MathKLIX – Math Quiz Mode and Expansion Guide

User Guide for the Oscar Learning Platform

Welcome to Math Quiz Mode

Oscar's Math Quiz Mode is designed to help young learners develop **strong number sense, reasoning skills, and confidence with mathematics** through **hands-on, play-based interaction**.

Rather than focusing on worksheets, drills, or memorisation, Math Quiz Mode encourages children to:

- **build mathematical ideas physically**
- **explore relationships between numbers**
- **explain their thinking aloud**
- **solve problems by reasoning, not guessing**

The system is intentionally limited in symbols and numbers so that children focus on *understanding* rather than *procedure*. This aligns with best practice in early mathematics education and with how the Australian Curriculum introduces number concepts in the early years.

Oscar's Math Quiz Mode is suitable for:

- classroom use (Foundation to Year 3)
- small-group instruction
- intervention and support
- home learning with parents or carers

Oscar's Math Quiz Mode is available with the standard Gen2 Coding with Oscar module, or can be optimised with the dedicated MathKLIX expansion pack, which provides additional KLIX:

	Coding with Oscar (built-in)	MathKLIX Expansion (optional)
Total	Say123	Total
Missing Number	Random	Missing <?>
Numbers	1-3 or 1-5	Additional 1-5
Operations	Implied Addition	Add +, Multiply X

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What Math Quiz Mode Includes (and What It Doesn't)

Included:

Math Quiz Mode uses:

- **Digits 1–5**
- **Addition (+)**
- **Multiplication (×)**
- **TOTAL** (to indicate "work out the result")
- **Missing number / unknown**, represented by a dedicated KLIX (or transitional use of RANDOM)

This small symbol set is **deliberate**. It keeps learning concrete, visible, and manageable for young children.

Not Included (by design):

Math Quiz Mode does *not* introduce:

- subtraction (−) or division (÷) symbols
- large numbers
- negative numbers
- fractions
- written algorithms

Instead, **subtraction and division are handled conceptually** through *missing-number problems*, such as:

- 5 = 2 + ?
- 3 × ? = 6

This approach avoids early abstraction while still developing deep mathematical understanding.

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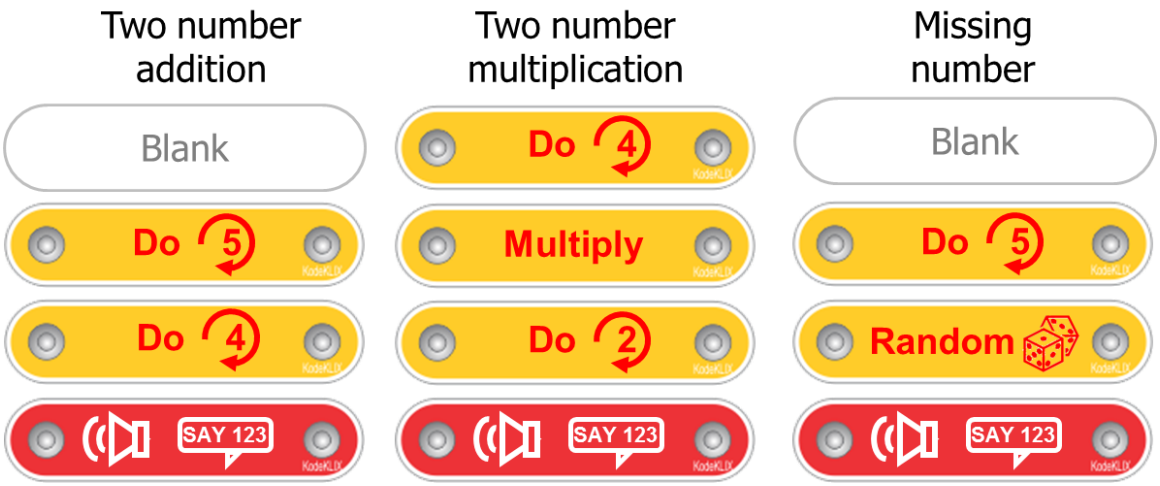
How Math Quiz Mode Is Used

Basic Structure

Children create a maths challenge by placing KLIX pieces in a sequence.
When **TOTAL** appears in the final coding line, Oscar recognises the sequence as a *quiz* and prompts the child to think and respond.



Examples:

- 2 + 3 TOTAL
- 5 = 2 + ?
- 3 × ? = 6

Oscar then:

- asks a question aloud
- pauses for thinking time
- responds to the child by providing the answer

Who Controls the Learning?

The **child** does.

Children decide:

- which numbers to use
- where to place the unknown
- how to test or change their idea

Teachers and parents act as **guides**, asking questions such as:

- “How do you know?”
- “Can you show me another way?”
- “What happens if you change this number?”

