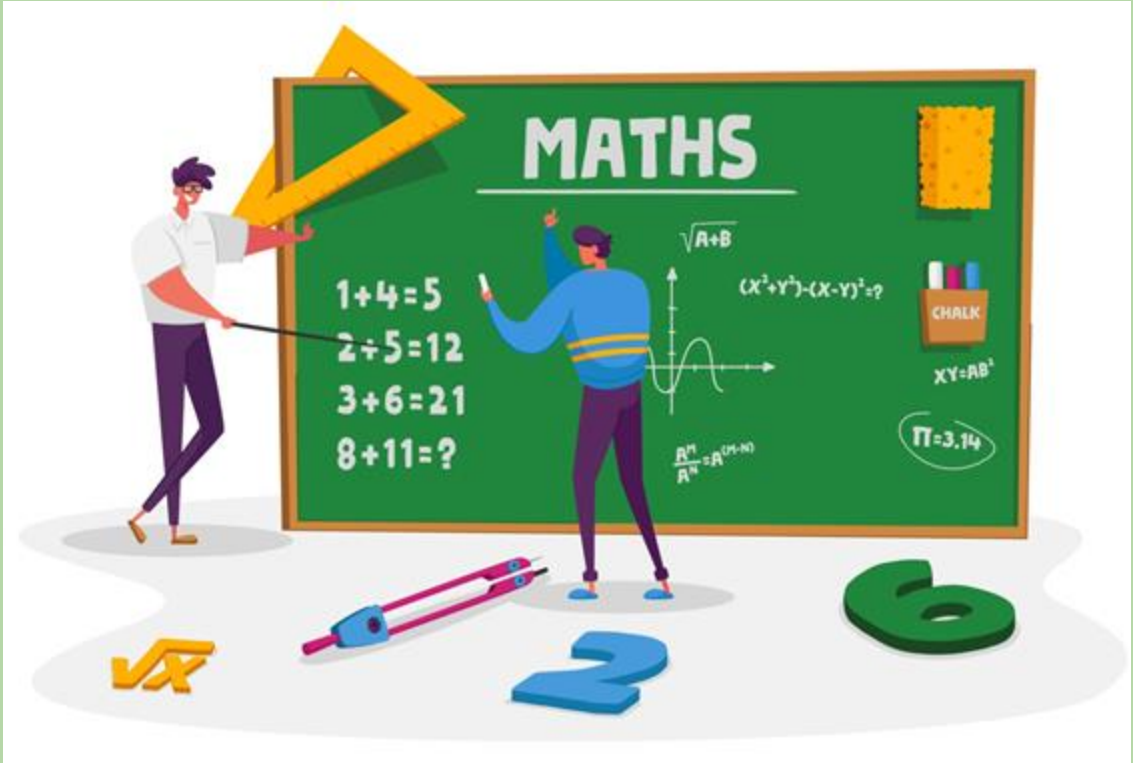



# PYP Mathematics
# Learning *and* Teaching
## November 3rd 2026

H-FARM INTERNATIONAL SCHOOL

Today we will explore:

1. What mathematics do we use in our **DAILY LIFE**? Survey.
2. **CONTEXT**: past-present-future of learning and work
3. What **SKILLS** do students really need to thrive in the future?
4. What does mathematics learning look like at **H-FARM**?
5. H-Farm mathematics **CURRICULUM** (CBI Program)
6. Q & A session

H-FARM INTERNATIONAL SCHOOL

# Math in our daily lives

- ❏ Write some examples of ways you use math in your life.
- ❏ Use post-it notes.
- ❏ Discuss your choices with other people at your table.
- ❏ Share with us all.

H-FARM INTERNATIONAL SCHOOL


Budgeting


Cooking


Health and fitness


Decorating



Music


Driving


Balancing the checkbook


Shopping


Baking


Home Improvement


Exercising


Sewing


Mathematics in your job


Construction


Sports


Technology


Calculating travel and de...


Gardening



DIY


Time

# Changing life and work environments...





# …require different school environments and different teaching/learning





# How has Computation changed?

1. TECHNOLOGICAL CHANGES

1. PEDAGOGICAL CHANGES

H-FARM
INTERNATIONAL
SCHOOL

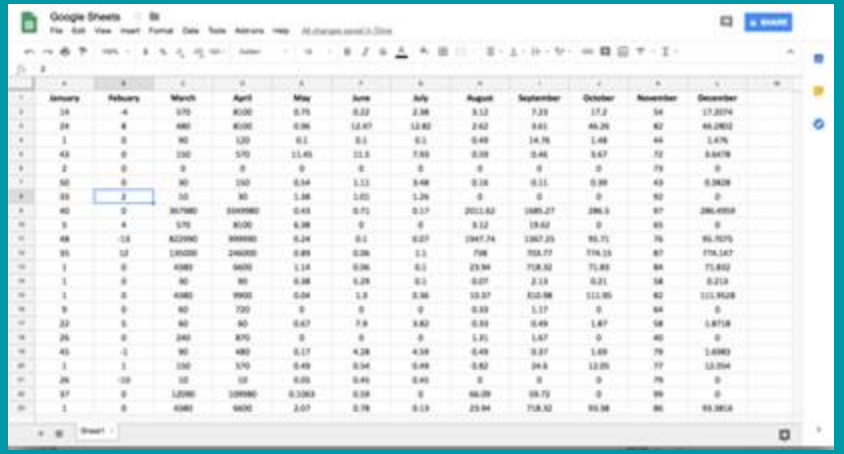
# How has Computation changed?

