opportunity for such students to present their learning in different ways that still address identified criteria.	• Teachers should ensure high expectations and the creation of opportunities for students to demonstrate their learning. • It is important that teachers do not lower expectations for students with an average no bias profile. • Identify learning objectives that support all student aspirations. Teachers should not 'differentiate' using the language of 'all students, most students, some students' but instead provide common objectives for all learners. • Teachers should ensure that learning opportunities are broad and varied and use strategies that help build student confidence across the ability spectrum. • They should work additionally to support the development of a growth mindset using personal knowledge of individual learners. • Teachers should promote the students' developing sense of self-awareness of their personal learning attributes through positive, caring and clearly defined interactions. • Average-achieving no bias learners may not share common characteristics in the same way that higher-achieving no bias students often do.	• Teachers should maintain appropriate expectations and enable students to demonstrate their learning. • Attainment is relatively low, and basic literacy and numeracy skills are very likely to be a target for development. • Teachers should take into account that students with poorly developed reasoning abilities often have difficulty learning abstract concepts. • Accordingly, teachers need to ensure that planned objectives, activities and outcomes are all clearly identified in language that makes sense to the learner. • Where a written or oral assignment is a key outcome, the teacher should ensure that students have a clear understanding of the processes, structure and criteria for success. • These students may have difficulty identifying what is important to learn and judging where they should focus their attention. Consequently, teachers should ensure that clear guidance is provided regarding task structure and expected outcomes. • Promoting a positive attitude to learning is essential if all students are to give their best in the classroom.

No bias profiles			
Examples of strategies to use	Teachers should provide focused challenges at an appropriate level to ensure that higher-attaining students do not become bored or disaffected. 1. Extension menus for challenge 2. Opportunities for independent study	The provision of effective scaffolding support for student learning is the gateway to achieving subsequent independent success. 1. Scaffolding learning 2. Small-step learning	Teachers should focus on support strategies that encourage students to move securely in their learning journey by ensuring that they clearly understand the direction of the learning and expected outcomes. 1. Step-by-step scaffolding of learning 2. Addressing self-esteem and motivation

Verbal Reasoning bias profiles			
Verbal Reasoning profile summary	The ability to express ideas and reason through words is essential to subjects with a high language content and the most obvious skill picked up by traditional assessment.		
	Extreme verbal bias (V+)	Moderate verbal bias (Vmu)	Mild verbal bias (V–)
Student characteristics	• Students with a relative strength in verbal reasoning will generally do best when they talk and write about their learning – they can be adept language users. • They are likely to participate effectively in group discussions, work well with a partner, show high standards of written expression in a range of subjects, enjoy word games and similar activities, have an extensive vocabulary and demonstrate creative writing skills. • They will do relatively well in language-based subjects where verbal skills are at the fore (for example, English, history, modern languages and other humanities subjects). • These students will be quick to see links between verbal concepts and are often adept at interpreting and understanding the nuances and ambiguities of language.	• Students with this profile are more likely to prefer to engage with written material and should show high average or above average attainment in language-based subjects such as English and history. • Students may find subjects that draw on spatial ability, such as science, technology, graphic design and geography, more challenging. • Opportunities to link language-based skills with a structured understanding of writing, including text-type guidance, is likely to support students' work in more STEM-based subjects. • Teacher modelling, classroom demonstrations and guided instruction will be effective in supporting student achievement across the curriculum.	• Students with this profile are less likely to be comfortable working with written material and language-based subjects such as English and history. • It is essential to identify if a mild verbal bias profile results from some specific difficulty with reading, remembering that only the Verbal Battery requires any reading ability – no reading is required for the Quantitative, Spatial and Non-verbal Batteries. • It may be that the student speaks English as an additional language (EAL) and is not yet fluent in reading English.

Verbal Reasoning bias profiles			
What does this look like in the classroom?	• Students with a relative strength in verbal reasoning will tend to be good at developing ideas and their lines of thinking in continuous text. They are likely to be able to explain a process logically. • Students with high verbal reasoning scores can further develop their skills through group work and can also play a prominent role in developing the skills of others. • Since their non-verbal scores are relatively low, high verbal reasoning scoring (V+) students may need some support in using the kind of visual models that teachers may think will support their learning. • V+ students tend to have higher national test and examination attainment than students with a similar mean *CAT4* score who have their strength in the Quantitative, Spatial or Non-verbal Batteries. • More girls than boys tend to have V+ profiles.	• When active modelling is a regular feature of lessons, verbal bias students are more likely to produce work that achieves the standard required. • These students may be hindered by weaker spatial skills and so may need support when working with pictures, diagrams, mind maps and so on. • Such students are likely to be confident with written texts and are able to successfully use the processes described in teacher modelling. • With verbal scores significantly higher than other batteries, these students will benefit from a focus on asking and answering questions.	• The low score on the Verbal Battery may be because these students speak English as an additional language (EAL). A more accurate estimate of their reasoning ability may be gained by considering their mean score excluding the verbal score. • The distance between being 'word rich' and 'word poor' can, for students with a mild verbal bias, be a significant disadvantage long before external examinations become important. • As well as addressing specific individual issues, there is much that can be done to support reading development across the curriculum for students relatively weak in verbal reasoning, ensuring that they are able to make progress in their learning because they have the required reading skills.
Examples of strategies to use	Teachers should focus on using the strengths of students with this profile and supporting them in areas where they may be weaker. 1. Effective group work 2. Encouraging students to talk about their learning 3. Pairing students with different strengths	Strategies should focus on addressing students' areas of weakness and building on strengths with the following strategies. 1. Effective step-by-step modelling 2. Asking students detailed questions	Teachers should use strategies focused on building reading skills. 1. Increasing the range of texts used 2. Improving comprehension skills 3. Establishing a secure reading culture