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Why Small Numbers (1–5) Are Enough

Young children understand numbers **long before** they understand symbols or written methods. Digits 1–5:

- map directly to fingers, dots, dice, and counters
- support **subitising** (recognising quantity without counting)
- allow children to reason mentally and physically

With just these numbers, children can explore:

- number bonds
- combinations
- repeated addition
- inverse relationships
- pattern discovery

This creates what educators call **"bounded infinity"**: a small symbol set with a surprisingly large learning space.

Why Addition and Multiplication Are Prioritised

Addition

Addition is the foundation of early number understanding. Math Quiz Mode supports:

- combining quantities
- part–part–whole thinking
- checking answers by recounting or rearranging

Multiplication (as grouping)

Multiplication is introduced **conceptually**, not as rote times tables. Children experience multiplication as:

- "groups of"
- repeated addition
- structured counting

For example:

- 2×3 becomes "two groups of three"

This aligns strongly with early-years curriculum intent.

Subtraction and Division Through Missing Numbers

Instead of introducing − and ÷ symbols early, Math Quiz Mode reframes these ideas as **missing-number problems**.

Examples:

- Subtraction → $5 = 2 + ?$
- Division → $3 \times ? = 6$

This approach:

- avoids negative or fractional outcomes
- keeps all answers within familiar numbers
- encourages reasoning rather than rule-following

Children learn to ask:

"What number makes this true?"

This is a powerful form of early algebraic thinking and is strongly supported by contemporary mathematics education research.

The Role of the "Missing Number" KLIX

The missing number represents:

- an unknown
- something to be discovered
- a thinking challenge

Pedagogically, this is different from *randomness*. The purpose is **not chance**, but **reasoning**.

Using a clear missing-number concept:

- helps children understand the task instantly
- reduces teacher explanation
- supports consistent mathematical language across school and home

Pedagogical Foundations

Math Quiz Mode is built on well-established principles of early mathematics learning:

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Concrete → Representational → Abstract (CRA)

Children:

1. manipulate physical objects (KLIX)
2. see symbolic representations
3. verbalise and reason about ideas

Play-based learning

Learning happens through:

- exploration
- experimentation
- repetition with variation
- low-risk failure and retrying

Mathematical talk

Oscar's spoken prompts encourage children to:

- explain their thinking
- use mathematical language
- listen to others' ideas

Reasoning before fluency

Understanding is prioritised before speed or memorisation.

Benefits for Teachers

For teachers, Math Quiz Mode:

- supports **differentiation** (same tools, different challenges)
- enables **formative assessment**
- encourages student talk and justification
- fits easily into numeracy rotations
- requires minimal setup

Teachers can observe:

- how students approach problems
- whether they reason or guess
- how they respond to feedback
- how they explain their thinking

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Evidence can be collected through:

- observation notes
- photos of KLIX layouts
- audio or written explanations

Benefits for Parents

For parents, Math Quiz Mode:

- removes anxiety around “teaching maths”
- provides clear prompts and structure
- turns maths into shared play
- makes children’s thinking visible

Parents do not need to “know the right method”.
They simply ask:

- “How did you know?”
- “Can you show me?”
- “What happens if we change this?”

Curriculum Alignment (Overview)

Math Quiz Mode aligns with the **Australian Curriculum (v9.0)** as defined by the **Australian Curriculum, Assessment and Reporting Authority (ACARA)** and with the **Western Australian Curriculum**, overseen by the **School Curriculum and Standards Authority (SCSA)**.

Foundation to Year 1

- representing numbers with objects and symbols
- combining quantities
- understanding part–part–whole relationships
- explaining thinking using informal language

Year 2

- modelling additive and multiplicative situations
- understanding multiplication as grouping
- solving missing-number problems
- recognising inverse relationships

Year 3 (extension and reinforcement)

- connecting multiplication and division conceptually
- justifying solutions
- comparing strategies

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Math Quiz Mode is a **conceptual reasoning tool**, not a replacement for formal instruction or fluency practice.

General Capabilities Supported

Math Quiz Mode contributes to:

- **Numeracy** – interpreting and reasoning with numbers
- **Critical and Creative Thinking** – exploring patterns and relationships
- **Personal and Social Capability** – collaboration, turn-taking, confidence
- **Literacy (oral)** – explaining strategies and reasoning

Assessment and Reporting

Math Quiz Mode supports **formative assessment** by making learning visible. Teachers can assess:

- reasoning processes
- use of mathematical language
- problem-solving strategies
- persistence and engagement

This evidence complements:

- written tasks
- work samples
- standardised assessments

Key Takeaway

Oscar's Math Quiz Mode:

- uses a **small, carefully chosen symbol set**
- prioritises **understanding over memorisation**
- supports **early algebraic thinking**
- aligns strongly with curriculum intent
- works equally well at school and at home

By asking children to *build*, *think*, and *explain*, Math Quiz Mode helps them develop a confident, flexible relationship with mathematics that will support learning well beyond the early years.

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