## TECHNOLOGICAL CHANGES









H-FARM INTERNATIONAL SCHOOL

# Impact of Technology on the Maths Curriculum

- Some mathematics becomes *more important* because technology requires it
- Some mathematics becomes *less important* because technology replaces it
- Some mathematics becomes *possible* because technology allows it

NCTM

H-FARM INTERNATIONAL SCHOOL

# Calculation Methods

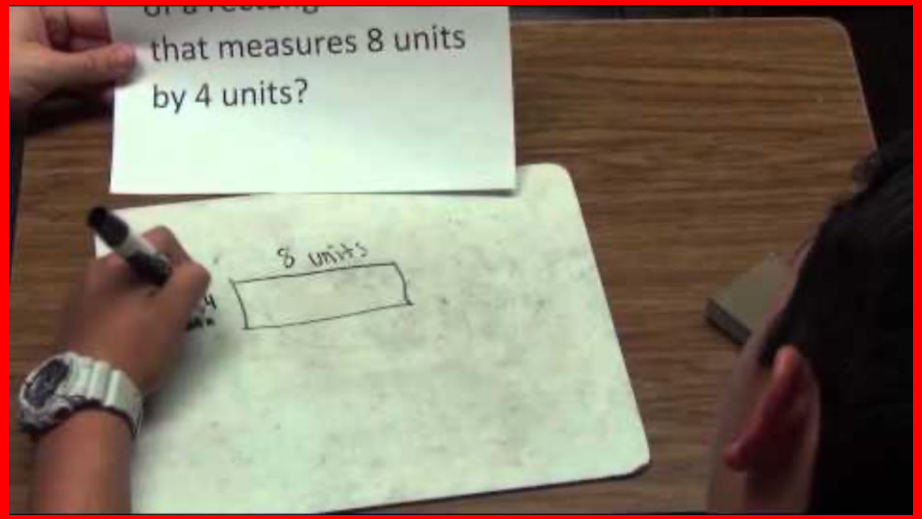
| | Written Algorithms | Mental Algorithms | Calculator |
|---|---|---|---|
| ADULTS | 10% | 75% | 15% |
| KIDS IN A TYPICAL SCHOOL | 85% | 10% | 5% |

