1. The Importance of Precision Teaching of Mathematical Procedures for Oscar

Oscar is entering Year 5 having been assessed as working at **pre-Key Stage** in mathematics. This indicates that he has not yet secured many of the foundational mathematical skills expected before accessing the Key Stage 2 curriculum.

For pupils at this stage of development, successful mathematics teaching depends upon carefully structured, explicit instruction that breaks learning into small, manageable steps. Rather than expecting pupils to infer methods from whole-class teaching or open-ended problem solving, they require direct teaching of the procedures needed to complete mathematical tasks accurately and consistently.

For Oscar, this means learning **how** to perform mathematical operations before he can be expected to apply them independently or use them in more complex reasoning.

Why Explicit Teaching is Important

Autistic pupils with significant learning needs often experience difficulties with:

- processing lengthy verbal explanations;
- holding several pieces of information in working memory simultaneously;
- generalising learning from one context to another;
- coping with multiple methods being presented at the same time; and
- independently identifying the sequence of steps needed to complete a mathematical task.

Without explicit instruction, these processing demands can become barriers to learning long before the mathematical concepts themselves are understood.

Teaching mathematical procedures through carefully sequenced, repeated practice reduces cognitive load and enables the learner to focus attention on one step at a time.

Precision Teaching Supports Learning

Precision teaching involves:

- breaking mathematical skills into very small learning steps;
- **modelling each step explicitly**;
- providing immediate feedback;
- practising until the skill becomes fluent;
- checking accuracy regularly; and
- gradually increasing independence as confidence develops.

This approach allows pupils like Oscar to experience success, develop confidence and build secure foundations for future learning.

Procedural Fluency Supports Conceptual Understanding

Procedural learning and conceptual understanding should not be viewed as competing approaches.

For pupils with significant additional learning needs, secure procedural knowledge often provides the foundation upon which conceptual understanding can later develop.

When a pupil is no longer overwhelmed by remembering each individual step of a calculation, more mental capacity becomes available for recognising mathematical relationships, understanding why methods work and solving increasingly complex problems.

For Oscar, explicit teaching of mathematical procedures is therefore not an alternative to conceptual understanding but an essential pathway towards it.

The Role of Individual Adult Support

Delivering this level of instruction requires continuous observation of Oscar's responses, immediate correction of misconceptions and adaptation of teaching to his rate of learning.

These are functions that cannot ordinarily be provided through whole-class teaching alone.

A dedicated adult is able to:

- present instructions in smaller, manageable steps;
- repeat explanations consistently;
- provide immediate corrective feedback;
- monitor understanding continuously;
- prevent frustration from escalating into anxiety; and
- ensure that new skills are mastered before introducing additional complexity.

Without this level of individual support, Oscar is unlikely to receive the intensity and consistency of instruction necessary to acquire the foundational mathematical skills required for successful participation in the Key Stage 2 curriculum.

Given Oscar's current attainment at pre-Key Stage, precision teaching delivered through individualised adult support represents an evidence-based approach that maximises his opportunity to make meaningful mathematical progress.

This approach is supported by:

- **Education Endowment Foundation** guidance on improving mathematics in Key Stages 2 and 3, which recommends explicit instruction, careful sequencing and reducing cognitive load for pupils who are struggling.
- **National Council of Teachers of Mathematics**, which emphasises that procedural fluency and conceptual understanding are complementary and should develop together.
- **National Autistic Society**, which advises that many autistic pupils benefit from structured, explicit teaching, visual modelling, repetition and predictable routines because these reduce uncertainty and support learning.

For Oscar, who benefits from very explicit, step-by-step instruction, you would avoid assuming he already knows what "subtract" means. You would break the process into small, concrete steps.

How to Subtract 4 from 20

1. Start with the number **20**.
2. We are taking away **4**.
3. Count backwards **four numbers**.

20 → **19** (that's 1)

19 → **18** (that's 2)

18 → **17** (that's 3)

17 → **16** (that's 4)

4. Stop counting because you have counted back **4 numbers**.

The answer is 16.

Another way using a number line

Start at **20**.

Jump back one step four times:

20 ← 19 ← 18 ← 17 ← **16**

You land on **16**.