Spatial Ability bias profiles			
Spatial Ability summary	Spatial Ability – the capacity to think and draw conclusions in three dimensions – is needed for many STEM subjects, but not easily measured by other datasets. Identifying such students and supporting their progress is a major way in which the ever-growing 21st-century demand for STEM-related skills can be met.		
	Relative strength in spatial ability (S+)	Moderate strength in spatial ability (Smu)	Relative weakness in spatial ability (S-)
Student characteristics	• Students with this profile have a distinct strength in spatial over verbal learning. • These students should excel when engaged in tasks that require visualisation and will learn quickly when working with pictures, diagrams, 3D objects, mind maps and other tangible methods. • Their relatively weaker verbal skills may make learning through written texts, writing and discussion less effective. • Students with an S+ profile are often characterised as 'intuitive' and capable of seeing 'the big picture', but this may be at the expense of a lack of attention to detail which can be characteristic of such students.	• Smu students exhibit a relative strength in spatial over verbal learning. • Their performance is likely to be better when they are engaged in tasks that require visualisation, including working with pictures, diagrams, maps and 3D objects. • Whilst they are likely to be average or above in STEM subjects that make the most of their spatial abilities, they may be less confident of success in language-based subjects such as English and the humanities.	• Students with this profile have a weak preference for spatial reasoning. • They are likely to perform better when engaged in tasks that require visualisation and so may enjoy working with pictures, diagrams, maps and 3D objects. • Whilst these students are likely to be average or above in the STEM subjects that make the most of their spatial ability, like other students with a spatial bias they may be less confident of success in language-based subjects such as English and the humanities.

Spatial Ability bias profiles			
What does this look like in the classroom?	• Early identification and appropriate provision for S+ students is likely to make a significant difference to their progress in STEM subjects and more generally across the curriculum. • Teachers should be aware that closely linked to spatial skills is the ability to think analogically: that is, to see relational similarities between one situation and another. • Most S+ students will benefit from a highly visual start to any lesson and are likely to enjoy and learn best through active learning methods, including simulations, problem-solving activities and the creation of original ideas and responses to new learning. • S+ students' ability to quickly visualise a solution, see a pattern or draw conclusions from a range of disparate sources make them invaluable in group work.	• Smu students, particularly if they have lower than average verbal reasoning scores, are likely to require more support in developing language skills. • Such students will gain more when they are actively involved in the learning process, and teachers need to support this through developing and then sustaining engagement.	• Students with this profile will be encouraged and helped to use their better spatial ability in subjects that depend on verbal skills through the use of visual material, such as infographics, to support text. • For students with English as an additional language (EAL), the low score on the Verbal Battery may indicate a lack of fluency with the English language. • It is also possible that a low verbal score might reflect social and economic disadvantages, such as little exposure to rich and varied language in the home or wider environment. • One key to continuing achievement is likely to be the role played by effective collaboration with other students.
Examples of strategies to use	S+ students will learn best using a variety of learning activities. 1. Effective lesson starters 2. Active learning 3. Use of visual images and drama	Smu students will benefit from sustaining engagement, and teachers should use strategies to encourage active involvement. 1. Using the physical environment for learning 2. Focusing on improving attitudes to learning 3. Using effective delivery strategies	Strategies for these students should focus on using their strengths to address their weaknesses. 1. Extending collaborations in group work 2. Effective use of plenaries 3. Use of visual-learning techniques

Quantitative Reasoning		
Quantitative Reasoning summary	Quantitative Reasoning – the ability to use numerical skills to solve problems - is applicable well beyond mathematics.	
	Relative strength in quantitative reasoning (Q+)	Relative weakness in quantitative reasoning (Q-)
Student characteristics	• Students with strong quantitative reasoning show good understanding of relationships between numbers, in seeing patterns and order in numbers and in combining and recombining various quantitative elements in meaningful ways. • Q+ profiles tend to be associated with relatively high achievement in mathematics, and in other subjects with a significant quantitative component. • Conversely, Q+ students may struggle to explain and justify their inferences and deductions verbally.	• Students with weak quantitative reasoning show poor understanding of relationships between numbers, in seeing patterns and order in numbers and in their flexibility in combining and recombining quantitative elements in meaningful ways. • If the absolute quantitative score is very low (stanines 1-3), and if in class work the student's difficulties appear to be confined to numbers, then it is possible that some kind of specific arithmetical difficulty (or dyscalculia) is involved.
What does this look like in the classroom?	• Effective use of quantitative reasoning in the classroom may be particularly important where students have strong quantitative reasoning but are less secure in their verbal profiles. • Some research has suggested that students who excel in learning rule-based mathematical knowledge can show better than expected knowledge of grammar. • Students with a strength in quantitative reasoning may also find an understanding of computer skills easier than some of their peers, especially procedures such as using text editors, spreadsheets or cut-and-paste facilities.	• Research has suggested that dyscalculic students may have problems understanding that number words and numerals refer to the size (or numerosity) of the sets they denote.
Examples of strategies to use	The following strategies will help to use Q+ learners' strengths effectively. 1. Bringing quantitative skills to group work 2. Providing enrichment activities focused on quantitative skills 3. Extending the range and depth of questioning	Strategies for supporting Q- learners include activities to support and improve working memory. 1. Reducing the burden on working memory 2. Selecting activities that improve working memory