*Doug Clarke*

H-FARM INTERNATIONAL SCHOOL

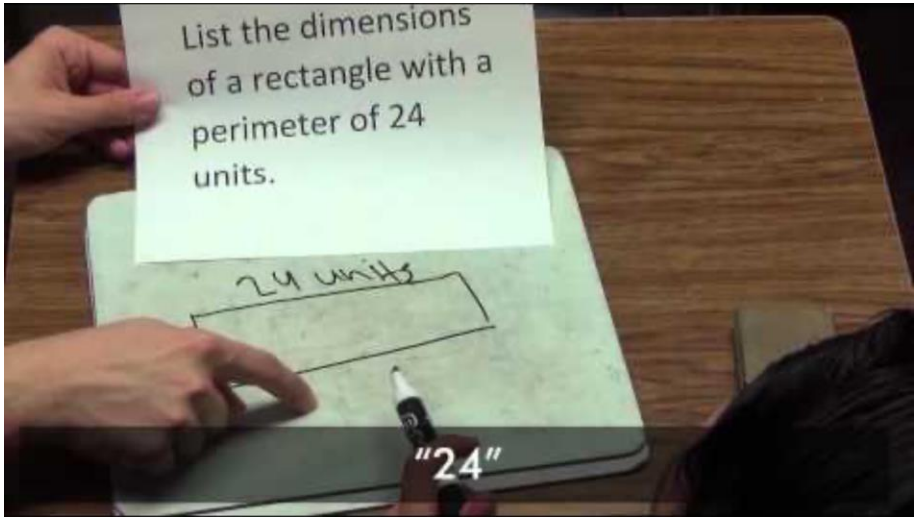
# Why SKILLS are not enough

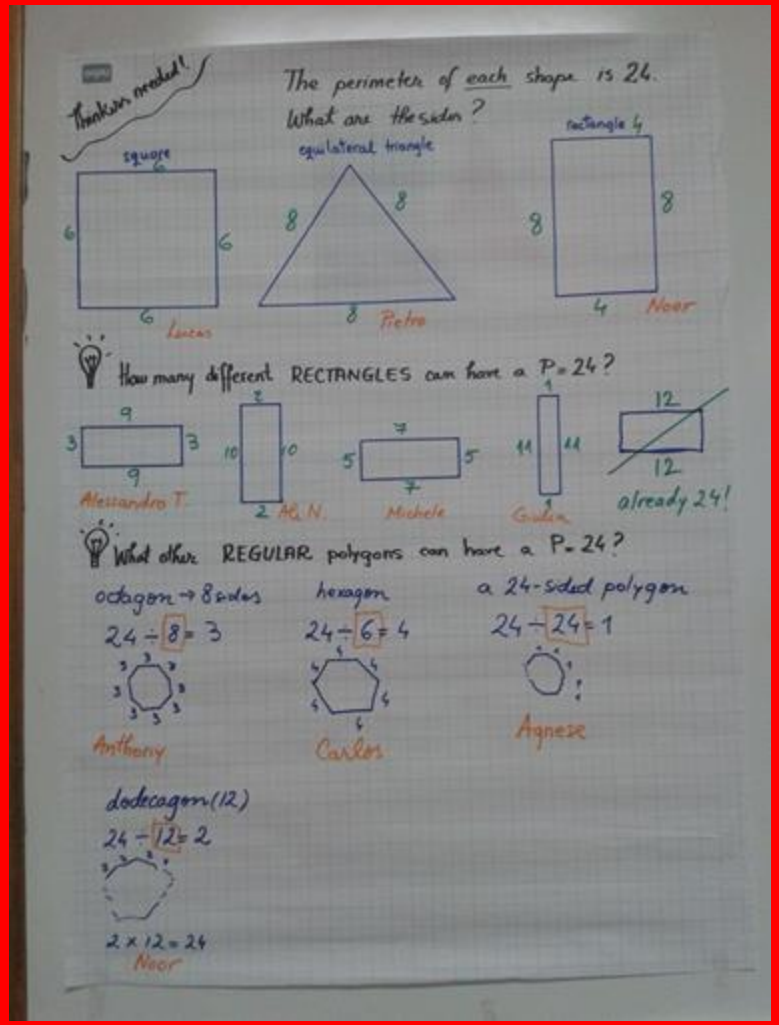
H-FARM
INTERNATIONAL
SCHOOL




**PROCEDURAL** skill?
Yes.

**CONCEPTUAL** understanding?
No.



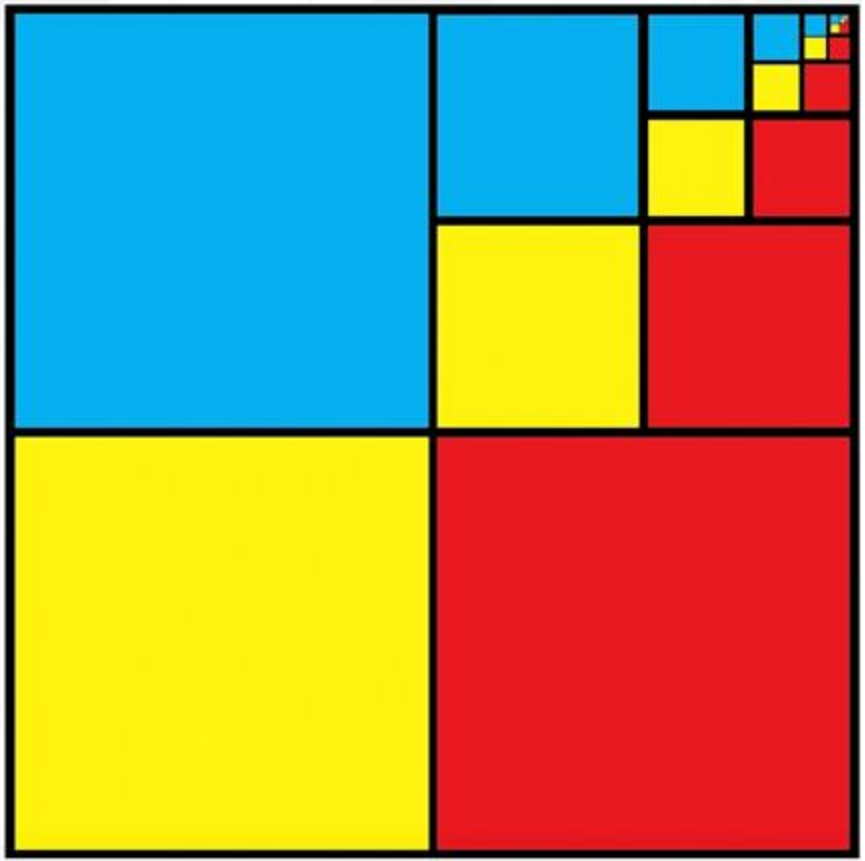



CONCEPTUAL understanding is revealed in RICH tasks,

that require multiple **solutions** or diverse **strategies**.

# Friday maths talk

- What do you notice?
- What do you wonder?
- What fraction of the whole square is yellow?