Remember

- **Subtract** means **take away** or **count backwards**.
- Start with the **big number**.
- Count back the number you are taking away.
- The number you finish on is the answer.

20 − 4 = 16 ✅

This style of instruction is an example of **explicit instruction** or **precision teaching**. It tells Oscar exactly what to do at each step, uses consistent language, and avoids expecting him to infer the method on his own. As he becomes more confident, he can gradually move from counting back to recalling subtraction facts automatically.

OSCAR STILL REQUIRES CRA

2. For Oscar, **strict adherence to the CRA approach — Concrete → Representational → Abstract — is particularly important because it reduces the amount of inference he has to make when moving from a physical experience to a mathematical symbol or procedure.** This is especially relevant given the difficulties with his language, working memory, generalisation and his current attainment being substantially below his chronological age.

Why CRA is particularly important for Oscar

1. It gives mathematics a tangible meaning

Oscar can be presented with real objects before being expected to understand abstract mathematical notation. For example, rather than simply showing him **23 + 15**, he can physically handle 23 objects and 15 objects, combine them and see what happens.

This gives the number and operation a meaning that words and symbols alone may not provide.

2. It reduces reliance on language

Oscar's receptive and expressive language difficulties mean that a verbal explanation such as *"exchange ten ones for one ten"* may not be sufficient. With CRA, he can **see and physically perform the exchange** using equipment such as counters, cubes or place-value apparatus.

The adult can then attach the language to the experience.

3. It supports working memory

An abstract calculation requires Oscar to hold several things in mind simultaneously: the numbers, the operation, the procedure, the place-value relationships and what he has already done.

Concrete materials externalise some of this information. Oscar can **see the mathematics in front of him**, rather than having to retain everything mentally.

4. It helps develop procedural memory

This is particularly important for Oscar. Repeatedly performing the same mathematical process accurately with concrete materials helps establish a reliable procedure.

For example:

23 + 15

→ build 23
→ build 15
→ combine
→ exchange where necessary
→ represent the result pictorially
→ write **38**

With sufficient carefully structured repetition, the procedure can become increasingly automatic.

5. It prevents premature abstraction

One of the risks for Oscar is being moved to worksheets and written algorithms simply because they are appropriate to his chronological year group.

That can create the appearance that he is being taught the curriculum while he has not actually acquired the underlying mathematical concept.

For Oscar, **being able to reproduce an answer is not necessarily evidence that he understands the mathematical concept**.

CRA provides a way of establishing the concept.

6. It supports generalisation

Oscar may learn something successfully in one context but find it difficult to apply the same principle in another. CRA provides multiple representations of the *same mathematical idea*.

For example:

Concrete: 3 groups of 4 objects
Representational: three groups of four dots
Abstract: 3 × 4 = 12

The adult can explicitly show Oscar that these are **three different ways of representing exactly the same mathematics**.

That explicit connection is important rather than assuming that Oscar will automatically make the connection himself.

7. It makes misconceptions visible

With an abstract worksheet, it can be difficult to determine *why* Oscar has produced an incorrect answer.

With concrete resources, the adult can observe exactly where his understanding breaks down.

For example, if Oscar cannot correctly make **36** using tens and ones, the problem may actually be place value rather than addition. The teaching can therefore address the underlying difficulty rather than simply correcting the answer.

The important point for Oscar

CRA should **not** mean allowing Oscar to stay permanently at the concrete stage.

The objective is a carefully controlled progression:

Concrete → Representational → Abstract → increasingly independent abstract application

The crucial point is that **Oscar should not be moved to the next stage simply because the adult thinks he ought to be ready for it.** He should demonstrate sufficient understanding at each stage before the representation is progressively withdrawn.

For Oscar, therefore, CRA is not simply a preferred teaching style. **It should form part of a consistent, individualised mathematical teaching methodology**, delivered by an adult who understands his learning profile and can recognise when he has genuinely understood a concept.

With consistent 1:1 support, the adult can:

- establish the concept concretely;
- observe Oscar's responses;
- identify misconceptions immediately;
- repeat and practise where necessary;
- introduce the pictorial representation;
- explicitly connect it to the concrete experience;
- introduce the mathematical symbols;
- check that Oscar understands rather than merely copies;
- systematically reduce adult prompting; and
- record when he is ready to generalise the skill.