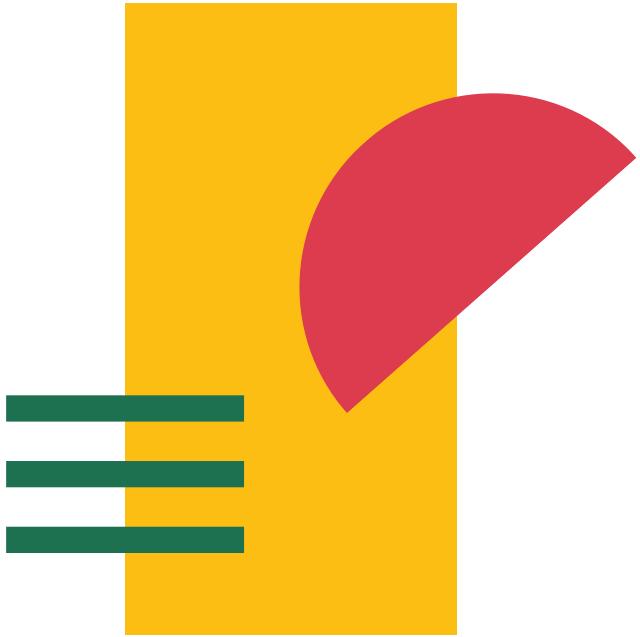


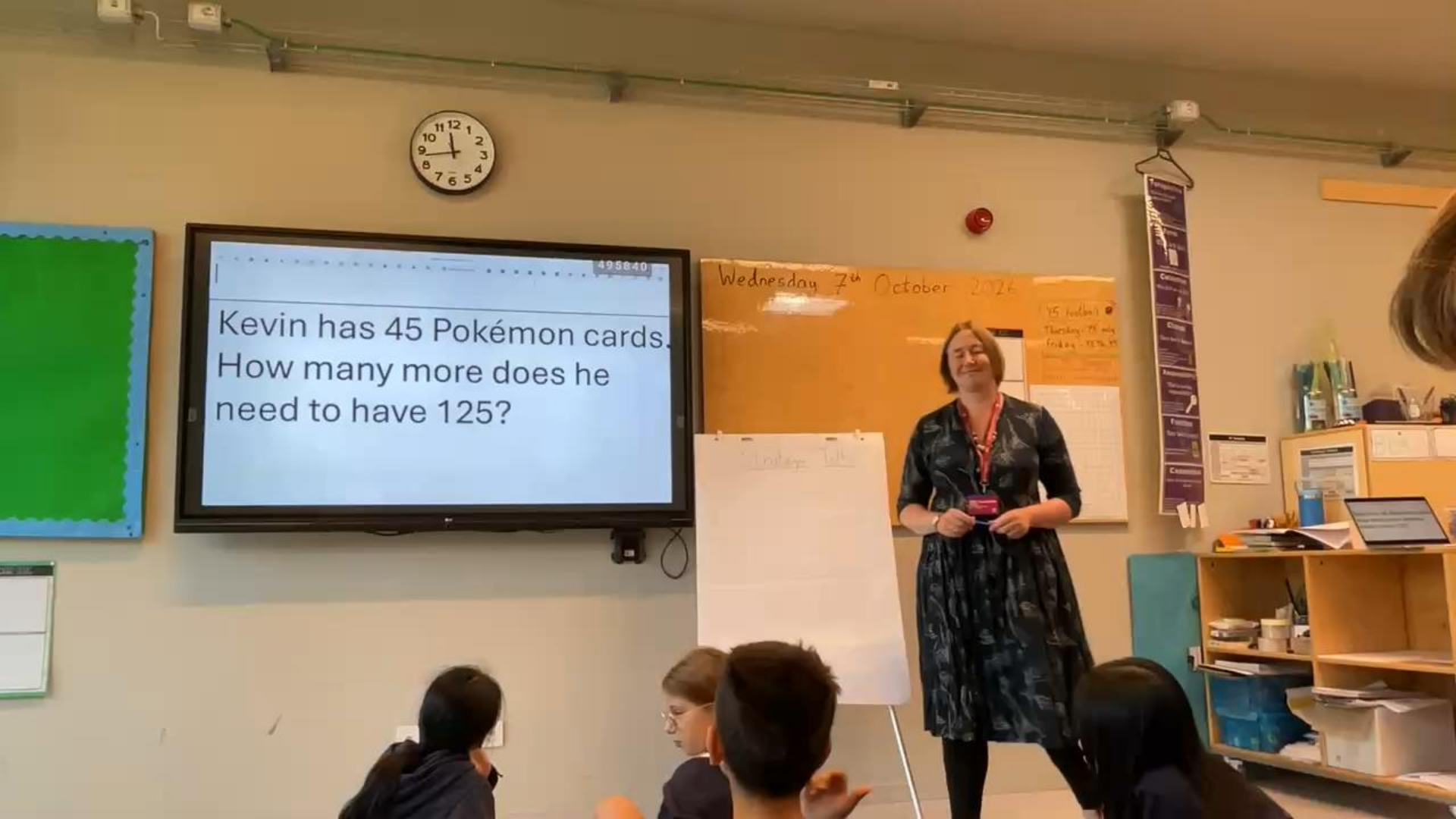
H-FARM INTERNATIONAL SCHOOL

# Strategy Talks

## What are they?

- Use one simple equation or statement
- Compare multiple strategies for solving the problem
- Use visual thinking routines in order to record children's ideas
- Create a shared understanding
- Empower children's thinking
- Create a collective bank of resources
- Encourage children to think critically and creatively



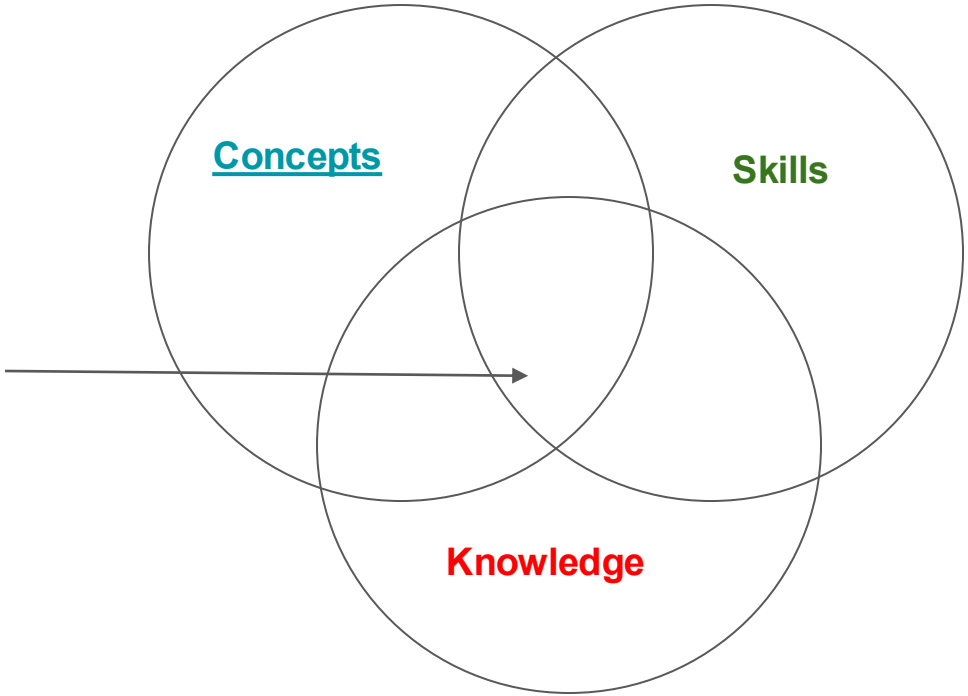

Kevin has 45 Pokémon cards.
How many more does he need to have 125?
Wednesday 7th October 2026

# Good mathematics teaching

- Encourages children to **think mathematically** rather than do math.
- Encourages children to **explain their thinking** and articulate the processes they use, especially when an answer is “wrong”
- Provides opportunities for the **exchange of points of view** among children
- Is based on thorough and current **research about learning** and is clearly articulated across the developmental phases students move through.

# MATHEMATICS - The 3-legged stool

This is where **UNDERSTANDING** happens




H-FARM INTERNATIONAL SCHOOL

Conceptual understanding is **not** built in a lesson.
It requires ***a SERIES of lessons*** where the students need to:

- ***manipulate*** *(objects, symbols, data etc.)*
- ***discuss*** *findings*
- ***generalize*** *(form "theories"/"rules")*
- ***debate***
- ***justify*** *answers (proofs/counter-arguments)*
- ***apply*** *to increasingly complex situations*

H-FARM INTERNATIONAL SCHOOL

# Let’s THINK some math together!

Inquiry groups (Prove the statement)

Choose your **PROVOCATION**.
Prove or disprove it is correct.
Share with class.

**A**

$100 < 99$

**B**

$36 = 63$

# 6 a day: what is it for?

**6-a-day**

| | | |
|---|---|---|
| **Calculate.**<br>3,125 x 32 =<br>_____ | **Convert** this improper fraction into a mixed fraction.<br>13/5 | Write one strategy for solving word problems: |
| Write a **word problem** which has the equation **5x12** in it. | Calculate.<br>**3/5** of **100**<br>_____ | Show 6 ¾<br>on the **number line.**<br>_____ |

# UNDERSTANDINGS: Students will understand that...

## Phase 1

**U1.** People can add to find out how many altogether.

**U2.** People can subtract to find out how many are left when some are taken away or how many were taken away.

**U3.** Adding one object to a set gives the next counting number.

**U4.** Subtracting one object from a set gives the counting number before.

**U5.** People can use models to help them solve mathematical problems.

**U6.** People can record their thinking using words, pictures and numerals.

## Phase 2

**U1.** Numbers can be added more efficiently by counting on from the larger number.

**U2.** Numbers can be subtracted by counting back from the larger number.

**U3.** When information is missing in a mathematical problem, people can add or subtract to work out the missing number.

U4. People can represent story problems with a number sentence.

**U5.** All the parts of a set added together make the whole set.

**U6.** Numbers can be added in any order, but in subtraction the order cannot be changed without changing the meaning.

**U7.** People can solve problems by visualising the count.

**U8.** Sharing fairly means making sure that everyone gets the same number of objects.

## Phase 3

**U1.** To find the difference between two sets, people can use addition or subtraction strategies.

**U2.** People can break numbers apart to help solve addition and subtraction problems.

**U3.** Using familiar addition and subtraction number relationships helps people to solve problems efficiently.

**U4.** The more people sharing a quantity, the smaller the equal share each person gets.

## Phase 4

**U1.** Understanding the inverse relationship between addition and subtraction can help people to solve problems efficiently.

**U2.** People can use a series of steps to create a pathway to a solution.

**U3.** People use estimation to help solve problems.

**U4.** Division can be used to separate a set into equal groups.

**U5.** Multiplication can be used to join equal groups.

**U6.** People can create models or visualize to solve problems and communicate ideas.

## Phase 5

**U1.** People can solve multiplication and division problems by visualising patterns such as arrays.

**U2.** In multiplication and division, people make equal groups so that they can count the groups rather than individual objects.

**U3.** People can use addition, subtraction, multiplication and division to compare quantities.

**U4.** Knowing familiar number relationships frees up people's brains to focus on Problem-solving.

**U5.** Finding patterns can help people to learn and remember multiplication number relationships.

**U6.** People can estimate to check if a sum or difference seems reasonable.

**U7.** People can use familiar number relationships to select a pathway to a solution.

**U8.** People can use place value to manipulate numbers to work out solutions.

## Phase 6

**U1.** Learning a range of strategies helps people work flexibly and efficiently with numbers.

**U2.** People use key words and their understanding of mathematical operations to decide which operation will help solve a problem.

**U3.** Identifying the parts of a word problem can help people to write an equation to solve it.

**U4.** Understanding the inverse relationship between multiplication and division can help people to solve problems efficiently.

**U5.** Division can be used to solve both sharing and grouping problems.

**U6.** In real-life situations, division may leave a remainder.

**U7.** Not all real-life problems require an exact answer; sometimes estimating is more appropriate.

## Phase 7

**U1.** Multiplication and division can be used in problems involving equal groups, comparison and finding area and volume.

**U2.** Understanding place value and the relationships between operations can help people to solve problems efficiently.

**U3.** People can estimate to check if a sum, difference, product or quotient is reasonable.

**U4.** People can use familiar number relationships to select a pathway to a solution.

## Phase 8

**U1.** What people do with a remainder depends on the context of the problem.

**U2.** People can use what they know about the relationship between multiplication and division to work out solutions.

**U3.** People select calculation strategies based on the numbers involved and their skill levels. (What is most efficient for them.)

**Key:**

- Additive Strategies
- Additive & Multiplicative Strategies
- Multiplicative Strategies

# KNOWLEDGE: Students will know...

## Phase 1

**K1** The meaning of the terms: model, add/addition, subtract/subtraction, altogether, take away, remove, plus, minus, less, more.

## Phase 2

**K1.** Familiar number relationships up to 5 (2 and 3, 4 and 1, etc.).

**K2.** Familiar number relationships with 5 (5 and 1, 5 and 3, etc.).

**K3.** Familiar number relationships up to 10 (2 and 8, 4 and 6, etc.).

**K4.** The meaning of the terms: sum, number sentence.

**K5.** The meaning of the symbols +, -, =.

**K6.** Doubles to 5 + 5.

## Phase 3

**K1.** Familiar number relationships with 10 (10 and 3, 10 and 6, etc.).

**K2.** The meaning of the terms: sum, difference, addend, familiar number relationships.

**K3.** The meaning of the symbol = to mean "is the same as" or "is equal to".

**K4.** Doubles to 10 + 10.

## Phase 4

**K1.** Familiar number relationships up to 20 (12 and 8, 4 and 16, etc.).

**K2.** The meaning of the terms: equation, estimate, inverse relationship, product and factor.

**K3.** Know how inverse relationships work within addition and subtraction number families.

**K4.** The meaning of the symbols x, ÷.

**K5.** In multiplication equations, one number represents how many objects are in each equal group, while the other tells how many groups there are altogether.

## Phase 5

**K1.** Familiar number relationships up to 100, especially multiples of 5 and 10 (75 and 25, 20 and 80, etc.).

**K2.** The terms: pathways and manipulate.

**K3.** The difference between face value and place value.

**K4.** The meaning of the terms: array, quotient, divisor, dividend.

**K5.** An increasing number of multiplication and division familiar number relationships.

**K6.** In division equations, the first number(dividend) represents how many in the total group and the second number represents how many groups the whole set will be divided into or how many in each group.

**K7.** Patterns in multiplication number relationships

## Phase 6

**K1.** An increasing number of multiplication and division familiar number relationships.

**K2.** How inverse relationships work within multiplication and division number families.

**K3.** The meaning of the term: remainder.

**K4.** A remainder is the amount left over when one number does not divide exactly by another.

**K5.** Real-life examples where estimating is appropriate.

## Phase 7

**K1.** Most or all of the multiplication and division familiar number relationships.

**K2.** The meaning of the terms: multiple.

**K3.** Multiplying by a multiple of 10, (e.g., 20) is equivalent to multiplying by 10 then by the number of tens: x 10 x 2).

**K4.** Real-life examples where rounding is appropriate.

## Phase 8

**K1.** Remainders can be: discarded, converted to a fraction or decimal, forced to the next highest whole number, rounded to the nearest whole number or recorded as a remainder.

**Key:**

**Additive Strategies**

**Additive & Multiplicative Strategies**

**Multiplicative Strategies**

THE CONCEPT-BASED INQUIRY MATHEMATICS PROJECT

# SKILLS: Students will be able to...

## Phase 1

**S1.** Solve problems by combining or separating sets and counting all.

**S2.** Solve problems by modeling using materials or drawing a picture.

**S3.** Explain their addition and subtraction strategies to others.

**S4.** Record the results of adding and subtracting using pictures, words and numerals.

**S5.** Distinguish between addition and subtraction problems.

## Phase 2

**S1.** Give examples of when they "trust the count" and why.

**S2.** Use the count-on-from strategy in order to solve addition tasks (e.g., 6 + 3 = ?)

**S3.** Use the count-on-to strategy in order to solve missing addends tasks (e.g. 6 + ? = 9).

**S4.** Use the count-back-from strategy to subtract (e.g. 9 – 3 = ?).

**S5.** Use the count-back-to strategy to solve missing subtrahends tasks (e.g. 9 – ? = 6).

**S6.** Explain their addition and subtraction strategies to others.

**S7.** Within a problem context, record the results of adding and subtracting using pictures, diagrams and number sentences.

**S8.** Share a set of objects one by one to form equal groups. Discuss what could be done with any that are left over.

**S9.** Use fair sharing to decide if a number is odd or even.

## Phase 3

**S1.** Use a range of non-count-by-one strategies when adding or subtracting two or more numbers (doubles, near doubles, bridging to 10).

**S2.** Use a count-back-from strategy or count-on-to strategy to find the difference between two numbers.

**S3.** Decompose numbers flexibly to support mental strategies for addition and subtraction.

**S4.** Use numbered or blank number lines to model addition and subtraction problems.

**S5.** Solve real-life sharing story problems using materials, drawing, skip counting.

## Phase 4

**S1.** Write an addition or subtraction equation to represent the number relationships in a problem.

**S2.** Describe a real-life situation/context to which a given addition or subtraction calculation could apply.

**S3.** Use front-end addition and subtraction to estimate a sum or difference and explain whether the estimate is reasonable.

**S4.** Use addition and subtraction as inverse operations to solve problems (e.g., 14 – 9 = ? think 9 + ? = 14).

**S5.** Within a problem context, record the process and results of adding, subtracting, multiplying and dividing using pictures, diagrams and in equations.

**S6.** Solve multiplication and division story problems using materials, drawing, skip counting, arrays and/or any familiar number relationships.

## Phase 5

**S1.** Use flexible mental strategies when adding and subtracting numbers.

**S2.** Use face value and place value of digits in a number when adding and subtracting two-digit numbers mentally

**S3.** Use estimation to check the reasonableness of sums and differences.

**S4.** Use visual models to represent mental addition and subtraction strategies.

**S5.** Relate the numbers and operation in an equation to the context of the problem.

**S6.** Write an equation to represent the number relationships in a problem.

**S7.** Use known multiples in calculating related multiples (e.g. uses multiples of 2 to calculate multiples of 4).

**S8.** Compare quantities using multiplication and division, e.g. three times as many.

## Phase 6

**S1.** Use face value and place value of digits in a number when adding and subtracting three-digit numbers mentally.

**S2.** Choose an appropriate operation to solve a problem.

**S3.** Make multiplication and division number families.

**S4.** Identify the Start, Change, and Result to write an equation for a problem.

**S5.** Use flexible mental strategies to calculate products and quotients using numbers up to 100.

**S6.** Recognize when a division problem will have a remainder.

**S7.** Determine whether a particular problem relates to sharing division or grouping division.

**S8.** Estimate products and quotients and explain whether the estimate is reasonable.

## Phase 7

**S1.** Use place value and the relationships between operations to solve problems efficiently.

**S2.** Use face value and place value of digits when adding, subtracting, multiplying and dividing.

**S3.** Use estimation to check the reasonableness of sums, differences, products and quotients.

## Phase 8

**S1.** Justify their choice of calculating, estimating or rounding in relation to the context of the problem or situation.

**S2.** Select an appropriate calculation strategy based on the numbers involved in the problem and their skill level.

**Key:**

**Additive Strategies**

**Additive & Multiplicative Strategies**

**Multiplicative Strategies**

# Maths strands from the CBI Programme

Throughout the year **7 strands of mathematics** will be taught/learned:

- Pattern and Function
- Number and Number sense
- Number operations
- Shape and Space
- Measurement
- Partitioning
- Statistics and Probability

H-FARM INTERNATIONAL SCHOOL

# What does mathematics look like at H-FARM?



playing



thinking



collaborating









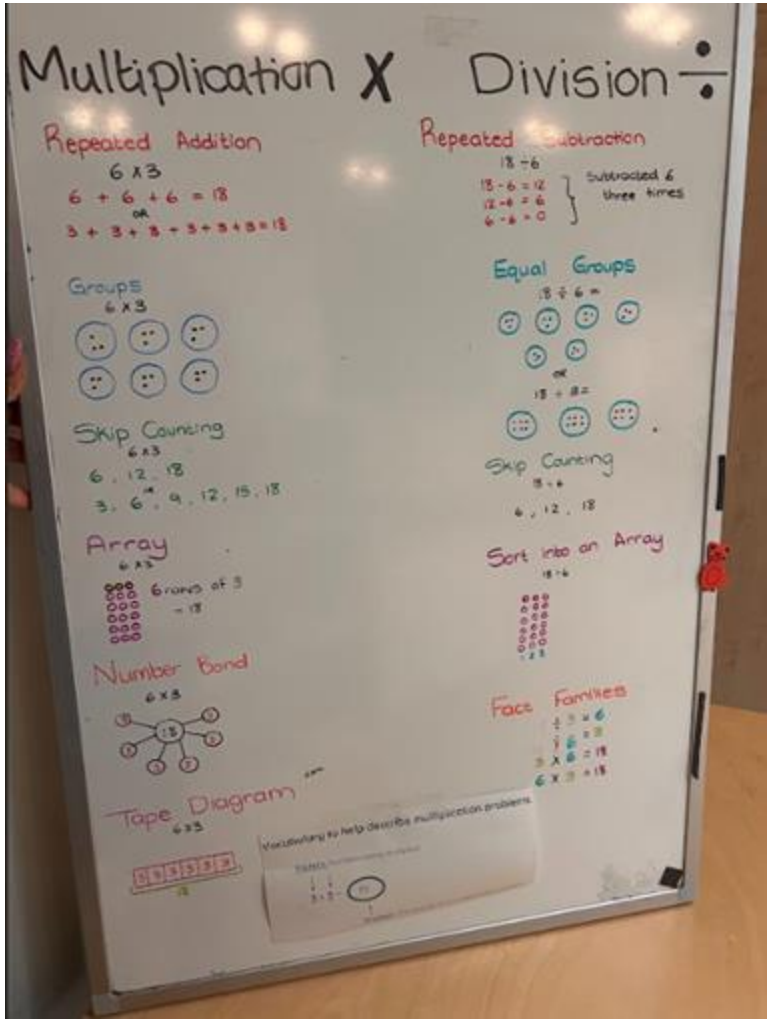
using real-life tools



supporting



anchor charts





discussing



explaining

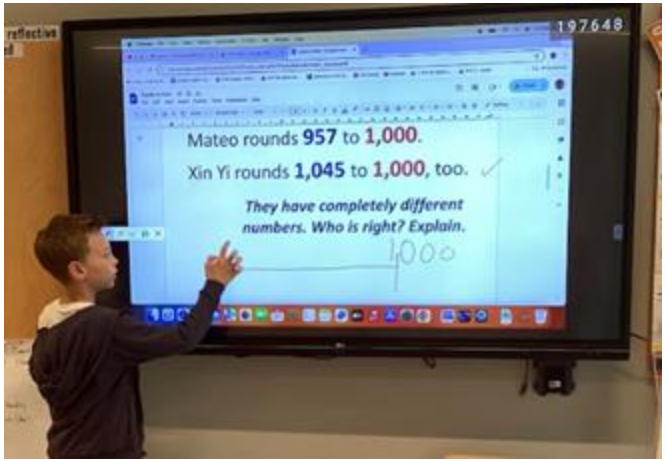


finding patterns

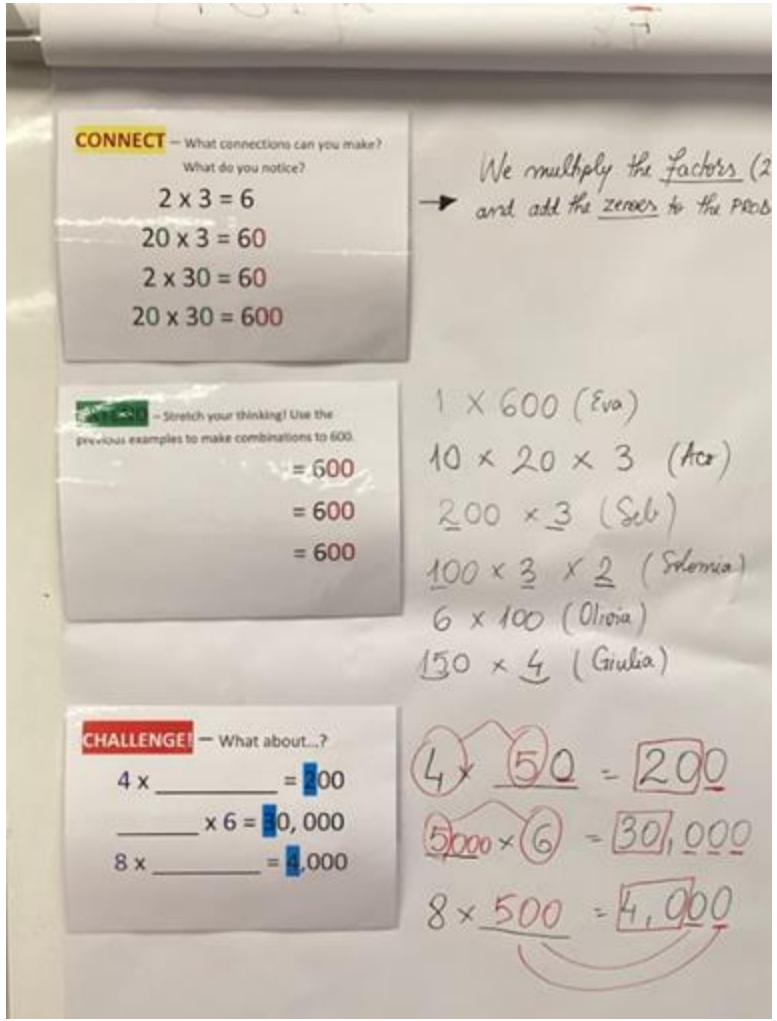




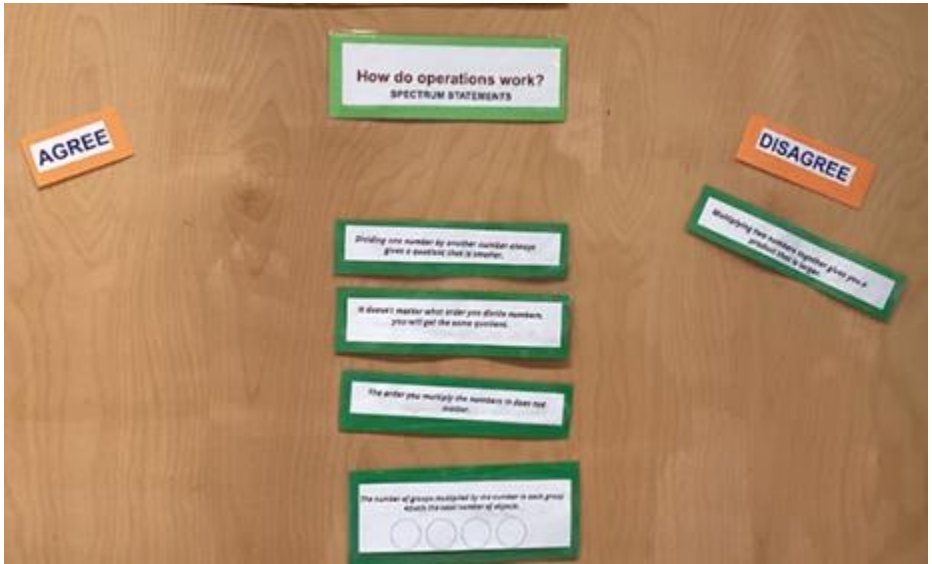


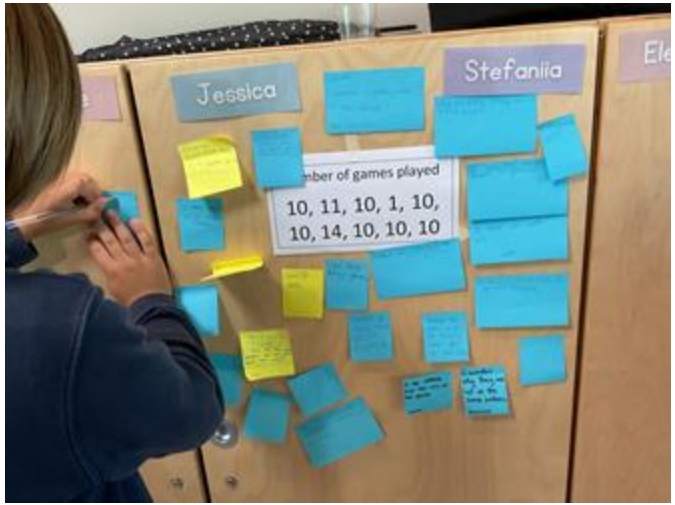


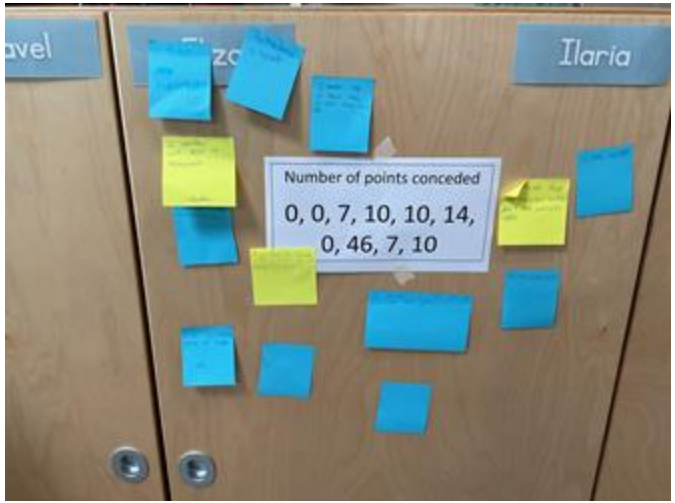

connecting
extending
challenging




debating





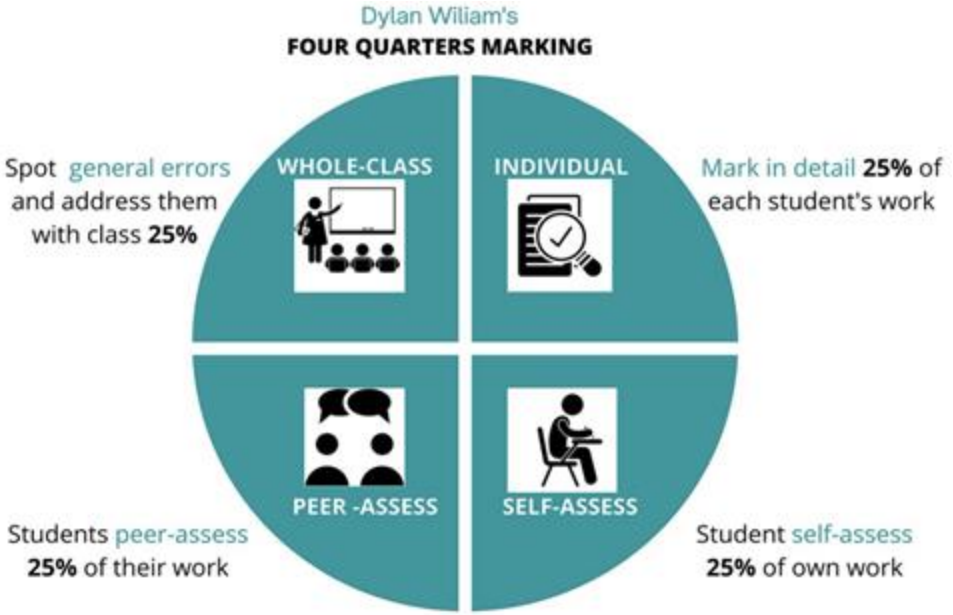




**Gallery Walk**: students use language techniques to express their mathematical knowledge and inspire debate.

# Marking

- **<u>Not everything is marked</u>**
- PA-peer assessed
- TA-teacher assessed
- SA-self assessed




Marking must be valuable to teachers and students. Time must be given for feedback and correction.

H-FARM INTERNATIONAL SCHOOL

# Questions and Answers